Pūtauaki Small Bird Monitoring 2015 Re-measure

Final Report

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FWIF
First Words In Fauna

CONTENTS

1 Executive Summary

Small bird counts were conducted on 20 transects situated within a 239.9 hectare study area on Pūtauaki, a volcanic cone in the Eastern Bay of Plenty, between November 7th 2015 and December 1st 2015.

This was the second year of small bird monitoring in the study area, where predator control began in the winter/spring of 2014. The objective of this work is to demonstrate the effectiveness of the predator control programme conducted on Pūtauaki. Small birds are known to exhibit rapid population growth in response to predator reduction and thus are a good indicator of operation success.

Observations of indigenous and introduced species increased as a whole between 2014 and 2015, with significant increases for bellbird, tui and shining cuckoo. A greater number of tomtit and NI robin, species known to be particularly sensitive to predation, were observed in 2015, indicating that predation pressure is lower within the monitoring area.

Most common indigenous and indicator species did not show significant increases, but this could be due to any number of factors unrelated to predation. Breeding success and bird conspicuousness fluctuate inherently from year to year, so multiple monitoring years are needed to accurately assess the response of the bird community to predator removal. Given the success of predator control at other monitored sites, managers can expect to see an increase in the relative abundance of most, if not all, indigenous species if predator control continues on an annual basis.

Long-tailed cuckoo were observed on a handful of transects throughout the monitoring period, and were most likely breeding, or attempting to breed. This species typically parasitises the nests of whitehead in the North Island. Whitehead were not observed during the set-up or monitoring stages, but could be present in a low-density population. Alternatively, long-tailed cuckoo may have adapted in response to local decline of whitehead by targeting the nests of other passerine species.

It is recommended that bird monitoring be carried out annually for at least four more years, at the same time of year, and by the same observer, in order to accurately assess the success of the predator control program.

2 Introduction

Pūtauaki is located in the Eastern Bay of Plenty Region, twenty-seven kilometres south-west of Whakatane and three kilometres east of Kawerau. It is a dacite volcanic cone and the easternmost vent of the Okataina volcanic centre within the Taupo Volcanic Zone (Beadel et al 2013). The mountain is ecologically important because it is one of the few remaining natural areas in the Kaingaroa ecological district and because of its links with other natural areas both directly and via the Tarawera River (Dean et al. 2008).

Pūtauaki is owned and managed by the Ngā Maunga Kaitiaki Trust. The Trust was established in 2005 as a result of the mountain and surrounding land being removed from the Tarawera No.1 Block as part of the 2004 Tarawera Forest lands sale. The purpose of the Trust is to ensure that kaitiakitanga over their tupuna maunga continues, with a vision to fully restore Pūtauaki as an icon in New Zealand for conservation without impinging on waahi tapu and the inherent sacredness of the mountain (Dean et al. 2008).

As part of this vision a memorandum of understanding (MOU) between Ngā Maunga Kaitiaki Trust and Bay of Plenty Regional Council (BOPRC) was created. The MOU was designed and aimed to protect Pūtauaki and its surrounds for the benefit of their indigenous biodiversity and on behalf of future generations (BOPRC and Ngā Maunga Kaitiaki Trust 2012). In March 2013, this was formalised through the initiation of a five year Biodiversity Management Plan (BMP).

As part of the BMP predator control operations were initiated and a bird monitoring project was established.

Small bird monitoring is one of several tools used by BOPRC to monitor biodiversity trends, and provide information about temporal variation in relative bird abundance in response to predator control. Small bird monitoring has been successfully used for outcome monitoring in a number of similar sites across the Bay of Plenty region. Birds typically increase rapidly in response to predator control, and are relatively easy to monitor, thus helping managers to measure operational success.

Small bird monitoring was first conducted on Pūtauaki in 2014 to collect baseline bird abundance data. The results were similar to baseline counts collected for other projects in the region. The 2015 data reflects the results of the first full breeding season subject to predator control and is the first year of comparative analysis.

The first full baiting period was completed in 2014 and replicated in 2015. If intensive possum and rat control continues annually, the expectation is that the relative abundance of indigenous birds will increase and overall forest health will improve.

The primary objective of this report is to present an estimate of how the relative abundance of common and indicator forest species has changed between 2014 and 2015 as a result of predator control.

3 Methods

3.1 Site Details

All twenty transects are located within the 239.9 hectare current area of study (Fig. 1). Yellow lines are current and proposed rat monitoring lines. Potential expansion areas for predator control are also detailed.

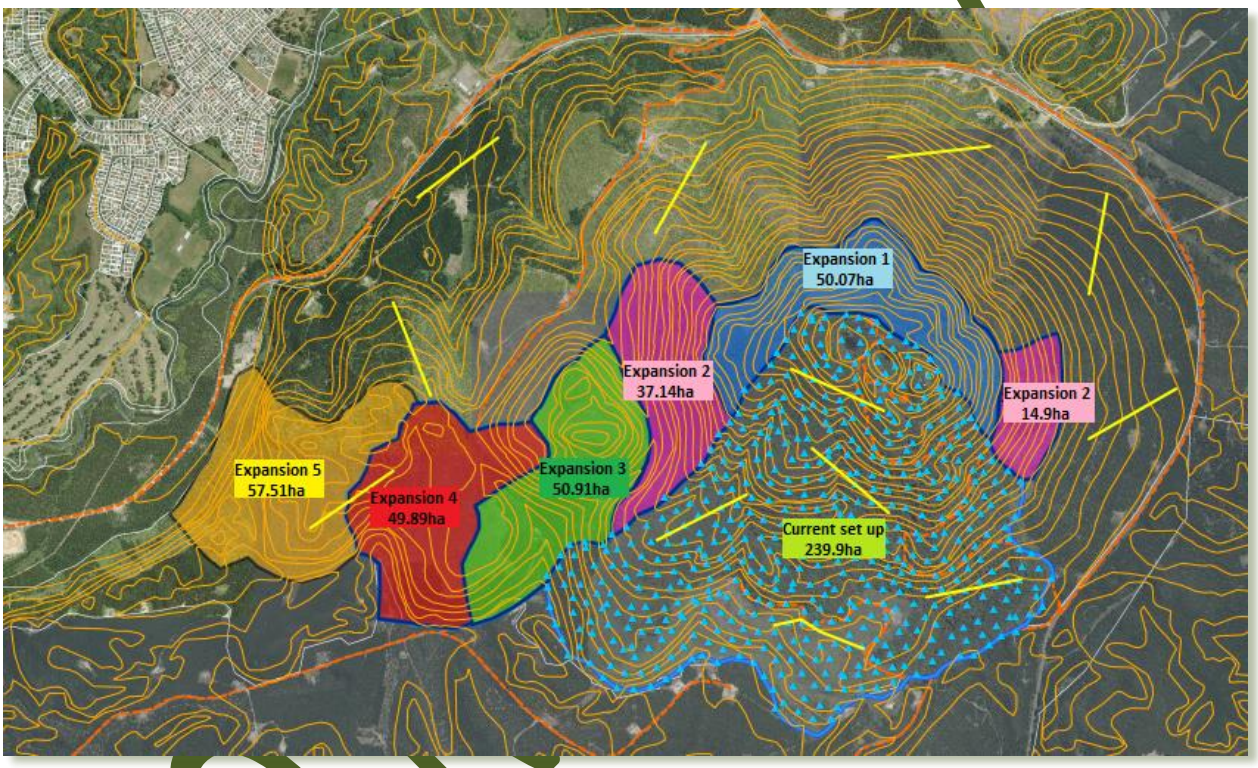

Figure 1. Current area of study and potential areas for bait station network expansion.

Information about the study site and its biodiversity characteristics can be found in the 2014 monitoring report prepared by FWIF (Campbell & Quinn 2015).

The rationale for the current monitoring design is outlined in the 2014 report (Campbell & Quinn 2015).

3.2 Transect Placement

Twenty 250m transects were placed within the designated area of study prior to 2014 bird monitoring fieldwork (Fig. 2). As per the specifications of our best practice methodology (Campbell 2013) transects at similar altitudes were spaced at a minimum of 150m intervals to avoid the chance of double counting and most transects were set up along pre-existing bait lines. At different altitudes transects were spaced at a minimum of 200m intervals as sound can travel further on the mountain and the added distance should help avoid any chance of double counting.

Coordinates for each transect can be found in Appendix A. Instructions on how to reach transects are also included, as well as a difficulty grading for each.

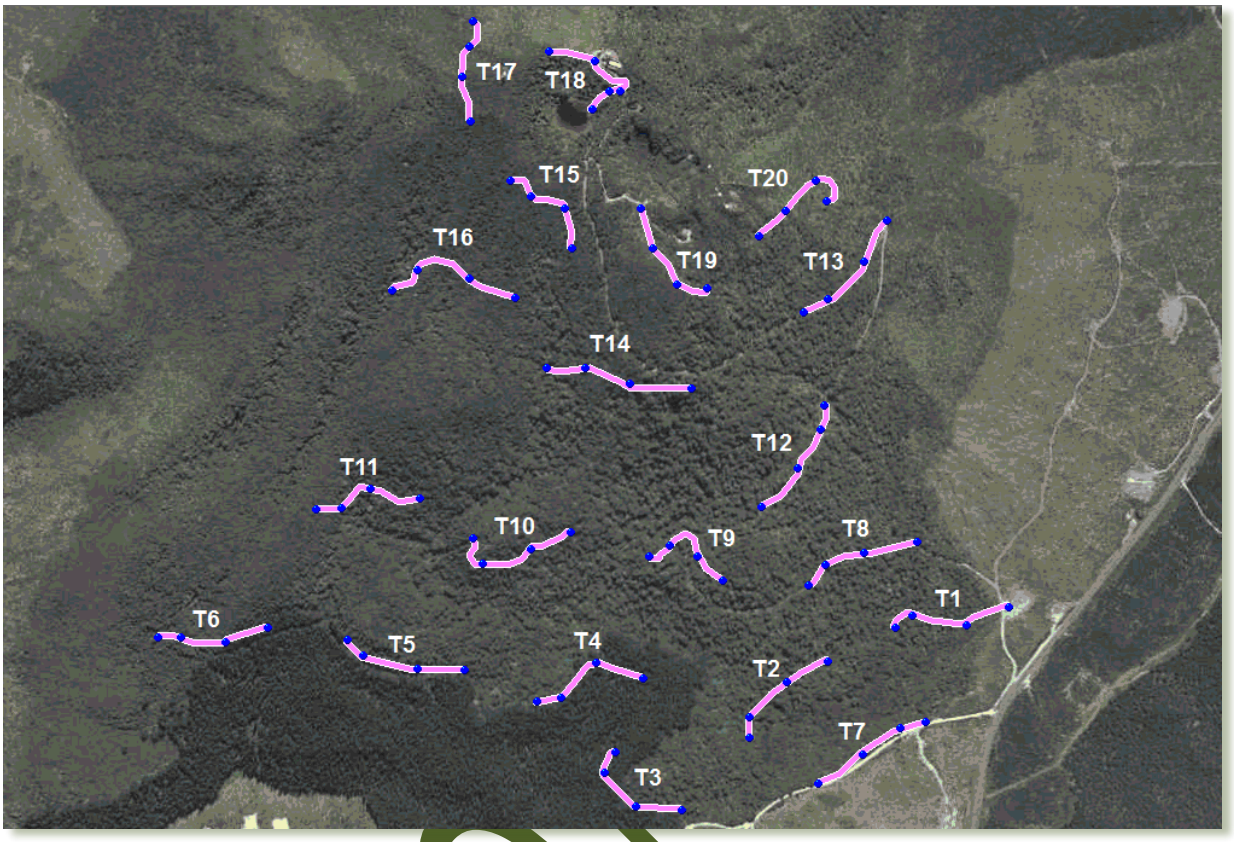

Figure 2. Placement of transects within area of study

3.3 Bird Counts

Count methodology followed Dawson and Bull (1975), except where stated otherwise.

Three individual counts were carried out at each transect between November 7th 2015 and December 1st 2015. In an effort to reduce the amount of variation caused by temporal patterns in bird abundance, each transect was visited once during each of the following times: early morning (6-10am), mid-day (10am-1pm) and afternoon (1-4pm).

To overcome observer bias, only one skilled observer (Conor Quinn, FWIF) conducted all counts.

The observer walked at a consistent slow pace along a given transect and identified and counted all the birds seen or heard perpendicular to that transect. No individual bird was knowingly counted more than once along transects.

An example of the count data sheets can be found in Appendix B. Detailed information about statistical methods used in this report is included in Appendix C.

4 Results

A total of 24 species of small birds were recorded within the Pūtauaki monitoring area in 2015: seven endemic (occur only in New Zealand), six native (self-introduced but not unique to New Zealand), and 11 introduced (human introduction from other countries). A complete list of common and scientific names can be found in Appendix D and raw data can be found in Appendix E.

Between 2014 and 2015 there was an increase of 5 recorded species. One of these new species was long-tailed cuckoo (endemic), while the rest were introduced birds (goldfinch, pheasant, quail and yellowhammer) that were observed on transects located near non-native or short scrub habitat.

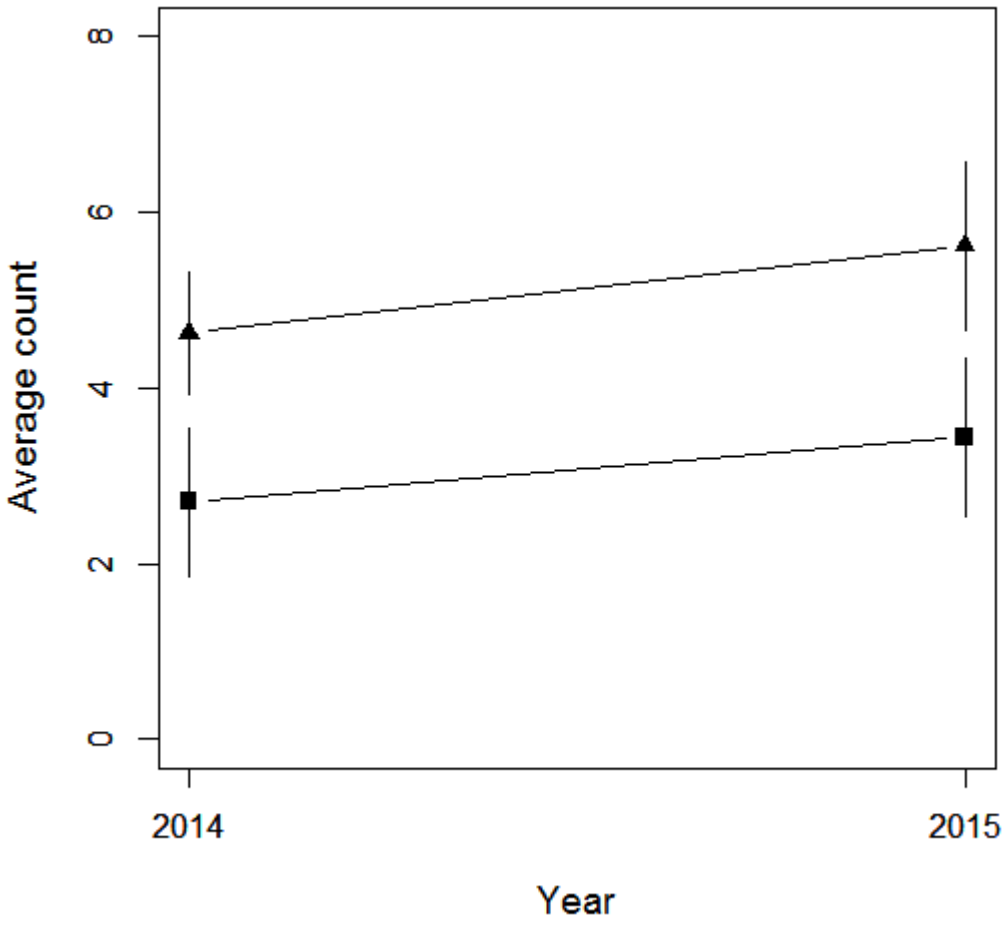

Figure 3. Change in abundance for common indigenous (triangles) and introduced birds (squares) between 2014 and 2015. The increase was statistically significant for both groups (paired t-test, p<0.05). Error bars are ± 2 Standard Error (also known as a 95% Confidence Interval: the range of values that is 95% likely to contain the population average).

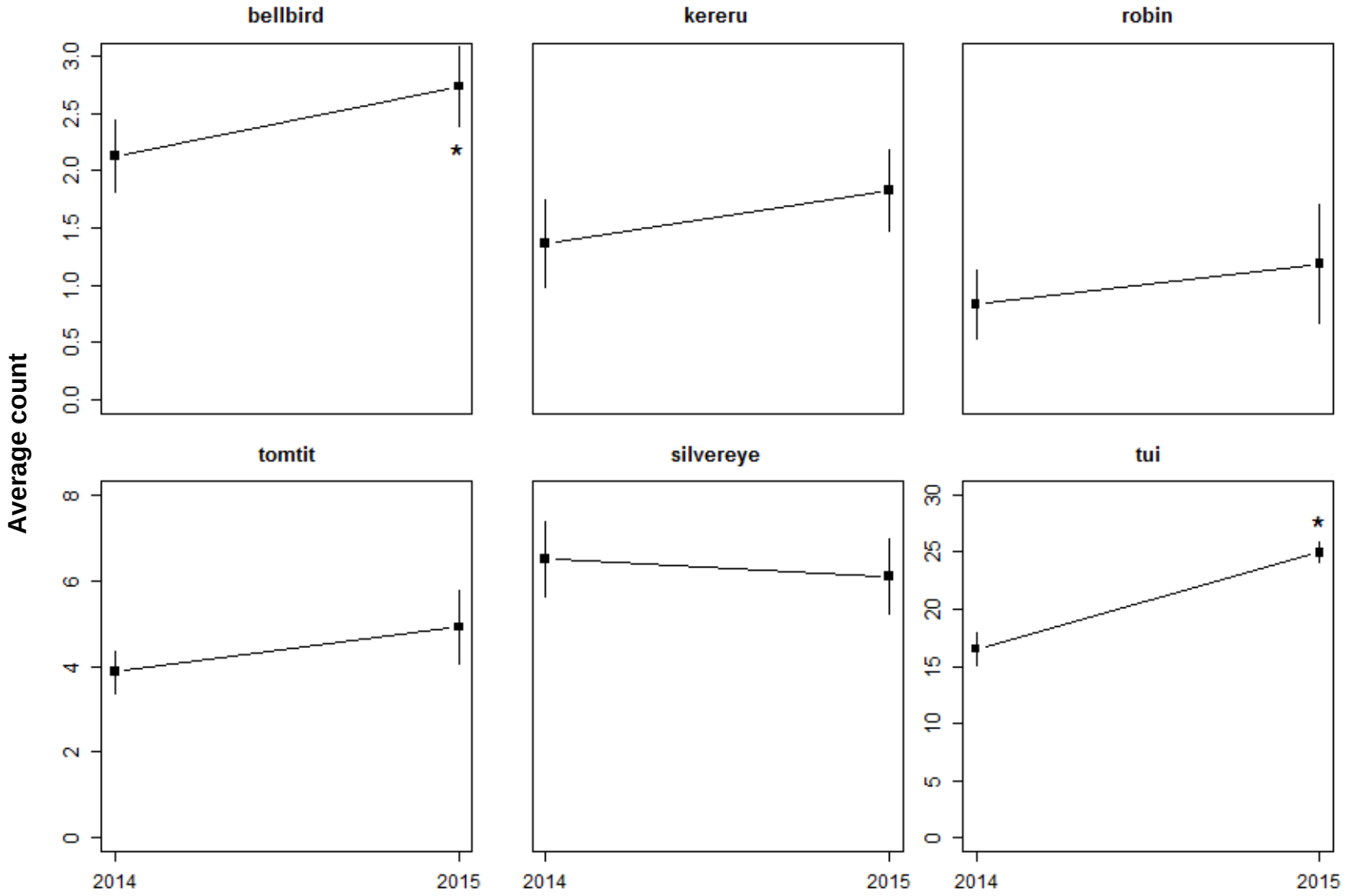

Figure 4. Change in relative abundance for individual indicator species between 2014 and 2015. Error bars are ± 2 Standard Error. Asterisk (*) denotes that change is statistically significant (paired t-test, p<0.05).

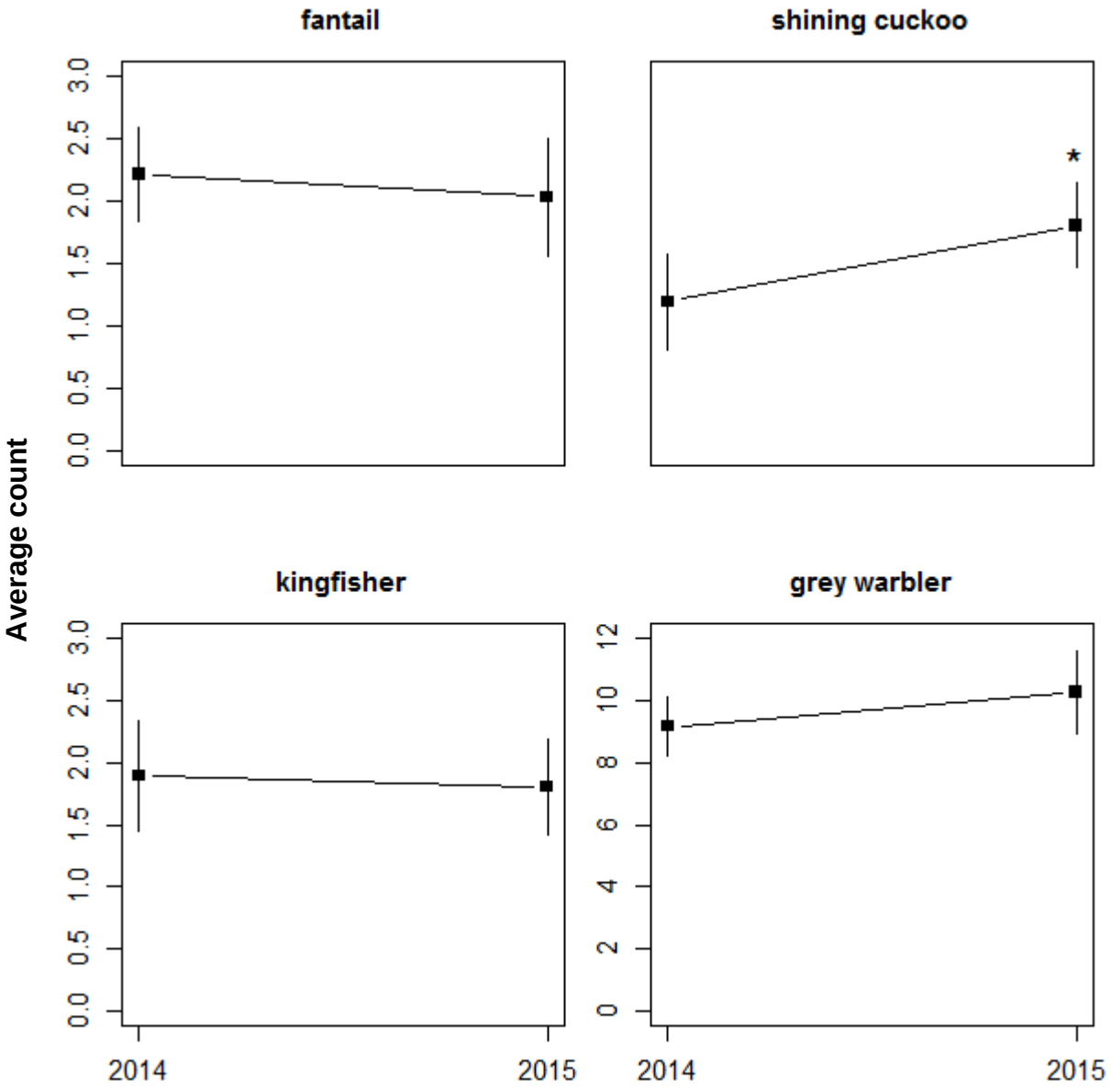

Figure 5. Change in the relative abundance of individual common indigenous birds between 2014 and 2015. Error bars are ± 2 Standard Error. Asterisk (*) denotes that change was statically significant (paired t-test, p<0.05).

There was a signficant increase in both common indigenous species and common introduced species between 2014 and 2015 (Fig 3.).

The response by individual species varied considerably, with only bellbird, tui and shining cuckoo showling signficant increases between years (Fig.4 & Fig 5.). As has been typical at other monitoring sites, tui showed the most dramatic increase and accounted for most of the growth shown by indigenous species overall. Increases and decreases by other species were not statistically significant (Fig. 4 & Fig.5), meaning that there was little change in relative abundance.

5 Discussion

The 2015 monitoring season marks the first re-measure on Pūtauaki and the first full breeding season subject to intensive predator control. As a whole, observations of indigenous and introduced species increased significantly in number from the baseline measure, although not all individual indigenous species were more abundant in 2015.

Tui showed the most pronounced increase. Rapid initial population growth by tui has been observed at other bird monitoring sites in the eastern Bay of Plenty (Campbell and Quinn 2016, Quinn and Campbell 2016), suggesting that this species responds relatively quickly to predator control. We expected to see significant increases for more species in the first year, given that post-control pest monitoring results were good, but results were still very positive. Tomtit and NI robin, species particularly sensitive to predation, both increased in relative abundance, suggesting that predation pressure has eased within the monitoring area.

It is possible that we are seeing a lag in population growth due to low densities of breeding adults, and that faster growth will occur as juveniles from the 2014 and 2015 seasons mature. Another potential explanation is environmental variables. Breeding success and behaviour, and thus bird conspicuousness during the monitoring period, are influenced by changes in local weather conditions (Moss et al. 2001, Wesolowski and Cholewa 2009) and therefore can vary from year to year. Additionally, birds are known to alter their breeding behaviour, phenology and fecundity in response to predation (Lima 2009), so it could take a little time for them to adjust to a predator-free environment.

Pūtauaki is a unique environment with environmental conditions not seen at other FWIF bird monitoring sites. The Tarawera scoria and Rotomahana mud soils on Putauaki are stony and porous resulting in poor water and nutrient retention (Dean *et al*. 2008), and terrain is very steep over much of the study site. This makes growing conditions difficult for native flora, and permanent water sources less abundant for wildlife. Communities living in this type of habitat could be more vulnerable to weather extremes such as drought and rain storms. Rain-induced soil movements were observed on multiple occasions during the set-up and monitoring periods (Quinn, C. *pers. ob.* 2015). Although flora and fauna have presumably adapted to disturbances of normal magnitude, we theorise that unusually large rain events could potentially have adverse effects at the local scale by eroding nutrient-rich top soil and organic matter from the forest floor. Loss of these components has been shown to negatively affect the density and composition of soil and litter dwelling invertebrates (e.g. Pimentel *et. al.* 1995, Hall and Virginia 1997, Santorufoa *et. al.* 2012).

Long-tailed cuckoo were observed on six transects throughout the monitoring period. This cuckoo is a summer migrant to New Zealand where it specialises in parasitising the nests of whitehead (*Mohoua albicilla*) in the North Island (Gill 2013). The peak egg laying period for this species is November and December (Gill 2013), so it is very likely that long-tailed cuckoo were breeding, or attempting to breed, in the monitoring area. There have been no

observations of whitehead during any stage of the project, but we certainly can't rule out the possibility that a low-density population is present. Whitehead were observed during a 2007 bird survey (Dean et al. 2008).

We found no published information regarding nest parasitism of non-target hosts by long-tailed cuckoo, suggesting that this is uncommon or rarely noticed behavior. Long-tailed cuckoo lay eggs that look similar to those of their *Mohoua* hosts (Briskie 2003) and chicks mimic *Mohoua* begging calls (Mclean and Wass 1987), indicating a longstanding relationship between brood parasite and host. Nevertheless, historic decline in whitehead, its only North Island host, may have forced long-tailed cuckoo to become less specialist. During fieldwork a number of long-tailed cuckoo were observed in a raucous altercation high in the canopy with two chaffinch (Quinn, C. *pers*. *ob*. 2015). The much larger long-tailed cuckoo forced the two chaffinch to vacate the canopy area, whereupon the chaffinch retreated to a tree 30-40 metres away and repeated an alarm type call. It is possible that long-tailed cuckoo parasitise chaffinch nests and/or the nests of other passerines on Pūtauaki.

Pūtauaki is home to an ecologically diverse and important community, and pest control will be critical to protecting and enhancing these flora and fauna. Despite the slow start, we expect to see an increase in the relative abundance of indigenous birds over time in response to predator control. Breeding success and bird conspicuousness naturally fluctuate from year to year, meaning that multiple years of monitoring data are needed to accurately interpret trends.

6 Conclusions and Recommendations

- The first re-measure shows that predator control has significantly increased the overall number of indigenous species, with tui showing a particularly large increase.
- Species most sensitive to predation, tomtit and NI robin, both increased, indicating lower predation pressure within the monitoring area.
- Many common indigenous and indicator species got off to a slow start, but this could be due to any number of factors unrelated to predation. Data from additional monitoring years will be needed to accurately assess the response of the bird community to predator removal.
- It is recommended that predator control continue annually, at least until monitoring confirms that the bird population has stabilised.
- It is recommended that bird monitoring be carried out annually for at least five more years **or** until the data confirms that the abundance of indigenous birds has stabilised. At this time managers may choose to focus on long-term trends.
- Bird monitoring will be an important tool in assessing the effects of future changes to the predator control program. If pest control is to be pulsed in later years, then it would be wise to time bird monitoring to best detect changes in predator numbers.
- It is recommended that the same observer be used for each monitoring survey and that monitoring be carried out within a four week period at approximately the same time in each monitoring year. This will help to minimise variability in the data.

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Appendices

Appendix A – GPS references for transect start and end waypoints and directions to transects.

Appendix B – Field sheets used for recording bird observations along transects.

Appendix C – Statistical methods.

Appendix D – Table of common and scientific names for all 2015 bird species.

Appendix E – Raw counts for all bird species in 2015.