Article

Perceptions of Birds by Urban Residents in an Australian Regional City and Implications for Conservation

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Simple Summary: Little is known about why humans like or dislike particular animal or plant species. Given the prevalence of common and threatened bird species within cities, more research is necessary to determine human attitudes to urban birds. As humans directly and indirectly impact urban birds and directly affect bird habitats, it is important to understand human attitudes to fauna and their conservation in order to protect biodiversity in expanding cities. In Australia, few studies have considered the impact of human attitudes on birds. Those that have focused primarily on particular species. In this study, we aim to understand how urban residents of an Australian city categorise birds, specifically the attitudes of these urban residents to local birds and their conservation. We suggest how attitudes to bird species may inform conservation initiatives and methods for maintaining biological diversity in urban areas.

Abstract: Given the prevalence of common and threatened bird species within cities, more research is necessary to determine human attitudes to urban birds and how this may affect conservation in urban areas In Australia, few studies have considered the impact of human attitudes on birds; those that have focused primarily on particular species. In this study, we aim to understand the perceptions of urban residents of an Australian city (Ballarat) by examining the ways they categorise birds (using the multiple sorting technique). We found that people were particularly enamored by large, exotic species, but if familiar to them, native species were positively perceived by people. People tended to view aggressive species negatively, but only where this aggression was directed at humans. This approach gained important insight into the attitudes of these urban residents to local birds and their conservation. We used this insight to suggest how attitudes to avian species conservation may inform conservation initiatives and methods for maintaining biological diversity in urban areas.

1. Introduction

As urbanisation increases globally, urban ecology and social-ecological research has increased significantly over the past decade [1,2]. The ways in which urban residents perceive specific taxonomic groups is becoming an important question for conservation in cities [3–5]. Surprisingly, few studies have considered the ways in which urban residents perceive birds in their neighbourhoods (although see [6–8]. It is widely accepted that cities around the world support significant components of national, regional, and local biodiversity. Many cities are home to threatened species. In an analysis of 54 worldwide cities, it was found that close to a third contain globally threatened bird species [9]. Urban environments can be modified to improve habitat and resource availability for species

living in urban or urban fringe habitats [10,11], although remnant vegetation is particularly important for some species [12,13].

One way of understanding how people perceive birds is by measuring people's attitudes. Attitudes can be conceived as a person's positive or negative disposition to a specific object or event. A commonly explored attitude is preference, usually expressed as people's likes or dislikes for something [14–16]. Attitudes can be either explicit (formed from deliberate thought) or implicit (occur automatically and may not enter a level of conscious processing) [17]. Attitudes are an essential concept, as they precede and are believed to direct a person's behaviour [17]. Although positive attitudes to a species do not necessarily lead to positive conservation behaviour [18], attitudes can be useful for researchers to predict human conservation behaviour and the factors which may inhibit these behaviours.

Birds are a charismatic and easily recognised faunal group within urban environments. Some research suggests that personal experience, attractiveness, and perceived intelligence of animals influence human attitudes towards animals [19,20]. In the United States, small birds such as hummingbirds, robins, cardinals, and blue jays were well liked in residential areas [19]. In France, research suggests that human attitudes seem to be related more to the variety of birds rather than the abundance of birds [6]. The extent to which a species is liked seems to vary according to species' behaviours, for example the roosting habits of Common Starlings in Europe are considered undesirable by urban residents due to the resultant uncleanliness of buildings [6]. Furthermore, negative perceptions of birds considered urban-dwelling were attributed to human–wildlife conflict [20]. Positive attitudes towards birds may be positively correlated with factual knowledge about birds, particularly in children and adolescents [21]. However, other studies have suggested that people may have a positive attitude regarding species protection, regardless of low factual knowledge [22].

Recent research suggests that urban residents have a positive reaction to natural sounds in urban areas, particularly to bird song [23]. Young people in urban settings are more appreciative of an urban landscape if it contains a greater diversity of bird song [24]. Similarly, urban residents seem to be more aware of bird diversity than abundance [6]. Although urban residents dislike some species, a majority of people seem to appreciate birds in cities [6,25].

Given the prevalence of both native and introduced, common and threatened bird species within cities, more research is necessary to determine human attitudes to urban birds to inform conservation actions and urban nature-based policy and programs. As humans directly and indirectly impact urban birds [26,27] and directly affect important bird habitats (e.g., gardens), it is vital to understand human attitudes to fauna and their conservation in order to protect biodiversity in expanding cities.

In Australia, urban areas are considered to contain a disproportionately high number of threatened species compared to non-urban areas [28]. Research on urban ecology, and particularly avian ecology in cities, is also increasing in Australia [10,29,30]. However, few studies in that country have explored human attitudes towards birds and those that have focused primarily on particular species (e.g., [31–33]). In this study, we aim to understand how urban residents perceive and categorise birds, the attitudes of urban residents to local birds and their conservation, and suggest how attitudes to avian species conservation may influence human behaviour.

2. Materials and Methods

2.1. Study Site

Ballarat is a growing regional city in Victoria, southeastern Australia. The city has a total population of over 116,000 and a population density of 153.6 persons per square km [34]. Ballarat has a cool temperate climate with warm summers and cool winters. The mean temperatures range from 3.2 °C (July minimum) to 25.3 °C (January maximum) and the average annual rainfall is 688.7 mm [35]. The city is situated in the Central Highlands of Victoria and is surrounded by agricultural land and remnant vegetation, including the

Woowookarung Regional Park and Creswick Regional Park. Ballarat was founded during the Australian gold rush of the 1850s and has a historic, heavily urbanised town centre surrounded by suburbs with extensive gardens and parks [36]. Ballarat's urban area comprises a compact central business district, surrounded by residential development, with industrial areas concentrated in outer fringing areas. Larger urban parkland is comprised mostly of exotic vegetation, but small remnants of native vegetation are interspersed throughout, particularly near the outer fringes. The streetscapes are a mix of exotic and native vegetation. These various elements of the urban area support distinct bird assemblages [37].

2.2. Participant Selection

The sampling strategy aimed to obtain a wide range of views within the community rather than a representative sample of all Ballarat residents—an approach widely used in perception studies (e.g., [38]). A sample of 29 Ballarat residents was invited to participate in this study to assess their views about birds and conservation. An initial group of participants known to the primary researcher were contacted and invited to participate. Additional participants were then recruited to ensure a diverse range of views were collected until few new concepts were raised by the participants and the themes being discussed had started to saturate, which typically occurs after 10–15 interviews [39,40]. Additional participants were either known to the researchers or were suggested by the participants.

2.3. Photo Selection

Sixty-one bird species were selected for the survey to assess the perception of species with a wide range of appearances, behaviours, and local familiarity (see Appendix A); these traits have been shown to be important when considering people's perceptions of birds [20]. These included species locally indigenous to Ballarat, native to Australia but not indigenous to Ballarat, and 'exotic' bird species (i.e., both non-native species that have naturalised in Ballarat and bird species not found in Australia). This allowed residents' perceptions of local, Australian, and exotic bird species to be explored. The species were chosen with a broad range of habitats, behaviours, body shapes, and colours to identify whether these traits influenced perception. Photographs of each bird species were chosen (sourced from Google Images with a creative commons usage license) with a plain background that would not unduly influence the participants' responses.

2.4. Survey Procedure

Surveys were undertaken between October 2014 and May 2015. The survey method used was the multiple sorting technique [41], which requires participants to sort photographs into groups and can be used to measure the similarity of given stimuli (also see [38]). The number of times each stimulus is placed into groups is used to determine their similarity. The characteristics of the stimuli shaping similarity can then be identified to better understand the perceptual categories people use.

Each participant was given instructions by the researcher prior to commencement of the sorting exercise. This study used two undirected (free) and four directed sorts. The free sorts asked the participants to sort the photographs into two or more groups, where the birds in each group are similar in some important way (to the participant) and different from those in other groups. Examples of this could be sorting by size, bill type, colour, or type of bird (e.g., parrot). These free sorts provide an indication of the underlying mental categories used by residents in their perception of birds.

The directed sorts allowed the researchers to find out specific information about each participant's attitudes towards urban birds, including which local species are well known, which birds are liked or disliked, awareness of aggressive behaviour in birds, and the importance of different species for conservation. Again, the sorting technique allows the characteristics of birds that shape preference (how much people like birds) and perception/familiarity to be identified.

After each sort, the photographs were placed back in a random order for the participant to begin the next sort. The questions used to direct the sorts were:

1. Please sort according to whether you are familiar with the bird (knowledge of name not required).
2. Please sort according to whether you like or dislike the bird.
3. Please sort according to whether you consider the bird to be aggressive or dangerous.
4. Please sort according to whether you would be sad or upset, or not, if the bird was lost from the Ballarat area.

After directed to sort 1, photos of birds that the participant was not familiar with and all birds that do not occur in the local area were removed to focus the remaining directed sorts on familiar species that occurred locally. After each sorting of the photographs, the participants were invited to give feedback or thoughts they had on the reasons for their grouping of the birds or reactions to specific species.

2.5. Statistical Analysis

Undirected sorts were analysed using R [42]. The number of times each pair of birds appeared in the same group sorts was counted and these counts were used to generate a similarity matrix. Multi-dimensional scaling analysis (MDS) was used to identify how similarly the bird species were perceived by the participants. The MDS locates the birds in two-dimensional space which can be displayed on a graph. The MDS graph was interpreted qualitatively to determine the characteristics of birds that influenced perceived similarity. Birds that are located nearer each other on the MDS graph are perceived as more similar than those that are further apart, allowing the character of birds that shape perceived similarity to be identified (e.g., if body size influences similarity, then small birds would be grouped together and large birds grouped together, but the small and large birds are separated on the MDS graph).

Attitudes to particular species were determined by calculating the proportion of respondents placing each species in attitudinal categories (e.g., like/dislike).

3. Results

3.1. Demographic Information

A total of 29 participants were surveyed. The sample comprised 18 males and 11 females, with ages ranging from 18 to 54. All participants had completed education to at least Year 12 level and spoke English as their primary language.

3.2. Undirected Sorting

Multi-dimensional scaling of the undirected sorts showed a number of patterns and groupings based on characteristics. The participants primarily distinguished birds based on size and "nativeness" or indigeneity (local species vs. international species), suggesting these characteristics are most important in how the participants in this study perceived birds. A number of other groups are apparent in the undirected sorting, this includes aquatic species, such as the Black Swan, Pacific Black Duck, and White-faced Heron. Small passerines also formed a clear group, including the Grey Fantail and Superb Fairy-wren (Figure 1). This shows that both habitat and body size are also important characteristics that shape the way the participants perceived birds.
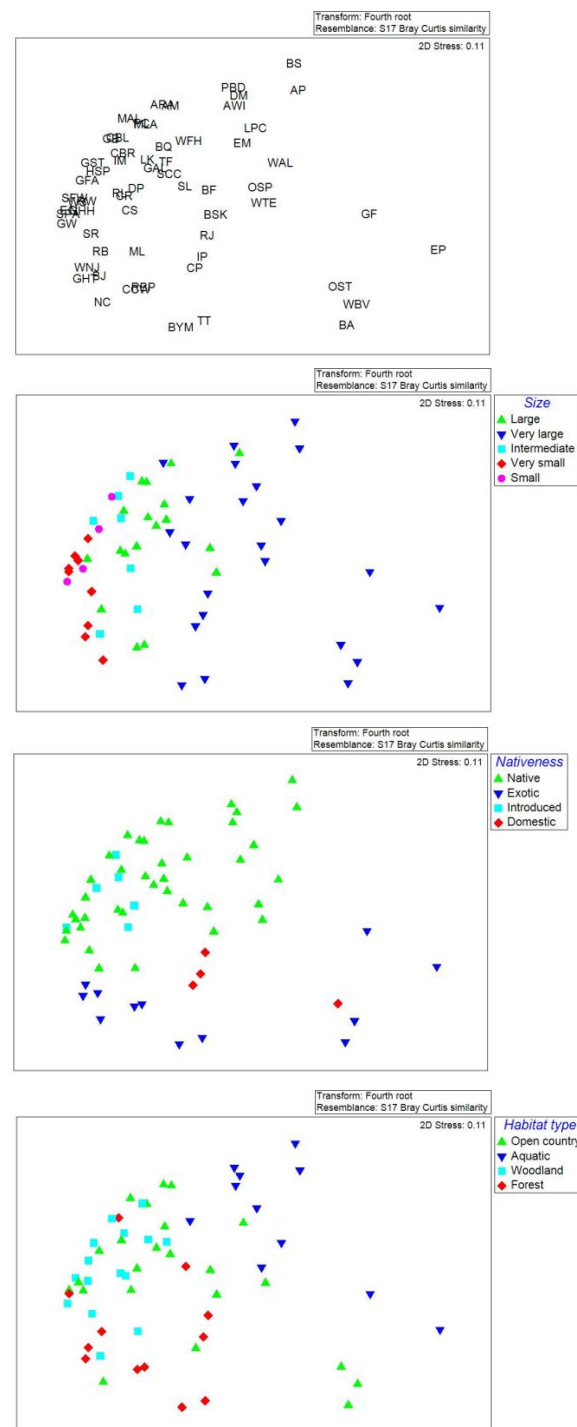
Figure 1. Multi-dimensional scaling ordination of undirected sorting of human attitudes to bird species from residents of Ballarat, Australia, by size, habitat type, and nativeness. The codes for the bird names in the top left image are defined in Appendix A.

3.3. Directed Sorting

3.3.1. Familiarity of Bird Species

All participants indicated that they were familiar with 13 of the 61 species (Figure 2). Of these, the Toco Toucan, Emperor Penguin, Ostrich, and Great Flamingo were non-Australian or non-indigenous species. Of the 40 Australian or locally indigenous species shown to the participants, nine were recorded as familiar to all participants. Apart from the Emu, all of these species were common or prominent in the study area.
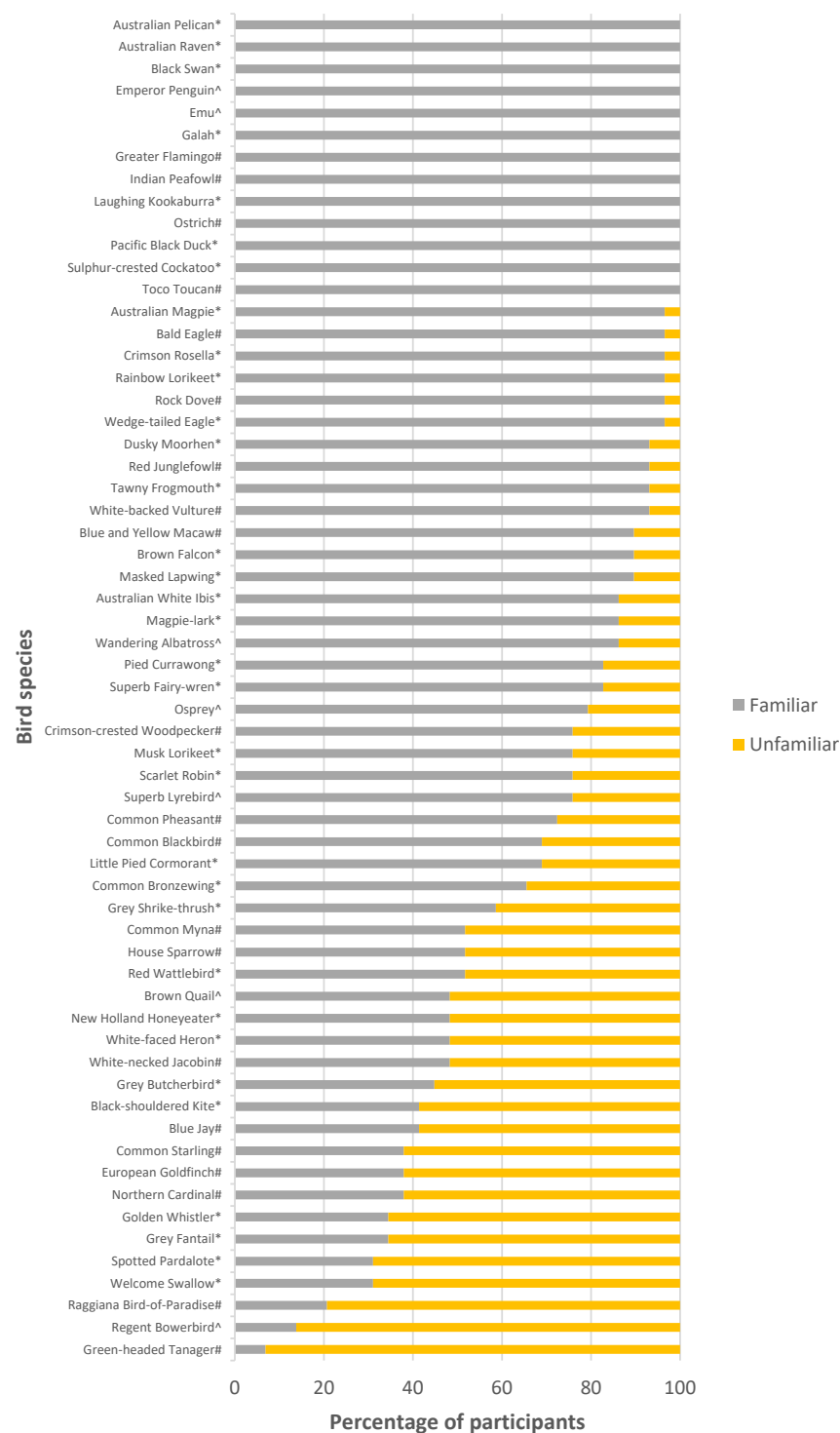
Figure 2. Familiarity of bird species to the survey participants from Ballarat, Australia. * = species indigenous to the study area, ^ = species native to Australia but not indigenous to the area, and # = exotic species.

At least half of the participants were unfamiliar with 17 of the 61 bird species. Ten of these species were Australian native species; however, not all were indigenous to the study area. A further two species, the Common Starling and European Goldfinch, were exotic species that occur in the study area. Of these less-familiar species, several are common within the study area, including the New Holland Honeyeater, Grey Butcherbird, and Welcome Swallow (Figure 2).

3.3.2. Bird Species That Were Liked or Disliked

The second directed sort gauged the preferences of the participants to locally occurring species (this included species that may not occur in the urban matrix but could theoretically occur in the area according to historical Atlas of Living Australia distribution maps— https://www.ala.org.au/ (accessed on 1 September 2014). The percentage of participants who liked or disliked (or considered neutral) a species is shown in Figure 3. All participants had a positive attitude (liked or neutral) towards 11 species, including the Scarlet Robin, Golden Whistler, Grey Fantail, and Spotted Pardalote, four small woodland passerines which are present but uncommonly seen within residential areas.
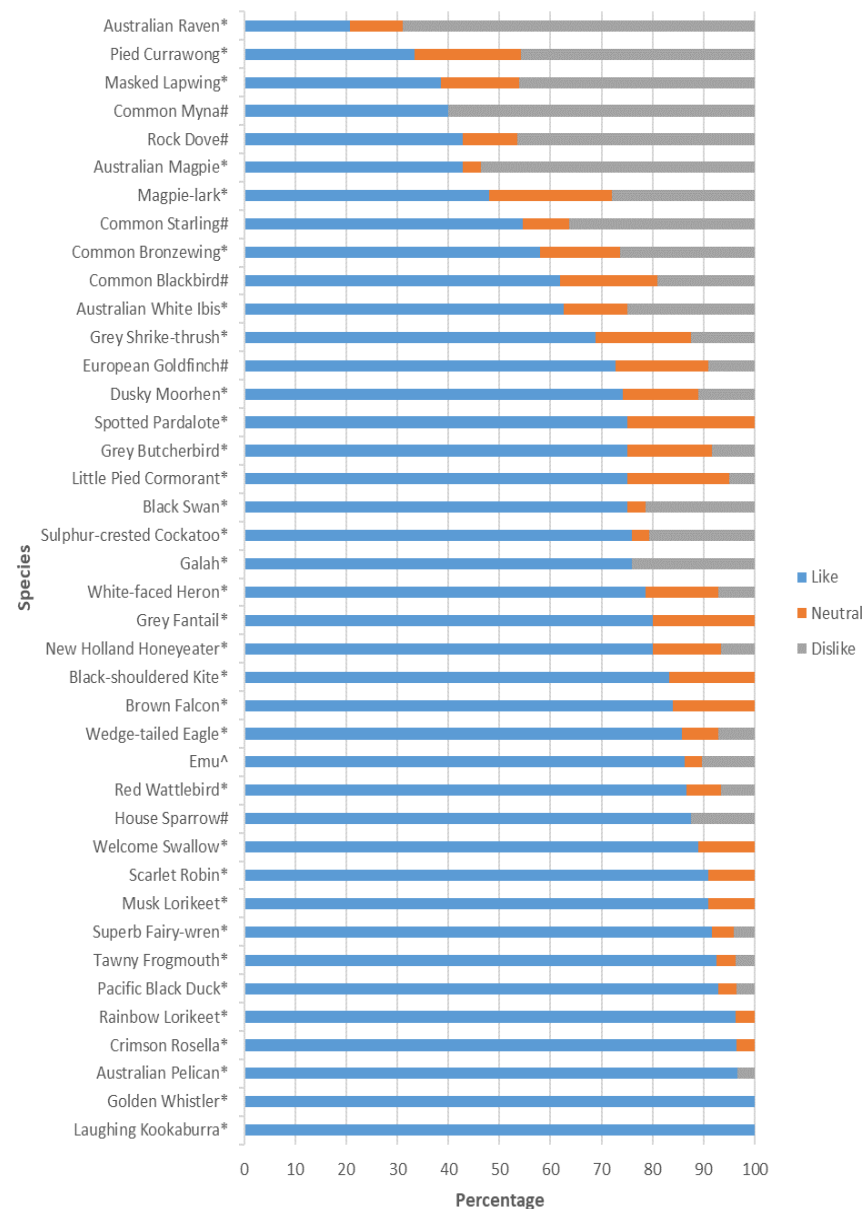

Figure 3. Participants like or dislike of bird species, from Ballarat, Australia. * = species indigenous to the study area, ^ = species native to Australia but not indigenous to the area, and # = exotic species.

Three species were disliked by at least 50% of the participants: the Australian Magpie, Australian Raven, and Common Myna. The Common Myna has been sighted in Ballarat but is not yet established in the city (it is common and established in the nearby cities of Melbourne and Geelong so would be familiar to many residents). The Australian Magpie is a common urban species in the study area, and while the Australian Raven is not as

common in the study area, a very similar-looking species, the Little Raven (not used in the survey), is very prominent.

3.3.3. Perceptions of Aggressiveness in Birds

The third directed sort asked the participants to classify locally occurring species as aggressive or non-aggressive. The participants could define aggression as either aggression towards humans or general aggression towards other birds or taxa. Six of these species were considered aggressive by a majority of participants, including the Australian Magpie, Black Swan, Wedge-tailed Eagle, and Masked Lapwing. Fifteen of forty species were not considered aggressive birds by any study participants; these species were predominantly aquatic species or small passerines, such as the Superb Fairy-wren, Scarlet Robin, and Grey Shrike-thrush, as shown in Figure 4.
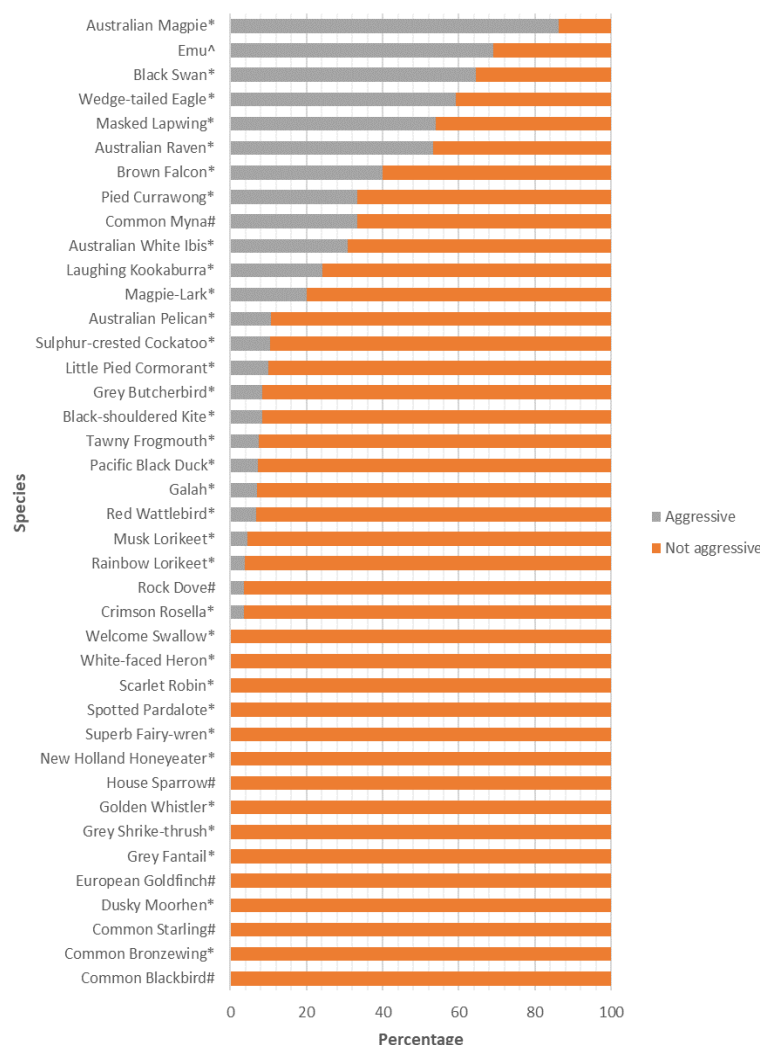

Figure 4. Aggressiveness of bird species according to participants in Ballarat, Australia. * = species indigenous to the study area, ^ = species native to Australia but not indigenous to the area, and # = exotic species.

3.3.4. Perceptions of Aggressiveness in Birds

The fourth and final directed sort asked the participants to sort the locally occurring bird species according to whether they would be sad or upset if the species was lost from the area. At least 50% of the participants agreed that they would be upset if any species became extinct, regardless of local occurrence or pest status (e.g., Common Myna) (Figure 5). For eight species, all participants said they would be upset if that species became extinct

(either locally or generally); these species were the Black Swan, Laughing Kookaburra, Australian Pelican, Superb Fairy-wren, Scarlet Robin, Golden Whistler, Grey Butcherbird, and Welcome Swallow.
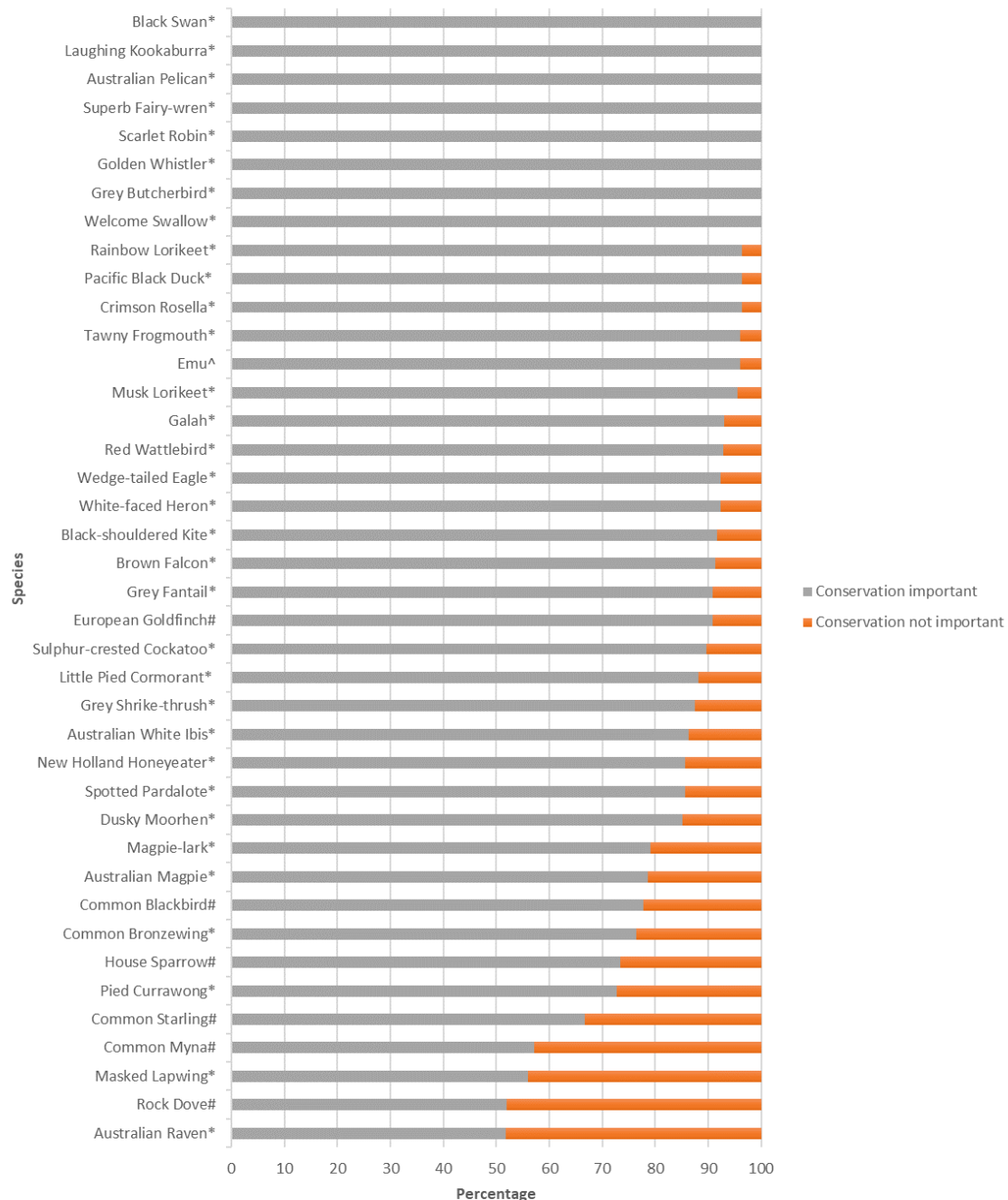

Figure 5. Participants' attitudes to the conservation of local bird species in Ballarat, Australia. * = species indigenous to the study area, ˆ = species native to Australia but not indigenous to the area, and # = exotic species.

3.4. General Observations

These results suggest that Ballarat residents have a general appreciation for local bird species. However, many participants failed to recognise common species such as the House Sparrow and Common Starling.

The most common reasons for participants stating that they disliked a bird were generally related to the behavioural traits of a species. The most prominent example of this was the aggressive swooping behaviour of the Australian Magpie. Other reasons

included taking garbage from bins (Raven), pest status (Common Myna), and being chased for food (Black Swan). Despite not displaying such behaviours, some species, such as the Pied Currawong and Grey Butcherbird were also viewed negatively, possibly due to their similar appearance to an unpopular species (e.g., ravens and magpies). It was also notable that raptors, although usually liked by participants, were generally viewed as aggressive or dangerous, despite their infrequent appearance within the urban residential zone and lack of aggression towards humans.

4. Discussion

The present study provides one of the first Australian examples of how local residents categorise a variety of bird species and the attitudes those residents have towards local birds and their conservation. The participants most commonly sorted birds according to nativeness, habitat, and size. However, the grouping of aquatic birds also suggests that people are capable of discerning the ecology and habitat of bird species through the presence of common features (or their experience/familiarity with birds from different habitats).

More participants recognised large, charismatic exotic species than some indigenous species. For example, the exotic Greater Flamingo and Toco Toucan were two of the most recognised species in the survey, whereas less than half of the participants recognised two native passerines common in the study area—the Golden Whistler and New Holland Honeyeater. This could suggest that many people do not pay attention to the avian fauna in their neighbourhood, know birds by name rather than sight, or that they lack the information or education to actively distinguish species [43]. When developing citizen science programs, size may be an important factor to consider, as residents who are unaware of many smaller birds may not notice them [44]. Conversely, education and citizen science programs could draw attention to smaller species to increase people's awareness of them.

Most participants had a generally positive attitude towards all birds. Only three species were disliked by a majority of participants: the Australian Raven, Common Myna, and Australian Magpie. The participant's experience of aggressive behaviour by Masked Lapwing, Australian Magpie, or ravens likely explains the negative attitudes to these species. This is consistent with other studies that have shown that the aggressive behaviour of birds is an important determinant of public opinion [45,46]. For other species, such as the Rock Dove, Common Starling, and Common Myna, negative attitudes may be based on the reputation of these species as introduced pests—a finding that is consistent with previous studies (e.g. [43]). The specific traits of these species that influence these attitudes (e.g., excrement and noise from colonial roosting in urban areas and competition with native bird species) warrant further research.

There were 11 species that were liked by all participants that were familiar with them. Interestingly, all of these were native species, including the Spotted Pardalote and Golden Whistler, which were recognised by fewer than half of the participants. These are brightly coloured birds and colourful and regional uniqueness has been shown to positively influence people's perception of birds [20], and other fauna such as butterflies (e.g., [5,47]). It should also be noted that species perceived as aggressive were not necessarily viewed negatively. This only seemed to occur where the aggression was directed towards humans, such as in the case of the Masked Lapwing and Australian Magpie. Birds of prey, despite being viewed as generally aggressive, were liked by most participants in our study, consistent with Perry et al. [45] who noted this group of species "elicit strong emotional responses from people, both of excitement and of fear and concern". Our findings contrast with those of other studies in different social and ecological contexts that have found that traits such as colour, song, and foraging drive public perception [20].

Most participants said that they would be concerned if any birds became locally extinct. When asked about the conservation of bird species, many participants also made verbal statements indicating that they would be despondent in the knowledge of any bird becoming extinct. This was regardless of the species' behaviour, pest status, or distribution.

The other participants were primarily concerned with the conservation of bird species they have positive attitudes towards. These findings may be explained by people supporting avian conservation due to the perceived social and environmental benefits of birds [6].

The directed sorts suggest that local residents overall have positive attitudes towards birds in their city (see also [6]), with the primary exception being bad personal experience with a species or a negative view of a species as a pest. Although a positive attitude does not automatically result in positive conservation behaviour or actions (e.g. [48]), a broad range of studies have shown that population-level attitudes do influence pro-environmental behaviours [49]. Our findings suggest that a majority of participants have positive attitudes towards birds and their conservation which could be conducive to positive bird conservation behaviours.

Importantly, as has been observed in previous studies (e.g., [50]), participants required little factual knowledge to have a positive attitude towards a bird species and want to see it conserved [18,22]. This poses an important challenge for managers and researchers, as it implies that community engagement, rather than education, may be important in creating cities that promote biodiversity. In Ballarat, Australia, the public does have positive attitudes towards birds and avian conservation. The greater understanding of such attitudes generated from this study in conjunction with other studies (e.g., [51,52]) should be used to focus conservation initiatives and demonstrate public interest in biodiversity conservation more broadly. Additional wide-scale studies could test these results and further inform how human perceptions influence urban bird conservation.

Institutional Review Board Statement: Ethics approval to undertake this study was obtained from Federation University Australia (Ethics approval number B14-108).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are available upon request.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Full list of bird species used in the photo sort survey.

Common Name	Scientific Name	Code	Origin	Locally Occurring *
Australian Magpie	*Cracticus tibicen*	AM	Native	Yes
Australian Pelican	*Pelecanus conspicillatus*	AP	Native	Yes
Australian Raven	*Corvus coronoides*	ARA	Native	Yes
Australian White Ibis	*Threskiornis Molucca*	AWI	Native	Yes

Table A1. *Cont.*

Common Name	Scientific Name	Code	Origin	Locally Occurring *
Bald Eagle	*Haliaeetus leucocephalus*	BA	Exotic	No
Brown Falcon	*Falco berigora*	BF	Native	Yes
Blue Jay	*Cyanocitta cristata*	BJ	Exotic	No
Brown Quail	*Coturnix ypsilophora*	BQ	Native	No
Black Swan	*Cygnus atratus*	BS	Native	Yes
Black-shouldered Kite	*Elanus axillaris*	BSK	Native	Yes
Blue and Yellow Macaw	*Ara ararauna*	BYM	Exotic	No
Common Blackbird	*Turdus merula*	CBL	Exotic	Yes
Common Bronzewing	*Phaps chalcoptera*	CBR	Native	Yes
Crimson-crested Woodpecker	*Campephilus melanoleucos*	CCW	Exotic	No
Common Pheasant	*Phasianus colchicus*	CP	Exotic	No
Crimson Rosella	*Platycercus elegans*	CR	Native	Yes
Common Starling	*Sturnus vulgaris*	CS	Exotic	Yes
Dusky Moorhen	*Gallinula tenebrosa*	DM	Native	Yes
Rock Dove	*Columba livia*	DP	Exotic	Yes
European Goldfinch	*Carduelis carduelis*	EG	Exotic	Yes
Emu	*Dromaius novaehollandiae*	EM	Native	No
Emperor Penguin	*Aptenodytes forsteri*	EP	Native	No
Galah	*Eolophus roseicapilla*	GAL	Native	Yes
Grey Butcherbird	*Cracticus torquatus*	GB	Native	Yes
Greater Flamingo	*Phoenicopterus roseus*	GF	Exotic	No
Grey Fantail	*Rhipidura albiscapa*	GFA	Native	Yes
Green-headed Tanager	*Tangara seledon*	GHT	Exotic	No
Grey Shrike-thrush	*Colluricincla harmonica*	GST	Native	Yes
Golden Whistler	*Pachycephala pectoralis*	GW	Native	Yes
House Sparrow	*Passer domesticus*	HSP	Exotic	Yes
Common Myna	*Sturnis tristis*	IM	Exotic	Yes
Indian Peafowl	*Pavo cristatus*	IP	Exotic	No
Laughing Kookaburra	*Dacelo novaeguineae*	LK	Native	Yes
Little Pied Cormorant	*Microcarbo melanoleucos*	LPC	Native	Yes
Magpie-lark	*Grallina cyanoleuca*	MAL	Native	Yes
Musk Lorikeet	*Glossopsitta concinna*	ML	Native	Yes
Masked Lapwing	*Vanellus miles*	MLA	Native	Yes
Northern Cardinal	*Cardinalis cardinalis*	NC	Exotic	No
New Holland Honeyeater	*Phylidonyris novaehollandiae*	NHH	Native	Yes
Osprey	*Pandion cristatus*	OSP	Native	No
Ostrich	*Struthio camelus*	OST	Exotic	No
Pacific Black Duck	*Anas superciliosa*	PBD	Native	Yes
Pied Currawong	*Strepera versicolor*	PC	Native	Yes

Table A1. *Cont.*

Common Name	Scientific Name	Code	Origin	Locally Occurring *
Regent Bowerbird	*Sericulus chrysocephalus*	RB	Native	No
Raggiana Bird-of-Paradise	*Paradisaea raggiana*	RBP	Exotic	No
Red Junglefowl	*Gallus gallus*	RJ	Exotic	No
Rainbow Lorikeet	*Trichoglossus haematodus*	RL	Native	Yes
Red Wattlebird	*Anthochaera carunculata*	RW	Native	Yes
Sulphur-crested Cockatoo	*Cacatua galerita*	SCC	Native	Yes
Superb Fairy-Wren	*Malurus cyaneus*	SFW	Native	Yes
Superb Lyrebird	*Menura novaehollandiae*	SL	Native	No
Spotted Pardalote	*Pardalotus punctatus*	SPA	Native	Yes
Scarlet Robin	*Petroica boodang*	SR	Native	Yes
Tawny Frogmouth	*Podargus strigoides*	TF	Native	Yes
Toco Toucan	*Ramphastos toco*	TT	Exotic	No
Wandering Albatross	*Diomedea exulans*	WAL	Native	No
White-backed Vulture	*Gyps africanus*	WBV	Exotic	No
White-faced Heron	*Egretta novaehollandiae*	WFH	Native	Yes
White-necked Jacobin	*Florisuga mellivora*	WNJ	Exotic	No
Welcome Swallow	*Hirundo neoxena*	WS	Native	Yes
Wedge-tailed Eagle	*Aquila audax*	WTE	Native	Yes

* Has been recorded in the region according to Atlas of Living Australia records.

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