

Ornithological discovery, exploration, and research on the Auckland Islands, New Zealand subantarctic

COLIN M. MISKELLY*

Museum of New Zealand Te Papa Tongarewa,
PO Box 467, Wellington 6140, New Zealand

ROWLEY H. TAYLOR

13 Templemore Drive, Richmond 7020, New Zealand

ABSTRACT: The Auckland Islands comprise the largest and most researched island group in the New Zealand subantarctic region, and have the largest number of endemic bird taxa. Paradoxically, they are the only one of the five island groups that has not yet been the subject of a comprehensive avifaunal review. We summarise the history of ornithological exploration of the group, and where this information is held, based on a database of 23,028 bird records made between 1807 and 2019. More than 76% of these observations were unpublished, with the two largest sources of information being Heritage Expedition wildlife logs (5,961 records) and records collected during the Second World War coastwatching 'Cape Expedition' (4,889 records). The earliest records of endemic taxa are summarised, along with the earliest records of significant seabird breeding colonies. Citizen science (principally eBird, with 1,597 unique records) is a rapidly growing source of information, and new records of vagrant species continue to accumulate at a rapid rate. Compared with other subantarctic islands, Auckland Islands' birds have received very little research attention, with most effort to date focused on a few large surface-nesting seabird species.

Miskelly, C.M.; Taylor, R.H. 2020. Ornithological discovery, exploration, and research on the Auckland Islands, New Zealand subantarctic. *Notornis* 67(1): 11–58.

KEYWORDS: Auckland Islands, Cape Expedition, coastwatchers, discovery, ecotourism, New Zealand subantarctic, ornithology, research, shipwreck

Introduction

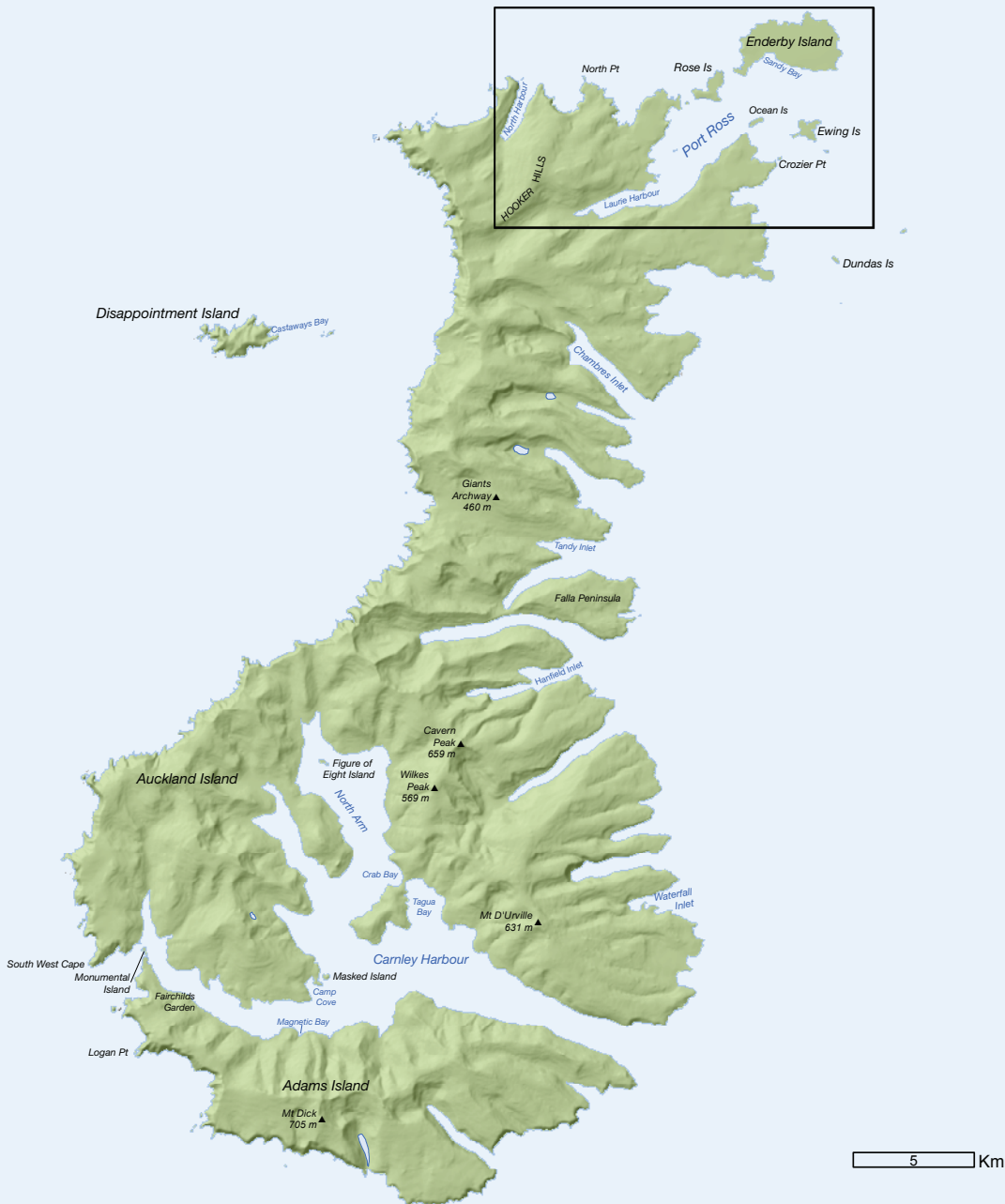
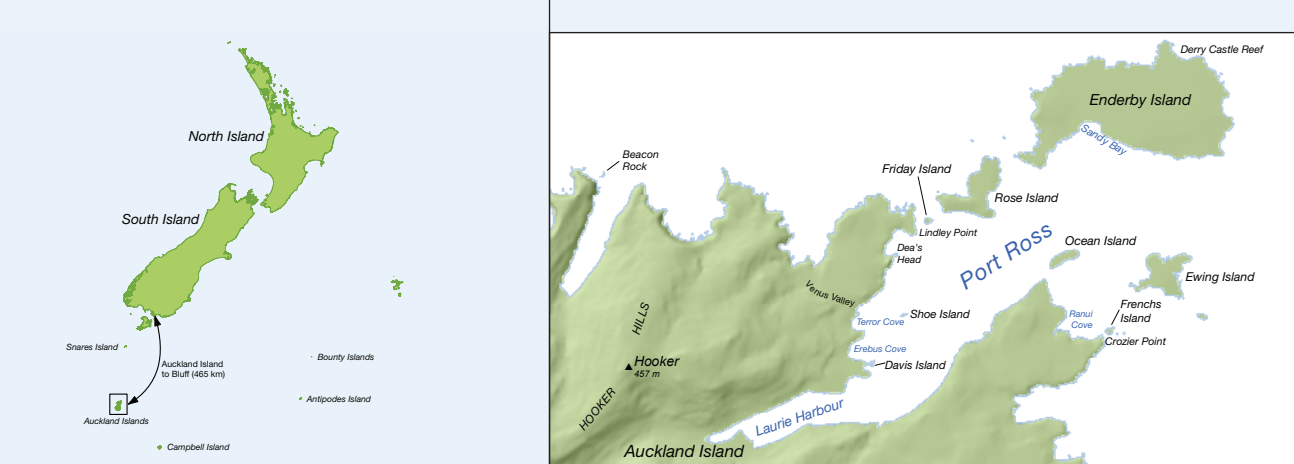
The Auckland Islands (Maukahuka/Motu Maha, 50°44'S, 166°05'E; Fig. 1) are the largest and most biologically diverse of New Zealand's subantarctic island groups, and they have the richest human history (McLaren 1948; Eden 1955; Fraser 1986; Riddell 2018). Early Māori lived on at least Enderby Island in the north of the group (Anderson 2005, 2009), but the islands were uninhabited at the time of their European discovery by Abraham Bristow in 1806. Commencing soon after this, the two large, sheltered harbours – Port Ross (in particular) and Carnley Harbour – were used as havens for early whaling and sealing captains seeking to exploit marine mammals at the islands, in surrounding seas, and at nearby more exposed island groups (Prickett 2009). The prospect of a lucrative whale fishery was also the lure for the short-lived 'Hardwicke' settlement in Port Ross (1849–52), the only attempt at European settlement on any of the islands south of New Zealand (Mackworth & Munce 1999; Fraser 2014). The Hardwicke settlers lived alongside about 70 Māori and Moriori from the Chatham Islands, who had arrived in 1842 and departed in 1856 (Malone 1854; Mikaere 1986). Less willing visitors were survivors of at least seven shipwrecks between 1864 and 1907, who produced a few records of the wildlife encountered and consumed (e.g. Musgrave 1865; Raynal 1874; Escott-Inman 1911; Eunson 1974; Allen 1997).

Ornithological exploration of the group began with brief visits by separate United States, French, and British scientific expeditions over an 8-month period in 1840, and continued during a German expedition to observe the 9 Dec 1874 transit of Venus (Fraser 1986; Jones 2009). Pigs (*Sus scrofa*), cats (*Felis catus*), and house mice (*Mus musculus*) were already established on the main island by 1840 (Russell *et al.* 2020 – Chapter 6 in this book), and so there has been a long history of low abundance and diversity of bird species on Auckland Island; partly in consequence, naturalists have directed their attention more to the smaller islands in the group. From 1888 onwards, naturalists were occasionally able to visit the islands as passengers or guests aboard New Zealand government steamers servicing castaway depots and searching for shipwrecked sailors. Several papers and books mentioning the birds of the Auckland

Islands were published as a result (e.g. Reischek 1889a; Chapman 1891; Ogilvie-Grant 1905; Archey 1923; Guthrie-Smith 1936), but none attempted a comprehensive review of previous information. The government steamship service ceased in 1929 due to the installation of wireless radio on all ocean-going craft, and fewer vessels were passing the Auckland Islands following the opening of the Panama Canal in 1914 (Guthrie-Smith 1936; Fraser 1986; Egerton *et al.* 2009). During the government steamer era there were also rare visits by naturalists accompanying independent expeditions, including Leonard Kristensen on the *Antarctic* in 1894 (Bugayer accepted ms), and Edward Wilson returning from the Antarctic with Robert Falcon Scott in 1904 (E. Wilson 1966).

The Auckland Islands, and Campbell Island to the south-east, were the focus of a major scientific research expedition by the Philosophical Institute of Canterbury in November 1907, resulting in the publication of the substantial two-volume *The subantarctic islands of New Zealand* (Chilton 1909). Unfortunately no ornithologists were involved. Edgar Waite wrote the chapter on vertebrates, and lamented that arrangements with respect to birds had fallen through; as he was not asked to write about birds until after the expedition, he did not research the topic in advance, nor pay them particular attention while on the islands (Waite 1909). The islands' birds received more attention during the Second World War 'Cape Expedition', with experienced ornithologists recruited among the personnel tasked with watching for any enemy vessels that might attempt to use Port Ross, Carnley Harbour, and Perseverance Harbour (this last on Campbell Island). The science programme was led by Robert Falla, and included several others who also made major contributions to New Zealand ornithology both before and after the war, including Ron Balham, Charles Fleming, Jack Sorensen, and Graham Turbott. Ornithological findings from the Campbell Island station were published by Sorensen (1951) and Bailey & Sorensen (1962); however, Falla never fulfilled his ambition to write a definitive account

FIGURE 1 (OPPOSITE). Map of the Auckland Islands, showing places named in the text.



of the Cape Expedition birds (Fleming 1980). The little information so far published from the Auckland Islands' Cape Expedition stations is contained in papers with wider taxonomic or geographical scope (e.g. Fleming 1950; Falla 1965), and the memoirs and diaries of Graham Turbott and Charles Fleming published more than 60 years later (Turbott 2002; McEwen 2006).

Robert Falla visited the Auckland Islands on several further occasions through to 1978, including leading the Dominion Museum, and Department of Scientific and Industrial Research (DSIR), expeditions of 1954, 1962–63, and 1966. He published accounts of some of the rarer endemic birds, and also the fauna of Dundas Island (Falla 1967, 1978; Falla *et al.* 1979). Brian Bell of the Wildlife Branch of Internal Affairs (later known as the Wildlife Service) began his association with the islands as a member of the 1962–63 and 1966 expeditions, and led the major 1972–73 expedition that made extensive use of support vessels to investigate many of the lesser islands of the group (Yaldwyn 1975; Atkinson 2001). Bell undertook to work with Falla to produce a comprehensive account of the birds of the Auckland Islands (memorandum dated 13 Sep 1973, Archives New Zealand AANS W3832 Box 20); however, this never eventuated.

Preliminary results of the 1972–73 expedition were compiled by John Yaldwyn (1975), and included five reports on birds (authored by Brian Bell, Christopher Robertson, Gerry van Tets, Milton Weller, and Gordon Williams). A subsequent compendium of 1973 to 1984 reports provided to the Department of Lands and Survey (then the administering authority for Auckland Islands Nature Reserve) was compiled by Andrew Penniket *et al.* (1986), and included eight reports under the heading 'Avifauna'. The report on the endemic subspecies of banded dotterel (*Charadrius bicinctus exilis*) had already been published (Pierce 1980). Two reports by Murray Williams on the endemic Auckland Island teal (*Anas aucklandica*) signalled the start of a research programme on the species that produced several further outputs over the following decade (M. Williams 1986, 1995; Moore & Walker 1991).

The Department of Conservation (DOC) was formed from parent agencies (including the Wildlife Service, and the Department of Lands and

Survey National Parks and Reserves Division) in 1987. Access to the Auckland Islands has increased markedly since then due to the advent of regular ecotourism ship visits, plus funding for charter vessels procured via levies from the fishing industry, allowing targeted research on species affected by fisheries by-catch. Bird research since 1987 has consequently focused mainly on censuses, population dynamics, and the foraging ecology of large surface-nesting seabirds, particularly the four species of albatross (*Diomedidae*) plus the yellow-eyed penguin (*Megadyptes antipodes*).

Kath Walker and Graeme Elliott initiated a long-running (and continuing) research programme on Gibson's wandering albatross (*Diomedea antipodensis gibsoni*) on Adams Island in 1993 (see e.g. Walker *et al.* 1995; Walker & Elliott 1999, 2006; Elliott & Walker 2005). The almost annual presence of research teams on this large, little-modified island has provided opportunities for research on several other species, including subantarctic snipe (*Coenocorypha aucklandica*) (Miskelly, Walker *et al.* 2006; Miskelly, Bell *et al.* 2006), New Zealand falcon (*Falco novaeseelandiae*) (Hyde & Worthy 2010), white-chinned petrel (*Procellaria aequinoctialis*) (Rexer-Huber, Thompson *et al.* 2020 – Chapter 15 in this book; Rexer-Huber *et al.* 2019), light-mantled sooty albatross (*Phoebastria palpebrata*) (Rexer-Huber, Walker *et al.* 2020 – Chapter 12 in this book;), and white-headed petrel (*Pterodroma lessonii*) (G.A. Taylor *et al.* 2020 – Chapter 14 in this book). An even longer-running research programme focused on New Zealand sea lions (*Phocarcos hookeri*) on Enderby Island has allowed long-term data to be collected there on yellow-eyed penguin and southern royal albatross (*Diomedea epomophora*) population sizes (Chilvers 2014; Muller *et al.* 2020 – Chapter 9 in this book; G.B. Baker *et al.* 2020 – Chapter 10 in this book), along with occasional short-term studies, for example on Auckland Island shag (*Leucocarbo colensoi*) census techniques (Chilvers *et al.* 2015).

While most of the bird research on the Auckland Islands since 1987 has had a single-species focus, broader ornithological surveys were undertaken on multiple small islands in Feb 1988 (Graeme Taylor), Nov–Dec 1989 (Moore & McClelland 1990), Jun 1998 (Alan Tennyson), and Jan 2018 (Colin Miskelly and Alan Tennyson), on Adams Island in Nov–Dec 1989

(Buckingham *et al.* 1991), and on Disappointment Island in Jan 1993 (Graeme Elliott, Pete McClelland, Christopher Robertson, and Kath Walker). These studies resulted in publications on, among others, the Auckland Island rail (*Lewinia muelleri*) (Elliott *et al.* 1991), Auckland Island banded dotterel (Walker, Moore *et al.* 1991), Auckland Island teal (Moore & Walker 1991), two vagrant bird species (McClelland & Moore 1991), yellow-eyed penguin (Moore 1992), Auckland Island snipe (*Coenocorypha aucklandica aucklandica*) (Tennyson 1999), lesser fulmar prion (*Pachyptila crassirostris flemingi*) (Tennyson & Bartle 2005), white-chinned petrel (Rexer-Huber *et al.* 2017), and white-headed petrel (Miskelly *et al.* 2019). However, many findings from these surveys are published for the first time in this special issue of *Notornis*.

Despite the increased level of research on Auckland Islands' birds, and increased ecotourism visits in recent decades, there has been no comprehensive description and analysis of the islands' avifauna produced until this special issue. The most complete accounts (including lists of vagrant species) were by Turbott (2002: 101–133) and Shirihai (2002: 445–446). We report here on the overall patterns of bird records on the Auckland Islands over time and space, including identifying where much of the unpublished information is held. We focus on the details of when and where endemic bird taxa were first encountered and recognised as distinct, and on the discovery of significant seabird breeding colonies. This includes new English-language information translated from original accounts of the 1874–75 German Transit of Venus Expedition (Krone 1875, 1877, 1900). We also discuss extinctions among Auckland Islands' birds, and changes in the known size of the fauna, including new occurrences of vagrant species. Details of individual species records are provided in Chapter 2 of this book (Miskelly *et al.* 2020), and descriptions of the bird communities on Adams Island, Enderby Island, and Disappointment Island are given in Chapters 3, 4, and 5 (Elliott *et al.* 2020; French *et al.* 2020; Walker *et al.* 2020).

Sources of information

This review is based on a collation of 23,028 unique bird records dating between 1807 and 2019

(see Miskelly *et al.* 2020, Chapter 2, for methods, and Supplementary materials <http://notornis.osnz.org.nz/node/4445> for the full dataset). More than 76% of these records were previously unpublished, with more than 29% held privately in personal notebooks and logbooks (Table 1). The single largest source of records was Heritage Expeditions trip reports from 1992 to 2018 (5,961 records, 26%), followed by Cape Expedition records (4,388 records, 19%), and data from Adams and Disappointment Islands 1989–2018 contained in logbooks held by Kath Walker and Graeme Elliott (3,037 records, 13%).

The observers who contributed the most records were Rodney Russ (2,420 records, with 2,015 of these during Heritage Expeditions visits), Charles Fleming (1,600 records), and Robert Falla (1,541).

TABLE 1. Sources of bird records used during this review. Records sourced from Heritage Expeditions trip reports are included among unpublished reports. All records are presented in Supplementary material (<http://notornis.osnz.org.nz/node/4445>).

Information source	No. of bird records	Percentage
Published scientific paper	571	2.5
Published report	1,013	4.4
Published book	2,238	9.7
Published on website	1,603	7.0
Published magazine article	51	0.2
Published newspaper article	11	0.05
Published (total)	5,487	23.8
Unpublished report	6,686	29.1
Unpublished thesis	42	0.2
Unpublished, museum specimen	327	1.4
Unpublished, in public archive	3,125	13.6
Unpublished, held by DOC	633	2.7
Unpublished, held privately	6,728	29.2
Unpublished (total)	17,541	76.2



FIGURE 2. Engraving of Captain Benjamin Morrell (1795–1839). By Gimber and Dick, after painting by Sloan, as used in B. Morrell (1832).

16

Chronology of ornithological exploration, discovery, and research in the Auckland Islands

Initial European discovery and exploration, 1807–30

Polynesian settlers in the thirteenth to fourteenth centuries left no record of their ornithological explorations other than food remains in middens (Anderson 2005, 2009). Captain Abraham Bristow of the British whaling company Enderby and Co. was en route from Tasmania to Cape Horn when he 'discovered' what he named 'Lord Auckland's Groupe' on 18 Aug 1806. His vessel, the *Ocean*, was fully laden and he regretted that he was unable to land: 'This place I should suppose abounds with seals, and sorry I am that the time and the lumbered state of my ship do not allow me to examine it' (McLaren 1948; Jones 1970). Bristow returned the following

year on the *Sarah* to take formal possession of the islands, and was at the Auckland Islands from 7 Oct to 19 Dec 1807, seeking skins of New Zealand fur seals (*Arctocephalus forsteri*) (McNab 1907; Jones 1970; Prickett 2009). The only record of birds he encountered is contained in two letters that he wrote to Lord Auckland in 1810 that mention albatrosses, muttonbird (presumably sooty shearwater *Ardenna grisea*), shag, 'a great variety of singing birds with sweet melodious notes' (likely to include bellbird *Anthornis melanura*), lark (New Zealand pipit *Anthus novaeseelandiae*), snipe 'in the marshy ground', 'such plenty' of small gulls (red-billed gull *Chroicocephalus novaehollandiae scopulinus*) and teal along the shores, and several flocks of ducks (probably grey duck *Anas superciliosa*) that were shy, when all the other birds were tame. Bristow also released several pigs on Enderby Island (and possibly the main island) to provide food for the crew of visiting vessels (R.H. Taylor 2006a; letters held by Naval Hydrographer's Office, Taunton, Somerset, File OD 29.3 OD NZ/2).

The islands were much frequented by sealing and whaling gangs over the following decades (Prickett 2009); however, few records of the birdlife encountered are known to exist. The Reverend John Butler visited on 2 Sep 1824 and recorded a fine penguin (probably yellow-eyed penguin), and consumed albatross and muttonbird (Barton 1927; this is out of season for the chicks of sooty shearwater and too early for returning adults, and so is likely to refer to another petrel species). Captain Benjamin Morrell famously failed to find a single fur seal during his 8-day visit from 28 Dec 1829, but did provide a lengthy bird list (B. Morrell 1832).

Morrell (Fig. 2) is widely dismissed as a fantasist, whose glowing description of the climate, soil, and vegetation of the Auckland Islands was largely responsible for Charles Enderby choosing to establish the doomed settlement of Hardwicke in 1849 (Fraser 2014; additional discussion of Morrell's unreliability in Hamilton 1870; Bertrand 1971; and Best & Shaughnessy 1979). Morrell's faunal list included 'three sorts of harmless, inoffensive lizards' and also dragonflies, neither of which have otherwise been reported from the islands, suggesting that he may have confused or embellished his account with observations made elsewhere in New Zealand over the following three weeks. However, there is enough

detail in his account to allow at least a dozen known species of Auckland Islands birds to be identified. After fanciful descriptions of bellbird and tui (*Prosthemadera novaeseelandiae*), both of which he admired for ‘the sweetness of their liquid melody’, Morrell (1832, p. 362) continued:

There are three or four other kinds of birds that sing very sweetly, and several kinds that I never heard sing. I also saw a species of the cuckoo; and the gross-beak, about the size of a thrush, is common. Parrots and paroquets are very numerous, and generally of the most beautiful plumage. There are likewise a variety of large wood-pigeons.

But the most curious bird which I saw on this island is called by some the golden-winged pigeon. It is remarkable for having most of the wing-feathers marked with golden-yellow, changing its colours according to the different lights in which it is viewed, to green and bronze; forming when the wing is closed, two bars across the back. The bill and legs are red; the lower part of the neck and the forepart of the head are of a dove-colour, and a dark-brownish red passes each eye. The two middle feathers of the tail are lighter than the other parts of the plumage, which inclines to a bright lead-colour, with a bar of black near the ends. . . . I also saw two kinds of falcons, and three or four species of owls. Among the rocks we saw black sea-pies, with red bills, and crested shags of a leaden colour. About the shores were a few sea-gulls, black herons, wild ducks, plovers, sand-larks, snipes, rooks, nellies, and several kinds of gulls.

Morrell’s birds include the expected, the unlikely, and the bizarre. Breeding species that match his descriptors include bellbird, tui, red-crowned parakeet (*Cyanoramphus novaeseelandiae*) and/or yellow-crowned parakeet (*C. auriceps*), New Zealand falcon (possibly adult and young), Auckland Island shag, red-billed gull and/or southern black-backed gull (*Larus dominicanus*), grey duck and/or Auckland Island teal, banded dotterel (“plover”), New Zealand pipit (“sand-lark”), subantarctic snipe, northern giant petrel (“nellites”), yellow-eyed penguin, and eastern rockhopper penguin (*Eudyptes filholi*).

Species more likely to have been seen elsewhere

in New Zealand include the cuckoo (either shining cuckoo *Chalcites lucidus* or long-tailed cuckoo *Eudynamis taitensis*), reef heron (*Egretta sacra*; “black heron?”), variable oystercatcher (*Haematopus unicolor*; “black sea-pies, with red bills”), owls (morepork *Ninox novaeseelandiae*, and laughing owl *N. albifacies*), and piopio (*Turnagra* sp.; “the gross-beak, about the size of a thrush?”).

The New Zealand raven (*Corvus antipodum*; “rook?”) is known from the Auckland Islands by a single bone (Dawson 1964, 2020 – Chapter 8 in this book), and was never reported alive by European naturalists (i.e. it is unlikely that Morrell encountered a corvid elsewhere in New Zealand). His detailed description of what sounds like a *Hemiphaga* pigeon with unusual plumage (including yellow bands on its wings) does not match any known New Zealand bird. The only other suggestion that pigeons occurred on the Auckland Islands is by Abby Morrell, who accompanied her husband on the voyage but was so unwell at the Auckland Islands that she did not go ashore (B. Morrell 1832; A.J. Morrell 1833). Abby Morrell (1833) recorded ‘a green bird, about the size of a robin’ with a fine melody (bellbird), ‘large brown and green paroquets’, and ‘large wood-pigeons’, but it is likely that her account was derived from her husband’s book published the previous year.

17

United States, French, and British expeditions, 1840

It is an extraordinary coincidence that the first naturalists to visit the Auckland Islands were members of three independent scientific expeditions in 1840, 34 years after Bristow’s discovery. All were involved in Antarctic exploration, with the Americans and the French on their way north in March, and the British on their way south in November.

The first was the USS *Porpoise* (part of Rear Admiral Charles Wilkes’ United States Exploring Expedition), which visited Port Ross under the command of Lieutenant Cadwalader Ringgold during 7–10 Mar 1840 (Wilkes 1845). Expedition naturalist Dr Silas Holmes collected the first known specimens of yellow-eyed penguin and subantarctic snipe (Peale 1848), with the latter being the first specimen of any snipe collected in the New Zealand region. Unfortunately an 8-year delay in publication of the report on



FIGURE 3. The two new bird species named by Jacques-Bernard Hombron and Honoré Jacquinot (1841) based on specimens collected by the Dumont d'Urville expedition while at the Auckland Islands in March 1840. **A.** Auckland Island merganser (*Mergus australis*). **B.** Yellow-eyed penguin (*Megadyptes antipodes*). Chromolithograph of *Catarrhactes antipodes* Hombron & Jacquinot, 1841. Plates 31 (part) and 33 (part) from Dumont d'Urville (1842).

birds of the expedition meant that Holmes did not receive lasting recognition for his efforts, with both species being named first by the French and British expeditions that followed. *Aptenodytes flavilavata* Peale, 1848 and *Scolopax holmesii* Peale, 1848 are junior synonyms for *Megadyptes antipodes* (Hombron & Jacquinot, 1841) and *Coenocorypha aucklandica* (G.R. Gray, 1845) respectively. Holmes reported that 'game included gray ducks, snipes, cormorants, and the common shag', and described seeing falcon, bellbird, and tomtit (*Petroica macrocephala*) – 'a still smaller species, of a black colour spotted with yellow, was numerous and sang very sweetly' (Wilkes 1845). Holmes probably saw white-chinned petrels on the Hooker Hills, based on his description 'Near the summit the ground was perforated with burrows. Many of the birds were sitting on the ground and made no attempt to escape', as they are the burrowing petrel species most likely to be seen on the surface during the day. 'The sea birds [that] were very numerous on the opposite side of the island, sitting upon the cliffs or hovering over the islet' (Wilkes 1845) may have referred to Auckland Island shags on the northern cliffs on Enderby Island.

The French corvettes *Astrolabe* and *Zélée* under the command of Jules Sébastien César Dumont d'Urville arrived the day after the *Porpoise* departed, and were in Port Ross during 11–20 Mar 1840 (Dumont d'Urville 1846). Jacques-Bernard Hombron and Honoré Jacquinot prepared the account of the birds collected during the expedition, describing three species that they considered to be new. *Falco australis* Hombron & Jacquinot, 1841 is a junior synonym for *Falco novaeseelandiae* Gmelin, 1788; however, they were the first to describe and name the yellow-eyed penguin (as *Catarrhactes antipodes*; Fig. 3, and see above) and the Auckland Island merganser (*Mergus australis*).

Additional notes on the birds of Port Ross were reported by Dumont d'Urville, logbook keeper Lieutenant Gaston de Roquemaurel, and César Desgraz (Dumont d'Urville's secretary). Between them they noted that penguins, petrels, and albatrosses were abundant, and recorded tui ('des philédons, des merles à cravate'), parakeets ('petites perruches'), good-tasting teal ('canards assez petits mais d'un goût excellent'), thousands of shags nesting on the shoreline, and a dead crested penguin (Dumont d'Urville 1846). Desgraz (in

Dumont d'Urville 1846) described taking albatross adults and eggs, and catching giant petrels (*'des pétrels géants, de grands oiseaux gris'*) among the shrubs where they nested. He also described two kinds of gull, Cape petrels (*Daption capense*) and various other seabirds (*'des goelands, des mouettes, des damiers et divers autres oiseaux de mer'*) feeding around a dead whale. Roquemaurel (in Dumont d'Urville 1846) reported that albatrosses, herons, and penguins were abundant (*'les albatros, les hérons et les pingouins s'y rencontrent par bandes innombrables'*), providing support for the earlier report of herons by B. Morrell (1832).

The British Antarctic Expedition (HMSs *Erebus* and *Terror*) under Captain James Clark Ross was based in Port Ross from 20 Nov to 12 Dec 1840, and made extensive biological collections (Ross 1847). Bird records and specimens were collected mainly by the surgeon on HMS *Erebus*, Dr Robert McCormick (Fig. 4), who published his memoirs 44 years later (McCormick 1884; plus 'McCormick diary', a transcript in the Alexander Turnbull Library (ATL), microfilm Micro-MS-Coll-20-2665: 675–709). The official record of the birds of the expedition was prepared by George Robert Gray at the British Museum (now the Natural History Museum, NHM). Gray (1845) listed 15 species collected at the Auckland Islands by the expedition, and named three new species (teal, snipe, and plover). Using current names these were: Auckland Island teal (named as *Nesonetta aucklandica*; Fig. 5A), yellow-eyed penguin, sooty shearwater, common diving petrel (*Pelecanoides urinatrix*; two diving petrel species were collected – see below), white-faced storm petrel (*Pelagodroma marina*), subantarctic snipe (named as *Gallinago aucklandica*; Fig. 5B), New Zealand falcon, shore plover (*Thinornis novaeseelandiae*; the unique Auckland Island specimen named as *T. rossii*; Fig. 5C), southern black-backed gull, red-billed gull, red-crowned parakeet, bellbird, tui, tomtit, and New Zealand pipit. The three petrel species were reported as collected off the coast, although Salvin (1896) listed an adult white-faced storm petrel from Enderby Island in the British Museum that was presented by Mr Oakeley (see below). The British Museum also received a specimen of yellow-crowned parakeet collected at the Auckland Islands by the expedition (accession no. 1842.12.16.42; see under orange-fronted



FIGURE 4. Robert McCormick. Portrait by Stephen Pearce. National Portrait Gallery, London.

parakeet *Cyanoramphus malherbi* in Miskelly et al. 2020, Chapter 2); however, Gray (1845) did not include this location detail when he stated '*This species inhabits various parts of New Zealand*'.

Further bird specimens collected at the Auckland Islands by the British Antarctic Expedition were acquired by the British Museum after 1845, including through the bequest of Robert McCormick (Sharpe 1906). In addition to the species mentioned by Gray (1845), Salvin (1896) listed two specimens of southern royal albatross (as '*Diomedea regia*') from Enderby Island, and two Antarctic prions (*Pachyptila desolata*; listed as '*Prion banksi*'). Saunders (1896) listed a specimen of white-fronted tern (*Sterna striata*; as '*Sterna frontalis*') ex the Gould Collection as being from the Auckland Islands. John Gould (1804–81) is known to have received specimens from both Sir James Clark Ross and Robert McCormick (Whitley 1938; Miskelly 2000). There would have been few other sources from which Gould could have obtained this bird before 1881; however, we are unable to confirm that this specimen was collected in 1840.

McCormick (1884 and diary) provided much detail on where most of these specimens were collected, including type localities for the teal (Laurie Harbour) and snipe (Enderby Island),



FIGURE 5. The three new bird species named by George Robert Gray (1845) based on specimens collected by the James Clark Ross *Erebus & Terror* expedition while at the Auckland Islands in Nov–Dec 1840. **A.** *Nesonetta aucklandica* (now Auckland Island teal *Anas aucklandica*). **B.** *Gallinago aucklandica* (now subantarctic snipe *Coenocorypha aucklandica*). **C.** *Thinornis rossii* (possibly an unusually dark shore plover *T. novaeseelandiae*).

but made no recognisable or specific mention of the shore plover, diving petrels, sooty shearwater or any storm petrel. McCormick recorded shooting or capturing several further species that apparently were not retained as specimens in the official expedition collection, including shags, northern giant petrel and their young on Ewing Island, red-billed gulls ('ash backed gulls') at Erebus Cove and Enderby Island, and subantarctic skua *Catharacta antarctica* ('brown gull'). A 'small species of merganser' in Laurie Harbour and a 'solitary ring-plover' (= banded dotterel) on Friday Island were observed but not collected (McCormick diary; Ross 1847).

The albatross that McCormick (1884) shot on Ewing Island on 30 Nov 1840 was most likely a light-mantled sooty albatross, as this is the only species subsequently recorded there. He also reported finding southern royal albatross (as '*Diomedea exulans*') on eggs on Enderby Island and on the hills north-west of Port Ross, and an Antarctic prion ('blue petrel') on an egg at Terror Cove. In addition to this, McCormick referred to 'several kinds of petrel . . . breeding in holes underground, and on the sides of the cliffs bounding the bays' (quoted in Ross 1847). Ross further mentioned that 'Mr Oakley [Henry Oakeley, mate of the *Erebus*] was sent to examine Enderby Island, where also he landed some rabbits [*Oryctolagus cuniculus*], and brought back with him the nests and young birds of several small kinds of petrel he found there'. In addition to white-faced storm petrel, this comment may refer to the collection of an adult and a chick of South Georgian diving petrel (*Pelecanoides georgicus*), which are held in the NHM. The specimens were first attributed to this taxon (i.e., not *P. urinatrix exsul*) by Robert Falla, sometime between 1939 and 1966, based on annotations on the labels of these and other NHM diving petrel specimens (Falla *et al.* 1966; Alan Tennyson, *pers. comm.* to CMM, 25 Feb 2019).

Maungahuka and Hardwicke settlements, 1842–56

Little information is available on the birds encountered and utilised by Ngāti Mutunga and their Moriori slaves during the 14 years they lived at 'Maungahuka' in Port Ross, although Mikaere (1986) suggested that they harvested young albatrosses from the clifftops.

The most detailed accounts of the short-lived Enderby Company 'Hardwicke' settlement in Port Ross are the diaries of William Mackworth and William Munce (Mackworth & Munce 1999; Fraser 2014), neither of whom made any mention of birds. A few species from this era were mentioned by Martin [1852] and Malone (1854), none of which are additional to species recorded in 1840. However, they do provide some insights into the impacts that the settlers and their support crews had on local wildlife through hunting for food or sport. Edmond Malone was the purser on HMS *Fantome*, which visited Port Ross during May–Aug 1852 to assist with removal of the settlers and settlement (Fraser 2014). During these 13 weeks the officers killed '302 toois [tui], 144 wild duck [likely grey duck and Auckland Island teal], 12 sea-lions, 6 parrots [red-crowned parakeet and/or yellow-crowned parakeet], 2 snipe, 8 bullocks and cows, and 3 calves' (Malone 1854).

Shipwrecks, 1864–1907

The wreck of the schooner *Grafton* in the northern arm of Carnley Harbour on 3 Jan 1864 initiated a remarkable story of self-sufficiency, survival, and self-rescue of all five crew. It was also remarkable because Captain Thomas Musgrave and first mate François Raynal both wrote detailed accounts of their ordeal (Musgrave 1865; Raynal 1870, 1874). These provide the first information on the wildlife of the southern end of the group, and by far the most detail on birdlife of any of the Auckland Islands shipwreck survivor accounts. Cats and mice were present around Carnley Harbour in 1864–65, but pigs had not reached this far south (Musgrave 1865; Norman & Musgrave 1866).

Musgrave and Raynal mention at least 13 recognisable bird species, including Auckland Island shag (as 'widgeon', with up to 26 shot at a time; Fig. 6), bellbird, tui, tomtit, red-crowned parakeet, New Zealand falcon, grey duck, Auckland Island teal, Auckland Island merganser, sooty shearwater, and albatrosses and gulls (species uncertain). Falcons (called 'hawks' by Musgrave) were common, and were attracted to plucked shags that had been hung up high out of reach of blowflies (*Calliphora* sp.): 'we have killed five [hawks], and this encourages the small birds to come near' (Musgrave 1865). The shags apparently left Carnley Harbour to breed elsewhere; however,

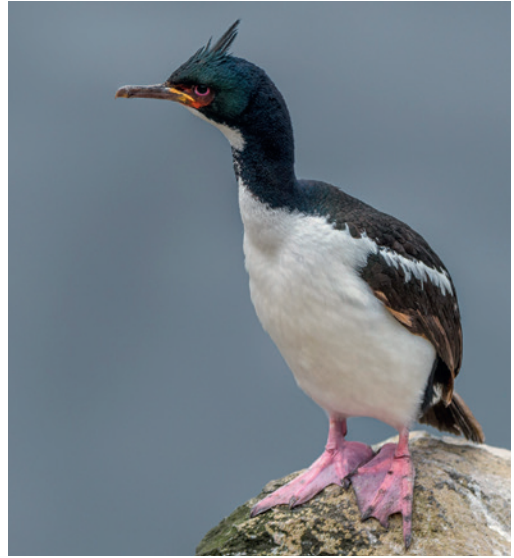


FIGURE 6. Auckland Island shag. Enderby Island, January 2016. Image: Tony Whitehead.

Musgrave (writing on 1 Jan 1865) described tui, tomtit, bellbird, and gulls laying in November, and later recorded young parakeets in the nest in early-March. The only mention of mergansers was a 'small covey' at Camp Cove on 11 Jun 1864, of which four were shot. Raynal (1874) described them as 'birds that resembled divers, except in the bill, which is like that of the cormorant'. Musgrave (1865: 73) mentioned 'numerous burrows all round the shores of this vast bay', which he attributed to an unknown burrowing mammal; these are likely to have been the burrows of Antarctic prions and possibly other burrowing petrels.

One of the most puzzling descriptions by Musgrave (1865: 71) was 'a small bird which appears to be an annual visitor . . . here about same time both last year and the present one. They come in immense flocks, fly rather high, and in waves. They are evidently a seed bird of the sparrow species, and very much resemble a wild canary, both in color and size. They only remained here a few days [and departed c. 3 Apr 1865]'. While this is a plausible description of common redpolls (*Carduelis flammea*) – the only finch that occurs commonly at the Auckland Islands today – the first introductions of this species to New Zealand were very small numbers of birds in the 1860s, and they were not considered to be well established until around the end of

the century (Thomson 1922). The earliest definite record of redpolls from the Auckland Islands was in 1942. It is more likely that Musgrave was describing winter flocks of pipits, which are now unlikely to include more than a dozen individuals.

Both men mention a 'water-hen', which could be the Auckland Island rail. The first was on Adams Island on 11 Jun 1864: 'On our way down again we fell in with a water-hen, which George [Harris] adroitly killed with a stone' (Raynal 1874). Only 8 days later on Wilkes Peak (on the main island), Musgrave (1865) described 'coming back I caught a bird something like a water-hen'. Baron Anatole von Hügel (1875) claimed that a rail specimen that he purchased in Invercargill in Dec 1874 had been 'killed on [Auckland] island by the unfortunate Capt. Musgrave of the Grafton', although his own label on the specimen (AMNH 545046) notes it as having been freshly skinned, and gives the collection date as Nov 1874 (Falla 1967). The specimen ended up in the Rothschild collection and (since 1932) the American Museum of Natural History (AMNH). Gregory Mathews and Tom Iredale (1913), James Greenway (1958), and Falla (1967) all considered the bird to be a typical large adult (probably male) Lewin's rail (*Lewinia pectoralis*), a species

not otherwise recorded from New Zealand. Mathews & Iredale (1913) and Greenway (1958) suggested that it was unlikely that the specimen was from the Auckland Islands or New Zealand; this conclusion was supported by Elliott *et al.* (1991) based on a comparison of Falla's measurements of the AMNH specimen with those from living *L. muelleri* from Adams Island. Preparing and preserving bird skins would be an unlikely and challenging task for shipwreck survivors who were not naturalists, and neither Musgrave nor Raynal mentioned this activity in their journals. The possible provenance of the 1874 rail specimen is discussed further below.

The actual type specimen of Auckland Island rail is equally mysterious. It is unknown where or when it was collected. It was acquired by the botanist Baron Ferdinand von Müller in Melbourne, who forwarded it to Count Hans von Berlepsch at the Stuttgart Museum, Germany, some time before 1893 (Rothschild 1893; Falla 1967). It was brought to the attention of scientists when Walter Rothschild borrowed it from von Berlepsch, and used it to name *Rallus muelleri* (Fig. 7). It is assumed that the specimen was returned to Stuttgart, where it vanished, most likely destroyed by Allied bombing in the Second World War (Falla 1967). There is no record of any naturalist examining the type specimen after 1893, and it was never compared directly with the larger specimen now in the AMNH, even though this was apparently in Rothschild's private collection in 1893 (Sharpe 1894).

The *Invercauld* was wrecked at the north-west of Auckland Island on 10 May 1864, with three only of the 25 crew surviving until their rescue a year later (Allen 1997; Druett 2007). The little information regarding birds encountered was from the recollections of Robert Holding, during c. 8 months spent on Rose Island from Sep 1864 (Allen 1997). Holding reported about ten bird species. Although he did not know their names, his descriptions match northern giant petrel ('three albatrosses [feeding on a seal killed on a hill] started to run [until] the wind got under their wings'), sooty shearwater and at least one smaller burrowing petrel (the latter heard but not seen), Auckland Island teal, grey duck ('I also got a few more of the small ducks, but none of the larger size ones'), subantarctic skua, bellbird ('the place

22

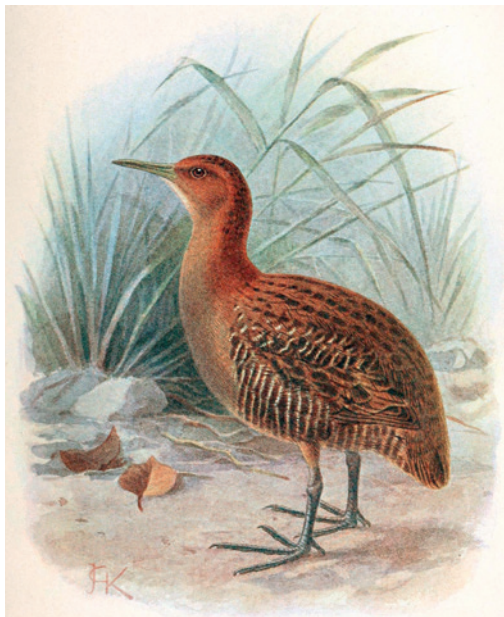


FIGURE 7. Auckland Island rail. Chromolithograph of the type specimen, by John Gerard Keulemans, from Rothschild (1907).

seemed alive with them'), and tomtit. The main bird species harvested were Auckland Island shags ('widgeon') caught with nooses dangled over the northern cliff, where a large colony was still present in Jan 2018. The ledge was 'covered with birds in all stages of breeding', and up to 26 birds were caught in an hour (Allen 1997: 180–181).

The *General Grant* (wrecked on the west coast of the main island on 14 May 1866) is perhaps the most famous of the eight known shipwrecks at the Auckland Islands, having lured many fortune-seekers south in search of the gold that it was rumoured to be carrying. Ten of 83 passengers and crew survived 18 months until their rescue, by which time they had been living on Enderby Island for 8 months, having used small boats to move around the archipelago. The only bird species mentioned in the survivors' accounts were albatrosses killed and eaten on Disappointment and Enderby Islands, and subantarctic skuas ('Cape hens') and falcons ('hawk') on Enderby Island (Sanguilly 1869; Eunson 1974; Allen & Scadden 2009), with one 'hawk' kept as a pet (Sanguilly 1869).

The last shipwreck on the Auckland Islands was the *Dundonald*, which struck Disappointment Island on 7 Mar 1907 (Escott-Inman 1911). Fifteen of the 28 crew survived on the 284 ha island for 7 months before constructing coracles from *Veronica elliptica* branches covered with sails, allowing four of the men to paddle to the main island and return with a boat (see below). The entire group decamped to Port Ross, from where they were rescued a month later (Chilton 1909). The men survived on Disappointment Island by eating white-capped mollymawk chicks (Fig. 8), of which about five per person per day were required, equating to c. 12,000 chicks by mid-August (Escott-Inman 1911). Able seaman Charles Eyre recounted his ordeal to Herbert Escott-Inman a few years later. Apart from the all-important mollymawks, there is little detail about the wildlife encountered on Disappointment Island.

The mollymawks were present in immense numbers, but most chicks had fledged by 23 Aug, and they were entirely gone by 7 Oct (Escott-Inman 1911). There were 'some' skuas and [Gibson's wandering] albatrosses present. The albatrosses were very shy, although the castaways caught a few to attach sail-cloth messages (requesting



FIGURE 8. White-capped mollymawk chick, South West Cape, Auckland Island, March 2007 (100 years to the month after the wreck of the *Dundonald*). Image: Paul Sagar.

23

rescue) around their necks. Several petrel species breed abundantly on Disappointment Island; however, Eyre (in Escott-Inman 1911) mentioned only 'night birds' and 'whale-birds'. The 'night birds' were still present in June, and so were most likely white-headed petrels (as sooty shearwaters and white-chinned petrels should have departed by then); or the term may have been used collectively for these three large petrel species. There were 'a lot of whale-birds on the island, but these are only little fellows, and were of no use to us at all' (Eyre in Escott-Inman 1911). Whalebird is a name usually applied to prions; however, prions were very scarce on Disappointment Island between 1993 and 2018 (Walker *et al.* 2020 – Chapter 5 in this book). Waite (1909) recorded prion remains in skua middens on Disappointment Island the same year as the *Dundonald* wreck, but it is possible that Eyre used the name 'whale-bird' to refer to small petrel species in general. Common diving petrels, black-bellied storm petrels (*Fregetta tropica*), and

grey-backed storm petrels (*Garrodia nereis*) are all abundant on Disappointment Island (Walker *et al.* 2020).

Francis Monckton, and the German Transit of Venus Expedition 1874-75

There were three attempts at pastoral farming at the Auckland Islands between 1874 and 1910 (Dingwall 2009). Dr Francis Monckton took up the first lease, had a house built at Erebus Cove, and installed shepherd Frederick Nelson and his wife in Sep 1874 (Dingwall 2009; Bade 2012). Monckton used his schooner *Mabel Jane* to supply the farm, and in early-Dec 1874 it returned from the initial 3-month visit to the islands bringing a party of Monckton's friends '*who had collected all they could in the way of marketable mammal skins and curios, and no doubt a few birds*' (Falla 1967). This was only a fortnight before Anatole von Hügel arrived from Melbourne, and it is likely that the *Mabel Jane* was the source of a pair of Auckland Island mergansers (killed in late-Nov 1874) and an Auckland Island snipe purchased in Invercargill by von Hügel, and

possibly also the enigmatic Lewin's rail specimen (now in the AMNH) that is part of the confused history of the Auckland Island rail (von Hügel 1875; Falla 1967; Elliott *et al.* 1991). The snipe, which was acquired by the Liverpool Museum, was collected on '*Mt Teviot, Auckland Island*' by J. McIvor (Fisher 1981). Unfortunately this is an unknown location, and so it is unclear whether this was a genuine record of snipe from the main island.

The Nelsons were in residence in Port Ross when the German Transit of Venus Expedition arrived on 15 Oct 1874, and were present throughout their 5-month stay (Bade 2012; Figs 9 & 10). Hermann Krone was the chief photographer for the astronomical expedition, and took responsibility for the collection of wildlife specimens and writing up scientific findings (Bade 2012). Bird specimens from this expedition are held in the Senckenberg Natural History Collections of Dresden, and include 80 specimens of 26 species from the Auckland Islands, plus one nest (Table 2, based on a spreadsheet provided by Jens Jakobitz, *pers. comm.* to CMM, 10 Aug 2018). Notable among

24



FIGURE 9. The first land-based scientific expedition to the Auckland Islands: the 1874-75 German Transit of Venus Expedition station at Terror Cove, Port Ross. Image: Hermann Krone, State Library of Victoria, H86.2/36.

TABLE 2. Bird specimens collected at the Auckland Islands during the German Transit of Venus Expedition 1874-75 (Oct 1874–Mar 1875), held by the Senckenberg Natural History Collections of Dresden. Identifications of 22 previously mislabelled specimens (including vagrant penguins) were based on images provided by Jens Jakobitz and Frederik Albrecht, *pers. comm.* to CMM, 15 Sep 2018. Scientific names are provided in the text.

Species	No.	Registration nos	Localities (and specimen detail)
Auckland Island merganser	2	C_5730 & C_5731	Carnley Harbour
Auckland Island teal	4	C_5733 to C_5736	Rose Island and Ewing Island
Grey duck	1	C_5732	
Eastern rockhopper penguin	2	C_5737 & C_5738	‘North side’ Port Ross
Fiordland crested penguin	1	C_5740	Rose Island
Erect-crested penguin	1	C_5739	‘North side’ Port Ross
Yellow-eyed penguin	2	C_5741 & C_5748	Carnley Harbour and ‘south side’
<i>Diomedea</i> sp.	1	C_5798	Enderby Island dunes (bones)
<i>Thalassarche</i> sp.	1	C_5797	(skeleton)
Antarctic prion	4	C_5714 to C_5717	Erebus Cove and Terror Cove
<i>Pachyptila</i> sp.	1	C_2748	(skeleton)
Sooty shearwater	2	C_5712 & C_5713	Enderby Island
Common diving petrel	4	C_3451 & 5719 to 5721	Port Ross and ‘north side’
Auckland Island shag	8	C_5722 to C_5729	Port Ross, and Enderby, Rose, and Shoe Islands
New Zealand falcon	2	C_5742 & C_5743	Rose Island
Bar-tailed godwit	2	C_5747 & C_5748	Rose Island
Subantarctic skua	3	C_5698 to C_5700	Port Ross
Southern black-backed gull	7	C_5691 to C_5697	Port Ross (5 adults and 2 juveniles)
Red-billed gull	5	C_5702 to C_5706	Port Ross and Enderby Island
White-fronted tern	4	C_5707 to C_5710	Port Ross, Laurie Harbour, and Erebus Cove
Antarctic tern	1	C_5711	Rose Island
Red-crowned parakeet	3	C_5744 to C_5746	Venus Valley
Bellbird	5	C_3447 & C_3448 C_5790 to C_5792	‘North side’ Venus Valley
Tui	7	C_3443 to C_3445 C_5783 to C_5787	‘North side’ Port Ross and Venus Valley [C_5784 missing]
Tomtit	3	C_5752 to C_5754	Venus Valley
Silvereye	2	C_5789 & C_5812	Venus Valley (C_5812 is a nest)
New Zealand pipit	3	C_5749 to C_5751	Rose Island



FIGURE 10. Members of the 1874-75 German Transit of Venus Expedition at Terror Cove, Port Ross. Hermann Krone (the oldest member of the party, at 47 years old) is in the back row at the right. Image: Hermann Krone, State Library of Victoria, H85.88/14.

these are the first Auckland Islands records for erect-crested penguin (*Eudyptes sclateri*), Fiordland crested penguin (*E. pachyrhynchus*), bar-tailed godwit (*Limosa lapponica*), white-fronted tern, Antarctic tern (*Sterna vittata*), and silvereye (*Zosterops lateralis*), and the first specimens of grey duck, eastern rockhopper penguin, Antarctic prion, Auckland Island shag, and subantarctic skua.

Krone was not a trained naturalist. Unfortunately he used scientific names (which were often wildly incorrect) when guessing the identity of birds that he saw, giving the false impression of precise identifications.

Based on his description of bird appearance and behaviour (and surviving specimens), his incorrect names included *Larus pacificus* for southern black-backed gull, *Eudyptes pachyrhynchus* for yellow-eyed penguin, *Eudyptula minor* for eastern rockhopper penguin, *Prion turtur* for Antarctic prion, *Rallus dieffenbachi* for subantarctic snipe (described as a small, long-billed snipe-like bird), and *Procellaria gigantea* for subantarctic skua; plus, it is likely that his *Diomedea cauta* refers to light-mantled sooty albatross (Krone 1875, 1877). Provided these names are understood, his German texts contain considerable detail on

bird distribution and behaviour around Port Ross (Krone 1875, 1877, 1900).

Species that Krone encountered but did not collect (or for which no specimens survive) included subantarctic snipe on Rose, Ewing, and Enderby Islands, and three species of albatross. He encountered a single great albatross (*Diomedea* sp.) on an egg on the Hooker Hills (Krone 1900), but it is not possible to determine whether this was a southern royal albatross or a Gibson's wandering albatross. A 'smaller white albatross with black markings' named as '*Diomedea culminata*' by Krone (1877) was described as a coastal inhabitant, implying that the white-capped mollymawk colonies subsequently discovered on Disappointment Island and South West Cape were not visited.

Notable absences included yellow-crowned parakeet (which Krone 1875 explicitly stated as being absent), northern giant petrel, and banded dotterel. Southern royal albatrosses were evidently not breeding on Enderby Island at the time, and yellow-eyed penguins were rarely encountered around Port Ross but nested in great numbers around Carnley Harbour (Krone 1875, 1900). The absence of large ground-nesting seabirds around Port Ross in 1874–75 compared with 1840 reveals some of the ecological impact of the Maungahuka and Hardwicke settlements during 1842–56.

Krone (1877, 1900) was the first observer to comment on the extensive bird bone deposits in the dunes at Sandy Bay, Enderby Island. The Senckenberg Natural History Collections of Dresden retain bones of "*Diomedea exulans*" [likely *D. epomophora*] collected by Krone at 'Auckland Inseln, Sanddüne auf Enderby Island' (Jens Jakobitz, pers. comm. to CMM, 10 Aug 2018).

Searches for castaways, 1888–1929

The wrecks of the *Grafton*, *Invercauld*, and *General Grant* in 1864 and 1866 were the impetus for the Southland Provincial and New Zealand Governments to establish provision depots on the subantarctic islands, with additional boatsheds and boats scattered around Port Ross and Carnley Harbour. Unfortunately there were no facilities on Disappointment Island until a boatshed was built there in 1908 in response to the wreck of the *Dundonald* (Egerton *et al.* 2009). Servicing of the depots, and searches for shipwreck

survivors, were undertaken initially (and only sporadically) by small vessels. However, from 1888 onwards the larger government steamers *Stella*, *Hinemoa*, and *Tutanekai* visited two to three times a year and were able to take a few passengers on most trips, facilitating access to the Auckland Islands by scientists and naturalists (R.H. Taylor 2006b; Egerton *et al.* 2009). Some officers of these vessels developed great interest and knowledge in subantarctic wildlife, which they willingly shared with their passengers. Most notable were Captains John Fairchild and John Bollons, and the *Stella*'s second engineer William Bethune. Knowledge of the Auckland Islands birdlife grew rapidly through to the final voyage of the *Tutanekai* in 1929, and only a précis of the more notable findings can be presented here.

The Austrian collector Andreas Reischek was the first naturalist to explore Adams Island, in Jan 1888, reporting [Gibson's] wandering albatross breeding, and also the presence of snipe, banded dotterel, subantarctic skua, red-crowned parakeet, bellbird, tomtit, pipit, and silvereye (Reischek 1889a, b). Subsequent observers added Auckland teal (Jan 1890; Frederick Chapman 1891), Antarctic prion, grey-backed storm petrel, and New Zealand falcon (Jan 1901; Earl of Ranfurly in Ogilvie-Grant 1905), yellow-eyed penguin breeding (Jan 1901; Frederick Hutton in Falla archive, ATL), northern giant petrel breeding (Feb 1907; Edgar Waite 1907); light-mantled sooty albatross breeding (Mar 1927; Reginald Oliver 1927), and white-headed petrel, white-chinned petrel, and black-bellied storm petrel all on eggs at Fairchild's Garden at the north-western tip of Adams Island in Feb 1929 (Edgar Stead specimens in Canterbury Museum).

Robert Wilson in Oct 1891 was the first observer to record the 'thousands' of mollymawks (*Thalassarche* sp.) nesting on the slopes of Disappointment Island: '*They dotted the side of the hill like a big mob of sheep*' (R.A. Wilson 1891). However their identity would not be resolved until 1944. Frederick Hutton in 1901 reported southern royal albatrosses breeding at the eastern end of Adams Island, based on information from Captain Bollons (Ogilvie-Grant 1905). Other notable seabird breeding colony discoveries included light-mantled sooty albatross at Waterfall Inlet on 26 Jan 1888, and white-headed petrel at an unspecified

location the same month (Reischek 1889a). Vast rookeries of rockhopper penguins were noted on the west coast of Auckland Island on 11 Jan 1890, plus an immense area of mollymawk nests at South West Cape on the same date (Chapman 1891). The first report of white-headed petrels breeding within Port Ross was two birds on eggs on Ocean Island on 6 Feb 1929 (Edgar Stead specimens in Canterbury Museum).

Chapman (1891) reported snipe to be plentiful on Rose Island on 10 Jan 1890, and they were seen on Enderby Island by Ethel Richardson on 25 Oct 1890 (three birds; Cass 2014) and Robert Wilson on 28 Oct 1891 (one bird; R.A. Wilson 1891). Both these islands had established populations of rabbits and other browsing mammals (cattle *Bos taurus* and/or sheep *Ovis aries*) at the time or soon after (Russell *et al.* 2020 – Chapter 6). These proved to be the last sightings of snipe on Enderby Island until 1972, and on Rose Island until 1985 (Shepherd *et al.* 2020 – Chapter 16 in this book).

28

The government steamship era at the Auckland Islands is perhaps best known ornithologically for the Auckland Island merganser being hunted to extinction for museum specimens, with Governor of New Zealand Lord Ranfurly being responsible for their death knell (Kear & Scarlett 1970; M. Williams 2012). At least 20 specimens were obtained from Carnley Harbour and the eastern inlets of Auckland Island between 1888 and the last sighting in 1902.

Colonising, non-breeding, and vagrant species first reported from the Auckland Islands between 1888 and 1929 included mottled petrel (*Pterodroma inexpectata*) in 1890 (Buller 1891), Eurasian blackbird (*Turdus merula*) and white heron (*Ardea modesta*) in Port Ross in Oct 1891 (R.A. Wilson 1891), Campbell Island mollymawk (*Thalassarche impavida*) in 1895 (Falla 1937), European goldfinch (*Carduelis carduelis*) in 1896 (Lukins 1896), a black swan (*Cygnus atratus*) in Port Ross in Jan 1901 (Frederick Hutton notebook in Falla archive, ATL), two Macquarie Island shags (*Leucocarbo purpurascens*) shot by Commander John Rolleston of HMS *Archer* in Jul 1901 (first record for New Zealand; Miskelly & Cooper 2020 – Chapter 17 in this book), and a specimen of a blue petrel (*Halobaena caerulea*) in the Canterbury Museum that was collected by William Bethune, probably between 1885 and 1895. Perhaps the most remarkable

vagrant bird sighting was by John Bollons, who reported five blue ducks (*Hymenolaimus macrorhynchos*) in Hanfield Inlet in Feb 1883 (Waite 1909). Bollons at the time was a crew member on the government schooner *Kekeno* under Captain James Greig (McCraw 1999).

Antarctic expeditions, 1894 and 1903

The crew of the Norwegian whaling and sealing vessel *Antarctic* under Captain Leonard Kristensen is famed for achieving the first substantiated landing on the Antarctic continent, near Cape Adare on 24 Jan 1895 (Borchgrevink 1895; Bull 1896). Six months before this, the vessel was at the Auckland Islands seeking whales, and to take on water and wood for fuel (Bugayer accepted ms). During 23–30 Jul 1894 the *Antarctic* was anchored alongside Figure of Eight Island at the head of North Arm, Carnley Harbour. While there, Kristensen recorded shooting at least ten species of birds, including merganser ('fish duck'), grey duck, teal, yellow-eyed penguin, shag, snipe, subantarctic skua, tui, and at least two species of gull (possibly confusing juveniles and adults as representing additional species). He also reported seeing giant petrel and two species of albatross (Bugayer accepted ms). Kristensen's journal implies that the birds were taken near the anchorage, which would make this the only known record of snipe from the main island or Figure of Eight Island. However, it is possible that a small vessel was used to visit Adams Island c. 13 km away.

Robert Falcon Scott used Port Ross as a rendezvous point for his three vessels at the end of his 1901–04 Antarctic Discovery Expedition (Fraser 1986). Expedition doctor and naturalist Edward Wilson was aboard the *Discovery* in Port Ross from 15 to 28 Mar 1904, and recorded 22 bird species, of which 18 species were collected (E. Wilson 1966; Miskelly 2020 – Chapter 18 in this book). Notable among these were the first South Polar skua (*Catharacta maccormicki*) recorded from New Zealand (Miskelly 2020 – Chapter 18), five Auckland Island teal from the bay at Dea's Head (on the main island), five falcons (two from Enderby Island, two from Erebus Cove and one from Laurie Harbour), and the second recorded yellow-crowned parakeet from the Auckland Islands, which Wilson painted (E. Wilson 1966: 132).

Philosophical Institute of Canterbury, 1907

The Philosophical Institute of Canterbury scientists had a dramatic start to their subantarctic expedition when they were involved in the rescue of survivors from the *Dundonald* wreck on 16 Nov 1907 (Chilton 1909; Godley 1979). The 15 survivors were then at Erebus Cove, and when the *Hinemoa* returned from the Bounty and Campbell Islands it was used to access Disappointment Island so that the body of Jabez Peters could be exhumed for burial in the cemetery at Erebus Cove. Remaining artefacts used by the castaways were also retrieved, including the frame of a coracle they had built, which was retained by Canterbury Museum. This visit on 28 Nov 1907 provided the first opportunity for naturalists to explore Disappointment Island. Waite (1909) recorded white-headed petrel nesting, and the

presence of rockhopper penguin, Auckland Island teal, pipit, and subantarctic skua. A dead white-chinned petrel was found in a burrow, and the skuas had been feeding on white-headed petrels, sooty shearwaters, and Antarctic prions. Breeding of [Gibson's] wandering albatross was implied by the presence of 'one-year-old' birds, presumably chicks ready to fledge. Waite (1909: 574) included a photograph of a white-capped mollymawk on a nest, but the birds were misidentified as '*Diomedea melanophrys*' (black-browed mollymawk), leaving the identification of the mollymawk species breeding on the Auckland Islands unresolved.

Other notable finds of the 1907 expedition (Fig. 11) included a blackbird nest with eggs at Terror Cove (the first reported breeding of a bird species introduced to New Zealand on the islands), and recognition of Ewing Island as a stronghold for Auckland Island teal (Waite 1909).



FIGURE 11. Members of the Philosophical Institute of Canterbury expedition at Camp Cove, Carnley Harbour, Auckland Island, in November 1907. Edgar Waite is seated at front left. Image by Samuel Page. National Library of New Zealand, PA1-q-228-01.

TABLE 3. Contributions of Auckland Islands bird records by Cape Expedition team members 1941–47. Many records were attributed to multiple observers and so have been tallied more than once. Ranui Cove is in Port Ross, and Tagua Bay is in Carnley Harbour; ‘survey’ refers to members of the mapping survey team, who travelled widely; ‘Campbell Island’ team members visited on their way to or from the Campbell Island coastwatching station.

Team member	Records	Year	Location where based
Charles Fleming	1,600	1942	Tagua Bay
Robert Falla	1,293	1943	Ranui Cove
Hugh Wenham	813	1945	survey
Graham Turbott	386	1944	Ranui Cove then survey
Ron Balham	252	1943	Ranui Cove
Laurie Pollock	218	1941, 1943	Tagua Bay then Ranui Cove
Ed Doley	139	1943	Ranui Cove
Alan Paine	130	1943, 1944	Tagua Bay then Ranui Cove
Jack Sorensen	119	1944, 1945, 1947	Campbell Island
Bill Dawbin	91	1943	Ranui Cove then Tagua Bay
John Jones	75	1943	Ranui Cove
Doug Knowles	55	1941, 1944	Tagua Bay then Campbell Island
Allan Eden	52	1944–45	survey
Lou Seabeck	50	1942	Ranui Cove
John Douglas	35	1942	Tagua Bay
Others	154	1941–45	
Total	4,889		

Second World War coastwatchers, 1941–47

The ‘Cape Expedition’ was a unique period in the development of knowledge of Auckland Islands’ natural history. For the first and only time, naturalists were present year-round, both in Port Ross and Carnley Harbour, with both teams using the support vessels (*Ranui* and *Tagua*) and station boats to access offshore islands. There was greater focus on identifying burrow-nesting petrels and their nesting distribution than previously, and this extended to the novel (if unintentional) sampling method of using tame cats at both the Ranui Cove station in Port Ross and the Tagua Bay station in Carnley Harbour (Russell *et al.* 2020 – Chapter 6). During 1944–45, Allen Eden led a survey team to prepare a topographic map of the islands (Eden 1955), and this provided opportunities for team members Graham Turbott and

Hugh Wenham to record birds on the exposed tops of Auckland Island and Adams Island.

Many team members contributed to the bird records and specimens collected at the Auckland Islands during the Cape Expedition, with Charles Fleming, Robert Falla, and Hugh Wenham (Fig. 12) the most prolific contributors (Table 3). While Fleming’s observations have been published (McEwen 2006), more than 62% of coastwatcher observations remained unpublished. Falla was the director of the Canterbury Museum during the war years, and so many of the bird specimens were deposited there (122), with the bulk (292) going to the Dominion Museum (now Te Papa) and six to Auckland Museum.

Perhaps the most notable bird discoveries of the period were recognition of fulmar prion (*Pachyptila crassirostris*) as a new breeding species for the group, on Ocean Island on 5 Jan 1943

(Robert Falla) and on Rose Island on 13 Nov 1943 (Ed Doley), and a South Georgian diving petrel on an egg on Dundas Island on 28 Oct 1943 (Robert Falla & Ed Doley). Other burrowing petrel species found breeding on the smaller islands included white-headed petrel (8 islands; Miskelly *et al.* 2019), common diving petrel (8 islands), sooty shearwater (6 islands), Antarctic prion (5 islands), white-chinned petrel (3 islands), and grey-backed storm-petrel (Adams Island only). Four petrel species were found breeding on the main island, with Antarctic prions common around Ranui Cove and out to Crozier Point (McEwen 2006). A white-faced storm petrel colony near the Ranui Cove station was discovered after a cat was startled from a corpse on 2 Nov 1942 (McEwen 2006). Two common diving petrels were found on eggs (north of Chambers Inlet on 30 Nov 1943, Robert Falla; and near Erebus Cove on 5 Dec 1943, Ron Balham), and Lou Seabeck found a hatched eggshell identified as that of a grey-backed storm petrel on a ledge in Crab Bay, Carnley Harbour, on 13 Jan 1943 (McEwen 2006).

Southern royal albatrosses were found breeding on Enderby Island for the first time since 1840, with three chicks reported by the crew of the *Ranui* in June 1942 (McEwen 2006). The identity of the mollymawk species breeding at the Auckland Islands (as white-capped mollymawk) was finally resolved at South West Cape on 22 Jan 1943 (Laurie Pollock diary, held by DOC Invercargill) and on Disappointment Island on 9 Dec 1944 (Turbott 2002). Robert Falla had named this mollymawk (as *Thalassarche cauta stedi*) in 1933, based on specimens collected off Stewart Island by Edgar Stead in 1931 and 1932 (Miskelly 2012). Falla (1933) referred to it as 'the commonest mollymawk in the seas around Stewart Island during the summer months'. Its breeding grounds were unknown at the time; however, Falla (*ibid.*) pointed out that some form of *Thalassarche cauta* bred on Disappointment Island but had 'not yet been correctly identified'.

New species recorded on Disappointment Island during this sole war-time visit were light-mantled sooty albatross, Auckland Island shag, Eurasian blackbird, and common redpoll, and the island was identified as being a major breeding site for white-chinned petrel (Turbott 2002).

Buller's mollymawk (*Thalassarche bulleri*) was

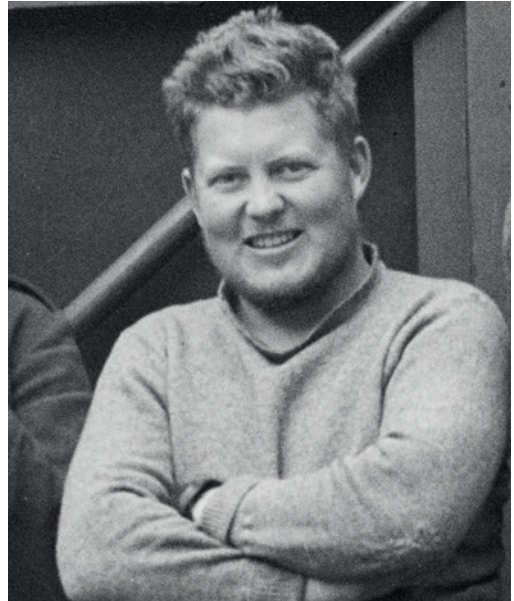


FIGURE 12. Hugh Wenham at Carnley Harbour coastwatching station, Auckland Island, 1945. Image by Allan Eden, courtesy of Richard Nester, Department of Conservation.

identified as a regular winter visitor to Carnley Harbour during 1941–45, and small numbers of subantarctic little shearwaters (*Puffinus elegans*) were recorded off the east coast in most months of the year (Turbott 2002; McEwen 2006). The two species of giant petrel were not recognised as distinct species until 1966 (Bourne & Warham 1966), but sightings of five white morph giant petrels and another bird described as 'very pale' (Turbott 2002; McEwen 2006; Hugh Wenham in Falla archive, ATL) suggest that southern giant petrels (*Macronectes giganteus*) were regular non-breeding visitors as well.

Yellow-crowned parakeets were identified as the predominant parakeet species on the main island, with 34 records identified to species, compared with 9 for red-crowned parakeet. In contrast, the ratio for other islands in the group was 3 yellow-crowned to 20 red-crowned, plus hybrids were recorded on Adams Island (Turbott 2002; McEwen 2006). Two yellow-crowned parakeets and a red-crowned parakeet collected near Ranui Cove Jun 1943–Mar 1944 (NMNZ OR.025565, OR.025576 & OR.025578) were subsequently identified as having orange-fronted

parakeet (*Cyanoramphus malherbi*) mitochondrial DNA (Rawlence *et al.* 2015; Miskelly *et al.* 2020 – Chapter 2).

A small flock of sheep was maintained on Ocean Island as a source of fresh meat, and the regular visits to Ocean Island resulted in discovery of the first active nests of Auckland Island teal, by John Jones and Ron Balham in Dec 1943 (Falla archive, ATL). The Auckland Island rail continued to be a mystery bird, with single possible sightings on Adams Island and Ewing Island in 1942, plus Falla reported nocturnal calls distinguishable from teal and snipe on Ewing Island in 1943 (Falla 1967; McEwen 2006).

Exploration and surveying of the mountain tops and ridge lines on the main island produced the first known banded dotterel nest (and the only breeding record from the main island), west of Chambres Inlet on 30 Sep 1943 (Falla 1978), and small numbers of [Gibson's] wandering

albatrosses breeding between Mt D'Urville and Wilkes Peak (east of Carnley Harbour) and at South West Cape (Turbott 2002; McEwen 2006; Laurie Pollock diary; Falla archive, ATL; Fig. 13). Banded dotterels were also found on the tops of Adams Island (with breeding suspected) and in non-breeding flocks on Enderby Island (Falla 1978; Turbott 2002).

Introduced species recorded from the islands for the first time were common starling (*Sturnus vulgaris*) and common redpoll (Mar 1942), song thrush (*Turdus philomelos*; Apr 1942), skylark

FIGURE 13. Coastwatchers with an almost-fledged Gibson's wandering albatross on the ridge north-east of Tagua Bay, Auckland Island, 21 January 1943. From left: Jack Trigger, Laurie Pollock, Geoff Prichard, and Alister Duthie. Image by Charles Fleming. National Library of New Zealand, PA1-q-955-20-1532.



(*Alauda arvensis*) and chaffinch (*Fringilla coelebs*) (Sep 1942), house sparrow (*Passer domesticus*; Feb 1943), and dunnock (*Prunella modularis*; May 1947), with breeding confirmed for common starling, common redpoll, house sparrow, chaffinch, and song thrush. Other vagrant species recorded for the first time were little shag (*Phalacrocorax melanoleucos*; Jun 1942), welcome swallow (*Hirundo neoxena*; first record for New Zealand, Ranui Cove, Jun 1943), swamp harrier (*Circus approximans*; Jun 1943), Australasian shoveler (*Anas rhynchotis*; Oct 1943), Arctic tern (*Sterna paradisaea*; Nov 1943), fairy prion (*Pachyptila turtur*; 1943), turnstone (*Arenaria interpres*) and Pacific golden plover (*Pluvialis fulva*) (Feb 1944), and grey petrel (*Procellaria cinerea*; May 1947). Further detail for all species is given in Miskelly *et al.* (2020 – Chapter 2). Robert Falla's notebook entry for 5 Jun 1943 includes 'N.B. One swallow doesn't make a summer' (Falla archive ATL).

The year-round presence of the coastwatchers provided opportunities for long-term studies of chick growth rates (e.g. of Auckland Island shag, southern royal albatross, and Gibson's wandering albatross) and seasonal plumage and facial colour changes in Auckland Island shag and tomtit. However, apart from Fleming's (1950) description of the absence of sexual dimorphism in Auckland Island tomtits, and publication of raw data collected by Charles Fleming (McEwen 2006) and Graham Turbott (2002), these data have not been interpreted or published (see Falla archive in ATL, and Turbott logbooks in Auckland Museum).

New Zealand museum and government research expeditions, 1954–78

Peter Bull and Rowley Taylor of the Animal Ecology Section, DSIR, and Dick Dell from the Dominion Museum spent 4 days on Enderby Island, and also landed on Rose Island, in Mar 1954 while the *Holmlea* was en route to Macquarie Island for a medical evacuation (R. Taylor 2018). Their primary focus was a study of the rabbit populations established on each island; however, their report listed several migrant wader species from Enderby Island (ANARE [Australian National Antarctic Research Expeditions] to Enderby Island (Auckland Islands), Bull *et al.* report in Falla archive ATL; Miskelly *et al.* 2020 –

Chapter 2). Among these were the first records of lesser knot (*Calidris canutus*), and a flock of c. 30 banded dotterels included 'one slightly smaller dotterel which was rather paler above and with somewhat different coloured legs (pale greenish)' that is likely to have been of the nominate subspecies *Charadrius bicinctus bicinctus*, i.e. a vagrant from the New Zealand mainland (see Pierce 1980 for the only subsequent record).

The Nov 1954 DSIR expedition was led by Robert Falla of the Dominion Museum and was based in Port Ross, apart from a few hours ashore at Fairchild's Garden, Adams Island (Falla 1975a). Many of the bird records of the expedition are contained in an unpublished report by Kazimierz Wodzicki and Rowley Taylor of the Animal Ecology Section, who again focused their attention on rabbits on Rose and Enderby Islands. A copy of their report is in the Falla archive, ATL, along with Falla's own notes. The only additional species record was a shining cuckoo, seen by Robert Falla on Ocean Island.

The 1962–63 expedition was again led by Robert Falla, and was based at Ranui Cove from 26 Dec to 20 Jan (Falla 1975b). Brian Bell of the Wildlife Branch of Internal Affairs was a member of the team; bird records from the expedition are held by the Bell family (accessed courtesy of Elizabeth Bell) and in the Falla archive, ATL. Notable records included the first breeding record of northern giant petrels in Port Ross since 1840 (three chicks on Ocean Island on 28 Dec 1962), and white-faced storm petrels found ashore on Ocean and Ewing Islands (Bell and Falla archives). Four vagrant or colonising bird species were recorded for the first time, with an Australasian gannet (*Morus serrator*) offshore (Kinsky 1969), several sightings of at least two mallards (*Anas platyrhynchos*) on the coast of the main island, and two red-necked stints (*Calidris ruficollis*) and a black-tailed godwit (*Limosa limosa*) on Enderby Island (Brian Bell, unpublished report).

Elliot Dawson from the New Zealand Oceanographic Institute, DSIR, landed on Enderby Island on 18 Jan 1964, finding bones of a New Zealand raven (*Corvus antipodum*) and an Auckland Island rail in the dunes at Sandy Bay (Dawson 1964, 2020 – Chapter 8), and the skull of a broad-billed prion (*Pachyptila vittata*) apparently from a skua midden (Te Papa specimen OR.026363).

The Jan-Feb 1966 expedition was organised jointly by the Dominion Museum and the Botany Division of DSIR, with Robert Falla leading the Port Ross team and Eric Godley from Botany Division leading a team of seven men who camped at Magnetic Bay on Adams Island for 3 weeks (Falla 1975c). The find of the expedition was an Auckland Island rail, first seen inside the Adams Island kitchen tent on 24 Jan and caught in an improvised trap made by Brian Bell on 30 Jan (John Kendrick notebook). It was brought back to the mainland and kept at Mt Bruce Native Bird Reserve until 1975 (Fig. 14). The specimen is in the Te Papa collection (OR.O18929), and remains the only known study skin of the species, as the type specimen is presumed to have been destroyed during the Second World War (Falla 1967). Entomologist Ron Ordish also found the first known nest of subantarctic snipe, on Ewing Island (Miskelly, Walker *et al.* 2006).

The 1972-73 Auckland Islands Expedition was

a large multi national expedition sponsored by the Outlying Islands Reserves Committee. Led by Brian Bell of the Wildlife Service, Internal Affairs, the 28 personnel were based at multiple sites around the islands from 30 Nov 1972 to 28 Feb 1973 (Yaldwyn 1975). A total of 1576 bird records was contributed by 27 personnel, including five staff from the Wildlife Service, and crew members from the *Acheron* and *St Michael*. More than a third of the observations were recorded by a young wildlife trainee Rodney Russ, who would return to the Auckland Islands numerous times after he founded the ecotourism company Heritage Expeditions in the early 1990s. More than 150 bird specimens and skeletal remains were collected, with 123 deposited in the National Museum (now Te Papa), 22 in the Canterbury Museum, and the remainder taken to the United States and Australia by expedition members Milton Weller (Iowa State University), Peter Connors (University of California), and Gerry van Tets (CSIRO Division of Wildlife Research, Canberra) (Yaldwyn 1975).

Comprehensive boat support allowed landings on most of the islands in the group, including Beacon Rock, where Cape petrels were a new breeding record (Bell 1975). Two landings on Disappointment Island resulted in the discovery of snipe there (including an egg being found), and

34

FIGURE 14. The Auckland Island rail captured on Adams Island in 1966, photographed while in captivity at Mt Bruce, Wairarapa. Image: Rod Morris, © Department of Conservation.



at least one pair of erect-crested penguins apparently breeding among the eastern rockhopper penguins on Disappointment Island. Snipe were observed on Enderby Island for the first time since 1891, a black-bellied storm petrel was found on an egg on Rose Island (R. Taylor, *pers. obs.*) and fulmar prions were found on Ewing Island (although breeding was not confirmed).

Much effort was put into counting and banding large albatrosses, mainly on Adams Island but also on Enderby Island, plus two southern royal albatross pairs were found nesting on northern headlands of Auckland Island. Total counts or estimates were 7,250 pairs of [Gibson's] wandering albatross, and 34 pairs of southern royal albatross, although it was noted that only about half the adult population breeds per annum (Robertson 1975). A small colony of white-capped mollymawks was found east of Logan Point on Adams Island, and the total population was estimated at more than 64,000 pairs, with 93% of the population on Disappointment Island (Robertson 1975). Eastern rockhopper penguin colonies were mapped on the main island, with 5,000 to 10,000 pairs estimated (Bell 1975).

Milton Weller undertook a study of foraging ecology and behaviour of Auckland Island teal on Ewing Island (Weller 1973, 1975), and Gerry van Tets studied Auckland Island shag breeding ecology and behaviour on Enderby Island (van Tets 1974, 1975). An unsuccessful search was made for the Auckland Island merganser (G.R. Williams & Weller 1974). Four new vagrant species were recorded during the expedition: king penguin (*Aptenodytes patagonicus*; Enderby and Adams Islands), Salvin's mollymawk (*Thalassarche salvini*; Port Ross), curlew sandpiper (*Calidris ferruginea*; Tandy Inlet), and sharp-tailed sandpiper (*C. acuminata*; Enderby Island).

Robert Falla was not a member of the 1972–73 expedition; however, he received a knighthood during this period for outstanding services to conservation (Atkinson 2001: 47). Falla returned to the Auckland Islands two further times in 1978, the first as a guest of Alex & Colleen Black on the *Acheron* in January, during which Falla, Rowley Taylor, and Colleen Black landed on Dundas Island (Falla *et al.* 1979). Falla and Taylor also recorded a fulmar prion fledgling on Monumental Island (20 Jan), and the first black shags (*Phalacrocorax*

carbo) from the islands, with up to nine birds seen at each of four sites (R. Taylor, *pers. obs.*; Falla archive, ATL). During Nov–Dec 1978, the New Zealand navy provided logistic support to the joint Department of Lands and Survey and Wildlife Service 'Bounty-Antipodes-Auckland-Snares' (BAAS) expedition, which had a primary focus on the then rarely visited Bounty and Antipodes Islands (Robertson & van Tets 1982; Imber 1983). Sir Robert travelled as a guest on the frigate HMNZS *Waikato*, and was at the Auckland Islands during 22–23 Nov. His last notable records from the islands (at age 77) included flocks of 60–70 turnstones put up by the helicopter he was in while over both Dundas and Ewing Islands, and also along the south coast of Enderby Island (Falla archive, ATL).

New Zealand sea lion researchers, 1975–2018

Research into New Zealand sea lion population dynamics, and their interactions with fisheries, has been undertaken almost annually on Enderby Island since soon after the 1972–73 expedition. In recent years the programme has also included frequent stays on Dundas Island, and day visits to Figure of Eight Island. Observations on other wildlife have been sporadically recorded by sea lion research teams over the 40+ years that the programme has run, with most observations sourced from Martin Cawthorn (1975–91), sea lion research team diaries held by the DOC National Office Marine Unit (1997–2016), and the current Enderby Island hut log (2008–17).

Although primarily focused on sea lions, the team has undertaken ongoing monitoring of the size of the southern royal albatross breeding colony (Childerhouse *et al.* 2003; G.B. Baker *et al.* 2020 – Chapter 10), and of the number of yellow-eyed penguins using Sandy Bay to access breeding sites (Chilvers 2014; Muller *et al.* 2020 – Chapter 9). In addition, Pinpimai *et al.* (2018) reported on *Klebsiella pneumoniae* bacterial isolates from faecal samples from two subantarctic skuas and a yellow-eyed penguin collected on Enderby Island (*Klebsiella* infection is a major cause of mortality in sea lion pups on Enderby Island).

The range of habitats present on Enderby Island, and the regular presence of observers, has resulted in the island being the site for many

'first' records for the archipelago (see also under *Ecotourism visits* below). Species first noticed by sea lion team members (all on Enderby Island) were chestnut-breasted shelduck (*Tadorna tadornoides*; Apr 1983), spur-winged plover (*Vanellus miles*) and chinstrap penguin (*Pygoscelis antarctica*) (Jan 1985), pukeko (*Porphyrio melanotus*; Jan 2011), and South Island pied oystercatcher (*Haematopus finschi*) and Australian coot (*Fulica atra*) (Feb 2012). Notable sightings on Dundas Island include a colour-banded Auckland Island teal (probably from Ewing Island, 4.8 km away) in Feb 1998, and a snipe in Feb 1999.

Port Ross islands, 1980–98

Several experienced ornithologists were able to visit islands in Port Ross during 1980–98. These included Ray Pierce studying the foraging ecology of Auckland Island banded dotterels on Enderby Island in Apr 1980 (Pierce 1980), and Murray Williams and colleagues studying Auckland Island teal population sizes, breeding ecology and behaviour on Rose Island (Feb 1982, Apr 1983, Dec 1991, Nov 1996), Enderby Island (Feb–Mar 1982, Dec 1991–Feb 1992), Ewing Island (Mar 1982, Apr 1983, Dec 1991–Jan 1992), and Ocean Island (Mar 1982, Dec 1991), with many of their findings summarised in M. Williams (1986, 1995). Rowley Taylor revisited Enderby and Rose Islands in Feb 1985, Graeme Taylor surveyed Enderby, Rose, Ocean, and Ewing Islands (and also Disappointment Island) in Feb 1988, Pete McClelland and Peter Moore surveyed Ewing, Enderby, Rose, and Ocean Islands in Nov–Dec 1989 (Moore & McClelland 1990; Moore & Walker 1991; Walker, Moore *et al.* 1991; Moore 1992), and Alan Tennyson surveyed Enderby, Ocean, Ewing, and Dundas Islands in Jun 1998 (Tennyson 1999; Tennyson & Bartle 2005).

Discoveries during this period included the first snipe seen on Rose Island since 1890 (seen in Feb 1985; R. Taylor, *pers. obs.*), a northern royal albatross (*Diomedea sanfordi*) at an empty nest bowl on Enderby Island in Feb 1988 (G. Taylor, *pers. obs.*), banded dotterels breeding on Enderby Island in Nov 1989 (Walker, Moore *et al.* 1991), and the first report of 'hakawai' nocturnal aerial displaying by Auckland Island snipe in Jun 1998 (Tennyson 1999). A northern royal albatross was first detected breeding on Enderby Island (in a mixed pair with a southern royal albatross)

during 1992–93 (Gales 1993). Vagrant species first reported at Port Ross during 1980–98 included grey-tailed tattler (*Tringa brevipes*; Enderby Island, Apr 1980), cattle egret (*Ardea ibis*; Enderby Island, Jun 1983; Te Papa specimen OR.023703), Caspian tern (*Hydroprogne caspia*; Port Ross, Dec 1983; Mayhill & Goulstone 1986), wandering tattler (*Tringa incana*; Enderby Island, Feb 1988), and Canada goose (*Branta canadensis*; Enderby Island, Nov 1989; McClelland & Moore 1991).

A dog previously trained to locate brown teal (*Anas chlorotis*) was used to locate Auckland Island teal and their nests in 1991–92 and 1996, resulting in the finding of 49 nests with eggs on Ewing, Rose, and Enderby Islands (M. Williams 1995 and unpublished report; Miskelly *et al.* 2020 – Chapter 2), compared with a total of four active nests found before 1991.

In search of rails, 1989 and 1993

The Auckland Island rail remained the most elusive and enigmatic of the surviving endemic birds from the time of its discovery through to the 1980s. For more than a century, the only confirmed record with precise locality and date information was the bird caught on Adams Island in Jan 1966. This began to change from Nov–Dec 1989, when a team of five camped on Adams Island for 5 weeks and used specialised traps, play-back of calls, and telemetry to survey for rails (Buckingham *et al.* 1991; Elliott *et al.* 1991). Five birds were caught, 43 were heard, and the first (and so far only) active nest was found, with several hundred birds estimated to be present (Elliott *et al.* 1991).

Graeme Elliott, Pete McClelland, Christopher Robertson, and Kath Walker were the first naturalists to camp on Disappointment Island for more than one night, during 16–26 Jan 1993. Similar survey methods were used for rails as had been used on Adams Island. Rails were confirmed as being present, with several birds heard and seen, and a chick and a juvenile caught (Elliott 2013; Walker *et al.* 2020 – Chapter 5).

The 1989 Adams Island team also estimated numbers of Gibson's wandering albatrosses (formally named as *Diomedea exulans gibsoni* by Christopher Robertson and John Warham in 1992), and counted southern royal albatrosses, yellow-eyed penguins, Auckland Island teal, and Auckland Island banded dotterels (Moore 1990;

Moore & Walker 1990; Buckingham *et al.* 1991; Walker, Moore *et al.* 1991). Species recorded from Adams Island for the first time included mallard, European goldfinch, and common starling.

Adams Island Gibson's wandering albatross research, 1991–2018

The 1989 estimate of 900–1,000 Gibson's wandering albatross chicks on Adams Island was far fewer than the 7,000 pairs estimated in 1972–73 (Robertson 1975; Buckingham *et al.* 1991), and was the catalyst for Kath Walker and Graeme Elliott to initiate a long-term study of the albatross population size and dynamics, including several surveys of the entire island, annual monitoring of survival and reproductive output in one study area, and nest counts in three reference sub-colonies (e.g. Walker, Dilks *et al.* 1991; Walker & Elliott 1999; Elliott & Walker 2005; Elliott *et al.* 2018). The study has also included tracking at-sea distribution of the birds to investigate potential interactions with fishing fleets (Walker *et al.* 1995; Walker & Elliott 2006).

Incidental wildlife observations have been recorded throughout this period in logbooks retained by Kath Walker and Graeme Elliott. The 2,472 Adams Island bird records include details of 30 snipe nests, 12 active falcon nests, 2 grey-backed storm petrel nests, 2 black-bellied storm petrel eggs, and 2 banded dotterel nests. 'Hakawai' aerial displaying by snipe was reported on 14 nights, after first being heard in June 2001 (Miskelly, Bell *et al.* 2006).

Despite the large number of experienced observers who have spent many months on Adams Island over nearly 30 years, very few vagrant bird species have been recorded (Elliott *et al.* 2020 – Chapter 3). The only addition to the Adams Island list since 1989 was a Snares crested penguin (*Eudyptes robustus*) in Feb 2010. This is in stark contrast to Enderby Island in the north of the group, where new vagrant species are regularly recorded (Miskelly *et al.* 2020 – Chapter 2; and next section).

Ecotourism visits, 1992–2018

Modern ecotourism cruises to the Auckland Islands began with the visit of the *Magga Dan* in Feb 1968 (Darby 1970). The *Lindblad Explorer* and *World Discoverer* visited occasionally through

the 1980s (see e.g. Adams & Lockley 1982), and in Dec 1990 a bird-focused cruise around the New Zealand subantarctic islands on the *World Discoverer* was organised in conjunction with the 20th International Ornithological Congress held in Christchurch (Dormon 1991). More regular visits began in 1992, with the first visit by Southern Heritage Expeditions (known as Heritage Expeditions since 1998). The company has visited the Auckland Islands more than 140 times since, with up to nine visits to the Auckland Islands per annum in recent years. Since 1994, Heritage Expeditions has prepared a daily ticklist of all bird and mammal species seen, and has made these available to participants as part of their souvenir trip report. When combined with details from the daily trip narrative, the trip reports from 1992 to 2018 hold close to 6,500 bird records from the Auckland Islands. Enderby Island is the most visited site, along with historic sites on the main island (particularly the Hardwicke settlement site at Erebus Cove, and the coastwatcher stations at Ranui Cove and Tagua Bay). At least 38 visits have also been made to the white-capped mollymawk colony at South West Cape.

Many experienced birdwatchers have travelled to the Auckland Islands with Heritage Expeditions and other tour operators, resulting in sightings of numerous new vagrant species at the group. Unfortunately many of these records exist solely as a species name in the daily bird list (see Miskelly *et al.* 2020 – Chapter 2). New records of birds seen during Heritage Expeditions that are supported by images or other corroborating data include eight species seen at sea around the islands (Antarctic fulmar *Fulmarus glacialisoides*, Nov 1996; Buller's shearwater *Ardenna bulleri*, Mar 1998; Wilson's storm petrel *Oceanites oceanicus*, Feb 1999; black-browed mollymawk (nominate form) *Thalassarche melanophrys*, Nov 1999; soft-plumaged petrel *Pterodroma mollis*, Nov 2000; Cook's petrel *Pterodroma cookii*, Nov 2007; short-tailed shearwater *Ardenna tenuirostris*, Dec 2008; Antarctic petrel *Thalassoica antarctica*, Nov 2011); and eight species seen on Enderby Island (whimbrel *Numenius phaeopus*, Feb 1994; Snares crested penguin, Feb 2000; yellowhammer *Emberiza citrinella*, Nov 2000; spotless crane *Porzana tabuensis*, Nov 2003; sanderling *Calidris alba*, Nov

2007; grey teal *Anas gracilis*, Nov 2011; greenfinch *Carduelis chloris*, Nov 2013; and pectoral sandpiper *Calidris melanotos*, Jan 2015), and two species first seen at South West Cape or nearby Breaksea Point (white-throated needletail *Hirundapus caudacutus*, Jan 1993; and royal penguin *Eudyptes schlegeli*, Feb 1993).

White-capped mollymawks, light-mantled sooty albatrosses, white-chinned petrels, and northern giant petrels, 2006–18

David Thompson and Paul Sagar (National Institute of Water and Atmospheric Research) and colleagues studied white-capped mollymawks at South West Cape during 2006–10, with a focus on tracking their at-sea distribution in relation to commercial fishing activity (Torres *et al.* 2011). This included a day on Disappointment Island (9 Dec 2008) to deploy satellite GPS tags on 15 mollymawks. Barry Baker and colleagues undertook aerial photography of the white-capped mollymawk colonies on Disappointment Island, South West Cape (Auckland Island) and Logan Point (Adams Island) in mid-Dec 2006–10 and mid-Jan 2011–18. Using a helicopter as a platform for photography, the images were used to estimate colony size and changes over time (G.B. Baker *et al.* 2018). During some of the same surveys, attempts were also made to use aerial photography to count Gibson's wandering albatrosses on Disappointment Island in 2014, and light-mantled sooty albatrosses on Adams Island in 2017 (G.B. Baker & Jensz 2014; Rexer-Huber, Walker *et al.* 2020 – Chapter 12).

Kalinka Rexer-Huber and Graham Parker began their involvement with Auckland Islands' seabird research as part of Rexer-Huber's PhD research on white-chinned petrel population size, at-sea distribution, and genetic relationships (Rexer-Huber 2017; Rexer-Huber *et al.* 2017, 2019). Initial surveys on Adams Island Dec 2013–Feb 2014 were followed by 12 days on Disappointment Island (with Paul Sagar) in Jan 2015, and further work on Adams Island (Dec 2015 & 2016), and Ewing Island, Auckland Island (Lindley Point), and Monumental Island (Dec 2015). The Port Ross island burrow counts were combined with a survey of northern giant petrel colonies during 2–4 Dec 2015 (Parker *et al.* 2016). Northern giant petrel counts have

continued annually at some sites (Parker & Bell 2017; Parker *et al.* 2020 – Chapter 13 in this book).

Rexer-Huber and Parker established a white-capped mollymawk study colony at Castaway Bay on Disappointment Island in 2015 (with David Thompson and Paul Sagar), and managed to return there for a few days each subsequent season to band further birds, to search for previously banded birds, and to retrieve geolocator tags fitted to 40 birds in 2016 (Rexer-Huber *et al.* 2018). Parker and Rexer-Huber also continued scan counts of light-mantled sooty albatross sub-colonies on Adams Island (initiated by Walker and Elliott), and tested other potential monitoring methods in 2015, 2017, and 2018 (Rexer-Huber, Walker *et al.* 2020 – Chapter 12). These projects were undertaken while Rexer-Huber and Parker were based on Adams Island contributing to the long-running Gibson's wandering albatross monitoring programme in 2013–19.

Yellow-eyed penguin research, 2006–18

Lisa Argilla investigated the role of the protozoan parasite *Leucocytozoon* sp. in yellow-eyed penguin mortality on Enderby Island during the 2006–07 and 2008–09 breeding seasons (Argilla *et al.* 2013). During the second season, Mel Young investigated patterns in colony visitation of the penguins in order to aid timing and interpretation of annual beach counts at Sandy Bay (Young 2009; Chilvers 2014). Searches for yellow-eyed penguin landing sites were undertaken along most of the accessible coastline of the group in Nov 2009, and in 2012–14, along with departure and arrival counts at the most-used sites (Beer 2010, and unpublished reports held by DOC Invercargill Office). Chris Muller searched extensively for nests on Enderby Island during 2015–18, comparing the efficiency of ground searching versus aerial radio telemetry in finding nests (Muller *et al.* 2019).

Ground-truthing of the relationship between number of nests and arrival and departure rates of adults on Enderby Island was used to interpret the 2012–14 shoreline counts at other sites in order to estimate the total yellow-eyed penguin population on the Auckland Islands (Muller *et al.* 2020 – Chapter 9). Data were also collected on yellow-eyed penguin diving and foraging, but these

are still being analysed (C. Muller, *pers. comm.* to CMM, 8 Mar 2019).

Rebecca French investigated yellow-eyed penguin behaviour in relation to human disturbance on Enderby Island in 2016–17, and found that the current ecotourism guidelines for permissible approach distances are insufficient to prevent disturbance of this timid species (French *et al.* 2018).

Southern right whale surveys, 2010 and 2012

University of Otago surveys for southern right whales (*Eubalaena australis*) in Port Ross in Aug 2010 and Jul–Aug 2012 provided rare modern-era opportunities for bird observations in winter on the Auckland Islands, including an analysis of Auckland Island shag diet (Lalas & McConnell 2012). Among the birds encountered was a little black shag (*Phalacrocorax sulcirostris*) photographed by Hiltrun Ratz in Aug 2012.

Petrel and snipe surveys on small islands, 2013–18

Kerry-Jayne Wilson and colleagues surveyed Masked and Figure of Eight Islands for petrels in Dec 2013 (K.-J. Wilson *et al.* 2018), and Fischer *et al.* (2017) searched for South Georgian diving petrels on Enderby Island in Dec 2016 but failed to find evidence of them persisting there. Colin Miskelly and Alan Tennyson (both from Te Papa) undertook surveys for burrow-nesting petrels on Enderby, Disappointment, Rose, Ewing, Ocean, Friday, Frenchs, Shoe, Davis, Dundas, Figure of Eight, Masked, and Monumental Islands in Jan 2018 (e.g. Miskelly *et al.* 2019), and collected blood samples from snipe on Disappointment, Rose, Enderby, and Ewing Islands to compare relationships of snipe throughout the archipelago (Shepherd *et al.* 2020 – Chapter 16). Alan Tennyson and others also collected further exposed subfossil bird bones from the dunes behind Sandy Bay on Enderby Island (Tennyson 2020 – Chapter 7 in this book). New discoveries in 2018 included Auckland Island banded dotterels breeding on Rose Island, fulmar prion fledglings in burrows on Ewing and Disappointment Islands, and a black-bellied storm petrel on an egg on Enderby Island.

Synthesis of 212 years of ornithological discovery and research in the Auckland Islands

Patterns of visitation and bird records

Knowledge of the Auckland Islands birds accumulated slowly for the first 135 years after discovery of the islands, with an initial peak of 102 unique bird records (and 19 new species records) due to the three French, United States, and British exploration expeditions in 1840 (Fig. 15). Lesser peaks of 66–75 records during 1901, 1904, and 1907 were due to the activities of the Earl of Ranfurly, Robert Falcon Scott's *Discovery* expedition, and the Philosophical Institute of Canterbury (Ogilvie-Grant 1905; Chilton 1909; Wilson 1966).

The most intense period of activity was during the Cape Expedition coastwatching era (1941–47), followed by the 1972–73 expedition. The third and final peak in Fig. 15 was due to the 2018 Te Papa expedition generating 776 records in addition to the annually increasing 'baseline' of c. 330 records generated by Heritage Expeditions and the research teams based on Adams and Enderby Islands during the 2017–18 summer. Other prominent peaks in activity were generated by the 1954, 1962–63, 1966, and 1989 expeditions.

Modern-era visits to the Auckland Islands have occurred almost entirely during summer (Nov–Mar), in contrast to the year-round presence of war-time Cape Expedition members (Fig. 16). Despite the shortened day-lengths, poor winter weather conditions, and the absence of many migratory seabird species, the Cape Expeditioners recorded 2,681 unique bird records during Mar–Oct 1942–45.

The spatial distribution of bird records has also changed over time (Table 4). Overall, a disproportionately high proportion of bird records were from the smaller islands, due to relatively greater search efforts there plus the greater abundance of birds on the small islands in the absence of cat and pig predation. This effect was partially masked during the Second World War, when coastwatchers were based at two stations on the main island, and the map-surveying team spent much time establishing trig points

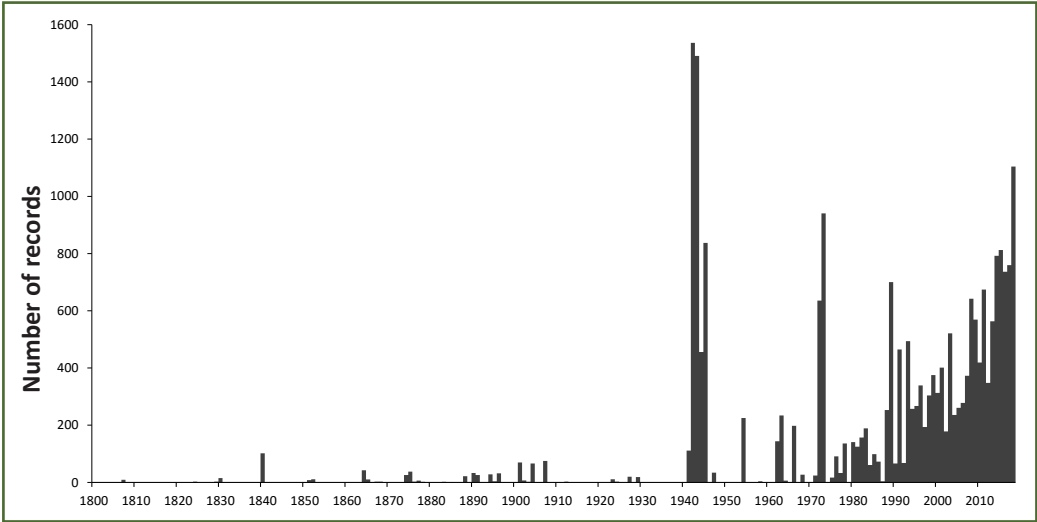


FIGURE 15. Number of bird records per annum at the Auckland Islands, 1807–2018.

40

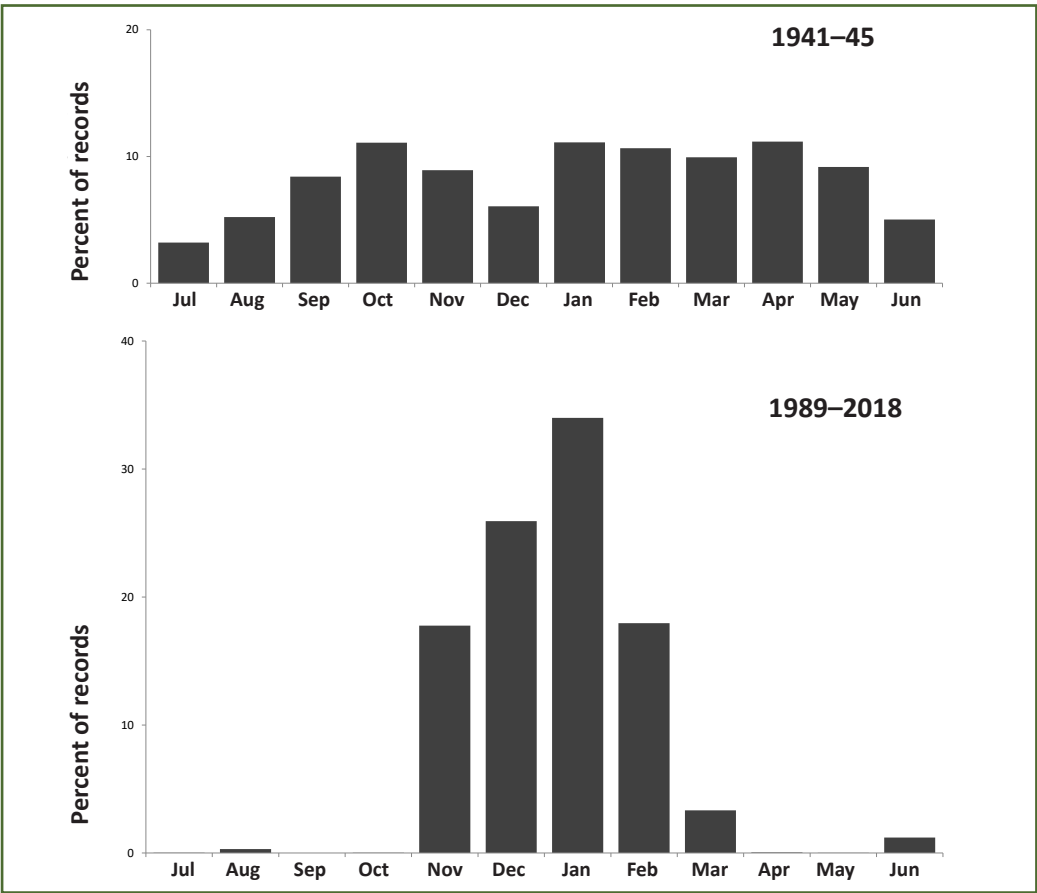


FIGURE 16. Seasonal spread of bird records at the Auckland Islands during the war-time coastwatching era (above) compared with the past three decades (below).

on the higher peaks on Auckland Island. During the 1940s, 61% of 'land-based' bird records were from the main island, which makes up 81% of the group's land area. However, over the past three decades only 12% of bird records were from the main island (Table 4; Fig. 17). In contrast, the ongoing albatross research programme on Adams Island generated 33% of land-based bird records

from 17% of the land mass, while ecotourism visits plus sea lion researchers on Enderby Island recorded 43% of land-based bird records from only 1.2% of the land mass. The high proportion of records from 12 ha Ocean Island during the Second World War was due to frequent visits to tend the flock of sheep used to supply fresh meat to the nearby Ranui Cove station.

TABLE 4. Changes in the spatial distribution of Auckland Islands bird records over time. Data presented are for land-based sightings only, and exclude records that cannot be attributed to a single island.

Island	Island area		Total land-based bird records		1941–47 bird records		1989–2018 bird records	
	ha	%	Count	%	Count	%	Count	%
Auckland I	45,889	80.9	3,988	23.7	1,887	60.5	1,171	12.0
Adams I	9,693	17.1	4,003	23.8	291	9.3	3,177	32.5
Enderby I	695	1.2	5,745	34.1	231	7.4	4,233	43.3
Disappointment I	284	0.5	544	3.2	18	0.6	370	3.8
Rose I	78	0.1	634	3.8	94	3.0	191	2.0
Ewing I	58	0.1	728	4.3	142	4.6	315	3.2
Ocean I	12	0.02	592	3.5	327	10.5	78	0.8
Other	24	0.04	613	3.6	128	4.1	234	2.4
Total	56,733		16,847		3,118		9,769	

41



FIGURE 17. Auckland Island, looking north over Norman Inlet to the head of Smith Harbour, with the base of Falla Peninsula on the right. Image: James Russell, March 2019.

Bird records contributed by women

Few women had the opportunity to research, observe, and report birds at the Auckland Islands until recent decades. Overall, women contributed about 11% of records up to 2018, with less than 2% of records during 1807–1988 and 17% of records since then (Fig. 18). Abby Morrell (1833) was the first woman to report birds at the Auckland Islands, describing species seen and heard from the deck of the trading schooner *Antarctica* in Carnley Harbour in Dec 1829. The only other nineteenth-century female voice was from the 1890 diary of Ethel Richardson, written while travelling aboard the government steamer *Hinemoa* and published more than 120 years later (Cass 2014).

Marie Darby contributed 27 records in Feb 1968 while working as a lecturer and guide on the pioneering ecotourism vessel *Magga Dan* (Darby 1970), and the Hamilton-based amateur malacologist and ornithologist Pauline Mayhill contributed 70 records during a private expedition in Dec 1983 (Mayhill & Goulstone 1986). Kath Walker was the pioneer of women’s involvement in ornithological research on the Auckland Islands in the modern era, contributing 230 bird records as a member of the 1989 Adams Island expedition (Fig. 18). Walker has visited the islands 16 times since, contributing a total of 720 records, followed by the 337 records by Kalinka Rexer-Huber during her six research visits during 2013–19. Kath Walker and Graeme Elliott have also provided opportunities

for many other women to participate in their long-running albatross research programme on Adams Island. Elsewhere in the group, Louise Chilvers, Jo Hiscock, and Sandy King have organised surveys of yellow-eyed penguins and Auckland Island shags, and Lisa Argilla, Mel Young, and Rebecca French have studied different aspects of yellow-eyed penguin biology, behaviour, and parasitology on Enderby Island.

Discovery and naming of endemic and near-endemic taxa

Eight endemic bird species or subspecies are recognised from the Auckland Islands, with an additional four subspecies that are (or were) found on the Auckland Islands and each occur on one other southern island or island group (Table 5). Several of these taxa are similar to other related taxa, and as a consequence were recognised as being present on the Auckland Islands long before the endemic taxon was named. For example, several explorers and shipwreck survivors reported shags or cormorants (sometimes referred to as ‘widgeon’) at the Auckland Islands from 1807 onwards, with hundreds of birds shot or snared and eaten. However, the Auckland Island shag was described only in 1888, based on specimens received from Joseph Burton, Colonial Museum taxidermist, in 1885 (Buller 1888). Burton travelled to the islands on the *Hinemoa* in 1880, where he collected specimens of merganser, teal, and ‘a series of shags’ (Hector 1881; Oliver 1955). Similarly, the tomtit was

42

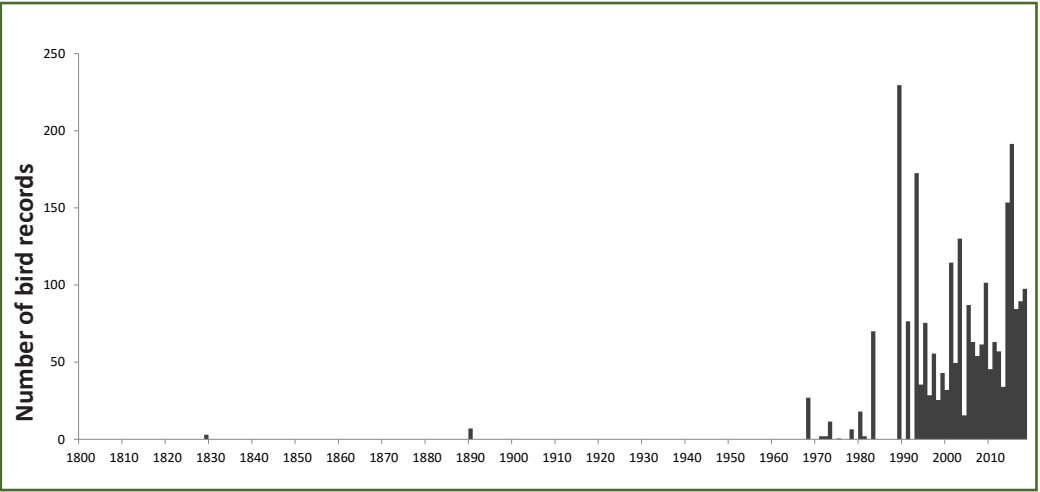


FIGURE 18. Auckland Islands bird records contributed by women, 1807–2018.

TABLE 5. Discovery and naming of endemic and near-endemic bird taxa on the Auckland Islands. The pipit, mollymawk, prion, and diving petrel each have a population on one other southern island or island group. The merganser is considered to have been extinct since 1902, and the South Georgian (Whenua Hou) diving petrel has not been confirmed present at the Auckland Islands since 1943.

Taxon	Reported	Collected	Named
Auckland Island merganser <i>Mergus australis</i>	Mar 1840	Mar 1840	<i>Mergus australis</i> Hombron & Jacquinot, 1841
Auckland Island snipe <i>Coenocorypha aucklandica aucklandica</i>	Oct–Dec 1807	Mar 1840	<i>Gallinago aucklandica</i> G.R. Gray, 1845
Auckland Island teal <i>Anas aucklandica</i>	Oct–Dec 1807	Nov 1840	<i>Nesonetta aucklandica</i> G.R. Gray, 1845
Auckland Island pipit <i>Anthus novaeseelandiae aucklandicus</i>	Oct–Dec 1807	Nov 1840	<i>Anthus aucklandicus</i> G.R. Gray, 1862
Auckland Island shag <i>Leucocarbo colensoi</i>	Oct–Dec 1807	1874–75	<i>Phalacrocorax colensoi</i> Buller, 1888
Auckland Island rail <i>Lewinia muelleri</i>	Jun 1864?	unknown	<i>Rallus muelleri</i> Rothschild, 1893
Auckland Island tomtit <i>Petroica macrocephala marrineri</i>	Mar 1840	Nov 1840	<i>Myiomoira macrocephala marrineri</i> Mathews & Iredale, 1913
White-capped mollymawk <i>Thalassarche cauta steadi</i>	Jan 1890	Mar 1943	<i>Thalassarche cauta steadi</i> Falla, 1933
Auckland Island banded dotterel <i>Charadrius bicinctus exilis</i>	Nov 1840	Oct 1943	<i>Charadrius bicinctus exilis</i> Falla, 1978
Gibson's wandering albatross <i>Diomedea antipodensis gibsoni</i>	1886	Jan 1901	<i>Diomedea exulans gibsoni</i> Robertson & Warham, 1992
Lesser fulmar prion <i>Pachyptila crassirostris flemingi</i>	Jan 1943	Jan 1943	<i>Pachyptila crassirostris flemingi</i> Tennyson & Bartle, 2005
Whenua Hou diving petrel <i>Pelecanoides georgicus whenuahouensis</i>	Oct 1943	Nov 1840	<i>Pelecanoides whenuahouensis</i> Fischer, Debski et al., 2018

first collected in 1840 but was not named as an endemic subspecies until 1913 (Mathews & Iredale 1913).

G.R. Gray (1862) described a new species of pipit (*Anthus aucklandicus*) based on birds collected by the 1840 *Erebus & Terror* expedition, with the delightful, if unconvincing, diagnosis ‘Probably a distinct species from the former one [*A. novaeseelandiae*], with a triflingly larger foot.’ The subspecies *A. novaeseelandiae aucklandicus* is now recognised as occurring on the Auckland and Campbell Islands (Turbott 1990; Gill et al. 2010).

McCormick saw a ‘ringed plover’ on Friday Island in 1840 (unpublished diary; New Zealand National Library Micro-MS-Coll-20-2665), and

Reischek (1889a) saw ‘the banded dotterel’ on Adams Island in 1888; however, the first specimens were not collected until Oct 1943 (Adams Island) and Apr 1944 (Enderby Island). Oliver (1955) recognised the bird as distinct, and described a male collected on Adams Island in Aug 1944 under the name “Auckland Islands banded dotterel *Charadrius bicinctus* subsp.”, but it was another 23 years before Falla (1978) proposed the name *C. bicinctus exilis* for the bird.

All large albatrosses breeding on the Auckland Islands were referred to as ‘wandering albatross *Diomedea exulans*’ before the royal albatross became widely accepted as a separate species in the 1890s. Lesson (1825) had proposed the name

'*epomophora*' for a bird from an unknown locality (probably Australian waters; Gill *et al.* 2010). However, Lesson's name was overlooked by Buller (1891) when he proposed the new name *Diomedea regia* for the large, white-plumaged birds breeding on Campbell Island (now southern royal albatross *D. epomophora*) to distinguish them from the '*Diomedea exulans*' from the Auckland Islands. The southern royal albatrosses breeding on Enderby Island had been extirpated around the time of the Maungahuka and Hardwicke settlements, and so in 1891 the typical large albatross known from the Auckland Islands was the form of wandering albatross breeding on Adams Island (Reischek 1889b; Buller 1891). Once the distinction between [southern] royal albatross and wandering albatross was understood, it was recognised that New Zealand wandering albatrosses were smaller and darker than those breeding south of the Polar Front around the Southern Ocean, and that there were further differences in plumage and the timing of egg-laying between the Auckland and Antipodes Islands populations (Reischek 1889b; Chapman 1891; Oliver 1930, 1955; Robertson & Bell 1984; Marchant & Higgins 1990). Robertson & Warham (1992) proposed names for the two populations, with *Diomedea exulans gibsoni* coined for the form breeding on Adams, Disappointment, and Auckland Islands (based on type specimens collected on Adams Island in 1973 and 1985); additional measurements were published in Robertson & Warham (1994).

A 'small-billed' form of fulmar prion was discovered breeding on islands in Port Ross by members of the Cape Expedition, with birds found on Ocean Island (Jan & Mar 1943) and Rose Island (Nov 1943). Robert Falla was involved in these discoveries, and recognised the birds at the time as being fulmar prions (*Pachyptila crassirostris*) (see McEwen 2006). Falla was a member of the Ornithological Society of New Zealand's founding Checklist Committee, which surprisingly did not mention fulmar prions breeding at the Auckland Islands in their inaugural checklist (Fleming 1953), although shortly afterwards Oliver (1955) included the Auckland Islands among the breeding sites for *Pachyptila crassirostris crassirostris*. The Auckland Islands birds were included under lesser fulmar prion *P. crassirostris eatoni* in the second checklist (Kinsky 1970), and under *P. crassirostris*

crassirostris in the third checklist (Turbott 1990), which did not accept the subspecies *eatoni* (which the Checklist Committee considered to be a junior synonym of fairy prion *P. turtur*, see below).

Gregory Mathews (1912) proposed the name *Pseudoprion turtur eatoni* based on a specimen from Kerguelen Island in the southern Indian Ocean. Falla (1937) believed that five birds that he found skua-killed on nearby Heard Island in 1929 belonged to the same taxon, which he subsequently suggested (Falla 1940) should be a subspecies of *Pachyptila (Pseudoprion) crassirostris* (Mathews 1912), following on from Fleming's (1939) Chatham Island work revealing that *turtur* and *crassirostris* should both be regarded as full species. Harper & Rowlett (1983) alluded to the type of '*P. crassirostris eatoni*' having been incorrectly identified, and Tennyson & Bartle (2005) presented evidence that the bird was a form of fairy prion *Pachyptila turtur*, and therefore the name could not be used for any fulmar prion population. As no name had been applied to the form of fulmar prion breeding at the Auckland Islands and Heard Island, Tennyson & Bartle (2005) proposed *Pachyptila crassirostris flemingi* based on type specimens collected on Ewing Island in 1973. The name honoured Sir Charles Fleming, who ironically never saw the Auckland Islands birds in the field, as he was based in Carnley Harbour when the birds were discovered, and completed his tour of duty a month later (McEwen 2006).

The 1840 British expedition collected two species of diving petrel at Port Ross, though only one species was recognised initially, named as *Pelecanoides urinatrix* by Gray (1845). Salvin (1896) recognised two forms among the specimens collected in 1840, assigning an adult and a chick to *P. urinatrix*, and an adult collected by Lieutenant Alexander Smith (senior mate of the *Erebus*) to *P. exsul*, which he characterised as having grey underwing coverts (cf. white in his *P. urinatrix*). At some date between 1939 and 1966, Robert Falla identified the 1840 expedition '*urinatrix*' specimens as being South Georgian diving petrels *P. georgicus* (based on Falla's undated annotations to specimen labels, and Falla *et al.* 1966). Fleming (1953) included the cryptic comment that '*Auckland Island [P. georgicus] records are by R. A. Falla (unpublished)*' without elaborating whether Falla knew of the 1840 Enderby Island specimens

(in addition to the 1943 Dundas Island specimen) before then.

South Georgian diving petrels were discovered breeding on Codfish Island/Whenua Hou in 1978 (Imber & Nilsson 1980). Fischer *et al.* (2018) concluded that these birds were the same taxon as the extinct Auckland Island population, and that they were phenotypically distinct from all other populations. They suggested a new species name *Pelecanoides whenuahouensis*, with adult specimens from Enderby Island (1840) and Dundas (1943) included among the paratypes (Fischer *et al.* 2018; note that the Dundas Island collection date is given as 1840 in error). The IOC World Bird List (2019) database recognises the taxon as a subspecies of *P. georgicus*.

The discovery and naming of the merganser, snipe, teal, rail, and white-capped mollymawk were described earlier in this review. The first four taxa are considered endemic to the Auckland Islands (see M. Williams *et al.* 2014 regarding the merganser), with the mollymawk breeding also on Bollons Island, Antipodes Islands (Tennyson *et al.* 1998).

Cumulative total of species recorded

We recognise 123 bird species as recorded from the Auckland Islands (Miskelly *et al.* 2020 – Chapter 2; and Fig. 19). The largest increments in the cumulative species total occurred as a result of the three expeditions that visited in 1840 (13 additional species recorded) and during the 1941–47

Cape Expedition (19 additional species recorded). Records of new vagrant species have accumulated at a mean rate of 0.9 new species per annum for the past 30 years, with no indication that an asymptote has been reached. It is likely that many more vagrant species reached the Auckland Islands during this period, but these additional reports lack verification (Appendix 1 in Miskelly *et al.* 2020 – Chapter 2).

Discovery of albatross colonies

Confusion over albatross names contributed to similar confusion over when (and where) the various species were discovered breeding at the Auckland Islands. Several authorities attributed the discovery of wandering albatrosses breeding at the Auckland Islands to the 1840 Ross expedition (Oliver 1930, 1955; Watola 2008); however, all of the confirmed records of large albatrosses breeding in the Port Ross area (the only site visited by the 1840 expeditions) have been of royal albatrosses. These include two southern royal albatrosses and many eggs collected on Enderby Island by Robert McCormick on 30 Nov 1840 (referred to as *Diomedea regia* by Salvin 1896). Unfortunately the identity of the single large albatross found nesting on the Hooker Hills in 1874–75 by Hermann Krone (1900) is unknown. This is the only known record of a *Diomedea* albatross breeding at the north end of the group between 1840 (Ross expedition) and 1942, when Cape Expedition members found that southern

45

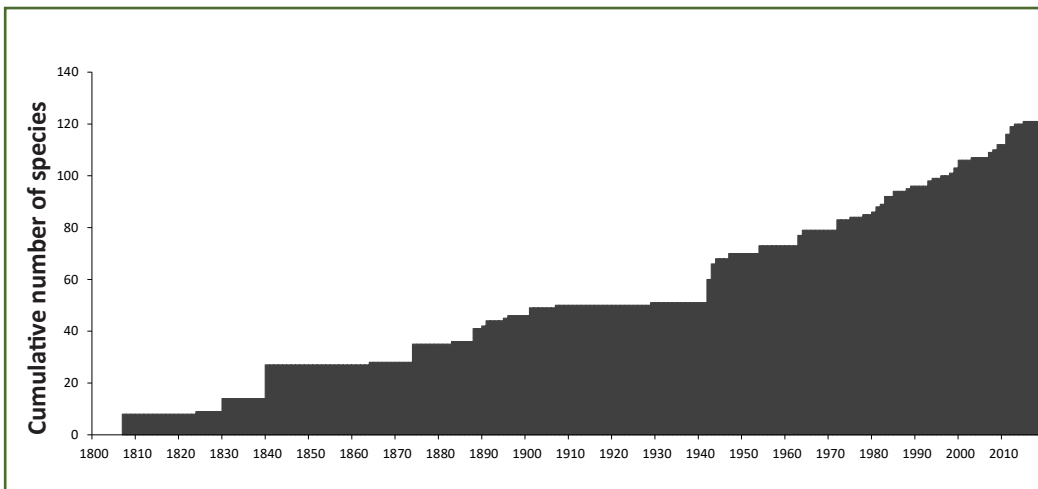


FIGURE 19. Cumulative total number of bird species recorded from Auckland Islands, 1807–2018.

royal albatrosses had recolonised Enderby Island (McEwen 2006). However, Sanguilly (1869) implied that albatrosses were nesting and were hunted on Enderby Island by survivors of the *General Grant* shipwreck in 1866–67 (although the term ‘albatross’ may have referred to giant petrel, light-mantled sooty albatross, or other large seabirds). Southern royal albatrosses were found breeding at two sites on the main island just north of the Hooker Hills in 1972–73 (Robertson 1975).

The first description of large albatrosses breeding on Adams Island was by Andreas Reischek (1889a, b) following his visit in Jan 1888. Reischek’s accounts were clearly of Gibson’s wandering albatrosses, as the eggs were fresh (and edible) on 25 Jan whereas southern royal albatrosses lay in Nov–Dec (Moore 2017). Chapman (1891) described finding a large colony, and the gathering of a hundred fresh eggs, of wandering albatrosses on Adams Island in Jan 1890. Buller (1891) reported that Captain John Fairchild (of the government steamer *Hinemoa*) had found a colony of royal albatrosses nesting at the Auckland Islands, apparently on 7 Feb 1891, and that they were “occupying a separate locality, and quite apart from *Diomedea exulans*”. The two species had the expected difference in the timing of breeding previously observed between Adams Island (wandering albatrosses) and Campbell Island (royal albatrosses), with the royal albatross nests containing young birds while the wandering albatrosses were just preparing to lay. Buller did not describe where this new colony was, but it is likely to have been at the eastern end of Adams Island, where Frederick Hutton (*in* Ogilvie-Grant 1905) reported royal albatrosses to be nesting, based on information from Captain John Bollons, who had taken over as captain of the *Hinemoa* after Fairchild was killed in a cargo-loading accident in 1898. The ongoing breeding by southern royal albatrosses at the eastern end of Adams Island was confirmed in 1973 and 1989 (Robertson 1975; Buckingham *et al.* 1991).

Wandering albatrosses were found breeding on Disappointment Island in 1907 by survivors of the *Dundonald* shipwreck, and later that year by members of the Philosophical Institute of Canterbury who were involved in their rescue (Waite 1909; Escott-Inman 1911). The first nest on the main island (where a few Gibson’s wandering

albatrosses nest on the hilltops around Carnley Harbour) was found by Laurie Pollock and Douglas Knowles in July 1941 (Pollock 1941 diary *in* Falla archive, ATL).

Oliver (1930) stated that [black-browed] mollymawks were discovered breeding at the Auckland Islands about 1871. This was probably based on Potts’ (1874) report of an egg of ‘*Diomedea melanophrys*’ from the Auckland Islands, as a cutting of Potts’ article is among Oliver’s research file held at Te Papa (viewed 4 Apr 2019 by CMM). The next earliest records of breeding mollymawks that we found were at South West Cape in Jan 1890 (Chapman 1891) and on Disappointment Island in Oct 1891 (Wilson 1891). Waite (1909), followed by Oliver (1930), reported the birds to be black-browed mollymawks, and their correct identity (white-capped mollymawk) at both sites was not resolved until the coastwatching era (Jan 1943 at South West Cape, and Dec 1944 on Disappointment Island; Laurie Pollock 1943 diary held by DOC Invercargill, and Turbott 2002). The identity of the birds (as *Diomedea cauta cauta*) was first reported by Fleming (1953), and Oliver (1955) pointed out that the photograph from Disappointment Island reproduced in Waite (1909) was of a white-capped mollymawk. Brian Bell and Rodney Russ found a small colony east of Logan Point on Adams Island on 23 Jan 1973 (Rodney Russ diary; Robertson 1975).

Light-mantled sooty albatrosses breed in small colonies and as isolated pairs on cliffs and steep slopes throughout the group. They were first reported breeding (at Waterfall Inlet) in Jan 1888 (Reischek 1889a).

Extinctions

Two bird species are well documented as having become extinct on the Auckland Islands since 1900. The last known Auckland Island mergansers were two birds shot by Mr Shattock, the Earl of Ranfurly’s butler, in Carnley Harbour on 9 Jan 1902 (Alexander 1902; Ogilvie-Grant 1905; M. Williams 2012). The only twentieth-century record of South Georgian diving petrel at the Auckland Islands was the bird found on an egg on Dundas Island by Robert Falla and Ed Doley on 28 Oct 1943 (see ‘coastwatchers’ section, and Imber & Nilsson 1980; Fischer *et al.* 2017), although the taxon survives on Codfish Island/Whenua Hou (Fischer *et al.* 2018). However, there are several

other species that may have had resident populations on the Auckland Islands that died out before or soon after the first naturalists visited in 1840. Pigs, cats, and mice were already established on the main island by 1840 (Russell *et al.* 2020 – Chapter 6), and the islands and shoreline of Port Ross were heavily modified by whalers and sealers who had built dwellings and attempted to grow vegetables (Wilkes 1845; Dumont d'Urville 1846; Ross 1847). Polynesians had also subsisted on the islands between AD 1200 and 1400, based on archaeological deposits, including bird food remains, found on Enderby Island (Anderson 2005, 2009).

The unique specimen of *Thinornis rossii* (currently considered to be an immature shore plover *T. novaeseelandiae*) was reported by Gray (1845) to have been brought from 'Auckland Island' by the 1840 Ross expedition, although Robert McCormick specifically states that he failed to collect the only 'ringed' plover (likely banded dotterel) that he saw during the expedition (McCormick unpublished diary; New Zealand National Library Micro-MS-Coll-20-2665). Mathews & Iredale (1913) suggested that the bird may have been collected in Auckland province, based on McCormick's disclaimer and the lack of subsequent records from the islands. However, at least two other crew members (Lieutenants Henry Oakeley and Alexander Smith) are known to have collected birds during the expedition, some of which were not included in McCormick's accounts (Salvin 1896), and so the stated provenance of this bird may be correct. Fleming (1982) identified the collector of the *T. rossii* specimen as being '[McCormick's] shipmate J.R. Forester'. There was no one of this name among the officers of the *Erebus* or the *Terror* (Ross 1847), and we suggest that this is a transcription error of J.R. Forster as the naming authority of the junior synonym *Charadrius torquatus* (see Forster 1844). The specimen is much darker than typical *T. novaeseelandiae*, and may represent an extinct (and distinct) taxon.

Dawson (1964, 2020 – Chapter 8) reported finding a single bone of a New Zealand raven (*Corvus antipodum*) on Enderby Island, and this find is further discussed by Tennyson (2020 – Chapter 7). The only modern account of corvids at the Auckland Islands is B. Morrell's (1832) mention of 'rooks' following his visit in 1830. Several other species of unknown identity were

mentioned by Morrell, including black herons (perhaps corroborated by Dumont d'Urville's 1846 'les hérons'), pigeons, oystercatchers and owls. His detailed description of a pigeon apparently similar to (but differing from) the New Zealand pigeon *Hemiphaga novaeseelandiae* hints at a bird fauna that had changed greatly before 1840. However, the absence of these four species groups from extensive bone deposits on Enderby Island (Tennyson 2020 – Chapter 7) further supports the unreliability of Morrell's account.

White-faced storm petrels may also be extinct on the Auckland Islands. The last reported sighting (on Ewing Island) was in 1989, and they have not been reported at sea near the islands since 1947 (Moore & McClelland 1990; Miskelly *et al.* 2020 – Chapter 2).

Bone deposits on Enderby Island

Hermann Krone in Jan 1875 was the first observer to report extensive bird bone deposits in the dunes behind Sandy Bay, Enderby Island. His account, translated from German, describes the area as being 'covered abundantly with bleached bones, most particularly from the albatross and the birds of the coast', and 'skeletons lie about in large numbers, in as many different kinds as the animals of the island provide them . . . cormorants and albatross and seagulls and penguin; petrel too, the black variety, is frequently represented among them' (Krone 1900). The deposits were also noted by Ethel Richardson in 1890 (Cass 2014) and Edward Wilson in 1904 (E. Wilson 1966).

John Yaldwyn in Jan 1963 and Jan 1975, and Elliot Dawson in Jan 1964 were the first researchers to investigate the bone deposits in detail (Dawson 1964; Yaldwyn 1986). Gerry van Tets collected a large series of bones in 1972–73 (Anderson 2009), and Alan Tennyson analysed collections made by himself and others in 1998, 2003, and 2018 (in Anderson 2009, and Tennyson 2020 – Chapter 7). Atholl Anderson and colleagues investigated evidence of early Polynesian presence at Sandy Bay (Anderson 2005, 2009); however, it is believed that the extensive bone deposits are mainly of natural origin (Yaldwyn 1986; Tennyson in Anderson 2009). At least 46 species are represented in the deposits, which are dominated by bones of diving petrels, southern royal albatrosses, and prions (Tennyson in Anderson 2009; Tennyson

2020 – Chapter 7). Notable finds include bones of the New Zealand raven and Auckland Island merganser (globally extinct), South Georgian diving petrel (no longer present in the Auckland Islands), and Auckland Island rail (no longer present on any islands in Port Ross) (Dawson 1964, 2020 – Chapter 8; Tennyson *in* Anderson 2009; Tennyson 2020 – Chapter 7).

Ecological and behavioural research

Few of the breeding bird species have been the focus of land-based studies of ecology or behaviour undertaken on the Auckland Islands, and most of these studies have been of short duration. Single-season studies of diet or foraging ecology were undertaken for Auckland Island teal (Weller 1975), Auckland Island banded dotterel (Pierce 1980), New Zealand falcon (Hyde & Worthy 2010), Auckland Island shag (Lalas & McConnell 2012), and subantarctic skua (Tennyson *in* Miskelly *et al.* 2020 – Chapter 2). The only active Auckland Island rail nest ever found was located using radio-telemetry (Elliott *et al.* 1991), while Miskelly, Walker *et al.* (2006) reported on 25 nests and 46 broods of Auckland Island snipe found on five islands in the course of other field work undertaken between 1966 and 2006.

The most detailed study of the ecology and breeding biology of an endemic 'land bird' so far undertaken was Williams' (1995) study of Auckland Island teal, mainly undertaken on Ewing Island in 1991–92. All but three of the 49 nests found were located by 'Bob' (a German short-haired pointer), the first time a dog had been used for conservation or research purposes in the New Zealand subantarctic. French *et al.*'s (2018) investigation of yellow-eyed penguin behaviour in relation to human disturbance was the first study designed to investigate the impact of ecotourism on birds at the Auckland Islands.

The sole exception to these short-term or incidental ecological studies has been the ongoing study of Gibson's wandering albatrosses on Adams Island, initiated by Kath Walker and Graeme Elliott in Feb 1991. Most of the annual visits to the study colony have been in Jan–Feb, with the timing allowing determination of the number of eggs laid by arriving breeders and of fledging success by pairs that bred the previous year in this biennially breeding species, which takes a full year

to raise each chick (Walker & Elliott 1999; Elliott *et al.* 2018). Although much data has been collected on egg-laying dates, and on survival rates and nest site fidelity of breeding birds (Walker & Elliott 1999), the inaccessibility of the study colony for much of the year means that many breeding parameters have not been recorded (e.g. incubation length, hatch dates, fledging period, and chick growth rates). However, attachment of satellite tags to breeding adults allowed remote monitoring of incubation shifts and provisioning visits during chick-rearing between Jun and Sep (Walker & Elliott 2006). This same study also reported on the at-sea distribution of breeding and non-breeding Gibson's albatrosses of both sexes, finding that they ranged predominantly west of the Auckland Islands, into the Tasman Sea and south of Australia.

Three additional seabird species have been tracked from the Auckland Islands. GPS dataloggers were used to track white-capped mollymawks from South West Cape during early chick-rearing, with tags retrieved from 19 birds (Torres *et al.* 2011). Most birds foraged east of the Auckland Islands and within 50 km of the colony. Less precise light-sensitive geolocator tags were used to track white-chinned petrels and white-headed petrels breeding on Adams Island between 2011 and 2017 (Rexer-Huber 2017; G.A. Taylor *et al.* 2020 – Chapter 14). White-chinned petrels foraged around the South Island, south to Antarctic waters and west to the Tasman Sea and South Australian waters, but rarely ventured as far east as the Antipodes or Chatham Islands (Rexer-Huber 2017). White-headed petrels foraged mainly to the west of the Auckland Islands, reaching as far as the southern Indian Ocean (Taylor *et al.* 2020 – Chapter 14).

Genetic research

Ten species of birds that breed at the Auckland Islands have been included in regional or international studies of genetic diversity and relationships. Studies of five of the larger seabird species revealed that they were genetically close to their nearest neighbouring populations, including on islands off Tasmania (white-capped mollymawk), Antipodes Island (Gibson's wandering albatross), Antipodes and Campbell Island (northern giant petrel and white-chinned petrel), and Campbell

Island (Auckland Island shag), but more distantly related to populations further afield or that are more morphologically distinct (Abbott & Double 2003; Burg & Croxall 2004; Techow *et al.* 2010; Kennedy & Spencer 2014; Rexer-Huber *et al.* 2019).

Phylogenetic comparisons of snipe and teal populations from the New Zealand subantarctic islands and the Chatham Islands revealed that these birds persisted on the Auckland Islands throughout the period of peak glaciation (A.J. Baker *et al.* 2010; Mitchell *et al.* 2014), while it is likely that parakeets, falcon, and the rail were more recent arrivals (Rawlence *et al.* 2015; Garcia-R *et al.* 2016; Trewick & Olley 2016). Shepherd *et al.* (2020 – Chapter 16) investigated phylogeographic structure of snipe populations on five islands within the Auckland Islands and found four separate refugial populations kept separate by the presence of cats and pigs on the main island. This included the surprising revelation that snipe persisted undetected on either or both of Enderby and Rose Islands for more than 80 years.

Conclusions

The bird fauna of the Auckland Islands is diverse, with a high endemic component. However, it has received very limited bird research effort compared with other subantarctic islands, with no multi-year ecological studies completed on any species other than Gibson's wandering albatross, and recent population and tracking data available for only a few of the larger seabird species. This is in marked contrast to the Snares Islands 270 km to the north, where the presence of a research station constructed by the University of Canterbury in 1961 facilitated more than four decades of bird research by staff and students from University of Canterbury and University of Otago, producing more than 50 published ecological or behavioural studies on birds, and population estimates for all 29 breeding bird species (Warham 1967; Miskelly *et al.* 2001).

Bird research on the Auckland Islands has been limited through both logistics constraints (particularly the absence of a permanently staffed research station) and restrictive management regimes by successive administering authorities. We hope that this will change in parallel with

current plans to eradicate pigs, cats, and mice from the main island, as this will provide rich opportunities to research bird population recoveries and behavioural responses to the restored environment.

Acknowledgements

Many people have generously contributed to this review through loaning their notebooks, diaries, or logbooks, or those of deceased family members. We particularly thank the late Hilary Haylock (Robert Wilson's daughter), Karen Baird (John Kendrick's step-daughter), and Elizabeth Bell (Brian Bell's daughter) for the loan of their fathers' diaries and notebooks, Kath Walker and Graeme Elliott for loaning their remarkable series of logbooks spanning 30 years of Adams Island research, and also Rodney Russ, Martin Cawthorn, Kerry-Jayne Wilson, Murray Williams, Jean-Claude Stahl, Noel Hyde, Alan Tennyson, Rebecca French, Chris Muller, Graham Parker, and Kalinka Rexer-Huber for providing copies or originals of their unpublished bird records. Rodney Russ and Lynn Tough facilitated access to 25 years of Heritage Expedition reports, and we further acknowledge Rodney's pivotal role in providing access to the Auckland Islands for many research teams and numerous bird enthusiasts among his staff and expeditioners since 1993. Igor Debski and Joseph Roberts facilitated access to unpublished reports and diaries held by DOC in Wellington and Invercargill. Emma Burns (Otago Museum), Joanne Cooper (Natural History Museum, UK), Matt Rayner (Auckland Museum), Paul Scofield (Canterbury Museum), and Jens Jakobitz, Frederik Albrecht, and Martin Paeckert (Senckenberg Naturhistorische Sammlungen, Dresden) provided details of specimens in their care.

We gratefully acknowledge the scholarship of James Braund (School of Cultures, Languages and Linguistics, University of Auckland) and his generosity in providing translations of the writings of Hermann Krone, and Grant McAlpine for his assistance with translations of French texts. Te Papa librarians Victoria Boyack, Christine Kiddey and Martin Lewis provided much assistance with our research, as did the staff of Archives New Zealand and the Alexander Turnbull Library, Wellington. This review was improved by comments received from Christopher Robertson and Alan Tennyson.

Literature cited

- Abbott, C.L.; Double, M.C.** 2003. Phylogeography of shy and white-capped albatrosses inferred from mitochondrial DNA sequences: implications for population history and taxonomy. *Molecular Ecology* 12: 2747–2758.
- Adams, R.; Lockley, R.** 1982. *Voyage through the Antarctic*. London, Allen Lane. 160 pp.
- Alexander, D.** 1902. Cruise of the *Tutanekai* to the southern islands December 1901–January 1902. Manuscript MSY-4600–04. Alexander Turnbull Library, Wellington.
- Allen, M.F.** 1997. *The wake of the Invercauld*. Auckland, Exisle. 256 pp.
- Allen, M.F.; Scadden, K.** 2009. *The General Grant's gold; shipwreck and greed in the Southern Ocean*. Auckland, Exisle. 192 pp.
- Anderson, A.** 2005. Subpolar settlement in South Polynesia. *Antiquity* 79: 791–800.
- Anderson, A.** 2009. Prehistoric archaeology in the Auckland Islands, New Zealand subantarctic region. pp. 9–37 In: Dingwall, P.R.; Jones, K.L.; Egerton, R. (eds) *In care of the Southern Ocean – an archaeological and historical survey of the Auckland Islands*. New Zealand Archaeological Association Monograph 17.
- Archey, G.** 1923. Notes on birds of the sub-Antarctic islands of New Zealand. *Records of the Canterbury Museum* 2: 117–120.
- Argilla, L.S.; Howe, L.; Gartrell, B.D.; Alley, M.R.** 2013. High prevalence of *Leucocytozoon* spp. in the endangered yellow-eyed penguin (*Megadyptes antipodes*) in the sub-Antarctic regions of New Zealand. *Parasitology* 140: 672–682.
- Atkinson, T.** 2001. 'St Michael' goes south; a 31 foot motor-sailer in support of the 1972/73 Auckland Islands Scientific Expedition. Wellington, Department of Conservation. 136 pp.
- Bade, J.** 2012. Hermann Krone's record of the German scientific expedition to the Auckland Islands to observe the Transit of Venus, 1874–75. pp. 89–106 In: Braund, J. (ed.) *Ferdinand Hochstetter and the contribution of German-speaking scientists to New Zealand natural history in the nineteenth century*. Germanica Pacific 10: 1–314.
- Bailey, A.M.; Sorensen, J.H.** 1962. *Subantarctic Campbell Island*. Proceedings No. 10. Denver Museum of Natural History. 305 pp.
- Baker, A.J.; Miskelly, C.M.; Haddrath, O.** 2010. Species limits and population differentiation in New Zealand snipes (Scolopacidae: *Coenocorypha*). *Conservation Genetics* 11: 1363–1374.
- Baker, G.B.; Elliott, G.P.; French, R.K.; Jenz, K.; Muller, C.G.; Walker, K.J.** 2020. Development of aerial monitoring techniques to estimate population size of great albatrosses (*Diomedea* spp.). *Notornis* 67: 321–331.
- Baker, G.B.; Jenz, K.** 2014. Gibson's albatross at Disappointment Island – analysis of aerial photographs. Report prepared by Latitude 42 Environmental Consultants Pty Ltd for Department of Conservation. 6 pp.
- Baker, G.B.; Jenz, K.; Cunningham, R.** 2018. White-capped albatross aerial survey analysis of 2015 & 2016 breeding season data. Draft report prepared by Latitude 42 Environmental Consultants Pty Ltd for Ministry for Primary Industries Contract SEA2016–29. 24 pp.
- Barton, R.J. (compiler)** 1927. *Earliest New Zealand: the journals and correspondence of the Rev. John Butler*. Masterton, Palamontain & Petherick. 449 pp.
- Beer, K.J.** 2010. Distribution of yellow-eyed penguins (*Megadyptes antipodes*) on the Auckland Islands: November–December 2009. Dunedin, Department of Zoology, University of Otago. 58 pp.
- Bell, B.D.** 1975. Report on the birds of the Auckland Islands Expedition 1972–73. pp. 136–142 In: Yaldwyn, J. (ed.) *Preliminary results of the Auckland Islands Expedition 1972–73*. Wellington, New Zealand Department of Lands and Survey.
- Bertrand, K.J.** 1971. *Americans in Antarctica 1775–1948*. American Geographical Society special publication 39. New York, American Geographical Society. 544 pp.
- Best, P.B.; Shaughnessy, P.D.** 1979. An independent account of Captain Benjamin Morrell's sealing voyage to the south-west coast of Africa in the *Antarctic*, 1828/29. *Fisheries Bulletin South Africa* 12: 1–19.
- Borchgrevink, C.E.** 1895. The voyage of the "*Antarctic*" to Victoria Land. *Nature* 52: 375–377.
- Bourne, W.R.P.; Warham, J.** 1966. Geographical variation in giant petrels of the genus *Macronectes*. *Ardea* 54: 45–67.
- Buckingham, R.; Elliott, G.; Walker, K.** 1991. Bird and mammal observations on Adams Island and southern Auckland Island 1989. Science & Research Internal Report No. 105. Wellington, Department of Conservation. 16 pp.
- Bugayer, J. (ed.)** Accepted ms. *Antarctic's voyage to*

- the Southern Ocean or the Norwegian landing on South Victoria Land. Seattle, Ayer and Land Books.
- Bull, H.J.** 1896. *The cruise of the 'Antarctic' to the South Polar regions*. London, Edward Arnold. 243 pp.
- Buller, W.L.** 1888. *A history of the birds of New Zealand*. 2nd edn, vol. 2. London, published by the author. 359 pp.
- Buller, W.L.** 1891. An exhibition of new and interesting forms of New Zealand birds, with remarks thereon. *Transactions of the New Zealand Institute* 23: 36–43.
- Burg, T.M.; Croxall, J.P.** 2004. Global population structure and taxonomy of the wandering albatross species complex. *Molecular Ecology* 13: 2345–2355.
- Cass, C.** 2014. *We three go south; the 1890 diary of Ethel Richardson's trip to the sub-Antarctic*. Wellington, Phantom House. 151 pp.
- Chapman, F.R.** 1891. The outlying islands south of New Zealand. *Transactions of the New Zealand Institute* 23: 491–522.
- Childerhouse, S.; Robertson, C.; Hockly, W.; Gibbs, N.** 2003. Royal albatross (*Diomedea epomophora*) on Enderby Island, Auckland Islands. *DOC Science Internal Series* 144: 1–19.
- Chilton, C. (ed.)** 1909. *The subantarctic islands of New Zealand*. 2 vols. Wellington, Philosophical Institute of Canterbury and New Zealand Government Printer. 848 pp.
- Chilvers, B.L.** 2014. Changes in the annual counts of yellow-eyed penguins (*Megadyptes antipodes*) at Sandy Bay, Enderby Island, 2001–2012. *Notornis* 61: 103–105.
- Chilvers, B.L.; Baker, G.B.; Hiscock, J.A.; McClelland, P.J.; Holdworth, M.; Jensz, K.** 2015. Comparison of breeding population survey methods for Auckland Island shag (*Phalacrocorax colensoi*). *Polar Biology* 38: 1847–1852.
- Darby, M.M.** 1970. Summer seabirds between New Zealand and McMurdo Sound. *Notornis* 17: 28–55.
- Dawson, E.W.** 1964. Antarctic oceanography 1963–64. *Antarctic* (June): 430–432.
- Dawson, E.W.** 2020. An extinct New Zealand raven (*Corvus antipodum*) on the Auckland Islands – an osteographic enigma? *Notornis* 67: 295–297.
- Dingwall, P.R.** 2009. Pastoral farming at the Auckland Islands. pp. 107–122 In: Dingwall, P.R.; Jones, K.L.; Egerton, R. (eds) *In care of the Southern Ocean – an archaeological and historical survey of the Auckland Islands*. New Zealand Archaeological Association Monograph 17.
- Dormon, P.** 1991. Subantarctic islands bird cruise. *OSNZ News* 60: 1.
- Druett, J.** 2007. *Island of the lost: shipwrecked at the edge of the world*. Algonquin, Chapel Hill. 304 pp.
- Dumont d'Urville, J.S.C.** 1842. *Voyage au Pole sud dans l'Océanie sur les corvettes l'Astrolabe et la Zélée*. Plates (Vol. 2, Oiseaux et coléoptères). Paris. 41 pl.
- Dumont d'Urville, J.S.C.** 1846. *Voyage au Pole sud dans l'Océanie sur les corvettes l'Astrolabe et la Zélée*. Paris. 295 pp.
- Eden, A.W.** 1955. *Islands of despair; being an account of a survey expedition to the sub-Antarctic islands of New Zealand*. London, Andrew Melrose. 212 pp.
- Egerton, R.; Burgess, S.; Petchey, P.; Dingwall, P.R.** 2009. The Auckland Islands shipwreck era. pp. 123–190 In: Dingwall, P.R.; Jones, K.L.; Egerton, R. (eds) *In care of the Southern Ocean – an archaeological and historical survey of the Auckland Islands*. New Zealand Archaeological Association Monograph 17.
- Elliott, G.P.** 2013. Auckland Island rail. In: Miskelly, C.M. (ed.) *New Zealand Birds Online*. www.nzbirdsonline.org.nz [viewed 6 Mar 2019].
- Elliott, G.; Walker, K.** 2005. Detecting population trends of Gibson's and Antipodean wandering albatrosses. *Notornis* 52: 215–222.
- Elliott, G.; Walker, K.; Buckingham, R.** 1991. The Auckland Island rail. *Notornis* 38: 199–209.
- Elliott, G.; Walker, K.; Parker, G.; Rexer-Huber, K.** 2018. Gibson's wandering albatross population study and census 2017/18. Report prepared by Albatross Research for the Department of Conservation. 16 pp.
- Elliott, G.P.; Walker, K.J.; Parker, G.C.; Rexer-Huber, K.; Miskelly, C.M.** 2020. Subantarctic Adams Island and its birdlife. *Notornis* 67: 153–187.
- Escott-Inman, H.** 1911. *The castaways of Disappointment Island*. London, Partridge. 319 pp.
- Eunson, K.** 1974. *The wreck of the General Grant*. Wellington, Reed. 168 pp.
- Falla, R.A.** 1933. Notes on New Zealand petrels; with descriptions of new forms and some new records. *Records of the Auckland Institute and Museum* 1: 173–180.
- Falla, R.A.** 1937. Birds. *B.A.N.Z. Antarctic Research Expedition 1929–1931*. Reports – Series B, Vol. 2. Adelaide, B.A.N.Z.A.R.E. Expedition Committee. 103 pp.

- Falla, R.A.** 1940. The genus *Pachyptila* Illiger. *Emu* 40: 218–236.
- Falla, R.A.** 1965. Birds and mammals of the subantarctic islands. *Proceedings of the New Zealand Ecological Society* 12: 63–68.
- Falla, R.A.** 1967. An Auckland Island rail. *Notornis* 14: 107–113.
- Falla, R.A.** 1975a. Report on the D.S.I.R. expedition to the Auckland Islands in H.M.N.Z.S. Tui, November 1954. pp. 336–338 In: Yaldwyn, J. (ed.) *Preliminary results of the Auckland Islands Expedition 1972–73*. Wellington, New Zealand Department of Lands and Survey.
- Falla, R.A.** 1975b. Report on the 1962–63 Auckland Islands expedition. pp. 339–342 In: Yaldwyn, J. (ed.) *Preliminary results of the Auckland Islands Expedition 1972–73*. Wellington, New Zealand Department of Lands and Survey.
- Falla, R.A.** 1975c. Report on the 1966 Auckland Islands expedition. pp. 364–369 In: Yaldwyn, J. (ed.) *Preliminary results of the Auckland Islands Expedition 1972–73*. Wellington, New Zealand Department of Lands and Survey.
- Falla, R.A.** 1978. Banded dotterel at the Auckland Islands: description of a new sub-species. *Notornis* 25: 101–108.
- Falla, R.A.; Sibson, R.B.; Turbott, E.G.** 1966. *A field guide to the birds of New Zealand*. London, Collins. 256 pp.
- Falla, R.A.; Taylor, R.H.; Black, C.** 1979. Survey of Dundas Island, Auckland Islands, with particular reference to Hooker's sea lion (*Phocarctos hookeri*). *New Zealand Journal of Zoology* 6: 347–355.
- Fischer, J.H.; Debski, I.; Miskelly, C.M.; Bost, C.A.; Fromant, A.; Tennyson, A.J.D.; Tessler, J.; Hiscock, J.H.; Taylor, G.A.; Wittmer, H.U.** 2018. Analysis of phenotypic differentiations among South Georgian diving petrel (*Pelecanoides georgicus*) populations reveal an undescribed and highly endangered species from New Zealand. *PLOS One*. doi: 10.1371/journal.pone.0197766
- Fischer, J.H.; Hjørsvardsdottir, F.O.; Hiscock, J.A.; Debski, I.; Taylor, G.A.; Wittmer, H.U.** 2017. Confirmation of the extinction of South Georgian diving petrels (*Pelecanoides georgicus*) on Enderby Island. *Notornis* 64: 48–51.
- Fisher, C.T.** 1981. Specimens of extinct, endangered or rare birds in the Merseyside County Museums, Liverpool. *Bulletin of the British Ornithologists' Club* 101: 276–285.
- Fleming, C.A.** 1939. Birds of the Chatham Islands – part 1. *Emu* 38: 380–413.
- Fleming, C.A.** 1950. New Zealand flycatchers of the genus *Petroica* Swainson. *Transactions of the Royal Society of New Zealand* 78: (Pt 1) 14–47 & (Pt 2) 127–160.
- Fleming, C.A. (convener)** 1953. *Checklist of New Zealand birds*. Wellington, Reed. 80 pp.
- Fleming, C.A.** 1980. Obituary: Sir Robert Falla, KBE, CMG, DSc (NZ), FRSNZ. *Emu* 80: 41–44.
- Fleming, C.A.** 1982. *George Edward Lodge; the unpublished New Zealand bird paintings*. Wellington, Nova Pacifica. 410 pp.
- Forster, J.R.** 1844. *Descriptiones animalium quae in itinere ad Maris Australis per annos 1772 1773 et 1774 suscepto collegit observavit et delineavit Ioannes Reinoldus Forster*. H. Lichenstein (ed.) Berlin, Koeniglich-Preussische Akademie der Wissenschaften. 424 pp.
- Fraser, C.** 1986. *Beyond the roaring forties: New Zealand's subantarctic islands*. Wellington, Government Printer. 214 pp.
- Fraser, C.** 2014. *The Enderby settlement: Britain's whaling venture on the subantarctic Auckland Islands 1849–52*. Dunedin, Otago University Press. 256 pp.
- French, R.K.; Miskelly, C.M.; Muller, C.G.; Russ, R.B.; Taylor, G.A.; Tennyson, A.J.D.** 2020. Birds of Enderby Island, Auckland Islands, New Zealand subantarctic. *Notornis* 67: 189–212.
- French, R.K.; Muller, C.G.; Chilvers, B.L.; Battley, P.F.** 2018. Behavioural consequences of human disturbance on subantarctic yellow-eyed penguins *Megadyptes antipodes*. *Bird Conservation International* 1–14. doi: 10.1017/S0959270918000096.
- Gales, R.** 1993. *Co-operative mechanisms for the conservation of albatross*. Hobart, Australian Nature Conservation Agency. 132 pp.
- Garcia-R, J.C.; Elliott, G.; Walker, K.; Castro, I.; Treweek, S.A.** 2016. Trans-equatorial range of a land bird lineage (Aves: Rallidae) from tropical forests to subantarctic grasslands. *Journal of Avian Biology* 46: 219–226.
- Gill, B.J.; Bell, B.D.; Chambers, G.K.; Medway, D.G.; Palma, R.L.; Scofield, R.P.; Tennyson, A.J.D.; Worthy, T.H.** 2010. *Checklist of the birds of New Zealand, Norfolk and Macquarie Islands, and the Ross Dependency, Antarctica*. 4th edn. Wellington, Te Papa Press in association with the

- Ornithological Society of New Zealand. 501 pp.
- Godley, E.J.** 1979. The 1907 expedition to the Auckland and Campbell Islands, and an unpublished report by B.C. Aston. *Tuatara* 23: 133–158.
- Gray, G.R.** 1845. Birds. I. Birds of New Zealand. pp. 1–20 In: *The zoology of the voyage of H.M.S. Erebus and Terror, under the command of Captain Sir James Clark Ross, R.N., F.R.S., during the years 1839–43*. Vol. I. London, E.W. Janson.
- Gray, G.R.** 1862. A list of the birds of New Zealand and the adjacent islands. *Ibis* 4: 214–252.
- Greenway, J.C.** 1958. *Extinct and vanishing birds of the world*. New York, American Committee for International Wild Life Protection Special Publication No. 13. 518 pp.
- Guthrie-Smith, H.** 1936. *Sorrows and joys of a New Zealand naturalist*. Dunedin, Reed. 252 pp.
- Hamilton, R.V.** 1870. On Morrell's Antarctic voyage in the year 1823, with remarks on the advantages steam will confer on future Antarctic explorers. *Proceedings of the Royal Geographical Society* 14: 145–156.
- Harper, P.C.; Rowlett, R.A.** 1983. A prion picture puzzle from the South Atlantic. *Notornis* 30: 344–348.
- Hector, J.** 1881. New Zealand Institute, 1880–81 (13th annual report). *Appendices to the Journals of the House of Representatives*, 1881 Session I, H-25.
- Hombron, [J.B.]; Jacquinot, [H.]** 1841. Description de plusieurs oiseaux nouveaux ou peu connus, provenant de l'expédition autour du monde faite sur les corvettes *l'Astrolabe* et la *Zélée*. *Annales des Sciences Naturelles* (Second series) 16: 312–320.
- Hyde, N.H.S.; Worthy, T.H.** 2010. The diet of New Zealand falcons (*Falco novaeseelandiae*) on the Auckland Islands, New Zealand. *Notornis* 57: 19–26.
- Imber, M.J.** 1983. The lesser petrels of Antipodes Island, with notes from Prince Edward and Gough Islands. *Notornis* 30: 283–298.
- Imber, M.J.; Nilsson, R.J.** 1980. South Georgian diving petrels (*Pelecanoides georgicus*) breeding on Codfish Island. *Notornis* 27: 325–330.
- IOC World Bird List** (2019). Version 9.1. <https://www.worldbirdnames.org> [viewed 13 Mar 2019].
- Jones, A.G.E.** 1970. Captain Abraham Bristow and the Auckland Islands. *Notes and Queries*, October: 369–371.
- Jones, K.L.** 2009. Terror Cove, Port Ross: the German Transit of Venus Expedition 1874 and other scientific and discovery expeditions from 1840 to the start of World War 1. pp. 87–103 In: Dingwall, P.R.; Jones, K.L.; Egerton, R. (eds) *In care of the Southern Ocean – an archaeological and historical survey of the Auckland Islands*. New Zealand Archaeological Association Monograph 17.
- Kear, J.; Scarlett, R.J.** 1970. The Auckland Islands merganser. *Wildfowl* 21: 78–86.
- Kennedy, M.; Spencer, H.G.** 2014. Classification of the cormorants of the world. *Molecular Phylogenetics and Evolution* 79: 249–257.
- Kinsky, F.C.** 1969. New and rare birds on Campbell Island. *Notornis* 16: 225–236.
- Kinsky, F.C. (convener)** 1970. *Annotated checklist of the birds of New Zealand including the birds of the Ross Dependency*. Wellington, Reed. 96 pp.
- Krone, H.** 1875. Die deutsche Expedition zur Beobachtung des Venusdurchganges, am 9. Dezember 1874, auf den Auckland-Inseln. *Sitzungs-Berichte der naturwissenschaftlichen Gesellschaft Isis zu Dresden* (7–12): 126–138.
- Krone, H.** 1877. Die Auckland-Inseln. XIII. und XIV. *Jahresberichte des Vereins für Erdkunde zu Dresden*: 35–44.
- Krone, H.** 1900. *Vater und Sohn auf der Weltreise 1874, 1875 zur Beobachtung des Venusdurchganges 1874 Dezember 9, Station Auckland-Inseln*. [Father and son on a voyage around the world 1874, 1875 to observe the transit of Venus 9 December 1874, Auckland Islands station.] Vol. 2: 1–312; Vol. 3: 1–234. Halle a. d. Saale: Otto Hendel.
- Lalas, C.; McConnell, H.** 2012. Prey of Auckland Island shags (*Leucocarbo colensoi*) in winter. *Notornis* 59: 130–137.
- Lesson, R.P.** 1825. Distribution géographique de quelques oiseaux marins observés dans le voyage autour du monde de la corvette *La Coquille*. *Annales des Sciences Naturelles Paris* 6: 88–103.
- Lukins, E.** 1896. *Round southern isles*. Nelson, Bond, Finney & Co. 28 pp.
- Mackworth, W.A.; Munce, W.J.** 1999. Enderby settlement diaries: records of a British colony at the Auckland Islands 1849–1852. Dingwall, P.R.; Fraser, C.; Gregory, J.G.; Robertson, C.J.R. (eds). Wellington, Wild Press, and Pakuranga, Wordsell Press. 266 pp.
- Malone, R.E.** 1854. *Three years' cruise in the Australasian colonies*. London, Bentley. 304 pp.
- Marchant, S.; Higgins, P.J. (eds)** 1990. *Handbook of Australian, New Zealand and Antarctic Birds. Ratites to Ducks*. Vol. 1. Melbourne, Oxford University Press. 1400 pp.

- Martin, R.M.** [1852]. *The British colonies; their history, extent, conditions and resources. New Zealand, Tasmania, etc.* Vol. 3. London, London Printing and Publishing. 886 pp.
- Mathews, G.M.** 1912. *The birds of Australia*. Vol. 2. London, Witherby & Co. 527 pp.
- Mathews, G.M.; Iredale, T.** 1913. A reference list of the birds of New Zealand. Part II. *Ibis* (series 10) 1: 402–452.
- Mayhill, P.; Goulstone, J.F.** 1986. Landsnails of the Auckland Islands December 1983. pp. 86–99 In: Penniket, A.; Garrick, A.; Breese, E. (compilers) *Preliminary reports of expeditions to the Auckland Islands Nature Reserve 1973–1984*. Reserve Series. Wellington, New Zealand Department of Lands and Survey.
- McClelland, P.J.; Moore, P.J.** 1991. New species for the Auckland Islands. *Notornis* 38: 80.
- McCormick, R.** 1884. *Voyages of discovery in the Arctic and Antarctic seas and round the world*, 2 vols. London, Sampson Low, Marston, Searle and Rivington. 843 pp.
- McCraw, J.** 1999. *Coastmaster; the story of Capt. James B. Greig*. Hamilton, Silverdale Publications. 196 pp.
- 54 **McEwen, M. (ed.)** 2006. *Charles Fleming's Cape Expedition diary; Auckland Islands, 1942–43*. Wellington, McEwen Associates. 256 pp.
- McLaren, F.B.** 1948. *The Auckland Islands: their eventful history*. Wellington, Reed. 111 pp.
- McNab, R.** 1907. *Murihiku and the southern islands*. Invercargill, William Smith. 499 pp.
- Mikaere, B.** 1986. Maungahuka – the nearest Maori settlement to the South Pole. *Tu Tangata* 31: 24.
- Miskelly, C.M.** 2000. Historical records of snipe from Campbell Island, New Zealand. *Notornis* 47: 131–140.
- Miskelly, C.M.** 2012. Bird names commemorating Edgar Stead. *Notornis* 59: 7–14.
- Miskelly, C.M.** 2020. First record of South Polar skua (*Catharacta maccormicki*) from New Zealand – Auckland Islands, March 1904. *Notornis* 67: 427–429.
- Miskelly, C.M.; Bell, E.A.; Elliott, G.P.; Walker, K.J.** 2006. 'Hakawai' aerial displaying by three populations of subantarctic snipe (genus *Coenocorypha*). *Notornis* 53: 375–381.
- Miskelly, C.M.; Cooper, J.H.** 2020. Macquarie Island shags (*Leucocarbo purpurascens*) at the Auckland Islands – an addition to the New Zealand list. *Notornis* 67: 419–426.
- 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.
- Miskelly, C.M.; Gilad, D.; Taylor, G.A.; Tennyson, A.J.D.; Waugh, S.M.** 2019. A review of the distribution and size of gadfly petrel (*Pterodroma* spp.) colonies throughout New Zealand. *Tuhinga* 30: 93–173.
- Miskelly, C.M.; Sagar, P.M.; Tennyson, A.J.D.; Scofield, R.P.** 2001. Birds of the Snares Islands, New Zealand. *Notornis* 48: 1–40.
- Miskelly, C.M.; Walker, K.J.; Elliott, G.P.** 2006. Breeding ecology of three subantarctic snipes (genus *Coenocorypha*). *Notornis* 53: 361–374.
- Mitchell, K.J.; Wood, J.R.; Scofield, R.P.; Llamas, B.; Cooper, A.** 2014. Ancient mitochondrial genomes reveals unsuspected taxonomic affinity of the extinct Chatham duck (*Pachyanas chathamica*) and resolves divergence times for New Zealand and sub-Antarctic brown teals. *Molecular Phylogenetics and Evolution* 70: 420–428.
- Moore, P.J.** 1990. Population survey of yellow-eyed [sic] penguins on the Auckland Islands, Nov–Dec 1989. Science and Research Internal Report No. 73. Wellington, Department of Conservation.
- Moore, P.J.** 1992. Population estimates of yellow-eyed penguin (*Megadyptes antipodes*) on Campbell and Auckland Islands 1987–90. *Notornis* 39: 1–15.
- Moore, P.J.** 2017. Southern royal albatross. In: Miskelly, C.M. (ed.) New Zealand Birds Online. www.nzbirdsonline.org.nz [viewed 14 Mar 2019].
- Moore, P.J.; McClelland, P.J.** 1990. Notes on the birds of the Auckland Islands, November–December 1989. Science and Research Internal Report No. 93. Wellington, Department of Conservation. 9 pp.
- Moore, P.; Walker, K.** 1990. Auckland Island teal on Ewing and Adams Island, Auckland Islands, November 1989. Science and Research Internal Report No. 82. Wellington, Department of Conservation.
- Moore, P.J.; Walker, K.** 1991. Auckland Island teal *Anas aucklandica aucklandica* revisited. *Wildfowl* 42: 137–144.
- Morrell, A.J.** 1833. *Narrative of a voyage to the Ethiopic and South Atlantic Ocean, Indian Ocean, Chinese Sea, North and South Pacific Oceans in the years 1829–30*. New York, Harper. 230 pp.

- Morrell, B.** 1832. *A narrative of four voyages: the South Sea, North and South Pacific Ocean, Chinese Sea, Ethiopic and Southern Atlantic Ocean, Indian and Antarctic Ocean from the year 1822 to the year 1831*. New York, Harper: 492 pp.
- Muller, C.G.; Chilvers, B.L.; Barker, Z.; Barnsdale, K.P.; Battley, P.F.; French, R.K.; McCullough, J.; Samandari, F.** 2019. Aerial VHF tracking of wildlife using an unmanned aerial vehicle (UAV): comparing efficiency of yellow-eyed penguins (*Megadyptes antipodes*) nest location methods. *Wildlife Research*. doi: 10.1071/WR17147
- Muller, C.G.; Chilvers, B.L.; French, R.K.; Hiscock, J.A.; Battley, P.F.** 2020. Population estimate for yellow-eyed penguins (*Megadyptes antipodes*) in the subantarctic Auckland Islands, New Zealand. *Notornis* 67: 299–319.
- Musgrave, T.** 1865. *Castaway on the Auckland Isles: a narrative of the wreck of the "Grafton" from the private journals of Capt. Thos. Musgrave, edited by J.J. Shillinglaw*. Melbourne, Dwight: 112 pp.
- Norman, W.H.; Musgrave, T.** 1866. *Journals of the voyage and proceedings of H.M.C.S. Victoria in search of ship-wrecked people at the Auckland and other islands*. Melbourne, Government Printer: 56 pp.
- Ogilvie-Grant, W.R.** 1905. On birds procured by the Earl of Ranfurly in New Zealand and the adjacent islands. *Ibis* 5 (8th series): 543–602.
- Oliver, W.R.B.** 1927. Solitary isles; the Dominion's outposts; birds and strange plants; a museum officer's notes. *Evening Post*, 16 Apr 1927: 13.
- Oliver, W.R.B.** 1930. *New Zealand birds*. Wellington, Fine Arts: 541 pp.
- Oliver, W.R.B.** 1955. *New Zealand birds*. 2nd edn. Wellington, Reed: 661 pp.
- Parker, G.; Bell, M.** 2017. Northern giant petrel population estimates and trends in New Zealand. Information document Inf 17 to PaCSWG4, Agreement on the Conservation of Albatrosses and Petrels. Dunedin, Parker Conservation: 3 pp.
- Parker, G.C.; French, R.K.; Muller, C.G.; Taylor, G.A.; Rexer-Huber, K.** 2020. First northern giant petrel (*Macronectes halli*) breeding population survey and estimate for the Auckland Islands, New Zealand. *Notornis* 67: 357–368.
- Parker, G.C.; Muller, C.G.; Rexer-Huber, K.** 2016. Northern giant petrel *Macronectes halli* breeding population survey, Auckland Islands, December 2015 – February 2016. Report to the Conservation Services Programme, Department of Conservation. Dunedin, Parker Conservation: 16 pp.
- Peale, T.R.** 1848. *United States Exploring Expedition, during the years 1838, 1839, 1840, 1841, 1842. Under the command of Charles Wilkes, U.S.N. Mammalia and ornithology*. Vol. 8. Philadelphia, C. Sherman: 338 pp.
- Penniket, A.; Garrick, A.; Breese, E. (compilers)** 1986. *Preliminary reports of expeditions to the Auckland Islands Nature Reserve 1973–1984*. Reserve Series. Wellington, New Zealand Department of Lands and Survey: 231 pp.
- Pierce, R.J.** 1980. Habitats and feeding of the Auckland Island banded dotterel (*Charadrius bicinctus exilis* Falla 1978) in autumn. *Notornis* 27: 309–324.
- Pinpimai, K.; Roe, W.D.; Biggs, P.J.; Dittmer, K.E.; Michael, S.A.** 2018. Draft whole-genome sequences of five *Klebsiella pneumoniae* isolates from the subantarctic islands of New Zealand. *Microbiology Resource Announcements* 7: e01328-18. doi: 10.1128/MRA.01328-18
- Potts, T.H.** 1874. On the birds of New Zealand. *Transactions of the New Zealand Institute* 6: 139–153.
- Prickett, N.** 2009. Sealing in the Auckland Islands. pp. 39–57 In: Dingwall, P.R.; Jones, K.L.; Egerton, R. (eds) *In care of the Southern Ocean – an archaeological and historical survey of the Auckland Islands*. New Zealand Archaeological Association Monograph 17.
- Rawlence, N.J.; Kennedy, M.; Scofield, R.P.; Tennyson, A.J.D.; Boussès, P.; Chambers, G.K.** 2015. Taxonomic status of *Cyanoramphus* parakeets on the Auckland Islands and implications for the validity of the orange-fronted parakeet as a discrete species. *Journal of the Royal Society of New Zealand* 45: 197–211.
- Raynal, F.E.** 1870. *Les naufragés ou vingt mois sur un récif des Iles Auckland*. Paris, Librairie Hachette et Cie: 374 pp.
- Raynal, F.E.** 1874. *Wrecked on a reef, or, twenty months in the Auckland Islands*. London, Thomas Nelson: 215 pp.
- Reischek, A.** 1889a. Notes on the islands to the south of New Zealand. *Transactions of the New Zealand Institute* 21: 378–389.
- Reischek, A.** 1889b. The habits and home of the wandering albatross. *Transactions of the New Zealand Institute* 21: 126–128.

- Rexer-Huber, K.** 2017. White-chinned petrel distribution, abundance and connectivity: NZ populations and their global context. Report to NZ Department of Conservation. Dunedin, Parker Conservation. 13 pp.
- Rexer-Huber, K.; Parker, G.C.; Sagar, P.M.; Thompson, D.R.** 2017. White-chinned petrel population estimate, Disappointment Island (Auckland Islands). *Polar Biology* 40: 1053–1061.
- Rexer-Huber, K.; Thompson, D.R.; Parker, G.C.** 2018. White-capped albatross mark-recapture study at Disappointment Island, Auckland Islands. Field season 2018. Report to Conservation Services Programme, Department of Conservation. Dunedin, Parker Conservation. 15 pp.
- Rexer-Huber, K.; Thompson, D.R.; Parker, G.C.** 2020. White-chinned petrel (*Procellaria aequinoctialis*) burrow density, occupancy, and population size at the Auckland Islands. *Notornis* 67: 387–401.
- Rexer-Huber, K.; Veale, A.; Catry, P.; Cherel, Y.; Dutoit, L.; Foster, Y.; McEwan, J.C.; Parker, G.C.; Phillips, R.A.; Ryan, P.G.; Stanworth, A.J.; van Stijn, T.; Thompson, D.R.; Waters, J.; Robertson, B.C.** 2019. Genomics detects population structure within and between ocean basins in a circumpolar seabird: the white-chinned petrel. *Molecular Ecology* 28 (20): 4552–4572. doi: 10.1111/mec.15248
- Rexer-Huber, K.; Walker, K.J.; Elliott, G.P.; Baker, G.B.; Debski, I.; Jensz, K.; Sagar, P.M.; Thompson, D.R.; Parker, G.C.** 2020. Population trends of light-mantled sooty albatross (*Phoebastria palpebrata*) at Adams Island and trials of ground, boat, and aerial methods for population estimates. *Notornis* 67: 341–355.
- Riddell, S.** 2018. *Trial of strength: adventures and misadventures on the wild and remote subantarctic islands*. Dunedin, Exisle. 254 pp.
- Robertson, C.J.R.** 1975. Report on the distribution, status and breeding biology of the royal albatross, wandering albatross and white-capped mollymawk on the Auckland Islands. pp. 143–151 In: Yaldwyn, J. (ed.) *Preliminary results of the Auckland Islands Expedition 1972–73*. Wellington, New Zealand Department of Lands and Survey.
- Robertson, C.J.R.; Bell, B.D.** 1984. Seabird status and conservation in the New Zealand region. pp. 573–586 In: Croxall, J.P.; Evans, P.G.H.; Schreiber, R.W. (eds) *Status and conservation of the world's seabirds*. International Council for Bird Preservation Technical Publication 2. Cambridge, International Council for Bird Preservation. 778pp.
- Robertson, C.J.R.; van Tets, G.F.** 1982. The status of birds at the Bounty Islands. *Notornis* 29: 311–336.
- Robertson, C.J.R.; Warham, J.** 1992. Nomenclature of the New Zealand wandering albatrosses *Diomedea exulans*. *Bulletin of the British Ornithologists' Club* 112: 74–81.
- Robertson, C.J.R.; Warham, J.** 1994. Measurements of *Diomedea exulans antipodensis* and *D. e. gibsoni*. *Bulletin of the British Ornithologists' Club* 114: 132–134.
- Ross, J. C.** 1847. *A voyage of discovery and research in the southern and Antarctic regions, during the years 1839–43*. Vol. 1. London, John Murray. 366 pp.
- Rothschild, W.** 1893. *Rallus muelleri*, sp. n. *Bulletin of the British Ornithologists' Club* 1: 40–41.
- Rothschild, W.** 1907. On extinct and vanishing birds. *Proceedings of the 4th International Ornithological Congress*: 191–217.
- Russell, J.C.; Horn, S.R.; Miskelly, C.M.; Sagar, R.L.; Taylor, R.H.** 2020. Introduced land mammals and their impacts on the birds of the subantarctic Auckland Islands. *Notornis* 67: 247–268.
- Salvin, O.** 1896. Tubinares (petrels and albatrosses). pp. 340 to 475 In: Saunders, H.; Salvin, O. Catalogue of the Gaviæ and Tubinares in the collection of the British Museum. *Catalogue of the birds in the British Museum*. Vol. XXV. London, Trustees of the British Museum. 475 pp.
- Sanguilly, W.M.** 1869. Shipwreck of the “General Grant”. *Harper's New Monthly Magazine*, New York, March 1869, 38: 535–540.
- Saunders, H.** 1896. Gaviæ (terns, gulls, and skua). pp. 1 to 339 In: Saunders, H.; Salvin, O. Catalogue of the Gaviæ and Tubinares in the collection of the British Museum. *Catalogue of the birds in the British Museum*. Vol. XXV. London, Trustees of the British Museum. 475 pp.
- Sharpe, R.B.** 1894. Catalogue of the Fulicariæ (Rallidæ and Heliornithidæ) and Alektorides (Aramidæ, Eurypygidæ, Mesitidæ, Rhinocetidæ, Gruidæ, Psophiidæ, and Otididæ) in the collection of the British Museum. *Catalogue of the birds in the British Museum*. Vol. XXIII. London, Trustees of the British Museum. 353 pp + 9 pl.
- Sharpe, R.B.** 1906. Birds. pp. 79–515 In: *The history of the collections contained in the Natural History Departments of the British Museum*. Vol. II. London, Trustees of the British Museum. 782 pp.
- Shepherd, L.D.; Bulgarella, M.; Haddrath, O.; Miskelly, C.M.** 2020. Genetic analyses reveal an unexpected

- refugial population of subantarctic snipe (*Coenocorypha aucklandica*). *Notornis* 67: 403–418.
- Shirihai, H.** 2002. *A complete guide to Antarctic wildlife; the birds and marine mammals of the Antarctic continent and the Southern Ocean*. Helsinki, Finland, Alula Press. 510 pp.
- Sorensen, J.H.** 1951. *Wild life in the subantarctic*. Christchurch, Whitcombe & Tombs. 85 pp.
- Taylor, G.A.; Elliott, G.P.; Walker, K.J.; Bose, S.** 2020. Year-round distribution, breeding cycle, and activity of white-headed petrels (*Pterodroma lessonii*) nesting on Adams Island, Auckland Islands. *Notornis* 67: 369–386.
- Taylor, R.H.** 2006a. The 1806 discovery of the Auckland Islands in the context of those times. Auckland Islands 1806–2006. CD compiled and distributed by Auckland Islands Bicentennial Committee. Wellington, Royal Society of New Zealand.
- Taylor, R.** 2006b. *Straight through from London: the Antipodes and Bounty Islands, New Zealand*. Christchurch, Heritage Expeditions. 415 pp.
- Taylor, R.** 2018. Memories of the Auckland Islands, 1954. *Antarctic* 36: 10–12.
- Techow, N.M.S.M.; Ryan, C.O.; Phillips, R.A.; Gales, R.; Marin, M.; Patterson-Fraser, D.; Quintana, F.; Ritz, M.S.; Thompson, D.R.; Wanless, R.M.; Weimerskirch, H.; Ryan, P.G.** 2010. Speciation and phylogeography of giant petrels *Macronectes*. *Molecular Phylogenetics and Evolution* 54: 472–487.
- Tennyson, A.J.D.** 1999. Confirmation of a nocturnal aerial display by Auckland Island snipe (*Coenocorypha aucklandica aucklandica*). *Notornis* 46: 241–242.
- Tennyson, A.J.D.** 2020. Holocene bird bones found at the subantarctic Auckland Islands. *Notornis* 67: 269–294.
- Tennyson, A.J.D.; Bartle, J.A.** 2005. A scientific name for fulmar prions nesting at Auckland and Heard Islands. *Notornis* 52: 47–55.
- Tennyson, A.J.D.; Imber, M.; Taylor, R.** 1998. Numbers of black-browed mollymawks (*Diomedea m. melanophrys*) and white-capped mollymawks (*D. cauta stadi*) at the Antipodes Islands in 1994–95 and their population trends in the New Zealand region. *Notornis* 45: 157–166.
- Thomson, G.M.** 1922. *The naturalisation of animals and plants in New Zealand*. Cambridge, Cambridge University Press. 607 pp.
- Torres, L.G.; Thompson, D.R.; Bearhop, S.; Votier, S.; Taylor, G.A.; Sagar, P.M.; Robertson, B.C.** 2011. White-capped albatross alter fine-scale foraging behaviour patterns when associated with fishing vessels. *Marine Ecology Progress Series* 428: 289–301.
- Trewick, S.A.; Olley, L.** 2016. Spatial size dimorphism in New Zealand's last endemic raptor, the kākārearea *Falco novaeseelandiae*, coincides with a narrow sea strait. *Ibis* 158: 747–761.
- Turbott, E.G. (convener)** 1990. *Checklist of the birds of New Zealand and the Ross Dependency, Antarctica*. 3rd edn. Auckland, Random Century. 247 pp.
- Turbott, G.** 2002. *Year away; wartime coastwatching on the Auckland Islands, 1944*. Wellington, Department of Conservation. 153 pp.
- van Tets, G.F.** 1974. Australasia and the origin of shags and cormorants. *16th International Ornithological Congress Abstracts*: 13.
- van Tets, G.F.** 1975. Observations on the Auckland Island shag, 1972–73. pp. 152–153 In: Yaldwyn, J. (ed.) *Preliminary results of the Auckland Islands Expedition 1972–73*. Wellington, New Zealand Department of Lands and Survey.
- von Hügel, A.** 1875. Letter to Bowdler Sharpe. *Ibis* (3rd series) 5: 389–394.
- Waite, E.R.** 1907. The southern islands – notes on the Governor's trip. *The Press*, Christchurch, 19 February.
- Waite, E.R.** 1909. Vertebrata of the subantarctic islands of New Zealand. pp. 542–600 In: Chilton, C. (ed.) *The subantarctic islands of New Zealand*. Vol. 2. Wellington, Philosophical Institute of Canterbury and New Zealand Government Printer.
- Walker, K.; Dilks, P.; Elliott, G.; Stahl, J.-C.** 1991. Wandering albatross on Adams Island February 1991. *Science & Research Internal Report No. 109*. Wellington, Department of Conservation. 14 pp.
- Walker, K.; Elliott, G.** 1999. Population changes and biology of the wandering albatross *Diomedea exulans gibsoni* at the Auckland Islands. *Emu* 99: 239–247.
- Walker, K.; Elliott, G.** 2006. At-sea distribution of Gibson's and Antipodean wandering albatrosses, and relationships with longline fisheries. *Notornis* 53: 265–290.
- Walker, K.; Elliott, G.; Nicholls, D.; Murray, D.; Dilks, P.** 1995. Satellite tracking of wandering albatross (*Diomedea exulans*) from the Auckland Islands: preliminary results. *Notornis* 42: 127–137.

- Walker, K.J.; Elliott, G.P.; Rexer-Huber, K.; Parker, G.C.; Sagar, P.M.; McClelland, P.J.** 2020. Shipwrecks and mollymawks: an account of Disappointment Island birds. *Notornis* 67: 213–245.
- Walker, K.; Moore, P.; Elliott, G.** 1991. The Auckland Island banded dotterel has apparently increased. *Notornis* 38: 257–265.
- Warham, J.** 1967. Snares Islands birds. *Notornis* 14: 122–139.
- Watola, G.** 2008. *The discovery of New Zealand's birds.* Orewa, Arun Books. 320 pp.
- Weller, M.W.** 1973. Waterfowl in the Auckland Islands. *Antarctic Journal of the United States* 8: 188–190.
- Weller, M.W.** 1975. Ecological studies of the Auckland Islands flightless teal. *Auk* 92: 280–297.
- Whitley, G.P.** 1938. John Gould's associates. *Emu* 38: 141–167.
- Wilkes, C.** 1845. *Narrative of the United States Exploring Expedition, during the years 1838, 1839, 1840, 1841, 1842.* Vol. 2. Philadelphia, Lea and Blanchard. 476 pp.
- Williams, G.R.; Weller, M.W.** 1974. Unsuccessful search for Auckland Islands merganser (*Mergus australis*). *Notornis* 21: 247–249.
- Williams, M.** 1986. The numbers of Auckland Island teal. *Wildfowl* 37: 63–70.
- Williams, M.** 1995. Social structure, dispersion and breeding of the Auckland Island teal. *Notornis* 42: 219–262.
- Williams, M.** 2012. A merganser at Auckland Islands, New Zealand. *Wildfowl* 62: 3–36.
- Williams, M.; Tennyson, A.J.D.; Sim, D.** 2014. Island differentiation of New Zealand's extinct mergansers (Anatidae: Mergini), with description of a new species from Chatham Island. *Wildfowl* 64: 3–34.
- Wilson, E.** 1966. *Diary of the 'Discovery' Expedition to the Antarctic 1901–1904.* London, Blandford Press. 416 pp.
- Wilson, K.-J.; Barthel, A.; Lipson, M.; Fogwill, C.; Turney, C.** 2018. New breeding records of seabirds at Carnley Harbour (Auckland Islands), Cossack Rock (Campbell Island) and south coast of the Snares. *Notornis* 65: 168–173.
- Wilson, R.A.** 1891. [Unpublished] Diary of a trip to Milford Sound and the sub-Antarctic islands, October–November 1891. [Copy held by C. Miskelly].
- Yaldwyn, J. (ed.)** 1975. *Preliminary results of the Auckland Islands Expedition 1972–73.* Wellington, New Zealand Department of Lands and Survey. 447 pp.
- Yaldwyn, J.C.** 1986. Sandhills of Sandy Bay Auckland Islands, January 1975. pp. 148–153 In: Penniket, A.; Garrick, A.; Breese, E. (compilers) *Preliminary reports of expeditions to the Auckland Islands Nature Reserve 1973–1984.* Reserve Series. Wellington, New Zealand Department of Lands and Survey.
- Young, M.J.** 2009. Beach behaviour of yellow-eyed penguins (*Megadyptes antipodes*) on Enderby Island, Auckland Island group, New Zealand. Diploma in Wildlife Management, Otago University. 32 pp.