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**Recommendations for  
Establishing a Community  
Volunteer Bird Monitoring  
Program at Styx Mill  
Conservation Reserve.**



By Maree Henderson-Fitzgerald  
Summer Scholarship  
December/January 2012

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## Recommendations for Establishing a Community Volunteer Bird Monitoring Program at Styx Mill Conservation Reserve.

### Abstract

Monitoring bird populations is crucial in obtaining a census of species within a given area, which can then be used to formulate whether the diversity or abundance of bird populations are growing, declining or stabilising. Bird monitoring programs are conducted yearly in New Zealand by Landcare Research; however this aims to generate information relating only to local garden populations. The development of a bird monitoring program in local wetlands and reserves would be hugely beneficial in ascertaining the diversity and abundances of bird species. This report looks to investigate and recommend sites and strategies in establishing a community volunteer bird monitoring program at Styx Mill Conservation Reserve, Christchurch, New Zealand.

### Introduction

The monitoring of birds is a process where bird species are identified and counted to determine the diversity and/or abundance of bird species within a given area. A number of projects exist around the world to help to capture bird populations, in both the wild and domestic gardens, to monitor whether populations of birds are increasing, decreasing or are stable. In New Zealand, Landcare Research conducts yearly garden bird surveys to monitor bird diversity within New Zealand gardens (Landcare Research Garden Counts, 2011). It is an open program where anyone can take part. The surveys main aim is to look at population density over time. It is conducted in winter as this is when native bird species come into gardens to forage and to gain some shelter (Landcare Research FAQ, 2011).

Bird monitoring programs are also conducted by the Department of Conservation (DoC) for the monitoring of bird life within specified areas (DoC Bird Monitoring, 2011). In Christchurch, there are other projects that monitor bird populations; the Banks Peninsula Conservation Trust conduct bird surveys in the Port Hills area in Christchurch (Jan Walker, local rep for OSNZ, personal correspondence).

#### Styx Mill Conservation Reserve

The Styx River is a spring fed eco-system that runs from the northern area of Christchurch out east to the Brooklands estuary (The Styx, 2011). The Styx Living Laboratory Trust is a community run project that is increasing awareness of the ecosystems within the Styx River catchment, including monitoring programs for invertebrates, and water quality. In 2000, the local government and the local community established a long term project, called "The Styx Vision 2000-2040", to develop and protect the Styx river catchment within Christchurch, New Zealand. The vision has five goals (The Styx Visions, 2011):

- Goal 1: to create a living spring-fed ecosystem; including increasing diversity of the bird populations.
- Goal 2: to protect the river catchment from its source to where it feeds into the ocean.
- Goal 3: establish an environment that is "living"; establishing research and learning partnerships.

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- Goal 4: create a usable environment for the community.
- Goal 5: cultivate partnerships with local, national, and international entities to facilitate growth of the project.

The Styx Mill Conservation Reserve is an important wetland in Christchurch (Crossland, 2002). The Trust relies on community support and volunteers to help with the projects that they run. Part of a new project that the Trust is investigating is a monitoring program for birds within the . The Styx Mill Conservation Reserve comprises of ponds, exotic and native tree areas, and some pasture land. Currently the only bird monitoring program is conducted by the Christchurch City Council, which performs a complete bird count at least once a year, along the Styx River catchment (Andrew Crossland, personal correspondence). Part of goal 1 is to increase native bird populations within the Styx River catchment. Increasing the diversity of bird species is of greater importance than increasing species abundance (Crossland, 2002). The proposed community volunteer bird monitoring project would also address goals 3, 4 and 5.

### Summer Scholarship Aim

The summer scholarship was conducted to look at ways to set up a volunteer program for bird monitoring within the reserve. Between November 2011 and February 2012 bird counts were conducted weekly in a number of different ecosystem and vegetative areas to ascertain the most beneficial areas for establishing bird count stations at the Styx Mill Conservation Reserve.

A predator proof fence is currently being constructed around the reserve, thus establishing a bird monitoring program prior to the completion of the fence may be beneficial; a comparison between bird counts prior to and after completion of the fence can determine the impact of the fence on bird populations within the reserve.

## **Methods**

A reconnaissance walk through of the Styx Mill Conservation Reserve, Janet Stewart Reserve, and Brooklands Lagoon at the Styx River mouth was conducted to identify possible bird counting locations. At the Styx Mill Conservation Reserve, four probable locations were decided upon (Fig: 1); wetland ponds area, pasture area, exotic tree/forest, and native tree/forest. Bird counts were conducted on a near weekly basis in each of these areas to get an idea of the number, diversity and ease of identifying and counting birds.

Brooklands Lagoon was visited on a number of occasions to identify the ease of bird counting and identification. A number of locations around this area were investigated until one location was chosen (Fig. 2). Bird counts were carried out twice and then discontinued due to the vast area of the lagoon and the announcement that the area was being vacated due to the Christchurch earthquakes.

Two separate methods were used for counting birds. Five minute bird counts were used within vegetative locations and pasture land. Full bird counts were used when counting birds on the pond/water areas. The five minute bird count consisted of counting all birds seen or heard within a

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five minute time limit. The full bird count entailed counting all birds on the ponds or lagoon, with no time limit set.

The Department of Conservation (DoC) has developed 5 minute bird count templates that they distribute to their volunteers and staff for their official bird counting events. This is available on the internet and downloadable. A datasheet was formulated and simplified based on this datasheet where the birds seen or heard are recorded along with the environmental conditions, the date, who the monitors were and space for recording of bird numbers (see Appendix A).



Figure 1: Locations of the bird counts at Styx Mill Conservation Reserve, Christchurch, New Zealand. Map retrieved from Google Earth 16 December 2011.



Figure 2: Location of the Brooklands lagoon bird count, Brooklands Estuary, Christchurch, New Zealand. Map retrieved from Google Earth 16 December 2011.

### **Locations**

#### **Exotic Bush Area**



Figure 3: Exotic bush area at Styx Mill Conservation Reserve. Styx Mill Conservation Reserve, Christchurch, New Zealand.

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There was one counting station in the exotic bush area (Fig. 3, 4). A five minute bird count was conducted for each visit from 14 November 2011 until 1 February 2012. Birds were identified as either heard or seen. Bird counts were conducted using the five minute bird counting method.



Figure 4: Exotic bush area at Styx Mill Conservation Reserve. The green dot is the location of where the bird counts took place. GPS location 43° 27' 54.44" S, 172° 35'56.44" E. Styx Mill Conservation Reserve, Christchurch, New Zealand. Map retrieved from Google Earth 16 February 2012.

### Native Bush Area



Figure 5: Native bush area at Styx Mill Conservation Reserve. Styx Mill Conservation Reserve, Christchurch, New Zealand.

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There was one counting station in the native bush area (Fig. 5, 6). A five minute bird count was conducted for each visit from 14 November 2011 until 1 February 2012. Birds were identified as heard or seen.



Figure 6: Native bush area at Styx Mill Conservation Reserve. The green dot is the location of where the bird counts took place. GPS location 43° 27' 47.53" S, 172° 36' 11.16" E. Styx Mill Conservation Reserve, Christchurch, New Zealand. Map retrieved from Google Earth 16 February 2012.

### Pasture Area



Figure 7: Pasture area at Styx Mill Conservation Reserve. Styx Mill Conservation Reserve, Christchurch, New Zealand.

There was one counting station in the pasture area (Fig.7, 8). A five minute bird count was conducted for each visit from 14 November 2011 until 1 February 2012. Birds were identified as seen only.

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Figure 8: Pasture area at Styx Mill Conservation Reserve. The green dot is the location of where the bird counts took place. GPS location 43° 27' 45.53" S, 172° 36' 14.05" E. Styx Mill Conservation Reserve, Christchurch, New Zealand. Map retrieved from Google Earth 16 February 2012.

### Ponds Area

The ponds area was divided into two ponds – pond A & pond B (Fig. 9).



Figure 9: Pond area, Styx Mill Conservation Reserve. Top) Pond A; Bottom) Pond B. Styx Mill Conservation Reserve, Christchurch, New Zealand.

There were no time constraints in counting birds on either pond. Due to the size of the ponds and the location of islands within the ponds, there were multiple counting points (Fig. 10).

Bird counts were conducted from 14 November 2011 until 1 February 2012 on Pond B. Pond A bird counts were conducted from 23 November 2011 until 1 February 2012.



Figure 10: The ponds area at Styx Mill Conservation Reserve. The green dots are the locations where the bird counts took place. GPS location for Pond A 43° 28' 00.45" S, 172° 36'22.21" E, 43° 28' 59.28" S, 172° 36'26.46" E, 43° 28' 57.02" S, 172° 36'28.07" E, 43° 28' 55.56" S, 172° 36'29.14" E. GPS locations for Pond B 43° 28' 54.82" S, 172° 36'29.89" E, 43° 28' 53.48" S, 172° 36'32.63" E, 43° 28' 52.11" S, 172° 36'32.23" E, 43° 28' 50.70" S, 172° 36'31.74" E. Styx Mill Conservation Reserve, Christchurch, New Zealand. Map retrieved from Google Earth 16 February 2012.

### **Brooklands Lagoon**

Brooklands lagoon lies at the mouth of the Styx River. Bird counts were not constrained by time and all birds seen were counted (Fig. 11). Counts were done on the 14 November 2011 and 1 December 2011 only.

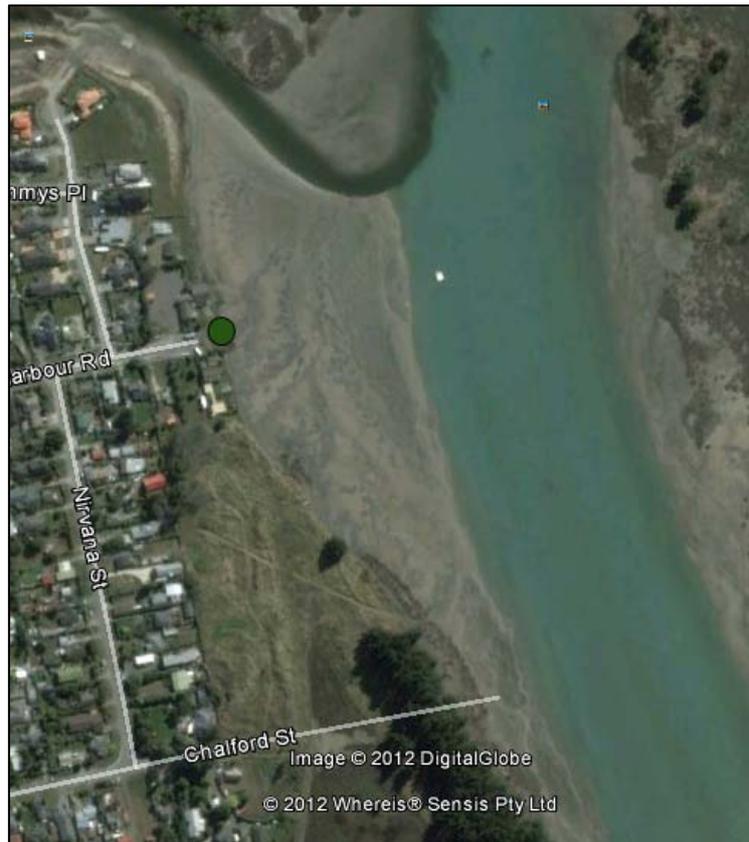


Figure 11: Brooklands lagoon area at the Styx river mouth. The green dot identifies the bird count location. GPS 43° 23' 55.97" S, 172° 42'09.34" E. Brooklands Estuary, Christchurch, New Zealand. Map retrieved from Google Earth 16 February 2012.

### **Data Analysis**

Due to the cross breeding between the introduced mallard ducks and the native grey duck, it can be difficult to identify accurately the bird species; thus all ducks that were mallard like were counted as mallard ducks. As mallards are an introduced species, these ducks were also classed as introduced species throughout the report.

Bird counts were started on 14 November 2011, however not all of the areas were counted so all data for the 14 November 2011 was omitted in the data analysis for this report.

The lagoon area was visited twice only due to the announcement that the Brooklands area was to be abandoned due to the earthquake damage to the area. For this reason, the counting of this area was abandoned after the 2<sup>nd</sup> visit. It was also deemed a hard area to count due to the vastness of the lagoon as well as possible problems identifying visiting bird species from various continents (Andrew Crossland, personal correspondence).

In counting birds, the raw data includes adult and juvenile birds, however in compiling the data and analysing, all birds are classed by species with development stage omitted.

Common names are used throughout the report. There is a species list provided in Appendix B with the species scientific names in full.

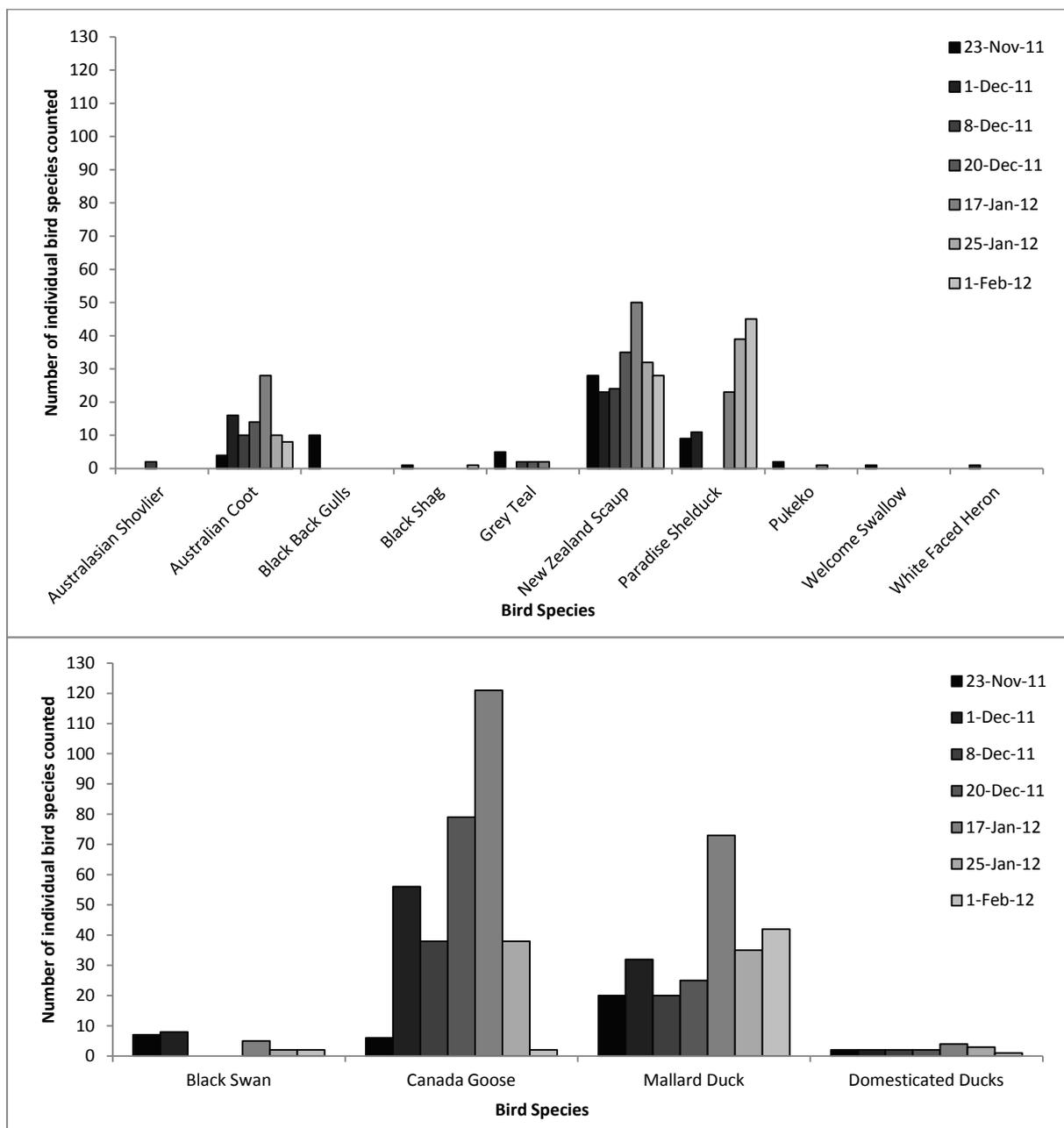
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Microsoft Excel® 2007 was used for creating the graphs. Adobe® Photoshop® Elements 8.0 was used for the generation of images.

**Results**

Pond A

Pond A showed greater diversity of native species of birds than introduced species of birds; however the introduced bird species were more abundant (Fig: 12, 14). Introduced species made up 57% of bird species counted; the most abundant bird species were Canadian Geese (31%), Mallard duck (23%), New Zealand Scaup (20%), Paradise Shelduck (12%) and the Australian Coot (8%) (Fig 13).



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Figure 12: Number of individual bird species counted on Pond A from 23 November 2011 until 1 February 2012 at Styx Mill Conservation Reserve, Christchurch, New Zealand. (Top) shows native bird species; (bottom) shows introduced bird species.

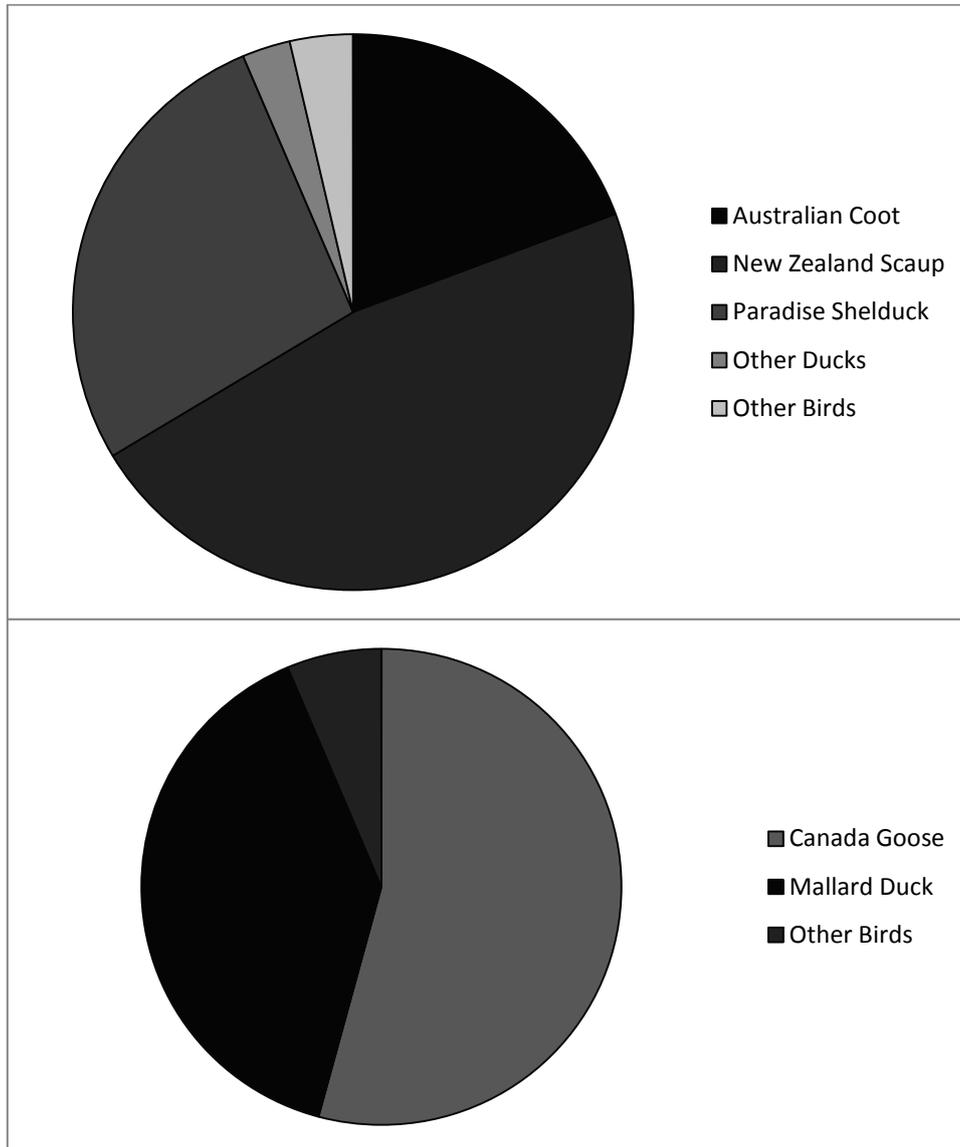


Figure 13: Percentages of the main bird's species from Pond A by native (top) and introduced (bottom).

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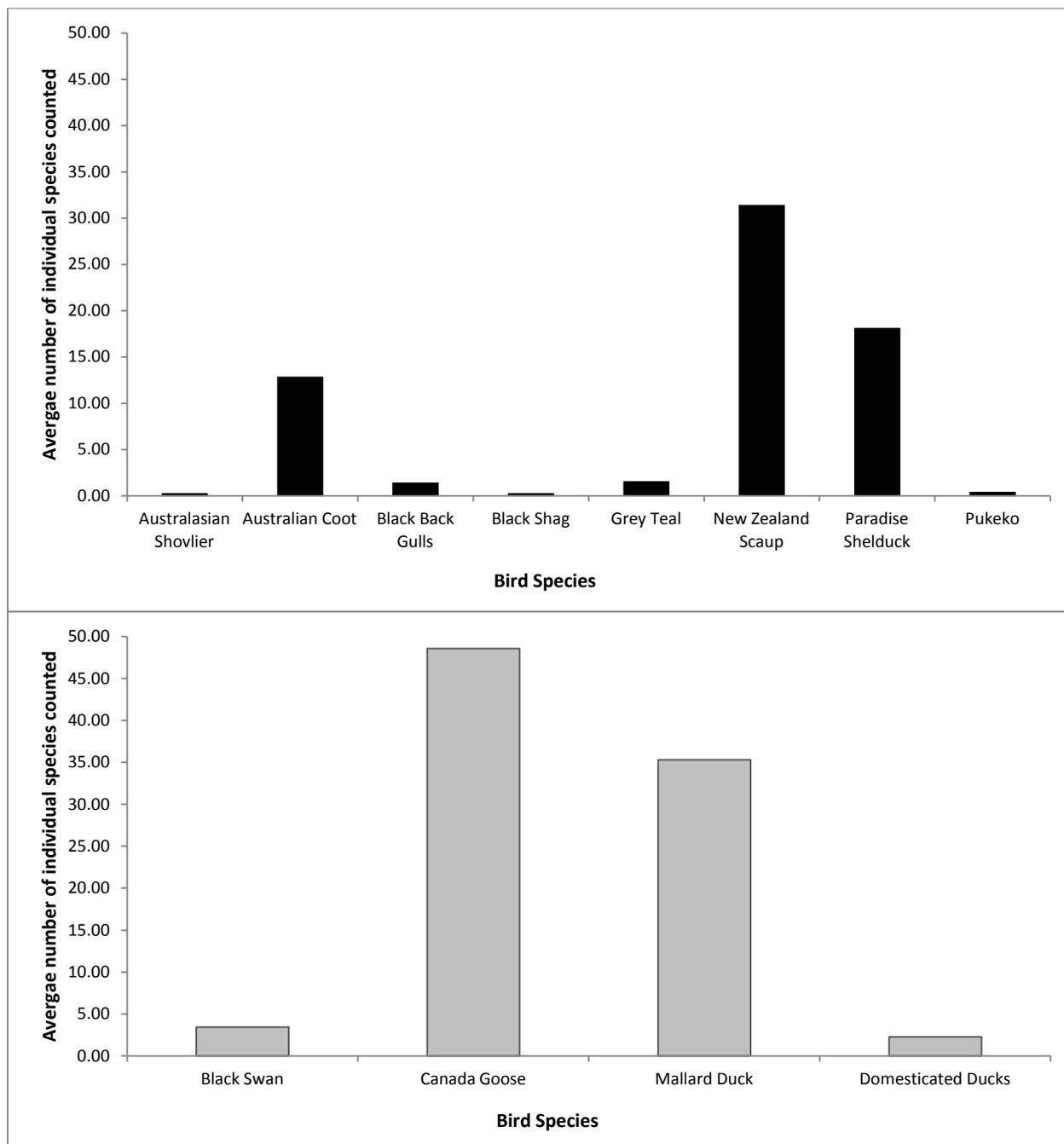


Figure 14: Average number of individual bird species counted on Pond A from 23 November 2011 until 1 February 2012 at Styx Mill Conservation Reserve, Christchurch, New Zealand. (Top) shows native bird species; (bottom) shows introduced bird species.

**Pond B**

The diversity of bird species on Pond B was lower than in Pond A (Fig: 15, 17), however the native species of birds was more abundant than the introduced species of birds; the most abundant bird species were Paradise Shelduck (41%), New Zealand Scaup (16%), Australian Coot (14%), Canadian Geese (13%) and Mallard duck (10%) (Fig. 16). As time increased, the number of Paradise Shelduck increased from 1 on 23 November 2011 to 151 on 1 February 2012 (Fig. 15).

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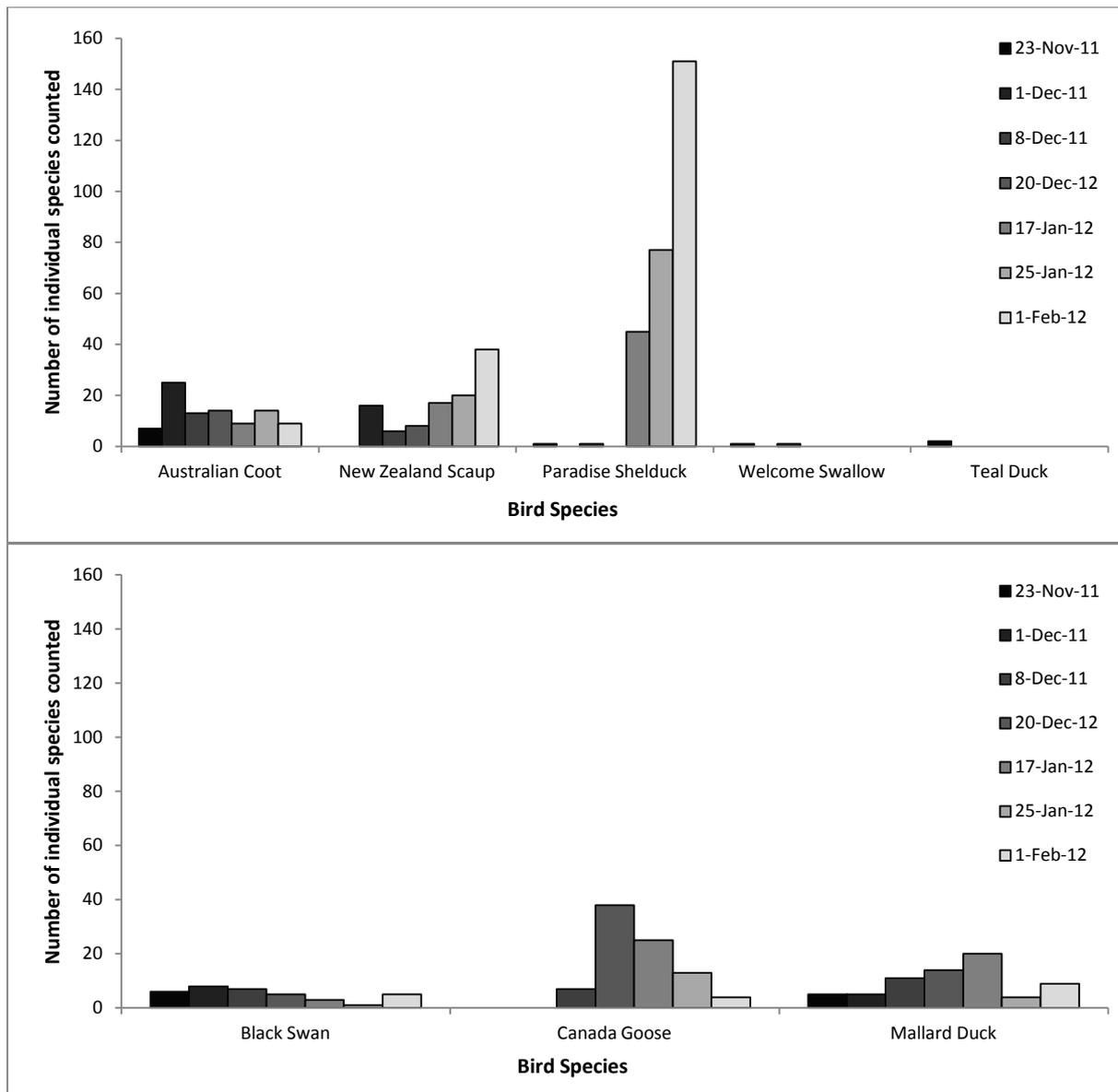


Figure 15: Number of individual bird species counted on Pond B from 23 November 2011 until 1 February 2012 at Styx Mill Conservation Reserve, Christchurch, New Zealand. (Top) shows native bird species; (bottom) shows introduced bird species.

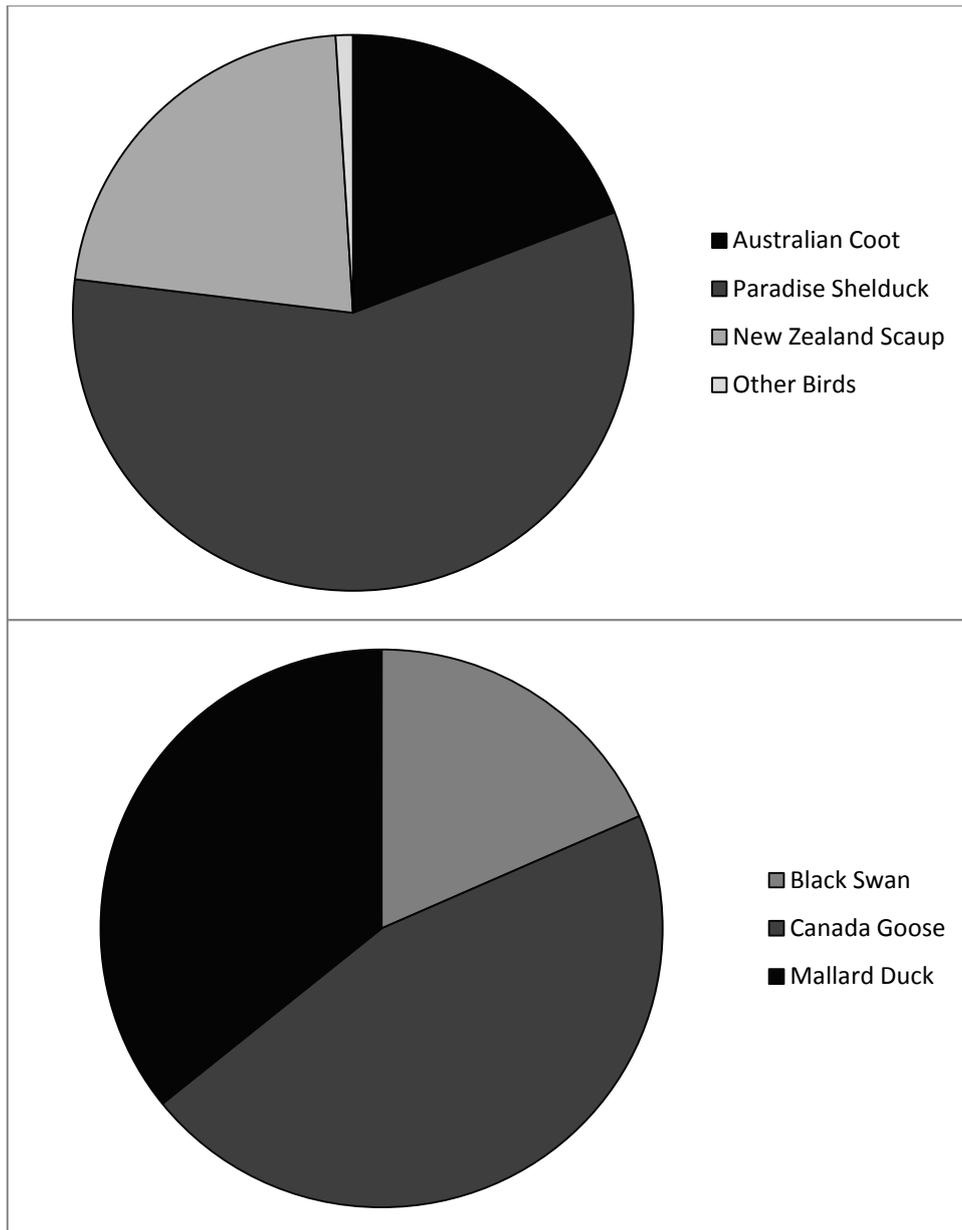


Figure 16: Percentages of the main bird species from Pond B by native (top) and introduced (bottom).

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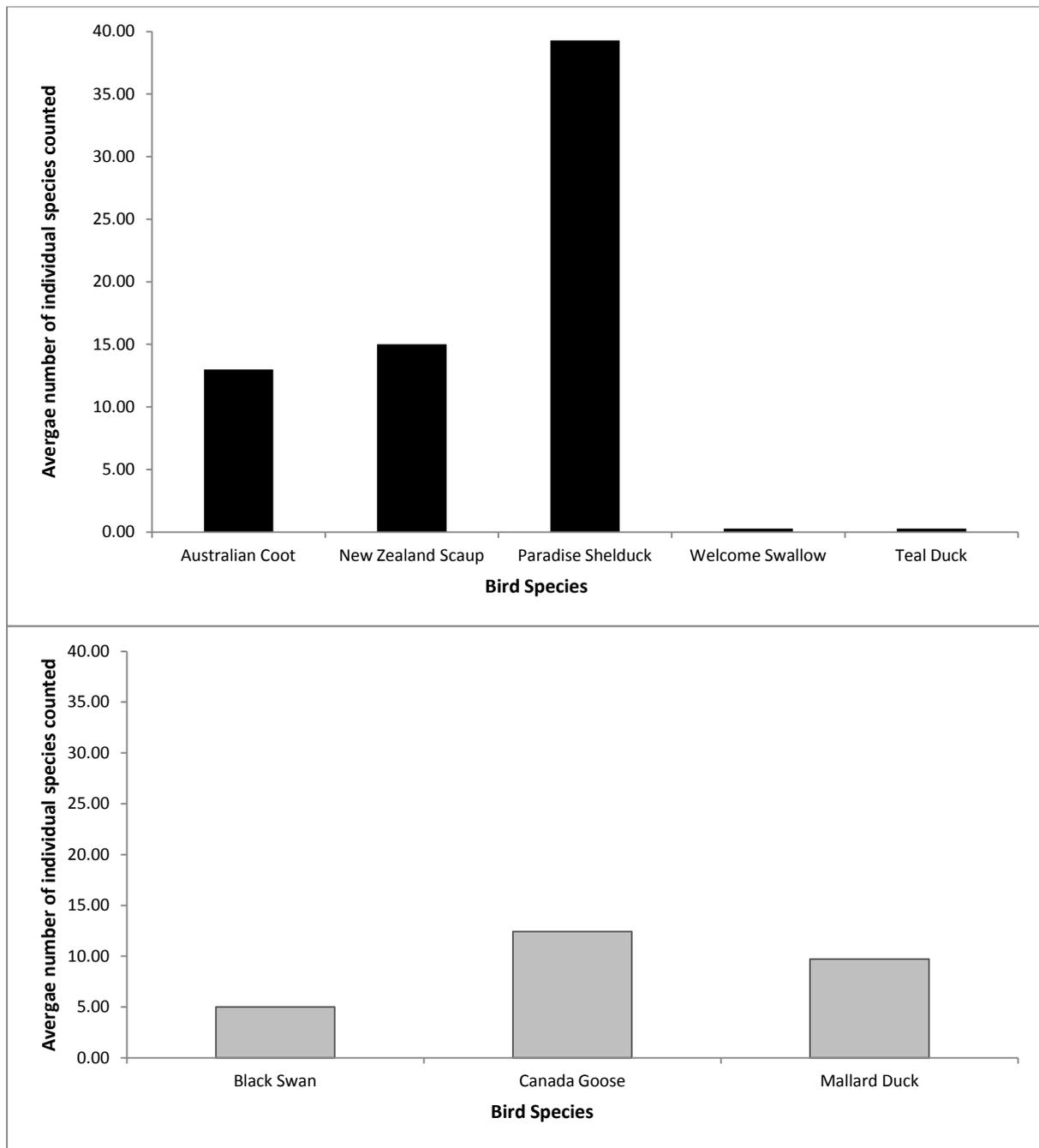


Figure 17: Average number of individual bird species counted on Pond B from 23 November 2011 until 1 February 2012 at Styx Mill Conservation Reserve, Christchurch, New Zealand. (Top) shows native bird species; (bottom) shows introduced bird species.

**Pasture Area**

The pasture area was not overly abundant in bird life. The most abundant bird species were Pukeko's and Starling's (Fig. 18).

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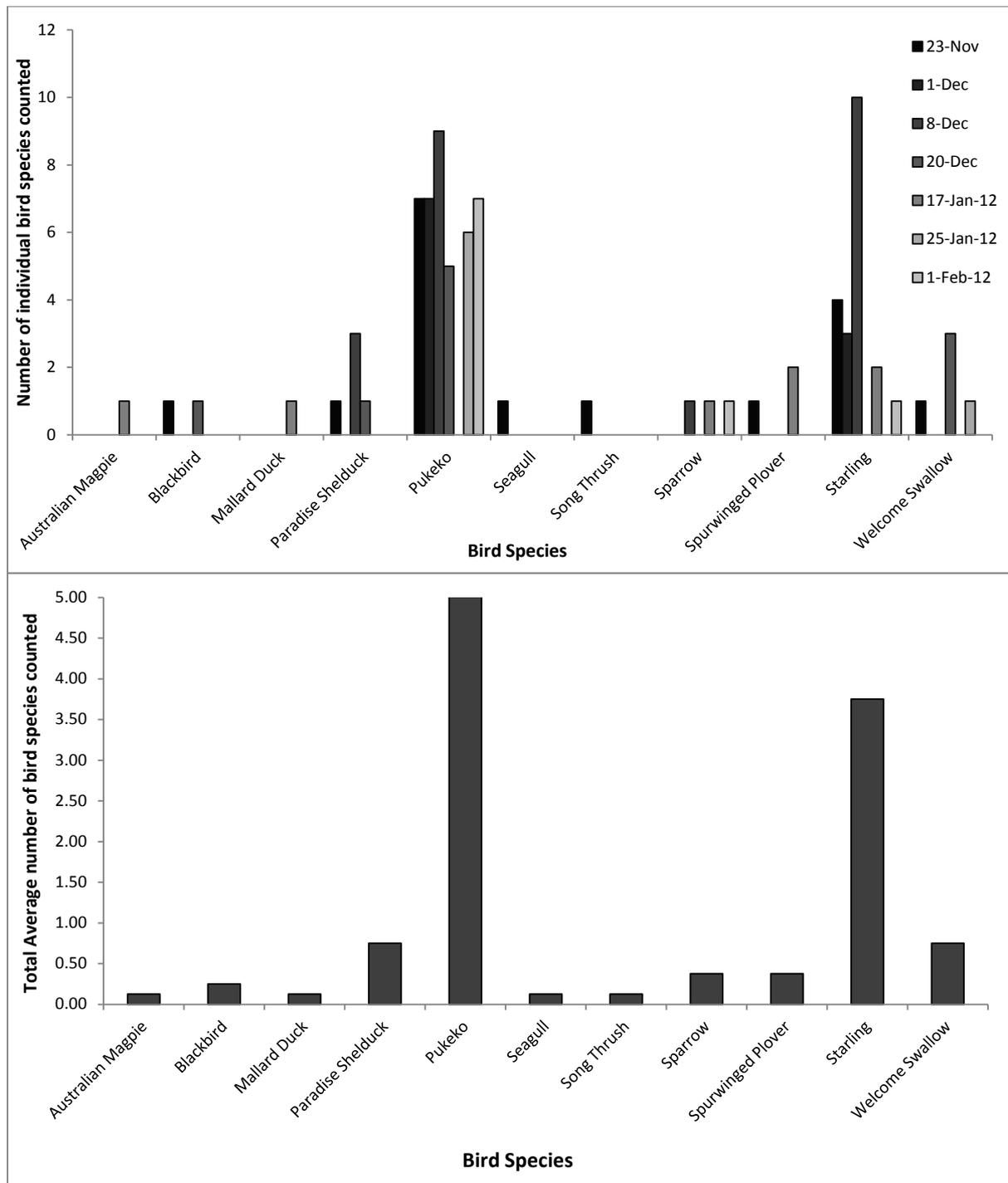


Figure 18:(Top) Number of individual bird species counted on the pasture area from 23 November 2011 until 1 February 2012 at Styx Mill Conservation Reserve, Christchurch, New Zealand. (Bottom) Average number of individual bird species counted on the pasture area from 23 November 2011 until 1 February 2012 at Styx Mill Conservation Reserve, Christchurch, New Zealand. (Top) shows native bird species; (bottom) shows introduced bird species.

Exotic Area

The exotic area resulted in a fairly diverse range of bird species. The most abundant bird species counted were introduced species; the sparrow and the blackbird species (Fig. 19). Native species were heard and seen but to a lesser extent.

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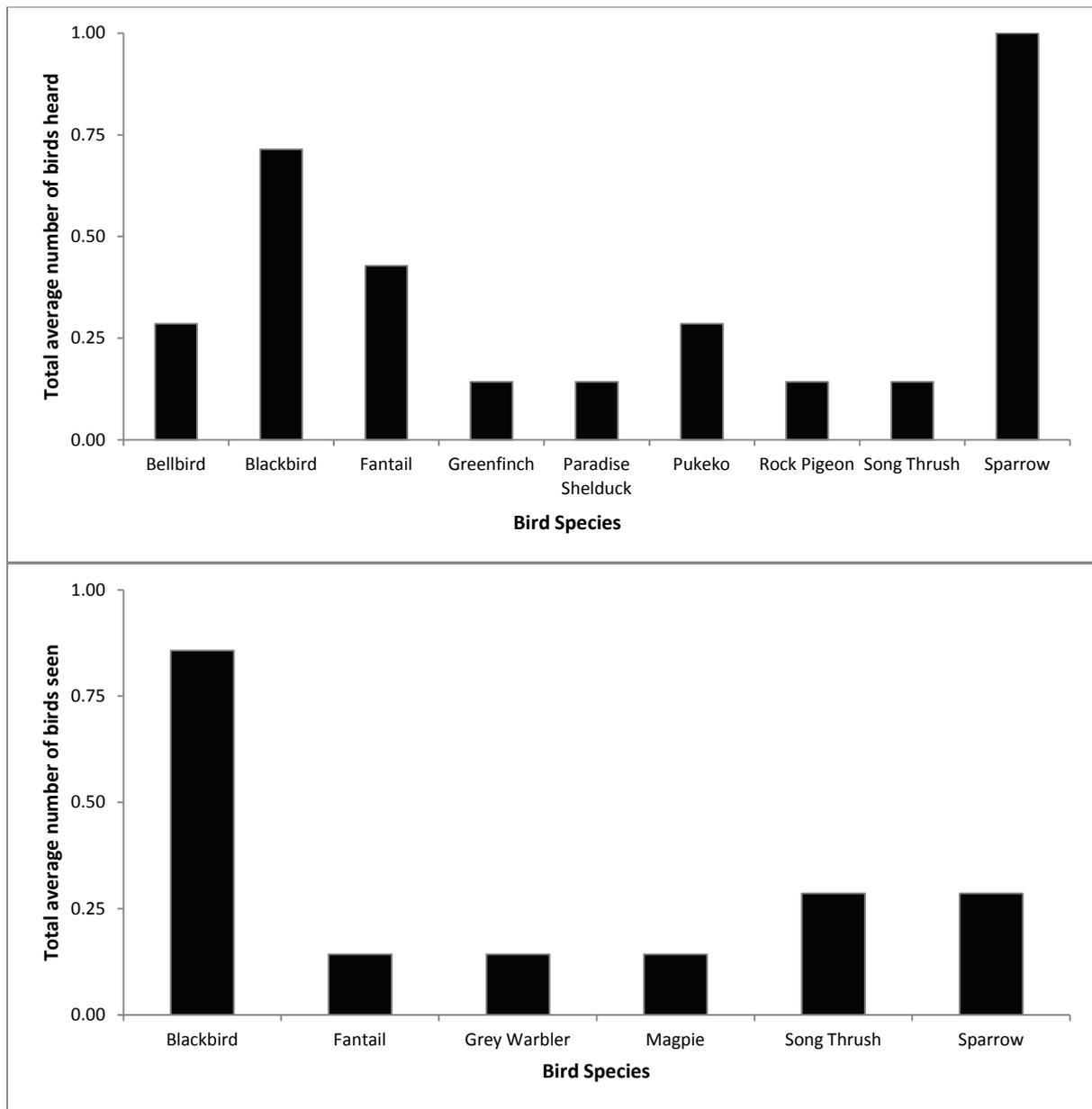


Figure 19: Average number of individual bird species counted in the Exotic area from 23 November 2011 until 1 February 2012 at Styx Mill Conservation Reserve, Christchurch, New Zealand. (Top) shows bird species heard; (bottom) shows bird species seen.

Native Area

The native area had a greater diversity of seen versus heard bird species. The most abundant birds seen were introduced species; Welcome Swallow, Sparrow and Greenfinch (Fig. 20). The most heard bird was the native Bellbird (Fig. 20).

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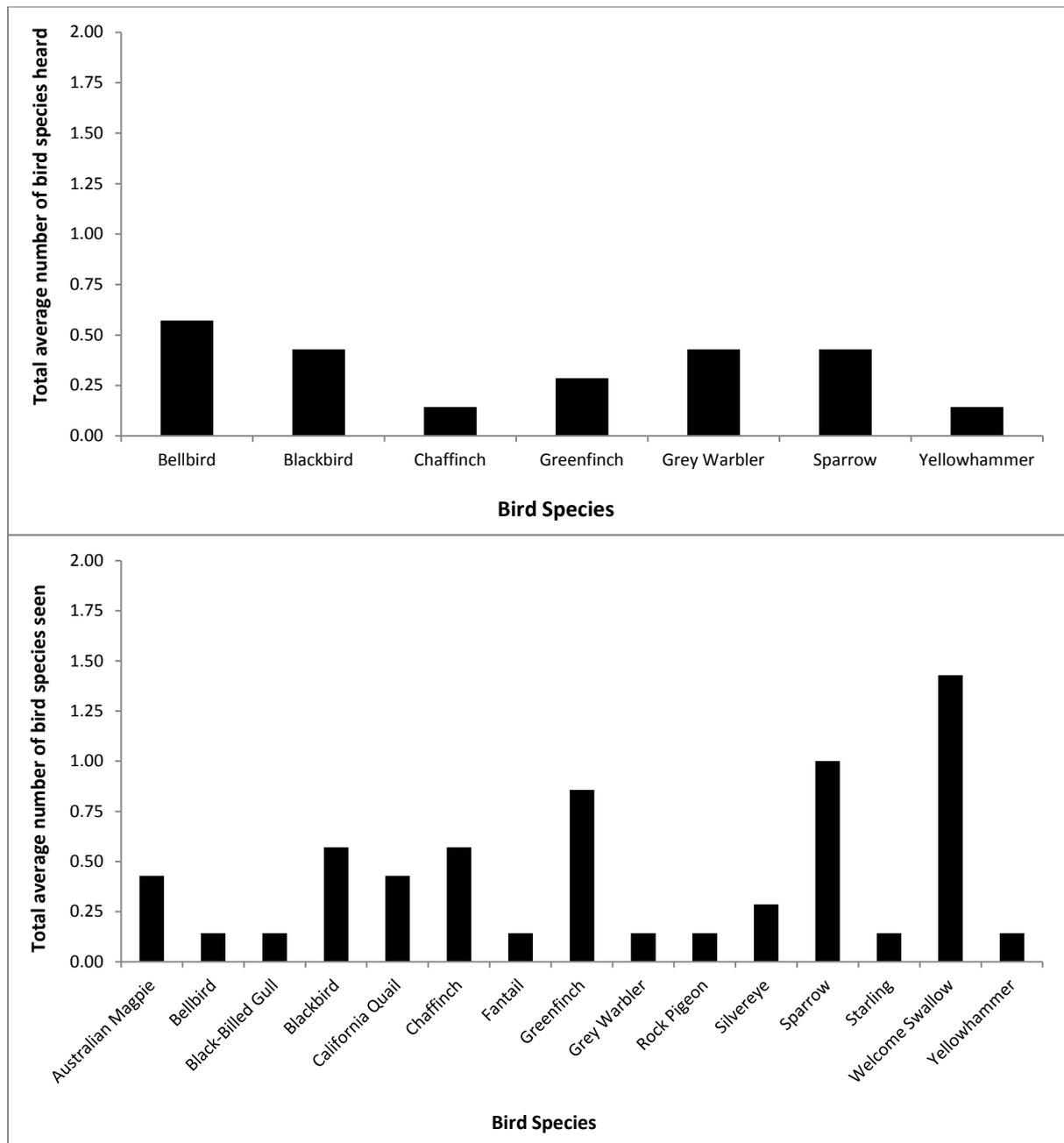


Figure 20: Average number of individual bird species counted in the Exotic area from 23 November 2011 until 1 February 2012 at Styx Mill Conservation Reserve, Christchurch, New Zealand. (Top) shows bird species heard; (bottom) shows bird species seen.

**Native area vs. Exotic area**

A comparison was done looking at the bird species diversity and abundances between the native and the exotic areas. The native area looked to attract higher numbers of native species, for example the Grey Warbler, Bellbird, and the Silver Eye; however the Fantail looked to favour the exotic area over the native area (Fig. 21).

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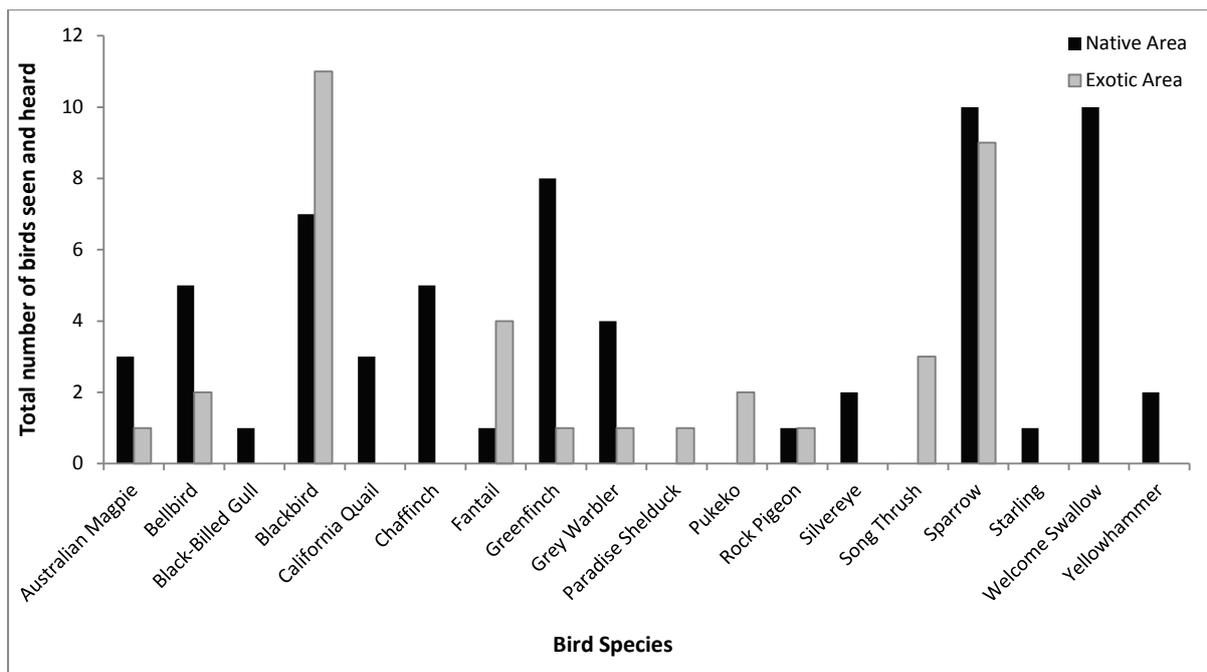


Figure 21: Total number of individual bird species counted in the Exotic area and Native area from 23 November 2011 until 1 February 2012 at Styx Mill Conservation Reserve, Christchurch, New Zealand.

Brooklands Lagoon

The lagoon area did not show as high a diversity as expected. The lagoon was visited twice where Pied Oyster Catchers and Pied Stilts were the most abundant birds seen (Fig. 22).

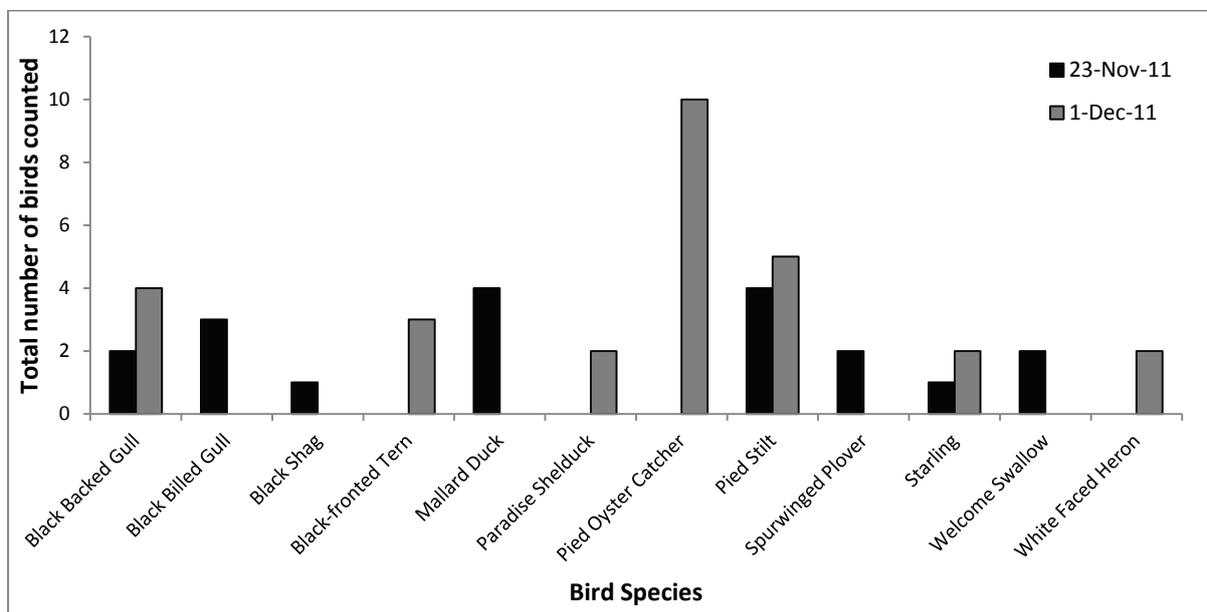


Figure 22: Total number of bird species counted in the Brookland Lagoon area on the 23 November 2011 and 1 December 2011 at Brookland Estuary, Christchurch, New Zealand.

## **Discussion**

Bird counts conducted showed no increase in the number of birds over time within the exotic and native bush areas or the pasture area; however this can be partly due to the learning of bird calls. Each time bird counts were conducted within these two areas, not all birds heard were able to be identified. In stark contrast, the pond areas saw dramatic increases in some bird species as the summer progressed. This contrast can be linked to the ease of learning birds by sight and having the time to refer to a bird species book for identification; learning bird by sight was easier than learning bird calls. Of important note for bird numbers on the ponds, was the two dates where birds, namely Canada geese, were scared from areas close to the airport for airport safety and culled (conversation with John Parry, Christchurch City Council Ranger). This was conducted at the end of October 2011 and at the end of January 2012. The numbers of Canadian Geese counted from the 23 November 2011 increased dramatically until it reached its peak on 17 January 2012 where a dramatic drop off was seen. At about this time, the number of Paradise Shelduck started to increase in number with the highest number being recorded on the last day of counting, 1 February 2012. It would be interesting to know whether Canada Geese numbers correlate with Paradise Shelduck numbers or whether the Paradise Shelduck naturally increases in number in January.

New Zealand Scaup look to be doing well on the reserve, which is a good sign for the species as New Zealand Scaup are classed as an uncommon endemic bird species in New Zealand.

Although the two ponds were connected via a narrow gap, the diversity and abundance of birds differed greatly. Pond A had much higher diversity and abundance than pond B. Why this is, it is not known. A study between the two ponds would need to be conducted to ascertain what the differences could be that determine bird attraction to either pond.

The bird counts within the native and exotic areas were taken using the five minute bird count model. After consultation with Andrew Crossland, the orthologist from the Christchurch City Council, it may be more beneficial to conduct a number of five minute bird counts along a transect within each of these areas, thus enabling a greater number of birds to be counted and logged – four stations within each area has been suggested by Andrew as this number will make the data more robust and also allow for the measuring of bird density. The volunteer program could look at instigating three or four 5 minute bird count stations along the exotic area path and within the native bush area, however the distance between each bird count station would need to be far enough away to reduce or even eliminate the possibility of counting the same heard birds between stations. The two transect lines in the exotic and native areas would also need to be far enough away to maintain independent and reliable counts.

Knowledge of bird identification is advantageous. In order to be able to identify bird calls between species, the bird calls of each species need to be either already known or learnt. This can pose a challenge, as it did to me while conducting bird counts in the native and exotic areas. Due to these areas being under canopies, the ability to be able to identify a fast flying bird or a bird call became crucial. A number of birds that were heard during the counts were unable to be identified. Bird identification was not an issue on the pond or the pasture areas over time due to counting birds by sight. A number of avenues were investigated to try and ascertain the best way to learn bird calls. A number of websites were found that would be beneficial for future volunteers in learning the calls of birds due to the sites being easily available on the internet, thus accessible from home. The website

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www.whatbird.co.nz allows for searching by bird family, species, origin (native or introduced) plus other search criteria. The website gives details about the abundance of the birds, where they are found in New Zealand and a short or long audio of their bird calls. It also includes a good photo of each bird. If the volunteers have access to an iPod Touch or an iPhone, then there is an application that can be downloaded from the apps store which is free called WhatBirdNZ. This application is based on the website mentioned above. Both of these tools are valuable to learning the bird calls to be able to identify birds accurately.

A suggestion by Lincoln University lecturer Dr Laura Molles is to initially learn native bird calls and count only native bird calls until all introduced bird calls are able to be identified. It would need to be noted during the counts that this process was being done. A challenge I came across was being able to differentiate between all the different finch calls as they are very similar. Learning only the native bird calls initially would not be a huge hindrance to Styx Mill Conservation Reserve as one of the main goals of the reserve is to increase native bird populations; thus being able to identify native bird calls ahead of introduced bird calls would not affect this objective. As the volunteers became more adept at each bird call, introduced species bird calls can be learnt and then added to the bird count – again it would need to be noted during the counts that this process was being done.

The counting of birds within the pasture area was a trial to see if this area would be of benefit. Five minute bird counts were used and only counted birds that were in the paddock. It was determined, however, that the native area was too close to the pasture area, thus counts in the pasture area had the potential to interfere with the native area counts, thus the potential for cross over counting of birds would be too high, which could lead to confounding issues with the data collected. It is recommended that the pasture area be dropped.

The lagoon area at Brooklands estuary was only counted twice due to the announcement of the Brooklands suburb being zoned red due to the earthquakes and was to be abandoned. As with all community projects, community buy-in is a major part for succession of local projects; thus the removal of a community may affect volunteer involvement. Access to the area once demolition commences may also be a problem. Andrew Crossland, from Christchurch City Council, suggested the bird populations within the lagoon area can include high migratory birds which may be harder on volunteers to learn, and also that the lagoon itself was a large area making it very difficult to get counts from the whole area. Due to all the issues surrounding the area, further counting of this area is not being recommended.

In formulating a bird counting process it was determined that a minimum of 2 people were needed for bird counting; 1 person to identify and count the birds and 1 person to note down counted birds using the bird counting template in Appendix A. The template includes weather conditions; however volunteers may not be willing to count birds in open terrain while getting wet. If bird counts are conducted in all weathers, then analysis can be done on the data to note if the weather does have any effect on the bird populations. During my summer scholarship, there was only one day of bird counting where the weather was slightly drizzly so I could not analyse if the weather conditions made any impact.

## **Recommendations**

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After analysing the information provided by Andrew Crossland and researching five minute bird counts conducted by DoC, I would like to recommend that bird counts be conducted in October/November, December/January and in June/July as a minimum. These months will help to count birds that are breeding in the summer months, birds that come into the city during the winter months and also the effects on the numbers of Canadian Geese with the culling programs undertaken in late October and late January. If volunteers wish to conduct bird counts monthly, for example on the first of every month, this would generate more data for analysis at a later date and would be beneficial.

In conducting bird counts, it is recommended that there are at least 2 volunteers; one to count and identify the birds and one to note down the species. If volunteers are of varying backgrounds, then the more experienced at bird identification could be paired with the less experienced helping to accelerate the learning of bird calls and identification.

### Recommended Locations

The exotic bush area would benefit from 3 bird counting stations (Fig. 23), with each station having a five minute bird count conducted and then move to the next station. The counts remain within their stations, but the data can then be compiled together as one exotic bird count.



Figure 23: Possible bird counting stations in the exotic bush area. The distance between sites a & b is approximately 132 metres. The distance between sites b & c is approximately 127 metres. Styx Mill Conservation Reserve, Christchurch, New Zealand. Map retrieved from Google Earth 16 February 2012.

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The native bush area would benefit from 2 bird counting stations (Fig. 24), with each station having a five minute bird count conducted and then move to the next station. The counts remain within their stations, but the data can then be compiled together as one native bird count. Once more native vegetation is planted then more native bush counting stations can be added. It is recommended that there is enough distance between each counting station to obtain independent bird counts and to reduce crossover of counting the same bird at two stations.



Figure 24: Possible bird counting stations in the native bush area. The distance between sites a & b is approximately 80 metres. Styx Mill Conservation Reserve, Christchurch, New Zealand. Map retrieved from Google Earth 16 February 2012.

Learning and counting only native bird calls initially would not harm the objectives of the Styx Mill Conservation Reserve. Once native bird calls are known, introduced bird calls can then start to be learnt and counted.

The counting stations for the ponds are the same as was used in the summer scholarship (Fig. 25). No changes in locations are needed. All birds on the ponds are counted. Once a station is counted, then moving to the next station means that any additional birds that land in the area just counted are not counted. The reason for this is that birds are constantly moving/swimming around and going back to count a station already counted due to new arrivals, may result in counting some birds more than once.



Figure 25: Bird counting stations in the ponds area. Styx Mill Conservation Reserve, Christchurch, New Zealand. Map retrieved from Google Earth 16 February 2012.

### **Recommended Resources**

Various resources are advantageous for bird counting.

#### **Books**

The use of a good bird species book is crucial when identifying birds on the ponds.

- Hand Guide to the Birds of New Zealand by Hugh Robertson, Barrie Heather & Derek Onley (Illustrated). Cost is around \$35-40.  
This is the book I used and it is a very good book as it advises if the birds are local, rare visitors etc to help with identification. Also advises some detail on breeding. The pictures also give breeding and non-breeding illustrations as well as juvenile stages as birds can look different at different developmental stages.
- “The Field Guide to the Birds of New Zealand” by Hugh Robertson & Barrie Heather. Cost ~\$50. A more in-depth book of the one above. Possibly more than is needed.

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- “A Photographic Guide to Birds of New Zealand” by Geoff Moon & Lynnette Moon. Cost ~\$20-25. Compact book but may not include all birds and has much less information included about the birds.
- “Bird Calls of New Zealand” by Lynnette Moon, Geoff Moon, John Kendrick, & Karen Baird. Cost ~ \$30. This comes with a CD of bird calls which is very handy, but not all the birds are included in the book. There is only 1 finch (chaffinch) included, so getting to know greenfinch or goldfinch calls or what they look like would not be possible.

### Binoculars

A good pair of binoculars is also crucial. In investigating the costs for these, it was found that to obtain a good pair with water proofing; the cost for a set was approximately \$400. The water proofing stops the binoculars from fogging up in weather conditions. They are also water proof in case of rain. Two pairs should sufficient.

### Websites for bird calls and additional information

The following websites are available for learning bird calls and for further research.

Web sites for bird calls:

- <http://www.whatbird.co.nz/index.php>
- <http://www.doc.govt.nz/conservation/native-animals/birds/new-zealand-bird-songs-and-calls/>

Websites for identification of birds:

- <http://www.landcareresearch.co.nz/research/biocons/gardenbird/identification.asp>
- [http://www.landcareresearch.co.nz/research/biocons/gardenbird/documents/poster\\_garden\\_bird\\_guide\\_web.pdf](http://www.landcareresearch.co.nz/research/biocons/gardenbird/documents/poster_garden_bird_guide_web.pdf)

## **Acknowledgements**

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## **Benefits of the scholarship**

The scholarship was beneficial as it allowed learned information to be applied practically. I found it incredibly beneficial to apply theoretical knowledge to a practical environment as it allowed me to better understand the implications and applications of conducting ecological research. At the end of this scholarship I have learnt that the best laid plans do not always go to plan and research projects need to have flexibility as aspects can change throughout the projects life.

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## **Appendix A**

### **Data sheets for recording birds.**









## Appendix B

### Full Species List

Information referenced from Robertson & Heather, 1999.

Common Name	Scientific Name	Maori Name	Abundance
Australasian Shovler Duck	<i>Anas rhynchos</i>	Kuruwhengi	Common native
Australian Coot	<i>Fulica atra</i>		Locally common native
Australian Magpie	<i>Gymnorhina tibicen</i>		Abundant Australian introduction
Bellbird	<i>Anthornis melanura</i>	Korimako, Makomako	Common endemic
Black Shag (Great Cormorant)	<i>Phalacrocorax carbo</i>	Kawau	Common native
Black Swan	<i>Cygnus atratus</i>		Common Australian introduction
Black-Backed Gull	<i>Larus dominicanus</i>	Karoro	Abundant native
Black-Billed Gull	<i>Larus bulleri</i>		Common endemic
Blackbird	<i>Turdus merula</i>		Abundant European introduction
Black-fronted Tern	<i>Sterna albobriata</i>	Tarapiroe	
California Quail	<i>Callipepla californica</i>		Common North American introduction
Canada Goose	<i>Branta canadensis</i>		Common North American introduction
Chaffinch	<i>Fringilla coelebs</i>		Abundant European introduction
Dunnock	<i>Prunella modularis</i>		Common European introduction'
Fantail	<i>Rhipidura fuliginosa</i>	Piwakawaka	Abundant native
Greenfinch	<i>Carduelis chloris</i>		Common European introduction'
Grey Teal	<i>Anas gracilis</i>	Tete	Common native
Grey Warbler	<i>Gerygone igata</i>	Riroriro	Abundant endemic
Mallard Duck	<i>Anas platyrhynchos</i>		Abundant European introduction
New Zealand Scaup	<i>Aythya novaeseelandiae</i>	Papanga	Uncommon endemic
Paradise Shelduck	<i>Tadorna variegata</i>	Putangitangi	Common endemic
Pied Oyster Catcher	<i>Haematopus ostralegus</i>	Torea	Abundant native
Pied Stilt	<i>Himantopus himantopus</i>	Poako	Common native
Pukeko (Purple Swamphen)	<i>Porphyrio porphyrio</i>	Pukeko	Abundant native
Rock Pigeon	<i>Columba livia</i>		Common European introduction
Silvereye	<i>Zosterops lateralis</i>	Tauhou	Abundant native
Song Thrush	<i>Turdus philomelos</i>		Abundant European introduction
Sparrow (House)	<i>Passer domesticus</i>		Abundant European introduction
Spur-winged Plover	<i>Vanellus miles</i>		Abundant native

**Recommendations for Establishing a Community Volunteer Bird Monitoring Program at Styx Mill Conservation Reserve.**

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Starling	<i>Sturnus vulgaris</i>	Abundant European introduction
Welcome Swallow	<i>Hirundo tahitica</i>	Abundant native
White Faced Heron	<i>Ardea novaehollandiae</i>	Abundant native
Yellowhammer	<i>Emberiza citrinella</i>	Common European introduction

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