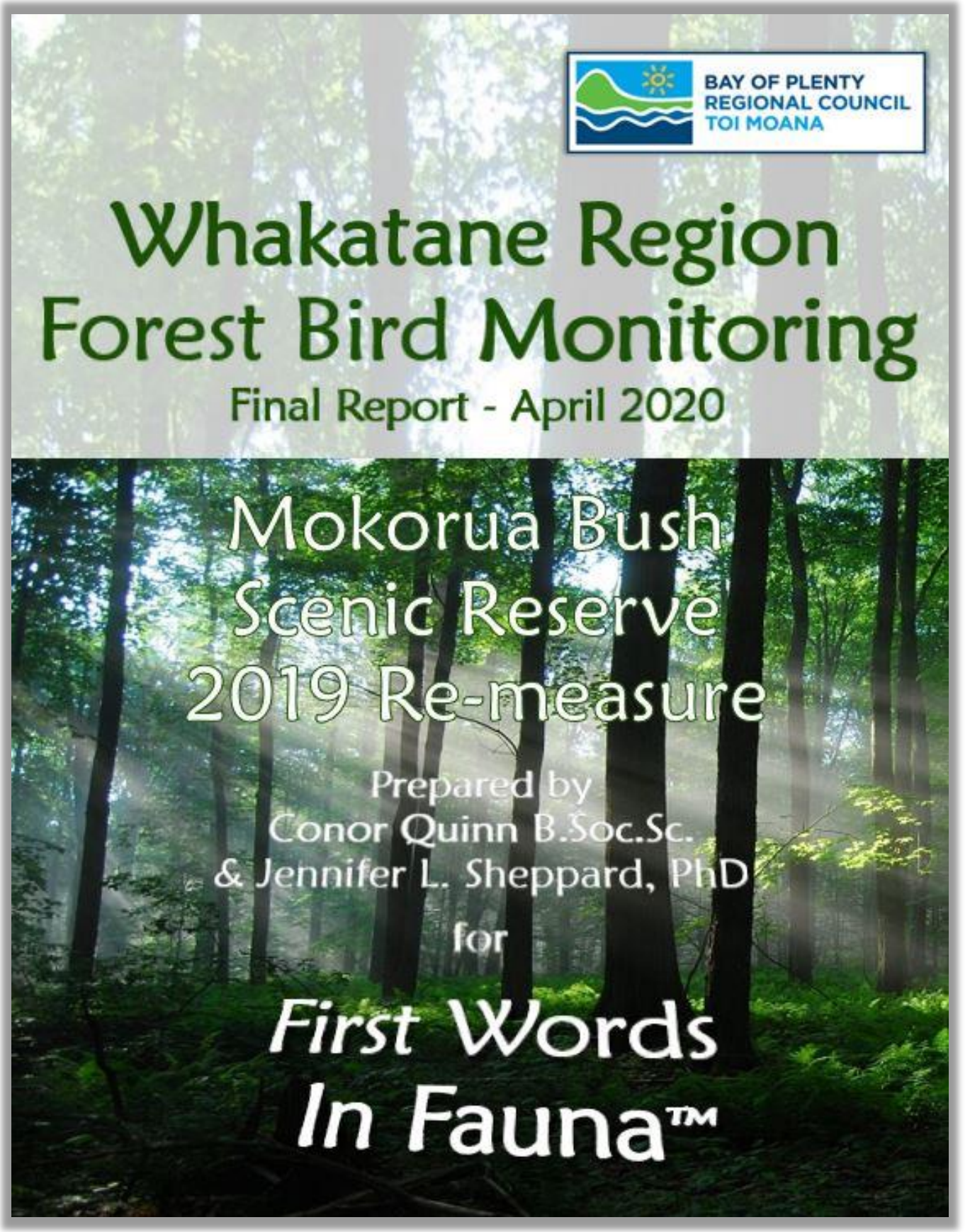
BAY OF PLENTY
REGIONAL COUNCIL
TOI MOANA
Whakatane Region
Forest Bird Monitoring
Final Report - April 2020
Mokorua Bush
Scenic Reserve
2019 Re-measure
Prepared by
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for
First Words
In Fauna™

CONTENTS

1 Executive Summary

Small bird counts were carried out on 22 transects in the Mokorua Bush Scenic Reserve (MBSR), Bay of Plenty, between 7th November and 7th December 2019. The main objective of this project is to investigate the effectiveness of the predator control programme conducted at MBSR. Forest birds are known to exhibit rapid population growth in response to predator reduction and thus are a good indicator of operation success. Five-minute bird counts (5MBCs) were also conducted this year to allow for site comparison with other similar projects conducted in New Zealand.

The 2019 re-measure represents the fourth year of bird monitoring at the Reserve using our best practice, peer reviewed methodology and the ninth full breeding season subject to intensive predator control. It is the first year of results since initiating a biennial monitoring regimen, meaning monitoring was not conducted in 2018 and will be conducted again in 2021.

Relative abundance for indigenous species has increased significantly from 2013 to 2019, suggesting that ongoing predator control continues to enhance the indigenous bird population and habitat health in the MBSR. In particular, significant increases for North Island (NI) robin and tui between 2017 and 2019 is a positive sign for continuing improvement of bush vitality. However, the site may be experiencing a phase of stabilisation for several species due to a variety of potential causal factors. These include bird population dynamics, food competition and habitat limitations.

A population plateau for several indigenous species was not unexpected and previous modelling showed trends where species such as bellbird, fantail, silvereye and tomtit may show strong growth towards the end of a ten-year cycle of continuous and intensive annual predator control. It is also possible the Australian bushfire catastrophe may have negatively impacted the Whakatane area population of the migratory shining cuckoo arriving on New Zealand shores in the second half of 2019.

Analysis shows that the NI robin population at MBSR has stabilised from 2016 to 2019, indicating that the 2014 translocation project in the nearby Ohope Scenic Reserve (OSR) has assisted in developing a stable population across the area, well beyond OSR boundaries.

As multiple years of monitoring data are needed to accurately interpret any emerging trends, the recommendation is that biennial monitoring continues, aligned with a consistency in approach for subsequent transect and 5MBC re-measures.

2 Introduction

Mokorua Bush Scenic Reserve (MBSR) is located in the Eastern Bay of Plenty, close to Whakatane, between Valley Road and the Ohope Scenic Reserve (OSR). MBSR (and nearby Kōhī Point Scenic Reserve) is administered by Whakatāne District Council while the OSR is jointly managed by DOC and Te Rūnanga o Ngati Awa through the management committee Te Tapa Toru a Toi.

Predator control operations have been undertaken in the MBSR for a number of years. Possum (Trichosurus vulpecula) and rat (Rattus rattus; Rattus norvegicus; Rattus exulans) control began in 2004, and baiting continued annually through 2008. No possum or rat control was carried out in 2009 or 2010. In 2011 annual predator control resumed utilising an intensive network of bait stations at 75x75 spacing. Mustelid (*Mustela erminea*; *Mustela nivalis*; *Mustela furo*) control, in the form of traps, was extended across the MBSR between 2013 and 2014.

A forest bird monitoring project was established in the MBSR in 2013 as part of the Whakatane Ohope Reserves Biodiversity Management Plan 2011-2016, and a baseline measure was conducted November-December 2013. The results were discussed in the 2013 report (Campbell and Quinn 2014). While forest bird monitoring projects continued annually at KPSR and OSR, a re-measure was not conducted in the MBSR during 2014 and 2015 due to budgetary constraints.

Forest bird monitoring is one of several tools used by BOPRC to monitor biodiversity trends, providing information about temporal variation in bird abundance in response to management actions (primarily introduced predator control). As intensive predator control has been carried out annually since 2011 there is an expectation that, over time, forest health will improve and relative abundance of indigenous birds will increase.

This is the fourth year of birds surveyed at MBSR using the monitoring design implemented in 2013 (see Quinn & Greaves 2013 for details) and the first year since a biennial monitoring regimen was introduced for MBSR, KPSR and OSR, as per previous recommendations (Quinn and Campbell 2017). Consequently, these three sites were not re-measured in 2018.

MBSR, Kōhī Point Scenic Reserve and OSR are all subject to the same predator control regimen through the Whakatāne and Ōhope Sites Environmental Programme 2018-2021 (along with the Ngāti Awa Kawenata and Dodds Covenant). Partners in the Whakatāne and Ōhope Sites Environmental Programme include Bay of Plenty Regional Council, Department of Conservation, Whakatāne District Council, Te Rūnanga o Ngāti Awa, Te Tapa Toru a Toi, Ngāti Awa Group Holdings Limited and Whakatāne Kiwi Trust.

In May 2014 DOC, in partnership with the Whakatāne Kiwi Trust, translocated 40 North Island robin (Toutouwai; *Petroica longipes*; At Risk-Declining) to boost the number of remnant breeding pairs in the OSR (Walter and Palmer 2014). These birds have since dispersed across the three Whakatane monitoring sites and have been observed in MBSR (Quinn and Campbell 2018). Post-release dispersal by North Island (NI) robin is common, with sites like the OSR that have high connectivity to suitable habitat having the lowest probability of retention of translocated birds (Parlato and Armstrong 2012).

As all three of these sites are in relatively close proximity to one another and connectivity exists between MBSR and OSR, and OSR and KPSR, by way of pockets of native bush and stands of pohutukawa (*Metrosideros excelsa*), respectively, it is worthwhile assessing any similar bird population trends that appear across these sites (Fig. 1, overleaf), as well as tracking any NI robin population expansion.

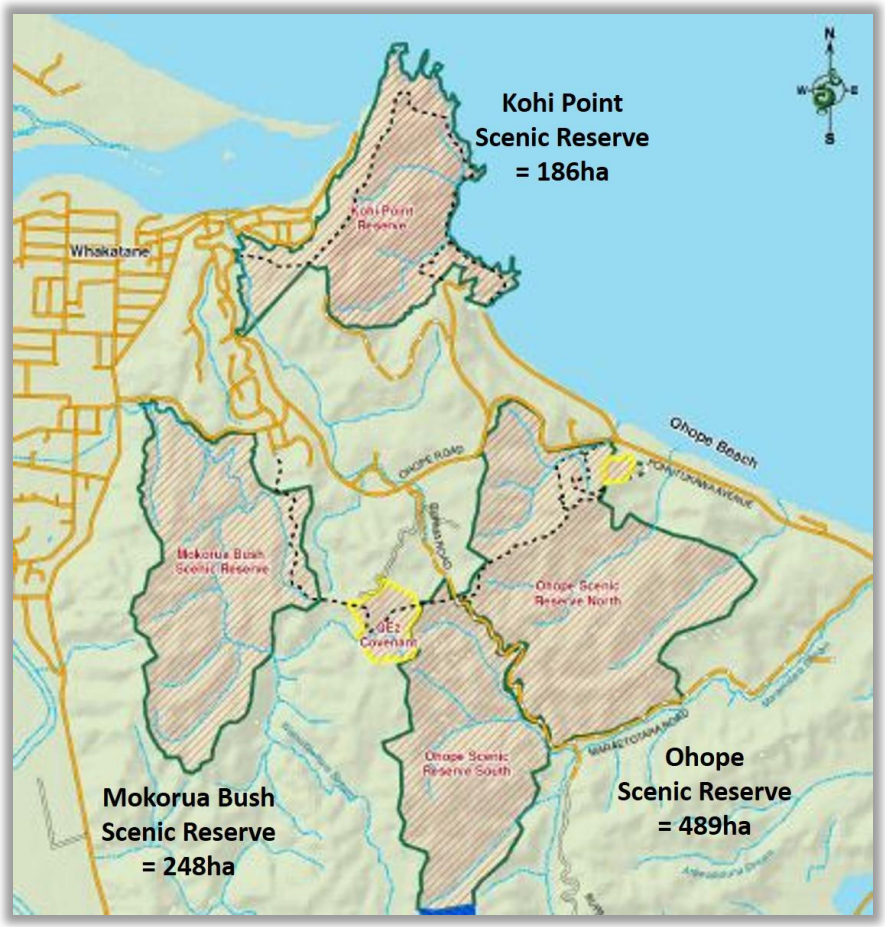

Figure 1. Location Of The Three Whakatane Monitoring Sites.

The primary objective of this report is to present and discuss a summary analysis of temporal trends in the relative abundance of common indigenous birds between 2013 and 2019 as the result of predator control in MBSR. Understanding temporal trends in bird abundance will help managers to gauge the success of the predator control programmes and inform strategic decision making for predator control going forward.

3 Methods

Information about the study site and its biodiversity characteristics can be found in the 2013 monitoring report prepared by FWIF (Campbell and Quinn 2014).

The rationale for the current monitoring design is also outlined in the 2013 report (Campbell and Quinn 2014).

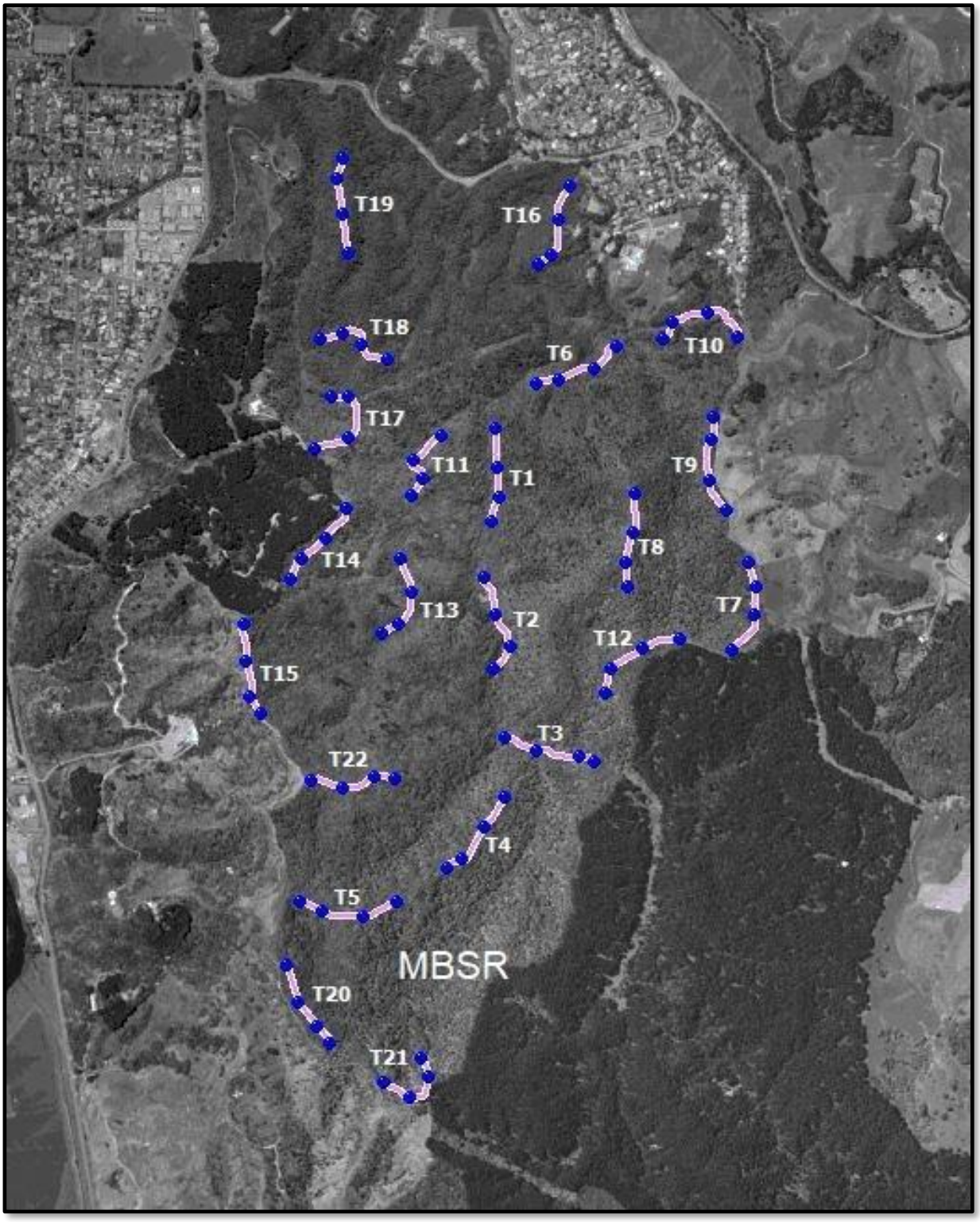

Figure 2. Current Transect Set-up In Mokorua Bush Scenic Reserve.

3.1 Transect Placement

Transects of 250m in length were placed within the study area prior to initial baseline bird monitoring, with minimum distances of 150m between each transect on even terrain and 200m on steep terrain. This amount of separation is required to reduce the chances of double counting a given bird. All twenty-two transects follow bait lines, suitable tracks or purposely cut tracks to ensure monitoring is conducted within our Health and Safety parameters (Fig. 2).

GPS coordinates for each transect have been recorded. Instructions on how to reach transects are also detailed, as well as a difficulty grading for each, in Appendix A.

3.2 Transect Bird Counts

Transect line counts were used to measure relative bird abundance in the spring/early summer of each year. Count methodology followed Dawson and Bull (1975), except where otherwise stated.

Three individual counts were carried out at each transect between 7th November and 7th December 2019. In an effort to reduce the amount of variation caused by daily 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).

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.

As per the recommendation from a peer review of the forest bird monitoring projects, that an additional, suitably experienced observer should be used in future, to reduce the period over which surveys are undertaken, and provide redundancy if individual observers become unavailable (Fitzgerald et al 2019) we assessed the impact another observer would mean for this specific site. This project is one of the two medium-sized forest bird sites from the five monitored in the Whakatane District and a time benefit analysis determined that using another observer would assist in shortening the monitoring time period, considering the requirements of the methodology and the annual addition of 5-Minute Bird Counts (5MBCs). Therefore, to maintain the current fieldwork window and include 5MBCs within that time period, two skilled observers (Conor Quinn and Amy Quinn, FWIF) conducted all counts. To assist in overcoming observer bias the observers monitored a minimum of one day together onsite at the MBSR to develop process consistencies around slow walk transect timing and bird recognition.

An example of count data sheets for transects and 5MBCs can be found in Appendix B. Copies of raw data sheets and raw data in excel format were also supplied to BOPRC.

3.3 5-Minute Bird Counts (5MBCs)

Another single series of 5MBCs were conducted in MBSR this year for potential comparative analysis in subsequent years and comparative analysis with other similar projects in New Zealand. A 5MBC was conducted at the beginning and end of each of the 22 transects, for 44 total replicates completed during the fieldwork window. Count methodology followed Dawson and Bull (1975), with a one-minute wait period initiated upon arriving at the location, prior to beginning each five-minute measure. All birds seen or heard were identified, included on the field sheet and marked in one of three distance categories: <20 m, 20–100 m, and >100 m. No individual bird was knowingly counted more than once. These 5MBCS will be conducted each year transect re-measures are conducted at the site. Comparative analysis of 5MBCs in results and discussion of those results may be included in subsequent reports.

Two skilled observers (Conor Quinn and Amy Quinn, FWIF) conducted all 5MBC counts at MBSR.

A table detailing the results can be found in Appendix D. Copies of raw data sheets and raw data in excel format were also supplied to BOPRC.

3.4 Data Analysis

Abundance estimates and statistical analyses

Relative abundance for transects describes how species are representative throughout a given area and allows for a comparable index of each species between sites and over time. Given that data has been collected from this site by the same methodology since 2013, this was a suitable approach that allowed easy comparisons between years and within species. Relative abundance is calculated as:

$$abundance = \frac{\sum(average\ birds\ per\ transect)}{total\ number\ of\ transects}$$

This testing then analysed whether counts were different between species and years using ANOVA and then performed a Tukey's Post Hoc Test, which allowed for multiple comparisons between years and species. Tukey's test is more suited than one-way ANOVA's for comparing multiple means than when there are more than two groups as it reduces the chance of type 1 error.

Not all data collected from this site is presented in this report. Many species, including some indigenous species, were so sparsely distributed that trends in their abundance are difficult to determine statistically. In order to make the statistical analyses as robust as possible, only data from species that were counted on a large proportion of transects ("common species") are generally included. The exception to this rule is NI robin, because of its significance as an indicator species. All other indicator species were common on transects.

A comparison for spread of NI robin across transects was included this year, following on from the analyses conducted in the combined Whakatane Region Bird Monitoring 2017 Report. Spread is shown as the percentage of transects occupied by at least one NI robin.

4 Results

Twenty-seven species were detected during the 2019 survey, including 10 endemic, 6 native and 11 introduced species. Weka (woodhen; *Gallirallus australis greyi*), paradise shelduck (pūtakitaki*; Tadorna variegata*) and greenfinch (*Carduelis chloris*) were new records for this site. NZ falcon (karearea; *Falco novaeseelandiae*) and kaka (bush parrot; *Nestor meridionalis*), had only been previously reported in 2017 and was absent again this year. A complete list of common, scientific and Māori names for 2019 can be found in Appendix C.

Counts of common indigenous; bellbird (korimako, *Anthornis melanura*), fantail (pīwakawaka, *Rhipidura fuliginosa placabilis*), grey warbler (riroriro, *Gerygone igata*), kereru (wood pigeon, *Hemiphaga novaeseelandiae*), kingfisher (kōtare, *Todiramphus sanctus vagans*), NI robin, shining cuckoo (Pīpīwharauroa, *Chrysococcyx lucidus lucidus*), silvereye (tauhou, *Zosterops lateralis lateralis*), tomtit (miromiro, *Petroica macrocephala toitoi*), tui (parson bird, *Prosthemadera novaeseelandiae*) and introduced species; blackbird (*Turdus merula*) and chaffinch (*Fringilla coelebs*), were greater in 2019 than when surveys began in 2013 ($Tukey_{Indigenous}$: est = -4.08, t = -4.43, p < 0.001; $Tukey_{Introduced}$: est = -2.86, t = -4.96, p < 0.001; Figure 3). Also, while counts of indigenous and introduced birds appeared greater in 2019 than in the previous survey year, this change was not significant ($Tukey_{Indigenous}$: est = -7.44, t = -0.74, p = 0.87; $Tukey_{Introduced}$: est = -1.18, t = -2.05, p = 0.17; Figure 3).

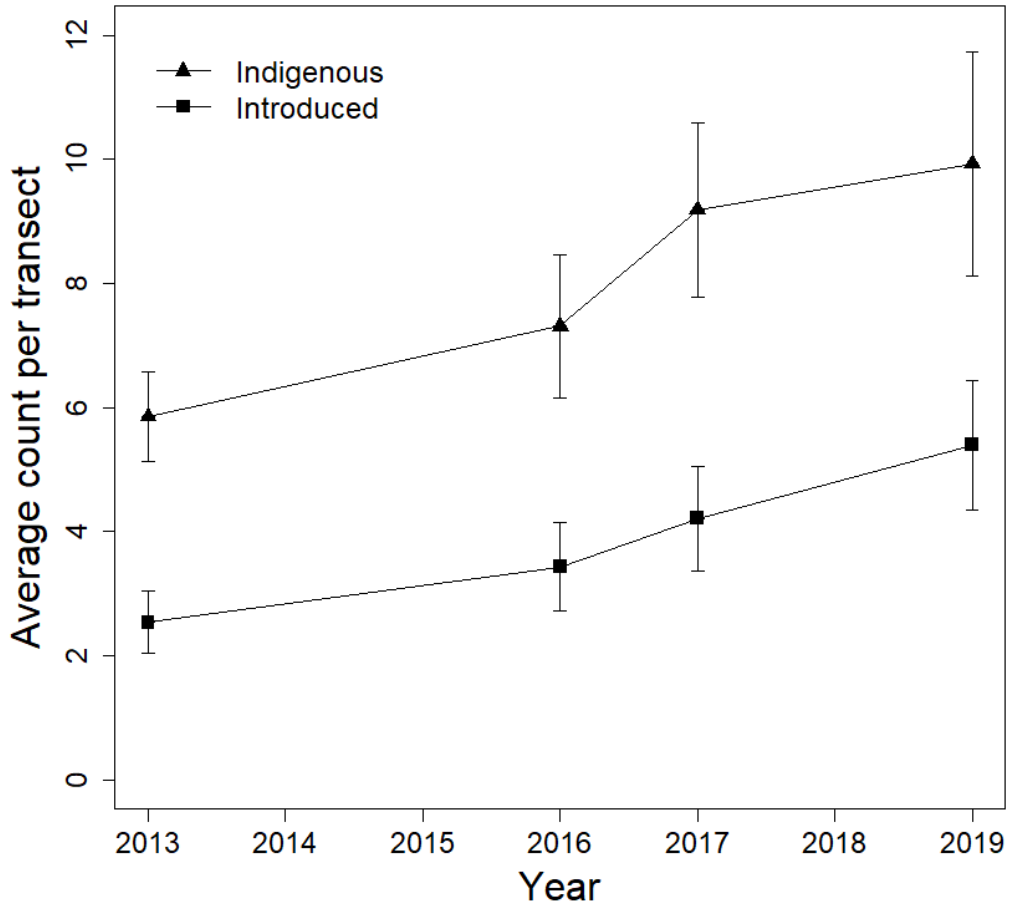

Figure 3. Relative abundance of ten common indigenous (triangles) and two introduced (squares) birds detected along 22 survey transects 2013, 2016, 2017 and 2019 in Mokorua Bush Scenic Reserve.

Relative abundance of tui and NI robin increased since the previous survey in 2017, but otherwise abundance of common indigenous species did not change (Figure 4; Table 2). Nevertheless, relative abundance of all common species except for fantail, shining cuckoo and silvereye has increased since initial surveys in 2013 (Figure 4; Table 2).

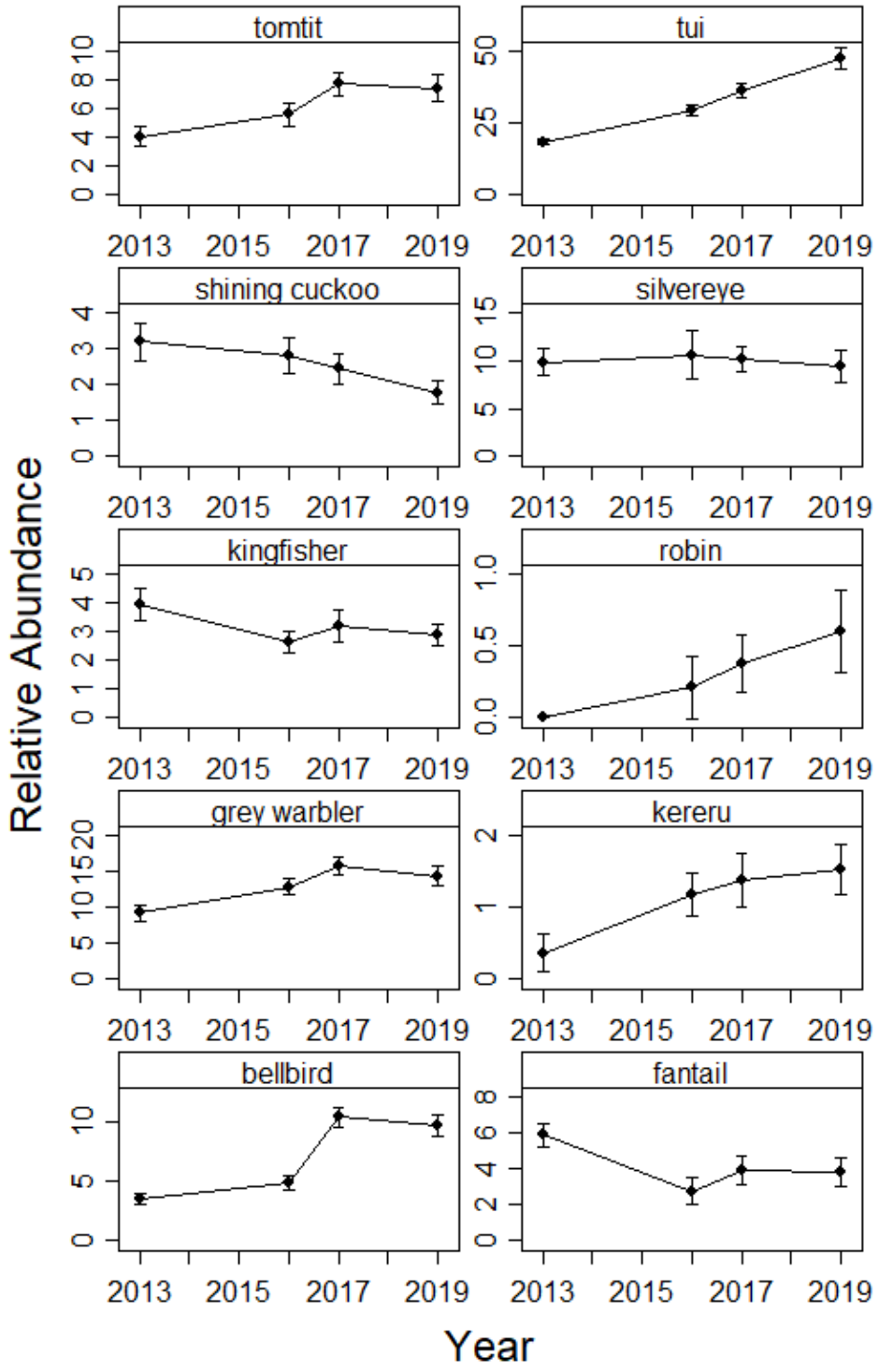

Figure 4. Relative abundance of indigenous indicator species detected along 22 survey transects 2013, 2016, 2017 and 2019 in Mokorua Bush Scenic Reserve. Error bars represent 95% Confidence Intervals.

Table 1 – Results from Tukey Post Hoc test illustrating the differences in relative abundance for each species between the 2013 and 2019 survey years (first column) and 2017 and 2019 survey years (last column) in Mokorua Bush Scenic Reserve. Estimate values indicate the mean change in relative abundance of the earliest year (i.e., the negative value of bellbird in 2013-2019 comparison indicates that abundance was lower in 2013 when compared to the baseline year of 2019). P-values less than 0.05 indicate a significant change.

	2013-2019		2017-2019	
	Estimate	P value	Estimate	P value
Bellbird	-6.15	<0.001	0.68	0.55
Fantail	2.08	0.001	0.12	1.00
Grey warbler	-5.12	<0.001	1.41	0.34
Kereru	-1.17	<0.001	-0.15	0.91
Kingfisher	1.03	0.017	0.29	0.83
Robin	-1.00	<0.001	-0.23	0.41
Shining Cuckoo	1.41	<0.001	0.65	0.18
Silvereye	0.45	0.98	0.73	0.94
Tomtit	-3.38	<0.001	0.27	0.97
Tui	-29.39	<0.001	-11.21	<0.001

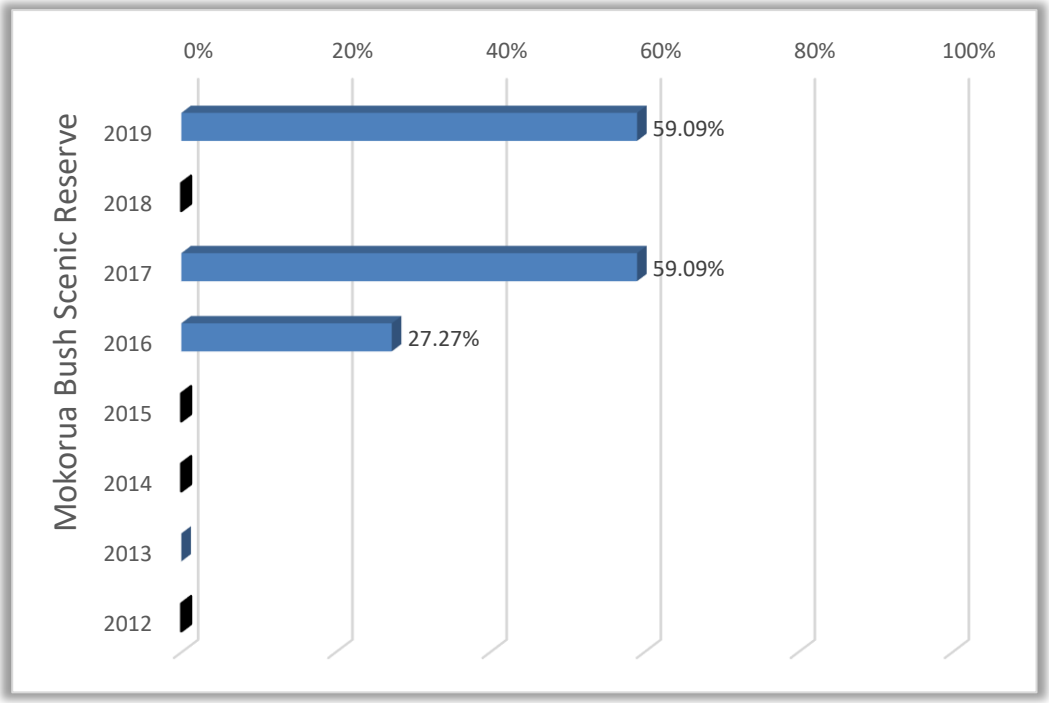

Figure 5. Spread of NI robin at MBSR from the start of monitoring using the current methodology, by percentage of transects where species observed. Black squares signify monitoring had not yet begun or was not conducted that year.

Our tracking spread for NI robin increased immediately after monitoring was re-established in 2016, and has remained steady at 59% from 2017 to 2019 (Figure 5).

5 Discussion

The 2019 monitoring season marked the fourth year of bird monitoring at Mokorua Bush Scenic Reserve (MBSR) and the ninth full breeding season subject to intensive predator control. It is the first year of results since initiating a biennial monitoring regimen, meaning monitoring was not conducted in 2018 and will be conducted again in 2021.

Increases of relative abundance for indigenous species between 2013 and 2019 was statistically significant, with the population growth trend appearing to have remained steady since monitoring began, despite the lack of continuous re-measures. Most individual indigenous species observed also showed significant increases over this time period, and tui and NI robin showed significant increases between 2017 and 2019, suggesting that ongoing predator control continues to enhance the indigenous bird population and habitat health in the MBSR.

These sustained increases for tui and NI robin are a very positive sign for persistent improvement of bush vitality, given the importance of a nectarivore (honeyeaters) such as tui in the pollination and seed dispersal of a range of native plant species (Anderson *et al* 2006). Growth trends for NI robin could provide extra insight for predator programme recommendations going forward. This is particularly true for mustelid and cat control as NI robin spends a considerable amount of time feeding on the ground (Heather & Robertson 2005). As the spread for NI robin remains steady, while the population increases, it is possible that certain areas of habitat within the Reserve support population growth more readily than others. Continued tracking of NI robin should give additional insight into preferred habitat, which could inform methodologies for any future translocation projects.

Multiple observations of weka at MBSR and across all three Whakatane sites would indicate that the resident population is growing. A ground dwelling bird, similar to kiwi, weka is susceptible to predation and breeds well when there is an absence of predators (Bramley and Veltman 1998; Williams et al 2012), so ongoing population increases would indicate low pest pressure at MBSR.

It appears the population growth for some indigenous species may have plateaued since 2016. Excluding tui and NI robin, most species populations have remained relatively steady. Variables other than pest pressure and climate change should also be considered, as inbreeding depression, food scarcity and competition may slow growth rates for some indigenous species when limitation by predation is alleviated (Innes et al 2010). This may also include competition from exotic species assimilating to native flora and habitat, as introduced species have shown its first significant increase at MBSR since monitoring began.

Hypotheses around population density and territory size in relation to fecundity may also apply to several of our indicator species, and the unintended consequences of creating pest-free environments for indigenous bird species could result in a variety of differing scenarios around carrying capacity for individual monitoring sites. Increased knowledge around the inter-dependence of certain species and population dynamics in regard to food competition and habitat limitations can only assist in ensuring future pest control programmes have the most informed pathway to success.

A species conspicuous by a significant and unexpected population decrease was shining cuckoo. Similar decreases also occurred at OSR and KPSR. This may be a natural population variation for, as yet, unknown reasons as shining cuckoo are migratory and generally travel to New Zealand to breed from western Pacific islands August to October (Williams et al 2006). However, there may be an unanticipated variable, potentially related to climate change[1]. As part of their migratory path, shining cuckoo make a transit stop in the forests of northeastern Australia, between the Coral Sea and Brisbane (Williams et al 2006). In that area, from June 2019, forest fires were burning, with a combination of major fires combining in the area from late August 2019 to form several immense fires (Huf and Mclean 2020). The forest damage was catastrophic, meaning much of the transit zone for shining cuckoo was either burning, destroyed or smoke

[1] https://www.worldweatherattribution.org/wp-content/uploads/WWA-attribution_bushfires-March2020.pdf

shrouded, resulting in depleted food sources and a compromised transitory path. As shining cuckoo has displayed phenological responses to climate change (Both et al. 2006), it is conceivable that these contributing factors resulted in fewer shining cuckoo making it to New Zealand shores and thus, a reduced population in the Whakatane District. Subsequent re-measures may shed further light on this hypothesis.

The significant improvement of relative indigenous bird abundance since the establishment of monitoring illustrates the effectiveness of predator control programmes. While increasing diversity of indigenous species, including weka in 2019, and stabilisation of the NI robin population across the local area, shows how continuous and intensive pest control can support ongoing habitat and species enhancement over the long term.

Breeding success and bird conspicuousness naturally fluctuate from year to year so multiple years of monitoring data are needed to accurately interpret any emerging trends. Therefore, it is recommended biennial monitoring continues, aligned with a consistency in approach for subsequent transect and 5MBC re-measures.

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Appendices

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

Appendix B are photos of the Field Sheet Masters used for fieldwork.

Appendix C details Common, Scientific and Maori names of birds.

Appendix D details the raw results from 5MBC counts conducted as part of 2019 fieldwork.

Appendix A

Transect	Grid Ref Easting	Grid Ref Northing	Transect Difficulty Grading 1 = Low 2 = Med 3 = High	Location Instructions
TR1			1	Follow main track entering from White Horse Drive and stay right through the main junction. On the left before the bridge enter the side track and follow side track for 50m to the start of T1.
Start	1951486	5789822		
250m /end	1951475	5789573		
TR2			1	Follow instructions for T1. Continue along track after end of T1 for 175m where T2 begins.
Start	1951456	5789422		
250m /end	1951482	5789179		
TR3			1	Follow instructions for T1 & T2. Continue along track after end of T2 for 160m where T3 begins.
Start	1951512	5788992		
250m /end	1951753	5788926		
TR4			3	Follow instructions for T1, T2 & T3. At the 100m mark of T3 there is a marked triangle showing where G line begins up the ridgeline. T 4 begins 160m up the ridgeline at bait station G27.
Start	1951514	5788834		
250m /end	1951356	5788641		
TR5			1	Follow instructions for T4. Continue along G line after end of T4 for 160m where T5 begins, finishing at G19. Follow G line to exit at the western edge of the Reserve.
Start	1951220	5788551		
250m /end	1950961	5788552		
TR6			1	Follow main track entering from White Horse Drive. Go left at the main junction and left again up bait line W for 100m where T6 starts. T6 ends off main track 50m past V2.
Start	1951813	5790046		
250m /end	1951591	5789939		
TR7			2	Follow main track entering from White Horse Drive. Go left at the main junction and follow track to the end. Go over the sty and follow toi track for 75m. T7 starts inside the Reserve marked at the fence by pink tape. T7 continues along S line.
Start	1952135	5789215		
250m /end	1952167	5789459		
TR8			1	Follow main track entering from White Horse Drive. Go left at the main junction and follow track to the bench seat on the right. T8 starts left of the bench 50m inside the bush, follow the pink tape to find start. The transect continues parallel to the track for 100m before joining track and ending off track at bait station t3.
Start	1951864	5789665		
250m /end	1951847	5789398		
TR9			2	Follow instructions for T7 and continue along S line after end of T7. T8 starts 175m after end of T7.
Start	1952107	5789604		
250m /end	1952087	5789856		
TR10			3	Follow instructions for T7 & T8 and follow S line after end of T8. T10 starts at S39 200m after end of T8. Exit Reserve and follow fence line along driveway and across garden to find S39. T10 ends around X1 and follow pink tape to exit Reserve close to White Horse Drive.
Start	1952149	5790068		
250m /end	1951951	5790069		
TR11			1	Follow main track entering from White Horse Drive and stay right through the main junction. Cross the bridge and follow track for 150m where T11 starts off track on right.
Start	1951342	5789804		
250m /end	**1951264**	**5789646**		
TR12			**3**	Follow main track entering from White Horse Drive. Go left at the main junction and follow track to within 20m of the end, where T12 starts at S25. T12 continues back along main track to beginning of R line where it continues to the end near R3.
Start	1951988	5789262		
250m /end	1951800	5789104		
TR13			2	Follow instructions for T11 and continue along main track after end of T11 until beginning of I line on left of track. T13 starts at I7 and continues along I line. Return to track to exit.
Start	1951219	5789502		
250m /end	1951179	5789319		

TR14			1	Either enter from bottom track at Gorge Rd carpark and travel 1.4km up to G line or follow main track entering from White Horse Drive and travel past T11 & T13 until the beginning of G line, which is off track to the left on the border between the Reserve and the pine forest. T14 starts at G1.
Start	1951087	5789608		
250m /end	1950939	5789419		
TR15			1	Follow instructions for T14 and continue along G line after end of T14. T 15 starts 200m after end of T14 around G7.
Start	1950859	5789294		
250m /end	1950899	5789053		
TR16			2	Park by Kauri Grove half way up the Gorge Rd. Follow pink tape from entrance to observation track to the start of T16 around F12.
Start	1951688	5790478		
250m /end	1951602	5790265		
TR17			2	Enter from bottom track at Gorge Rd carpark and travel 1km up track until secondary track on the right. Follow this track to the end to start of T17. Return to track to exit.
Start	1950990	5789765		
250m /end	1950994	5789945		
TR18			3	Enter from bottom track at Gorge Rd carpark and travel 750m up track until reaching marking for D26. Follow D line to D27 where T18 starts. Go back up to main track and cross onto B line after 100m, where T18 finishes around B14. Return to track to exit.
Start	1951214	5790025		
250m /end	1950969	5790135		
TR19			1	Enter from bottom track at Gorge Rd carpark and travel 450m up track until reaching marking for C line. Follow pink marking on right of track to start of T19, which runs parallel to main track and finishes around C14.
Start	1951094	5790300		
250m /end	1951084	5790576		
TR20			1	Follow instructions for T14 and continue along fence line after end of T15 for around 600m. T20 starts around CL15-1 and finishes around Cl15-5
Start	1950905	5788381		
250m /end	1951021	5788153		
TR21			2	Follow instructions for T14 and continue along fence line after end of T15 for around 1km, past the end of T20, where T21 starts around CL15-8. Enter Reserve at CL15-10 and follow pink marked line to end of T21.
Start	1951164	5788081		
250m /end	1951299	5788191		
TR22			2	Follow instructions for T14 and continue along fence line after end of T15 for 150m until marked beginning of O line. Follow O line where T22 starts before O1. Return to fence line to exit.
Start	1951014	5788878		
250m /end	1951274	5788888		

Appendix B

Bird Monitoring Field Sheets

Transects

TRANSECT BIRD MONITORING FIELD-SHEET

Location Name: Mokorua Bush Scenic Reserve		**Grid Refs:** E: N:		**Date:**
				Fieldworker: C Quinn
Transect No:		**Start:**		**Finish:**
Sun:	**Temp:**	**Wind:**	**Rain:**	**Other Noise:**

Species	Tally		Total No.
	Seen*	Heard*	
Australasian Harrier			
Bellbird			
Blackbird			
Chaffinch			
Falcon NZ			
Fantail			
Fernbird			
Goldfinch			
Grey Warbler			
Kaka			
Kereru			
Kingfisher			
Long-tailed cuckoo			
Magpie			
Myna			
Paradise Shelduck			
Peacock			
Pheasant			
Pukeko			
Quail, California			
Redpoll			
Robin, New Zealand			
Rosella, Eastern			
Shining Cuckoo			
Silvereye			
Skylark			
Sparrow, Hedge			
Starling			
Swallow, Welcome			
Thrush, Song			
Tomtit			
Tui			
Turkey			
Whitehead			
Yellowhammer			
Unknown			

** If seen and heard, record it only as seen*

Flowering, fruiting – record details if relevant

Plant Species	Fruit or Flowers	Rare, occasional, common, abundant, or very abundant	Notes

5MBCs

5MBC BIRD MONITORING FIELD-SHEET

Location Name: Mokorua Bush Scenic Reserve		**Grid Refs:** E: N:		**Date:**
				Fieldworker: Quinn
5MBC no:		**Start:**		**Finish:**
Sun:	**Temp:**	**Wind:**	**Rain:**	**Other Noise:**

Species	Tally and distance			Total No.
	>20m	20m-100m	100m+	
Australasian Harrier				
Bellbird				
Blackbird				
Chaffinch				
Falcon, NZ				
Fantail				
Fernbird				
Goldfinch				
Grey Warbler				
Hedge Sparrow				
Kaka				
Kereru				
Kingfisher				
Kokako				
Long-tailed cuckoo				
Magpie				
Myna				
Paradise Shelduck				
Peacock				
Pheasant				
Pukeko				
Redpoll				
Robin, New Zealand				
Rosella, Eastern				
Shining Cuckoo				
Silvereye				
Starling				
Swallow, Welcome				
Thrush, Song				
Tomtit				
Tui				
Turkey				
Quail, California				
Whitehead				
Yellowhammer				
Unknown				

Appendix C – Common, Scientific and Maori names of birds

Common Name	Scientific Name	Maori Name	2016 Threat Category
Australian magpie*	*Gymnorhina tibicen*	n/a	Introduced and Naturalised
Bellbird	*Anthornis melanura*	Korimako	Not Threatened
Blackbird*	*Turdus merula*	n/a	Introduced and Naturalised
California quail*	*Callipepla californica*	n/a	Introduced and Naturalised
Chaffinch*	*Fringilla coelebs*	Pahirini	Introduced and Naturalised
Common pheasant*	*Phasianus colchicus*	Peihana	Introduced and Naturalised
Eastern rosella*	*Platycercus eximius*	n/a	Introduced and Naturalised
Falcon, NZ	*Falco novaeseelandiae*	Kārearea	Recovering
Fantail	*Rhipidura fuliginosa placabilis*	Pīwakawaka	Not Threatened
Goldfinch*	*Carduelis carduelis*	n/a	Introduced and Naturalised
Greenfinch	*Carduelis chloris*	n/a	Introduced and Naturalised
Grey warbler	*Gerygone igata*	Riroriro	Not Threatened
Harrier hawk	*Circus approximans*	Kāhu	Not Threatened
House sparrow*	*Passer domesticus*	n/a	Introduced and Naturalised
Kaka (bush parrot)	*Nestor meridionalis*	Kaka	Recovering
Kereru (wood pigeon)	*Hemiphaga novaeseelandiae*	Kereru	Not Threatened
Long-tailed cuckoo	*Eudynamys taitensis*	Koekoeā	Naturally Uncommon
Myna*	*Acridotheres tristis*	n/a	Introduced and Naturalised
New Zealand kingfisher	*Todiramphus sanctus vagans*	Kōtare	Not Threatened
North Island robin	*Petroica longipes*	Toutouwai	Declining
Paradise shelduck	Tadorna variegata	Pūtakitaki	Not Threatened
Peacock*	*Pavo cristatus*	n/a	Introduced and Naturalised
Redpoll*	*Carduelis flammea*	n/a	Introduced and Naturalised
Rifleman, North Island	*Acanthisitta chloris granti*	Tītitipounamu	Declining
Starling*	*Sturnus vulgaris*	n/a	Introduced and Naturalised
Shining cuckoo	*Chrysococcyx lucidus lucidus*	Pīpīwharauroa	Not Threatened
Silvereye	*Zosterops lateralis lateralis*	Tauhou	Not Threatened
Song thrush*	*Turdus philomelos*	n/a	Introduced and Naturalised
Tomtit	*Petroica macrocephala toitoi*	Miromiro	Not Threatened
Tui (parson bird)	*Prosthemadera novaeseelandiae*	Tui	Not Threatened
Weka (woodhen)	*Gallirallus australis greyi*	Weka	Recovering
Welcome swallow	*Hirundo neaxena neoxena*	Warou	Not Threatened
Whitehead	*Mohoua albicilla*	Pōpokatea	Declining
Wild Turkey*	*Meleagris gallopavo*	n/a	Introduced and Naturalised
Yellowhammer*	*Emberiza citrinella*	n/a	Introduced and Naturalised
*Introduced species			

Appendix D - Raw results from 2019 5MBC counts

Station No.	Observer	Date (dd/mm/yy)	Australasian Harrier	Bellbird	Blackbird	Chaffinch	Fantail	Grey Warbler	Kereru	Kingfisher	Long-tailed cuckoo	Pheasant	quail, California	Robin, NI	Rosella, Eastern	Shining Cuckoo	Silvereye	Swallow, Welcome	Thrush, song	Tomtit	Tui
1a	Conor Quinn	27.11.19		2		2	1	2									3			1	10
1b	Conor Quinn	27.11.19		3		5	1	4							2	1				1	8
2a	Conor Quinn	27.11.19		2		4	2	3												2	7
2b	Conor Quinn	27.11.19		2		4	1	4								1	2				7
3a	Conor Quinn	27.11.19		2	2	3		4		1											4
3b	Conor Quinn	27.11.19		2	1		3	5												2	12
4a	Amy Quinn	13.11.19		4			1	7		1						1	7				10
4b	Conor Quinn	13.11.19		1	1	3			1			1		1						3	8
5a	Amy Quinn	13.11.19		4		1	1		1							1	6			3	5
5b	Amy Quinn	13.11.19		1		1		5		1						2	3			4	8
6a	Conor Quinn	7.11.19		4	1	3	2	5	2	1							4				14
6b	Conor Quinn	7.11.19		5	1		1	3							2		5			1	17
7a	Conor Quinn	20.11.19		2	3	5		4		1							5				8
7b	Conor Quinn	20.11.19		1	1	3		3		1							3				7
8a	Conor Quinn	20.11.19		3	1	2		4		1							2			1	9
8b	Conor Quinn	30.11.19		1		4		3								1					6
9a	Conor Quinn	30.11.19		1		2		2									2				6
9b	Conor Quinn	20.11.19		1		5	1	2	1	1			1						1		10
10a	Conor Quinn	30.11.19		1		3		2								1	2		1		7
10b	Conor Quinn	20.11.19		3		8	2	4	1								5			2	11
11a	Conor Quinn	20.11.19		2			2	2	1							1	3				7
11b	Conor Quinn	20.11.19		2		5	2	4		1					1		2			1	11
12a	Conor Quinn	30.11.19		1	1	3	1	3								1				1	9
12b	Conor Quinn	20.11.19		2	1	2		4		1						1	3		2	1	9
13a	Amy Quinn	13.11.19		4			3	2	2	1						1				2	9
13b	Conor Quinn	13.11.19		2		4		6		1							2			1	7
14a	Amy Quinn	13.11.19		2		1											2				4
14b	Amy Quinn	13.11.19				1		3				1						2			4
15a	Amy Quinn	13.11.19		1		1		2										2			5
15b	Amy Quinn	13.11.19		5		2		7								1	3			1	7
16a	Conor Quinn	30.11.19		2	3		2			1							2				7
16b	Conor Quinn	30.11.19		1	1	3	1	3		1							3				6
17a	Conor Quinn	20.11.19		1	2	5	1	2		1							3				9
17b	Conor Quinn	20.11.19		2	2	2	2	5		2	1					1	2			2	7
18a	Conor Quinn	20.11.19		1	1	2									1	1	5			1	9
18b	Conor Quinn	20.11.19	2			4		2		1										2	7
19a	Conor Quinn	20.11.19		1	1	1		3		1		1					2			2	7
19b	Conor Quinn	20.11.19		1		5	2	4		1							4		1	2	8
20a	Amy Quinn	13.11.19		2			1	3		2						2				2	5
20b	Conor Quinn	13.11.19		2	3	6		4		2											7
21a	Amy Quinn	13.11.19		1		3	1	5								1	2				7
21b	Conor Quinn	13.11.19	1	1	1	5	1	6				1								2	7
22a	Amy Quinn	13.11.19		3		1	1	7		2						2	5			4	11
22b	Conor Quinn	27.11.19		1		2	1	3	1							1	2				6