

## SHORT NOTE

# Endemic is good, introduced is boring?

## Biases in bird reporting rates at the Auckland Islands

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It is a truth universally acknowledged, that New Zealand naturalists and conservationists value endemic species above introduced species (Young 2004; Russell *et al.* 2015; Parliamentary Commissioner for the Environment 2017). This bias has existed for more than 140 years: Buller (1873, 1887–88, 1905–06) did not include introduced species in his otherwise comprehensive *Histories of the birds of New Zealand*, Hutton & Drummond (1904) ignored them, and Guthrie-Smith (1910, 1914, 1925, 1936), Stead (1932), and Buddle (1951) did not include any introduced birds within a total of 101 chapters presenting information on the life histories of individual New Zealand bird species. This bias for endemic and native species and against introduced species is also evident in historical and recent reporting rates of wild birds, as here explored based on a comprehensive dataset of bird records from the Auckland Islands dating from 1840 to 2019 (Miskelly *et al.* 2020 – Chapter 2 in this book). The analytical process used (comparing full lists and part lists recorded at an identified site on a given date) is analogous to the full list versus part list options offered by the citizen science platform eBird (Sullivan *et al.* 2009), and reveals the direction of biases likely to occur if

part lists of New Zealand birds are considered for inclusion in frequency-of-occurrence analyses.

A dataset of 23,028 unique bird records from the Auckland Islands was collated from published and unpublished sources (Miskelly *et al.* 2020 – Chapter 2). Each bird record was assessed as to whether it was part of a full list for each site and date, based on the range of other bird species reported simultaneously, and particularly whether the observer recorded most of the expected common species at that site (= a full list; Miskelly *et al.* 2020 – Chapter 2). If the list was adjudged incomplete, it was further tagged as a part list (3+ species) or an incidental sighting (1–2 species). The following analyses are based on 602 full lists and 728 part lists, each recorded on a single island on a single calendar date (at-sea records were not included in the analyses). It is unknown whether this retrospective categorising of part lists is equivalent to the part lists explicitly identified by contributors to eBird, and so this analysis is presented as an alert to potential biases rather than an analysis of datasets as submitted to eBird.

The 602 full lists containing 7462 bird records were used to calculate reporting rates for 34

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**TABLE 1.** Biases in reporting rates of Auckland Island birds in part lists compared with full lists, based on the proportion that each of 34 species contributed to the total number of bird records (602 full lists with 7,462 bird records, and 728 part lists with 3,347 records). Endemic Auckland Island taxa are highlighted in yellow, and introduced species are highlighted in blue; non-endemic native species are not highlighted. Species are ranked from those with the largest positive bias at the top to the largest negative bias at the bottom. In the right-hand column, positive biases are shown in green and negative biases in orange, with the intensity of colour related to the degree of bias.

Taxon	% of full lists	% of part lists	Δ full vs part
Auckland Island snipe <i>Coenocorypha aucklandica aucklandica</i>	2.69	6.04	3.34
New Zealand falcon <i>Falco novaeseelandiae</i>	1.92	5.23	3.31
Gibson's albatross <i>Diomedea antipodensis gibsoni</i>	1.21	4.15	2.95
Auckland Island teal <i>Anas aucklandica</i>	3.32	6.15	2.83
Auckland Island rail <i>Lewinia muelleri</i>	0.23	1.91	1.68
Auckland Island banded dotterel <i>Charadrius bicinctus exilis</i>	2.32	3.26	0.94
Parakeet sp. <i>Cyanoramphus</i> sp.	4.25	4.87	0.62
Eastern rockhopper penguin <i>Eudyptes filholi</i>	0.54	1.05	0.51
Southern skua <i>Catharacta antarctica lonnbergi</i>	4.85	5.35	0.50
Grey duck <i>Anas superciliosa</i>	0.56	0.84	0.27
Light-mantled sooty albatross <i>Phoebastria palpebrata</i>	3.50	3.76	0.27
White-capped mollymawk <i>Thalassarche cauta steadi</i>	0.68	0.87	0.18
Yellow-eyed penguin <i>Megadyptes antipodes</i>	3.66	3.79	0.14
Yellow-crowned parakeet <i>Cyanoramphus auriceps</i>	0.84	0.51	-0.34
Auckland Island shag <i>Leucocarbo colensoi</i>	4.41	4.03	-0.38
Southern royal albatross <i>Diomedea epomophora</i>	2.12	1.67	-0.44
Northern giant petrel <i>Macronectes halli</i>	3.35	2.87	-0.48
Mallard and hybrids <i>Anas platyrhynchos</i> and hybrids	1.06	0.42	-0.64
Turnstone <i>Arenaria interpres</i>	1.06	0.42	-0.64
Song thrush <i>Turdus philomelos</i>	1.14	0.42	-0.72
Dunnock <i>Prunella modularis</i>	1.14	0.33	-0.81
Common starling <i>Sturnus vulgaris</i>	1.30	0.42	-0.88
Red-crowned parakeet <i>Cyanoramphus novaeseelandiae</i>	2.69	1.79	-0.90
White-fronted tern <i>Sterna striata</i>	1.80	0.72	-1.08
Antarctic tern <i>Sterna vittata</i>	2.81	1.46	-1.35
Auckland Island tomtit <i>Petroica macrocephala marrineri</i>	5.47	4.00	-1.46
Bellbird <i>Anthornis melanura</i>	6.43	4.72	-1.71
Red-billed gull <i>Chroicocephalus novaehollandiae scopulinus</i>	3.71	2.00	-1.71
Southern black-backed gull <i>Larus dominicanus</i>	3.89	2.18	-1.71
Auckland Island pipit <i>Anthus novaeseelandiae aucklandica</i>	5.12	3.05	-2.07
Silvereye <i>Zosterops lateralis</i>	3.26	1.05	-2.21
Common redpoll <i>Carduelis flammea</i>	3.14	0.72	-2.42
Tui <i>Prosthemadera novaeseelandiae</i>	3.79	1.37	-2.42
Eurasian blackbird <i>Turdus merula</i>	4.05	1.55	-2.49

bird species, based on the number of occasions that each species was recorded, expressed as a percentage of the total bird records (Table 1, and individual species graphs in Miskelly *et al.* 2020 – Chapter 2). The 34 species comprised seven taxa that are endemic to the Auckland Islands for breeding (if not year-round), 21 native species (or species groups) that are not endemic to the Auckland Islands, and six bird species that were introduced to the two main islands of New Zealand and have self-dispersed to the Auckland Islands and established breeding populations there (Miskelly *et al.* 2020 – Chapter 2). Below, these three groupings are referred to as ‘endemic’, ‘native’, and ‘introduced’, respectively.

The rate at which each species was reported was similarly calculated from 3,347 bird records in the 728 part lists (Table 1). Biases in reporting rates for part lists were calculated by comparing whether the percentage total for each species in the part lists was more or less than each species’ reporting rate in the full lists (Table 1). Scientific names for all species are given in Table 1.

The most frequently recorded species in the full lists was bellbird (6.43% of total bird records), followed by Auckland Island tomtit, Auckland Island pipit, subantarctic skua and Auckland Island shag (Table 1). The species reported least often was Auckland Island rail (0.23% of total bird records), followed by eastern rockhopper penguin, grey duck, white-capped mollymawk, and yellow-crowned parakeet (Table 1).

The most frequently recorded species in the part lists was Auckland Island teal (6.15% of total bird records), followed by Auckland Island snipe, subantarctic skua, New Zealand falcon, and parakeet spp. The species reported least often in part lists was dunnoek (0.33% of total bird records), followed by turnstone, mallard (and hybrids with grey duck), song thrush, and starling.

The most over-reported species in the part lists was Auckland Island snipe (6.04% of total bird records in part lists, an increase of 3.34%), followed closely by New Zealand falcon (Table 1). The most under-reported species was black-bird (1.55% of total bird records in part lists, a decrease of 2.49%), followed by tui and redpoll (Table 1).

Bird taxa endemic to the Auckland Islands were more likely to be over-reported in part lists

than native species, which in turn were more likely to be reported than introduced species (Tables 1, 2). Five of the seven endemic taxa had relatively higher reporting rates in the part lists, while all six introduced species had relatively lower reporting rates compared with the full lists (Table 1). Native species had a wider range of reporting rate changes between full and part lists compared with both endemic and introduced species, but with an intermediate mean (Tables 1, 2). Endemic species were significantly over-reported compared with both introduced and native species (Table 3).

**TABLE 2.** Biases in reporting rates of three groups of Auckland Island birds in part lists (compared with full lists), based on the proportion that each of 34 species contributed to the total number of bird records in each type of list. Data are summarised from the right-hand column of Table 1. A positive mean bias signifies species (and species groups) that were reported relatively more frequently in part lists compared with full lists.

	Mean bias	Min	Max
Endemic	1.41	-1.46	3.34
Native (not endemic)	-0.54	-2.42	3.31
Introduced	-1.33	-2.49	-0.64

**TABLE 3.** Statistical comparison of biases in reporting rates between bird taxa endemic to the Auckland Islands (Endemic), species that are native but not endemic to the Auckland Islands (Native), and species introduced to mainland New Zealand that have subsequently colonised the Auckland Islands (Introduced). Mean biases between groups were compared with two-tailed *t*-tests assuming unequal variances.

	<i>t</i>	<i>P</i>
Endemic vs Native	2.62	0.031
Endemic vs Introduced	3.54	0.006
Native vs Introduced	1.72	0.111

The magnitude of these biases rendered part lists unsuitable for analyses of the frequency of occurrence (or reporting) of each species over time and between islands, resulting in about a third of available bird records being excluded from analyses in the full review of 23,028 unique bird records summarised in Miskelly *et al.* (2020 – Chapter 2). This current analysis quantifies the biases that New Zealand naturalists exhibit against introduced species, and demonstrates the value of full bird lists (i.e. capturing reliable absence data) in bird mapping and recording schemes such as eBird (Sullivan *et al.* 2009).

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## Literature cited

- Buddle, G.A.** 1951. *Bird secrets*. Wellington, Reed. 71 pp.
- Buller, W.L.** 1873. *A history of the birds of New Zealand*. London, John van Voorst. 384 pp.
- Buller, W.L.** 1887–88. *A history of the birds of New Zealand*. 2nd edn. London, the author. 250 + 359 pp.
- Buller, W.L.** 1905–06. *Supplement to the 'Birds of New Zealand'*. London, the author. 200 + 178 pp.
- Guthrie-Smith, H.** 1910. *Birds of water, wood and waste*. Whitcombe & Tombs, Wellington. 196 pp.
- Guthrie-Smith, H.** 1914. *Mutton birds and other birds*. Whitcombe & Tombs, Christchurch. 207 pp.
- Guthrie-Smith, H.** 1925. *Bird life on island and shore*. William Blackwood, Edinburgh. 195 pp.
- Guthrie-Smith, H.** 1936. *Sorrows and joys of a New Zealand naturalist*. Dunedin, Reed. 252 pp.
- Hutton, F.W.; Drummond, J.** 1904. *The animals of New Zealand: an account of the colony's air-breathing vertebrates*. Whitcombe & Tombs, Christchurch. 381 pp.
- Miskelly, C.M.; Elliott, G.P.; Parker, G.C.; Rexer-Huber, K.; Russ, R.B.; Taylor, R.H.; Tennyson, A.J.D.; Walker, K.J.** 2020. Birds of the Auckland Islands, New Zealand subantarctic. *Notornis* 67: 59–151.
- Parliamentary Commissioner for the Environment, 2017.** *Taonga of an island nation: saving New Zealand's birds*. 139 pp. <http://www.pce.parliament.nz/media/1695/taonga-of-an-island-nation-web-final-small.pdf> [viewed 17 May 2019].
- Russell, J.C.; Innes, J.G.; Brown, P.H.; Byrom, A.E.** 2015. Predator-free New Zealand: conservation country. *Bioscience* 65: 520–525.
- Stead, E.F.** 1932. *The life histories of New Zealand birds*. London, Search. 162 pp.
- Sullivan, B.L.; Wood, C.L.; Iliff, M.J.; Bonney, R.E.; Fink, D.; Kelling, S.** 2009. eBird: a citizen-based bird observation network in the biological sciences. *Biological Conservation* 142: 2282–2292.
- Young, D.** 2004. *Our islands, our selves: a history of conservation in New Zealand*. Dunedin, Otago University Press. 298 pp.

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