

## SHORT NOTE

# A survey of northern New Zealand dotterels (*Charadrius obscurus aquilonius*) undertaken on Waiheke Island, New Zealand, in October 2023

JOHN E. DOWDING\*

3 Garratt Road, Waiheke Island 1971, New Zealand

ANNE WOODLEY

258c Orapiu Road, Waiheke Island 1971, New Zealand

ROB MORTON

182 Awaawaroa Road, Waiheke Island 1971, New Zealand

The New Zealand dotterel (*Charadrius obscurus*, NZD) is a large plover endemic to New Zealand. Two subspecies have been described (Dowding 1994). These were raised to species level by del Hoyo *et al.* (2014), but this change has not been adopted by other authorities, such as the eBird/Clements Checklist (Clements *et al.* 2023), the IOU Checklist (Gill *et al.* 2023), or the latest New Zealand Checklist (Checklist Committee 2022).

The northern New Zealand dotterel (*C. o. aquilonius*, NNZD) now breeds around much of the coastline of the North Island, but the bulk of the population is found in Northland, Auckland, Coromandel Peninsula, and Bay of Plenty. The entire population was censused four times between 1989 and 2011. Those counts were all undertaken in October, when nesting is under way and most birds are sedentary, and revealed a steady overall increase in numbers (Dowding 2020). There has

not been a census since 2011, and it is not known whether the increase in numbers has continued. In the absence of a complete North Island census, it may be possible to gather some information on trends by undertaking similar but smaller-scale breeding-season counts, or by examining changes in autumn counts of post-breeding flocks.

We report here the results of a breeding-season count of NNZD on Waiheke Island, undertaken in October 2023. Waiheke (c. 9200 ha) lies in the inner Hauraki Gulf, about 20 km east-northeast of Auckland city. The western half of the island has a dense human population, while the eastern half is mainly farmland. In the 2011 national census, 40 dotterels were counted on Waiheke, about 1.9% of the national NNZD population. We also include observations made outside the 2023 census period, including counts of post-breeding flocks on Waiheke, cases of inland breeding on the island, and comments on adult mortality in 2022/23 and 2023/24. In addition, we consider some of the potential threats that dotterels face on the island.

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\*Correspondence: [jdowding@xtra.co.nz](mailto:jdowding@xtra.co.nz)

The count was conducted in the same way as the four national censuses undertaken between 1989 and 2011 (Dowding 2020). The core period for the census was 17–20 October 2023. NNZD numbers are at an annual minimum in October (normally, no chicks will have fledged by then), and breeding adults are sedentary. Consequently, movement between sites is minimal, and so the number of birds missed or double-counted is likely to be negligible. Counts were carried out within 2 hrs of high water to ensure that birds foraging in intertidal areas over low water were not missed. We could not obtain land access to three sites on Man o' War Station during the core census period, and so these were checked by boat on 28 October. Principal sites used by NNZD are shown in Figure 1.

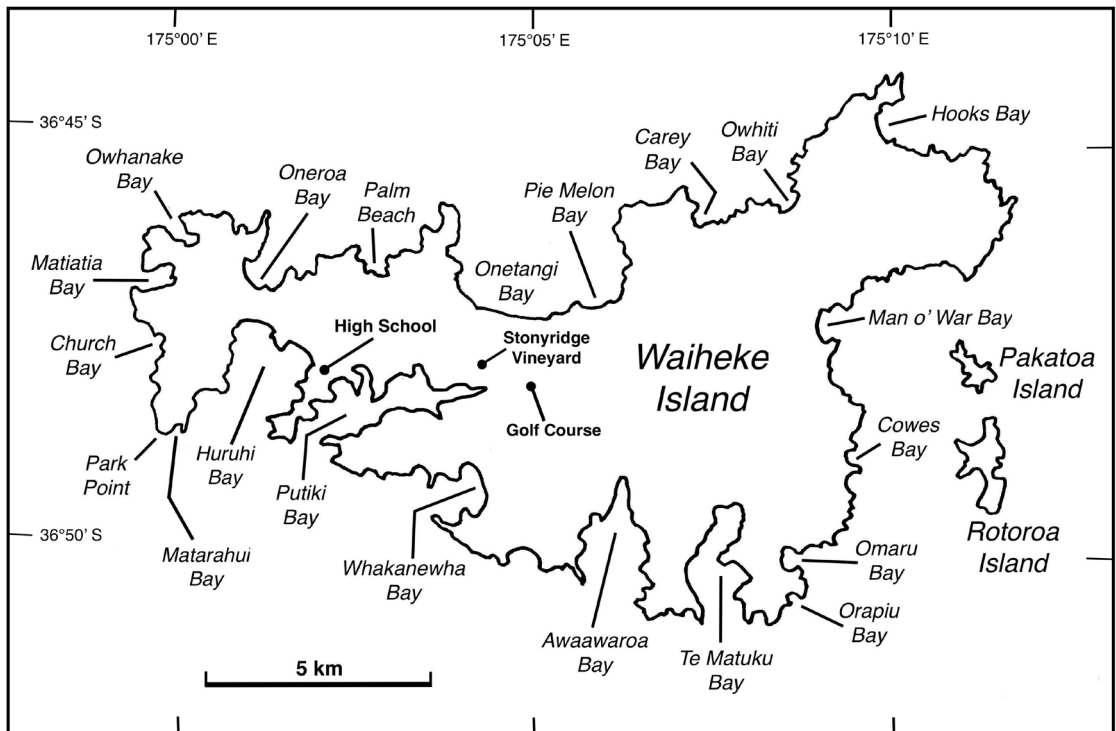
The totals for each of the censuses undertaken between 1989 and 2023 are minimum estimates of the population size at those times, but rates of change between them will not be comparable because the number of sites checked differed in each census. Rates of change between consecutive pairs of censuses are therefore presented as percentage changes in gross totals and in 'comparison' totals, i.e. totals from only the sites counted in both censuses of a consecutive pair. The actual rates

of change will lie somewhere between the gross changes and the comparison changes (see Dowding 2020). Of the four North Island censuses, those undertaken in 2004 and 2011 were believed to be the most complete (Dowding 2020). We therefore calculated rates of increase on Waiheke between 2004 and 2011, and between 2011 and 2023.

Annual post-breeding flock counts on Waiheke were undertaken by members of the Ornithological Society of New Zealand's Auckland region and others between 1996 and 2007. We have found no counts between 2008 and 2018, but they resumed in 2019 and have been undertaken by the authors since then. Flocks were counted between early March and early April, when numbers are normally at their peak (Dowding & Chamberlin 1991), and were conducted within one hour of high water (HW). Nomenclature of birds follows Checklist Committee (2022).

The counts obtained around Waiheke Island in 2004, 2011, and 2023 are shown in Table 1.

The number of NNZD counted on Waiheke in October 2023 was 77, a gross increase of 92.5% on the 40 counted in 2011. Rates of increase between 2011 and 2023 were much greater than those seen between 2004 and 2011 (Table 2). The population



**Figure 1.** Map of Waiheke Island, Hauraki Gulf, showing principal sites used by northern New Zealand dotterels and other locations mentioned in the text

in 2023 appeared to consist of 33–36 definite or probable pairs, and 5–11 non-breeding birds. Some sites surveyed are known to have had birds in the past, but were not occupied in 2023 (Table 1).

In spite of the large increase, there is some evidence that turnover of adults has been relatively high on Waiheke Island recently. Adult NNZD

normally show very high annual survival (Dowding 2020). They also show high breeding-site fidelity, and the failure of a pair to return to their territory often means that one of them has died (Dowding & Chamberlin 1991). There were obvious losses of adults during the 2022/23 and 2023/24 seasons. The number of pairs at Church Bay fell from eight in

**Table 1.** October counts of northern New Zealand dotterels (NNZD) on Waiheke Island in 2004, 2011, and 2023. Sites are listed clockwise around the island from Park Point in the southwest. – indicates that a site was not checked, 0 that a site was checked and no birds were seen.

Site	2004 count	2011 count	2023 count	Notes
Cable Bay	0	2	2	
Church Bay	0	2	6	8 pairs in 2022/23, 3 in 2023/24
Matiatia Bay	0	0	0	No previous records
Owhanake Bay	–	0	0	
Oneroa/Little Oneroa	0	0	0	No previous records
Sandy Bay	–	–	0	Small, very limited habitat
Enclosure Bay	–	–	0	Small, unsuitable habitat
Palm Beach	0	0	0	No previous records
Opopoto Bay	–	0	0	
Onetangi Beach	0	0	1	1 pair 2022/23, male lost Oct 23
Pie Melon Bay	4	4	5	Usually 2 pairs present
Woodlands Bay	–	–	0	Unsuitable, narrow and stony
Honeymoon Bay	–	–	0	Unsuitable, steep and stony
Carey Bay	–	–	0	Probably suitable for 1 pair
Cactus Bay	0	0	2	
Garden Cove	–	–	0	Very small beach
Owhiti Bay	5	2	4	
Hooks Bay	2	4	2	
Man o' War Bay	–	0	2	Possibly 1st record in 2023
Waikopou Bay	–	–	0	Beach narrow at HW
Days Bay	–	0	0	
Cowes Bay	–	0	0	
Arran Bay	–	–	0	
Waikorariki Bay	–	–	0	Beach narrow at HW
Patio Bay	–	–	0	
Omaru Bay	–	–	0	Little nesting habitat above HW
Orapiu Bay	0	0	0	
Otakawhe Bay	–	–	0	
Te Matuku Bay	3	4	14	Breeding site, autumn flock site
Awaawaroa Bay	9	6	10	2 on spit, 6 Waimanga, 2 Simoni
Woodside Bay	0	0	0	
Kauaroa Bay	–	–	0	Pair attempted to breed 2022/23
Whakanewha Bay	8	10	18	4 Poukaraka, 14 on main beach

Table 1. *continued*

Site	2004 count	2011 count	2023 count	Notes
Kuakarau Bay	–	0	0	Narrow, unsuitable
Oakura Bay	–	0	2	
Wharetana Bay	–	–	2	
Okoka Bay	–	–	0	Previous record of breeding
Putiki Bay shell bank	–	–	0	
Rangihoua/Golf Course	–	–	0	1 pair on Golf Course 2022/23
Anzac Bay	–	–	0	No records of breeding here
Ostend causeway	–	–	2	Not previously recorded here
Shelley Beach	–	0	1	No evidence of breeding here
High School fields	–	2	2	2 pairs in 2022/23
Bays on Kennedy Point	–	–	0	Habitat unsuitable
Huruhi Bay (Surfdale)	0	0	0	
Huruhi Bay (Blackpool)	0	2	2	No evidence of breeding here
Te Wharau Bay	–	0	0	Habitat marginal
Matarahui Bay	–	2	0	1 pair in 2022/23
<b>Number of sites</b>	<b>17</b>	<b>28</b>	<b>48</b>	
<b>Total NNZD counted</b>	<b>31</b>	<b>40</b>	<b>77</b>	

**Table 2.** Percentage changes in the numbers of northern New Zealand dotterels counted between consecutive censuses on Waiheke Island, 2004–2023. Comparison totals are from sites counted in both censuses of each consecutive pair (see Methods). Mid-point changes are the average of gross and comparison changes.

	2004–2011	2011–2023
Changes in gross totals	+ 29.0%	+ 92.5%
Changes in comparison totals	+ 16.0%	+ 82.5%
Mid-point changes	+ 22.5%	+ 87.5%

2022 to three in 2023, one bird in a pair at Matarahui Bay was lost in 2022/23, and one bird of a pair on the Golf Course in 2022/23 was found dead. One pair disappeared from the High School playing fields between 2022/23 and 2023/24, and on the night of 17–18 October 2023, the male of a pair nesting on Onetangi Beach disappeared, with cat (*Felis catus*) tracks leading to and from the nest. Remains of another adult were found on the Awaawaroa shell spit in 2022/23, and a trail camera recorded a cat at the site.

Inland (or non-beach) breeding by NNZD, defined as breeding more than 100 m from the nearest beach or HW mark (Dowding 2020), is now not uncommon in the Auckland region, with about 11% of the birds recorded in the region during the 2011 census showing this behaviour; in other regions it is rare (see Discussion in Dowding 2020).

We are aware of instances of inland breeding on Waiheke, including a nest on a mulch pile near the entrance to Stonyridge Vineyard in 2019/20 (1.1 km inland), a pair attempting to breed in grass on the Golf Course in 2022/23 (1.3 km inland), and nests in grass on the Waiheke High School playing fields in 2022/23 and 2023/24 (230 m and 270 m inland). These sites are shown in Figure 1.

Annual autumn counts of the post-breeding flock at Te Matuku Bay have also increased markedly. Numbers have increased roughly three-fold from an average of 20.7 ( $sd = 5.91$ , range = 16–37,  $n = 12$ ) during the period 1996–2007 to an average of 64.6 ( $sd = 13.9$ , range = 49–84,  $n = 5$ ) during the period 2019–2023. In March 2022, our count at Te Matuku Bay recorded 84 birds, while in 2023 we recorded 49 birds at Te Matuku and 24 at Blackpool Beach (c. 12.5 km to the northwest) on the same high

tide. Previously, Te Matuku was the only known NNZD flock site on the island, but it is possible that the flock split in 2023, either permanently or temporarily.

If the rate of increase recorded nationally between 2004 and 2011 (c. 20%) has continued, there would be roughly 2,700 birds in the NNZD population in 2023. The Waiheke count of 77 birds would constitute about 2.9% of that total, an increase from 1.9% of the national total in 2011. We note that Waiheke is located within the Auckland East count region, which had one of the highest rates of increase between 1989 and 2011 (see Dowding 2020). Even taking into account the longer interval between counts, the rate of increase in the Waiheke population between 2011 and 2023 was much higher than the 2004–2011 increase, and may not be typical of the North Island-wide population trend over the same period.

Survey coverage in the 2023 Waiheke count was by far the most extensive to date (Table 1), but many of the additional sites checked were small, contained marginal or unsuitable habitat (e.g. narrow, stony beaches), and most had no dotterels. Almost all of the growth in the Waiheke population therefore occurred at sites counted in earlier censuses, and was not the result of better coverage. This was reflected in the gross and comparison rates of increase that were similar for the period 2011–2023. However, the improved coverage does provide a much more detailed baseline for future counts, and a more complete view of current NNZD breeding distribution on the island. Further surveys are required to determine when the island's carrying capacity has been reached.

There are a number of likely reasons for the population increase. The long-running and intensive management programme at Auckland Council's Whakanewha Regional Park has included control of introduced mammalian predators (particularly cats, stoats *Mustela erminea*, and hedgehogs *Erimaceus europaeus*), re-location of nests at risk of flooding, and measures to reduce human disturbance to breeding birds. That programme has increasingly been supplemented by similar projects undertaken by community groups and concerned individuals at other sites on the island. NNZD show low natal-site fidelity (Dowding & Moore 2006), so there will probably also be immigration of young birds produced on the mainland and on nearby islands, such as Browns, Rangitoto/Motutapu, and Motuihe, all of which have been cleared of mammalian predators. Stoats are known predators of adult NNZD (Dowding & Murphy 1996), and the current programme to eradicate stoats from Waiheke (<https://tekorowaiowaiheke.org/eradication-project-progress>), will have helped, although the increase in dotterel numbers appears

(from flock counts) to have been under way before widespread stoat control began in February 2020. While the increase is positive, the NNZD remains Conservation Dependent, and management needs to be maintained if the taxon is not to decline again.

The three wide, sandy beaches on the north coast of Waiheke (Oneroa/Little Oneroa, Palm Beach, and Onetangi) now have no breeding pairs of NNZD. Physically, these beaches appear to provide good nesting habitat, but all three sites are used by many people and dogs (*Canis familiaris*), and are backed by dense housing and populations of domestic cats. In contrast, the sites that have shown the largest increases in numbers (Awaawaroa, Te Matuku, and Whakanewha Bays) are all relatively distant from human population centres.

The apparently high rate of loss of adults on Waiheke in the past two years is of concern, but further data are required to determine whether this level of mortality was unusual. Nationally, the main predators of adult NZD are stoats and cats (Dowding & Murphy 1996, 2001). Stoat numbers on Waiheke are currently believed to be very low (Frank Lepera, Te Korowai o Waiheke, *pers. comm.* October 2023), suggesting that cats may be largely responsible for recent adult NNZD losses on the island, as they are for losses of adult southern New Zealand dotterels (*C. o. obscurus*) on Stewart Island (Dowding & Murphy 1993).

Common native avian predators on Waiheke include swamp harrier (*Circus approximans*), southern black-backed gull (*Larus dominicanus*), pukeko (*Porphyrio melanotus*), red-billed gull (*Chroicocephalus novaehollandiae scopulinus*), and spur-winged plover (*Vanellus miles*), all of which are known predators of NNZD eggs and/or chicks (Marchant & Higgins 1993, JED *pers. obs.*). The North Island weka (*Gallirallus australis greyi*) is a recent addition to the suite of potential avian predators. Weka were introduced to Pakatoa Island, close to the eastern end of Waiheke, in 1996 (Beauchamp *et al.* 2009), and were subsequently transferred to nearby Rotoroa Island in 2002 (<https://www.facebook.com/RotoroaIslandNZ/posts/2260708340653207/>). They colonised the eastern end of Waiheke (either by swimming or by deliberate introduction) by 2011 at the latest (Rhys Burns, Department of Conservation, *pers. comm.*), and have been spreading westwards. They are now common at least as far west as Onetangi Bay (JED, *pers. obs.*). Weka are known to take the eggs and young of a wide range of bird species, and have been removed from a number of islands to protect other native fauna (Marchant & Higgins 1993). Little appears to be known about the potential impact of weka on NNZD; there are currently few places where their ranges overlap, and we are not aware of any research on the subject.

Potential threats other than predation include

disturbance to nesting birds, primarily by people, dogs, and vehicles, and losses of nests to spring tides and storm surges (Dowding & Davis 2007). Birds nesting on grassed areas are also at risk of losing eggs and small chicks to mowing (Dowding 2020).

Our census demonstrates that Waiheke Island is a discrete area that can easily be surveyed by about 10 people within 3–4 days. It thus provides a limited but rapid snapshot of a small part of the NNZD population, and one that could be undertaken regularly. We acknowledge that the NNZD population on Waiheke represents only a small fraction of the national population, but we have recorded our results here because we are unaware of any other published NNZD trend data collected since 2011. The large increases we have recorded on the island in both breeding season numbers and in post-breeding flock counts are at least consistent with the hypothesis that the national population has continued to grow since 2011. As many Waiheke residents own boats, it should be possible in future to expand our survey area (and hence the proportion of the population covered) to include nearby islands, particularly Pakatoa, Rotoroa, Ponui, Browns, and Motuihe. We also encourage others to undertake similar local or regional censuses elsewhere to provide further data on overall trends in the NNZD population.

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