

Before an Independent Hearings Panel  
appointed by the Waimakariri District Council

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*under:* the Resource Management Act 1991

*in the matter of:* Submissions and further submissions in relation to the proposed Waimakariri District Plan, Variation 1 and Variation 2

*and:* Hearing Stream 10A: Future Development Areas, Airport Noise Contour, Bird Strike and Growth policies

*and:* **Christchurch International Airport Limited**  
Submitter 254

Statement of evidence of Dr Leigh Bull (bird strike)

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Dated: 2 February 2024

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## **STATEMENT OF EVIDENCE OF DR LEIGH BULL**

### **INTRODUCTION**

- 1 My full name is Leigh Sandra Bull.
- 2 I am the Director of BlueGreen Ecology Limited, an ecological consultancy established in April 2023. My core work area is in avifauna. I am experienced in preparing assessments of ecological effects on terrestrial, freshwater, coastal and oceanic avifauna, as well as avifauna monitoring programmes, habitat surveys and restoration plans. Prior to my current role, I was working as a Senior Ecologist at Boffa Miskell Limited (*BML*) for approximately 16 years and was an Associate Partner and then Partner from 2018 to 2023.
- 3 Prior to joining BML, I held positions at the Department of Conservation (*DOC*), Université Paris Sud XI, and as an independent contractor to NIWA. While working for DOC my positions were as a Species Protection Officer in the Biodiversity Recovery Unit, and as a Senior Technical Support Officer in the Marine Conservation Unit.
- 4 I hold the qualifications of a Doctor of Philosophy (Ecology and Biodiversity), Master of Science (First Class Honours, Ecology) and Bachelor of Science (Zoology) from Victoria University of Wellington.
- 5 I have approximately 17 years' professional experience advising on ecological matters. I have worked on a number of major infrastructure development projects throughout New Zealand, including:
  - 5.1 Port and marina developments including Northport Eastern Expansion, CentrePort's Seaview wharf replacement, Lyttelton redevelopment and channel deepening, Wellington IReX wharf and ferry terminal development, and Kennedy Point Marina.
  - 5.2 Wind farms investigations (both pre- and post-construction) at West Wind, Mill Creek, Waipipi, Harapaki (formerly Titiokura and Hawkes Bay wind farms) and Mt Munro.
  - 5.3 Roads of National Significance including Transmission Gully, Mackays to Peka Peka, Puhoi to Warkworth and East West Link.
  - 5.4 Airports including Christchurch (Selwyn District Plan review, airport avifauna monitoring and Kōwhai Park solar farm), Nelson (Notice of Requirement for the proposed runway extension), Hawkes Bay (solar farm) and Wellington (seawall remediation).

- 6 Of particular relevance to these proceedings is my extensive experience working at wind farm developments. To date I have been the avifauna expert advising on the development of 10 wind farms in New Zealand. For such projects this involves collecting and analysing data on avifauna habitats, populations and movements across the wind farm site and wider landscape in order to understand the collision risks.
- 7 My professional memberships include:
- 7.1 The Environment Institute of Australia and New Zealand; and
  - 7.2 The New Zealand Ornithological Society.
- 8 I served in a voluntary role as the Editor of *Notornis*, the Ornithological Society of New Zealand's peer-reviewed scientific journal, from 2016 to 2018.
- 9 I am a Certified Environmental Practitioner (Ecology Specialist) with the Environment Institute of Australia and New Zealand and am bound by the Institute's code of ethics.

#### **CODE OF CONDUCT**

- 10 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. I have complied with it in preparing my evidence on technical matters. I confirm that the technical matters on which I gave evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from my opinions expressed.

#### **SCOPE OF EVIDENCE**

- 11 I have been asked to comment on the relief sought by CIAL in relation to the proposed Waimakariri District Plan (*Proposed Plan*). My evidence will address:
- 11.1 A summary of information pertaining to the population, breeding, roosting and feeding habits of the high strike risk bird species in Christchurch and Waimakariri districts;
  - 11.2 The use of shared airspace by those species and aircraft at Christchurch International Airport (*Christchurch Airport*); and
  - 11.3 Land uses that are attractive to those birds.

- 12 In preparing my evidence, I have reviewed and considered the following:
- 12.1 The relevant parts of the Section 42A Officer's Report for Hearing Stream 10A dated 9 January 2024; and
  - 12.2 Appendix C (Independent Bird Strike) of the aforementioned Section 42A Officer's report prepared by Dr Rachel McClellan titled '*Review of Christchurch International Airport submission on bird strike issues, Operative Waimakariri District Plan Review, Waimakariri District*'.

### **EXECUTIVE SUMMARY**

- 13 I have prepared evidence assessing the bird populations in Canterbury and analysing available information to inform CIAL's approach to bird strike risk management and to inform the relief that CIAL is seeking in this Proposed Plan process.
- 14 There is generally a paucity of data and detailed information on basic biological and ecological characteristics of widespread common species, at both a local and national scale. Thus, I have based my evidence on generalised information where more detailed information is not available. I have also analysed data from CIAL's ground-based surveys, collected both on- and off-airport.
- 15 The Waimakariri District lies within the 3-8 km and 8-13 km radii from the Christchurch Airport runways. As such, in my evidence I only address the species for which land use activities at those distances could contribute to the risk of strike.
- 16 It is predominantly the large and / or flocking species for which changes in land use could increase the risk of strike. In terms of current high-risk species, this includes southern black-backed gull (*SBBG*), Canada goose and feral pigeon (all currently high-risk species). In addition, other gull species, ducks, shags, swan and starling, which currently aren't classified as high risk, may also be attracted to various land uses which could encourage their movement across the landscape or facilitate population increases (which may result in them becoming higher risk species).
- 17 As an example of how changing land uses can influence bird populations, there have been documented changes in the foraging behaviour and movements of Canada geese in response to landscape changes in Christchurch City. Surveys in the "red zone" area indicated that population had increased following the earthquakes due to the area of land providing the urban populations (i.e. birds that are resident all year round and don't migrate to the high-country breeding grounds) of Canada geese with additional foraging habitat situated next to several wetland reserves.

- 18 I conclude that certain land uses in Waimakariri District could encourage changes in bird behaviour or population size which in turn impacts upon the risk profile at Christchurch Airport.
- 19 In the case of Canada geese, the main change in land use in Waimakariri District that could prove attractive to these birds relates to the provision of a large open waterbody within a rural landscape. While the majority of Caley's (2020)<sup>1</sup> tracking data recorded either local movements by resident birds, or long-distance movements by migratory birds using rivers and coastal areas, one bird from Lake Ellesmere was recorded traversing across the Waimakariri River on the way to Kaiapoi, which Caley (2020) described as a "halfway-hotel" for geese travelling to and from the Southern Alps. As such, it is important that other "halfway-hotels" aren't established that may attract Canada geese and increase the likelihood of them traversing the Christchurch Airport flight paths.
- 20 SBBG are capable of flying long distances and forage on a range of food sources from different habitats. While exact flight paths are not known, SBBG have been recorded flying in shared airspace on a number of occasions. Given SBBG colonies extend along much of the lower Waimakariri River, there is the potential that new land uses such as landfills / waste facilities and piggeries within 8 or 13 km of the Airport could attract birds from further up the river into shared airspace. As such, it would be prudent not to further increase the chance of birds dispersing across the wider landscape. I therefore support CIAL's relief seeking that waste management facilities proposed within a 13 km radius of Christchurch Airport are given a Non-Complying activity status.
- 21 Furthermore, based on the recent off-airport survey data collected by CIAL, I believe such as status would be appropriate for land uses where animal feed is available (e.g. piggeries, poultry farms, and equine racecourses). Sewage treatment and disposal facilities are another land use that I believe a Non-Complying Activity status would be appropriate.
- 22 While a much lower risk, land uses such as fruit farms, recreational areas and golf courses can also be attractive to flocking species such as starlings. As such, I am supportive of their inclusion in the proposed plan definition for "bird strike risk activity".

### **BIRD STRIKE**

- 23 Bird strike risk is a key threat to the safe operation of Christchurch Airport. Strategies for reducing the risk of strikes at Christchurch

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<sup>1</sup> Caley (2020). Seasonal and diurnal patterns of behaviour and movements of the Canada goose (*Branta canadensis*) in Christchurch city and central Canterbury, New Zealand. Master of Science in Ecology, University of Canterbury.

Airport focus on managing wildlife populations on and surrounding Christchurch Airport.

- 24 As such, CIAL has sought a number of amendments to the Proposed Plan to ensure a broad and consistent approach to this risk. That is, provisions addressing issues arising out of incompatible land use relating to the avoidance of bird strike risk.
- 25 The rules proposed by CIAL can be summarised as follows:
- 25.1 Bird strike risk activities are Permitted between 8 km and 13 km of the Christchurch Airport runway, but proposals must be accompanied by a bird strike management plan that will be prepared in consultation with CIAL. Expansion of the activity will require an updated plan to be provided to Council. CIAL must be notified of any proposal.
  - 25.2 Bird strike risk activities within 8 km of the Christchurch Airport runway are Restricted Discretionary, where there is a matter of discretion for bird strike risk. Combined areas of proposed temporary or permanent adjacent waterbodies must not exceed 1,000 m<sup>2</sup>. CIAL must be notified of any proposal.
  - 25.3 Waste management facilities are a Non-Complying activity within 13 km of the Christchurch Airport runway.
- 26 CIAL's proposed provisions are aimed at managing the establishment of new land uses that might provide new and additional habitat that is attractive to birds, such that it may increase the movement of birds across flight paths.
- 27 High risk off-airport bird hazard sites in the Canterbury region that have been identified by Avisure (2016)<sup>2</sup> include the following:
- 27.1 Waimakariri River - key breeding and roosting site for SBBG, and also a flyway for bird movements (resident and migratory);
  - 27.2 Agricultural land north of the Waimakariri River – farmland, ponds and pivot irrigation attractive to SBBG, feral pigeons and Canada goose;
  - 27.3 Peacock springs – supports various waterbirds;
  - 27.4 Paparua pig farm – attracts large flocks of feral pigeon and SBBG due to food supply. Pigeons also roost on buildings;

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<sup>2</sup> Avisure (2016). Off-airport bird hazard management plan. Unpublished report prepared for Christchurch International Airport Limited.

- 27.5 Riccarton racecourse – food supply and roosting opportunities for feral pigeon;
- 27.6 Roto Kohatu, the Groynes and Styx Mill Conservation Reserve – attractive to waterbirds; and
- 27.7 Russley and Harewood golf course – short grass and ponds attractive to waterbirds. Large numbers of roosting feral pigeons.
- 28 Other, lower risk, off airport sites include Riccarton Bush, agricultural land to the south of the Waimakariri River, Orana Park, Kaiapoi oxidation ponds, Estuary of Heathcote and Avon Rivers, Bromley oxidation ponds, Lakes Ellesmere and Forsyth, Clearwater Resort, Brooklands lagoon, Travis wetlands and Metro Road waste-transfer station.
- 29 Of the above-mentioned sites, part of the Waimakariri River is within the Waimakariri District. As noted above, that site provides breeding and roosting habitat for SBBG, and also serves as a flyway for bird movements (resident and migratory).
- 30 CIAL has adopted the Allan Risk Assessment method to identify wildlife species risk severity. This method uses historical strike data to assign a risk level to specific bird species. Bird species are categorised in terms of their likelihood of being struck (using a five-year strike history from Christchurch Airport), and the probability (consequence) of damage should they be struck (derived from the United Kingdom’s bird strike database using body mass).
- 31 Based on the method used, the highest risk species are SBBG, Australasian harrier, spur-winged plover and rock pigeon. Canada goose are also a serious hazard because of their size, flocking nature and propensity for exponential population growth, and an incident of bird strike has recently occurred. As such it is these five species that my evidence primarily addresses.

#### **BIRD POPULATIONS IN CHRISTCHURCH & WAIMAKARIRI**

- 32 Outlined in the following paragraphs is information that has been gathered pertaining to the population, breeding, roosting and feeding habits of the current high-risk species.
- 33 I note that there is generally a paucity of robust data and detailed information on basic biological and ecological characteristics of widespread common species, at both a local and national scale. Thus, I have based my evidence on generalised information where more detailed information is not available.

- 34 Furthermore, with the exception of the Waimakariri River, very little data has been collected for avifauna in other habitats within the Waimakariri District; most information has been collected within the boundaries of Christchurch City.
- 35 Since 2016, CIAL Wildlife staff have been conducting monthly ground-based surveys in locations around Christchurch Airport where high risk species may reside. These surveys inform CIAL of any particular fluctuations in bird populations around Christchurch Airport. Based on the information collected between 2016 and 2021, the survey methods and sites were updated in 2022<sup>3</sup> (refer to Map 1 attached as **Appendix 1** to my evidence), including sites within the Waimakariri District. Monthly monitoring using the updated sites and methods has been undertaken since September 2022.
- 36 CIAL also undertake monthly on-airport surveys at 10 locations around Christchurch Airport.
- 37 While I have not been involved in the collection of the CIAL avifauna data, I developed and authored<sup>3</sup> the updated off-airport survey method and sites. Here I present the results of my analysis of the off-airport data collected between September 2022 and December 2023, and on-airport data collected between January 2021 and December 2023, which I have also used to inform my evidence.

#### **Southern black-backed gull (SBBG)**

- 38 The SBBG is classified as *Not Threatened*, being common throughout New Zealand and found in most habitats. There is no accurate census of the total New Zealand population but it has been estimated to be >1 million breeding pairs (Taylor 2000<sup>4</sup>).
- 39 The SBBG is one of only two native bird species (the other being spur-winged plover) not afforded any level of protection under the Wildlife Act (1953). SBBG are often considered pests, especially at airports due to the strike risk and on farmland where some birds attack cast sheep and newborn lambs.
- 40 The largest breeding colonies occur on islands, steep headlands, sand or shingle spits, or on islands in shingle riverbeds. In Canterbury, the main breeding site is along the Waimakariri River, to the north of Christchurch Airport.
- 41 Surveys of breeding SBBG along the lower Waimakariri River (between the river mouth and the Waimakariri Gorge) have been conducted annually since 2016. In regard to the latest (2023)

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<sup>3</sup> Boffa Miskell (2022). Christchurch off-airport avifauna monitoring methods. Prepared by Boffa Miskell Ltd for Christchurch International Airport Ltd.

<sup>4</sup> Taylor (2000). Action Plan for Seabird Conservation in New Zealand, Part B: Non-Threatened Seabirds. *Threatened Species Occasional Publication No. 17*. Department of Conservation, New Zealand.



survey, Wildlands (2023)<sup>5</sup> reported a total of 5,045 breeding pairs from 43 breeding colonies; the colonies were observed approximately 5.6 km upstream of the river mouth to just above the confluence of the Kowhai and Waimakariri Rivers (Figure 1 below).

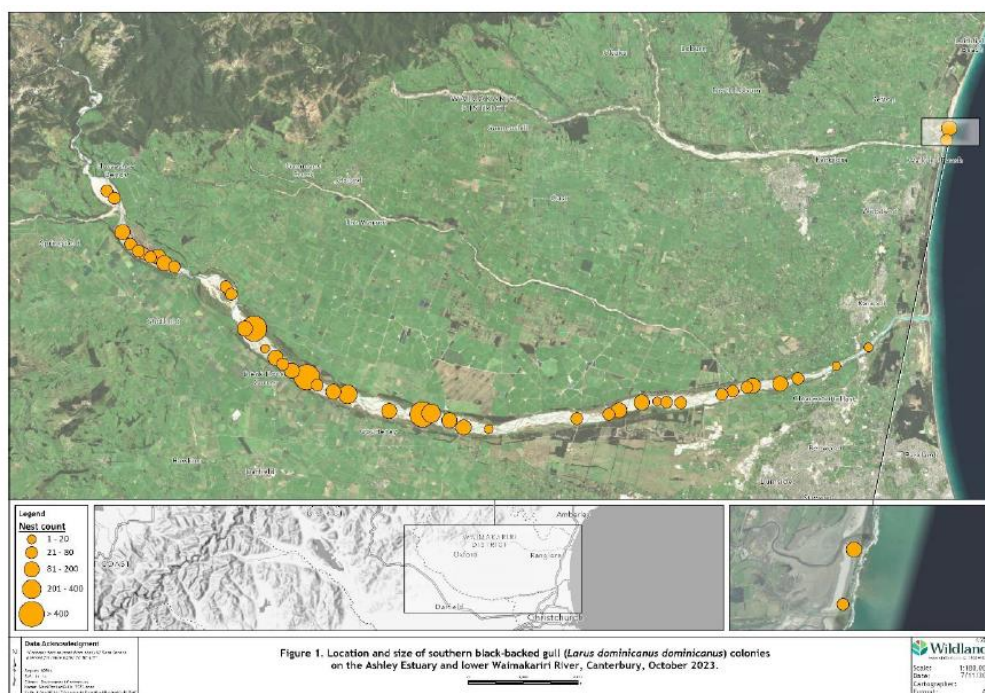


Figure 1: Location and size of SBBG colonies on the lower Waimakariri River, Canterbury, during the October 2023 survey (Source: Wildlands (2023)<sup>5</sup>).

- 42 Analysis of the data collected since 2016 shows an increasing trend in SBBG populations size along the lower Waimakariri River since 2017 (refer to Figure 2 below); however the most recent population numbers are similar numbers to those recorded in 2016. While approximately 5000 nests were recorded in both 2016 and 2023, these were distributed between 26 colonies in 2016 and 43 colonies in 2023. Furthermore, Wildlands (2023) note that the nests were distributed further along the river in 2023 (Figure 1 above).
- 43 Figure 3 shows the monthly totals of SBBG recorded by CIAL at 14<sup>6</sup> off-airport survey sites between September 2022 and October 2023. This data shows a seasonal pattern with numbers increasing during the breeding season (September to January).
- 44 Of the 14 survey sites, the highest maximum and average number of SBBG recorded during a count session was at the site 12 'Paparua Piggery' (refer to Figure 4 and Map 1).

<sup>5</sup> Wildlands (2023). Southern black-backed gull survey of the Ashley Estuary and lower Waimakariri River 2023

<sup>6</sup> Site 1 (Waimakariri River) is excluded from this analysis as data for that site is collected via the annual helicopter survey outlined in paragraph 41.

45 A number of SBBG have been recorded on-site at CIAL (Figure 5), with a maximum of 22 birds recorded on site on a single day in June 2023.

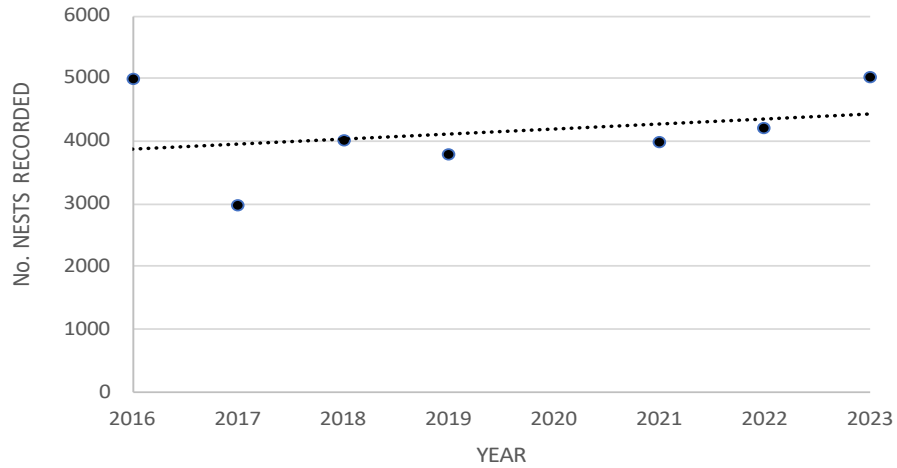


Figure 2: Number of SBBG nests recorded during annual<sup>7</sup> helicopter surveys of the lower Waimakariri River

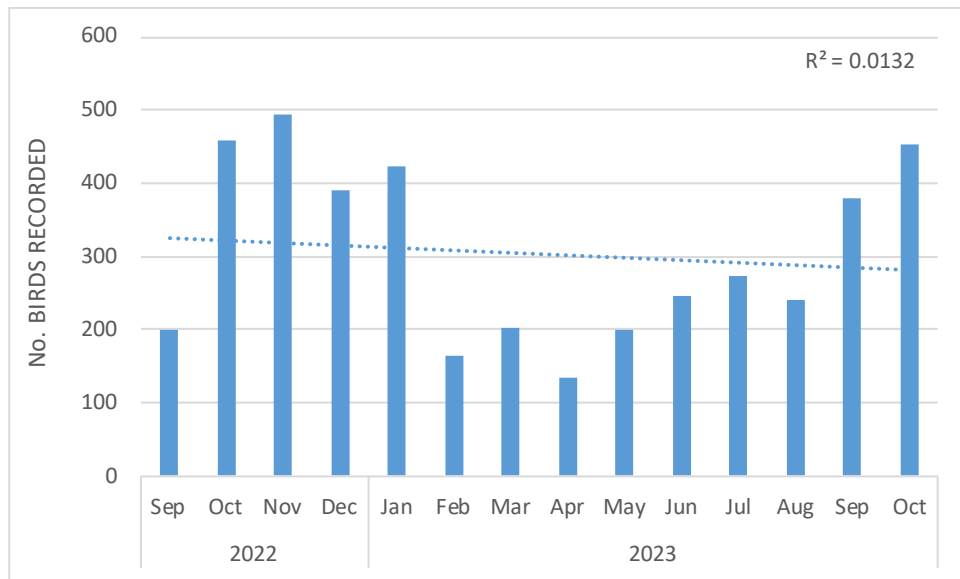


Figure 3: Total number of black-backed gull recorded at off airport survey sites (2-15; refer to Map 1) each month between September 2022 and October 2023.

<sup>7</sup> A survey was not conducted in 2020 during to Covid-19 restrictions.

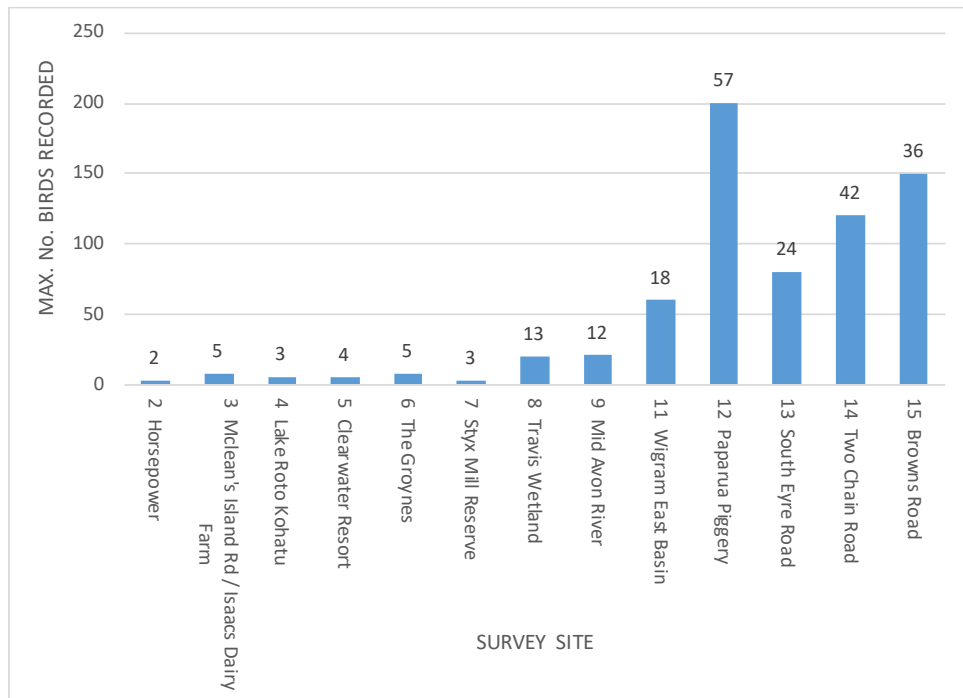


Figure 4: Maximum number of SBBG recorded during a count session at off airport survey sites (2-15; refer to Map 1) between September 2022 and October 2023. (Data labels above bars represent average numbers recorded across all count sessions)

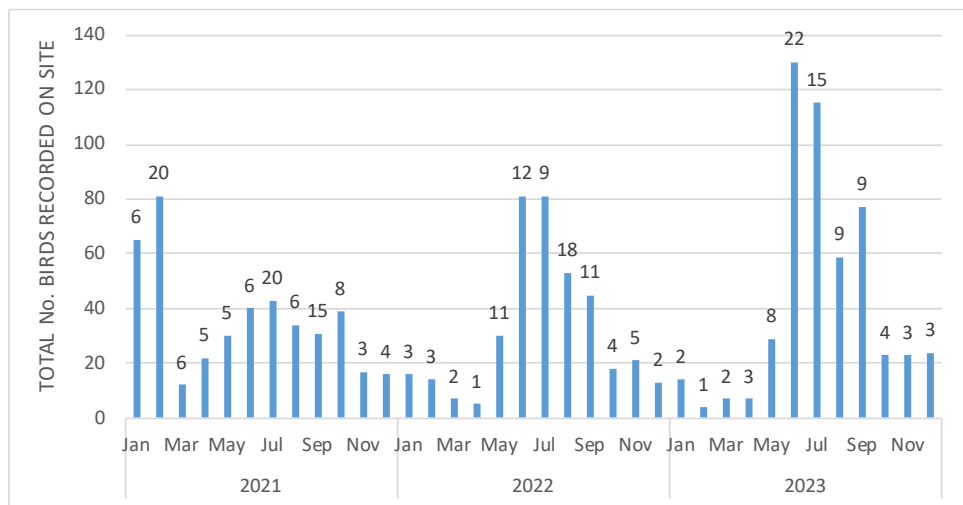


Figure 5: Total number of SBBG birds recorded each month on-site at Christchurch Airport from January 2021. (Data labels above bars represent maximum numbers recorded in a single day that month)

### Canada goose

- 46 The Canada goose (*Branta canadensis*), introduced to New Zealand, is a large (4.5–6.0 kg) flocking bird that grazes on pasture, young crops and aquatic plants. As such, its preferred habitat includes pastoral land adjacent to a lake or large pond. The total New Zealand population is estimated to be approximately 60,000, of

which two-thirds are in the South Island (Williams 2013<sup>8</sup>).

- 47 In the South Island, most birds breed near high-country lakes and rivers, with many birds migrating to Lake Ellesmere and other coastal lakes and estuaries in November to February for the autumn moult. Birds generally stay there throughout the winter to early September; at which time they head back to their breeding grounds.
- 48 Figure 6 shows the monthly totals of Canada geese recorded by CIAL at the off-airport survey sites between September 2022 and October 2023; this species was only recorded at 10 of the 14 survey sites. Numbers were generally lower during September to December.
- 49 The maximum number of birds was recorded at site 9 'mid-Avon', with approximately 4000 birds recorded during a single count session (refer to Figure 7 and Map 2). This site also had the highest average count of 326 birds.
- 50 Over the period of January 2021 to December 2023, there are two records of Canada geese on-site, those being on 23 and 26 January 2021, when 7 and 8 birds were recorded respectively.

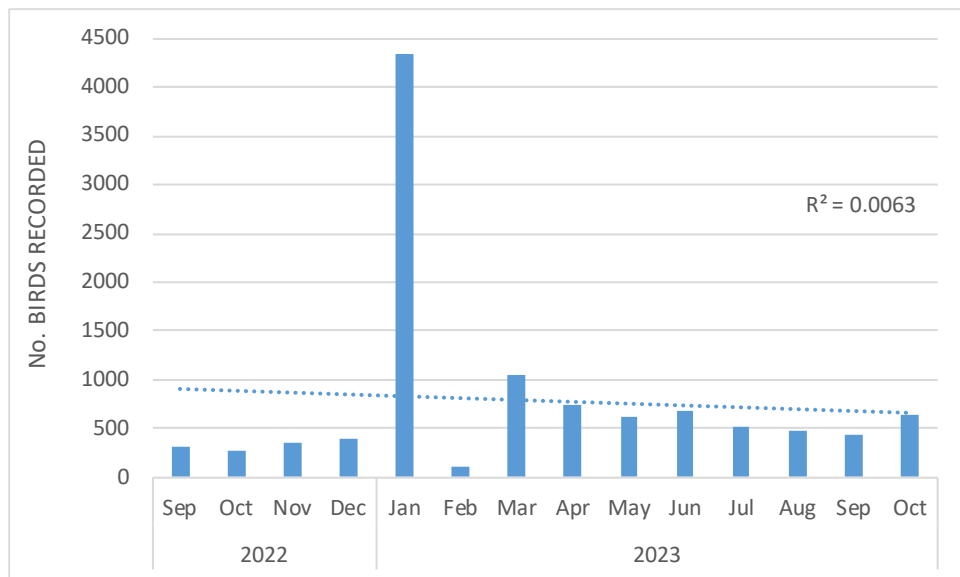


Figure 6: Total number of Canada geese recorded at off airport survey sites (2-15; refer to Map 1) each month between September 2022 and October 2023.

<sup>8</sup> Williams M.J. 2013 [updated 2022]: Canada goose | Kūihi. In Miskelly C.M. (ed.) New Zealand Birds Online. [www.nzbirdsonline.org.nz](http://www.nzbirdsonline.org.nz).

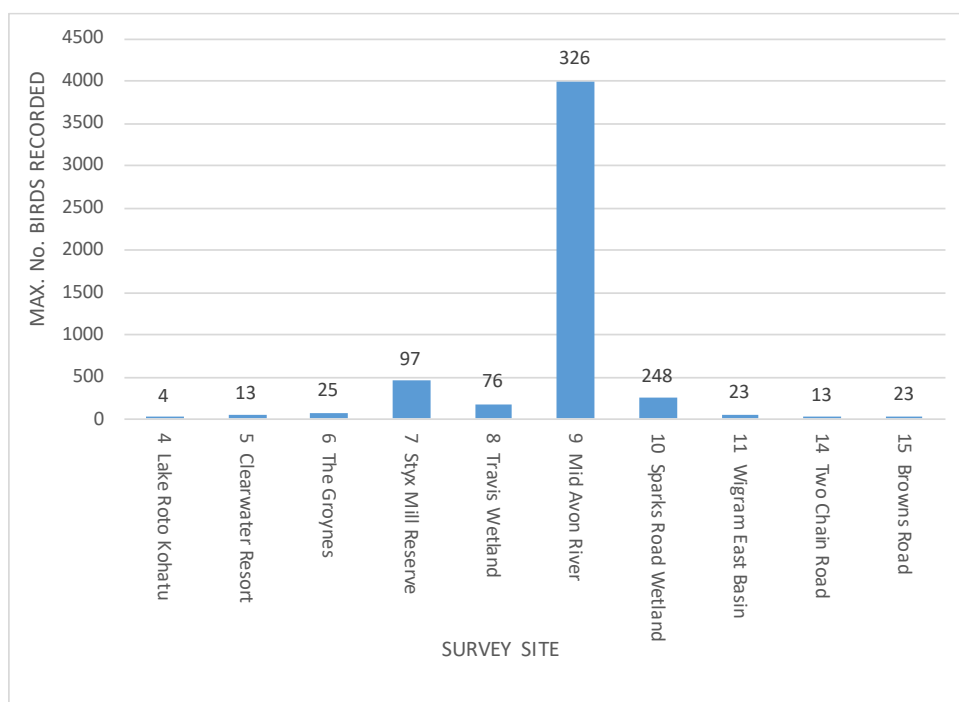


Figure 7: Maximum number of Canada geese recorded during a count session at off airport survey sites (2-15; refer to Map 1) between September 2022 and October 2023. (Data labels above bars represent average numbers recorded across all count sessions)

### Feral pigeon

- 51 Feral pigeon / rock pigeon / rock dove (*Columba livia*) is a widespread introduced species; in urban and rural environments, birds utilise a wide variety of habitats.
- 52 Feral pigeons roost and nest on and in buildings, both disused and in use, under bridges and wharves, and on ledges of cliffs and caves. In urban areas the diet consists mainly of food refuse and scraps, and in rural areas mainly commercial grains (peas, maize, barley, wheat, oats, and clover), either newly-sown or among stubble (Powlesland 2013<sup>9</sup>).
- 53 There are not accurate estimates of feral pigeon population sizes available. However, Figure 8 shows the number of feral pigeon recorded by CIAL at the off-airport survey sites between September 2022 and October 2023; note birds were only recorded at eight of the 14 survey locations, but the data shows an increasing trend at those sites (Figure 8). Of the survey sites, the highest number of maximum and average number of birds were recorded at the Paparua piggery (Site 12; refer to Figure 9 and Map 1).

<sup>9</sup> Powlesland R.G. 2013 [updated 2022]: Rock pigeon | kererū aropari. In Miskelly C.M. (ed.) New Zealand Birds Online. [www.nzbirdsonline.org.nz](http://www.nzbirdsonline.org.nz)

54 Large numbers of feral pigeon have been recorded on site at Christchurch Airport, including a maximum of 500 birds during a single day in February 2021 (Figure 10).

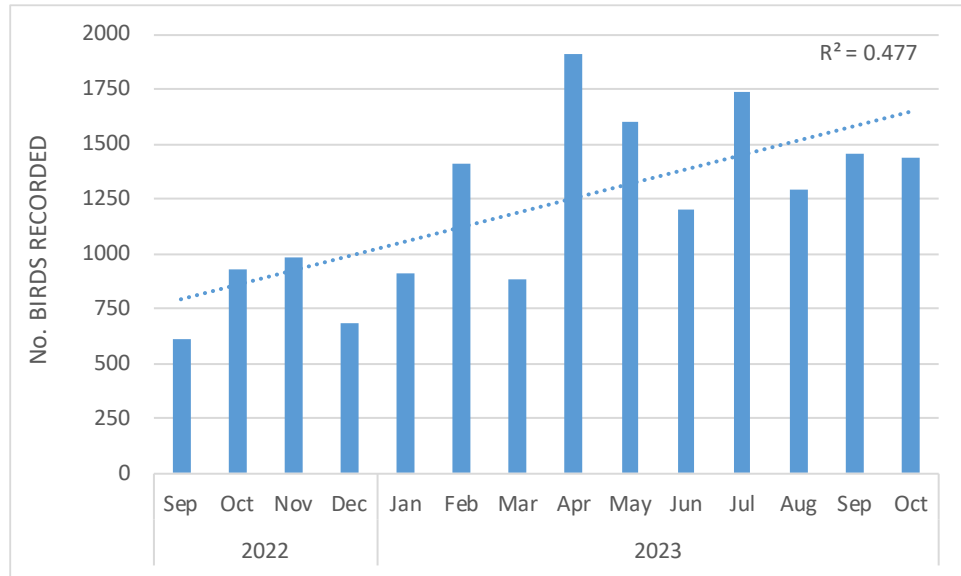


Figure 8: Total number of feral pigeon recorded at off airport survey sites (2-15; refer to Map 1) each month between September 2022 and October 2023.

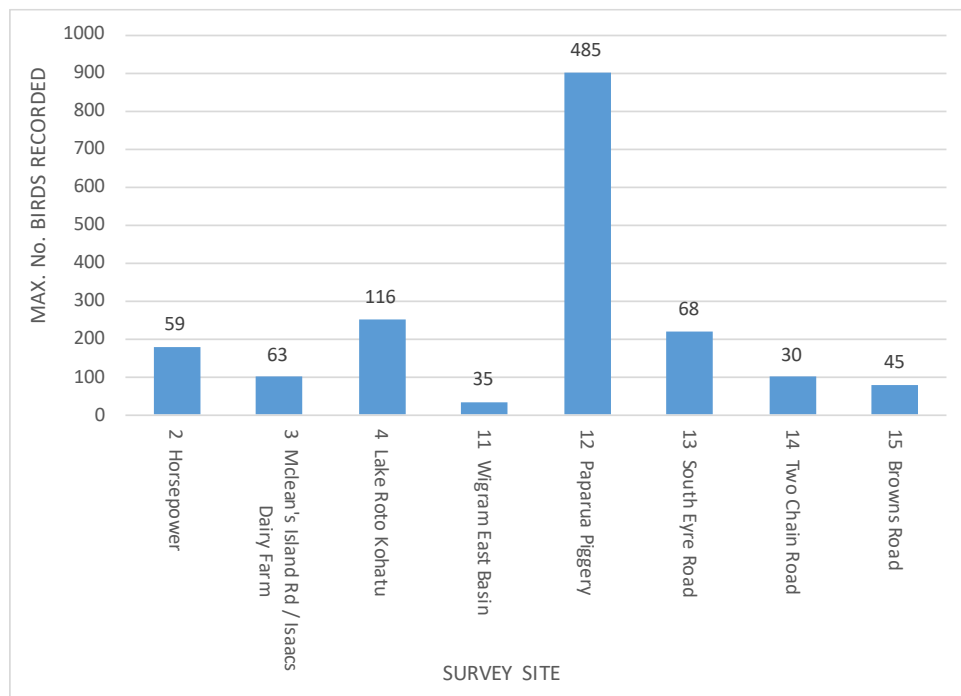


Figure 9: Maximum number of feral pigeon recorded during a count session at off airport survey sites (2-15; refer to Map 1) between September 2022 and October 2023. (Data labels above bars represent average numbers recorded across all count sessions)

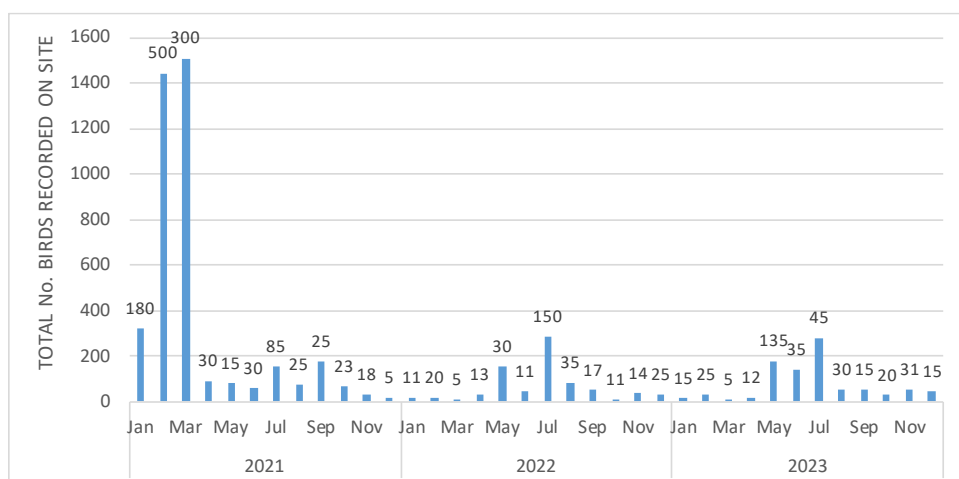


Figure 10: Total number of feral pigeon recorded each month on-site at Christchurch Airport from January 2021. (Data labels above bars represent maximum numbers recorded in a single day that month)

### Spur-winged plover

- 55 Spur-winged plover (*Vanellus miles*) was first recorded breeding near Invercargill in 1932 but is now widespread throughout New Zealand. Though no accurate or recent population estimate is available, this species is considered abundant in New Zealand (Woodley 2013<sup>10</sup>). As with the SBBG, this species is not afforded any level of protection under the Wildlife Act (1953).
- 56 This species inhabits a wide range of open habitats, usually near water (e.g. riverbeds and sea and lakeshores, agricultural pasture and urban parklands). Birds breed as isolated pairs and nest in wide-open habitat, with a preference for short grass (<12 cm). Barlow et al. (1972)<sup>11</sup> reported 66% of all nests within 45 m of water.
- 57 Barlow et al. (1972) recorded average territory sizes of 14.5 ha (ranging = 8.4-19.4 ha). Adults were found in breeding territory 9-10 months of year, with movements during nesting period very local (Barlow et al. 1972).
- 58 Birds forage and roost on ground, in short grass, bare areas of gravel or mud, or sparsely grassed areas. Birds forage on invertebrates within short-grassed pasture and ploughed paddocks, or crustaceans and molluscs if in coastal habitats.
- 59 Figure 11 shows the total monthly number of spur-winged plover recorded by CIAL at the off-airport survey sites between September

<sup>10</sup> Woodley, K. 2013. Spur-winged plover in Miskelly, C.M. (ed.) New Zealand Birds Online. [www.nzbirdsonline.org.nz](http://www.nzbirdsonline.org.nz)

<sup>11</sup> Barlow et al. (1972). Breeding data on the spur-winged plover in Southland, New Zealand. *Notornis* 19: 212-249.

2022 and October 2023. This data shows an increasing trend over that period of time.

- 60 Spur-winged plover were only recorded at 10 of the survey sites. The highest maximum (n=15) and average (9) number of birds was recorded at Travis Wetland (Figure 12).
- 61 In terms of on-site at Christchurch Airport, a maximum of 16 birds were recorded on a single day in both June 2021 and November 2023 (Figure 13).

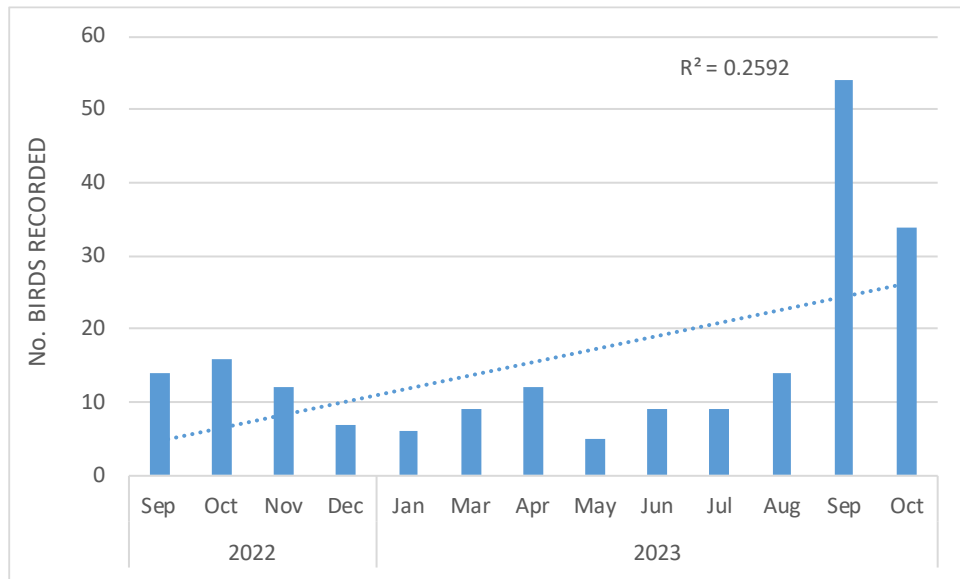


Figure 11: Total number of spur-winged plover recorded at off airport survey sites (2-15; refer to Map 2) each month between September 2022 and October 2023.



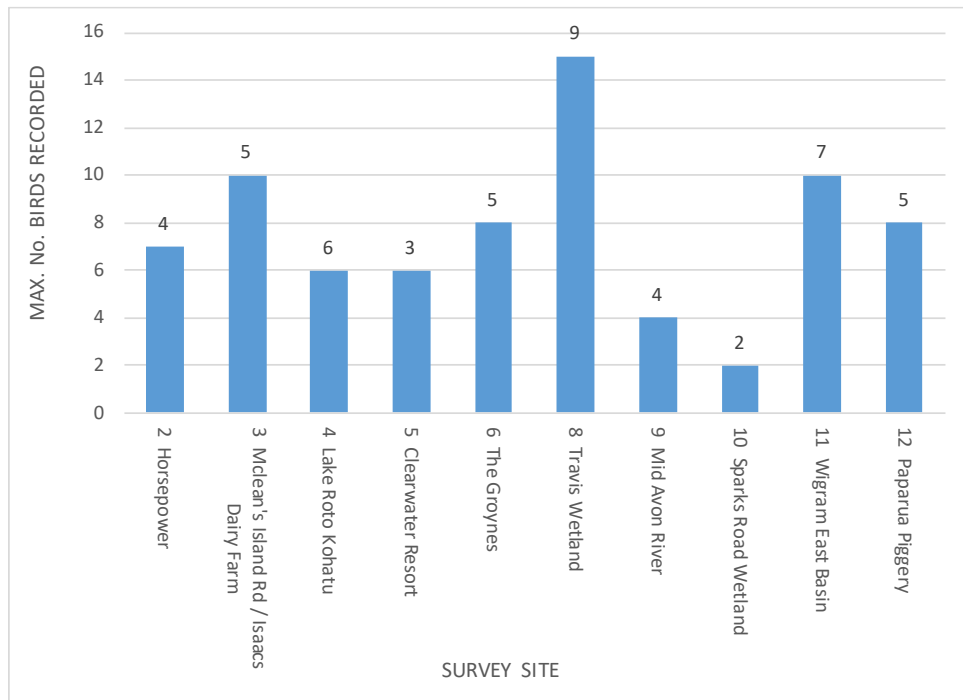


Figure 12: Maximum number of spur-winged plover recorded during a count session at off airport survey sites (2-15; refer to Map 1) between September 2022 and October 2023. (Data labels above bars represent average numbers recorded across all count sessions)

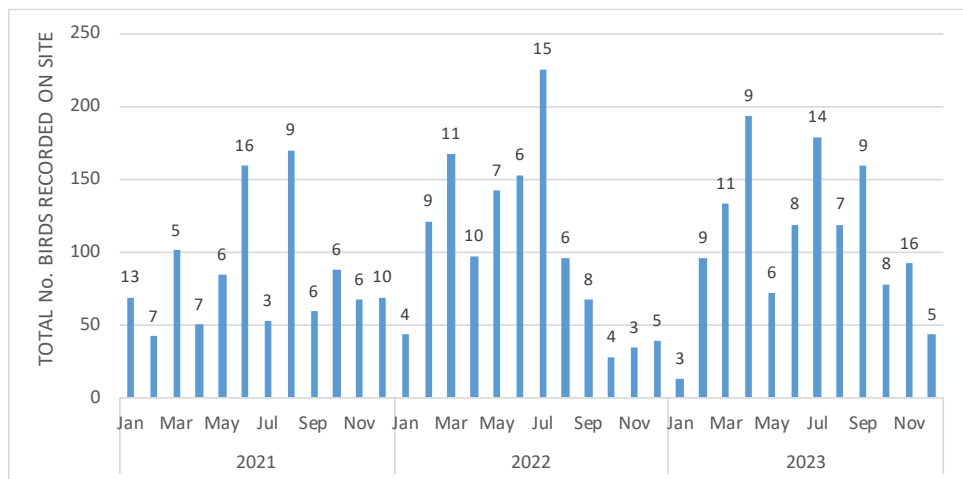


Figure 13: Total number of spur-winged plover recorded each month on-site at Christchurch Airport from January 2021. (Data labels above bars represent maximum numbers recorded in a single day that month)

### Australasian harrier

62 The Australasian / swamp harrier (*Circus approximans*) is classified as *Not Threatened* and is considered to be abundant throughout much of New Zealand (though no accurate national population estimate is available). It can be found in a variety of habitats including coastal fringe, estuaries, wetlands, pine forest, farmland and high-country areas.

- 63 This species is a solitary breeder and strongly territorial during the breeding season, during which it may have a home-range of approximately 900 ha. In the non-breeding season harriers often form communal roosts which can contain several hundred birds (Seaton et al 2013<sup>12</sup>).
- 64 Figure 14 shows the monthly total number of Australasian harrier recorded by CIAL at the off-airport survey sites between September 2022 and October 2023. This data shows very low numbers of birds being recorded. Birds were only recorded at three sites, with a maximum of one bird being recorded on any occasion (Figure 15).
- 65 In terms of on-site at Christchurch Airport, a maximum of four birds were recorded during a single day in May 2021 and August 2023 (Figure 16).

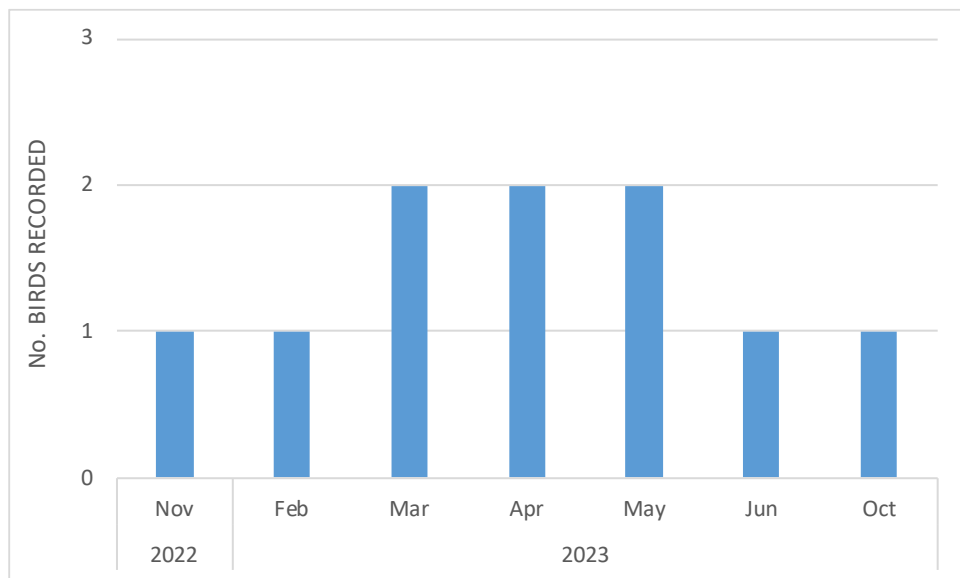


Figure 14: Total number of Australasian harrier recorded at off airport survey sites (2-15; refer to Map 1) each month between September 2022 and October 2023.

<sup>12</sup> Seaton, R.; Galbraith, M.; Hyde, N. 2013 [updated 2022]. Swamp harrier | kāhu. In Miskelly, C.M. (ed.) New Zealand Birds Online. [www.nzbirdsonline.org.nz](http://www.nzbirdsonline.org.nz)

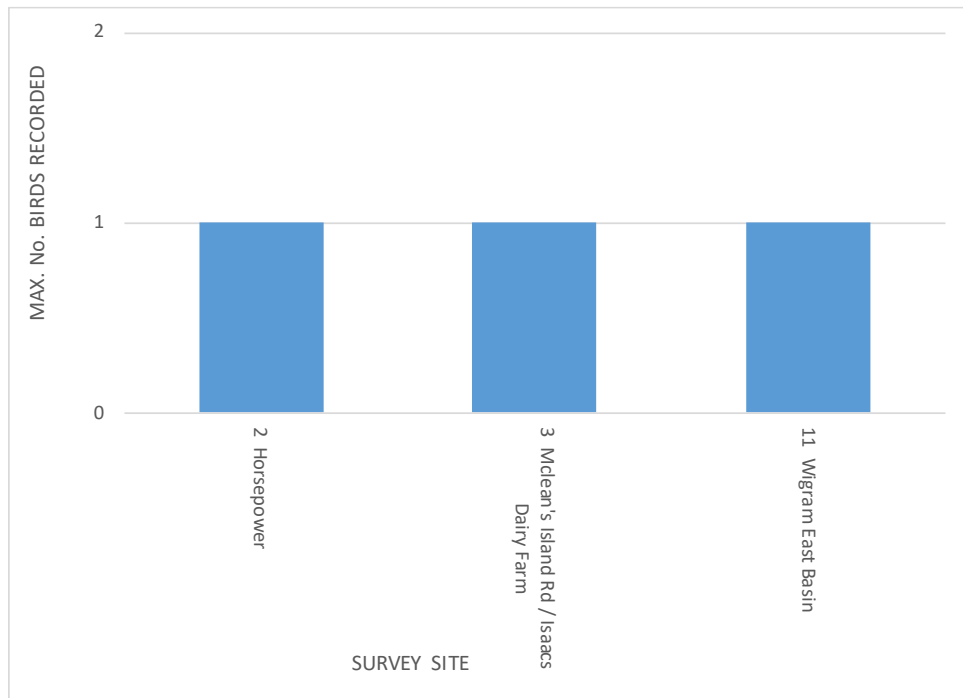


Figure 15: Maximum number of Australasian harrier recorded during a count session at off airport survey sites (2-15; refer to Map 1) between September 2022 and October 2023.

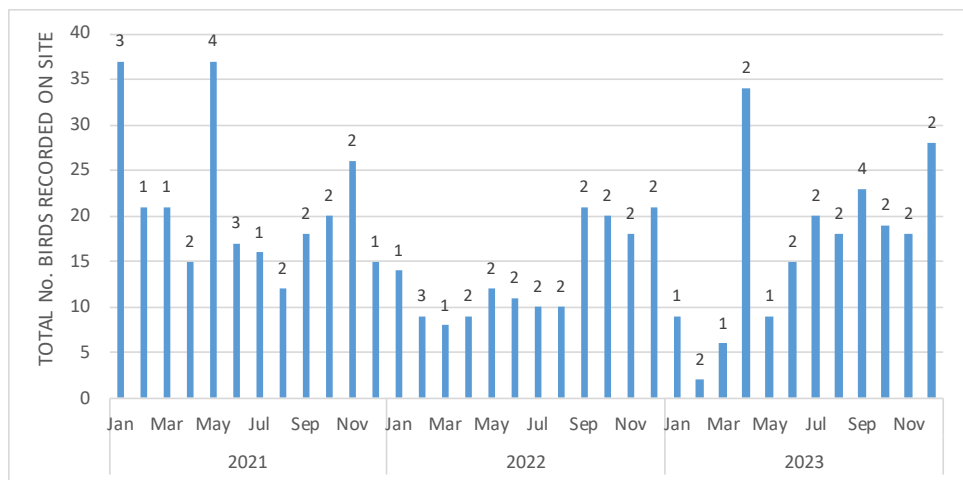


Figure 16: Total number of Australasian harrier recorded each month on-site at Christchurch Airport from January 2021. (Data labels above bars represent maximum numbers recorded in a single day that month)

### BIRDS IN SHARED AIRSPACE

66 The provision of suitable new habitat (be it for roosting, foraging or nesting) can increase the potential for bird strike due to:

66.1 Increasing the amount of habitat available and thereby attracting birds to that site; and

66.2 Increasing the populations through the ability of the additional habitat to support increasing numbers.

67 Both these scenarios can increase the number of birds that are in the shared airspace, either through increased movements or increased populations.

68 Figure 17 below shows the number of near strike and strike events for all species recorded at Christchurch Airport between April 2017 and January 2024.

69 Figure 18 and Figure 19 below show the number of near strike and strike events respectively from Christchurch Airport for the five high risk species outlined above between April 2017 and January 2024. The highest number of near strikes was recorded for SBBG, but spur-winged plover were the species with the highest records of actual strikes.

70 The five species of concern differ in their flight and dispersal behaviours and patterns. The key features and relevant information available for each of these species is described below.

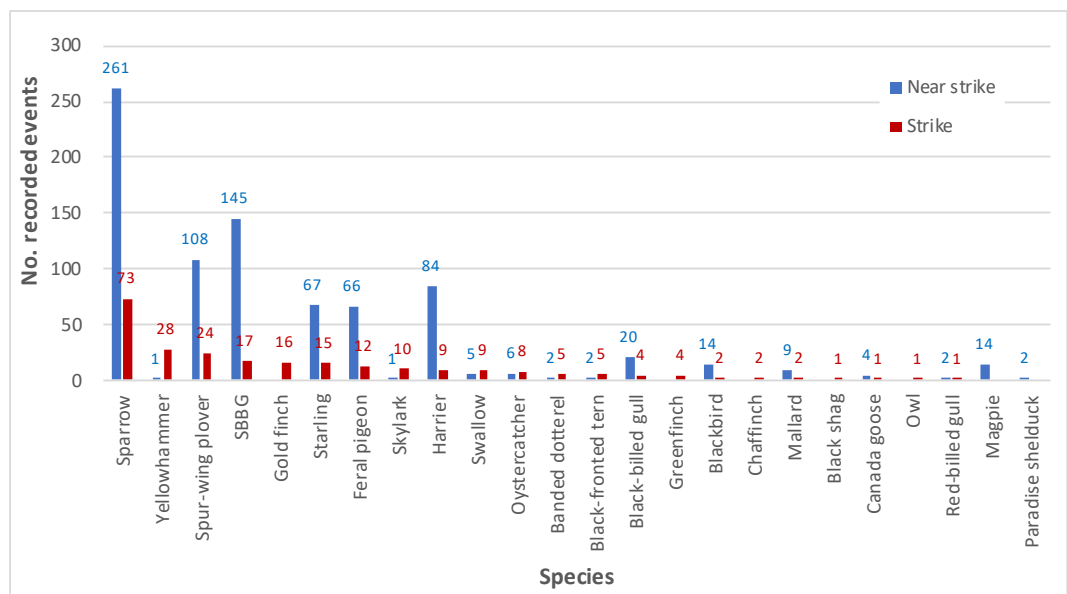


Figure 17: Number of near strike and strike events for all species recorded at Christchurch Airport between April 2017 and January 2024 (ordered by descending number of strike events).

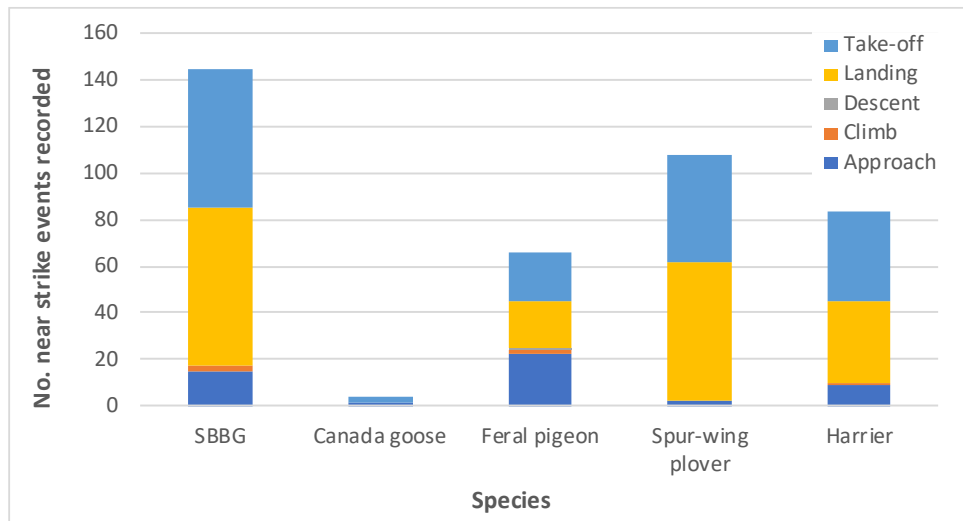


Figure 18: Number of near strike events recorded of high risk species recorded at Christchurch Airport between April 2017 and January 2024.

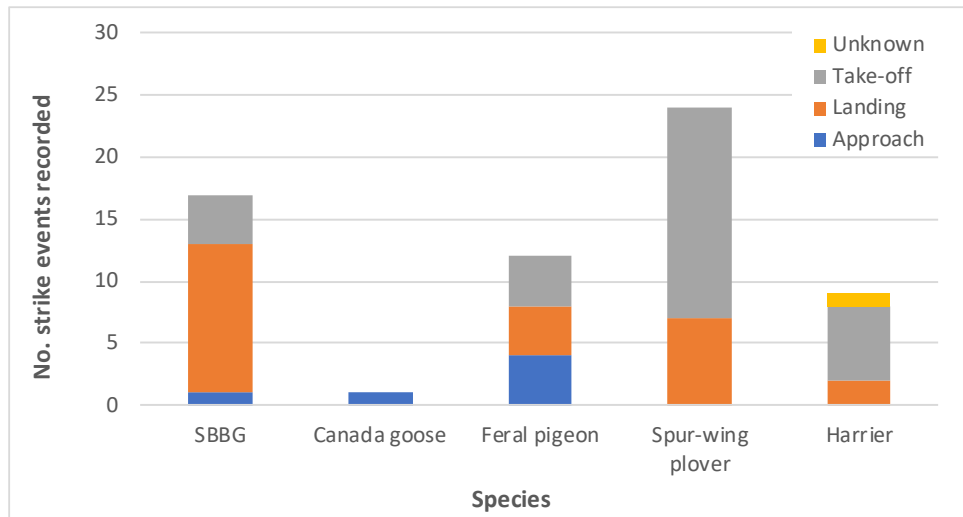


Figure 19: Number of strike events recorded of high risk species recorded at Christchurch Airport between April 2017 and January 2024.

### SBBG

- 71 SBBG, a resident species, breed and roost on the Waimakariri River, making daily movements from the river to and from feeding sites across the wider landscape. While the average home range of a SBBG is not known, Rowe (2013)<sup>13</sup> reported birds dispersing considerable distances. For instance, a SBBG banded in the Waimakariri Gorge was recorded approximately 325 km away in Oriental Bay (Wellington). Such distances were not uncommon, with 486 km being the furthest distance a bird was recorded from the site it was banded.

<sup>13</sup> Rowe (2013). Dispersal of southern black-backed gulls (*Larus dominicanus dominicanus*) banded in Canterbury, New Zealand, 1959-1993. *Notornis* 60: 134-142.

- 72 Furthermore, the fact that these birds are opportunistic feeders and exhibit scavenging behaviour would suggest that they are capable of sourcing food from many different habitats, potentially flying long distances to find food.
- 73 Birds fly individually or in flocks, often at heights between 0-50 feet (0-15 m) above ground level (AGL) but have been recorded as high as 5,000 feet (1524 m) AGL (Figure 20).
- 74 Thus, SBBG undertake daily, likely long distance, movements across the landscape (from the Waimakariri River), opportunistically searching for food and flying within shared airspace. As noted above, SBBG have been recorded as both near strike and strikes (Figure 18 and Figure 19 above), with the number of such events varying between April 2017 and December 2023 (Figure 21).

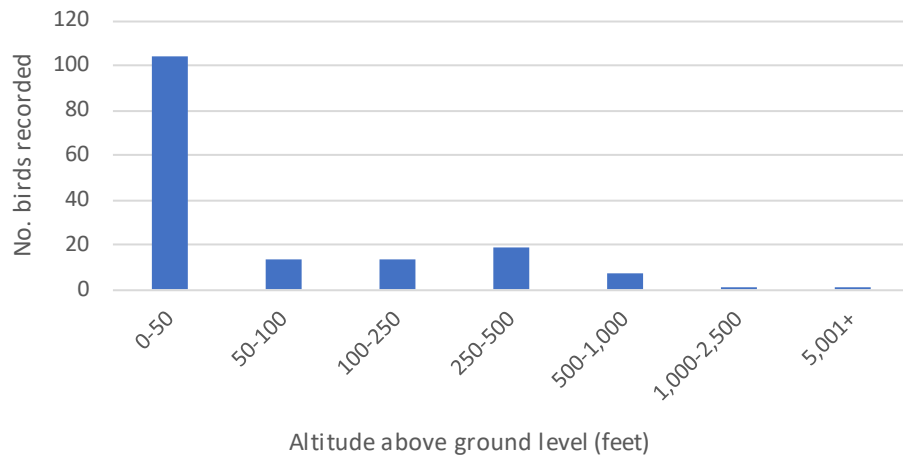


Figure 20: SBBG flight heights recorded at Christchurch Airport between April 2017 and January 2024.

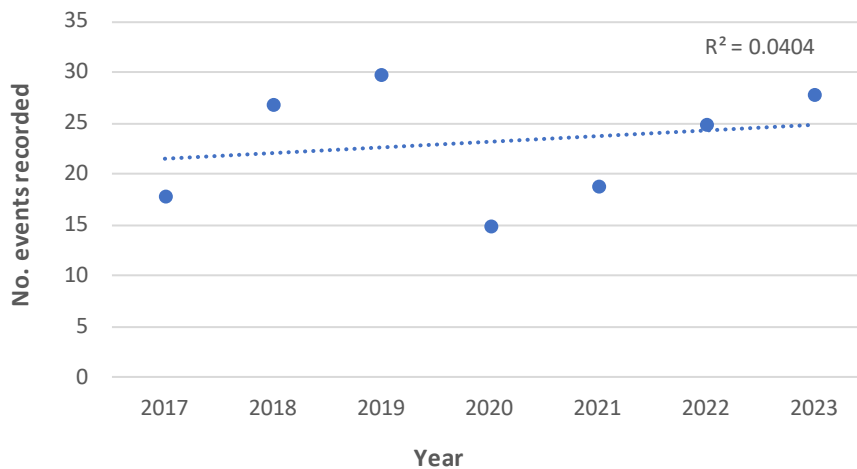


Figure 21: Number of near strike and strike events involving SBBG recorded at Christchurch Airport between April 2017 and December 2023.

### **Canada goose**

- 75 The Christchurch population comprises both resident (~1,000) and migratory (~2000-3000) birds. The large-scale migratory movements between the breeding and non-breeding sites occurs as follows:
- 75.1 November – December: Non-breeders or failed breeders from the high-country breeding sites arrive in Christchurch;
  - 75.2 April: Adults and young birds from the high-country breeding sites arrive to undertake the annual moult;
  - 75.3 September: Birds return to their high-country breeding sites.
- 76 The movements between breeding (high country) and non-breeding sites occurs across the Canterbury Plains utilising the braided-river corridors such as the Waimakariri and Rakaia Rivers to fly down to the coast (Caley 2020).
- 77 Caley (2020) used GPS tracking technology on a small sample of Canada geese to study patterns of diurnal and seasonal movements in Christchurch City and Central Canterbury. The findings of that work included:
- 77.1 The furthest distance travelled by a tagged individual was 128.8 km; this bird was tagged at Lake Ellesmere. For Christchurch city birds, the furthest travelled was 26.3 km.
  - 77.2 Long distance movements of Canada geese mostly occurred during spring with birds flying >20 km and as far as 115.6 km from point of being tagged.
  - 77.3 The long-distance flights coincided with a dispersal of geese away from the coast to inland breeding sites.
  - 77.4 Home range size varied between individuals, with the range of a Lake Ellesmere/Te Waihora goose spanning 20,540 km<sup>2</sup> during November 2019. In contrast, city birds only averaged ranges of 9.47 km<sup>2</sup> for the whole year, with a single goose peaking at 80 km<sup>2</sup> in August.
  - 77.5 Very few high-altitude flights were observed in autumn and winter compared to spring and summer (Figure 22 below). From January to August, the mean altitude of tagged birds remained between 5-8 m (i.e. 16-26 ft) ASL. Altitude throughout the winter remained around 8 m (26 ft) ASL. Mean altitude in September was 18.6 m (61 ft) ASL. Activity of geese decreased rapidly following the dispersal in spring, with drops in mean altitude to 4 m (13 ft) ASL.

77.6 Two distinct peaks in diurnal flight activity were recorded from 05:00 to 09:00 am and 16:00 to 20:00 pm. It is thought that birds are foraging on the ground outside of those peak times.

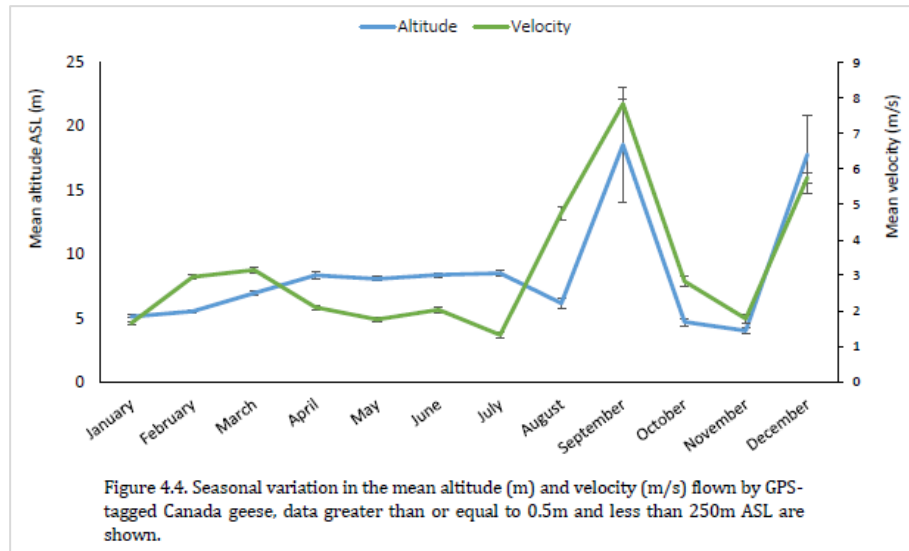


Figure 22: Figure 4.4 taken from Caley (2020)

- 78 Caley (2020) recorded one bird (3519) flying parallel to the SW-NE airport runway <1 km away at a height of between 100-200 m (328-656 ft) ASL from 18:37 to 18:47 hrs on 28/9/19 (refer to left image in Figure 23 below). The flight started (17:40 hrs) from the north end of Lake Ellesmere / Te Waihora, passed through Kaiapoi (19:10 hrs) and ended at Whites Road Recreation Reserve, Ohoka (19:31 hrs).
- 79 Caley (2020) recorded a second bird (3594) flying across the landscape within the vicinity of Christchurch Airport and along the Waimakariri River (refer to left image in Figure 24 below).
- 80 ENZ (2019) recorded an incidental observation of 16 Canada geese traversing the north end of the airfield at 18:12 hrs on 19/9/19, flying at an altitude of approximately 100 m (328 ft) AGL.
- 81 Caley (2020) concluded that currently there are few, if any Canada goose travelling to the west of the city within the range of Christchurch Airport that would cause concern.
- 82 Records of Canada geese in the CAA incidents data report birds at low numbers but in-flight heights between 50-500 ft (15-152 m) AGL (Figure 25 below). As noted above, Canada geese have been recorded as both near strike and strikes (Figure 18 and Figure 19 above), with the number of such events increasing between April 2017 and December 2023 (Figure 26 below).



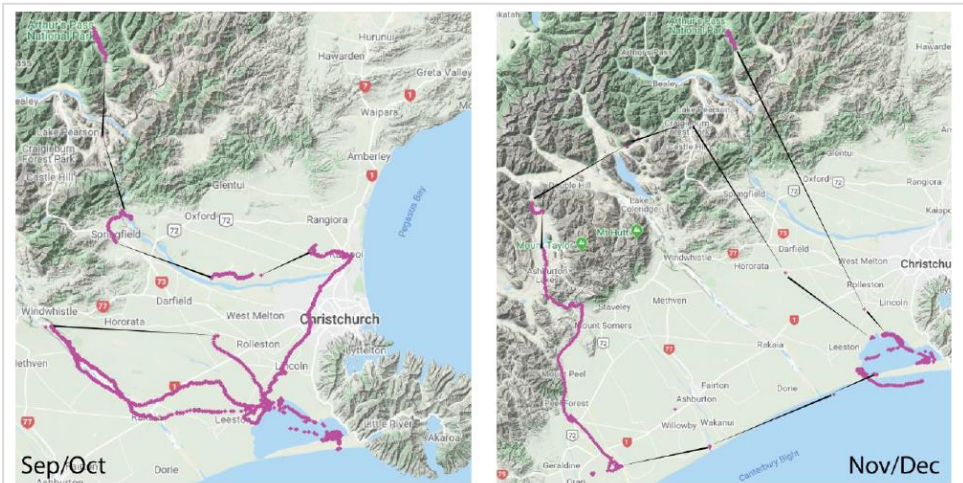


Figure 4.7. Illustration showing seasonal variation in the movements of bird 3519 “Charlie” from January 2019 to December 2019 at Lake Ellesmere/Te Waihora. Green star indicates site where individual was fitted with device. Black lines indicate trajectory of bird when flying between locational fixes.

Figure 23: Part of Figure 4.7 taken from Caley (2020).

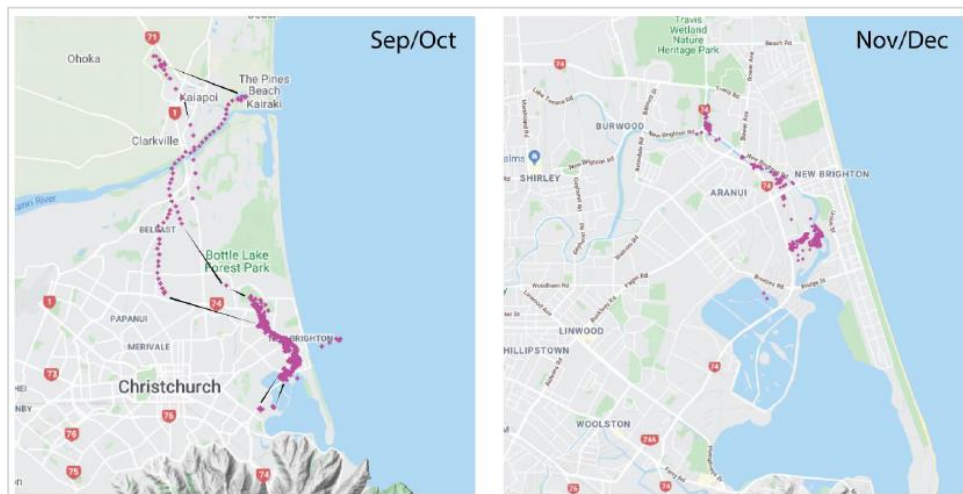


Figure 4.8. Illustration showing seasonal variation in the movements of bird 3594 “Maverick” from January 2019 to December 2019 in Christchurch city. Green star indicates site where individual was fitted with device. Black lines indicate trajectory of bird when flying between locational fixes.

Figure 24: Part of Figure 4.8 taken from Caley (2020).

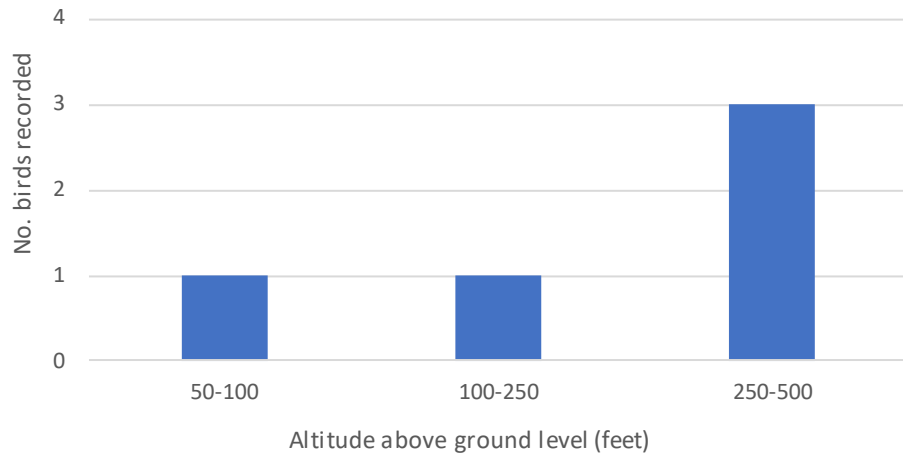


Figure 25: Canada geese flight heights recorded at Christchurch Airport between April 2017 and January 2024.

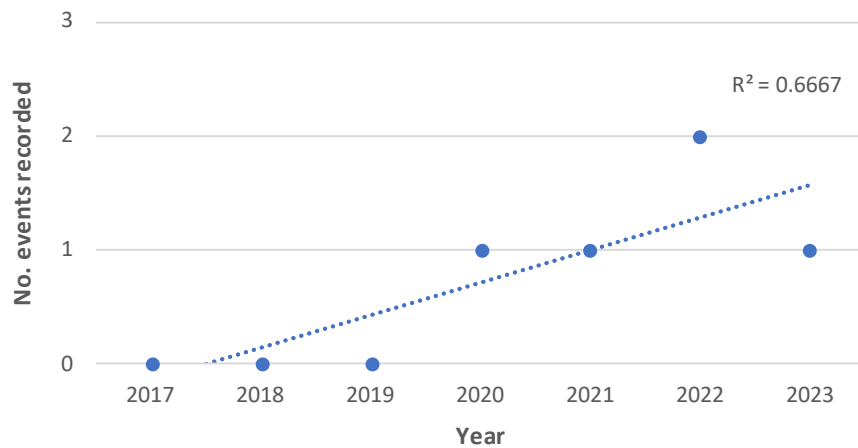


Figure 26: Number of near strike and strike events involving Canada goose recorded at Christchurch Airport between April 2017 and December 2023.

### Feral pigeons

- 83 When commuting between roosting and foraging sites, feral pigeons fly directly and quickly. They may travel several kilometres between roosting and feeding (Higgins & Davies 1996). Rock pigeons generally forage in pairs or as a loose flock (Powlesland 2013)<sup>9</sup>.
- 84 ENZ (2019)<sup>14</sup> undertook point count surveys of feral pigeon at five sites (refer to Figure 27 below) around Christchurch Airport between 06:00 and 19:00 hours. During that study, ENZ (2019) recorded a total of 995 individual pigeons, with a mean flock size of eight birds. With the exception of one bird, all pigeons observed were traversing the Christchurch Airport land. Flight paths of pigeons observed

<sup>14</sup> ENZ (2019). Avifauna Monitoring Report, Feral Pigeon Surveillance. Report Number 19008-001 prepared by Ecology New Zealand for Christchurch International Airport Ltd.

during that study were grouped into three zones (shaded dark grey in the image below). Most flocks were observed north of the airfield, with few observed traversing over two flight paths across the runway.

- 85 ENZ (2019) reported flight heights of flocks varied between 2-100 m (7-328 ft) AGL, with a relatively consistent average height AGL of 30 m (98 ft).
- 86 Flight heights of feral pigeon recorded in the CAA incidents data range from 0-1000 ft (0-305 m) AGL (Figure 28), clearly showing this species is capable of sharing airspace. As noted above, feral pigeon have been recorded as both near strike and strikes (Figure 18 and Figure 19 above), with the number of such events varying but showing a weak decreasing trend between April 2017 and December 2023 (Figure 29).

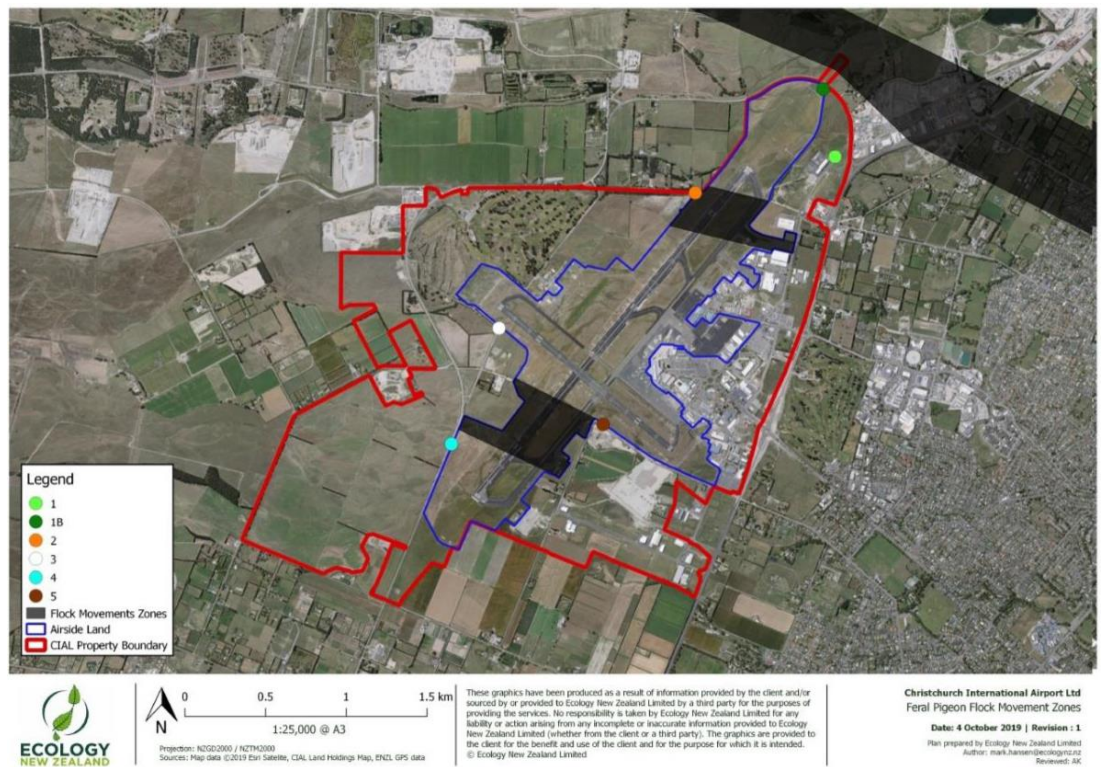


Figure 27: ENZ (2019) survey of feral pigeons at five sites around Christchurch Airport between 06:00 and 19:00 hours.

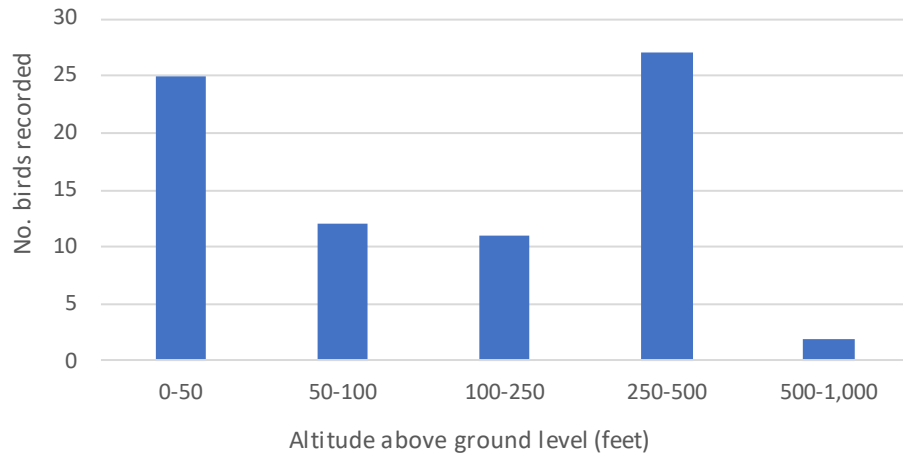


Figure 28: Feral pigeon flight heights recorded by pilots at Christchurch Airport between April 2017 and January 2024.

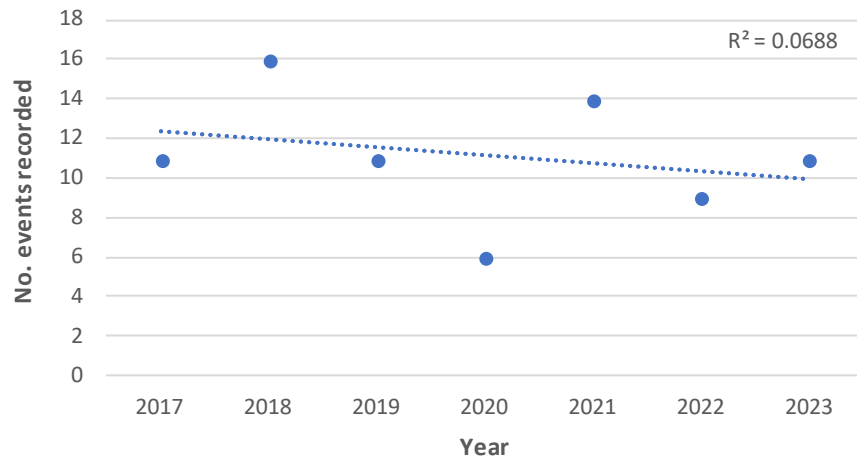


Figure 29: Number of near strike and strike events involving SBBG recorded at Christchurch Airport between April 2017 and December 2023.

### Spur-winged plover

- 87 Birds are often gregarious when not breeding, with flocks of up to 600 birds being recorded in October and December (presumably juveniles and non-breeders; Heather & Robertson 2005<sup>15</sup>).
- 88 Spur-winged plovers are resident and do not undertake seasonal migrations. Birds do move in response to availability of wetlands, using temporary and recently constructed artificial wetlands, then leaving when wetland dry or supply of food diminished (Marchant & Higgins 1993<sup>16</sup>).

<sup>15</sup> Heather & Robertson 2005. The Hand Guide to Birds of New Zealand. Auckland: Viking.

<sup>16</sup> Marchant & Higgins (1993). Handbook of Australian, New Zealand and Antarctic Birds, Vol. 2, Raptors to Lapwings. Melbourne: Oxford University Press.

89 Figure 13 above shows that spur-winged plover are regularly recorded on-site at Christchurch Airport, in part due to the resident and territorial behaviour. Flight height birds recorded in the incidents data range from 0-500 ft (0-152 m) AGL (Figure 30). As noted above, spur-winged plover have been recorded as both near strike and strikes (Figure 18 and Figure 19 above), with the number of such events increasing over the 2022-2023 period (Figure 31).

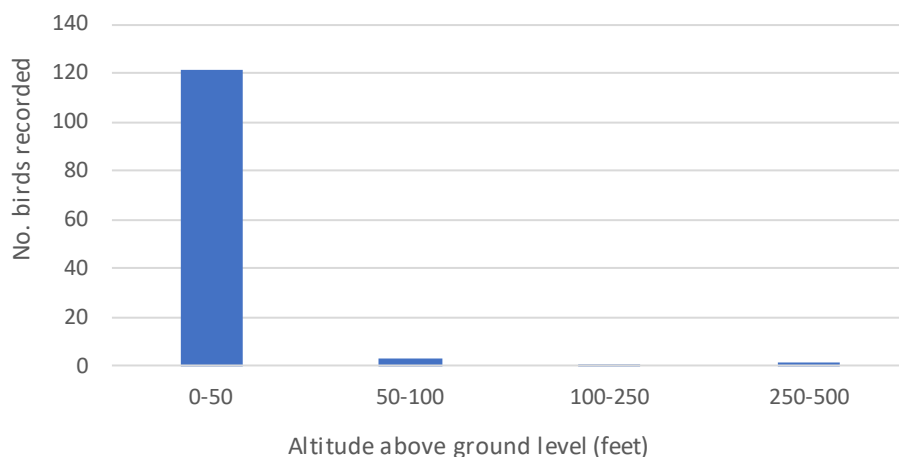


Figure 30: Spur-winged plover flight heights recorded by pilots at Christchurch Airport between April 2017 and January 2024.

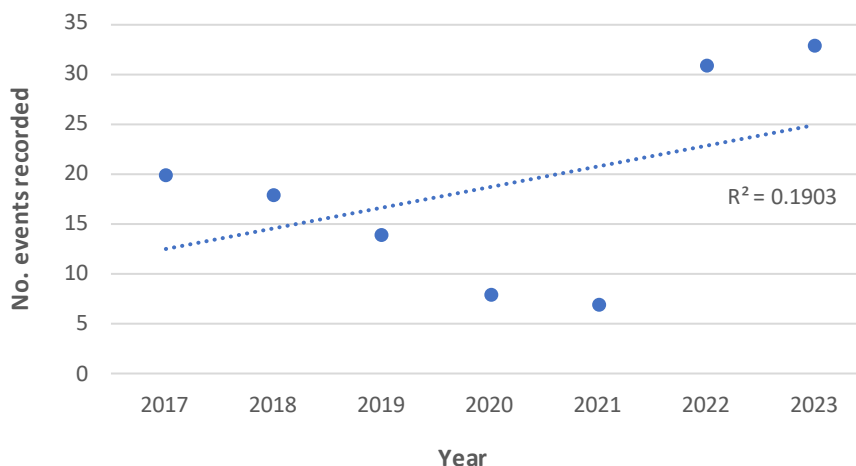


Figure 31: Number of near strike and strike events involving spur-winged plover recorded at Christchurch Airport between April 2017 and December 2023.

**Australasian harrier**

90 Birds are generally thought to be non-migratory in New Zealand, but with some local movements between breeding and wintering grounds (Seaton et al 2013<sup>12</sup>).

91 Harriers have large home ranges and forage over vast distances. Birds often circle up high on thermals and are able to disperse great distances in this manner (Seaton et al. 2013<sup>12</sup>).

92 Flight height for Australasian harrier recorded in the incidents data range from 0-2500 ft (0-762 m) AGL (Figure 32), showing this species is capable of sharing airspace. As noted above, harrier have been recorded as both near strike and strikes (Figure 18 and Figure 19 above), with the number of such events varying between April 2017 and December 2023 (Figure 33).

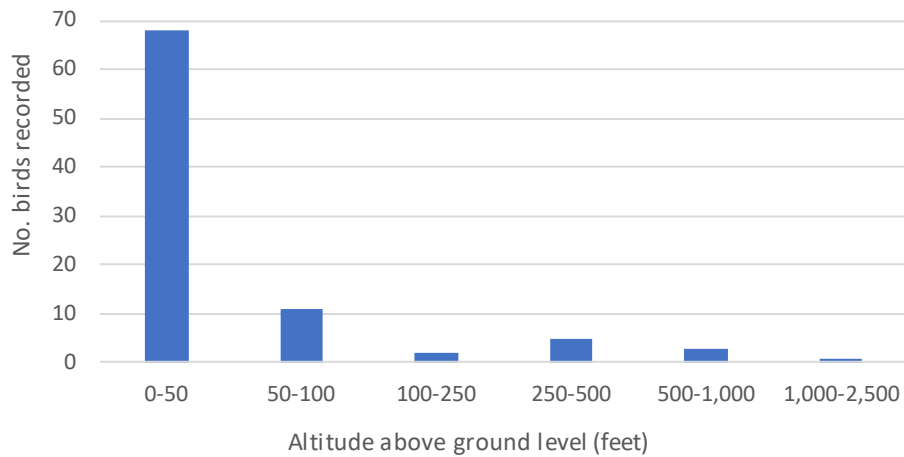


Figure 32: Australasian harrier flight heights recorded by pilots at Christchurch Airport between April 2017 and January 2024.

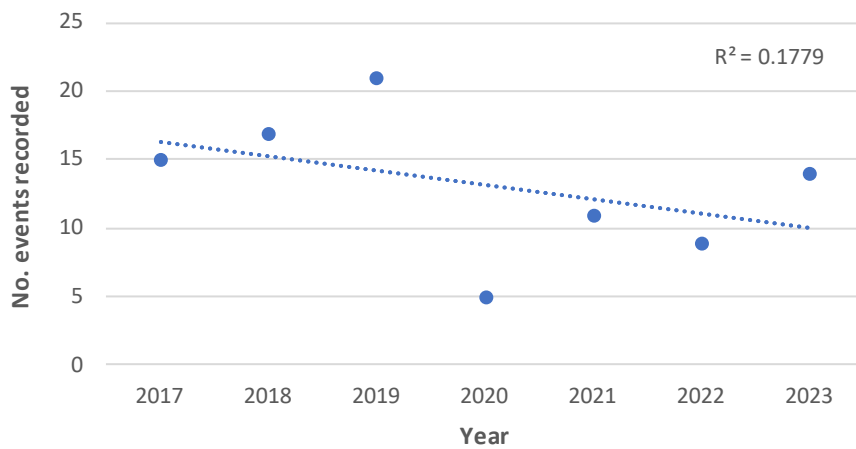


Figure 33: Number of near strike and strike events involving Australasian harrier recorded at Christchurch Airport between April 2017 and December 2023.

### LAND USES ATTRACTIVE TO BIRDS

93 As noted earlier, the provision of new suitable habitat (be it for roosting, foraging or nesting) can increase the potential for bird strike due to increased movement across the landscape and / or by increasing the populations of risk species through the ability of the additional habitat to support increasing numbers. Both these scenarios can increase the number of birds that are in the shared

airspace, either through increased movements or increased populations.

- 94 The purpose of the below recommended measures is not to reduce the existing risk of bird strike in the area, but rather ensure that future land use activities don't further add to the existing risk.
- 95 The Waimakariri District lies within the 3-8 km and 8-13 km radii to Christchurch Airport (refer to Map 1 at **Appendix 1**). As such, here I only address the species for which land use activities at those distances could contribute to the risk of strike. For instance, while changes in land use such as manicured grasslands and recreational fields within 8-13 km of Christchurch Airport are unlikely to increase the risk of strike for spur-wing; this would not be the case if those land-uses were to occur within 3 km of the Christchurch Airport. Thus, my recommendations below relate solely to land use activities between 3-13 km of the Airport.
- 96 At the distance of 3-13 km from Christchurch Airport, it is the large and / or flocking species for which changes in land use could increase the risk of strike. In terms of current high-risk species, this includes SBBG, Canada geese and feral pigeon (all currently high-risk species). In addition, other gull species, ducks, shags, swan and starling, which currently aren't classified as high risk, may also be attracted to various land uses which could encourage their movement across the landscape or facilitate population increases (which may result in them becoming higher risk species).
- 97 Caley (2020) reported an example of changes in the foraging behaviour and movements of Canada geese in response to landscape changes in Christchurch City. Preliminary surveys in the "red zone" area indicated that population had increased following the earthquakes due to the area of land providing the urban populations of Canada geese with additional foraging habitat situated next to several wetland reserves.
- 98 Thus, in the case of Canada geese, the main change in land use in Waimakariri District that could prove attractive to these birds relates to the provision of a large open waterbody within a rural landscape. The CIAL off-airport survey data collected between September 2022 and October 2023 recorded the highest numbers of Canada geese at sites with large open water bodies (refer to Figure 7 on page 12).
- 99 Caley's (2020) tracking data recorded several birds traversing across and along the Waimakariri River from the south, both as part of local and migratory movements. Caley described one bird from Lake Ellesmere stopping at Kaiapoi as a "halfway-hotel" before travelling to and from the Southern Alps. As such, it is important that other "halfway-hotels" aren't established that may attract

Canada geese and increase the likelihood of them traversing the Christchurch Airport flight paths.

- 100 Table 1 below lists some of the waterbodies / wetlands known to be utilised by Canada geese in Christchurch, and their approximate size. While not an exhaustive list, the smallest waterbody in that list at which Canada geese were recorded at was 1,926 m<sup>2</sup>. Other waterfowl such as mallard ducks are known to utilise much smaller waterbodies. Thus, there is the potential that the addition of permanent waterbodies >1000m<sup>2</sup> could serve to increase the movement of Canada geese across the landscape and potentially within airspace. I therefore support the relief CIAL is seeking in the form of a Restricted Discretionary activity status for such activity.

*Table 1: Approximate size of waterbodies / wetlands utilised by Canada geese in Christchurch.*

WATERBODY / WETLAND	AREA (m2)
Avon – Heathcote Estuary (Ihutai)	8,426,395
Avon River (Central)	112,772
Avon River (Lower)	528,041
Avon River (Upper)	131,348
Brooklands Lagoon	2,116,389
Clearwater Resort	158,011
Creamery Reserve	1,926
Creamery Reserve	7,382
Horseshoe Lake	221,455
Kaiapoi Oxidation Ponds	117,227
Lake Albert	3,622
Lake Roto Kohatu	57,713
Lake Roto Kohatu	84,455
Lower Styx Mill Basin	91,232
The Groynes	44,447
Travis swamp	1,163,322
Victoria Lake	19,610
Waimakariri River	25,880,310
Westlake Reserve Ponds	41,129

- 101 As noted earlier in my evidence, SBBG are capable of flying long distances and forage on a range of food sources from different habitats. Consequently, many of the land uses of concern to CIAL relate to SBBG and their scavenging habitats, particularly landfills and piggeries. This behaviour was evident in the CIAL off-airport survey data collected between September 2022 and October 2023, with the highest numbers of SBBG recorded at the Paparua Piggery (site 12) (refer to Figure 4 on page 10).



- 102 Within the Christchurch City boundaries there are already a number of sites / land uses that attract SBBG which breed and roost on the Waimakariri River, and encourage their movements across the landscape (refer to Map 1). While exact flight paths are not known, SBBG have been recorded flying in shared airspace on a number of occasions (refer to Figure 20 above), as both strikes and near strikes (refer to Figure 18 and Figure 19 above).
- 103 Given SBBG colonies extend along much of the lower Waimakariri River (refer to Figure 1 on page 8), there is the potential that new land uses such as landfills / waste facilities and piggeries within 8 or 13 km of Christchurch Airport could attract birds from further up the river into shared airspace. As such, it would be prudent not to further increase the chance of birds dispersing across the wider landscape in the vicinity of Christchurch Airport flight paths. I support the relief that CIAL is seeking for waste management facilities proposed within a 13 km radius of Christchurch Airport to be given a Non-Complying activity status.
- 104 Furthermore, I believe such a status would be appropriate for land uses where animal feed is available (e.g. piggeries, poultry farms, and equine racecourses). As shown by the data, the Paparua Piggery was found to attract high numbers of SBBG and feral pigeon (as recorded in the recent survey data; refer to Figure 4 on page 10 and Figure 9 on page 13). This recommendation is further based on the dispersal ability of these high risk species, their flocking behaviours, the flight heights they are able to achieve (refer to Figure 20 on page 21 and Figure 28 on page 27) and records of strike (Figure 19 on page 20).
- 105 Sewage treatment and disposal facilities are another land use that I believe a Non-Complying Activity status would be appropriate as these attract high risk species such as SBBG and Canada goose, as well as other waterfowl species. Locally, high numbers of such species occur<sup>17</sup> at both the Bromley and Kaiapoi oxidation ponds. Crossland (2005)<sup>18</sup> refers to Canada geese as a "problem bird" at the Bromley oxidation ponds, reporting upwards of 2500 birds in autumn/winter.
- 106 While a much lower risk, land uses such as fruit farms, recreational areas and golf courses can also be attractive to flocking species such as starlings. As such, I am supportive of their inclusion in the proposed plan definition for "bird strike risk activity".

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<sup>17</sup> <https://ebird.org/hotspots>

<sup>18</sup> Crossland (2005). A national biodiversity hot-spot from the treatment of urban wastewater — the Bromley Oxidation Ponds and Te Huingi Manu Wildlife Refuge, Christchurch. In *'Greening the City: Bringing Biodiversity Back into the Urban Environment'*, pages 189-198.

## **RESPONSE TO THE SECTION 42A REPORT**

- 107 Dr McClellan prepared a review of CIAL's submission on bird strike issues for Waimakariri District Council. I note that, as identified at the bottom of page 34 of the review, Dr McClellan and I appear to be in general agreement on the three key species (SBBG, Canada goose and feral pigeon) for which off-airport management / measures would reduce risk of bird strike at Christchurch Airport.
- 108 Before I respond to specific land use measures, there are several data-related matters that I wish to clarify in the following paragraphs.
- 109 The first bullet point on page 35 of the review states that "*Ongoing management of breeding and roosting numbers on the Waimakariri River appears to be leading to declines in counts on the river and at off-airport monitoring sites, and the bird strike rate at the airport is also declining.*"
- 110 I note that the latest survey data<sup>5</sup> of the SBBG on the Waimakariri River report an increase in their numbers over recent years (refer to Figure 2 on page 9 of my evidence), and furthermore the incidence of near strike and strike events with this species has not decreased between April 2017 and December 2023 (refer to Figure 29 on page 27 above).
- 111 Also, with regard to Canada goose Dr McClellan states (page 35) that there have been no incidences of bird strike for this species. However, I note that this is incorrect, with there being a recorded of a single strike event in June 2021.

### **Farming**

- 112 As part of the current review, Dr McClellan commented on the evidence presented by myself and Mr Shaw (Avisure) for CIAL in relation to the Selwyn District Plan. On page 13 of her review she writes "*It is worth noting that both Mr Shaw and Dr Bull's evidence highlight farming, and particularly sheep farming, as a bird risk activity, yet neither list sheep farming as a land use that requires management (monitoring or mitigation)*", going on to state that "*The omission of sheep farming (and for that matter, cropping and other agricultural activities) from any recommendations in the evidence of both experts is interesting.*"
- 113 As outlined above, the purpose of my recommended measures, both for the Selwyn and Waimakariri District Plan reviews, is not to reduce the existing risk of bird strike in the area, but rather to ensure that future land use activities don't further add to the existing risk. Thus, given such farming already occurs extensively, no requirements have been recommended.

### **Waterbody size**

- 114 On page 31 of the review with respect to waterbody size and Canada goose, Dr McClellan writes *"...in the wider context of lakes, estuaries, wetlands, and rivers in the central Canterbury region, the addition of a 1,000 m<sup>2</sup> pond, for example, makes little perceptible difference to the overall availability of such habitats and will not have a significant effect on the size of the Canada goose or waterfowl population."*
- 115 The rationale for the proposed rule around waterbodies of such size is to minimise the potential for creating "halfway-hotels" for Canada goose traversing across the landscape, particularly for birds travelling to and from the Southern Alps along the Waimakariri River corridor; it has not been suggested that such habitat would have a significant effect on the size of the Canada goose population. Thus, while the creation of such waterbodies may make *"little perceptible difference to the overall availability of such habitats"*, it nevertheless could potentially increase movements of some Canada goose across the landscape and within airspace.
- 116 Dr McClellan goes on to note that *"the placement of that 1,000 m<sup>2</sup> pond could become an issue if it were located in such a way that it encouraged birds to fly from the pond to another waterbody across the runways. This is controlled under the Christchurch District Plan within the 3 km bird management area, and elsewhere within the plan"*. However, I am of the opinion that the placement of ponds outside the 3km radius (i.e. within the 8 km radius) is equally relevant given the distance Canada goose can traverse and the flight height they can achieve.
- 117 As such I continue to support the provision proposed by CIAL in relation to waterbodies within 8 km of the airport.

### **Fish processing, abattoirs, freezing works, and intensive animal farming**

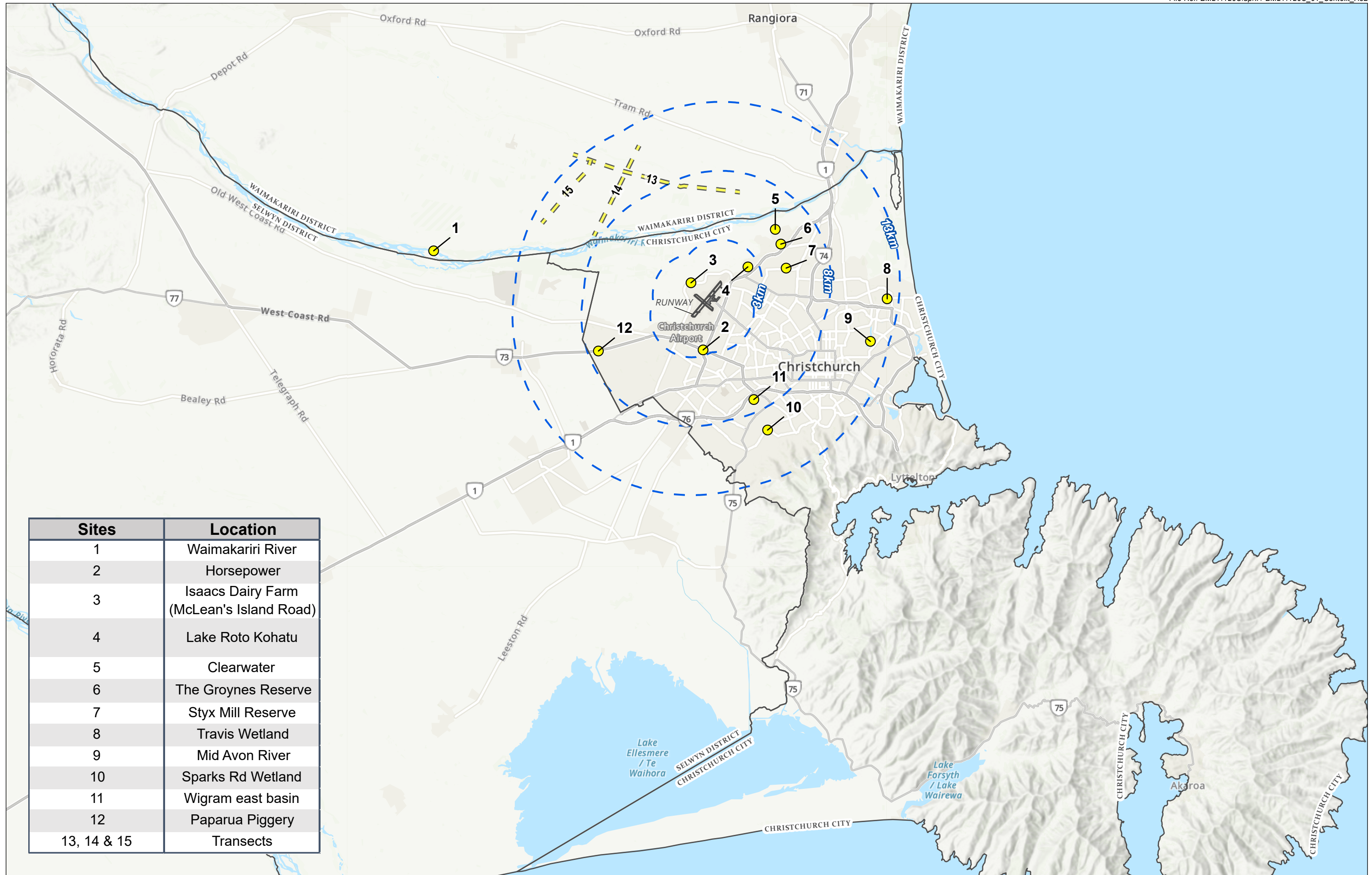
- 118 At Section 7.3 (page 32) of the review, Dr McClellan states that *"Bird strike rules were developed to manage these activities within a 3 km radius of Christchurch Airport in the Christchurch District Plan, but not beyond"*.
- 119 As shown by the recent off-airport data collected by CIAL, the Papparua Piggery, some 6 km from Christchurch Airport, was found to attract high numbers of SBBG and feral pigeon (as recorded in the recent survey data; refer to Figure 4 on page 10 and Figure 9 on page 13). Furthermore, these species have high dispersal ability, exhibit flocking behaviours, fly at heights within airspace (refer to Figure 20 on page 21 and Figure 28 on page 27) and have been recorded as strikes (Figure 19 on page 20). For these reasons I am of the opinion that measures are required beyond the 3 km radius of Christchurch Airport.

120 As such land uses such as fish processing, abattoirs, freezing works, and intensive animal farming which have the potential to attract large numbers of high-risk species such as SBBG and feral pigeon could increase the potential for bird strike and, in my view, should be managed accordingly under the Proposed Plan provisions.

Dated: 2 February 2024

Dr Leigh Bull

**APPENDIX 1 – CIAL OFF-AIRPORT AVIFAUNA MONITORING  
SITES**



Sites	Location
1	Waimakariri River
2	Horsepower
3	Isaacs Dairy Farm (McLean's Island Road)
4	Lake Roto Kohatu
5	Clearwater
6	The Groyne's Reserve
7	Styx Mill Reserve
8	Travis Wetland
9	Mid Avon River
10	Sparks Rd Wetland
11	Wigram east basin
12	Paparua Piggery
13, 14 & 15	Transects