BAY OF PLENTY REGIONAL COUNCIL

Ohope Scenic Reserve – Small Bird Monitoring

Final Report

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FWIF
First Words In Fauna

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1 Executive Summary

Small bird counts were conducted on 32 transects in the Ohope Scenic Reserve (OSR), Bay of Plenty, between October 19th and November 23rd 2014. This was the sixth consecutive year of small bird monitoring in the Reserve. The objective of this work is to demonstrate the effectiveness of predator control. Small birds are known to exhibit rapid population growth in response to predator reduction and thus are a good indicator of operation success.

Ongoing predator control has noticeably enhanced the health of the small bird community since monitoring began, with observations of indigenous species increasing 254% between 2009 and 2014. In this time the number of tomtit increased tenfold, with populations of most other indigenous species growing by at least 200%. Observations of North Island robin increased significantly in 2014 due, in no small part, to the translocation of 40 birds into the Reserve. Robin were observed on 20 transects, compared to 4 in 2013. The wide spread of these sensitive indicator species further emphasizes the success of predator control in the OSR.

While increases in abundance were statistically significant for most indigenous species between 2011 and 2013, fewer species exhibited significant increases in 2014. Some indicator species continue to thrive, particularly the nectarivores tui and bellbird. However, apart from robin, numbers of insectivores have mostly decreased, or stayed the same (grey warbler). It is hypothesised that low rainfall and extreme temperatures before and during fieldwork may have had a negative impact on observations of these species, with changes in behaviour due to a decrease in food availability a likely factor, combined with a natural variation due to prevailing environmental conditions.

Tomtit experienced a large decrease after two years of significant increase. Tomtit is particularly prone to behavioural modification as the result of environmental change, and the hot, dry conditions may have been particularly hard on this species in terms of breeding capacity. Changes in foraging behaviour could have also made tomtit more difficult to observe.

Tapered population growth may also be the first sign that habitat within the OSR is approaching carrying capacity, as detailed in the 2013 report. However, these results could just as easily be the result of natural population fluctuation or anomalous environmental conditions. Several years of stable count data will be needed before we can confirm that a population plateau has been reached for any given species, at which point long term trends will become important for monitoring.

Kereru abundance declined for a third consecutive year. Although we have presented several hypotheses in recent reports, there is no obvious reason for this decline. Longer term trends will be important for monitoring of this species, and data from other local bird monitoring projects might help us to understand kereru trends over a wider area. Specific monitoring of kereru could also assist in determining the factors contributing to the decline of the population in the OSR.

It is recommended that bird monitoring be carried out annually for a further two to three years *or* until monitoring data confirms that the bird community is stable. At this time managers should reassess monitoring frequency.

Predator control is clearly having a positive effect on the abundance and diversity of indigenous birds in the Ohope Scenic Reserve and should be continued.

2 Introduction

Ohope Scenic Reserve (489 ha) is a remnant of indigenous coastal and semi-coastal forest of significant biodiversity value located to the east of Whakatane, Bay of Plenty. The land is administered by the Department of Conservation (DOC), and is jointly managed by DOC and Te Runanga O Ngati Awa through the management committee Te Tapa Toru a Toi.

Small bird monitoring has been implemented in the Ohope Scenic Reserve since 2009 and is one of several tools used by the Bay of Plenty Regional Council to monitor biodiversity trends. The main objective of small bird monitoring in the Reserve is to provide information about temporal variation in bird abundance in response to management actions (primarily introduced predator control).

Intensive possum and rat control has been carried out annually since 2008 with an expectation that overall forest health would improve and that the abundance of indigenous birds would increase. The 2014 data reflects the results of six (2008-2014) consecutive breeding seasons subject to predator control.

The data summarized in this report also represents the fourth year that birds have been surveyed using a new monitoring design implemented in 2011 (see Campbell 2012 for details). Two new transects were added prior to the 2012 survey to improve coverage of the southern part of the Reserve, bringing the total number of transects to 32. There is now sufficient data for all 32 transects to be directly compared between 2012 and 2014. Data from the 12 original transects has again been standardised by transect length and graphed to provide us with some idea of the trend in abundance of common forest birds between 2009 and 2014.

In May 2014 DOC, in partnership with the Whakatane Kiwi Trust, translocated 40 North Island robin (NI robin) to boost the number of breeding pairs in the OSR (Walter and Palmer 2014). The goal was for the translocated birds to boost the remnant population and increase breeding capacity of the species in the OSR. The translocation project was predicated upon ten successful years of pest management in the Reserve and the fact that a small recorded population of the species was already present.

NI robin was first observed during fieldwork for this project in 2013, but had been previously observed outside the fieldwork period in 2012. Anecdotal evidence also suggested a number of NI robin were present in the OSR. A basic survey of NI robin following the translocation indicated that birds had moved away from the three original release sites (Appendix E). As a result it is expected that there will be a noticeable increase in NI robin observations across the OSR in 2014.

The primary objective of this report is to present an estimate of how the abundance of common and indicator forest species has changed between 2009 and 2014 as the result of predator control.

3 Methods

All transects are located within the Ohope Scenic Reserve. Information about the study site and its biodiversity characteristics can be found in the 2011 monitoring report prepared by FWIF (Campbell 2011).

The rationale for the current monitoring design and information about historical designs is outlined in previous FWIF reports (Campbell 2011, 2012).

Detailed information about how results in this report were calculated is included in Appendix B.

1.1 Transect Placement

Thirty 250m transects were placed within the Reserve boundary prior to 2011 bird monitoring. Two new transects were added in this area prior to 2012 monitoring. Bird surveys are now conducted on 32 independent transects.

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.

1.2 Bird Counts

Transect line counts were used to measure bird abundance in the spring/early summer of each year. Count methodology followed Dawson and Bull (1975), except where stated otherwise, with the inclusion of distance categories for transects (as per method outlined in Barraclough 2000).

Three individual counts were carried out at each transect between October 19th 2014 and November 23rd 2014. 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 (Amy Greaves, FWIF) conducted all counts. Amy has carried out all monitoring surveys since the project began.

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 C.

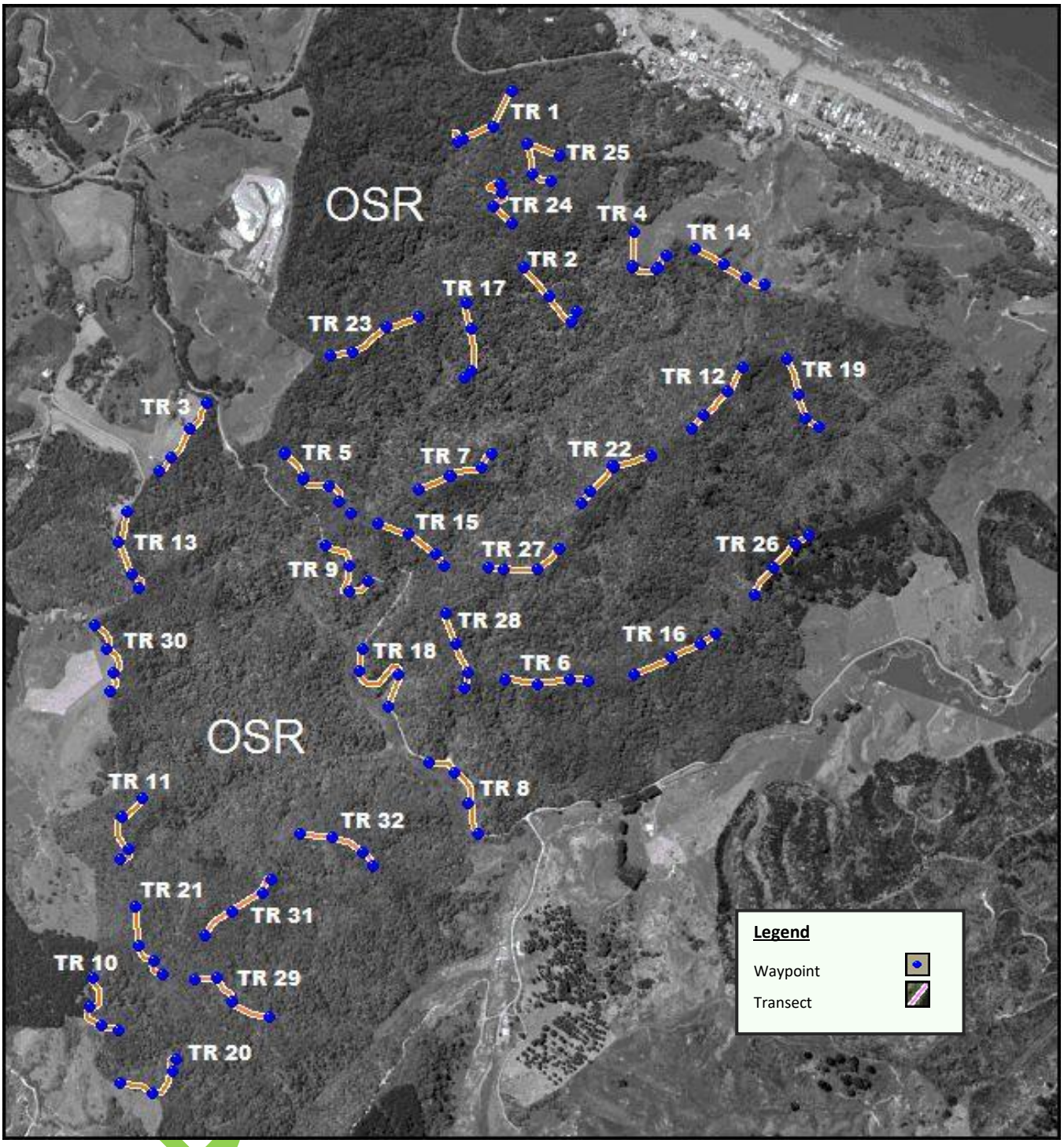

Figure 1. Location of transects within the Ohope Scenic Reserve.

4 Results

4.1 Comparison between old and new monitoring years

An 'index of abundance' was developed for transects 1-12 in order to compare between old (2009 & 2010) and new monitoring designs (Campbell 2012). A graph of index values has again been included to illustrate approximate long term trends (Fig 2).

	Average Index Value		Percent Increase	Statistically Significant
	2009	2014		
Indigenous	3.04	10.76	254	YES
Bellbird	0.28	1.09	287	YES
Kereru	0.17	0.36	114	YES
Robin	0.00	0.16	NA	YES
Silvereye	0.72	2.60	264	YES
Tomtit	0.08	0.86	1012	YES
Tui	1.18	5.61	377	YES

Table 1. Index values (averaged over transects 1-12) for indigenous birds as a whole, and for individual indicator species, showing percent increases over a six year period.

Overall, the number of indigenous species has increased by 254% since 2009, with several indicator species increasing by larger amounts (Table 1, Fig 2). Common indigenous birds have at least doubled in abundance since 2009, with the exception of shining cuckoo which appears to have decreased in abundance since 2009 (Fig 2). Despite a decrease in abundance between 2013 and 2014, tomtit has made the largest increase since 2009 (Table 1, Fig 2). Because a percent increase from zero cannot be calculated, we do not have a measure of increase for NI robin, but 2014 is the first year in which this species is clearly visible on the bar chart.

Readers should note that comparison of index values (calculated using data from transects 1-12) with actual values (calculated using data from transects 1-32) has revealed that this method is not an accurate measure of the overall *magnitude* of change, and that the *direction* of change (increase or decrease) is generally, but not always, correct. A case in point is grey warbler, whose index values show a slight increase between 2013 and 2014 (Fig 2). When data from transects 1-32 is taken into account, this species actually decreased slightly in 2014 (see Fig 4). In 2013 the reverse was true for grey warbler. These disparities indicate that the abundance of this species on transects 1-12 is not fully representative of its wider abundance in the Reserve.

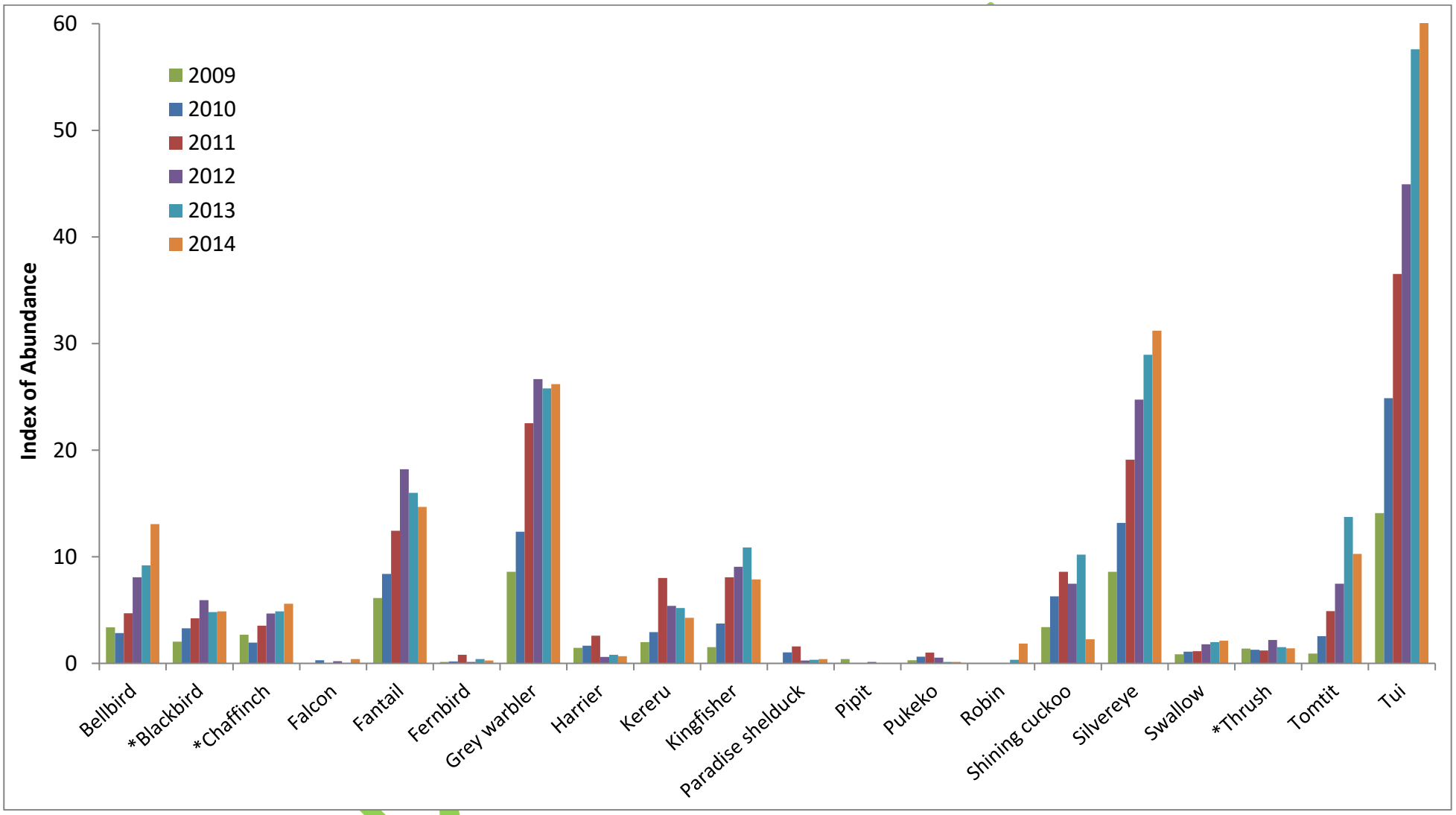

Figure 2. Bar chart showing relative abundance for indigenous bird species and common introduced species between 2009 and 2014 on transects 1-12. Common introduced species are marked with an asterisk (*).

4.2 Comparison between new monitoring years

A total of 30 species of small birds were recorded within the Reserve in 2011, 2012, 2013 and 2014. In 2014, nine species were endemic (occur only in New Zealand), seven species were native (self-introduced but not unique to New Zealand), and 14 were introduced (human introduction). A complete list of common and scientific names for 2014 can be found in Appendix D.

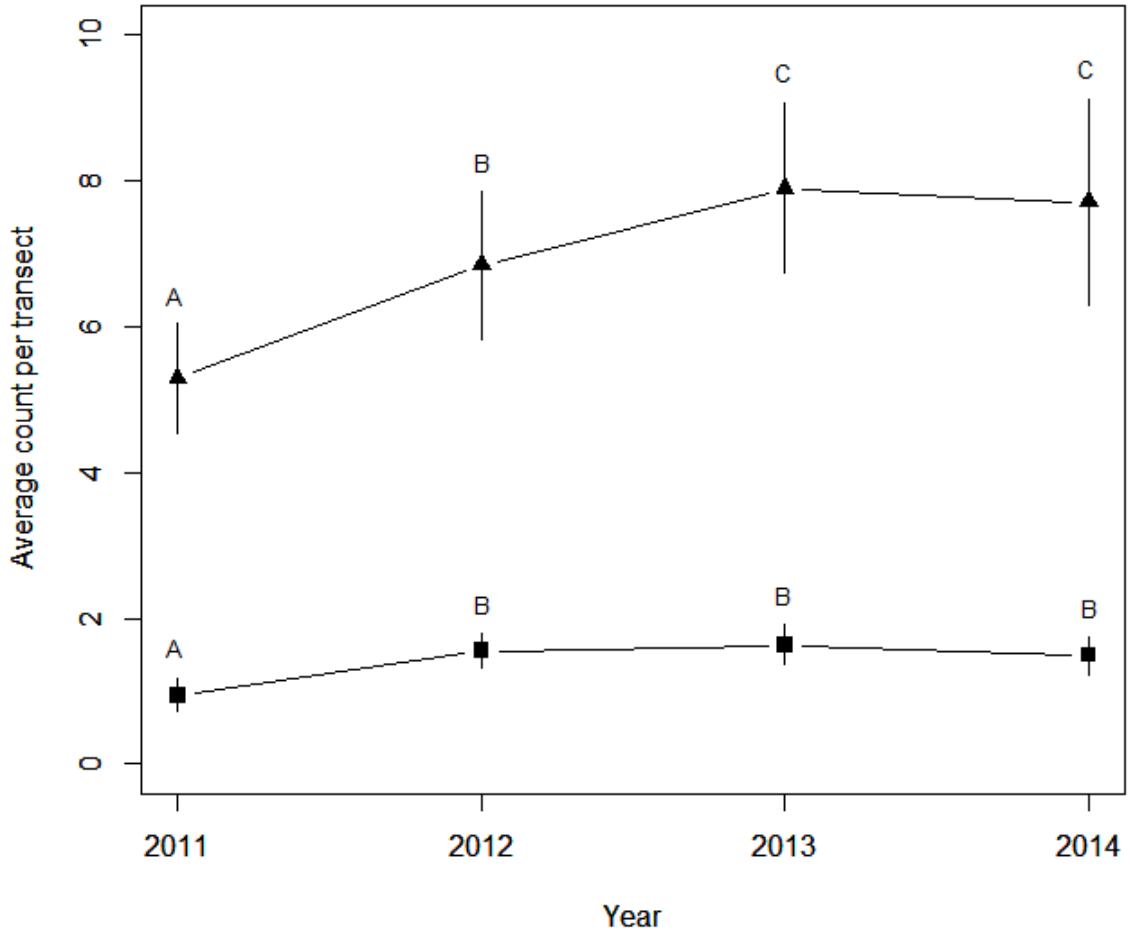

Figure 3. Average counts of common indigenous (triangles) and introduced (squares) birds 2011-2014. Vertical lines represent ± 1 standard error (standard deviation standardized by group size), and illustrate the amount of variation around the average. Shared letters indicate a non-significant difference in average bird count between years.

Indigenous birds were the most abundant group in all years. Introduced birds were less abundant and their distribution considerably more patchy than that of indigenous birds, with many species recorded on only a few transects (Appendix F). The number of common introduced birds has been stable since 2012, while the abundance of indigenous birds increased significantly in 2012 and 2013, but remained stable between 2013 and 2014 (Fig 3, ANOVA $p<0.05$).

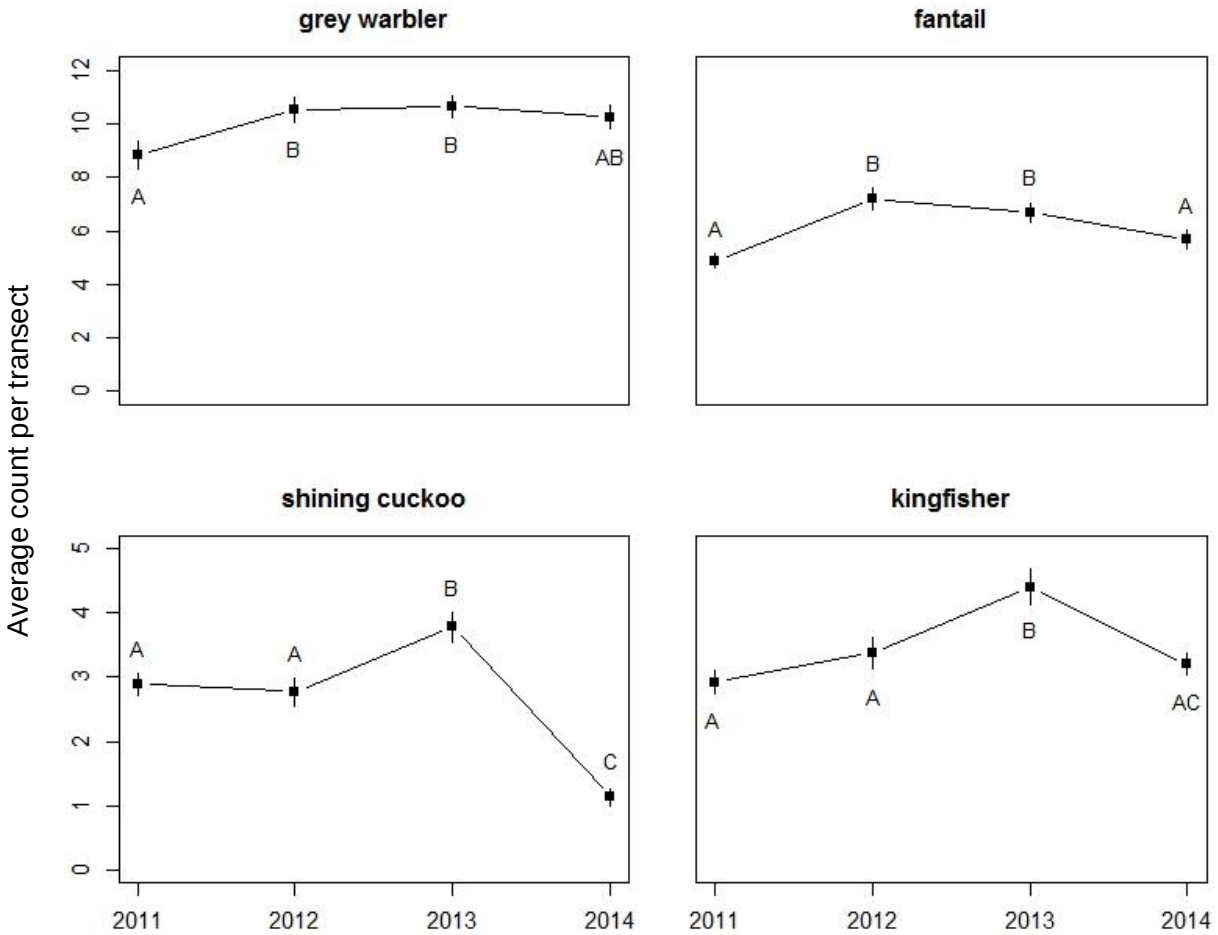

Figure 4. Lineplots showing average transect counts (transects 1-32) for common non-indicator species 2011-2014. Vertical lines represent ± 1 standard error (standard deviation standardized by group size), and illustrate the amount of variation around the average. Shared letters indicate a non-significant statistical difference in abundance between years (ANOVA, $p<0.05$). For instance, the abundance of grey warbler was significantly greater in years 2012 and 2013 compared with 2011, but the abundance of this species in 2014 is not different from any of the preceding years.

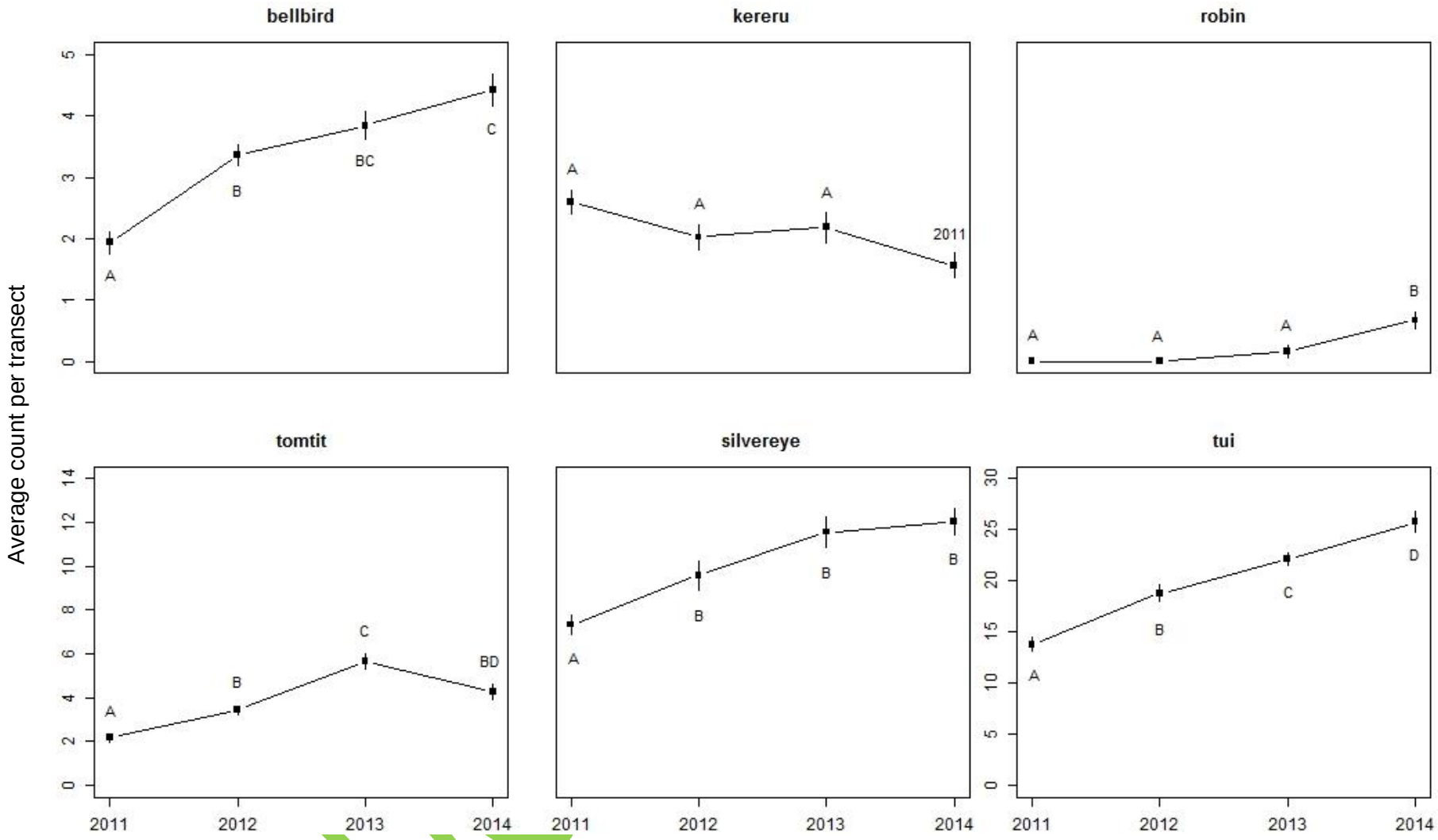

Figure 5. Lineplots showing average transect counts (transects 1-32) for indicator species 2011-2014. Vertical lines represent ± 1 standard error (standard deviation standardized by group size), and illustrate the amount of variation around the average. Shared letters indicate a non-significant difference in abundance between years (ANOVA, p<0.05) (Note: the abundance of kereru in 2014 differed significantly from 2011 only and is noted with '2011' as opposed to a letter).

A comparison of counts over all transects (1-32) for 2011 - 2014 shows that the abundance of all common non-indicator species decreased, although this decline was not significant for grey warbler (Fig. 4; ANOVA, $p<0.05$). Counts of kingfisher and fantail dropped to 2011 levels, while counts of shining cuckoo fell well below 2011 values, despite a large increase between 2013 and 2014.

Bellbird and silvereye remained stable in 2014 (Fig.4, ANOVA, $p<0.05$). Kereru abundance continued to decline in 2014, with numbers significantly lower than in 2011. Tomtit decreased significantly in abundance for the first time in 2014, with counts similar to those recorded in 2012 (Fig. 4, ANOVA, $p<0.05$).

NZ robin counts rose dramatically in 2014, with an average of 0.67 birds recorded on each transect, up from 0.16 in 2013 (Fig. 4, ANOVA, $p<0.05$)

Tui is the only species to show a marked increase in all four years (Fig. 4, ANOVA, $p<0.05$).

5 Discussion

The 2014 monitoring season marks the sixth consecutive year of small bird monitoring, and seventh consecutive breeding season subject to intensive predator control. In this time the number of indigenous birds has risen significantly for all recorded species. However, 2014 is the first year in which a significant annual increase in indigenous bird abundance was not evident. Most species declined or stayed the same in 2014, which may be the first sign of a stabilizing avian community. It is also possible that this plateau in abundance could be natural variation caused by environmental conditions experienced within the Reserve.

The Whakatane region experienced a decrease in annual rainfall in 2014. In October and November, when fieldwork was conducted, monthly rainfall was well below normal - less than 50% of the monthly average (Macara 2014). Extreme temperatures for these months were also recorded. These environmental conditions would have been stressful for the avian community and almost certainly affected bird abundance. Decreased ecosystem productivity and increased mortality are general consequences of drought on biodiversity (Archauxa and Wolters 2006), and it is likely that heat stress, lack of water, and depressed primary production affected all levels of the food chain in the OSR to a greater or lesser degree.

Apart from robin, numbers of insectivores have mostly decreased, or stayed the same (grey warbler). Drought causes changes in the phenology and quantity of many food sources, and has been shown to decrease invertebrate abundance (Bolger et al. 2005). Birds have been shown to delay nesting, or forgo it altogether, during drought (McCreedy and Van Riper 2014). Bolger et al. 2005, found that insectivores were unable to source enough invertebrates to feed their chicks during drought conditions. A lack of feeding type activity could also account for these species being less conspicuous during the fieldwork period.

Tomtit experienced a significant decrease in 2014 after two years of significant increases. As an indicator species that is particularly sensitive to environmental change, it would follow that decreased ecosystem productivity could have a greater impact on tomtit relative to other insectivore species. The abundance and availability of invertebrate prey can have a significant impact on tomtit behaviour and a decrease in this food source can often precipitate a change in foraging activity (Peace 2010). Less conspicuous behaviour, combined with a natural variation due to a climate anomaly, may explain the decrease in abundance for 2014.

This year's re-measure in the nearby Kohi Point Scenic Reserve (Quinn 2014) showed a similar trend for tomtit compared to other insectivores so it would follow that a common factor was causal in any change in abundance, such as a reduction in food availability due to an unusually dry habitat. It is also possible the abrupt introduction of additional robin into tomtit habitat contributed to a temporary change in tomtit behaviour, which also impacted their conspicuousness, as robin can become aggressive toward tomtit where territories have yet to be defined (Empson and Fastier 2013). Comparisons with future studies will be required to determine if the population decrease is natural, behaviour related or otherwise.

In previous years indicator species such as tomtit and tui showed some of the greatest gains. The most notable increase between the 2013 and 2014 monitoring seasons was by NI robin, mainly due to the translocation of 40 robin into the OSR. Robin were observed on 20 transects, compared to 4 in 2013. The majority of observations took place on transects a good distance away from the release points, indicating that birds have dispersed throughout the Reserve. There is also anecdotal evidence of successful nesting of translocated robin pairs at up to six locations across the Reserve (Palmer, B., October 2014, *pers ob*). Due to the comparatively small number of robin competing for resources it is likely the conditions had a lesser impact on this species than most.

Ongoing predator control will be critical to maintaining a viable robin population within the OSR. Control operations at nearby sites such as Mokorua and Kohi Point will be important for providing protected habitat for dispersing juveniles (Lovegrove et al. 2002). Two or more years of monitoring results will be needed to fully gauge the impact of the introduction of these birds on the OSR robin population.

While numbers of insectivores and generalists decreased or stayed the same, species that eat nectar continued to increase in 2014. The tui population showed a significant increase for the fourth consecutive year. Because the OSR comprises a portion of coastal forest, and contains drought resistant flowering species such as pohutukawa, nectarivores may have fared better compared to other feeding guilds during the drought. Furthermore, both species are relatively mobile, particularly tui, and therefore may have been able to locate additional food sources outside of the Reserve.

As a non-resident, the significant decrease of shining cuckoo could be due to a combination of factors, including conditions in its winter range or migratory route, although as an insectivore it was probably also impacted by dry conditions in its breeding range. A similar decline for shining cuckoo was found in the nearby Kohi Point Scenic Reserve (Quinn 2014), indicating that numbers of this species were generally lower in the area or less conspicuous than previous years due to the prevailing conditions.

Kereru continued to decline in 2014. We presented several theories as to why this might be happening in the 2013 OSR report (Campbell 2013). These included factors such as food availability and a tendency for population fluctuations due to their greater mobility. These factors could still be in play and, combined with harsh environmental conditions, a population decrease in 2014 was not to be unexpected. However, in the absence of additional information we are still unsure of why this species has declined consistently since 2011. A detailed study of the ecology and population dynamics of kereru in the OSR and surrounding areas could potentially shed light on causal mechanisms.

For the third consecutive year the population of introduced species remained stable. Blackbird and chaffinch both increased slightly, indicating that any variations in 2013 were likely natural fluctuations.

6 Conclusions and Recommendations

- The results of six years of bird monitoring show that the predator control program has dramatically increased the abundance of indigenous birds within the OSR.
- Drought appears to have had an impact on the avian community in 2014, the effects of which have confounded the presence of any stabilizing trends. If conditions are more favourable in 2015, we might expect to see recovery by the affected species.
- Robin numbers continue to increase and the 2014 population was greatly enhanced by the translocation of 40 birds into the Reserve. We predict continued growth of this species in the future.
- Kereru numbers continue to decline. In the absence of supporting information we are unable to offer a concrete explanation. However, the most likely scenario remains natural fluctuation linked with the availability of food resources in and out of the Reserve. Data from other local bird monitoring projects might help us to understand kereru trends over a wider area, and if the decline continues managers may want to consider additional kereru monitoring.
- It is recommended that predator control continue on a yearly basis, at least until monitoring indicates that the bird population has stabilised.
- It is recommended that bird monitoring be carried out annually for at least two to three more years (a total of six years using the new monitoring design). After this, 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 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 – Statistical methods.

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

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

Appendix E – Release Sites for NI Robin Translocation Project

Appendix F – Raw counts for all bird species in 2014