

# **SPENCER ROAD – Lake Tarawera**

## **BIRD MONITORING – 2020**

### **Five Minute Bird Counts**



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For the Bay of Plenty Regional Council (BOPRC). April 2021



# CONTENTS

Summary .....	4
Introduction .....	5
Method .....	6
Results and Discussion.....	7
Working Conditions.....	7
2020 Bird Survey Summary.....	8
Comparison with Previous 5MBC Results.....	11
Bird Population Trends.....	12
Proposed Listening Station Removals.....	18
Conclusion .....	21
Recommendations .....	22
Acknowledgements .....	23
References .....	24
Table 1. Conditions During Recording.....	7
Table 2. Summary Data of All Birds Counted in 2020 Survey .....	9
Table 3. Summary Data of All Spencer Road 5MBC Surveys.....	11
Table 4. Trends of Population Changes.....	12
Table 5. Distances Between Recording Stations.....	18
Table 6. Effect of Proposed Sampling Changes to Average Bird Counts Per Station...	19
<i>Appendix 1. Count Stations.....</i>	<i>24</i>
<i>Appendix 2. Names of bird species recorded – Spencer Road count station locations</i>	<i>25</i>
<i>Appendix 3. Map of Tarawera Settlement – Pest Control Area.....</i>	<i>27</i>

## SUMMARY

A series of 5 Minute Bird Counts (5MBC) were carried out in the Lake Tarawera settlement along Spencer Road (and some side roads) on three fine days in November and December of 2020. 5MBCs have been carried out every 3 to 5 years to help gauge the success of the rodent pest control undertaken by the community since 2000.

5MBCs are an index measure, used in this instance, to monitor bird abundance and changes in bird density and species. Results of bird counts can only suggest changes and possible trends over time.

The 2020 5MBCs were the fifth series of bird counts to be carried out in the past 15 years. Previous 5MBCs were undertaken in 2005, 2008, 2011 and 2016. All counts have been carried out at approximately the same time of year and all but the 2005 counts were undertaken by the author.

The number of birds recorded, expressed as an average per count station by year, shows a steady increase from 12 birds per station in 2005, to 41 in 2011. The number has plateaued around this level since.

The number of bird species has increased, year on year, to the highest recorded number this year, at 42 different species.

The Lake Tarawera Pest Control Group (LTPCG), are a volunteer group of mostly residents, linked to the Tarawera Rate Payers Association. They organise and carry out pest control (targeting rodents) throughout the year on private properties and reserve land in the settlement area of Tarawera, as well as on Kariri Peninsula. The work of this group is supported and sponsored by the Bay of Plenty Regional Council (BOPRC).

The results of this study indicate one successful outcome of their work

# INTRODUCTION

Lake Tarawera settlement is approximately 16 kilometres from Rotorua city. Spencer Road is approximately 8 kilometres in length and is the main access road along the north-western side of Lake Tarawera and for the settlement of houses there.

On the western side of Spencer Road above the houses are plantations of pine and eucalyptus trees, farmland and pockets of native forest. East of Spencer Road is Lake Tarawera itself and at the northern end of the road is native forest which connects with Lake Okataina.

Approximately 440 residences (of these only about 25% are permanent residents) are dotted through the well vegetated strip of land between Lake Tarawera and the farmland above, forming a corridor of native vegetation, exotic garden plants, large trees, lawns, wetland and farmland. The different habitats and variety of plants growing there provide food and shelter for birds and other wildlife throughout the year.

## Pest control:

Organised pest control targeting rodents began in June 2000 and was carried out by volunteers to reduce a major rodent infestation in the settlement at the time. Regular pest control has continued since then and still targets rodents in an effort to prevent further infestations, improve the general environment, and continue to enhance the native birdlife.

Pest control involves LTPCG volunteers checking and topping up bait stations positioned on properties throughout the settlement. The toxic baits used are Ditrac wax block baits, which are secured in bait stations on a vertical wire rod. Ditrac is a rodenticide containing the anticoagulant diphacinone, which is effective at killing rats and mice.

The LTPCG organise and carry out pest control throughout the year and are sponsored by the Bay of Plenty Regional Council (BOPRC).

## Five Minute Bird Counts:

5MBC surveys are a simple way of monitoring some of the benefits and changes in the environment, brought about by, in this case, regular rodent control.

Birds are preyed on by rodents, are conspicuous in the environment, and therefore are relatively easy to record to monitor changes in their abundance, density and variety over time. Many of these changes will be noticed by residents living at Tarawera and volunteers carrying out the rodent control, which encourages the continuation of their project.

### Report:

This report covers the 5MBC survey that took place in November and December of 2020 along Spencer Road and some adjoining roads. It includes the survey results, interpretation and recommendations.

## METHOD

Standard five-minute bird count (5MBC) methodology, (Dawson and Bull; 1975) was used for this survey.

Count stations are spaced approximately 100 to 200 metres apart along Spencer Road and several side roads. Birds seen or heard over a five-minute period were recorded. In previous surveys this was limited to a 100m distance from the station but this is no longer the standard technique. The time, date and weather conditions (sun, wind, temperature, precipitation) were also recorded at each station for each count carried out.

Bird counts were carried out between 9.00am and 1.00pm (NZ standard time) to be consistent with previous counts and to avoid both the dawn chorus and the quiet afternoon periods. All counts were conducted in fine, still conditions with no rain. Weekend days were avoided due to the extra noise, traffic and activity typical at that time of the year. Survey dates were; 20.11.2020, 27.11.2020, 11.12.2020.

To further randomise counts, on two occasions, the stations were visited in order, working from the South (19 Spencer Road) to the Northern end (591 Spencer Road), and the reverse on the other morning. This was an attempt to ensure specific stations were not visited around the same time each morning.

The same count stations were used this survey as were used in previous years, (2005, 2008, 2011 and 2016), and were located using existing residential house numbers.

See Appendix 1.

In 2005: 40 counts were made from 23 count stations over 5 days.

In 2008: 40 counts were made from 23 count stations over 4 days.

In 2011: 40 counts were made from 23 count stations over 4 days.

In 2016: 40 counts were made from 23 count stations over 3 days.

In 2020: 67 counts were made from 23 count stations over 3 days



Typical road edge vegetation.

## RESULTS & DISCUSSION

### Working Conditions

During the survey, at each station, a rating is recorded for temperature, wind, noise, amount of sun and amount of precipitation. These provide an indicator of the suitability of the conditions for bird counting. Table 1 shows the summary of these conditions.

**Table 1. Conditions During Recording**

	Average	Minimum	Maximum
Temperature.	4.5	4	5
Wind	0.4	0	2
Noise	0.4	0	1
Sun	5.0	5	5
Precipitation. Type	0.0	0	0

Temperature here is scored as either 4, which is 'mild' (11-15°C) or 5, which is 'warm' (16-22°C). The average was therefore around 15 to 16°C.

The wind score varied between no wind (0) and a score of 2 where leaves & branches are in motion. This high score equates to 3 or 4 on the Beaufort scale. Wind levels are important

as too much wind inhibits bird activity, and reduces the ability to hear calls. The average score of only 0.4 shows how little wind occurred during recording.

Noise levels were low, ranging from no background noise to a score of 1, which indicates moderate or variable noise. Typically, this was road noise from passing cars, but also included boats, and human activity such as chainsaws or hammering. These levels were not sufficient to affect the survey as they were neither loud enough, nor prolonged enough to affect the survey as indicated by the average of only 0.4.

Sun is recorded as minutes out of 5 so the score here reflects the 100% of sun experienced during the three mornings.

The precipitation score of zero, shows that there was no rain. Again, this can be important as birds are less obvious during inclement weather.

Table 1 shows that overall conditions during the survey were close to ideal and would have no effect on the accuracy of results.

### 2020 Bird Survey Summary

Table 2 summarises the full records of birds recorded. Excluding differences between data from other years which will be discussed further below, there are a wide range of observations that can be gleaned from this data.

1. Species recorded included a mix of water birds (13), forest passerines (9), introduced garden/farmland passerines (14) plus a number of domesticated or open country birds.
2. 5 of the top 10 most common species are introduced from Europe. These are House Sparrow, Starling, Blackbird, Chaffinch and Thrush. The prevalence of these birds indicates the mostly open 'farmland' type environment coupled with the large numbers of gardens, which are the natural environs for these species.
3. Of the indigenous species, Tui were second most common of all birds recorded followed by Scaup, and Bellbird. That Tui and Bellbird were so high on the rankings is, presumably, indicative of their being predominantly nectar feeding. There is a wide range and number of flowering plants in the gardens along Spencer Road which provide food, and the nearby indigenous forest on the slopes to the north provide natural habitat. Scaup of course were commonly seen in the nearby lake but they were the only water bird in the top 10 ranking. Next was the Australasian Coot at 15<sup>th</sup> on the list.
4. 42 different species were recorded which was the highest number so far.
5. For the second survey in a row a single Tomtit was heard calling at the far end of Spencer Road (this year at number 510).



6. Ignoring waterbirds, the station with the most of any single species was at 152 Spencer Road where 22 House Sparrows were counted on one occasion.
7. There was no species recorded at every station but the most widespread species noted was Tui. There was only 1 station, on 1 occasion where Tui were not recorded.
8. The site with most birds recorded on any single day was 524 Spencer Road with 181. 110 of these were Scaup and this was the highest number of any single species recorded for any single count.
9. The site with least birds on any day was 54 Spencer Road with only 17.
10. Grey ducks and Mallard ducks interbreed freely to the point where it is unlikely there are any true 100% Grey ducks left and it is difficult to identify which species dominates in any particular bird. Because of this no attempt was made to separate these and they have simply been recorded as 'Grallards'.
11. At the time of year that the surveys are carried out there are quite a number of fledglings about. These are non-descript in colour and behaviour and their call is often simply a piping for food. As these are difficult to distinguish from one another they have mostly been recorded as unknown.
12. Of the species recorded a number could be described as 'pest' species. These include Eastern Rosella, Canada Geese and Magpies. There were not high numbers of any of these species recorded.
13. Not evident in the data but this survey is unusual in that a very high percentage of the birds recorded are seen. This is unlike forest-based surveys, for example, where an ability to identify birds from calls is paramount, and it means that the data have a high level of accuracy in clearly identifying individual species.

**Table 2. Summary Data of All Birds Counted in 2020 Survey**  
(birds ranked in order of abundance)

	<b>Bird Species Recorded</b>	<b>Total recorded</b>	<b>Average per station</b>	<b>Maximum per station</b>	<b>Minimum per station</b>
1	House Sparrow	498	7.4	22	0
2	Tui**	435	6.5	15	0
3	Starling	356	5.3	18	0
4	Blackbird	326	4.9	10	0
5	Scaup**	275	4.1	110	0
6	Bellbird**	183	2.7	5	0
7	Chaffinch	160	2.4	6	0
8	Kereru**	140	2.1	10	0
9	Swallow*	84	1.3	7	0
10	Thrush	44	0.7	4	0
11	Californian Quail	42	0.6	4	0

	<b>Bird Species Recorded</b>	<b>Total recorded</b>	<b>Average per station</b>	<b>Maximum per station</b>	<b>Minimum per station</b>
12	Grey Warbler**	41	0.6	4	0
13	Greenfinch	28	0.4	4	0
14	Shining Cuckoo*	26	0.4	2	0
15	Eurasian Coot*	21	0.3	5	0
16	Hedge Sparrow	19	0.3	3	0
17	Goldfinch	17	0.3	3	0
18	Kingfisher*	17	0.3	4	0
19	Gull, Black backed*	17	0.3	4	0
20	Australasian Harrier*	17	0.3	2	0
21	Myna	14	0.2	3	0
22	Dabchick**	14	0.2	5	0
23	Fantail**	12	0.2	2	0
24	Rosella, Eastern	12	0.2	2	0
25	Goose, Canada	11	0.2	3	0
26	Magpie	11	0.2	2	0
27	Shag, Black*	11	0.2	2	0
28	Black Swan*	9	0.1	5	0
29	Yellow hammer	7	0.1	2	0
30	Shag, Little*	7	0.1	2	0
31	Silvereye*	5	0.1	2	0
32	Domestic fowl	5	0.1	1	0
33	Shag, Little black*	5	0.1	5	0
34	Grallard# (Grey & mallard duck)	3	0.0	2	0
35	Pheasant	2	0.0	1	0
36	Dove, Spotted	2	0.0	1	0
37	Gull, red billed*	2	0.0	1	0
38	Heron, white faced*	2	0.0	1	0
39	Peacock	1	0.0	1	0
40	Pukeko*	1	0.0	1	0
41	Redpoll	1	0.0	1	0
42	Tomtit*	1	0.0	1	0
43	Unknown (e.g., juveniles, finches)	89	1.3	6	0
	<b>All species</b>	<b>2973</b>	<b>44.4</b>	<b>181</b>	<b>17</b>

\* Designates indigenous species.

\*\* Designates endemic species.

# Gray and mallard ducks interbreed to the extent that neither species can be identified with accuracy.

## Comparison With Previous 5MBC Results

Table 3 summarises the basic numbers from all 5 surveys that have been undertaken at Spencer Road. This highlights some differences, some similarities and the important trend of increasing bird numbers.

Firstly, changes to the survey methodology were made this year in keeping with current accepted practice. In the past only birds within 100m of the site were recorded. The disadvantages of that method are in accurately identifying the 100m 'cut-off', and that it means you miss important species such as Australasian Harrier (Kahu) and water birds, plus a range of species where the natural habit is to travel between food sources (e.g., Tui, Kereru, or Starlings). All species benefit from pest control and past surveys may have missed important population changes in some of these species.

Secondly, an attempt was made to record from all sites on each of the 3 mornings. A number of stations are actually too close to each other and results from all stations was required to analyse the data change should some of these be removed from the sample.

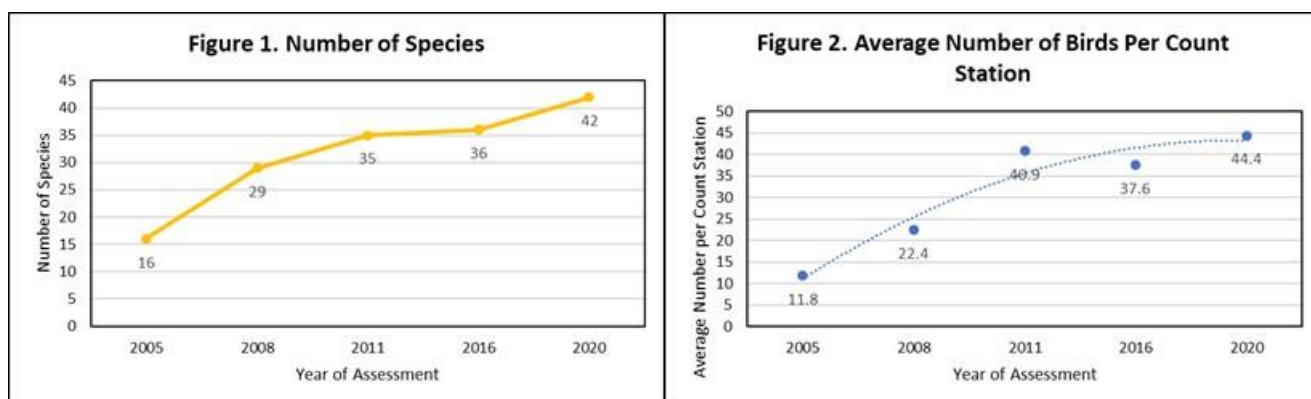
These two factors will have swelled both the total number of birds recorded, and the average number of birds per count station.

The total number of species recorded continues to increase, albeit slowly (Figure 1). Two species that are so far absent, that might be sighted in the future, are North Island Robin/Toutouwai (*Petroica longipipes*) and Karearea/Falcon (*Falco novaeseelandiae*).

Secondly, the average number of birds per station at 44.4 is probably not significantly different from 2011 or 2016, given the methodology change. So, it seems evident that the residents, due to their pest control, have successfully increased total bird populations to the 2011 level and have sustained their effort well, as the bird numbers have plateaued since (Figure 2). This is a very clear overall indicator of the worth of the pest management on bird populations in general.

**Table 3. Summary Data of All Spencer Road 5MBC Surveys**

Year	Months	Count days	Number of count stations	Total birds	Number of Species	Average per count station
2005	Nov	5	40	472	16	11.8
2008	Nov/Dec	4	40	897	29	22.4
2011	Nov/Dec	4	40	1638	35	40.9
2016	Nov/Dec	3	40	1505	36	37.6
<b>2020</b>	<b>Nov/Dec</b>	<b>3</b>	<b>67</b>	<b>2973</b>	<b>42</b>	<b>44.4</b>



## Bird Population Trends

For most species, there was little discernible change in bird numbers from 2016 to 2020 (Table 4). Seven species had obvious increases. These were House Sparrow, Starlings, Blackbirds, Scaup (most probably related to recording from more distant than 100m), Chaffinch, Kereru and Welcome Swallow. Nine species showed decline but for most this is probably just natural sampling variability. The exception perhaps is for Myna.

**Table 4. Trends of Population Changes**

No.	Species	2005	2008	2011	2016	2020*	Change from 2016	
							Trend	Percent
1	House Sparrow <sup>#</sup>	66	85	215	187	297	↑	59%
2	Tui	72	169	310	303	260	↓	-14%
3	Starling	12	157	281	127	213	↑	67%
4	Blackbird	152	76	160	160	195	↑	22%
5	Scaup, New Zealand	0	0	35	66	164	↑	149%
6	Bellbird	36	46	72	102	109	⇒	7%
7	Chaffinch	31	76	120	77	96	↑	24%
8	Kereru	10	40	73	38	84	↑	120%
9	Welcome Swallow	0	16	37	34	50	↑	47%
10	Thrush, Song	29	26	28	19	26	⇒	38%
11	Californian Quail	6	10	31	37	25	↓	-32%
12	Grey Warbler	10	28	21	34	24	↓	-28%
13	Greenfinch	32	25	24	36	17	↓	-54%
14	Shining Cuckoo	4	17	16	21	16	⇒	-26%
15	Eurasian Coot	0	4	8	13	13	⇒	-4%
16	Hedge Sparrow <sup>#</sup>	0	2	15	4	11	⇒	184%

							Change from 2016	
No.	Species	2005	2008	2011	2016	2020*	Trend	Percent
17	Kahu/Australasian Harrier	4	3	2	4	10	⇒	154%
18	Kingfisher	8	7	5	22	10	↓	-54%
19	Gull, Black-backed	0	12	11	27	10	↓	-62%
20	Goldfinch	0	11	12	27	10	↓	-62%
21	Dabchick, New Zealand	0	0	3	6	8	⇒	39%
22	Myna	20	33	36	60	8	↓	-86%
23	Fantail	0	8	15	8	7	⇒	-10%
24	Rosella, Eastern	0	8	7	11	7	⇒	-35%
25	Shag, Black	0	0	2	5	7	⇒	31%
26	Canada Goose	0	0	29	2	7	⇒	228%
27	Australian Magpie	0	0	1	1	7	⇒	557%
28	Black Swan	0	2	19	0	5	⇒	na
29	Shag, Little	0	2	1	2	4	⇒	109%
30	Yellowhammer	0	14	2	4	4	⇒	4%
31	Silvereeye	8	6	8	21	3	↓	-86%
32	Domestic fowl	0	0	0	0	3	⇒	na
33	Shag, Little Black	0	0	0	0	3	⇒	na
34	Grallard	0	0	0	0	2	⇒	na
35	White-Faced Heron	0	0	4	0	1	⇒	na
36	Gull, Red-billed	0	6	0	4	1	⇒	-70%
37	Pheasant, Ring-necked	0	0	3	3	1	⇒	-60%
38	Spotted Dove	0	0	0	1	1	⇒	19%
39	Pukeko	0	1	2	2	1	⇒	-70%
40	Peafowl	0	0	0	0	1	⇒	na
41	Redpoll	0	0	0	0	1	⇒	na
42	Tomtit	0	0	0	0	1	⇒	na
43	Spur-winged Plover	0	0	0	2	0	⇒	-100%
44	Skylark	8	4	2	2	0	⇒	-100%
	Unknown**	0	3	28	33	53	↑	61%
	<i>Total Bird Numbers →</i>	472	897	1638	1505	1775	⇒	18%
	<i>Total Bird Species →</i>	16	29	35	36	42	⇒	17%

\*2020 data has been adjusted to represent the equivalent of 40 stations to enable direct comparison with previous years.

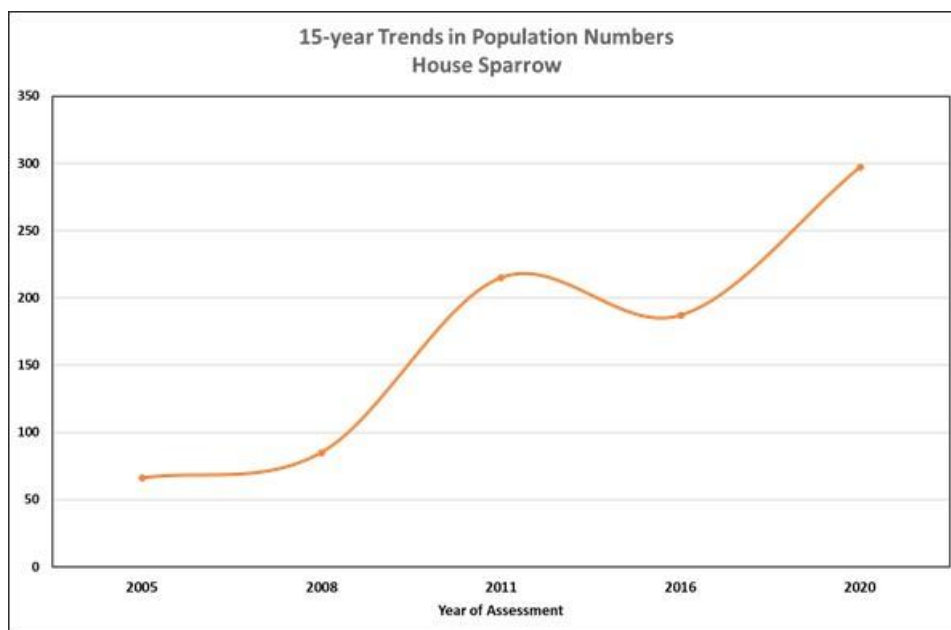
# In 2005 no Hedge Sparrows were recorded and it is hypothesised that Sparrows were not separated by species so some House Sparrow counts may actually be Hedge Sparrows.

\*\* Predominantly fledglings but also indistinguishable finches

Key individual trend changes for the 6 most common species, plus 2 unusual results (Kereru and Myna) are discussed here.

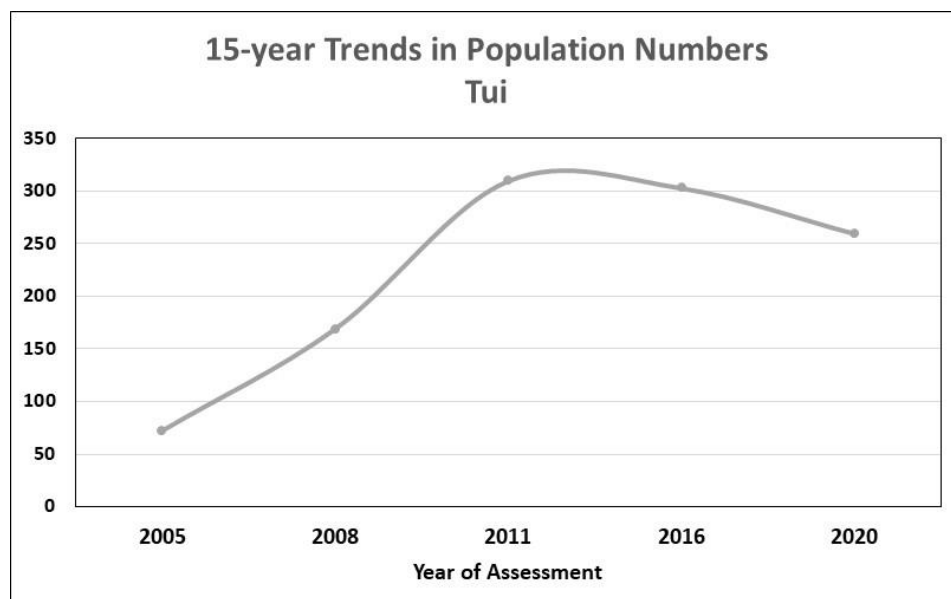
### House Sparrow

House Sparrow were the most common species recorded and this graph shows that their numbers have steadily increased since the start of these surveys. This is probably a good indication of the effect of ship rat control by the local community but may also reflect increased urbanisation in the area as sparrows do well in built-environments.



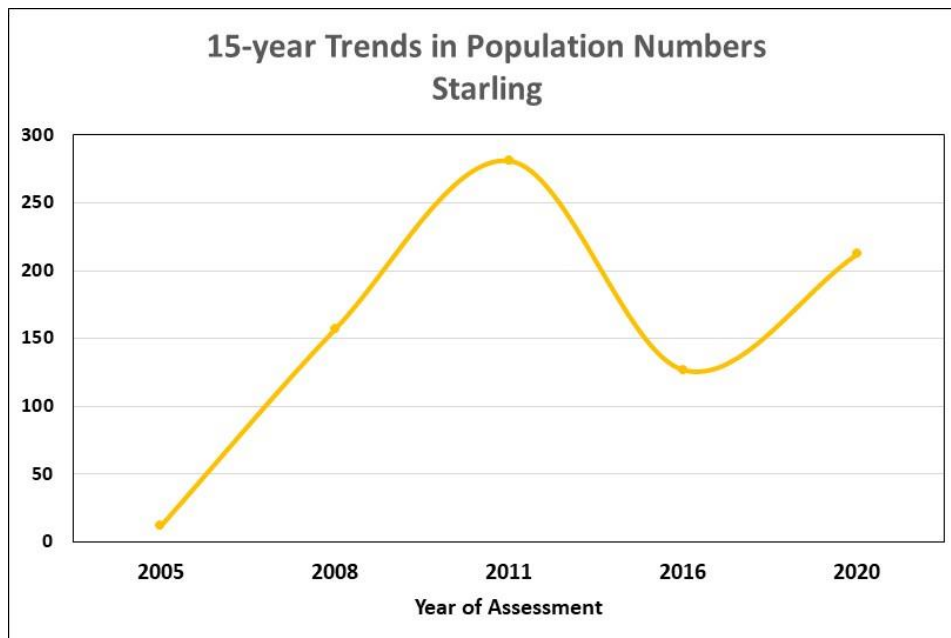
### Tui

Although the second most common species recorded in the survey, Tui appear to have reached a plateau in numbers about 2011. They are a very territorial bird and may have reached capacity for the area and food availability.



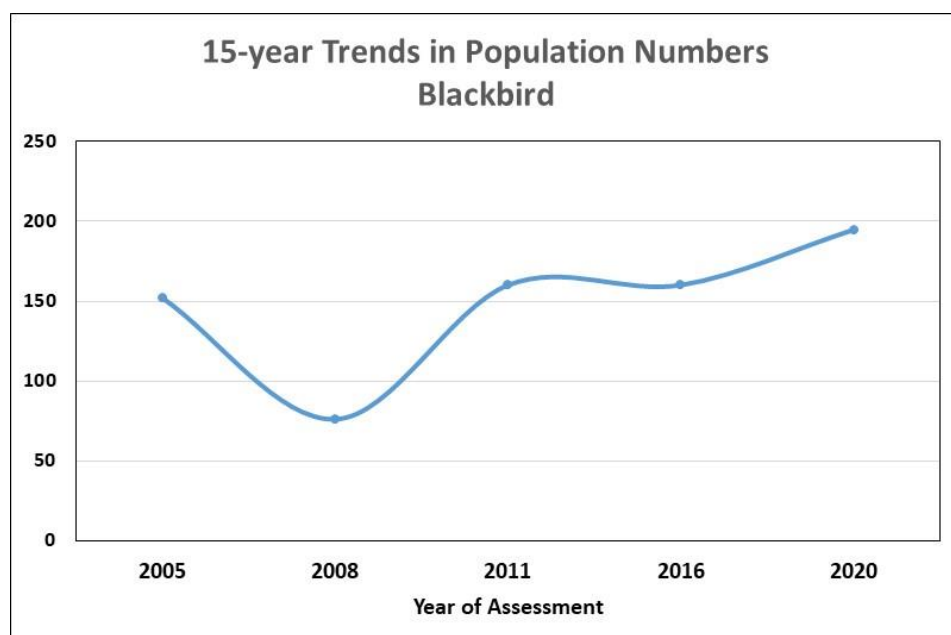
### ***Starling***

Starlings, the third most common species this survey, had a peak in numbers in 2011, followed by a population decrease in 2016 and recovery this year. Further trend data will be required but they may be plateauing in numbers also. As a species common on farmland there may also be some effect of changing local land use.



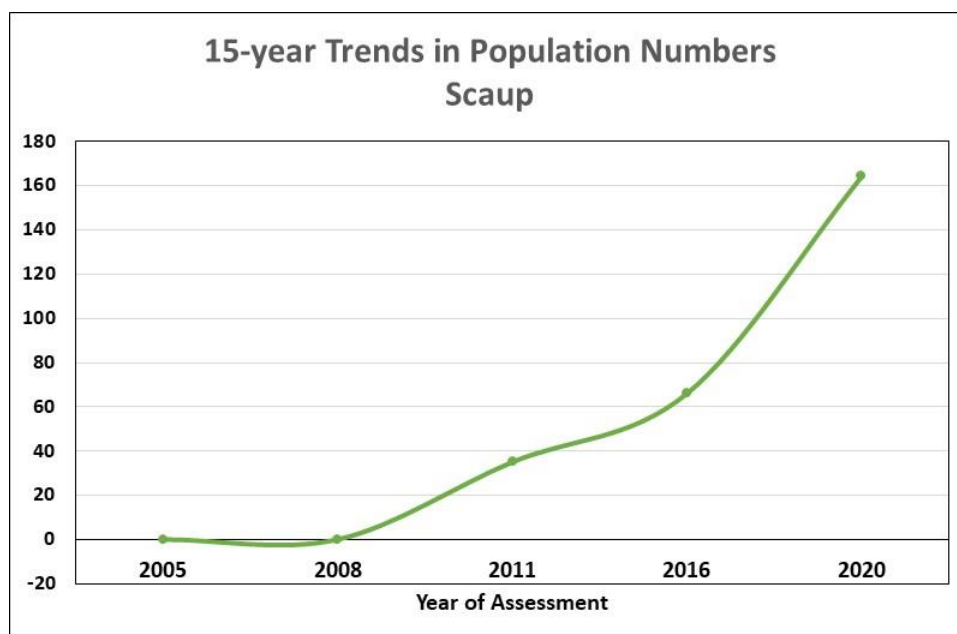
### ***Blackbird***

Blackbird numbers, unlike the first 3 species on this list, never showed the marked increases in numbers when rat control began in the community. This species is very successful and adaptable, and survives well across a range of environments. For example, Thrush which live in the same urban environment, and have much the same diet, are only about 17% of the total number of Blackbirds.



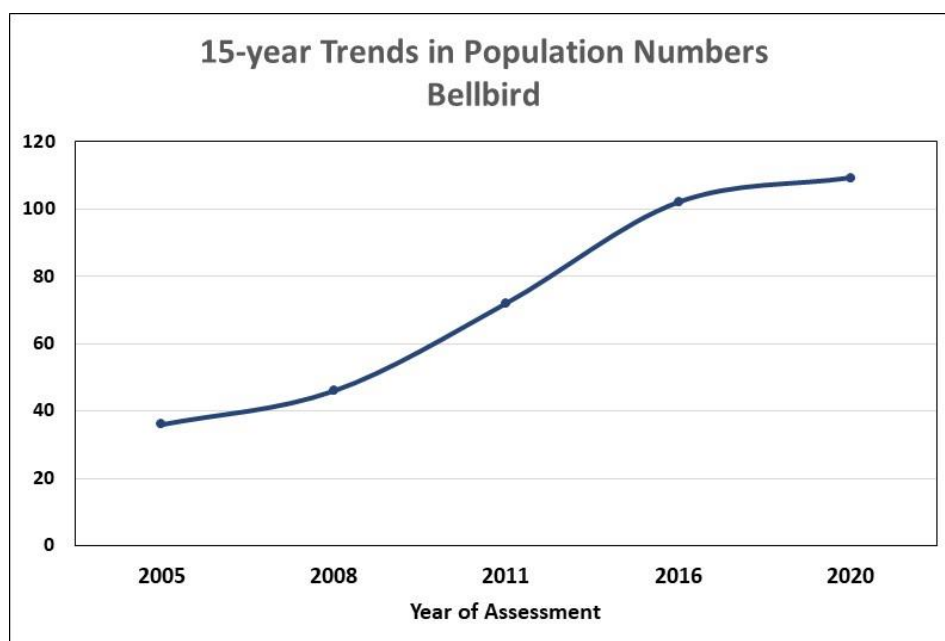
### ***Scaup***

This species appears to have increased significantly but the 5 yearly water bird surveys carried out by Department of Conservation (unpublished data) show that overall numbers have not increased at Tarawera since 2008. The particularly high record this year is caused by recording all birds seen, rather than just those up to 100m, and on one occasion, at one station, a flock of 110 were present just by chance.



### ***Bellbird***

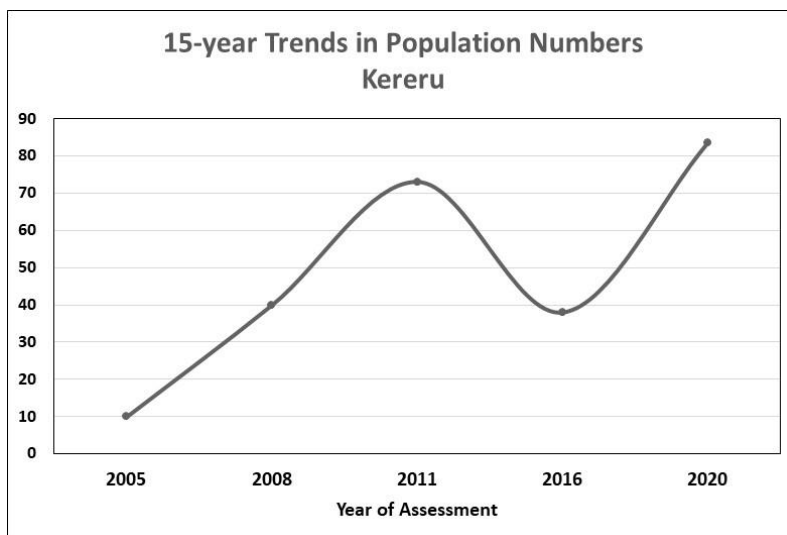
This iconic species has shown considerable increases up to 2016 but like other species may be plateauing in total population numbers. This is a similar trend to Tui which share similar habitat and food sources.





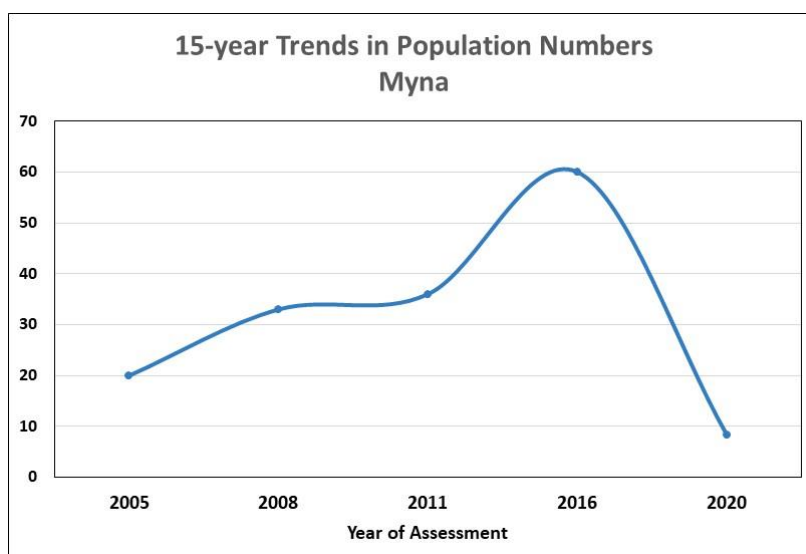
## Kereru

The trend for Kereru is dominated by a wide fluctuation in the last 3 surveys after a significant increase from the start of monitoring (and rat control). This species is mobile and follows favourite foods, which at Tarawera includes the flowering cherry (*Prunus sp.*). Seasonal variability in this food source will affect numbers and may have caused the decrease in 2016. Also, in this year, a large number of Kereru were seen flying, but further away than 100m. In previous years these birds would not have been counted.



## Myna

The trend in this graph is very difficult to rationalise. There has been no reported decline in Myna numbers nationally. After the first of the 3 mornings of this survey it was noted how few Myna were present and this remained true in the following two mornings. Such a dramatic decrease in numbers, since 2016, cannot be attributed to factors of local change in the environment, such as increased housing and garden numbers. A reduction in Myna can be beneficial to indigenous species as they are aggressive competitors.



## Proposed Listening Station Removals

It was noted during the survey that some stations were closer than recommended to each other which can result in double counting of some individual birds. Table 5 shows the full list of station addresses and the distance these are from the previous station. It is proposed that the three stations highlighted are dropped from future assessments to give a total of 20 stations. If each site is assessed twice then that gives the standard 40 visitations that have been the norm in previous reports. In the table the proposed shorter list of 20 are shown with the adjusted distances for comparison.

**Table 5: Distances Between Recording Stations**

All Stations			Proposed Reduction		
No.	Address	Distance from last station	No.	Address	Distance from last station
1	19 Spencer Rd		1	19 Spencer Rd	
2	33 Spencer Rd	215	2	33 Spencer Rd	215
3	54 Spencer Rd	227	3	54 Spencer Rd	227
4	75 Spencer Rd	158	4	75 Spencer Rd	158
5	93 Spencer Rd	202	5	93 Spencer Rd	202
6	133 Spencer Rd	333	6	133 Spencer Rd	333
7	152 Spencer Rd	222	7	152 Spencer Rd	222
8	165 Spencer Rd	124	8	177 Spencer Rd	203
9	177 Spencer Rd	108	9	199 Spencer Rd	196
10	199 Spencer Rd	196	10	225 Spencer Rd	234
11	225 Spencer Rd	234	11	248 Spencer Rd	238
12	248 Spencer Rd	238	12	10 Waitangi Rd	399
13	265 Spencer Rd	142	13	450 Spencer Rd	1010
14	10 Waitangi Rd	284	14	1 Ronald Rd	298
15	450 Spencer Rd	1010	15	Solitaire Lodge	260
16	1 Ronald Rd	298	16	510 Spencer Rd	311
17	Solitaire Lodge	260	17	537 Spencer Rd	281
18	510 Spencer Rd	311	18	568 Spencer Rd	193
19	524 Spencer Rd	137	19	588 Spencer Rd	218
20	537 Spencer Rd	143	20	591 Spencer Rd	164
21	568 Spencer Rd	193			
22	588 Spencer Rd	218			
23	591 Spencer Rd	164			

The 3 stations identified for removal are;

165 Spencer Road - Nothing unusual in the bird data. Gardens and houses on both sides of the road.

265 Spencer Road – Nothing unusual in the bird data. Very narrow road with low bush on 1 side and a small bank on the other. Not a particularly road-safe position.

524 Spencer Road – Data dominated by water birds. Steep bush face on 1 side. Direct views into Lake Tarawera on the other.

In order to evaluate what effect dropping these sites might have on the counts, Table 6 was produced to compare the original data with the records excluding the three count stations. This table shows the average count across all stations by individual bird species for the original 67 count stations (basically all 23 stations measured 3 times), the same data with the 3 non-complying stations removed (20 stations measured 3 times), and finally the selected 20 stations assessed just twice. In the last scenario two sample mornings were selected to include a South to North assessment and a North to South.

**Table 6: Effect of Proposed Sampling Changes to Average Bird Counts Per Station**

<b>Bird Species</b>	<b>23 Stations X 3 visits</b>	<b>20 Stations X 3 visits</b>	<b>20 Stations X 2 visits</b>	<b>Change from 23 to 20 stations</b>	<b>Change from 3 visits to 2 visits.</b>
House Sparrow	7.4	7.5	7.5	0.1	0.0
Tui	6.5	6.4	6.5	-0.1	0.1
Starling	5.3	5.1	5.2	-0.3	0.2
Blackbird	4.9	4.7	4.2	-0.1	-0.6
Scaup	4.1	2.4	2.1	-1.7	-0.3
Bellbird	2.7	2.7	3.0	0.0	0.2
Chaffinch	2.4	2.4	2.5	0.0	0.1
Kereru	2.1	2.0	2.2	-0.1	0.2
Swallow	1.3	1.3	1.1	0.1	-0.2
Thrush	0.7	0.6	0.6	-0.1	0.0
Californian Quail	0.6	0.6	0.5	0.0	-0.2
Grey Warbler	0.6	0.5	0.5	-0.1	0.0
Greenfinch	0.4	0.4	0.5	0.0	0.0
Shining Cuckoo	0.4	0.4	0.4	0.0	0.0
Eurasian Coot	0.3	0.3	0.2	0.0	0.0

Bird Species	23 Stations X 3 visits	20 Stations X 3 visits	20 Stations X 2 visits	Change from 23 to 20 stations	Change from 3 visits to 2 visits.
Hedge Sparrow	0.3	0.3	0.2	0.0	-0.1
Goldfinch	0.3	0.3	0.3	0.0	0.0
Kingfisher	0.3	0.3	0.2	0.0	-0.1
Gull, Black backed	0.3	0.2	0.3	0.0	0.0
Australasian Harrier	0.3	0.2	0.2	-0.1	0.0
Myna	0.2	0.2	0.2	0.0	0.0
Dabchick	0.2	0.1	0.0	-0.1	-0.1
Fantail	0.2	0.2	0.2	0.0	0.1
Rosella, Eastern	0.2	0.2	0.2	0.0	0.0
Goose, Canada	0.2	0.2	0.3	0.0	0.1
Magpie	0.2	0.2	0.2	0.0	0.0
Shag, Black	0.2	0.2	0.2	0.0	0.0
Black Swan	0.1	0.0	0.1	-0.1	0.0
Yellow hammer	0.1	0.1	0.1	0.0	0.0
Shag, Little	0.1	0.1	0.1	0.0	0.0
Silvereye	0.1	0.1	0.1	0.0	0.0
Domestic fowl	0.1	0.1	0.1	0.0	0.0
Shag, Little black	0.1	0.1	0.1	0.0	0.0
Grallard	0.0	0.0	0.0	0.0	0.0
Pheasant	0.0	0.0	0.0	0.0	0.0
Dove, Spotted	0.0	0.0	0.0	0.0	0.0
Gull, red billed	0.0	0.0	0.0	0.0	0.0
Heron, white faced	0.0	0.0	0.0	0.0	0.0
Peacock	0.0	0.0	0.0	0.0	0.0
Pukeko	0.0	0.0	0.0	0.0	0.0
Redpoll	0.0	0.0	0.0	0.0	0.0
Tomtit	0.0	0.0	0.0	0.0	0.0
Unknown	1.3	1.4	1.6	0.1	0.2
<b>All species</b>	<b>44.4</b>	<b>41.8</b>	<b>41.8</b>	<b>-2.6</b>	<b>-0.1</b>

For the two 'improved' scenarios there was negligible effect on the average data for each proposed change. In reducing from 23 to 20 stations only the data for scaup was significantly affected (reduced from 4.1 to 2.4 counts per station) and this also affected the 'All Species' result (down 2.6 counts per station to 41.8 average). The station at 524 Spencer Road had a view directly into Bay View Point. This station had a large number of water birds recorded, dominated by Scaup. On the 3 visits to this site the Scaup counts

were 0, 110 and 40. This demonstrated the enormous variability in point measurements of this mobile species and shows the strong effect these data had on the overall counts also.

It also emphasises how single data points can strongly affect results and why population trends through time are the more important indicator. Over-all it appears that reducing to 20 stations will not adversely affect trend data.

Secondly, when reducing the number of visits from 3 to 2 the only noticeable effect, which was relatively minor, was on blackbird counts. This is probably due to normal sampling variation. Day 2 was the day excluded from this analysis and it just happened to have more blackbirds (6.1 per station) than Day 1 (4.9) and Day 3 (3.5). This is normal biological variation.

Again, it seems that reducing the sampling from 3 to 2 days will not affect the overall data. It would also make sampling easier to schedule around inclement weather and would reduce field effort and costs in these surveys.

## CONCLUSIONS

Results of the 2020 5MBC survey indicate bird numbers have plateaued after big increases between 2005 and 2011. Ongoing control of rodents may keep bird numbers at the current levels but if habitat improves, they may continue to increase. By continuing pest control, habitat for native fauna will improve – especially along the lake edge, and, if this control includes possums, mustelids, hedgehogs and wallabies. There will also be better breeding success and a greater survival rate for birds (as well as other native fauna). Bird species such as Australasian Bittern/Matuku (*Botaurus poiciloptilus*), Spotless Crane/Puweto (*Porzana tabuensis*) and Fernbirds/Mātātā (*Bowdleria punctata*) might then reinhabit and become more common.

A proposal to reduce the number of count stations to 20 and to only carry out 2 days of counting is proposed for future surveys.

## RECOMMENDATIONS

- That the community initiated and driven rat control project be encouraged to continue.
- That the project managers consider alternative rodent toxins (but not brodifacoum) if allowable, to avoid bait shyness and the chance of breeding toxin resistance. This is best practice in pest control.
- Investigate the condition of the indigenous forest in the Spencer Road general area to see how degraded it is by browsers. Consider that pest control be expanded to include possums, mustelids and wallabies.
- That effort be made to control some of the pest plant species present, especially along the lake edge and to replant with appropriate native plants.
- That more information, maybe by way of interpretation panels be developed and set up to help increase public awareness of the work being done and why. Included could be information on some of the less common native flora and fauna species present, why they are important, and ways people can help look after them and their habitat to retain them into the future.
- That 5MBC surveys continue to be carried out every 3-5 years to monitor progress.
- Consider establishing four or five 5MBC stations, along Spencer Road in the non-residential stretch, between Waitangi Road intersection and 450 Spencer Road. This would allow comparison to be made with this differing environment (farmland and forest), and particularly where there is no known pest control.
- As discussed, 3 non-complying, count stations should be excluded from future surveys. This would leave 20 sites which might be sampled twice to match earlier survey numbers and would also reduce costs.
- This, and prior 5MBC reports for Spencer Road Lake Tarawera, should be made available to the Lake Tarawera Pest Control Group and the Lake Tarawera Ratepayers Association.
- In future surveys water birds, should be recorded but not included as part of change analysis. There are already waterbird surveys carried out across the whole of Lake Tarawera every 5 years as part of DOC's regular Rotorua Lakes Waterbird Surveys. Should analysis in status of waterbirds through time be required this is a more sensible source of data.

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We would also like to acknowledge and thank the Lake Tarawera Pest Control Group and residents of the Tarawera community for their ongoing pest control efforts. Rodent control has and is making a positive difference to this environment.

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## APPENDIX: 1. Count Stations

<i>Count Stations</i>	<i>Approximate Location of Count Stations</i>	<i>GPS Co-ordinates</i>
1	19 Spencer Road	1896679 / 5766343
2	33 Spencer Road – Junction	1896839 / 5766464
3	54 Spencer Road	1896867 / 5766728
4	75 Spencer Road	1896998 / 5767326
5	93 Spencer Road	1897146 / 5764960
6	133 Spencer Road	1897192 / 5767147
7	152 Spencer Road	1897242 / 5767388
8	165 Spencer Road	1897291 / 5767614
9	177 Spencer Road	1897205 / 5767788
10	199 Spencer Road	1897116 / 5767901
11	225 Spencer Road	1896953 / 5768038
12	248 Spencer Road	1896875 / 5768254
13	265 Spencer Road	1896883 / 5768429
14	10 Waitangi Road	1896897 / 5768666
15	450 Spencer Road	1896934 / 5769684
16	1 Ronald Road	1897370 / 5769874
17	Solitaire Lodge entrance	1897151 / 5769920
18	510 Spencer Road	1897124 / 5770164
19	524 Spencer Road	1897210 / 5770353
20	537 Spencer Road	1897267 / 5770469
21	568 Spencer Road	1897477 / 5770531
22	588 Spencer Road	1897737 / 5770594
23	581 Spencer Road	1897764 / 5770499



## APPENDIX: 2. NAMES OF BIRD SPECIES RECORDED

	<b>Common &amp; Te Reo Māori Name</b>	<b>Scientific Name</b>
1	<b>Bellbird</b> / Korimako	<i>Anthornis melanura oneho</i>
2	<b>Black Shag</b> / Kawau	<i>Phalacrocorax carbo nova</i>
3	<b>Black Swan</b> / Kakaianau	<i>Cygnus atratus</i>
4	<b>Black-backed Gull</b> / Karoro	<i>Larus dominicanus dominicus</i>
5	<b>Black-backed Magpie</b>	<i>Gymnorhina tibicen (sp)</i>
6	<b>Blackbird</b>	<i>Turdus merula</i>
7	<b>Californian Quail</b>	<i>Callipepla californica</i>
8	<b>Canada Goose</b>	<i>Branta canadensis</i>
9	<b>Chaffinch</b>	<i>Fringilla coelebs</i>
10	<b>Dabchick</b> / Weweia	<i>Poliocephalus rufopectus</i>
11	<b>Domestic Fowl</b>	<i>Gallus gallus domesticus</i>
12	<b>Eastern Rosella</b>	<i>Platycercus eximius</i>
13	<b>Eurasian Coot</b>	<i>Fulica atra</i>
14	<b>Fantail</b> / Piwakawaka	<i>Rhipidura fuliginosa placabilis</i>
15	<b>Goldfinch</b>	<i>Carduelis carduelis</i>
16	<b>Grallard</b>	<i>Anas superciliosa superciliosa X A. platyrhynchos</i>
17	<b>Greenfinch</b>	<i>Carduelis chloris</i>
18	<b>Grey Warbler</b> / Riroriro	<i>Gerygone igata</i>
19	<b>Hedge Sparrow</b>	<i>Prunella modularis</i>
20	<b>House Sparrow</b>	<i>Passer domesticus</i>
21	<b>Kahu</b> / Australasian Harrier	<i>Circus approximans</i>
22	<b>Kereru</b> / NZ pigeon	<i>Hemiphaga novaeseelandi</i>
23	<b>Kingfisher</b> / Kotare	<i>Halcyon sancta vagrans</i>
24	<b>Little Black Shag</b> / Kawautui	<i>Phalacrocorax culcirostris</i>
25	<b>Little Shag</b> / Kawaupaka	<i>Phalacrocorax melanoleucos brevirostris</i>
26	<b>Myna</b>	<i>Acridotheres tristis</i>
27	<b>Peafowl</b>	<i>Pavo cristatus</i>
28	<b>Pukeko</b> / Swamp hen	<i>Porphyrio porphyrio melanotus</i>
29	<b>Red-billed Gull</b> / Tarapunga	<i>Larus scopulinus</i>
30	<b>Redpoll</b>	<i>Carduelis flammea</i>
31	<b>Ring-necked Pheasant</b>	<i>Phasianus colchicus</i>
32	<b>Scaup</b> / Papango	<i>Aythya novaeseelandiae</i>
33	<b>Shining Cuckoo</b> / Pipiwharauoa	<i>Chrysococcyx lucidus lucidus</i>
34	<b>Silvereye</b> / Tauhou	<i>Zosterops lateralis lateralis</i>
35	<b>Skylark</b>	<i>Alauda arvensis</i>
36	<b>Song Thrush</b>	<i>Turdus philomelos</i>
37	<b>Spotted Dove</b>	<i>Streptopelia chinensis</i>
38	<b>Spur-winged Plover</b>	<i>Vanellus miles</i>

	<b>Common &amp; Te Reo Māori Name</b>	<b>Scientific Name</b>
39	<b>Starling</b>	<i>Sturnus vulgaris</i>
40	<b>Tomtit / Miromiro</b>	<i>Petroicamacrocephala toitoi</i>
41	<b>Tui</b>	<i>Prothemadera novaeseelandiae novaeseelandiae</i>
42	<b>Welcome Swallow</b>	<i>Hirundo tahitica neoxena</i>
43	<b>White-faced Heron / Matuku</b>	<i>Egretta novaehollandiae</i>
44	<b>Yellowhammer</b>	<i>Emberiza citronella</i>

## APPENDIX: 3 Map of Lake Tarawera Settlement – Pest Control Area

