State and trends in the diversity, abundance and distribution of birds in Upper Hutt reserves

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State and trends in the diversity, abundance and distribution of birds in Upper Hutt reserves

June 2012

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Main cover photo: Kereru – native New Zealand Pigeon (Robert Hall)

Executive summary

Five-minute bird counts have been carried out in seven Upper Hutt parks and reserves since 2005 to monitor trends in the diversity, abundance and distribution of native birds at these sites. In 2011 changes were made to the survey design to eliminate sampling bias, improve the coverage of bird count stations and improve our ability to detect changes in the local population of tui, a key pollinator and seed disperser of many native forest plant species.

Twelve native forest bird species were detected in Upper Hutt reserves in 2011, with larger and more well-connected reserves such as Wi Tako Reserve and Keith George Memorial Park continuing to support the greatest diversity of species. On average, a greater number of native forest bird species were detected per bird count station in Upper Hutt reserves than at Wellington City or Wairarapa bird count stations in 2011.

Silvereye, grey warbler and tui were by far the most frequently-encountered bird species in Upper Hutt reserves in 2011. In previous years, fantail had also been one of the most frequently encountered species, but in 2011 the encounter rate for this species was very low, probably a result of unusually heavy snowfall the previous winter. Whitehead and tomtit were encountered frequently in both Keith George and Wi Tako, but were scarce or absent from all other reserves. Kakariki, bellbird and rifleman were all detected for the first time in Wi Tako in 2011 and this is the first time that rifleman has been detected in any Upper Hutt reserve since bird counts began in 2005.

Blackbird was by far the most frequently encountered exotic bird species in Upper Hutt reserves, followed by chaffinch and eastern rosella. The abundance of eastern rosellas is of some concern, as they are known carriers of beak and feather disease and could compete for nest sites with native cavity-nesting birds.

The distribution of native forest birds was very similar to previous years. Grey warbler, tui and silvereye continued to be the most widespread species, however fantails were not detected in four of the seven reserves surveyed in 2011, again most likely a result of snow the previous winter. Kereru and bellbird continue to be seen more regularly in the larger, better-connected reserves and tomtit and whitehead continue to be almost entirely restricted to the two largest reserves. The detection of rifleman in Wi Tako this year illustrates the advantages of the new survey design as this species was detected in part of the reserve not surveyed in previous years.

Wi Tako and Keith George Memorial Park continue to emerge as the two most important reserves for native birds in Upper Hutt as they support the most diverse native bird communities of any of the reserves surveyed. We recommend that the control of mammalian predators be continued in these two reserves as a matter of priority and we recommend that bird monitoring be continued on an annual basis to monitor future trends in the diversity, abundance and distribution of native birds in these reserves.

Contents

1. Introduction

Bird monitoring is being carried out in a number of parks and reserves around Upper Hutt with the aim of monitoring trends in the diversity, abundance and distribution of native birds in these reserves over time. Bird monitoring began in 2005 when five-minute bird count stations were established in Keith George Memorial Park as part of Greater Wellington Regional Council's Key Native Ecosystem programme. In 2006 and 2007, bird count stations were added to six further parks and reserves around Upper Hutt to provide a more detailed picture of trends in bird distribution and abundance across Upper Hutt (Figure 1.1).

The results of these first three years of bird counts were reported in Stephens et al. (2007) and Fea and Moylan (2008). These authors reported that native bird diversity and abundance tended to be greater in larger and better connected parks and reserves with fantail (*Rhipidura fuliginosa*), tui (*Prosthemadera novaeseelandiae*), grey warbler (*Gerygone igata*) and silvereye (*Zosterops lateralis*) being the most frequently encountered species. Keith George Memorial Park emerged as an important habitat for native birds in Upper Hutt because it was the only reserve sampled that supported large populations of both whitehead (*Mohoua albicilla*) and tomtit (*Petroica macrocephala*).

The results of bird counts carried out in 2009 and 2010 were summarised in Govella et al. 2011. These authors found that the largest and most well-connected reserves continued to support the highest diversity of native birds. They also found that native species diversity in Upper Hutt reserves was lower than that found in Wellington City reserves and higher than that recorded from Porirua Scenic Reserve in 2009 and 2010.

Fantail, tui, grey warbler and silvereye were the most frequently encountered bird species in Upper Hutt reserves in 2009 and 2010, but whitehead were particularly abundant in Keith George Memorial Park in 2010. Kakariki (*Cyanoramphus* sp) were recorded in Keith George Memorial Park in 2010 and the authors suggested that this may be an early indication that this species is re-colonising the reserve after several decades' absence.

In 2011 this monitoring programme was reviewed by the current authors and a number of changes were made to improve the statistical robustness of the design. The existing bird count stations, for example, had been placed along tracks in each reserve to allow easy access for field staff. This had the effect of creating a biased and not particularly representative sample of the bird communities in each reserve, so the decision was made to re-locate the bird count stations to random locations within each reserve.

The number of bird count stations was also increased from 30 to 45 stations to improve survey coverage, and the decision was made to carry out two bird counts at each station to provide a sample of 90 bird counts each year. A sample of 90 bird counts was chosen because this ensured a sufficient sample size to detect a 25% or more change in the relative abundance of tui in Upper Hutt reserves from one year to the next.

Tui was chosen as an indicator species for the purpose of determining the sample size of bird counts because:

1. They are a conspicuous species that is easily recognised and identified by the public.

2. They perform an important role as pollinators and seed dispersers in native forest ecosystems.

3. They have shown a strong response to the pest control work being carried out in the Wellington Region over the past decade (Bell 2008; GWRC unpublished data).

This report summarises the results of these 2011 bird counts, which will form a baseline against which the results of future bird counts can be compared.

Figure 1.1: Location of parks and reserves included in the Upper Hutt bird monitoring program from 2007-2011

2. Methods

2.1 Field technique

A network of 45 bird count stations were established at random locations in six of the seven reserves that have been surveyed since 2007 (Figure 2.1). Due to the random placement of count stations, no station fell within the boundaries of the smallest of the seven reserves, Riverstone Park, so no abundance data could be collected for this reserve. Instead, a walk-through survey was carried out to collect data on species richness and distribution in this park.

Observers navigated to each count station using GPS and compass. Each station was marked with a blue triangle inscribed with the station number which was affixed to the nearest living tree. Care was taken to ensure that each bird count station was a minimum of 200 metres from the next and that no bird count station was within 50 metres of the edge of a reserve.

Bird counts were carried out using the standard five-minute bird count method (Dawson & Bull 1975). Two bird counts were carried out at each count station, but each count was carried out on separate a day. All counts were carried out during the month of November and counts were only made on fine, calm days between 1.5 hours after sunrise and 1.5 hours before sunset (approximately 7.30am to 6.30 pm). At each station, a trained observer spent five minutes recording the number of individuals of all bird species seen or heard from the count station (unbounded count). Care was taken not to record the same bird twice during a count.

Although no five-minute bird counts were carried out in Riverstone Park, a twenty-minute walk-through survey was carried out by one observer in November 2011 and a list was made of all bird species that were detected in the reserve. This data was then added to the distribution and species richness data collected from the other six reserves.

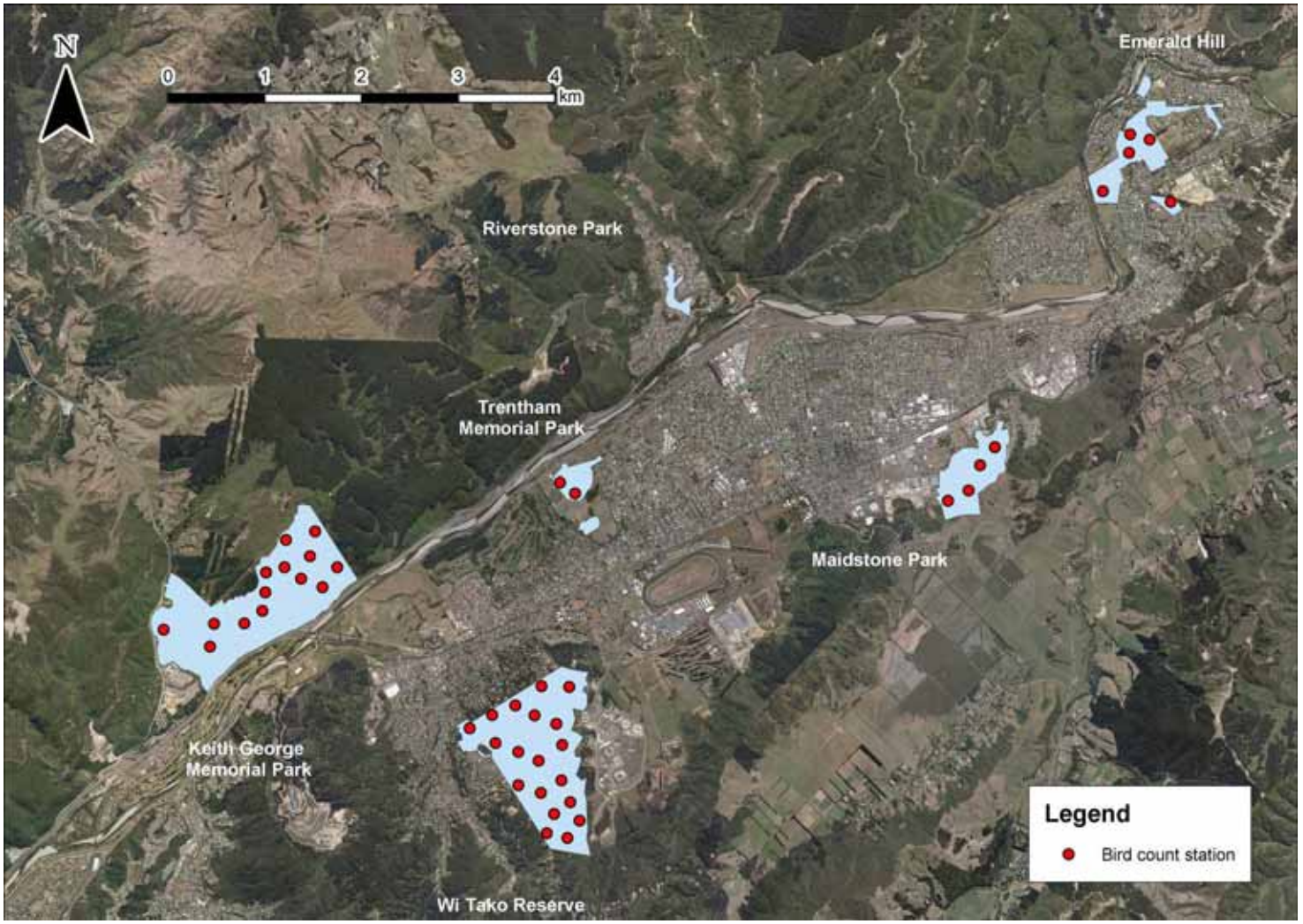

Figure 2.1: Locations of bird count stations established in Upper Hutt reserves in 2011 (Note: the single count station in Cloustonville Park is not shown)

2.2 Data analysis

Bird count data was entered into an excel spreadsheet using a standard five-minute bird count data template. This spreadsheet was then used to calculate the total number of native forest bird species detected in each reserve. The mean number of native forest bird species detected per count station in the Upper Hutt reserves was also calculated and compared to the mean number of species detected in Wellington City and Wairarapa reserves that were also surveyed in 2011. Two-tailed t-tests assuming unequal variances were used to assess whether any difference in the mean number of species detected per station in Upper Hutt, Wellington or Wairarapa reserves was statistically significant. This test is important because a statistically significant result indicates that any difference between two means is very unlikely to have occurred by chance, so instead represents a real difference in the species richness of native forest bird communities between the three reserve networks.

The bird count data was also used to calculate the mean number of birds of each species detected per count station across the Upper Hutt reserves surveyed. The mean number of birds detected provides a measure of the relative abundance and/or conspicuousness of each bird species in the Upper Hutt reserves (Dawson and Bull 1975).

Bird conspicuousness can vary in response to a number of variables such as time of year, change in observer, weather and time of day (Bibby et al. 2000). Because of this, every effort was made to either standardize or sample the range of variation in each of these factors so that we could be confident that any changes in the mean number of birds counted were more likely to be due to changes in abundance rather than conspicuousness. Precautions that were taken included carrying out these counts during the same month each year and using the same observers each year. Two observers were used to carry out these counts; both had excellent bird identification skills and both underwent several days of training to ensure they were carrying out the bird counts in a consistent manner. Counts were carried out in standardised weather conditions and were done throughout the day, except for 1.5 hours either side of dawn and dusk when birds tend to be more vocal and active.

Patterns in the distribution of native birds among Upper Hutt reserves were examined by mapping bird distribution using Arcmap version 9.3.1. Distribution data from the 2011 counts are compared with those generated from earlier counts carried out between 2007 and 2010 (and reported in Govella et al. 2011).

3. Results

3.1 Native species diversity

Twelve native forest bird species were detected in Upper Hutt Reserves in 2011, compared to eleven species detected in 2010. This increase was due to the detection of rifleman in Wi Tako reserve for the first time this year.

All twelve native forest bird species recorded in the seven Upper Hutt reserves sampled were also detected in Wi Tako Reserve, the most species-rich of the sampled reserves. Ten species were recorded in Keith George Memorial Park, the second most species-rich reserve, whereas six or fewer species were recorded in each of the other reserves sampled (Figure 3.1).

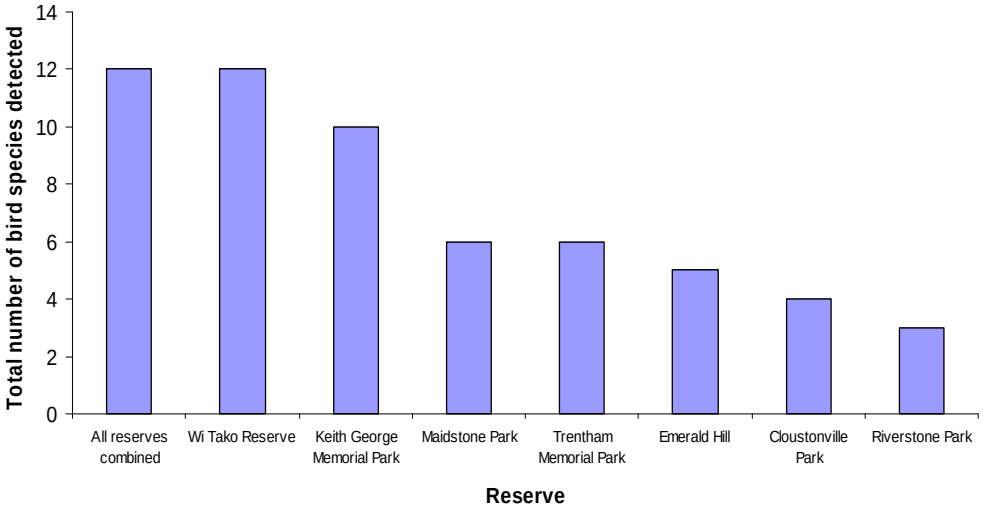

Figure 3.1: Total number of native forest bird species detected among Upper Hutt reserves in 2011

In 2011 the mean number of native forest bird species detected per count station in Upper Hutt reserves was significantly greater than in either the Wellington City or Wairarapa reserves sampled (two-tailed t-test; $P=3.29 \times 10^{-11}$ and $P=2.62 \times 10^{-6}$ respectively) (Figure 3.2). A mean of 3.8 species were detected per count station in Upper Hutt reserves, compared to 2.8 species in Wellington City reserves and 2.6 species in Wairarapa reserves in 2011.

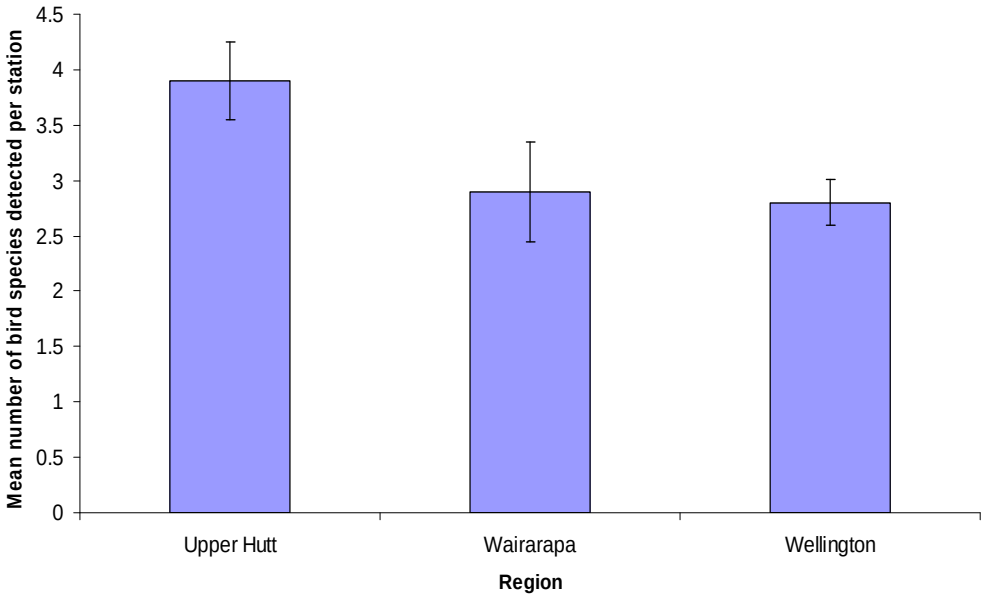

Figure 3.2: Mean number of native forest bird species detected per count station in Upper Hutt (n=90), Wairarapa (n=45) and Wellington City (n=200) reserves in 2011 (error bars show 95% confidence limits)

3.2 Bird abundance

Silvereye, grey warbler and tui were by far the most frequently encountered native forest bird species in Upper Hutt reserves in 2011, with between two and three birds of each species counted per station. Whitehead was the fourth most frequently encountered species with 0.9 birds counted per station. All other native forest bird species were detected at a rate of less than 0.5 birds per station. Of this latter group, the shining cuckoo (*Chrysococcyx lucidus*) was recorded most frequently at a rate of 0.3 birds per station and rifleman (*Acanthisitta chloris*) least frequently with 0.01 birds detected per station (Figure 3.3).

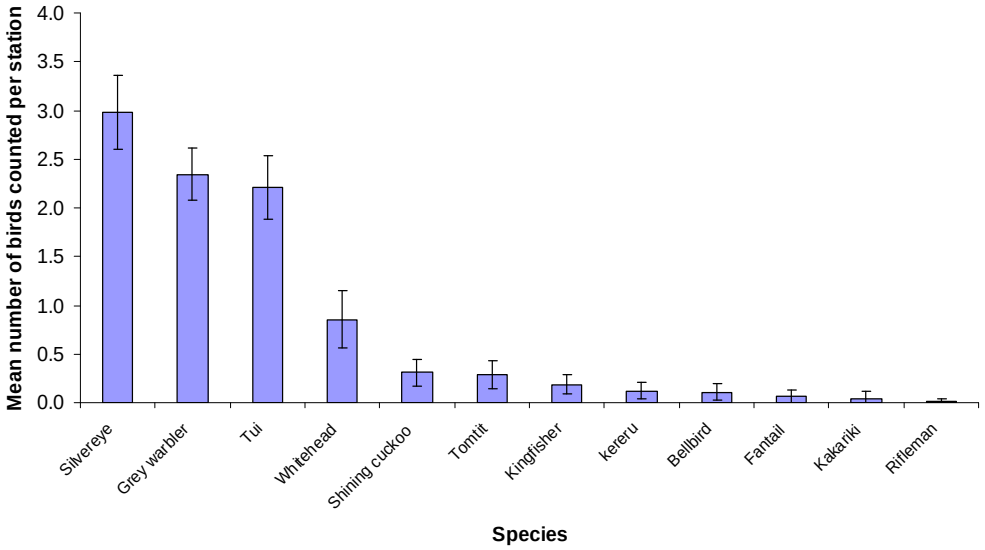

Figure 3.3: Mean number of birds detected per count station for each native forest bird species encountered in Upper Hutt reserves in 2011 (error bars show 95% confidence limits)

Blackbird (*Turdus merula*) was by far the most frequently encountered exotic bird species in the Upper Hutt reserves in 2011, with a mean of 1.8 birds encountered per count station. Chaffinch (*Fringilla coelebs*) and eastern rosella (*Platycercus eximius*) were the next most commonly encountered species, both being detected at a rate of 0.6 birds per count station. Less than 0.5 birds were counted at each station for song thrush (*Turdus philomelos*), dunnock (*Prunella modularis*) and goldfinch (*Carduelis carduelis*), (Figure 3.4).

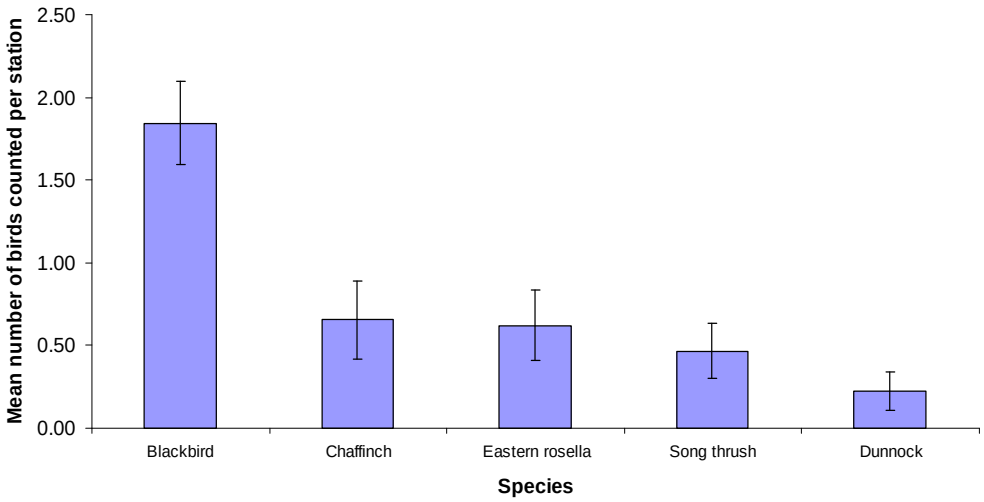

Figure 3.4: Mean number of birds detected per count station for the six most commonly encountered exotic bird species in Upper Hutt reserves in 2011 (error bars show 95% confidence limits)

3.3 Native bird distribution

The distribution of native forest birds in Upper Hutt reserves is similar to that found in previous years (Govella et al. 2011). Several species such as silvereye, grey warbler and tui continue to have a widespread distribution and were detected in almost all of the sampled reserves in 2011 (e.g. Figure 3.5).

Kereru (*Hemiphaga novaeseelandiae*) were again less widespread, being detected in only three of the seven reserves surveyed in 2011. Kereru were detected in the two largest reserves, Keith George and Wi Tako, and have been recorded in these reserves every year since 2007. Kereru were also detected in Maidstone Park in 2011, the first time they have been detected in this reserve since 2008. No kereru were detected in any of the other four smaller reserves in 2011 despite having been recorded intermittently in all reserves over the previous four years (Figure 3.6).

Bellbird (*Anthornis melanura*) was recorded only in Keith George and Wi Tako reserves in 2011. Whereas bellbird has been recorded in Keith George every year since 2007, this was the first time they had been detected in Wi Tako reserve in the last four years. In previous years bellbird has been recorded from Maidstone Park, Emerald Hill and Cloustonville Park, but were not encountered in any of these reserves in 2011 (Figure 3.7).

The distribution of fantails appears to have undergone a significant reduction since the previous year. Fantails were only recorded in three reserves in 2011: Keith George, Wi Tako and Trentham Memorial Park. In contrast, in previous years fantails had been recorded from almost every reserve since 2007 (Figure 3.8).

Several species continue to have quite localised distributions among the seven reserves sampled. Tomtit was again detected in both Keith George Memorial Park and Wi Tako reserve in 2011, but not in any of the five smaller reserves sampled (Figure 3.9). Whitehead was likewise detected in both Keith George and Wi Tako reserves as well as Cloustonville Park in 2011 (Figure 3.10). Whitehead have been regularly recorded in Keith George in previous years, however 2011 was the first year that this species has been recorded from Wi Tako and Cloustonville. Kakariki were likewise recorded in Wi Tako reserve for the first time in 2011, but were not recorded from any other reserve surveyed. Kakariki have only been encountered in one other reserve since 2007; this was in Keith George Memorial Park in 2010 (Figure 3.11).

Rifleman was also detected in Wi Tako Reserve for the first time in 2011. This is the first time that this species has been detected in any of the Upper Hutt reserves over the last four years. This species currently has the most restricted distribution of any of the native bird species detected this year, with birds only being detected at a single count station near the eastern boundary of Wi Tako reserve.

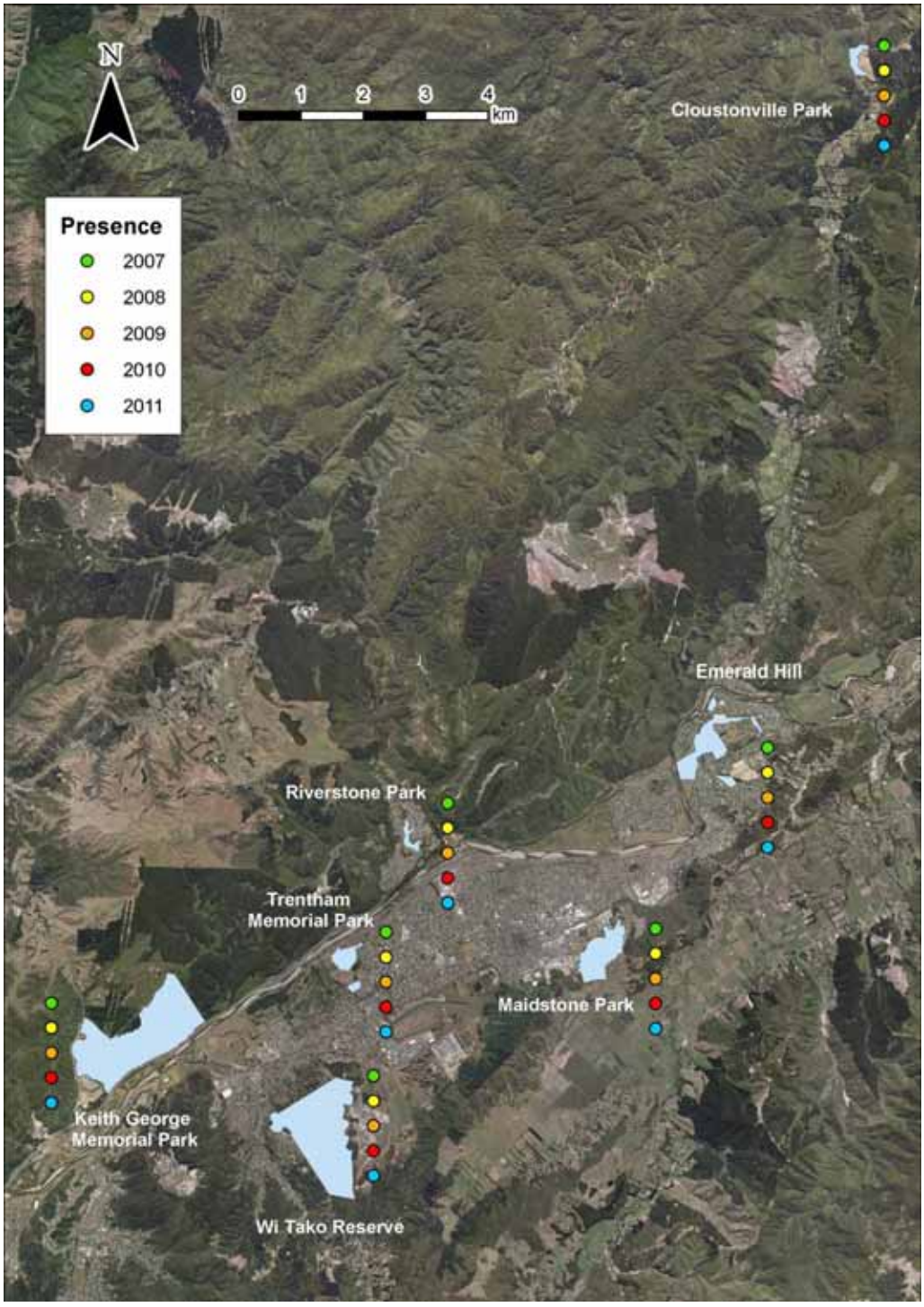

Figure 3.5: Distribution of tui across Upper Hutt reserves 2007-2011

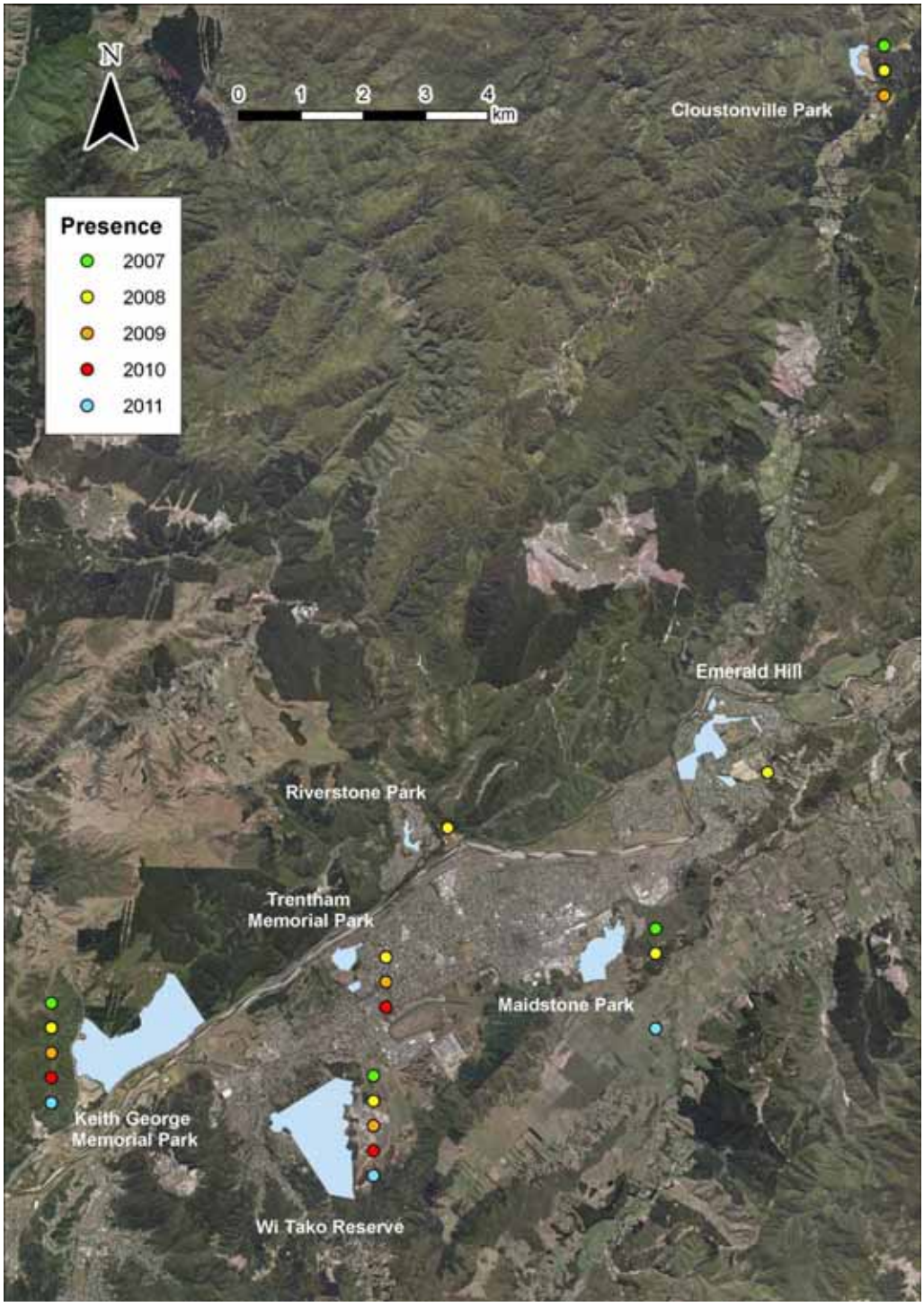

Figure 3.6: Distribution of kereru across Upper Hutt reserves 2007-2011

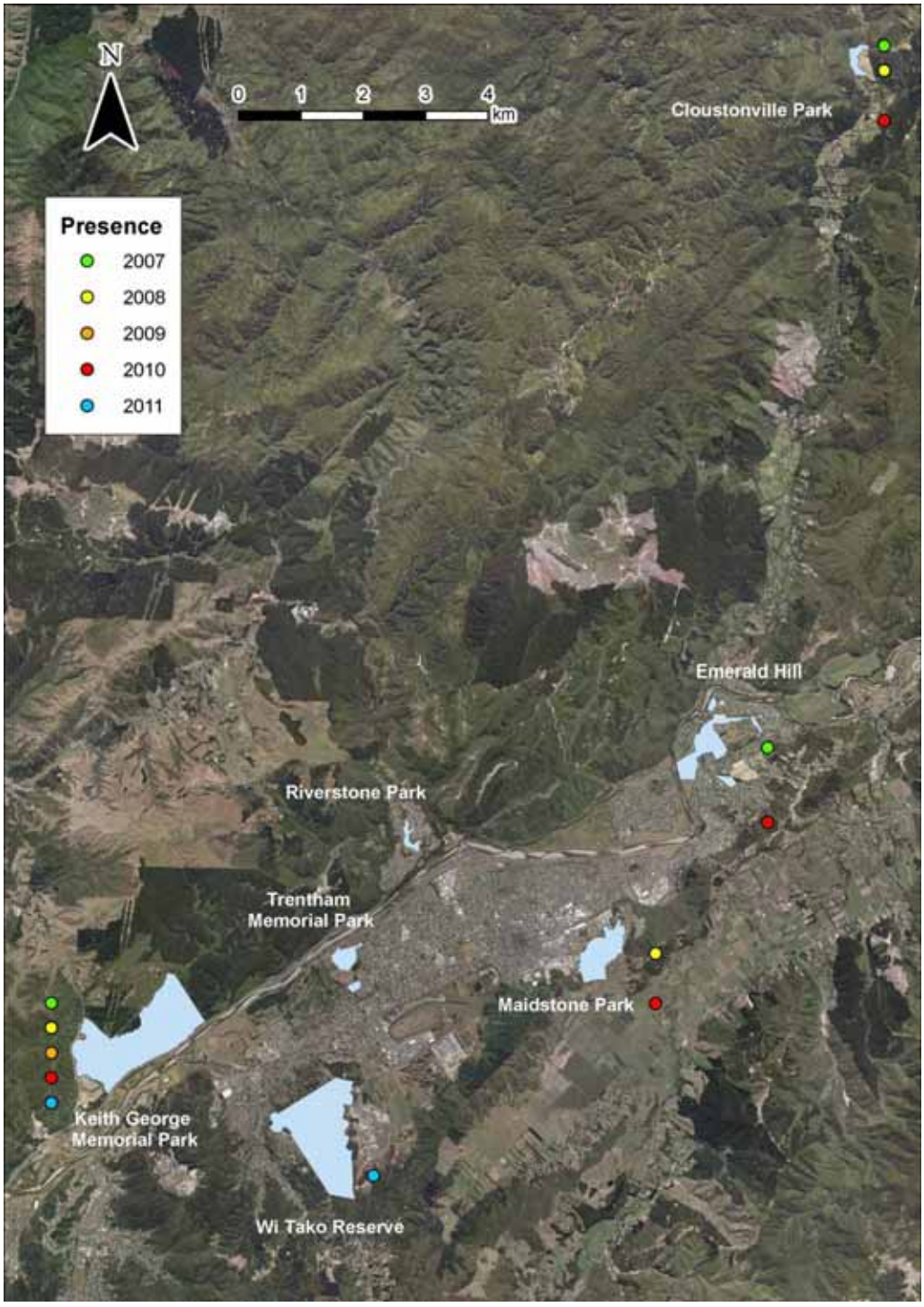

Figure 3.7: Distribution of bellbird across Upper Hutt reserves 2007-2011

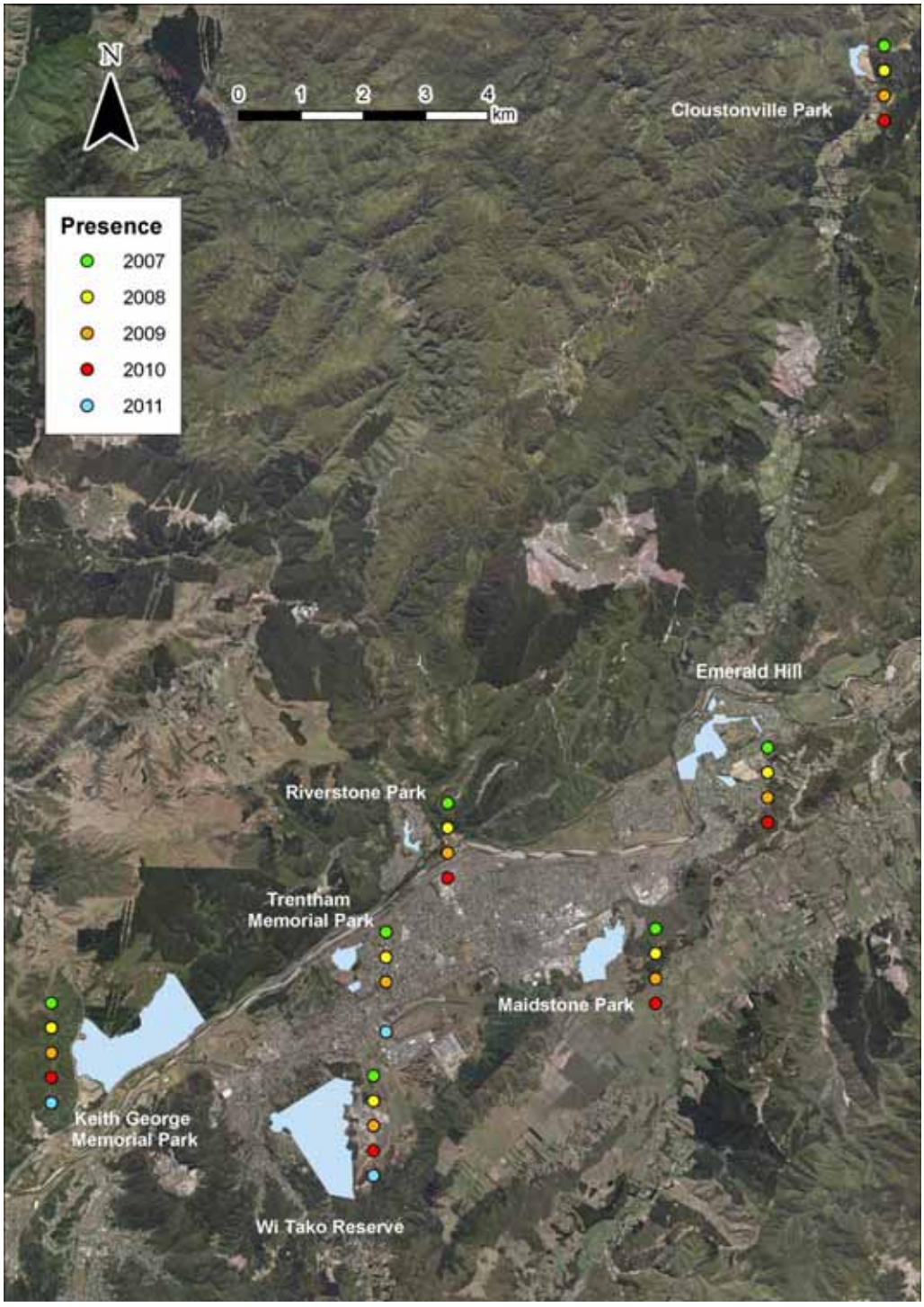

Figure 3.8: Distribution of fantail across Upper Hutt reserves 2007-2011

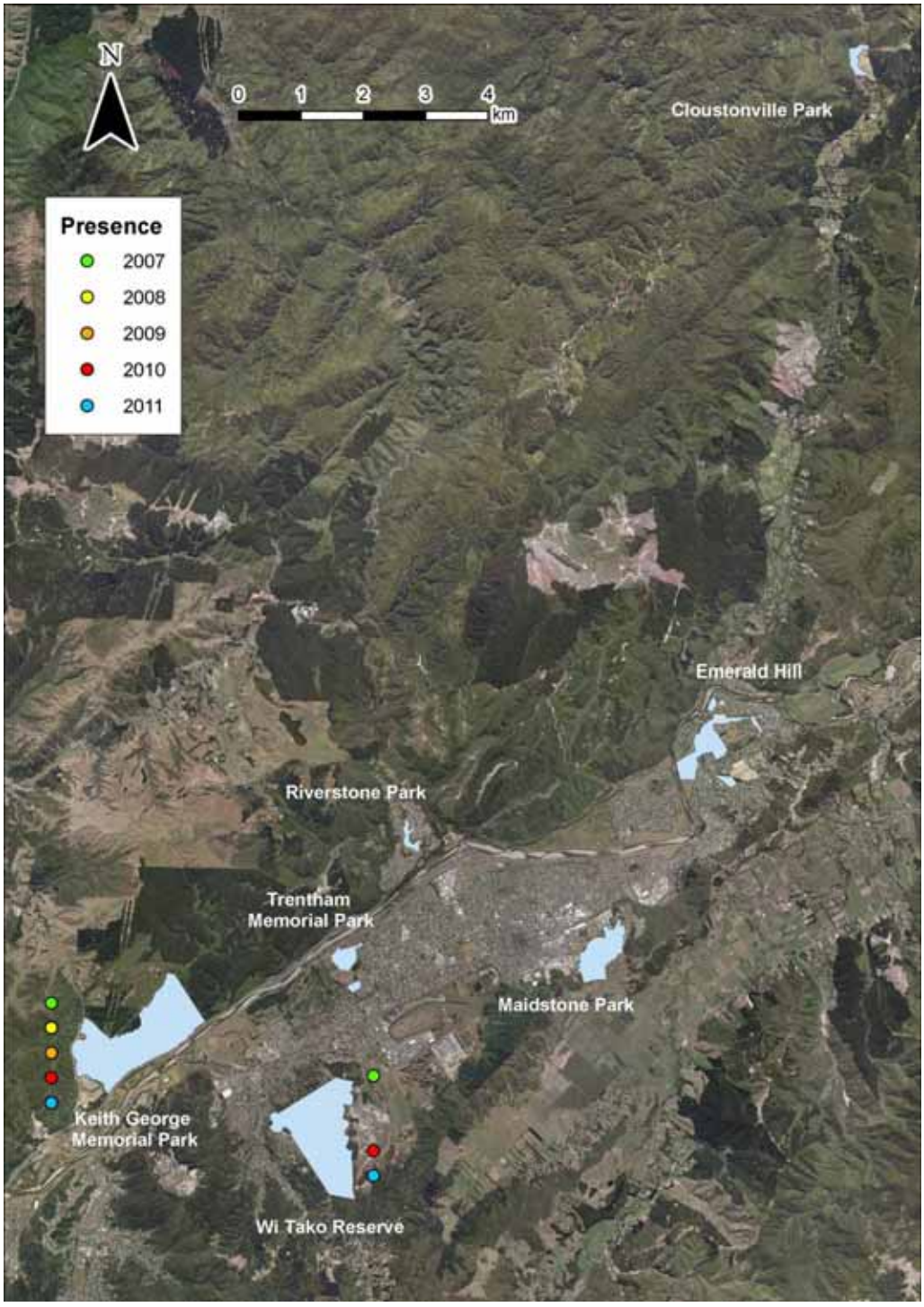

Figure 3.9: Distribution of tomtit across Upper Hutt reserves 2007-2011

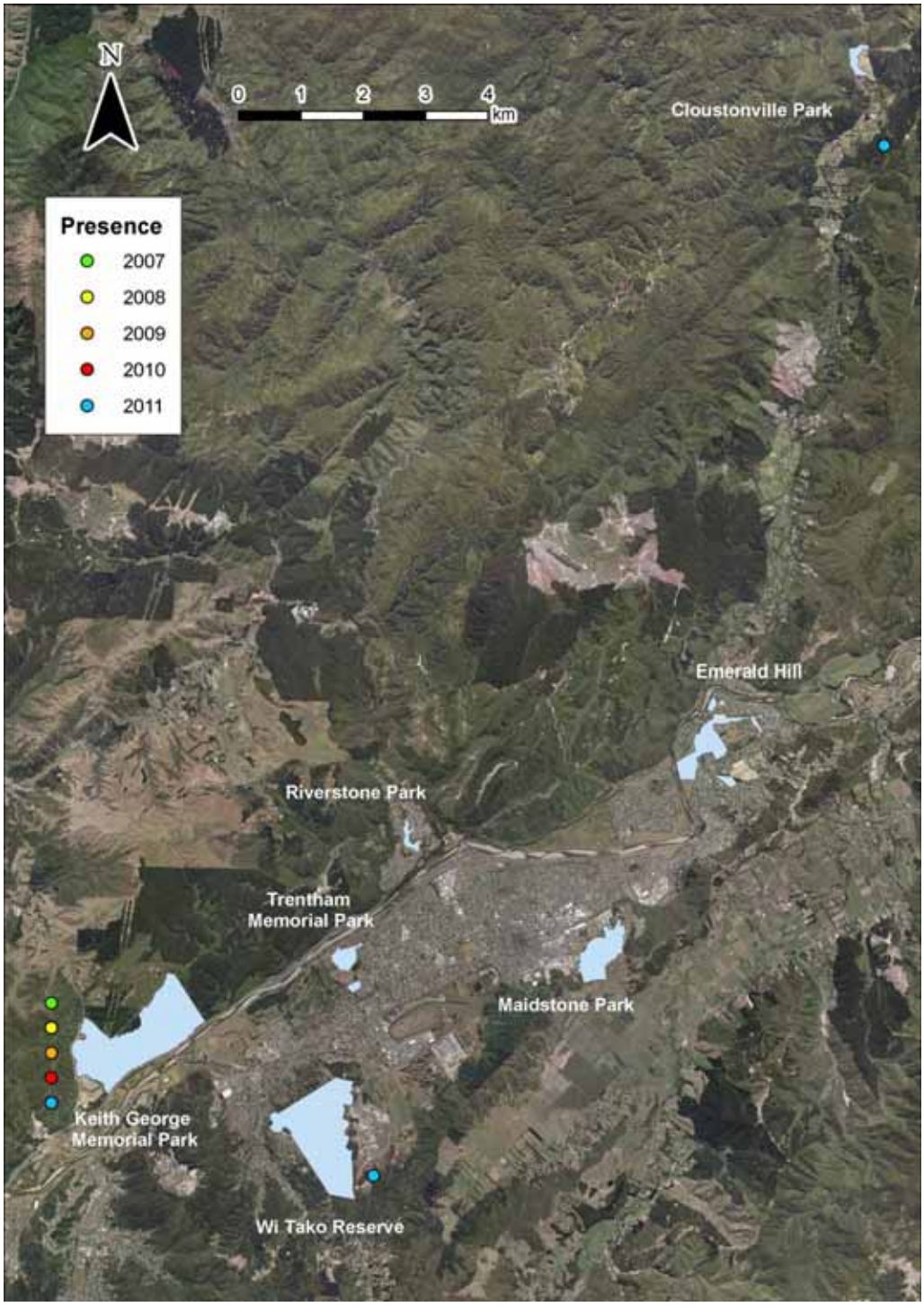

Figure 3.10: Distribution of whitehead across Upper Hutt reserves 2007-2011

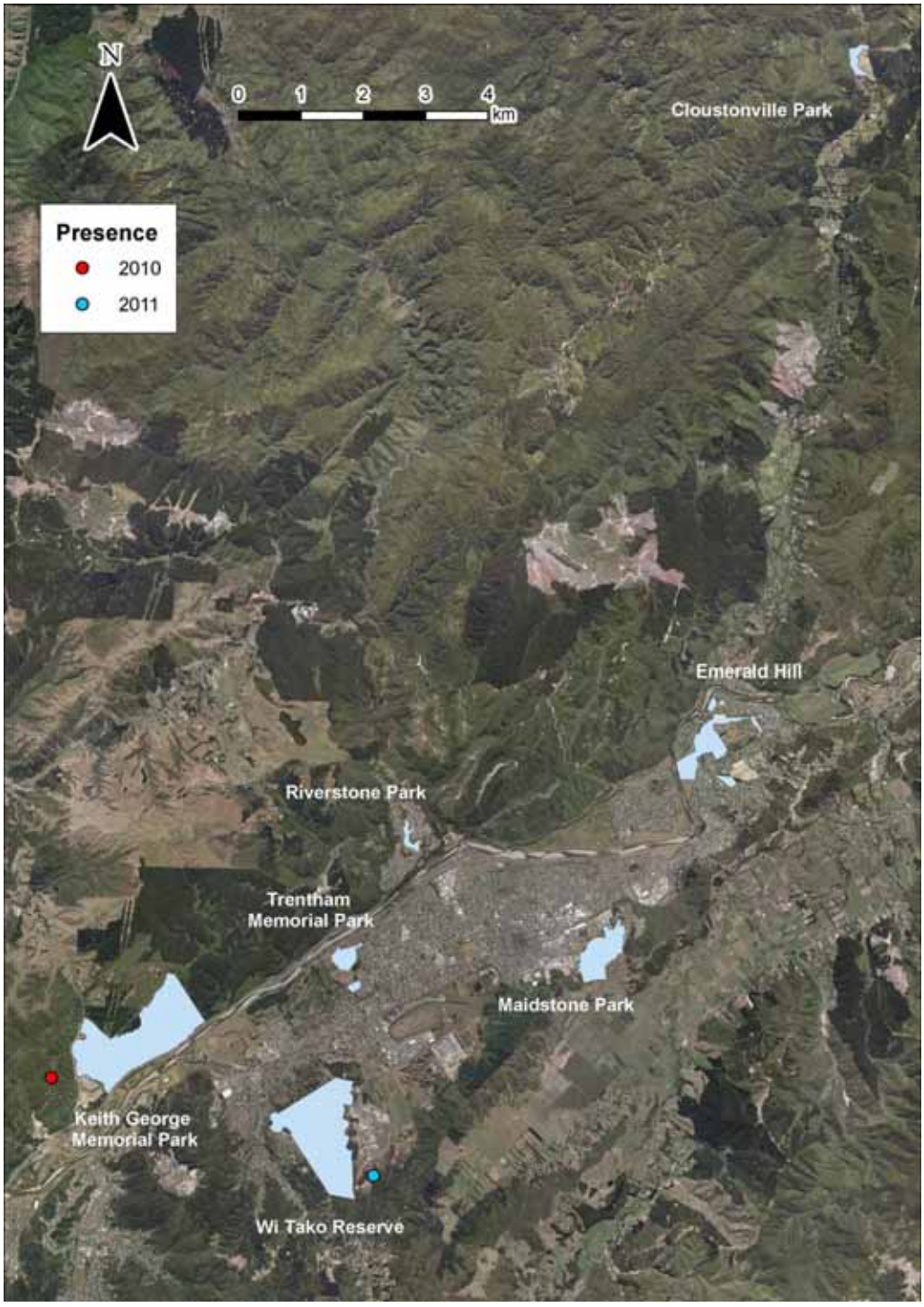

Figure 3.11: Distribution of kakariki across Upper Hutt reserves 2007-2011

4. Discussion

4.1 Native species diversity

The small increase in native forest bird species richness between 2010 and 2011 resulted from the detection of rifleman in Wi Tako reserve for the first time in 2011. Riflemen were detected in part of the reserve that hadn't been surveyed in previous years so for this reason it is difficult to say whether the presence of riflemen this year represents a recent colonisation event or whether we have found a small relict population that hadn't been detected in the past. Either way, the detection of riflemen for the first time this year illustrates the advantages of the new survey design with its relatively large sample size and random distribution of count stations providing representative coverage of the reserves sampled.

Rifleman is ranked as "At Risk – Declining" under New Zealand's current threat classification system (Miskelly et. al. 2008) so at the moment they are the most threatened bird species to be found in the Upper Hutt reserves. Riflemen are vulnerable to the impacts of introduced mammalian predators, but their relatively poor dispersal abilities also render them susceptible to local extinction following habitat fragmentation (Heather and Robertson 1996). Their presence in Wi Tako reserve, a relatively isolated piece of habitat several kilometres from the nearest large rifleman population, is therefore a pleasant surprise.

Wi Tako reserve and Keith George Memorial Park both continue to support markedly higher numbers of native forest bird species than any of the other five reserves sampled. This is most likely due to the fact that they are the two largest reserves sampled and they are relatively well connected to surrounding areas of native forest habitat (Govella et al. 2011). The five smaller reserves, in contrast, support fewer native forest bird species. Those species that are present are either those that are able to cope with significant modification and fragmentation of forest habitats (e.g. grey warbler and silvereye), or those that possess strong dispersal abilities (e.g. kereru) that are able to reach these reserves from larger tracts of bush nearby (Heather & Robertson 1996).

The average number of native forest bird species detected at any particular count station was significantly higher in Upper Hutt reserves compared to Wellington City reserves (excluding Zealandia) in 2011. This is in contrast to the previous two years when average species richness in Upper Hutt reserves was significantly lower than in Wellington City reserves (Govella et al. 2011). This apparent change is probably an artefact caused by changes to the design of the Wellington City bird counts in 2011. Like the Upper Hutt counts, in previous years the distribution of Wellington City bird count stations was heavily biased; in this case by mainly sampling better quality forest habitats such as Otari-Wilton's bush, or reserves close to the boundary of Zealandia. This created an artificially high estimate of average species richness for Wellington City count stations compared to those in Upper Hutt. In 2011, Wellington City bird counts were re-designed and bird count stations were re-located to random locations throughout Wellington City's reserve network (Zealandia again excluded). With such similar, unbiased sample designs, the

2011 comparison of average species richness between Upper Hutt and Wellington City bird count stations is likely to be far more accurate than in previous years.

The average number of species detected per count station in Upper Hutt reserves was also significantly greater than in a selection of Wairarapa reserves that were surveyed in 2011. This is due to the presence of tomtit, whitehead, bellbird, kakariki and riflemen in several Upper Hutt reserves, species that are either extremely rare or absent from the Wairarapa reserves sampled. In addition, low predator tracking rates in Keith George Memorial Park and Wi Tako reserve indicate that ongoing predator control in Upper Hutt reserves is likely to be helping to maintain populations of vulnerable species such as tomtit and whitehead in these reserves (GWRC unpublished data). Another factor contributing to the higher diversity of native bird species in Upper Hutt reserves is likely to be the proximity of several very large tracts of native forest such as the Akatarawa Forest from which species such as bellbird and kereru will be dispersing into Upper Hutt City reserves (Govella et al. 2011).

4.2 Bird abundance

The mean number of birds counted at a bird count station reflects not only the abundance of each species but also their relative conspicuousness in the habitat being sampled (Bibby et al. 2000). For this reason, comparing the mean number of birds of each species counted at a bird count station does not usually provide a direct measure of their relative abundance alone. Mean counts for large, vocal or highly mobile species such as tui and fantail are likely to provide fairly accurate estimates of relative abundance, provided not too many birds are double-counted. On the other hand mean counts for smaller, less vocal or less mobile species such as tomtit or rifleman will likely provide underestimates of their abundance in comparison to more conspicuous species.

The results for these Upper Hutt bird counts suggest that silvereye, grey warbler and tui are either the most abundant or most conspicuous bird species in Upper Hutt reserves. Silvereyes and grey warblers are both relatively small species that can easily be overlooked in dense forest when not vocalising (N. McArthur, pers. obs.). This means that these two species may be even more abundant relative to the other native bird species detected than these results indicate. Tui is a large, highly mobile and vocal species which is difficult to miss, even in relatively dense forest (N. McArthur, pers. obs.). The tui's rank as the third most frequently encountered bird in Upper Hutt reserves is therefore probably an accurate reflection of their abundance relative to other native forest bird species.

Although whitehead and tomtit were on average the fourth and sixth most frequently encountered bird species in Upper Hutt reserves respectively, these species were only detected in two or three of the seven reserves surveyed respectively. This means that they will be more abundant relative to other bird species in Keith George and Wi Tako, but very rare or absent from all other reserves.

All remaining native forest bird species have similar mean encounter rates across the sampled reserves. Of these species, kereru and riflemen can be relatively inconspicuous at times, so the rate at which these birds were encountered may underestimate their abundance relative to other species. Kereru spend long periods sitting still in the forest canopy and this behaviour combined with their dull green plumage means that they can be easily overlooked, despite their large size (Mander et al. 1998). Riflemen are also easily overlooked due to their small size, dull green plumage and high-pitched vocalisations which can be difficult for the human ear to detect (Heather & Robertson 1996). Similarly, encounter rates for bellbird can result in either over- or under-estimation of abundance due to the ease with which their calls can be confused with those of tui (N. McArthur, pers. obs.). Field workers carrying out this survey were familiar with the calls of both species, but were instructed to record any ambiguous detection as "unknown" rather than guess the species. For this reason, the encounter rate for bellbirds reported here is more likely to under- rather than over-estimate bellbird abundance relative to other species in Upper Hutt reserves.

Of the six most commonly-encountered exotic bird species in Upper Hutt reserves blackbird, chaffinch, eastern rosella, song thrush and goldfinch are all fairly conspicuous species. The encounter rates for these species are therefore likely to be an accurate reflection of their abundance relative to one another. The dunnock however is a comparatively shy bird that spends a lot of time in dense cover and it is usually only singing, territorial males that are detected during bird counts (Heather & Robertson 1996; N. McArthur pers. obs.). The mean number of dunnocks counted per station in Upper Hutt reserves is therefore very likely to underestimate their abundance relative to the five more conspicuous exotic bird species detected.

Of these exotic bird species, it is perhaps the eastern rosella that poses the greatest immediate threat to native birds in Upper Hutt reserves. eastern rosellas are considered to be a potential competitor for nest sites with native cavity nesters such as the kingfisher (*Todiramphus sanctus*) and kakariki (Wright & Clout 2001; Galbraith 2010), both of which are present in Upper Hutt reserves. eastern rosellas in New Zealand also carry beak and feather disease virus (BFDV), a virus known to cause increased mortality in wild parakeet populations and recently detected in a wild kakariki population in New Zealand (Ortiz-Catedral et al. 2009; Galbraith 2010). eastern rosellas co-exist with kakariki in Keith George Memorial Park and Wi Tako reserve and the two species have been observed forming mixed flocks in the nearby Moonshine Valley (I. Flux, pers. comm. 4 May 2012). There is a real risk therefore that eastern rosellas could transmit BFDV to local kakariki populations.

4.3 Native bird distribution

The distribution of native forest bird species across the seven reserves sampled is fairly typical of relatively small fragmented forest habitats in New Zealand. Species that have adapted well to habitat modification are those that can persist in the presence of mammalian predators and have relatively small territories

such as grey warbler and silvereye. These birds tend to be the most abundant and widespread species in Upper Hutt reserves.

The fantail is one exception, however. Fantails were commonly encountered in all reserves between 2007 and 2010, but were only recorded in three of the seven reserves sampled in 2011. Similar dramatic declines in the distribution and abundance of fantails have been observed in other Wellington forests between late 2010 and late 2011, with fantails becoming extremely rare in the Akatarawa Forest, Kaitoke Regional Park and Wainuiomata Water Catchment Area during this time (GWRC, unpublished data). This sudden, widespread decline was almost certainly caused by the two unusually heavy snowfall events that occurred in July and August 2011. Fantails are known to be particularly vulnerable to sudden declines and even local extinction following severe weather events (Miskelly & Sagar 2008). Their high productivity however, means they usually quickly recover to former numbers (Heather & Robertson 1996). As of May 2012, fantails are being encountered more and more frequently in the Hutt Valley and surrounding tracts of forest, indicating that recovery of local populations is already well underway (N. McArthur, pers. obs.).

Several bird species that require larger tracts of forest in order to maintain viable populations are also present in the Upper Hutt City reserves. Those species with the strongest dispersal abilities such as tui and kereru are more widespread than species with relatively poor dispersal abilities such as bellbird. Govella et al. (2011) were surprised that bellbird had not been recorded from Wi Tako reserve between 2007 and 2010, given that this reserve is relatively large and well-connected to surrounding areas of forest. Bellbird were detected in Wi Tako in 2011, again suggesting that the new survey design has improved our ability to detect relatively scarce species when they are present.

Wi Tako Reserve and Keith George Memorial Park have both emerged again this year as the most important reserves for native birds out of the seven reserves surveyed. Both reserves support the most diverse native forest bird communities in the area and are the only two reserves to support resident populations of whitehead and tomtit. Kakariki have been recorded in both reserves over the past two years and this species may be in the process of re-colonising these reserves after being absent for many decades (Govella et al. 2011). Riflemen were detected for the first time in Wi Tako reserve in 2011, the first time that this species has been recorded in any of the seven reserves surveyed since monitoring began in 2005. We recommend that both Keith George and Wi Tako reserves be considered high priorities for ongoing control of mammalian predators such as rats, possums and mustelids. We also recommend that these bird counts be repeated annually to monitor any ongoing changes in the diversity, abundance and distribution of native forest birds in these reserves.

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Appendix

This appendix contains lists of bird species encountered in each Upper Hutt reserve sampled between 2009 and 2011 (P = present). Threat classification rankings as per Miskelly et. al. (2008). (DE - Declining; RE - Relict; NT - Not threatened; I - Introduced and naturalised).

Cloustonville Park

Scientific Name	Common Name	Threat Ranking	2009	2010	2011
Anas platyrhynchos	mallard	I	P	P	
Anthornis melanura	bellbird	NT		P	
Chrysococcyx lucidus	shining cuckoo	NT	P		P
Circus approximans	swamp harrier	NT		P	
Fringilla coelebs	chaffinch	I	P	P	P
Gerygone igata	grey warbler	NT	P	P	P
Gymnorhina tibicen	Australian magpie	I		P	
Hemiphaga novaeseelandiae	New Zealand pigeon	NT	P		
Hirundo neoxena	welcome swallow	NT			P
Platycercus eximius	eastern rosella	I	P		P
Prosthemadera novaeseelandiae	tui	NT	P	P	P
Rhipidura fuliginosa	fantail	NT	P	P	
Sturnus vulgaris	starling	I	P		
Todiramphus sanctus	New Zealand kingfisher	NT	P		
Turdus merula	blackbird	I	P	P	P
Zosterops lateralis	silvereye	NT	P	P	P

Emerald Hill

Scientific Name	Common Name	Threat Ranking	2009	2010	2011
Anthornis melanura	bellbird	NT		P	
Carduelis carduelis	goldfinch	I			P
C. flammea	redpoll	I			P
Chrysococcyx lucidus	shining cuckoo	NT	P	P	P
Fringilla coelebs	chaffinch	I	P	P	P
Gerygone igata	grey warbler	NT	P	P	P
Gymnorhina tibicen	Australian magpie	I		P	P
Passer domesticus	house sparrow	I		P	P
Platycercus eximius	eastern rosella	I	P	P	P
Porphyrio porphyrio	pukeko	NT			P
Prosthemadera novaeseelandiae	tui	NT	P	P	P
Prunella modularis	dunnock	I			P
Rhipidura fuliginosa	fantail	NT	P	P	
Sturnus vulgaris	starling	I	P	P	P
Todiramphus sanctus	New Zealand kingfisher	NT	P	P	P
Turdus merula	blackbird	I	P	P	P
T. philomelos	song thrush	I		P	P
Vanellus miles	spur-winged plover	NT	P	P	
Zosterops lateralis	silvereye	NT	P	P	P

Keith George Memorial Park

Scientific Name	Common Name	Threat Ranking	2009	2010	2011
Anthornis melanura	bellbird	NT	P	P	P
Carduelis carduelis	goldfinch	I			P
Chrysococcyx lucidus	shining cuckoo	NT		P	P
Cyanoramphus sp *(novaezelandiae?)*	kakariki	RE		P	
Emberiza citrinella	yellowhammer	I			P
Fringilla coelebs	chaffinch	I		P	P
Gerygone igata	grey warbler	NT	P	P	P
Hemiphaga novaeseelandiae	New Zealand pigeon	NT	P	P	P
Larus dominicanus	black-backed gull	NT	P	P	P
Mohoua albicilla	whitehead	NT	P	P	P
Petroica macrocephala	tomtit	NT	P	P	P
Platycercus eximius	eastern rosella	I		P	P
Prosthemadera novaeseelandiae	tui	NT	P	P	P
Prunella modularis	dunnock	I			P
Rhipidura fuliginosa	fantail	NT	P	P	P
Tadorna variegata	paradise shelduck	NT	P		
Todiramphus sanctus	New Zealand kingfisher	NT		P	P
Turdus merula	blackbird	I	P	P	P
T. philomelos	song thrush	I			P
Vanellus miles	spur-winged plover	NT			P
Zosterops lateralis	silvereye	NT	P	P	P

Maidstone Park

Scientific Name	Common Name	Threat Ranking	2009	2010	2011
Alauda arvensis	skylark	I			P
Anthornis melanura	bellbird	NT		P	
Callipepla californica	California quail	I		P	
Carduelis carduelis	goldfinch	I			P
Chrysococcyx lucidus	shining cuckoo	NT			P
Emberiza citrinella	yellowhammer	I			P
Fringilla coelebs	chaffinch	I	P	P	P
Gerygone igata	grey warbler	NT	P	P	P
Gymnorhina tibicen	Australian magpie	I	P		P
Hemiphaga novaeseelandiae	New Zealand pigeon	NT			P
Larus dominicanus	black-backed gull	NT			P
Platycercus eximius	eastern rosella	I	P	P	P
Prosthemadera novaeseelandiae	tui	NT	P	P	P
Prunella modularis	dunnock	I			P
Rhipidura fuliginosa	fantail	NT	P	P	
Todiramphus sanctus	New Zealand kingfisher	NT	P	P	P
Turdus merula	blackbird	I	P	P	P
T. philomelos	song thrush	I			P
Zosterops lateralis	silvereye	NT	P	P	P

Riverstone Park

Scientific Name	Common Name	Threat Ranking	2009	2010	2011
Alauda arvensis	skylark	I			P
Callipepla californica	California quail	I	P		
Carduelis carduelis	goldfinch	I			P
Chrysococcyx lucidus	shining cuckoo	NT	P	P	
Fringilla coelebs	chaffinch	I	P	P	P
Gerygone igata	grey warbler	NT	P	P	P
Passer domesticus	house sparrow	I			P
Prosthemadera novaeseelandiae	tui	NT	P	P	P
Prunella modularis	dunnock	I			P
Rhipidura fuliginosa	fantail	NT	P	P	
Turdus merula	blackbird	I	P	P	P
Zosterops lateralis	silvereye	NT	P		P

Trentham Memorial Park

Scientific Name	Common Name	Threat Ranking	2009	2010	2011
Carduelis carduelis	goldfinch	I	P		
Chrysococcyx lucidus	shining cuckoo	NT			P
Fringilla coelebs	chaffinch	I	P	P	P
Gerygone igata	grey warbler	NT	P	P	P
Gymnorhina tibicen	Australian magpie	I	P	P	
Hemiphaga novaeseelandiae	New Zealand pigeon	NT	P	P	
Larus dominicanus	black-backed gull	NT	P	P	
Passer domesticus	house sparrow	I	P	P	
Platycercus eximius	eastern rosella	I	P	P	P
Prosthemadera novaeseelandiae	tui	NT	P	P	P
Prunella modularis	dunnock	I			P
Rhipidura fuliginosa	fantail	NT	P	P	P
Sturnus vulgaris	starling	I	P	P	P
Tadorna variegata	paradise shelduck	NT		P	
Todiramphus sanctus	New Zealand kingfisher	NT	P	P	P
Turdus merula	blackbird	I	P	P	P
T. philomelos	song thrush	I	P	P	P
Vanellus miles	spur-winged plover	NT	P		
Zosterops lateralis	silvereye	NT			P

Wi Tako Reserve

Scientific Name	Common Name	Threat Ranking	2009	2010	2011
Acanthisitta chloris	rifleman	DE			P
Anas platyrhynchos	mallard	I	P		
Anthornis melanura	bellbird	NT			P
Carduelis carduelis	goldfinch	I			P
Chrysococcyx lucidus	shining cuckoo	NT	P	P	P
Circus approximans	swamp harrier	NT	P		
Cyanoramphus sp *(novaezelandiae?)*	kakariki	RE			P
Fringilla coelebs	chaffinch	I	P	P	P
Gerygone igata	grey warbler	NT	P	P	P
Gymnorhina tibicen	Australian magpie	I	P	P	
Hemiphaga novaeseelandiae	New Zealand pigeon	NT	P	P	P
Larus dominicanus	black-backed gull	NT	P	P	P
Mohoua albicilla	whitehead	NT			P
Passer domesticus	house sparrow	I			P
Petroica macrocephala	tomtit	NT	P	P	P
Platycercus eximius	eastern rosella	I	P	P	P
Porphyrio porphyrio	pukeko	NT	P	P	P
Prosthemadera novaeseelandiae	tui	NT	P	P	P
Prunella modularis	dunnock	I			P
Rhipidura fuliginosa	fantail	NT	P	P	P
Sturnus vulgaris	starling	I	P	P	

Wi Tako Reserve contd.

Scientific Name	Common Name	Threat Ranking	2009	2010	2011
Tadorna variegata	paradise shelduck	NT	P	P	P
Todiramphus sanctus	New Zealand kingfisher	NT	P	P	P
Turdus merula	blackbird	I	P	P	P
T. philomelos	song thrush	I	P	P	P
Vanellus miles	spur-winged plover	NT	P		
Zosterops lateralis	silvereye	NT	P	P	P

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