

Long term trends in Wellington City bird counts: 1969 – 2006

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Abstract On 5 years between 1969 and 2006, counts were made of birds seen and heard along a 2.3 km transect through a central suburb of Wellington City. A total of 14,461 birds of 26 species were encountered, including 10 native and 16 introduced species. Silvereye (*Zosterops lateralis*), sacred kingfisher (*Halcyon sancta*) dunnoek (*Prunella modularis*) and rock dove (*Columba livia*) numbers remained similar over the 5 counts. By contrast, counts of tui (*Prothemadera novaeseelandiae*), fantail (*Rhipidura fuliginosa*) and grey warbler (*Gerygone igata*) rose between 1988-89 and 2005-06. New Zealand pigeons (*Hemiphaga novaeseelandiae*) and bellbirds (*Anthornis melanura*) were 1st detected in 2005. The number of mallard (*Anas platyrhynchos*), song thrush (*Turdus philomelos*), chaffinch (*Fringilla coelebs*), blackbird (*Turdus merula*), goldfinch (*Carduelis carduelis*) and greenfinch (*Carduelis chloris*) increased more than 3-fold between the earliest and latest counts. Increases in the numbers of most native and introduced species may have resulted from a possum control programme that began throughout the Wellington district in the 1990s and to the establishment of the nearby Karori Wildlife Sanctuary ('Zealandia'). Common starling (*Sturnus vulgaris*) and black-backed gull (*Larus dominicanus*) counts fell after 1971 as did the number of Australian magpies (*Gymnorhina tibicen*) between 1989 and 2005. Between 1969-71 and 1981-2, house sparrow (*Passer domesticus*) counts fell 37%, the figure remaining low until 2006. The coincidence of this decline in house sparrows with similar declines in the northern hemisphere is discussed.

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INTRODUCTION

Until the 1960s, bird species in New Zealand cities were generally described only using relative terms such as 'rare', 'common', or 'abundant'. Few attempts were made to count their numbers until Kikkawa (1966) established transects through the Dunedin Botanic Gardens and East (1967) did the same in the Christchurch Botanic Gardens. Because so little was known about the relative abundance of common birds in Wellington City at the time, one of us (R.E.B.) established a counting transect in 1969 from the upland suburb of Kelburn down to

the edge of the central business district. Since this time, other studies of urban bird populations have been conducted: Gill (1989) counted birds in the Auckland Domain; Guest and Guest (1993) counted birds in Palmerston North; Gibb (2000) reported on bird numbers in Lower Hutt; Miskelly *et al.* (2005) on forest birds recolonising Wellington; and Froude (2006) on the numbers of native birds in Wellington City reserves. However, most of these studies have been relatively short in duration. By contrast, our 'Kelburn' counts continued at irregular intervals until 2006, providing data on long-term changes in the relative abundance of common terrestrial birds in a New Zealand city. The results of this long-term survey are reported here.

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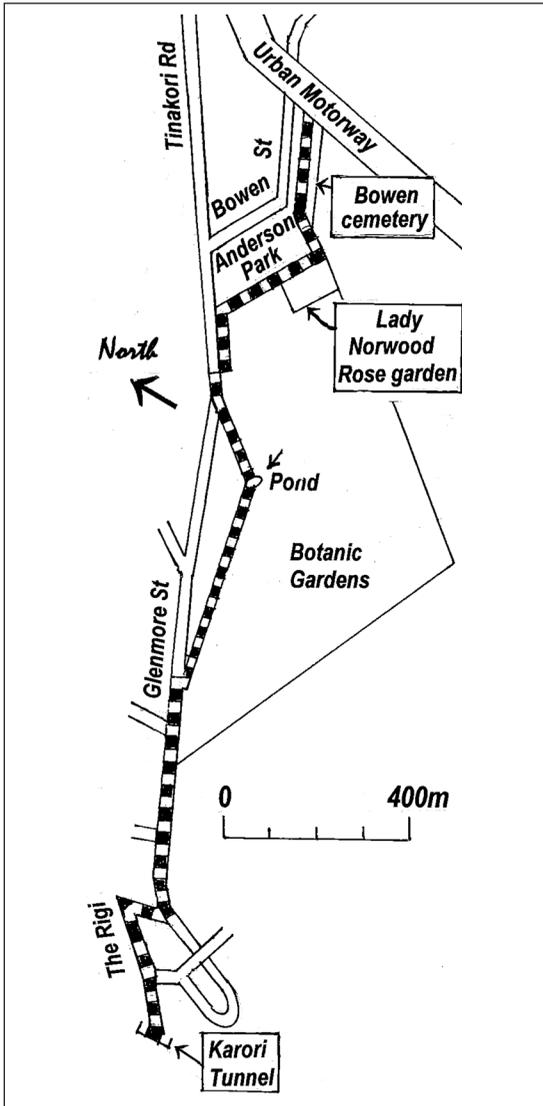


Fig. 1. Route of the 2.3 km bird-counting transect from the Karori tunnel, Kelburn, to the Bowen Cemetery, Thorndon, Wellington City.

METHODS

Surveys for birds were conducted along a transect within the city of Wellington, New Zealand. The 2.3 km transect passed from the Wellington suburb of Kelburn down Glenmore Street valley at the foot of Tinakori Hill, to the Bowen Street Cemetery near the Central Business District (Fig. 1). The transect passed down shady, steep-sided roads that were lined with largely foreign species of trees, scrub and gardens. It then followed a footpath through a corner of the Botanic Gardens and skirted the

more open Lady Norwood rose garden and grassed areas of Anderson Park. All birds seen and heard to a distance of 50 m were noted. To reduce the confounding effects of times of the day and variable weather, and to avoid traffic noise, all counts were made within 1-2 hours of dawn and only on cloudless, windless mornings. Each transect took about 45 minutes. R.E.B. made 48 monthly counts from Jul 1969 to Aug 1971, from Nov 1981 to Oct 1982, and from May 1988 to Apr 1989. Following the same route and counting procedure, C.D. undertook 12 additional monthly counts between May 2005 and Apr 2006. A total of 60 transects was made over the entire period of the study.

RESULTS

During the 5 years in which counts were made, a total of 26 species were recorded including 19 native and 16 introduced species (Table 1). Of the 14,461 individual birds counted, 3256 (22.5%) were native species. From the 3126 birds counted during the 1st transect in 1969, total numbers dropped to a minimum of 2347 in 1981-2. Total numbers remained low in the 1989-90 count but rose 29.9% to 3347 birds by 2005-06. Over the 5 counts the numbers of some species remained almost constant, some increased, and others decreased. Counts of silvereyes, kingfishers, dunnocks and rock doves remained almost constant in all 5 years (Table 1).

Between 1969 and 2005-06, fantails, tui, grey warblers, New Zealand pigeons, bellbirds, and shining cuckoos, collectively, increased from 19 to 169 birds (Table 1). The increase was most pronounced between 1989 and 2006. Over this same period, New Zealand pigeons and bellbirds were counted for the 1st time and tui numbers increased from 2 to 89 birds. Between the 1st and last counts, mallard duck numbers rose steeply from 380 to 939; blackbirds from 114 to 419; and chaffinches from 60 to 199 birds (Table 1). Goldfinch numbers also rose from 6 to 34; song thrush from 4 to 39; and greenfinches from 3 to 22 birds. The increases were also most pronounced between 1989 and 2005 (Figs. 2 and 3).

Counts of other species fell over the 37-year period. During the first 2 counts, an average of 578 starlings were recorded. In the following 3 years of counts, the average number more than halved to 261 birds. Over the 37-year period starlings dropped from 2nd to 4th most abundant bird, while mallards replaced house sparrows as the most abundant species. House sparrow counts fell 37% between 1969-71 and 1981-82 and remained low over the subsequent 2 counts (Figs. 2 & 3). The total counts of 12 mute swans and 25 muscovy ducks in the Botanic Gardens pond is misleading as these

Table 1. Numbers of birds seen or heard on 60 monthly transects between Kelburn and Thorndon, Wellington City, 1969 – 2006. Twelve transects were run during each yearly time period.

Species	1969-70	1970-71	1981-82	1988-89	2005-06	Totals
House sparrow (<i>Passer domesticus</i>)	1200	1110	747	879	742	4678
Mallard duck (<i>Anas platyrhynchos</i>)	380	258	424	485	939	2486
Silvereye (<i>Zosterops lateralis</i>)	343	299	543	509	362	2056
Starling (<i>Sturnus vulgaris</i>)	602	555	227	227	329	1940
Blackbird (<i>Turdus merula</i>)	114	138	151	162	419	984
Black-backed gull (<i>Larus dominicanus</i>)	294	463	24	61	3	845
Chaffinch (<i>Fringilla coelebs</i>)	60	70	91	125	199	545
Dunnock (<i>Prunella modularis</i>)	26	37	33	24	38	158
Fantail (<i>Rhipidura fuliginosa</i>)	12	34	28	23	47	144
Australian magpie (<i>Gymnorhina tibicens</i>)	29	30	16	26	5	106
Rock pigeon (<i>Columba livia</i>)	34	10	12	19	25	100
Tui (<i>Prothemadera novaeseelandiae</i>)	0	0	0	2	89	91
Grey warbler (<i>Gerygone igata</i>)	7	10	4	14	22	57
Song thrush (<i>Turdus philomelos</i>)	4	1	5	7	39	56
Goldfinch (<i>Carduelis carduelis</i>)	6	1	4	8	34	53
Sacred kingfisher (<i>Halcyon sancta</i>)	12	6	1	12	17	48
Greenfinch (<i>Carduelis chloris</i>)	3	1	3	6	22	35
Muscovy duck (<i>Cairina moschata</i>)	0	0	25	0	0	25
Mute swan (<i>Cygnus olor</i>)	0	12	0	0	0	12
Yellowhammer (<i>Emberiza citronella</i>)	0	12	0	0	0	12
Eastern rosella (<i>Platycercus eximius</i>)	0	2	0	3	3	8
New Zealand pigeon (<i>Hemiphaga novaeseelandiae</i>)	0	0	0	0	7	7
Redpoll (<i>Carduelis flammea</i>)	0	0	7	0	0	7
Bellbird (<i>Anthornis melanura</i>)	0	0	0	0	4	4
Shining cuckoo (<i>Chrysococcyx lucidus</i>)	0	0	1	0	2	3
Little black shag (<i>Phalacrocorax sulcirostris</i>)	0	0	1	0	0	1
TOTALS	3126	3049	2347	2592	3347	14461

numbers derive from the same single swan and 2-3 muscovy ducks counted on successive occasions during only a single count year, respectively. A domestic white goose (*Anser cygnoides*) was also seen once in the pond.

DISCUSSION

This study has 2 limitations. First, counts were made in only 5 years of the 37-year period and we have no data on what happened in the intervening years. Second, it is possible that the years we sampled may have been exceptionally good or exceptionally poor years for breeding or survival so we do not

know if the pattern we found is representative. Nevertheless, some conclusions can be drawn from these counts.

A total of 26 bird species was recorded during the 60 transects. This figure compares with the 14 breeding species counted by Kikkawa (1966) during transects in the Dunedin Botanic Gardens between 1958 and 1961, and the 20 species East (1967) similarly counted in the Christchurch Botanic Gardens in 1967. Using the 5-minute counting technique, Gill (1989) recorded 17 species during a year's counting in the Auckland Domain and Guest and Guest (1993) counted 32 species in a Palmerston North garden over 62 months. These

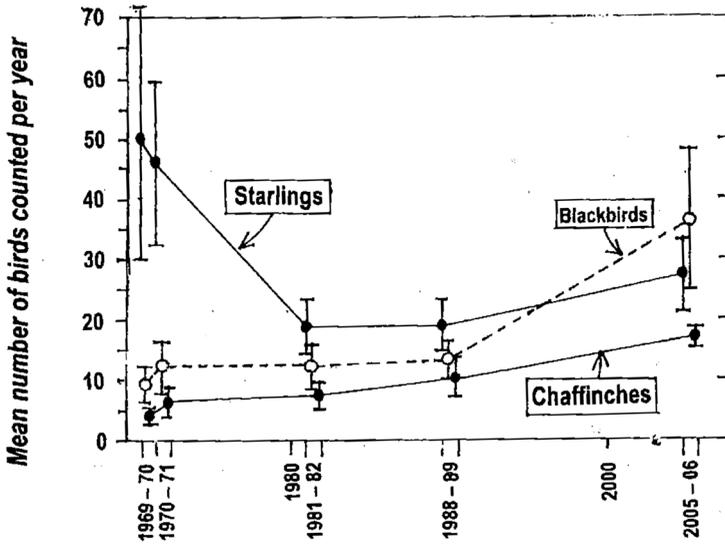


Fig. 2. Long term changes in the mean number of starlings, blackbirds and chaffinches counted on the Kelburn transect 1969 - 2006. The 95% confidence limits are also shown.

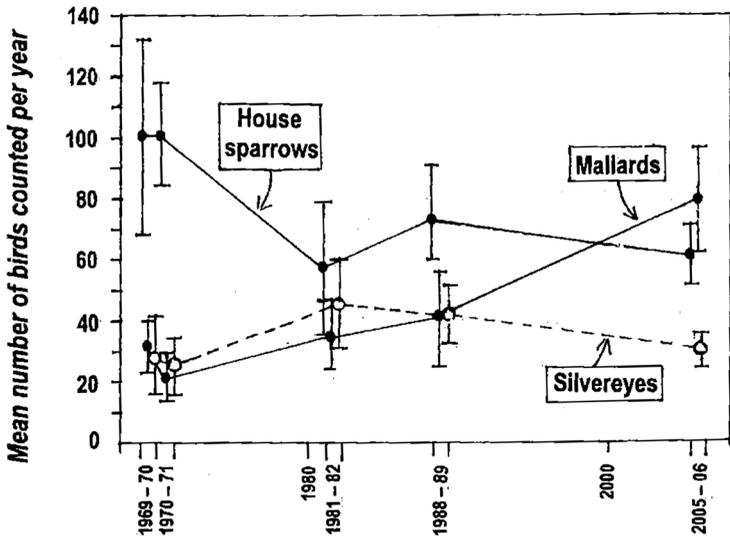


Fig. 3. Long term changes in the mean number of house sparrows, mallards and silvereyes counted on the Kelburn transect 1969 - 2006. The 95% confidence limits are also shown.

counts of species diversity compare poorly with the 150 terrestrial species recorded at the Olympic Park, Sydney, Australia (Sydney Olympic Park Authority: www.sopa.nsw.gov.au/our_park/environment/bcod/birds), the 211 species noted in backyard counts in the city of New York (Fowle & Kerlinger 2010) or the 117 terrestrial species currently listed for London, England by the Royal Society for the Protection of Birds (www.janja.dircon.co.uk/rspb/what.html). The almost total absence of migratory terrestrial birds in New Zealand probably account for these differences. Blackbirds, silvereyes and chaffinches were the only species to feature in the 'top 10' most common species in the Auckland, Wellington, Christchurch and Dunedin counts.

A few terrestrial species commonly encountered elsewhere in Wellington City were never observed on our transects: moreporks (*Ninox novaezeelandiae*) were not recorded because of their nocturnal nature and, although often seen on nearby Wrights and Tinakori Hills, no welcome swallows (*Hirundo tahitica*), pipits (*Anthus novaezeelandiae*), skylarks (*Alauda arvensis*) or harriers (*Circus approximans*) were noted, probably because these birds prefer a more open habitat. The single little black shag counted in Feb 1982 was probably returning late to the port from its overnight roost at the Karori Wildlife Sanctuary.

Annual counts of kingfishers, silvereye, dunnocks and rock pigeons remained almost

constant over the 37-year period. Counts made by Froude (2006) showed kingfisher numbers also remained constant in Wellington reserves from 2001–2005. The geographic distribution of silvereye also did not change over New Zealand as a whole between 1985 and 2004 (Robertson *et al.* 2007).

Between 1989–90 and 2005–06, the number of most native species counted on the Kelburn transect rose substantially. Spring counts of fantails, grey warblers, tui, and New Zealand pigeons in the Wellington Botanic gardens and 8 city reserves revealed significant rises between 2001 and 2005 (Froude 2006). Increases in the number of mallards, greenfinch, and goldfinch may be a reflection of their increased distribution over New Zealand since as a whole since 1985, as noted by Robertson *et al.* (2007).

The establishment of the Karori Wildlife Sanctuary in 1999 (subsequently renamed Zealandia), situated near the top of the Kelburn transect, and where several species of native bird were introduced, doubtless contributed to the recent rise in native bird numbers counted. However, Miskelly *et al.* (2005) point out that bellbirds, kaka, and parakeets recolonised the Wellington peninsula a year or 2 before these species were released in the newly established sanctuary. They attribute the early recolonisation to the extensive possum and rat control programmes by the Greater Wellington Regional Council and the Department of Conservation in the 1990s. The counts of most foreign bird species also increased over this period suggesting that insectivorous and granivorous species also benefited from the possum and rat control programmes.

The declines in numbers of some species likely have a number of causes. For example, in the 1960s, hundreds of black-backed gulls flew daily from the port of Wellington up the Glenmore valley to a large municipal rubbish tip in the suburb of Wilton. The tip closed in 1975 and few gulls were counted thereafter. Starling counts fell from 602 birds in the 1969–70 transects to 227 birds by 1982 and have remained low ever since. This fall coincided with other evidence for a continuing decline in their numbers around the Wellington district since the 1950s (Brockie 1983) and was probably a response to the changing landscape. Until the 1960s, sheep grazed extensive open land over large parts of the Wellington peninsula. Since then, most of the sheep have gone and much of their pasture overgrown with scrub and regenerating bush – habitat not favoured by starlings. In the 1980s, the Greater Wellington Regional Council, assisted by other organisations, undertook a magpie-control programme in the district. The fall in magpie numbers counted on these transects, from 29–30 birds in 1969–71 to 5 birds in 2005–6, no doubt reflects the success of the control programme.

The 37% fall in house sparrow numbers in our study coincided with 95% declines in British populations of house sparrows since the 1970s. Declines in the number of house sparrows have also been recorded in other parts of the native range of this species, including a decrease of 90% in Belgium, 57% in Hamburg, 37% in France, and lesser falls in Luxembourg, Holland, Lithuania. Between 1980 and 2004, introduced populations of house sparrow fell 60% in the eastern United States and by up to 45% in parts of Canada (Olioso & Olioso 2006). Many attempts have been made to explain these declines including the mechanisation of agriculture, changed practices in burning crop stubble, better seed storage and transport, the unsuitability of modern buildings as nest sites, modern insecticides reducing the food available to sparrow chicks, the loss of weed seeds, more predatory cats, sparrowhawks and magpies, air pollution in cities, and diseases (Crick *et al.* 2002; Summers-Smith 2003). However, European ornithologists admit to no consensus on these explanations so the cause or causes of the declines remain unexplained.

The almost simultaneous declines of sparrows in Wellington and the northern hemisphere may be a coincidence, or it may be due to the same or different causes but few of the suggestions put forward to explain declines in the northern hemisphere would explain the Wellington losses. Wellington City sparrows live in isolation from farmland and they nest in trees, not buildings. If insecticides have reduced the insect food available to sparrow chicks, the toxins appear to have done nothing to reduce the abundance of food available to other insectivorous species such as dunnocks, fantails and grey warblers whose numbers have increased since the 1970s. Similarly any reduction in weed seeds has done nothing to reduce the number of other finches, whose numbers have also increased. Any increase in the number of predatory cats in Wellington has done nothing to reduce several other vulnerable bird species whose numbers have also risen since the 1970s. The possibility of a lethal disease wiping out sparrows in both hemispheres cannot be ruled out though there were no reports of large numbers of dead sparrows in Europe or Wellington in the 1970s.

It is hoped that future counts along the same transect might track future trends and provide data with which to compare changing bird populations in New Zealand and overseas cities.

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