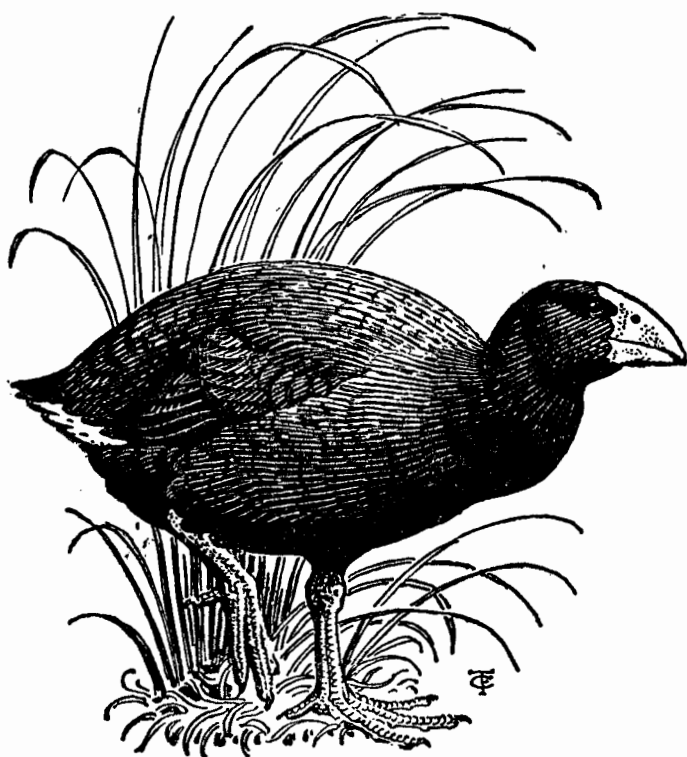


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SIGHTINGS AND RECORDS OF THE TAKAHE (*Notornis mantelli*) PRIOR TO ITS "OFFICIAL REDISCOVERY" BY DR G. B. ORBELL IN 1948

By BRIAN REID

ABSTRACT

Subfossil and midden remains show the species was once distributed throughout the entire length of New Zealand and there seems little doubt that Takahe were scattered throughout a much larger area of South Island during the latter half of the nineteenth century and in the early decades of this century than is generally known.

INTRODUCTION

Owen (1848) established the genus *Notornis* on sub-fossil bones found by W. B. Mantell in a midden at Waingongoro on the North Island west coast during 1847. The first 'living' Takahe to be described by Europeans was obtained by Mantell two years later — it was taken in Dusky Sound on the west coast of the South Island.

Knowledge of the early distribution of Takahe is based on the continuing exploration of a limited number of localities having suitable sites of preservation (caves, sink-holes, middens, etc.) and must, therefore, remain fragmentary. Furthermore, some caution is required when interpreting subfossil records from middens as food was often carried considerable distances. Notwithstanding these limitations, a fairly comprehensive record of the early distribution of the species is available. Excluding the south-west of South Island (i.e. Fiordland) where Takahe are found today, subfossil material has now been recorded from 45 different localities throughout New Zealand (Hamilton 1893; Gurr 1952; Yaldwyn 1956; Williams 1960; Trotter 1965; Medway 1967 and pers. comm.; R. J. Scarlett, pers. comm.). These localities extend from the northernmost tip of North Island to the most southern headlands of South Island (Fig. 1).

NORTH ISLAND

Subfossil remains are known from 19 areas and show the species was once widely distributed throughout the island. Half of the records come from sink-holes or caves which, with two possible exceptions, are located in areas that were extensively forested in pre-European times (Holloway 1960). It seems that the North Island Takahe often inhabited localities well removed from the limited areas of tussock-grassland and was more a bird of the forest than of the more open scrub and fernlands. Yaldwyn (1956) mentions that one of several caves at Martinborough, which previously were in forested land, was a sink-hole. It acted as a pit-trap for flightless birds and contained seven *Notornis* crania.

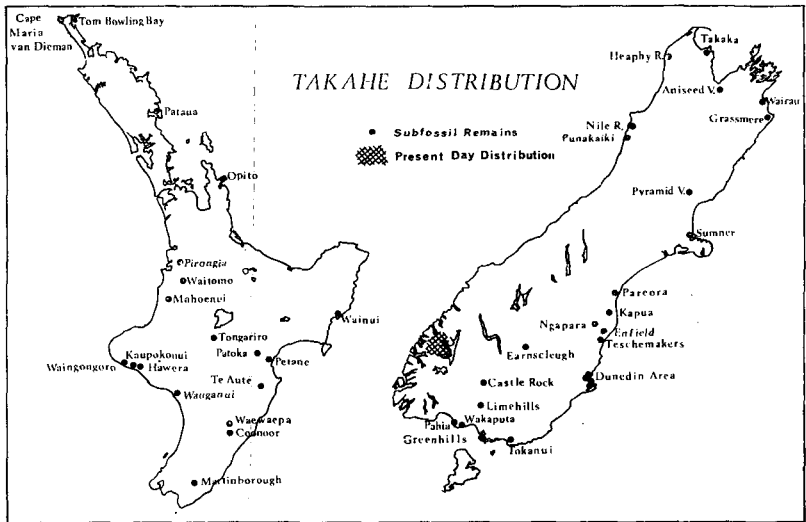


FIGURE 1 — Distribution of subfossil remains. Since 1960 (see Williams 1960, Fig. 1) Takahe remains have been found in a further 14 localities. These include nine sites in the North Island and five in the South Island.

It is not known when Takahe disappeared from North Island. While bones from early middens indicate the species was used for food, legends of the North Island Maoris give no clear reference to the bird (Williams 1960) and this suggests the North Island form either became extinct shortly following Maori colonisation or survived in low numbers during more recent centuries. Phillips (1959) presents quite convincing evidence of their existence in the Ruahine (and possibly the Tararua) ranges late last century. The Ruahines in the 1870s perhaps parallel Fiordland today as there are no obvious reasons why isolated, remnant populations should not have lingered among

the extensive undulating tussock tops and forested slopes of these mountains long after the species had disappeared from other parts of the island.

SOUTH ISLAND

Knowledge of Takahe distribution in South Island includes three categories of factual data — subfossil records, early sightings and recent surveys — along with Maori traditions and an accumulation of unconfirmed reports covering the latter half of the nineteenth century and the first half of this century. Many of these are dismissed, perhaps unfairly, as either fallacy or fantasy and only those accepted as being true or plausible are mentioned in this account.

Skeletal remains are known from 26 localities throughout South Island. Most records come from the eastern side of the island. These have not been accurately dated but are generally believed to be very old and Williams (1960) considers Takahe have long been extinct or very rare east of the Southern Alps. Midden material at Wairau Bar and Lake Grassmere was assigned by Duff (1956) to the Moa-hunter culture of 950-1550 A.D. while bones from Pyramid Valley and from some caves (i.e. Earnscleugh and Castle Rock) further south are associated with those of the large moas which Duff believes became extinct before 1450 A.D.

The foregoing suggests the species generally disappeared from this part of the island about 1100-1400 A.D.; or at a time when it is thought that large areas in this part of their range were reverting from forest to tussock-grasslands (Raeside 1948; Holloway 1954; Deevey 1955) which should have been advantageous to and perhaps led to an increase in the number of Takahe. This apparent anomaly may be explained if the climatic changes that favoured the spread of tussock also created conditions too arid for this graminivorous but water-loving rail.

Alternatively, populations may have survived in suitable areas of the Marlborough, Canterbury and Otago tussock lands until more recently than is believed by Williams, and Duff (1949) suggested Takahe once grazed throughout this extensive tussock zone.

The five records from the north-west of the island (Nelson Province) come from caves situated in, or on the coast backed by extensive forested areas which, perhaps, suggest a forest-dwelling species. However, in all instances these deposits were within 20-30 km of the nearest alpine tussock-lands and such distances could readily be covered by birds during their wintertime wanderings.

The patterns of shrinkage displayed by various extinct, near-extinct and rare native birds have been documented and discussed by Archey 1941; Oliver 1949; Williams 1956 and 1962; and Williams & Harrison 1972. Williams (1962) points out that all (including *Notornis*) follow a generally similar sequence, viz. extinction in North Island followed by diminution in the south with final stands being

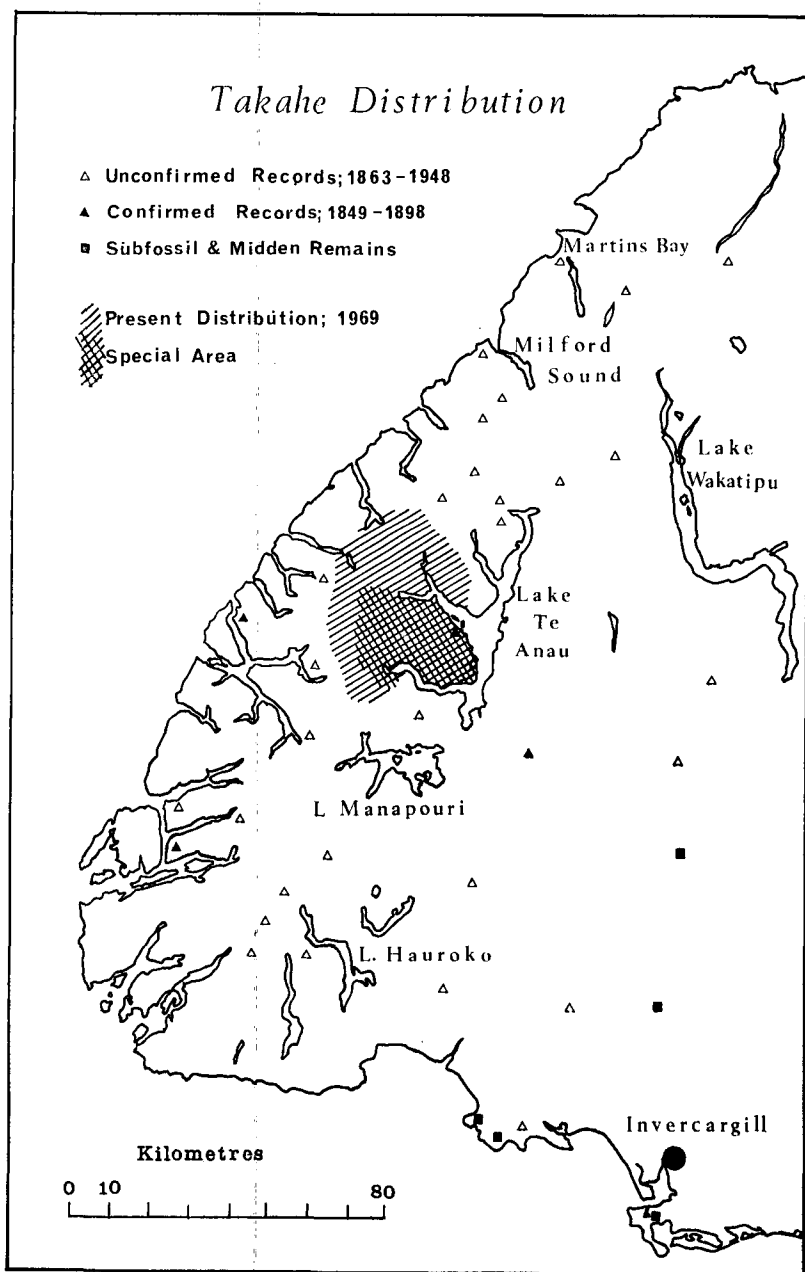


FIGURE 2 — South-west area of the South Island showing the present distribution of Takahe and also the locations of unconfirmed sightings, early captures and subfossil remains.

made in Fiordland — and his view that the decline in *Notornis* range and numbers during pre-European times has resulted primarily from climatic changes remains undisputed.

A few Takahe may have survived in the Nelson district during European times. In 1866 a Mr Gibson described a bird seen near Motupipi to Sir James Hector which the latter had no doubt was a Takahe (Turbott 1967) and 95 years later D. S. Allison found undated Takahe bones in a cave at Motupipi. Gordon Craig claimed seeing Takahe in the Nelson hills during 1934 and the same claim was made by two others in the same locality the following year. Although R. A. Falla (pers. comm.), who was familiar with the details, sought support for Craig in 1937 when the latter notified of his intentions to confirm the species presence, the official attitude of the day prevented this. Perhaps Takahe, like New Zealand's other very rare ground bird, the Kakapo (*Strigops habroptilus*), survived for longer and in greater numbers in Nelson than in any other part of the country with the exception of Fiordland.

There can be little doubt that the number of Takahe living in Fiordland has progressively declined during this century. Although only four living specimens were recorded (Oliver 1930) prior to the rediscovery in 1948 (Orbell 1949), it seems that Takahe were still widely distributed throughout Fiordland in the early nineteenth century. These four records (Dusky Sound, 1849; Deas Cove in Thompson Sound, 1851; 'the Wilderness' 5.5 km east of the Whitestone River, 1879; and on the shore of the Middle Fiord of Lake Te Anau about one km south of the mouth of the Snag Burn in 1898 (Drummond 1910)) show that during the latter half of last century the species still occurred east of Fiordland and probably inhabited an area in excess of 3850 sq. km or 1500 sq. miles (Reid 1969) as it is unlikely that four random records would denote extreme margins of the birds distribution. Unconfirmed reports from the middle and late nineteenth century suggest, in fact, that Takahe were then spread somewhat irregularly and discontinuously throughout about 15,000-16,000 sq. km (6,000 sq. miles): from Preservation Inlet in the south-east to north of Milford Sound; and to Mossburn and the Irthing River in the east.

There were no confirmed records between 1898 and 1948, and the species was considered to be 'officially' extinct although occasional sightings of Takahe were reported from Preservation Inlet to Milford Sound and from as far east as the Waiau River during this 50 year period. These three localities form the apices of a triangle some 11,500 sq. km (4,500 sq. miles) in area in which the Murchison Mountains occupy a more or less central position.

In addition to the reports from within this roughly triangular block, other unconfirmed sightings were reported from further north. These include:

Arawata River. In June 1950 L. Pracey (pers. comm.) was informed by an elderly ex-employee of the Ministry of Works at Jacksons

Bay that Takahe had been seen occasionally on the tussock slopes above the junction of the Joe and Arawata Rivers and below the Snowball Glaciers on the eastern side of the Arawata Valley earlier this century. Close questioning by Mr Pacey did not shake the old man's story.

Hunter Valley, Lake Hawea. "During Government deer control operations in 1943 my brother Norman shot what he thought was a stray pukeko in the head waters of Lake Stream. The area is not suitable habitat for pukeko and on recovering the bird he found it to be a takahe. I questioned him again about this incident after Notornis were rediscovered in the Murchison Mountains but he remained emphatic that the bird in Lake Stream was a Takahe." (T. Thomson, pers. comm.).

These and several other 'records,' along with the sightings in Nelson by Gibson and by Craig, suggest an irregular pattern of shrinkage with small pockets of Takahe persisting for longer in some isolated areas than in the surrounding country. Although this possibility was suggested by G. R. Williams (unpubl. rept, Dept Internal Affairs 1950), his thinking was somewhat contrary to established attitudes. Even following rediscovery in 1948, it was widely accepted that Takahe had been absent from all areas for a long time with the recently proven exception that a few birds still survived in a restricted area of the Murchison Mountains. This belief was in accord with a tradition of pessimism dating back to 1851 when the second living specimen was caught and Dr G. A. Mantell's *Fossils of the British Museum* was published. This book contains as its frontispiece an illustration of *Notornis* and in its text — "... it is unlikely that any further living specimens will ever be found ..." In official circles this attitude prevailed through time and reports from trampers or hunters were usually regarded with either scepticism or outright disbelief. Some who reported the presence of Takahe were discouraged, or even obstructed, from following up their clues. Reports were often hushed up and then ignored because — "... in the interests of conservation ... if there are any species generally believed to be extinct, the best course is not to disclose any different information ... (and thus ensure) ... the birds are not interfered with" (W. E. Parry, Minister of Internal Affairs, 26 November 1937). In retrospect these attitudes are hard to comprehend but the limited resources of the nation during the early decades of this century precluded the implementation of more positive policies, and secrecy does ensure a certain protection.

During the early days members of exploration and survey parties watched for Takahe. The surveyor, E. H. Wilmot, while working between Manapouri and Dusky Sound in 1897, remarked on the paucity of birdlife and wrote — "... of course we all kept a lookout for Takahe, but saw no signs of this rare bird" and John Hay (District Surveyor, Southland), who explored country between

the mouth of the Waiau and Preservation Inlet in 1883, commented — “. . . Kiwis are not very numerous, . . . Kakapos are very plentiful in most places . . . (but) . . . no signs of Takahe.” Although Maori tradition and folklore inferred, if not openly stated, that Takahe lived above the bushline, Europeans were more influenced by the fact that the four living specimens taken last century came from sea level or low altitudes and generally confined their searches to these areas. Smith (1888) probably reflected the opinion of the majority (including Charles Douglas; Pascoe 1957), and also accounted for the small number of reported sightings, when he wrote — “. . . After examining some of the secluded habitats of *Notornis* . . . (I consider) . . . it would be found in swampy parts of the bush, or on sedgy lagoons some distance inland on the southern rivers of Westland.”

While Buller (1882) who thought “it possible that many yet survive” and Benham (*Otago Daily Times* 23 August 1898) both stated the Takahe lived at higher altitudes than suggested by Smith — neither endorsed the Maori belief that it lived above the forest line. Following the capture of the third specimen, Buller wrote — “the weather had been exceptionally severe . . . (and the bird) . . . had been driven down from high country.” After the fourth specimen was taken, Benham wrote — “all four were caught during winter . . . on low lying ground, but there is little doubt that *Notornis* usually lives in higher and rougher bush, and was driven down by stress of weather.”

The Doon block, a popular hunting ground since the early 1920s, has been traversed by many since “P. Q. Caples and W. Dalton searched the rivers at the head of the Middle Fiord in 1863 . . . (and) . . . Quintin MacKinnon and George Tucker followed the Doon River and Large Burn in 1887” (Hall-Jones 1968); and yet it was not until 1956 that sign of Takahe was first reported in this locality (P. W. Maurice, pers. comm.). This and subsequent reports were confirmed by Wildlife Service Officers in 1967.

Unconfirmed sightings of Takahe made prior to 1948 in the south-west of South Island are grouped according to locality and the region is divided into four zones —

South Zone:

South of Lake Manapouri — Breaksea Sound, and west of the Waiau River.

Mid Zone:

The area north of Manapouri and Breaksea, but south of Clinton River and Sutherland Sound — and west of Lake Te Anau.

North Zone:

From Sutherland Sound to Martins Bay and west of the Hollyford and Pyke Rivers.

East Zone:

Includes all reports east of the Waiau and Lake Te Anau.

SOUTH ZONE

In January 1887, 38 years after the first living Takahe known to Europeans was caught by sealer's dogs in Dusky Sound, Reischek (1888) unsuccessfully searched for Takahe. He "... explored about 20 sq. miles (50 sq. km) of good grass country ... capable of pasturing 1600 head of cattle ... on table land about 1400 feet (430 m) above sea level ..." between Chalky and Dusky Sounds.

In 1888 Park (1889) reported hearing Takahe calling from three or more different localities in Dusky Sound. These, along with his records of Takahe in the Matukituki River in 1881 were strongly disputed by Melland (1890) who considered Park's descriptions of the calls better fitted those of Kakapo. Park (1891) replied with feeling and while Gurr's (1952) — "own experience of the habits of *Notornis* and its unmistakable 'booming' note — (make him) — reasonably certain that Park's records are correct", Williams (1956) considers that — "in general the honours seem to be solidly with Melland." The differences appear more significant than the similarities between Park's Dusky Sound and Matukituki records and while I am inclined to agree with Park's interpretation of the former, I believe he encountered only Kakapo in the Matukituki. The surprising point in this wrangle over the identity of the anonymous bird calls is that neither participant compared or contrasted these with the calls of the Weka (*Gallirallus* spp.) as the range and variety of Takahe calls are somewhat similar to those of the Weka — but tend to be deeper, louder, more resonant and more percussive.

While on a moose-hunting trip in Dusky Sound during 1921-22 Charles Evans (a ranger for the Southland Acclimatisation Society who had previously located "large straw stools" now known to be characteristic of Takahe) found footprints which he considered were made by *Notornis* in Beach Harbour and the launch crew saw a strange bird "large as a goose, and with the appearance of a swamp-hen." Evans later examined the feet of the specimen at Otago Museum and these corresponded with the prints he had seen (*Southland News* 25 November 1948).

There have been several reports of Takahe in the country south of Dusky Sound. An old Maori client described Takahe to Bathgate (1899), compared them with the Pukeko (*Porphyrio p. melanotus*) and said he had been told by the Aparima Maoris some 50 years previously that these birds were plentiful, but "went in patches," between Preservation Inlet and Lake Hauroko.

While Sir George Grey was at Preservation Inlet in 1868 some Maoris indicated a valley at the head of the Inlet where *Notornis* were said to be plentiful (Turbott 1967).

Two reports on the files of the Department of Lands & Survey and the Department of Internal Affairs are of interest. William Campbell (in a report dated 20 December 1948) stated that during the depression years (1928-1934) he and a companion spent most

of their time goldmining at Wilson River, south of Puysegur Point. To supplement their meat supply they would, from time to time, boat to Cascade Basin at the head of Long Sound and then tramp east to the tussock tops around the head of Lake Poteriteri where they saw birds which they described as "Grandfather Pukaki" (i.e. Pukeko) on many occasions.

The second report came from Cuthbert, a Government deer culler, who claimed seeing a bird "half larger than a pukeko — but with short legs" on a river flat between Long Sound and Lake Hauroko during 1937. The Forest and Bird Protection Society was opposed to Cuthbert's plan to return to the area in case the bird was caught and sold, and at their suggestion he was transferred from the district — and his story was discredited.

In November 1932, Mr E. Guthrie and his truck driver cornered, but failed to catch, a bird "18-20 inches high, beak and legs decidedly red, feathers green — and flecked with blue" at his timber mill on the Alton Burn, four km north-west of Tuatapere. When chased, this bird scrambled and hopped over logs — it could not fly. Although Guthrie had his belief that the bird was a *Notornis* reinforced the following month when he visited Wellington to discuss the sighting with Dr W. R. B. Oliver, he — "... was no publicity hunter, most reliable . . . and wished to remain anonymous" (F. G. Hall-Jones pers. comm.). The press, however, obtained the details from a third party five years later (*Evening Post* 1 December 1937).

A National Forest Survey party traversing the forests of Western Southland during 1946-47 was advised by an old prospector to watch for "Giant Pukakis" which were "good eating" on the tussock tops in the Hauroko - Poteriteri district (W. J. Wendelken pers. comm.).

MID ZONE

Maori tradition indicates that Takahe were well known in the country to the west of Lakes Te Anau and Manapouri. In his report of 1863, and later in a letter to Buller (Turbott 1967) Hector wrote — "I heard from the Maoris that these birds are, as yet, tolerably plentiful on the west side of Te Anau Lake . . . (particularly) . . . at the head of the North-West Arm near a small lake in a valley that leads to Bligh Sound. When feeding they are in the habit of cutting the grass . . . and laying it in a heap." The last statement suggests that at least one Maori informant was quite familiar with the habits of *Notornis*, while the preceding statement could refer to Lake Hankinson which was later mentioned by James Richardson in a series of historical articles on Fiordland written for the *Otago Daily Times* in 1891 — i.e. "The takahe is a species of large pukaki, much esteemed as a food by the natives who journeyed even as far as Lake Hankinson . . . specially to hunt them."

Following the capture of the fourth Takahe in 1898 an article in the *Western Star* stated — "There died at Colac Bay about 30 years ago an old Maori, Abraham who (with others) used to make

periodic trips . . . crossing Te Anau on Korari rafts . . . to a valley, at the back of this lake . . . (which) . . . they averred, was the only place they saw and killed the bird, since called *Notornis* . . . for food." (Beattie 1949).

Cowan (1906) writes — "In former times, according to Te Paina and Kupa Haereroa of Colac Bay, takahe were plentiful around the shores of Te Anau and Manapouri. They were driven down from the mountains by winter snows One of the spots much frequented by the bird was a lagoon . . . Te Wai-o-pani on the south-west shore of Te Anau. This lagoon is backed by a high cliff. Here the takahe . . . was hunted with dogs. The white man . . . has not yet discovered this well hidden spot." Cowan, along with John Hay (1883, *Lands & Survey Fieldbooks*, Invercargill), Richard Henry (1900), and John Moffett (*Southland News* 28 September 1909) expressed the belief that a few Takahe still existed west of Te Anau and Park (1889) stated that "much time has been spent searching for them" in that locality. Richard Henry who "was always on the look out for takahe" (Hall-Jones 1968) spent considerable periods in the mountains west of Te Anau "hunting for the unknown bird . . . responsible for the powerful and alarming . . . booming note" (Melland 1890) and, with "Quintin MacKinnon, followed the Tunnel Burn to above the bushline (i.e. the start of Takahe Valley) where they came on some old deserted tussock whares used by the Maoris when hunting takahe" (Beattie 1949).

Hall-Jones (1972, "Te Wai-o-pani," unpubl. mss) states that while there is no mention of these tussock huts in the written reports of either MacKinnon or Henry, other evidence (*in* Hall-Jones 1945) convincingly demonstrates that Te Wai-o-pani of the early Maoris is, indeed, the vale (since named Takahe Valley) where Dr G. B. Orbell rediscovered *Notornis* in 1948 — and where K. H. Miers found signs of Maori habitation under rock shelters one year later (Duff 1952). Duff thought the shelters were occupied by a small party of Maoris some time after the beginning of the eighteenth century, and his opinion was endorsed by the subsequent carbon-dating of some of the material at 1720 A.D. plus or minus 60 years (Fergusson & Rafter 1957).

According to E. S. Dollimore ("Takahe, Historical Notes," unpubl. 1956), Beattie had long identified Takahe Valley as Kohaka-Takahe — the legendary "nesting place of the takahe." He did not, however, publish this information until the year following Orbell's rediscovery (Beattie 1949). Beattie (1945) mentions that the Kepler Mountains, to the old Maoris, were the Takahe Mountains and access for hunting parties was up the Wai-Takahe Stream (now Forest Burn) which drains into the Waiau between Te Anau and Manapouri.

Within days of Orbell announcing the rediscovery, Mr Les Murrell — who opened up the route from Manapouri to Bradshaw Sound by placing a series of camps along the Freeman Burn and Tuaraki Stream in 1933 (Hall-Jones 1968) — informed Wildlife Service

staff at Te Anau that he had known of Takahe in the upper Freeman Burn for at least 20 years (K. H. Miers pers. comm.). Murrell had remained silent about his sightings and was perturbed because now the species' existence was well known.

The Murchison Mountains were a popular area for shooters from the 1920s to the 1940s. In the early twenties the late General Sir Norman William McDonald Weir (a Councillor of the Southland Acclimatisation Society) and T. F. Gilkinson saw "Pukeko through binoculars while scanning the floor and slopes of Takahe Valley for deer (F. G. Hall-Jones pers. comm.) and the *Auckland Weekly News* of 17 May 1933 contained a photo of Takahe Valley over the caption ". . . successful stalkers . . . this year were the Nitz brothers of Masterton . . . the valley is a splendid feeding ground."

Trevor Thomson and his brother (pers. comm.) did not see Takahe "or any evidence of them" during a day's shooting on the tussock tops above the Ettrick Burn (Dana Peaks area) in November 1946; but the following year C. Drysdale, after returning from a shooting trip in the neighbouring Chester Burn, informed C. E. McIvor (pers. comm.) of the presence of "pukeko" on the high tussock slopes of that head basin. A party shooting red deer and wapiti hybrids during April 1948 reported hearing strange 'kerlonk' bird calls in the Snag Burn (K. H. Miers pers. comm.) and there were several other reports which indicate the Takahe were either seen or heard, but not recognised, in the Murchison and other Mountains west of Te Anau during the years preceding their "official rediscovery."

These reports include one of "unknown bird calls and strange tracks in the Mid Burn" by Ken Sutherland (Orbell, letter of 18 January 1949); and another stating solitary specimens had been seen at various unspecified dates in the Glaisnock River (Beattie 1949). Both Les and Guy Murrell independently, and at different times, stated a belief that Takahe were in the Billy Burn (Vercoe, memorandum 7 March 1950; J. A. McIntosh pers. comm.). Guy Murrell's belief was based on the observations of Bain who spent considerable periods in this river during (or about 1940) and saw "funny swampies (i.e. pukeko) that could not fly" on the first clearing (J. A. Anderson pers. comm.).

Birds, since believed to be Takahe, were seen on at least three occasions in the Worsley Stream — first by R. Shearing in the South Branch (Waterfall Creek) during 1928 (Orbell, letter dated 18 January 1949) and then twice by T. H. Galbraith. Shearing later communicated his observation to R. A. Falla and Galbraith, in a letter to C. A. Fleming (dated November 1952), wrote — "In January 1932 . . . while fishing about a mile up the river with Mr Cheriton (manager of the Milford Track) we saw what we took to be two pukeko . . . but they appeared to be larger . . . and their colour different. The birds were in an open forest glade . . . a strange locality for pukeko as there was no swamp country in the vicinity. In January 1933 we returned to the Worsley and I saw . . . the same pukeko in

almost the same locality . . . I walked to within 100 yards of them and they disappeared into some scrub. I was convinced these were not the ordinary pukeko as I had seen these at close range a few weeks previously. Neither of us had . . . heard of the *Notornis* . . . I next visited the Worsley in January 1951, . . . after the rediscovery . . . and searched all over the open glade, but saw nothing of the birds." That these 'pukeko' did not fly, but moved into scrub, is of interest; and Vercoe, after checking on a different sighting, stated (memorandum, 1950) — ". . . There is no doubt that some takahe were in the Worsley about 15 years ago."

In addition to the two captures at Dusky and Thompson Sounds, there were several unconfirmed reports of Takahe west of the main range, including two from the latter Sound. Hector (1863) reported finding Takahe footprints on a swampy flat at the head of Deas Cove (where one specimen was captured 12 years earlier) on 5 August 1863 and Cumming (1953) saw a bird 17-18 miles (28 km) further up Thompson Sound at Gaer Arm in January 1910. This bird, which was — ". . . an outsize in pukekos, at least twice the size and more colourful . . . like a Black Orpington rooster but more streamlined" walked out of the bush onto a sandy spit and stood in full view of the cutter's racing crew (resting 50 feet off-shore) for about three or four minutes before taking fright and scuttling back into the bush when a sailor splashed with his oar. Although January is an unlikely month for Takahe to be at low altitudes Cumming's account is, nevertheless, most convincing.

Beattie (1945) records a sighting by Charles Port and James Richardson of "five overgrown swampheens on a piece of semi-cleared land" while returning down the Irene River to Emelius Arm (Charles Sound). At a later date Port viewed the mounted Takahe at Otago Museum and thought it looked smaller than the living birds he had seen. "Port had informed Robert McNab and Dr Young of his find but neither believed the story. He was very hurt over this. He kept a diary and notebooks, and having received much historical information from him, I had no difficulty in believing him when he told me at Riverton some time about 1910" (Beattie pers. comm.). In support of Beattie's defence of Port — the specimen at Dunedin does look smaller than birds in the wild and even today a few Takahe still inhabit the upper reaches of the Irene River.

An anonymous sighting of Takahe in Doubtful Sound some time prior to the rediscovery was reported by A. E. Hanan in the *Christchurch Press* on 4 October 1949.

NORTH ZONE

An early probable reference to *Notornis* which is mentioned in the cruise journal of HMS *Acheron* is cited by Beattie (1950). While anchored in Milford Sound during March 1851 Stevens (the pilot) saw a mysterious bird with ". . . intense magnificence of plumage . . . (and) . . . of all colours." Later a shore party,

including Dr Lyall, fancied seeing the same bird while collecting ducks, kakapo and kiwi. Hall-Jones (1968) points out that the narrative of this cruise — "... contains a very complete list of birds, including all those likely to be confused with *Notornis* ... (and therefore) ... there can be little doubt this is one of the earliest recordings of the species."

Between 1920 and 1950 there were several reports of Takahe in Milford Sound — but some of these sightings were undoubtedly of Pukeko. In November 1923, R. A. Waitiri, the launch master at Milford, approached to within 10 feet of a "strange bird, like a pukeko, only larger." Mr A. Leigh-Hunt requested further details and Waitiri, who was unfamiliar with Takahe, obliged by drawing and describing this species very accurately.

In April 1925 a visitor to Otago Museum, after inspecting the mounted specimen, was positive in his assertions to W. Goodlet (the Custodian) that he had recently seen such a bird at Milford Sound (*Otago Daily Times*, 16 April 1925). During the same year workers on the Milford Track also reported seeing Takahe. Although their claim was greeted generally with scepticism, Mr Dan Greaney vouched for the integrity of these observers in a letter to R. A. Falla (pers. comm.).

Don Matheson, an honorary ranger for the Southland Acclimatisation Society, in a letter to Internal Affairs dated May 1940 wrote — "... A friend, C. Rogers, who worked on the Milford Track during the summer of 1939-40, claimed there were a pair of *Notornis* where the Arthur River flows into Lake Ada. Rogers was certain they were not pukeko, although somewhat similar. He said the birds had been seen by many tourists, one of whom informed him they were worth 1000 pound (i.e. 2000 dollars) to anyone who could get them to a museum ...". Mr Long (manager of the hostel at Milford) stated that Pukeko had previously been reported from Lake Ada and while he personally was inclined to think Rogers saw Pukeko he "knew for sure that a takahe had been heard and chased further down the Sound at Anita Bay some years earlier by Guy Murrell and Mr McKenzie of Martins Bay."

Williams (1954) mentions that an old friend of his, when guiding on the Milford Track, saw Takahe on two separate occasions and heard them call more frequently.

Daniel McKenzie, the pioneer settler of Martins Bay (James-town) found bird prints six inches long on a sand ridge while travelling along the coast to the Kaipo River. He had seen such tracks before and stated they were made by a "fairly tall bird with bright blue plumage" which he concluded was a Takahe (E. S. Dollimore 1956; unpubl. notes). His daughter Alice saw a large blue bird which she took to be a *Notornis* in 1880 and again in 1889. She records that her brother independently saw the same bird and that over a period of several years its prints were often seen during winter in the sand at Martins Bay (McKenzie 1947).

In 1863, three years before Daniel McKenzie settled in Martins Bay, Captain Alabaster sailed up the Hollyford past Lake McKerrow and up the Pyke River to discover the lake that now bears his name. "During the trip, . . . according to Vincent Pyke, . . . Alabaster is reported to have encountered a party of Maoris whose diet commonly included the takahe." (Bennett 1952).

EAST ZONE

The third Takahe captured last century was injured by a dog on Hankinson's property, some 13 km ESE of Te Anau township in 1879. It is unlikely that this one confirmed record was the only bird seen; and it seems quite probable that the species, although rare, was fairly widespread east of Te Anau and the Waiau River 50-100 years ago. The old Maori who mentioned that Takahe were to be found in the Lake Hauroko area (Bathgate 1899) also stated that he had seen a dead bird while visiting Aparima some time before 1850. The account implies that the bird was feathered and in good condition; and this suggests it had been caught locally — and not carried for several days across at least 72 km (45 miles) of rough travelling that lies between these two localities. With the possible exception of species which were of ceremonial importance, game was usually 'dressed' before being carried over the considerable distances that sometimes separated hunting ground from village. There are no records, however, that indicate Takahe were of special significance and furthermore, food items could only outlast long journeys if the original supply was abundant, or if the intervening country provided the needs of the party while en route.

During the early days of European settlement there were one or two vague stories of large Pukeko on the lower slopes of the Takitimu Mountains, and these include a now anonymous report of "an extra large breed in the Blackmount area that could have been takahe" (G. Molloy, pers. comm.).

Two nearly complete subfossil *Notornis* skeletons were found at Castle Rock in 1892 (Hamilton 1892) — and two years later W. Malone (pers. comm.) saw a freshly killed bird about 8 km further up the Oreti Valley near the Irthing River. He writes — ". . . About 1875 my parents took over a farm at Lowther . . . to the west was a large cattle run — the Five Fingers Estate. The vegetation was predominantly a large red tussock three to four feet high; on the streams bullrush and flax grew. There were no trees. The area teemed with wildlife . . . Pukeko invaded our oat and turnip fields and strolled around our house. Three miles away at Round Hill was a cattlemen's camp. Two men from this camp, wishing to catch a train, cut across country and waited at our place. They carried a strange bird which their dog had caught and killed a mile-and-a-half back. A discussion followed. I was an interested listener. These men had no previous knowledge of the bird which was of strong build, larger than a domestic fowl, with blue feathers and a beak formation similar

to the pukekos. My father, after 20 years residence in the area, had neither seen nor heard of this species. When the train arrived the men departed, taking the bird with them. At the time I was about eight years of age. During the years that have passed I have often thought of this mystery bird and think it could be one of the species recently rediscovered west of Lake Te Anau."

Although Lowther lies approximately 48 km (30 miles) east of 'the wilderness' (Hankinson's), the Mararoa and Oreti River catchments formed a continuous zone of more or less suitable habitat. Two unconfirmed reports relate to the mountains north of, and in part drained by, these rivers. John Moffett and a companion (*Southland News* 28 September 1909) reported seeing a Takahe by a swamp at the head of the Mataura River in the Eyre Mountains — and birds were seen in the Ailsa Mountains by T. L. N. Johnston and 'Jock' Edgar (guide on the overland track from Queenstown to Glade House) during the summer of 1921-22. This sighting was — "on the open tops east of Lake McKellar, in an area known as The Keys which contains several small tarns and lies between the heads of the Caples and Greenstone Rivers — the place is reached by the old track from the Howden hut to the tops, then turning due south — at the time we took the birds to be pukeko but I now believe, with certainty, that they were takahe" (T. L. N. Johnston, letter to F. L. Newcombe, 1952).

In 1910 one of Edgar's assistant guides reported having seen an "over-sized, brightly plumaged pukeko" on the Te Anau side of, and just below Birling Pass in the Earl Mountains. The guide was surprised "because pukeko do not occur at such high altitudes" and Sir George Fenwick, after obtaining full details, was convinced the bird was a *Notornis* (*Otago Daily Times* 17 March 1950).

It may seem surprising that the Malone family along with several others who reported 'strange birds' were unaware of their probable identity until the austere conditions and poor communication of those days are taken into account. The pioneer farmers were totally involved 'breaking-in' their land and — "it is said that after the *Notornis* was caught in 1898 and sent to the Otago Museum, an old settler from Te Anau went to Dunedin to see it, expecting to find a great novelty. He looked at it for a moment and exclaimed — 'Why them's the birds we lived on all last winter. Our dogs used to catch 'em in the swamp'" (*Southland News* 25 November 1948). Although this report probably greatly exaggerates the number of captures, it has credence in that the birds were taken during winter.

Drummond (1910), paraphrasing a letter from J. Connor (Hankinson's manager in 1879), states that Robert Scott, the rabbitier whose dog caught the Takahe in 'the Wilderness,' was unaware of its identity or value. Scott had removed the bird from his tent pole and thrown it into a bush when preparing to shift camp site because even the "Keeping of a few feathers from . . . this somewhat large pukeko . . . was hardly worthwhile." Connor, who visited Scott

as the latter was packing, was casually shown the discarded specimen and he recognised "it as a stranger which he guessed was probably a *Notornis*." Drummond ends his article thus — "The incident gives rise to some reflections in regard to the number of specimens which may have been found, but which, through sheer ignorance, have been lost to the world."

During February 1949 I was led, by an octogenerian store-keeper at Rotokawau, into discussing the recent rediscovery. He grew up on a farm east of Te Anau and stated that a few specimens, which were 'good eating — but all drum-stick,' had been taken in the back country behind his home during the period 1875-1885. Recent dissections of Takahe have made his statement abundantly clear — each leg and thigh contains nearly five times as much flesh as the breasts in this flightless species.

OTHER SIGHTINGS AND COMMENTS

A contributor to the *Lyttelton Times* (Anon. 1886) wrote — ". . . not more than a year ago a Maori shearer assured me that there were still plenty of *Notornis* in certain localities in the Te Anau district" and Potts (1873), who had recently met a man whose diet probably included Takahe, regretted that reports of rare species were not forthcoming because — "the men who seek a living in the wilds of the S.W. coast of the South Island are not given, as a class, to the study of natural history." Concern was felt that while those who could encounter *Notornis* in their day-to-day living may be willing to eat the bird, they were seldom inclined to make their encounters public and, as a consequence, science could not "fully elucidate on the problems of this species" (Buller 1899). Buller continued — ". . . we should escape the reproach of posterity by doing all in our power to preserve the species . . . (or failing this, to at least obtain) . . . a full life history of this and other expiring species" and A. Hamilton considered that the authorities, as a logical start, should organise an expedition to locate Takahe (Bathgate 1899). Government had higher priorities for its limited exchequer so the visiting Bishop of Salisbury, in a sermon given at St Pauls in Wellington — "hoped that in this centre of activity in the Colony, there would be found gentlemen of leisure who would consecrate their lives to the study of the rare and vanishing fauna" (Buller 1899).

The Bishop's plea remained unheeded and, over the decades, reports of Takahe were infrequent. Two, reported by the Custodian of Otago Museum (W. Goodlet) in 1925, are of interest. "During 1924 a visitor from Te Anau asked to see the takahe exhibit. He satisfied me that he knew the haunt of *Notornis*, and mentioned that he had seen the bird three times within the previous three months. Another visitor during March 1925 definitely identified the mounted specimen as being the same as a bird he had seen and carefully noted particulars of in the Te Anau district. This person was convinced enough to also report his observations to Prof. W. B. Benham." The Custodian, unfortunately, did not record whether the sightings were made on the east or west side of the lake.

Takahe have even been reported on off-shore islands. A Mrs Cameron of Centre Island in Foveaux Strait stated that two birds "resembling pukeko, but of the size of a turkey" were killed and eaten by Maoris in 1878. She subsequently offered twenty pounds (equivalent to about \$400 in 1974) for a specimen, but without success (Chapman 1882). These birds presumably came from the mainland — the headland of Colac Bay lies 8 km to the north and it was at Lake George, near Colac, where an old Maori claimed seeing three or four Takahe when a small boy. Beattie (1949), who interviewed the old man before 1910, quotes him thus — "It is a big species of pakura (swamphen), but is more forcible, and would barge its way through growth and swamp."

Oliver (1930) never even hinted that Takahe might be extinct although more than 30 years had passed since the last specimen was obtained, nor can I find any other pre-rediscovery reference that states such a belief. Both Herries Beattie (pers. comm.) and F. G. Hall-Jones (pers. comm.) believed the circumstantial evidence and hearsay that came their way prior to 1948 was sufficient to nullify any pessimism. The latter wrote — "No one who gave any thought to *Notornis* believed the bird to be extinct" — and labelling it such at the time of Dr Orbell's rediscovery — "was newspaper sensationalism to dramatise what was (in any event) a very exciting occurrence."

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AN ASSESSMENT OF THE NUMBER OF TAKAHE IN THE 'SPECIAL AREA' OF THE MURCHISON MOUNTAINS DURING THE YEARS 1963 - 1967

By BRIAN REID and D. J. STACK

ABSTRACT

Details are given of the following evidence leading to an assessment of the number of Takahe in the "Special Area," a region of 518 sq. km in the Murchison Mountains: the number of known Takahe "territories" in the various localities or areas of the Murchison Mountains from 1948 to 1971 inclusive; observations made by different organizations in the "Special Area" (excluding the Takahe Valley - Point Burn Study Area) since 1948; the substance of the observations on which the population estimate is based; details of field observations and estimates of total number of territories and total adult population in the "Special Area" during the 1960s.

The total population of Takahe is estimated to number about 435-510 with a possible maximum in excess of 560 birds.

Dr G. B. Orbell rediscovered Takahe in the Tunnel Burn (= Takahe Valley) in November 1948 and within three months T. S. Howes reported evidence of this species in Waterfall Creek and the Chester Burn. During 1950 F. Woodrow found birds, or their sign, in Lake Creek, the Mystery Burn and along the Point Burn tops. The following year Woodrow recorded Takahe in the McKenzie Burn, Snag Burn and Sheerwall Creek, and confirmed his Mystery Burn and Lake Creek sightings, while V. Kappley and P. W. Maurice found evidence of Takahe in the Junction, Jennings and Woodrow Burns. By the end of 1962 the exploration by Woodrow and others showed Takahe were also present in Falls and Lyall Creeks as well as along the southern slopes of the Ettrick Burn (Fig. 2).

A Canterbury Museum expedition (Wisely 1956) which mapped the western Murchisons during February and March 1953 confirmed several previous reports and also recorded Takahe in the Esk Burn and in the Irene Watershed west of the main divide.

Members of the New Zealand Deerstalkers Association hunting in the northern sector of the 'Special Area,' a 518 sq. km region of the Murchison Mountains (cf. Fig. 5), between 1959 and 1965 located 19 previously unknown pairs and confirmed several earlier sightings.

During 1958 Wildlife Service officers (Miers 1958) traversed the eastern watersheds from the Snag to the Mystery Burn. This party discovered 13-17 new territories and confirmed the presence of a further 6-10 pairs.

From 1959 to 1962 inclusive W. H. Axeby and other Wildlife officers, while engaged on deer control in the SE part of the Murchisons, located a total of 31 territories including 12 that had not been recorded earlier.

In 1960 G. B. Orbell reported five pairs in the Snag Burn and two years later he found a further four pairs in the Snag/Miller Peaks area.

Deer control in the Murchison Mountains passed to the Forest Service in late 1962 and within their first 10 years of operations Forestry hunters, besides killing 9,281 deer, also furnished 335 reports on sightings of Takahe or presence of sign. Two shooters made an outstanding contribution: from late 1964 to early 1968 C. R. Deaker provided 153 reports including 48 sightings of pairs that had not been recorded previously and R. Dawson made 67 separate observations between late 1967 and early 1969. These records either provided a comprehensive background, or alternatively complemented or corroborated the findings of Reid, Stack and M. Evans (Forest Service) during their surveys of the western Murchisons in 1966 and eastern Murchisons the following year.

During the summer of 1969-1970 field parties from the Forest and Range Experimental Station (Forest Service) reported Takahe from 21 areas including one small valley that had not been visited previously.

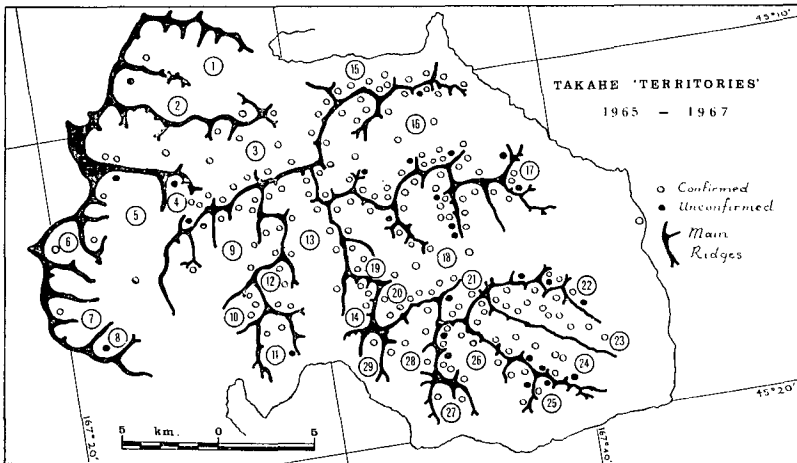


FIGURE 1 — The distribution of known territories in the Murchison Mountains, west of Lake Te Anau (1965-1967). The size of each territory, or more precisely, the space available to each pair during the nesting season varies from 2.5 to more than 80 ha, and averages 30-35 ha.

Table 1

THE NUMBER OF KNOWN TAKAHE 'TERRITORIES' IN THE VARIOUS LOCALITIES
OR AREAS OF THE MURCHISON MOUNTAINS - FROM 1948 TO 1971 INCLUSIVE

Locality	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
1 Junction Burn	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Jennings Burn	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
3 Woodrow Burn	-	-	-	1	1	3	3	4	4	4	4	5	5	7	8	9	9	12	14	15	16	17	17	17
4 Lake Wisely	-	-	-	-	-	-	-	-	-	-	-	-	3	4	4	4	4	4	4	4	4	4	4	4
5 Esk Burn	-	-	-	-	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	4	4	4
6 Forster Burn	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1
7 Adams Burn	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1
8 Philipson Burn	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1
9 McKenzie Burn	-	-	-	2	2	3	3	3	3	3	3	3	3	3	4	5	5	6	8	9	9	10	11	11
10	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3
11 Waterfall Creek	-	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
12 Lake Eyles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4	4	4	4	4
13 Chester Burn	-	1	1	1	1	3	3	4	4	4	4	4	5	5	6	6	7	7	8	9	9	10	10	10
14 Falls Creek	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3
15 Mid Fiord Faces	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	2	4	6	6	9	9	10	10	10
16 Snag Burn	-	-	-	2	2	4	4	4	4	4	6	6	6	8	9	12	20	24	25	33	33	34	34	34
17	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	3	3	3	3	3
18 Ettrick Burn	-	-	-	2	6	7	7	7	7	13	13	13	15	16	16	17	22	24	33	33	33	35	35	35
19 Plateau Creek	-	-	-	1	1	1	1	1	1	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
20 Lyall Creek	-	-	-	1	1	1	1	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21 Lake Creek	-	-	1	2	2	2	2	2	2	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4
22 Ettrick Faces	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	6	6	6	6	6	6
23 Takahe V. (Study)	3	5	7	8	9	9	10	11	11	11	11	11	11	12	12	12	13	13	13	13	13	13	13	13
24 Point B. (Area)	-	2	2	2	3	3	3	4	4	5	6	6	6	6	6	7	7	7	7	7	7	7	7	7
24 Point Burn Tops	-	-	2	2	2	2	2	2	2	3	3	4	4	4	4	4	4	4	4	6	6	6	6	6
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2	2	2	2
26 Mystery Burn	-	-	1	3	3	3	3	5	5	5	8	8	8	9	9	9	10	10	12	14	14	14	14	14
27 Sheerwall Creek	-	-	-	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
28 Williams Burn	-	-	-	-	-	-	-	-	-	-	-	-	1	2	3	3	3	4	4	4	5	5	5	5
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1
Territories Found ^a	3	6	7	13	8	13	2	6	0	1	17	1	5	13	8	8	15	22	18	34	3	6	4	0
Total Known ^a	3	9	16	29	37	50	52	58	58	59	76	77	82	95	103	111	126	148	166	200	203	209	213	213
New Territories ^b	0	2	5	12	6	13	1	4	0	0	16	1	5	12	8	7	14	22	18	34	3	6	4	0
Number of Reports ^b	0	2	9	29	9	32	2	5	0	0	25	5	13	26	30	16	22	73	79	124	74	87	73	7

a. Including the 'Study Area' (Takahe Valley, Point Burn). b. Excluding the 'Study Area'.

Table 1 shows the number of known Takahe territories in the 'Special Area' between 1948 and 1971 (cf. also Fig. 1). Early records were mainly couched in vague terms. While they indicated that a certain number of territories had been found within different watersheds, in most cases it was not possible to identify these early finds with more recent records because lack of detail on early maps prevented the accurate pinpointing of sightings. The routine plotting of territory sites or bird sightings on maps was started by Deaker in 1964 and from that year on it has generally been possible to identify each report as either a new record or a confirmation of an earlier find.

Observations made from 1964 onwards are assumed to include repeat sightings of all observations made before that year. As an example: ten different pairs have been located and subsequently confirmed in the Chester Burn since 1964 and the 13 separate records of Takahe in that valley prior to 1964 are assumed to be earlier sightings of these 10 territories. It is, however, highly probable that some of these early sightings may be of pairs in areas of the Chester Burn that have not been searched since the mapping of territory positions started as we estimate that only 70-80% of the Chester Burn tops and upper valleys have been traversed and searched since 1964.



FIGURE 2 — The Ettrick faces during August. Winter snow frequently drives the birds from the tussock tops down into the forests.

Likewise, any reports subsequent to 1964 that are ambiguous in that they could be either a new find or a confirmation of a known territory are assumed to be the latter. Consequently, while there is always the chance that a territory has been counted twice, the likelihood of two neighbouring pairs being assessed as a single territory is far greater and the estimate of 213 known territories would, most likely, err on the conservative side.



FIGURE 3 — Lake Eyles. This lake is approximately 1050 m above sea level and this basin contains four pairs of Takahe.

Table 2 summarizes the observations made by different organisations in the 'Special Area' (excluding the Takahe Valley - Point Burn Study Area) since 1948. It understates the contribution of Forest Service shooters who, in fact, recorded the presence of 144 different territories between 1964 and 1970. Thirty-six of their records confirm sightings made by Wildlife officers during 1966 and 1967 and a further 50 of their records are assumed to duplicate sightings made prior to 1964. The Wildlife Service Surveys of 1966 and 1967 located 142 different territories (Fig. 1). These include 66 that had been reported

Table 2. OBSERVATIONS OF BIRDS AND TERRITORIES

	New Territories First Reported	Confirmed Previously Reported Territories	Total Number of Observa- tions
Canterbury Museum	8	5	13
N.Z. Deerstalkers Ass.	19	32	51
Forest Service Hunters	58	276	334
F. & R. Exptal. Station	1	20	21
Wildlife Service	97	207	304
Miscellaneous	10	9	19
	193	549	742

previously by Forest Service shooters and 10 that remain unconfirmed as only sign was found during the Surveys and the areas have not been rechecked.

The substance of the observations upon which the population estimate is based is given in Table 3. Of the 742 separate reports, 64.4% were of birds, 29.5% were of 'sign' (droppings, cut grass, feathers, etc.) and 6.1% did not give details, only that Takahe were present.

Table 3. SUBSTANCE OF TERRITORY OBSERVATIONS

	Number of Reports		Number of Reports
'Sign' only	219	4 Birds Seen	3
1 Bird Seen	123	Chicks also seen	55
2 Birds Seen	245	Breeding nests seen	15
3 Birds Seen	37	Not specified	45
Total Number of Reports			742

Table 4 gives the details of field observations and also the estimates of the total number of territories and the total adult population (aged one year or older) in the the 'Special Area' during the nineteen-sixties (cf. Fig. 4). Birds have not been seen on 28 of the 213 reported territories and these are classed as unconfirmed although the abundance and freshness of sign indicated that most were occupied at the time.

Shooters in search of deer have ranged extensively over the Murchison Mountains but the routes taken are usually those that provide quickest access to favoured hunting grounds and often exclude areas providing suitable habitat for Takahe. Several such areas that are removed from the usual access paths were visited during the Wildlife Service surveys and 76 territories were found which were unknown to the shooters who have subsequently confirmed many of these records. Considerable areas, however, have not been searched or even traversed and we have no data on the Takahe population in several areas which, in total, represent about 20-30% of the tussock lands and alpine meadows of the 'Special Area.' Our estimate of the total population (Table 4) includes an allowance for these unexplored areas and we consider that there probably were between 212-243, and possibly as many as 270 occupied territories in the mid 1960s. As there are 2.1 adults birds per territory in an average year (Reid 1971) the total population is estimated to number about 435-510, with a possible maximum in excess of 560 birds.

THE ESTIMATED TAKAHE POPULATION LIVING WITHIN THE
518 SQ. KM 'SPECIAL AREA' OF THE MURCHISON MOUNTAINS
DURING THE MID 1960s (I.E. 1963 - 1967)

NOTORNIS 21

Area		Territories Reported			% of Area Searched	Est. Total Territories Probable		Territories Maximum		Est. No. Adult Birds Probable		Maximum	
		Confirmed	Unconfirmed	Total									
1	Junction Burn	1	0	1	40- 50	1- 2		3		3- 4		5	
2	Jennings Burn	1	1	2	40- 50	2- 3		4		4- 5		6	
3	Woodrow Burn	16	1	17	70- 80	18- 20		22		37- 42		46	
4	Lake Wisely	2	2	4	90-100	3- 4		4		6- 7		8	
5	Esk Burn	3	1	4	60- 70	3- 5		6		6- 9		13	
6	Forster Burn	1	0	1	60- 70	1- 2		2		2- 3		4	
7	Adams Burn	1	0	1	60- 70	1- 2		2		2- 3		4	
8	Philipson Burn	0	1	1	50- 60	1- 1		1		2- 2		3	
9	McKenzie Burn	10	1	11	70- 80	11- 13		15		23- 27		30	
10		3	0	3	70- 80	3- 4		4		6- 9		9	
11	Waterfall Creek	2	1	3	80- 90	2- 3		4		4- 7		8	
12	Lake Eyles	4	0	4	90-100	4- 4		4		8- 9		9	
13	Chester Burn	10	0	10	70- 80	11- 12		14		23- 26		29	
14	Falls Creek	3	0	3	80- 90	3- 4		4		6- 9		9	
15	Mid Fiord Faces	10	0	10	70- 80	11- 12		14		23- 26		29	
16	Snag Burn	30	4	34	70- 80	35- 40		43		72- 84		90	
17		2	1	3	90-100	2- 3		3		4- 7		7	
18	Ettrick Burn	31	4	35	70- 80	36- 40		45		75- 84		93	
19	Plateau Creek	3	0	3	90-100	3- 3		4		6- 7		9	
20	Iyall Creek	3	0	3	80- 90	3- 3		4		6- 7		9	
21	Lake Creek	3	1	4	80- 90	4- 4		5		8- 9		11	
22	Ettrick Faces	3	3	6	80- 90	6- 7		7		12- 13		16	
23	Takahe Valley	13	0	13	90-100	13- 13		13		27- 27		27	
24	Point Burn	10	3	13	80- 90	13- 14		15		27- 29		31	
25		1	1	2	60- 70	1- 2		3		2- 4		5	
26	Mystery Burn	11	3	14	70- 80	13- 14		16		27- 29		33	
27	Sheerwall Creek	2	0	2	50- 60	2- 2		2		4- 5		5	
28	Williams Burn	5	0	5	60- 70	5- 6		8		10- 13		16	
29		1	0	1	80- 90	1- 1		1		2- 2		3	
		185	28	213	70- 80	212-243		272		437-508		567	

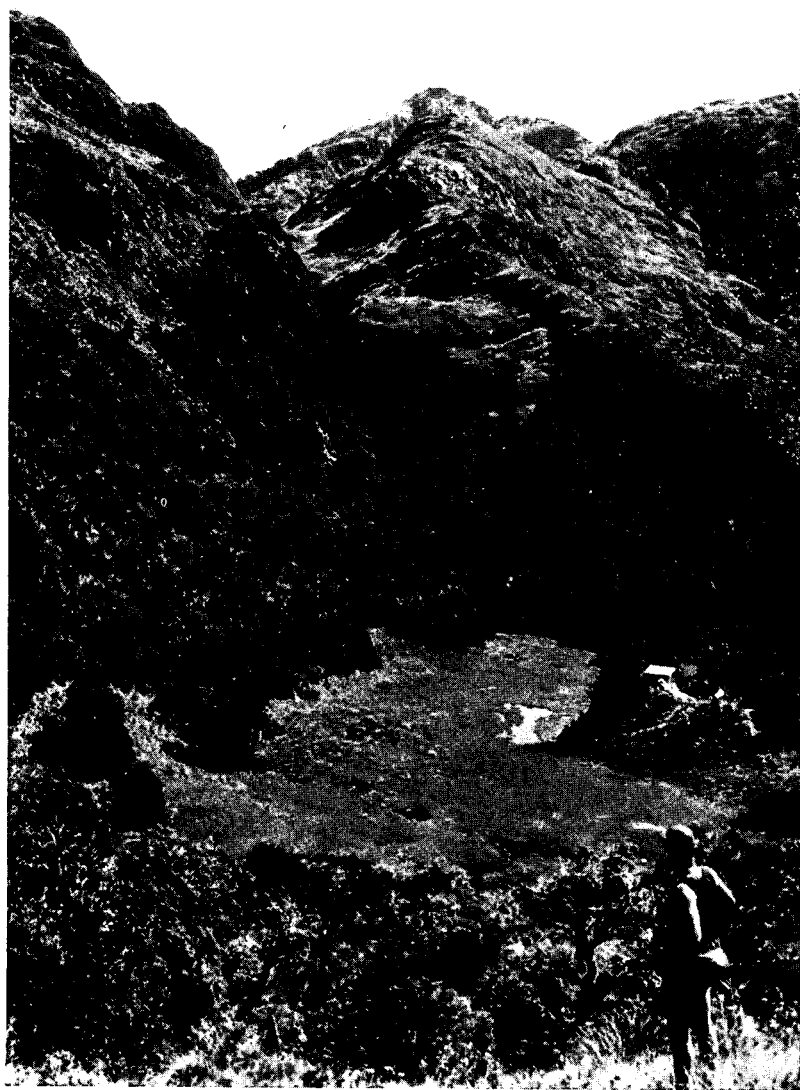


FIGURE 4 — The Woodrow Burn; a valley system which held between 17 and 20 pairs of birds during the mid 1960s.



FIGURE 5 — Mt Irene which delimits the western boundary of the "Special Area."

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SHORT NOTE

ROCK WREN USING AN ANVIL

Since interest in the subject of birds as tool-users is now world-wide, the following incident seems relevant and may be worth recounting.

On 14 January 1970 when my wife and I spent some time watching Rock Wrens (*Xenicus gilviventris*) not far from the Homer Tunnel, one was seen to catch a rather big bright-green grasshopper and to batter the body to pulp on a piece of corrugated iron, a relic perhaps from the building of the tunnel and swept away by an avalanche. For so small a bird a grasshopper of this size seemed a rather unwieldy morsel. But both Guthrie-Smith (1936: 146) and Soper (1972: 19) mention grasshoppers among the items of prey taken by Rock Wrens; and it seems that in summer these insects form a normal part of their diet. This being so, to render grasshoppers edible, Rock Wrens must be in the habit of 'softening them up' on a handy 'anvil' in much the same way as the Song Thrush (*Turdus philomelos*) smashes snails on a stone.

As to the identity of the grasshopper, I consulted Dr R. R. Forster of the Otago Museum and Mr J. S. Dugdale of the Entomology Division, DSIR, and I am grateful for their helpful interest. Both suggest that the grasshopper was either *Sigauss australis* or *Alpinacris tumidicauda*, with the balance of the rather inadequate data favouring the former.

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FAECES OF TAKAHE (*Notornis mantelli*): A GENERAL DISCUSSION RELATING THE QUANTITY OF FAECES TO THE TYPE OF FOOD AND TO THE ESTIMATED ENERGY REQUIREMENTS OF THE BIRD

By BRIAN REID

ABSTRACT

It is estimated that a Takahe requires about 300 K cal metabolizable energy daily for maintenance and that a bird feeding exclusively on grass will excrete about eight metres of faeces a day.

INTRODUCTION

A report covering the findings and opinions of the first official party, which visited Takahe Valley in January 1949, stated — "... while only 12-14 different Takahe were seen, total evidence suggested ... at least 20 nesting pairs ... and ... a conservative estimate places the population ... in some 500 acres (200 hectare) at 100 birds." Subsequent studies have shown the area referred to hold between 30-36 birds, including 9-12 pairs. The optimism of this first appraisal was based on the number of nests found and on the abundant 'sign' — cut tussock tillers and droppings — which covered the valley floor. It is now known that individual pairs may build up to seven nests (several are built prior to laying and additional brood nests may be made after the chicks hatch), and work at Mt Bruce Native Bird Reserve gives some data on the total length of faeces voided daily by captive birds feeding mainly on pasture grasses and poultry pellets. These data allow an approximate estimate of the length of faeces that would be excreted by birds feeding on a feral, mainly 'grass,' diet.

Takahe droppings are cylindrical and firm. They are haylike in texture and measure 6.3-14.8 (mean 10.2) cm in length. The diameter is usually between 8.5-13.8 (mean 10.63 mm but thin droppings (5.2-6.0 mm diameter) are occasionally voided and, in the field, these are sometimes incorrectly attributed to half-grown chicks. Sitting birds frequently pass large 'clocker' droppings 15-17 mm diameter. Macroscopic inspection of droppings from both wild and captive birds leads to the conclusion that only a small part of the vegetation eaten is digested as most of the constituent material seems little altered in colour or texture after its passage through the alimentary canal.

The diet of wild Takahe is rough and fibrous and birds spend much of their day grazing and browsing. Their staple food is tussock (*Chionochloa* spp) — they eat the more succulent tiller bases throughout the year and strip the seed heads in season. They also feed on seeds and leaves of other grasses (*Poa*, *Festuca* and *Hierochloa* spp.), the leaf bases of mountain daises (*Celmisia* spp.) and the stalks and rhizomes of the fern *Hypolepis* (Williams 1960). Takahe actively forage for and snap at insects but while these may provide a nutritionally important component of the diet, they represent only an infinitesimal portion of the total food ingested.

BODY WEIGHT, FOOD INTAKE AND FAECAL OUTPUT: MT BRUCE

Two pairs of Takahe were taken from the McKenzie Burn in Fiordland and placed in neighbouring 130 m² enclosures at Mt Bruce on 1 February 1970. Both pairs were in a high state of stress when released and, being a territorial species, the condition of each was further aggravated by the close proximity of the other pair. All four birds ignored the feed trays. Much of their time was spent pacing the hessian covered partition fence and although tension remained high, the number of faeces present (averaging 4.76 and 7.1 m per pair daily) suggested at the time that the birds were at least feeding adequately on pasture grasses. The birds were weighed four days later. All showed a decrease in body weight (from 12.7 to 18.6 percent) indicating that the intake of grass which produced the abundant faecal material was, under the conditions prevailing, insufficient to maintain the birds' weights. Although none of the birds took grit during this period, grit from Fiordland was still present in faeces voided four days after capture — suggesting the gizzard has the capacity to selectively retain some of its contents. During this period the 19.05 m of faeces voided by one pair contained 41 pieces of grit (from 1.0 to 3.2, mean 1.8 mm diameter), and the 28.46 m voided by the other pair contained 232 pieces of grit (from 1.1 to 5.3, mean 2.9 mm diameter; volume 5.7 cm³).

To reduce tension the birds were isolated from each other on 16 February and the most debilitated pair (male 2155 g; female 1770 g) was placed in a small (3 x 3 m) enclosed coop. This was shifted daily to provide limited grazing of fresh grass and the birds were also given a broth containing glucose and a milk powder-based invalid food. (Birds under stress settle down more quickly in small coops with solid walls for they quickly appraise the extent of their new environment and with familiarity comes security; and while birds in a stressed state may refuse to eat adequately they do not deny themselves fluids — presumably because hunger is not unduly uncomfortable, but water privation is physiologically intolerable). This liquid ration, in which the organic nutrient comprised 7% protein, 4% fat and 89% carbohydrates (dry weight), had an energy value of approximately 175 K cal/litre. These birds were at rest (the coop was warm and

they remained inactive) and the food required to maintain condition was minimal. By the end of four days both had gained slightly in weight (the male by 45 g, the female by 85 g) on a daily average consumption of 1.4 litres (240-250 K cal) of liquid per bird plus an unknown, but very reduced, intake of grass. In addition to passing a daily average of 1.42 m of normal grass droppings, each bird also voided between 8-12 almost clear, watery faeces every hour.

While both birds continued to show little inclination to graze or eat solid foods, they maintained a strong interest in the water troughs — on some days drinking in excess of four (maximum 4.13) litres broth/pair. The broths were progressively thickened (i.e. the birds were fed two or three different formulations daily and the thickest brew that was readily accepted on one day became the thinnest offered the following day). These reached a maximum in nutritive value on 10 March when one containing 21% protein, 8% fat and 71% carbohydrate (digestible organic nutrients, dry weight), and (based on the metabolizable energy values of the constituent food-stuffs for poultry) having an energy value of 1130 K cal/litre was accepted. One week later they had progressed to eat dry pellets almost exclusively. As the birds rehabilitated and increased in weight during this 25 day period, the area of their pen was progressively enlarged from 9 m² to 70 m².

By 24 March the male weighed 2680 g and the female 2255 g (mean weights of wild birds in Takahe Valley: 68 males, 2680 g; 67 females, 2265 g) and on that date the liquid supplements were discontinued. During the next six days these birds fed exclusively on grass and dry poultry pellets (average ration, 150 g/pair daily) and all their faeces were collected — once daily during the first three days and then twice daily (at 0630-0830 hours and 1630-1800 hours, Table 1) to distinguish between daylight and night droppings.

Droppings voided during the late afternoon and night, which were collected during the early morning before being subjected to excessive drying by the sun were, per unit length, generally 27% heavier than daytime faeces collected and weighed in the late afternoon. The night faeces produced from eating pellets had an average weight of 1.05 g/cm, while those resulting from grazing at night weighed 0.98 g/cm. There was no apparent difference in the dry weight of daytime or night-time faeces. Within the limits of accuracy available with an old household oven, the pellet faeces had a dry weight of 0.316 g/cm and the grass faeces had a dry weight of 0.27 g/cm.

When pellets, which were given just before the start of the afternoon collecting of faeces, were available both birds ate these enthusiastically and ignored grass. Observations during the evening and early morning indicated that the birds were sleeping, or at rest, for about 9.5 hours daily — they were inactive from about 1945 hours (or 30 minutes after nautical twilight) to about 0515 hours (or 15 minutes before nautical twilight). During these 9.5 hours each bird

-11-

TABLE 1 : WEIGHT OF PELLETS EATEN AND LENGTH OF FAECES EXCRETED IN SIX DAYS

Date March	Period of Day	Number of Hours	Pellets Eaten (£)	Length of Faeces (cm)			Faeces cm/Bird per Hour	Pellet Faeces cm/g Pellets
				Pellet	Grass	Total		
25-26	0900-0830	23.5	156	212	840	1052	22.4	1.36
26-27	0830-0830	24.0	157	216	701	917	19.1	1.38
27-28	0830-0830	24.0	154	206	752	958	20.0	1.34
28-29	0830-1730	9.0	0	0	691	691	38.4	-
"	1730-0630	13.0	127	173	159	332	12.8	-
"	0830-0630	22.0	127	173	850	1023	23.3	1.36
29-30	0630-1630	10.0	0	15	718	733	36.6	-
"	1630-0700	14.5	126	155	180	335	11.6	-
"	0630-0700	24.5	126	170	898	1068	21.8	1.35
30-31	0700-1800	11.0	0	0	752	752	34.2	-
"	1800-0930	15.5	147	203	262	465	15.0	-
"	0700-0930	26.5	147	203	1014	1217	23.0	1.38
		144.5	867	1180	5053	6235	21.6	1.36

voided between 8-11 faeces, with an average total length of 68.5 cm, in a heap or 'latrine.' These latrine droppings were composed almost entirely of pellet constituents indicating that the birds cleared their alimentary tracks of grass in the 2.5-3.0 hours between when the pellets were provided and when they settled for the night. It is not known by what hour the last of the pellets were eaten but the last faeces derived from pellets were voided between 0630-0730 hours — thereafter grass droppings appeared.

Over a period of 145.5 hours this pair grazed fairly extensively, ate 867 g of pellets and maintained body weight. In an average day each bird ate 72 g of pellets and voided 5.18 of faeces. The faeces derived from pellets measured 0.98 m and those derived from an unknown intake of grass measured 4.20 m. During the 14.5 hours the birds were awake each passed about 44-45 faeces with an average cumulative length of 31 cm/hour. During some periods of active feeding the birds voided 40 cm (or more) faeces/hour.

Grit was plentiful in the droppings — it numbered from 243 to 436 (mean 304) pieces per pair daily. The average size of the particles was 18 mm³ and the largest measured 6.6 x 6.4 x 6.0 mm. Grit was in frequent in droppings voided during the daytime and most was concentrated in the last two or three night time 'latrine' faeces. It appears that the birds may expel most of the grit in their gizzard along with the last of the food. The last pellet faece voided by the male in the early morning of 29 March measured 13.5 cm and contained 7.1 g (3.85cm³) of grit and silt — this included 156 pieces larger than 1mm³.

DISCUSSION

From the length of faeces voided daily by captive Takahe feeding on a known ration of poultry pellets plus an unknown intake of grass it is possible to make a broad estimate of the length of faeces excreted daily by a bird living on grass alone. This estimate relies on two assumptions;

- (I) The calorie requirements for Takahe are about the same as for hens of similar size; and
- (II) The relative digestibility (and nutritive value) of grass and pellets are about the same for poultry and Takahe.

The maintenance requirements for poultry having the same body weight as an average-sized Takahe (about 2.475 kg) are 290-300 K cal metabolizable energy (ME) per day (McDonald *et al.* 1966). The pellets fed to Takahe have a ME value for poultry of 2.595 K cal/g. Organic matter constitutes nearly 84% (dry weight) of the pellets and poultry digest about 74% of this (Bolton 1963; Titus 1961). While the dry weight of poultry faeces would represent about 38% of the dry weight of pellets eaten if all minerals and additives were voided along with the non-digestible organic matter; the dry weight of Takahe faeces averaged 48-49% of the dry weight of pellets eaten. It appears, therefore, that the utilization of pellets by Takahe is only 80-85% as efficient as the utilization of pellets by poultry and their ME rating of about 2.6 K cal/g for poultry may be as low as 2.0-2.2 K cal/g for Takahe. If this is so, the 72 g of pellets eaten daily by each bird would provide about 150 K cals and the ME value of the grass eaten (which produced 4.20 m of faeces) would be about the same if the energy requirements of Takahe are approximately the same as similar-sized, non-laying poultry.

For poultry, the nutritive value of dried grass is only half that of pellets. The former contains about 52% indigestible organic matter and has a ME rating of approximately 1.3 K cal/g (Bolton 1963) — compared with 26% indigestible organic matter and a ME rating of nearly 2.6 K cal/g for pellets. The faeces of a bird obtaining its calories from pellets should, therefore, have about one-quarter of the bulk of faeces excreted by a bird feeding on grass. During an average day, the length of the pellet faeces (0.98 m) voided by Takahe at Mt Bruce was 23% of the length of their grass faeces and the dry weight of the pellet faeces (31 g) was about 27% of the dry weight of the grass faeces.

The proportion of pellet to grass faeces excreted daily suggests that both foods provided a similar number of calories and this, in turn, suggests the energy requirements of Takahe are about 300 K cal ME per day.

The Capercaillie (*Tetrao urogallus*), which may weigh up to 6.5 kg, is frequently mentioned in texts because of the excessive length of faecal material it excretes. This large member of the grouse family

feeds mainly on an exceptionally low grade diet of conifer needles and buds, and voids about three metres of faeces each day (Welty 1962). The smaller Takahe, which in captivity excretes in excess of five metres of faeces daily on a diet of poultry pellets and pasture grass, is estimated to excrete in excess of eight metres daily on a less nutritious diet of only grass or tussock.

The alimentary canal of the Takahe, from the start of the oesophagus to the cloaca, measures 1.41 m or only 27% of the length of faeces voided daily by birds in captivity.

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PRELIMINARY RESULTS OF RESEARCH INTO THE PRESENT STATUS OF TAKAHE (*Notornis mantelli*) IN THE MURCHISON MOUNTAINS

By J. A. MILLS and R. B. LAVERS

ABSTRACT

Breeding and post-breeding counts of Takahe (*Notornis mantelli*) were made during 1972-73 and 1973-74 in three study areas within the Murchison Mountains: Takahe Valley and Point Burn, Eyles-Wisely, and Miller Peak. The Takahe Valley and Point Burn population declined markedly between 1966-67 and 1968-69 but only slightly between 1969-70 and 1973-74. Indications are that the Eyles-Wisely and Miller Peak populations may have declined only slightly since 1966 and actually increased in the present surveys. The decline in Takahe Valley and Point Burn is possibly related to suboptimum habitat.

INTRODUCTION

When Takahe (*Notornis mantelli*) were rediscovered in 1948 in a remote valley on the western shore of Lake Te Anau, Wisely (1949) thought there were only seven pairs. Since then expeditions have explored more than 1200 square kilometres of the Fiordland National Park and in 1969 the population was estimated at about 200 pairs with 170 pairs in the Murchison Mountains (Reid 1969). In a recent reassessment of the number of Takahe in the Murchison Mountains during the 1963 to 1967, Reid & Stack (1974) placed the population probably between 435 and 510. At present Takahe are restricted to an area of about 650 square kilometres comprising the Murchison Mountains and a small adjacent area to the north.

The population in Takahe Valley and the adjacent Point Burn has been monitored by the Wildlife Branch (Williams 1957, 1960; Williams & Miers 1958; Reid 1967, 1969) since 1949. An intensive research programme was initiated in 1972 following a marked decline in the population of this area, to ascertain the extent and possible causes of the decline.

This paper presents results of censuses taken during the breeding and post-breeding periods of 1972-73 and 1973-74 in three study areas within the Murchison Mountains and compares them with available data for previous years.

METHODS

The censuses were made in three study areas within the Murchison Mountains: Takahe Valley and Point Burn, Eyles-Wisely, and Miller Peak (Fig. 1). These areas total 65 square kilometres of tussock grassland and fell-field constituting approximately 28% of this type of vegetation in the Murchison Mountains (Table 1).

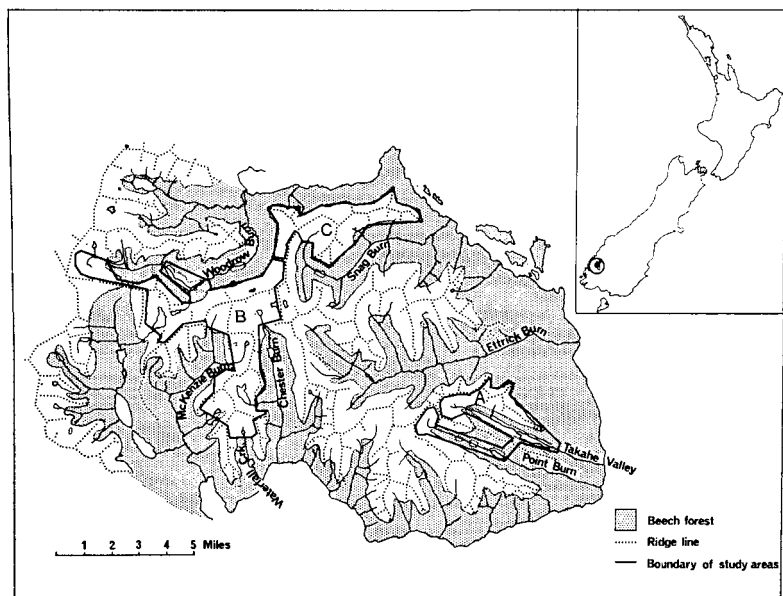


FIGURE 1 — The Murchison Mountains with the three study areas outlined. A. Takahe Valley and Point Burn; B. Eyles-Wisely; C. Miller Peak.

Three field parties, each consisting of two members, covered the study areas on foot from October to March. Tape recordings of Takahe calls were used to obtain responses from birds in dense tussock vegetation.

TABLE 1 - Description of the study areas within the Murchison Mountains.

Study area	Area (sq.km)	Altitude (metres)
Takahe Valley & Point Burn	10.5	900-1500
Eyles-Wisely	36.3	950-1650
Miller Peak	18.1	950-1500

RESULTS

Takahe Valley and Point Burn

Table 2 summarizes results from counts made during the breeding and post-breeding periods in 1972-73 and 1973-74. The number of adult Takahe present in the breeding period decreased by three between years. In January of both years there was temporary immigration of adults from the surrounding areas, which boosted the population. The immigrants remained at least until mid April.

TABLE 2 - The population of Takahe in the Takahe Valley and Point Burn, Eyles-Wisely and Miller Peak areas in the breeding period (October to December) and the post-breeding period (February) during 1972-73 and 1973-74

Study area	Oct.- Dec.		February	
	No. adults	No. pairs	No. adults	No. pairs
(a) 1972-73				
Takahe Valley & Point Burn	17	8	21	9
Eyles-Wisely	44*	19	43*	18
Miller Peak	30 *	12	30 *	12
(b) 1973-74				
Takahe Valley & Point Burn	14	6	19	8
Eyles-Wisely	41	20	41	20
Miller Peak	38	19	40	20

Note : *Figure possibly includes some yearlings which could not be distinguished from adults

Prior to 1972 the majority of census work in Takahe Valley-Point Burn was done in January and February, when the population could be expected to be at the highest level for the year. These counts indicated a marked decline in the number of adults and yearlings since 1966, but since 1969-70 the population appears to have stabilized at approximately half the 1966-67 level (Table 3). Between 1949 and 1957 the number of pairs on the valley floor of the study area appeared to fluctuate between 10 and 12 pairs (Williams & Miers 1958). Between 1963 and 1967-68 the number of pairs was approximately the same, fluctuating between nine and eleven, but there were only seven

TABLE 3 - The number of adults and yearlings in Takahe Valley and Point Burn between 1963 and 1974. The data from 1963 to 1971-72 are from Reid (1971) and refers to the lowest estimate.

Season	Number of adults and yearlings
1963-64	47
1964-65	45
1966-67	43
1967-68	36
1968-69	26
1969-70	22
1970-71	18
1971-72	19
1972-73	22 *
1973-74	20 *

Note : * As at 28 February

pairs present in 1968-69 (B. E. Reid pers comm), by 1972-73 the number had dropped to five pairs and by 1973-74 there were only three pairs. Since 1966-67, a commensurate but smaller decline has occurred in the number of pairs occupying territories above bush-line in the Takahe Valley and Point Burn area. In 1963-64 seven pairs were found, by 1966-67 there were eight (B. E. Reid pers comm) and in 1972-73 and 1973-74 there were four and five pairs respectively. Eyles-Wisely and Miller Peak

These study areas did not have any marked increase in population from temporary residents in January as occurred in Takahe Valley and Point Burn (Table 2). Miller Peak had one extra pair arrive in January 1974. In the Eyles-Wisely and Miller Peak areas there were nett increases of two and four pairs respectively between the 1972-73 and 1973-74 seasons. The census of Miller Peak in 1973-74 included three pairs in an area that was not visited in 1972-73 because of difficulty of access.

Although comparable censuses are not available for Miller Peak and Eyles-Wisely for individual years, Reid & Stack (1974) have produced an estimate of the population in the Murchison Mountains based on feeding sign, droppings and sightings of birds between the years 1963 and 1967. In the map presented by Reid & Stack (1974) there were 31 territories corresponding to the present Eyles-Wisely study area and 21 in the present Miller Peak area. Present counts show 20 territories in each, with one pair per territory. If the estimates of Reid & Stack (1974) reflect the actual population present in a particular year then the Miller Peak area has remained about the same whereas the Eyles-Wisely area has lost approximately 11 pairs. These population estimates, however, are probably an overestimate of the population present for a given year since some territories may not be occupied every year.

DISCUSSION

The Takahe Valley and Point Burn population has declined markedly between 1966-67 and 1968-69 but only slightly between 1969-70 and 1973-74. Although comparable counts are not available, indications are that the Eyles-Wisely and Miller Peak populations may have declined only slightly since 1966, and actually increased between 1972-73 and 1973-74. It is suspected that these different trends are at least in part related to differences in habitat. The Takahe Valley and Point Burn valley floors approximately 150 metres below bushline are almost unique in Fiordland in that they are treeless and covered with Red Tussock (*Chionochloa rubra*) (Mark 1973). The vegetation of the valley sides, head basins and cirques above bushline (1100 m) are, however, similar to those of the Miller Peak and Eyles-Wisely areas, containing the tall tussocks *Chionochloa pallens*, *C. flavescens* and *C. crassiuscula*. Red Tussock is the least nutritious of the tall tussocks (Connor *et al* 1970), and the birds feeding on this species on the valley floors of Takahe Valley and Point Burn are possibly

in sub-optimum habitat. Because of this Takahe Valley and Point Burn may have a high population only when the more preferred areas are fully occupied. This hypothesis would account for the smaller decline in numbers of Takahe in the more nutritious tussock communities above the bushline in Takahe Valley and Point Burn and the apparent smaller decline of the Eyles-Wisely and Miller Peak populations. At this stage it is not known whether the decline in Takahe numbers in Takahe Valley and Point Burn will continue or whether it represents a low in a cyclic fluctuation. To be a cyclic fluctuation there would have to be higher production in some years which expand into Takahe Valley and Point Burn. High survival of chicks may be related to the periodic seeding of the tall tussocks which they prefer when available. The irregular flowering of *Chionochloa* species occur on average every three years, and is largely environmentally controlled, usually occurring following a warm summer the previous year (Connor 1966, Mark 1968).

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BREEDING BIOLOGY OF THE INDIAN MYNA IN CITY AND AVIARY

By J. J. COUNSILMAN

ABSTRACT

In Auckland breeding occurs between late October and mid-April. During the 1970-71 breeding season 37% of territories were formed from undefended home ranges held during winter; remaining territories were created by non-residential pairs. Territories were defended by both sexes and averaged 0.83 ha.

Mynas nest in holes and crevices. Nests average seven days to build. Average clutch size for aviaries was 3.9 eggs. Incubation begins with laying of the second egg and lasts 16 days for first egg of a clutch and 13 days for last egg. Nestling period is about four weeks. Only females sit on the nest at night.

In total, 55% of all nests failed completely, and only 60% of pairs produced fledglings, from 24 single and eight double broods. Nesting success was 22%. Starvation of nestlings, disturbances and possibly shortages of food for adults were responsible for most mortality in nests.

Similarity of open woodland and urban habitats, omnivorous feeding habits and hole-nesting have pre-adapted Mynas for association with man. Mynas in Auckland, like several species of birds in European cities, did not experience shortages of food during winter and had smaller clutches, longer breeding seasons and higher densities than conspecifics in rural habitats.

INTRODUCTION

Populations of birds in cities have higher densities, more stable supplies of food and water, longer breeding seasons, lower rates of mortality and smaller clutch sizes than populations of the same species in natural habitats (Erz 1966). These conclusions are based primarily on studies of House Sparrows, *Passer domesticus*, (e.g. Summers-Smith 1963), Robins, *Erithacus rubecula*, (e.g. Lack 1943) and Blackbirds, *Turdus merula*, (e.g. Snow 1958) in Europe where feeding, roosting and breeding of these and other birds alongside man are relatively recent occurrences. The Indian Myna, *Acridotheres tristis*, on the other hand, has been associated with man for many centuries (see Sengupta 1968: 1) and is probably one of the oldest species of urbanized birds in the world. This study considers the breeding biology of the Myna in Auckland (population in 1971: 698,000), New Zealand and suggests to what extent conclusions from studies of other urbanized birds are true for this species.

In New Zealand the Myna is common in most towns and cultivated areas, but rare in other habitats, in the North Island north of Latitude 40°S (Bull & Gaze 1972).

METHODS

I observed four pairs of Mynas in four separate aviaries from October 1969 to June 1970 and free birds in a study area of about 240 ha. in the centre of Auckland (see Fig. 1) from October 1970 to April 1971. Birds in aviaries provided data not obtained from nests in the field; details of aviaries and maintenance of birds have been recorded elsewhere (Counsilman 1971). In the field I distinguished pairs primarily by their location and their relation to nests and secondarily by physical defects, vocalizations and colour-rings. As most nests were inaccessible to me, I determined whether they contained eggs or nestlings by behaviour of the pair.

I captured birds for aviaries and for banding and releasing using a narcotic, alpha-chloralose, added at 0.75% by weight to small cubes (2 x 2 x 2 cm) of bread (P. R. Wilson *in litt.*). There was about 40% mortality with this method. Dead birds were examined for sexual differences in colouration, weight and body measurements. Eight specimens were collected on 20 July 1969, 24 on 11 August 1969 and 41 on 24 September 1970 between three and 20 km north of Auckland. No baiting was done in the study area.

Results were evaluated statistically by Student's 't' for tests of significance (Backhouse 1967).

RESULTS

Specimens:

Males are significantly larger than females for weight and for length of body, wing, tail and tarsus but not for length of beak (Table 1; but *cf* Vyas 1964). Both sexes in New Zealand are much heavier than their counterparts in India: mean weights of 17 males and 11 females from Indian (Vyas 1964) are 62% and 60%, respectively, of mean weights of males and females in Table 1.

Sexes are alike in colouration in India (Whistler 1949) and New Zealand, but females are reported to be lighter in colour than males in South Africa (Mackworth-Praed & Grant 1963) and Hawaii (Eddinger 1967).

Territory:

The breeding seasons of 1969-70 and 1970-71 began in October with first territorial disputes and ended in mid-April with last separations of fledglings from adults. Start of both seasons coincided with a rise in mean monthly temperature to 16°C, a rise in monthly hours of sunshine to 200 and a drop in monthly rainfall to less than 100 mm. End of both seasons coincided with reverse trends. Mynas breed late compared to three other species of passerines common in Auckland (Blackbird, House Sparrow and Starling), all of which have fledglings by late October.

Table 1. Weights and body measurements of specimens¹

	N	Weight (gms) ²	Total Length (mm) ²	Wing (mm) ²	Tail (mm) ²	Tarsus (mm) ³	Beak (mm) ⁴
Males	32	130.5 \pm 8.2	256.8 \pm 6.1	140.7 \pm 3.5	86.3 \pm 3.5	37.8 \pm 3.2	21.8 \pm 1.5
Females	33	115.0 \pm 6.8	245.2 \pm 7.8	133.7 \pm 3.1	80.7 \pm 3.7	35.5 \pm 2.0	21.2 \pm 1.4
Both Sexes	65	122.6 \pm 10.8	250.9 \pm 9.1	137.2 \pm 4.8	83.5 \pm 4.6	36.6 \pm 2.9	21.4 \pm 1.5

1 Measurements follow Pettingill (1964)

2 A significant difference exists between males and females

($P < 0.001$).

3 A significant difference exists between males and females

($P < 0.01$).

4 No significant difference exists between males and females

($P > 0.05$).

Reproduction both years was preceded by formation of a summer roost near the Kiosk of the Auckland Domain in late October; this roost was abandoned in late January 1970 and early February 1971. Other communal roosts in the study area were occupied throughout the year (see Fig. 1). Daily movements of solitary birds, pairs and flocks in relation to communal sleeping have been discussed in another paper (see Counsilman 1974). Except during evening and at night pairs are the only social class that regularly visit the study area, though occasionally unmated birds and flocks of three to 20 birds pass through the area. Virginal formation of pairs occurs within flocks (Wilson 1973, Counsilman in prep.). After their first success in breeding pairs usually mate for life (Wilson 1973) and many occupy undefended home ranges during the non-breeding season as well as territories during the breeding season.

In India territories of Mynas are 'Type C' of Hinde (1956), a small area around the nest (Sengupta 1968), but in New Zealand they are 'Type A,' a large breeding area in which nesting occurs and most food is collected. Fifty-three territories were formed wholly or partially within the study area during the breeding season of 1970-71 (Fig. 1). Twenty developed from home ranges in late October, and the remainder were formed by non-residential pairs between early November and late December (Table 2). Some territories and home ranges (e.g. Nos. 2, 3 and 16) were occupied throughout this study (19 months), while two territories in which some nesting behaviour occurred were occupied for only one and two weeks (Nos. 9 and 43). One area was visited daily by six to eight pairs for seven weeks before Territories 8 and 18 were formed; neither pair produced fledgelings. In three instances pairs deserted territories (Nos. 36, 39 and 51) for several weeks or were replaced by different pairs; new or returning pairs did not breed.



FIGURE 1 — Aerial photograph of study area in Auckland with inclusive and bordering territories of 53 pairs during 1970-1971 breeding season. Communal roosts: KR = Kiosk, FR = Foundation and PR = Parnell.

The territory is defended by both sexes with calls, supplanting attacks and physical combat. Fights were common early in the season but rare after mid-January when most pairs had occupied nests or fledgelings.

Table 2. Number of pairs present and number and percent of pairs with eggs, nestlings or fledgelings in study area each week during 1970-1971 breeding season.

	November				December				January			
	1	2	3	4	1	2	3	4	1	2	3	4
Number of pairs present	20	20	27	39	44	41	43	43	45	45	45	44
Number and percent of pairs with eggs, nestlings or fledgelings	3	6	14	24	33	33	33	35	40	41	40	37
	15%	30	52	62	75	80	77	81	89	91	89	84

	February				March				April		
	1	2	3	4	1	2	3	4	1	2	3
Number of pairs present	45	44	40	37	34	31	27	35	26	30	25
Number and percent of pairs with eggs, nestlings or fledgelings	41	39	35	32	30	22	15	10	9	7	4
	91%	89	88	86	88	71	56	40	35	23	16

Most pairs spent part of each day outside their territory, though this varied with location, stage of reproduction, time of day and day of week. Some pairs (e.g. Nos. 2 and 3) rarely left their territories during the day, and most pairs with occupied nests only left for short periods. Between about 0800 and 1730 on a weekday a few pairs were frequently absent from their territories because of disturbances by vehicles and pedestrians. But, on Saturdays, Sundays and public holidays these pairs made fewer trips outside their territories because disturbances were fewer.

Mynas possess vocalizations, tentatively termed "Loud calls," which appear to serve to maintain pair bonds throughout the year and to proclaim a territory during the breeding season. In aviaries, males gave about twice as many Loud calls as females; they also made more supplanting and physical attacks on live birds placed in a pair's aviary. Calling can be heard any time of day, but there is a peak in the morning shortly after the pair's or male's arrival in the territory. First calls of the morning are usually given from a building, but they may also be given on the ground. When a mate is lost during the breeding season Loud calls also serve as advertisements to unmated individuals of the opposite sex. (A bird that loses its mate during the non-breeding season probably joins a flock to acquire a new mate.) I recorded extended periods of calling for a male in an aviary after his mate died and for a bird of unknown sex in Territory 39 who

called at least 293 times, during 40 minutes. Mates rarely remain separated for more than 30 minutes. The greatest number of Loud calls I recorded for a mated bird during a single bout was 83.

Distribution of territories was related to six subhabitats. Mynas did not visit native bush of the Domain (east of Territory 17). Grassland of the Domain contained more than half of Territories 10 and 20 but lacked sites for nests within itself; it was used extensively as feeding grounds by many Mynas. Bare ground of Grafton Gully supported parts of Territories 27, 37, 40 and 42 but was used little for foraging. Areas with a high density of buildings and pavement, e.g. Queen Street, supported only two territories (Nos. 14 and 44), while open woodland of the Domain held 10 (Nos. 2, 3, 8, 18, 26, 31, 33, 48, 51 and 53). Areas with buildings and pavement interspersed with parks and gardens held the remaining 39 territories (Nos. 1, 4-7, 9, 11-13, 15-17, 19, 21-25, 27-30, 32, 34-43, 45-47, 49, 50 and 52). Mean size of 51 territories (excluding Nos. 9 and 43) was 0.83 ha. (S.D. \pm 0.27) with smallest (No. 8) 0.09 ha. and largest (No. 36) 1.38 ha. There was no significant difference ($P > 0.05$) in sizes of territories between open woodland and areas with a moderate density of buildings and pavement.

Food:

No systematic study of food was made (see Wilson 1965). Mynas forage intensively on and beside roads in the early morning. Disturbances later in the day appear to be responsible for early foraging by urban birds (Strawinski 1963), but for the Myna other activities at other times of the day and availability of food along roads may also favour this behaviour (Wilson *in lett.*). In rural areas dead insects are the major items taken from roads, but in the city bread and other litter are taken as well. After early morning most foraging is in grassy areas and orchards where live insects, fruit and possibly some grains (see Editor's Note, *J. Bombay Nat. Hist. Soc.* 1930: 807) are taken. In the city the only items eaten that are not regularly taken on the ground are cicadas (*Amphisalta* spp.), which Mynas capture in trees, on buildings and on telephone poles.

Interspecific Encounters:

House Sparrows, Starlings and, to a lesser extent, Red-billed Gulls (*Larus scopulinus*), Black-backed Gulls (*L. dominicanus*), Black-birds and Rock Pigeons (*Columba livia*) also forage on and beside roads in the early morning. I have observed disputes between all of these species and Mynas. These encounters are probably not important to any species in defence or acquisition of a significant supply of food because disputed items are often left uneaten. Encounters between Mynas and Starlings are very common. The Myna clearly dominates the smaller Starling at roosts, nest-sites and over food. Although Mynas attack adults, eggs and nestlings of Starlings, they are unsuccessful in preventing this species from breeding in the city because of the large number of nest-sites Starlings can enter that Mynas can not. At

Havelock North Wilson (1973) found nesting success of Starlings to be almost nil at sites Mynas could enter. Blackbirds tried to rob Mynas of food on six occasions and were twice successful, while Mynas tried to rob Blackbirds on three occasions but were not successful. Mynas mobbed Black-backed Gulls, Red-billed Gulls, cats and humans that came near occupied nests.

Reproduction:

1. Sites of Nests and Construction —

Mynas nest in holes and crevices. Table 3 lists numbers and percentages of sites used to three stages of reproduction. The most frequently used as well as most successful site was located under metal roofs of private houses. These sites were well protected from weather, and rats may have been the primary detrimental factor directly affecting the nests. One roof-nest (in Territory 12) was destroyed when a house was demolished and three nests in drains (in Territories

Table 3. Nest-sites used to three stages of reproduction.

Site	Incubation	Nestlings	Fledgelings ¹
Under metal roof; gutter entrance	17(25%)	16(31%)	14(41%)
In drain funnel on roof	12(18%)	8(15%)	5(14.5%)
Air vent	10(15%)	8(15%)	5(14.5%)
Vegetation: tree, palm and ivy	7(11%)	6(11%)	2(6%)
Crevice, beside a pipe	5(7%)	4(8%)	3(9%)
Attic; wall hole entrance	5(7%)	3(6%)	2(6%)
Under roof tiles	5(7%)	3(6%)	2(6%)
Between drain and wall	4(6%)	3(6%)	1(3%)
Street lamp	1(2%)	1(2%)	0
Construction crane	1(2%)	0	0
Totals:	67(100%)	52(100%)	34(100%)
Number of pairs involved	47	44	32

¹ Refers to nest-sites from which fledgelings were produced

3, 19 and 23) were ruined by rain. Two nests (in Territories 26 and 40) were apparently abandoned because of repeated difficulties in entering the sites, in air vents. In Auckland 11% of nests were in vegetation compared with 32% in Honolulu (Eddinger 1967).

Height of nests varied from 1.5 m to about 25 m, with an average of about seven metres.

For their first nest of the season a pair usually spent several days inspecting holes and crevices. One bird (the female in aviaries) does most of the inspecting and chooses the final site; the mate perches nearby, calls and may give Head-bowing displays (see Counsilman 1971 and in prep.). Once a site is chosen, pairs (probably especially the male) continue to inspect holes, either as a continuing response to nesting Starlings or in anticipation of changing sites. One pair (No. 12) began building at a new site within several hours after the destruction of their previous nest. Three pairs (Nos. 11, 12 and 29) each with two consecutive failures of occupied nests spent between one and two weeks inspecting sites; and, one pair (No. 48) tried for three weeks to build a nest in the territory of another pair (No. 3) but was repeatedly attacked. Changing sites after a successful nest occurred on four occasions by four pairs; two of these nests again gave rise to fledgelings. Renesting at the same site after an earlier success occurred 12 times, by 11 pairs; six of these were again successful.

Both sexes build the nest. Time spent building varied with site, date, stage at which previous nesting (if any) ended and individual pair. For first nests of the season pairs averaged seven days between start of building and laying of first eggs; a few pairs required twice as much time. Building required less time as the season advanced, when a site was re-used and when the previous nesting ended at the egg stage rather than the nestling or fledgeling stage. Sengupta (1968) found the building period to be six to eight days for 20 nests in India, and Eddinger (1967) reported five to 12 days for 25 nests in Hawaii. Additional material is brought to the nest during laying and incubating.

Mynas use a variety of natural and manufactured products in nests: dry grass, eucalyptus leaves, small twigs, string, pieces of plastic and paper and primary and secondary feathers. Sengupta (1968) found snake sloughs in 10 of 20 nests in West Bengal and believed they were used to scare away predators. The nest has no lining and is solely a mass of unarranged material with a depression in the centre.

Figure 2 summarizes reproductive activities of 53 pairs. At least 108 nests were started. During November all building involved first nests of the season, and, except for five or six first nests in December, remaining building involved second and replacement nests. Intervals between peaks in numbers of pairs constructing nests became gradually shorter as the season advanced.

2. Laying and Incubating —

Females in aviaries laid eggs between 0700 and 0900 on consecutive days. Average size of clutches was 3.9 for eight clutches, and

number of eggs per clutch varied from three (two clutches) to five (one clutch) with four eggs most common (five clutches). All four nests in the field accessible to me had clutches of three. Average clutch sizes were 3.5 eggs for 10 nests in Honolulu (Eddinger 1967), 3.8 eggs for 12 nests in West Bengal (Sengupta -968) and 4.4 eggs

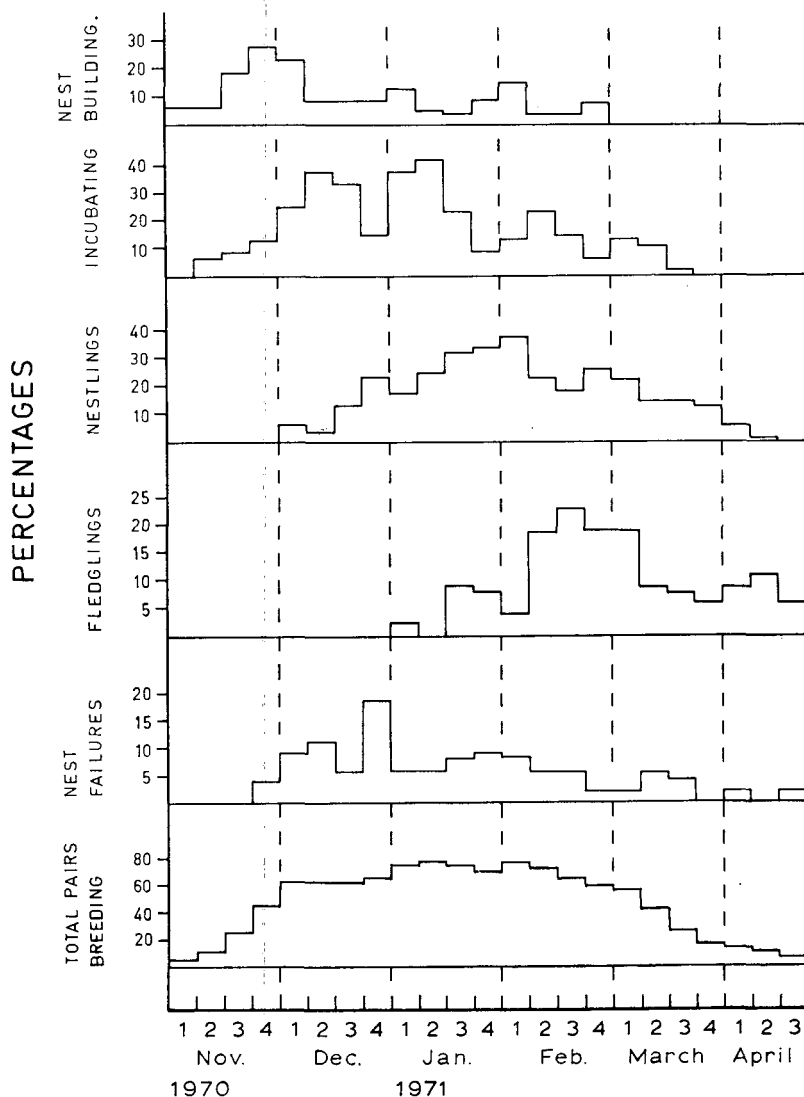


FIGURE 2 — Percentages of 53 pairs engaged in reproductive activities in study area during 1970-1971 breeding season.

for 20 nests in Madras State, India (Lamba 1963). At Havelock North, New Zealand, first clutches laid by inexperienced and experienced pairs averaged 3.5 and 4.1 eggs, respectively (Wilson 1973). Lamba (1963) believes the Myna to be an indeterminate layer because of geographical differences in sizes of clutches in India. However, in aviaries eggs broken during laying are not replaced, and this is characteristic of determinate layers (Davis 1955). Probably most songbirds are determinate layers (von Haartman 1971).

Incubation has been reported as beginning with laying of the second egg (Sengupta 1968) and with laying of the last egg (Eddinger 1967). Although aviary birds began sitting immediately after the second egg was laid, all eggs usually hatched on the same day. First eggs averaged 16 days between laying and hatching, while last eggs averaged 13 days. A similar period for incubating the last egg was found in Hawaii (Eddinger 1967). Only 14 days was required for first eggs of most clutches found near Calcutta (Sengupta 1968), though usually 17 days was necessary at Vellore (Lamba 1963), also in India.

Only the female possesses a brood patch and sits on the nest at night. Males sit on eggs for short periods during the day but undoubtedly do not warm them as efficiently as females (see Snow 1958: 98). Females in aviaries spent an estimated 30% to 40% of the day incubating, with an average of nine minutes per sitting period. Males made fewer visits than females and spent an average of four minutes per visit. In the field males and females together made an average of 4.7 visits per hour to nests with eggs, during 23 hours of observations.

There were four well-defined peaks in numbers of pairs with eggs that followed by one week each of four peaks in numbers of pairs building nests (Fig. 2). In total, 47 different pairs had 88 nestings to at least incubation, a mean of 1.66 nestings per pair for 53 pairs.

3. Nestlings —

In four clutches in the aviaries all eggs hatched on the same day, but one clutch hatched over three days; two clutches did not hatch and one clutch had one nestling. Only 48% of 31 eggs hatched. Chicks began begging immediately, and both parents fed them. In the aviaries parents fed nestlings live or dead insects but did not feed them food provided for adults (chicken mash, apples and minced meat). In the field nestlings were fed exclusively on invertebrates, primarily insects, for their first 10 days, after which time they were also fed small quantities of bread and fruit. Cicadas were common in the study area from late December to March, and during February they constituted up to 90% of items brought to some nests with nestlings two weeks or older. Females brood at night for 14 to 17 days before joining males at communal roosts. In the field pairs made an average of 11 visits per hour to nests with nestlings, during 33 hours of observations.

During incubation there were 24 complete failures of nests, and as a result only 44 different pairs made 64 nestings to the nestling stage. The peak in numbers of pairs with nestlings occurred in late January and early February (Fig. 2).

4. Fledgelings and Nesting Success —

The nestling period varied from 20 to 30 days with an average of about 27 days. In the four cases of a brood fledging at three weeks of age, the young disappeared after one night out of the nest, presumably victims of predators or exposure; none could fly. During the day parents remain near fledgelings that can not fly, but families with flying young move toward the nearest trees. Families appear at communal roosts, but it is not known how soon this follows fledging. In January and February fledgelings from a first brood associate with parents for one to two weeks before being chased out of the territory; but, in March and April adults rarely attempt to re-nest if they already have fledgelings, and families may remain together for three or four weeks.

There were 24 complete failures of nests during the nestling stage, the same number as during incubation. In all, 55% of occupied nests did not produce fledgelings. Rate of complete failures was relatively constant throughout the nesting season except for one high, isolated peak in late December that corresponded to a sharp drop in numbers of nests containing eggs (Fig. 2). The reason for this peak is not known.

In total, 32 different pairs (60% of the pairs) produced 40 fledged broods, 24 single and eight double broods, resulting in 77 fledgelings. This is an average of 1.45 fledgelings per breeding pair — assuming that late-comers and early deserters to the study area did not breed successfully elsewhere. But, at its peak in March the number of fledgelings and juveniles arriving at the Parnell roost was 32% of the total number of roosting birds (see Line C of Figure 3, Counsilman in press). Thus, recruitment in and around the study area by the end of the breeding season was probably slightly less than one young bird per two birds one year or older.

Based on an average of 3.9 eggs per clutch (aviaries), 88 nestings to incubation and 77 fledgelings nesting success in the study area was about 22% for 343 eggs. This represents a maximum figure for success of eggs because probably not all nests were found before they failed (see Mayfield 1961), and not included are nests in which eggs may have been laid but incubation did not follow.

The 13 pairs that were present in the study area both before and after the 1970-71 breeding season had a nesting success of 27% for that season compared with 20% for other pairs; this difference was statistically significant ($P < 0.001$). Nesting success in the woodland subhabitat was not significantly ($P > 0.05$) different from success in the subhabitat with a moderate density of buildings and pavement.

5. Double Broods —

Two broods of fledgelings were produced by each of eight pairs: Nos. 2, 10, 16, 27, 28, 34, 38 and 46. These pairs had significantly ($P < 0.025$) fewer fledgelings per brood in their first brood (1.3) than in their second (2.3) and significantly ($P < 0.05$) fewer in their first brood than did pairs with only one brood (2.0). But, their second broods were significantly ($P < 0.05$) larger than those of single brooded pairs. Also, they had significantly ($P < 0.01$) fewer complete failures than pairs with no fledgelings but not significantly ($P > 0.10$) fewer than pairs with one brood; and, their first broods fledged significantly ($P < 0.01$) earlier than broods of other pairs.

One territory (No. 2) was in savannah, one (No. 10) was in grassland, and the remaining six were in areas with a moderate density of buildings and pavement. These territories were not significantly ($P > 0.05$) different in size from those of less successful pairs, but they did average 0.12 ha. smaller. Also, the coefficient of variation ($S.D. \div \bar{x}$) was 16% for sizes of territories of pairs with two broods but 30% for sizes of territories of pairs with one brood and 32% for territories of pairs with no young. In other words, there was a most favourable size for a territory and those belonging to the most successful pairs varied least from this size.

DISCUSSION

Urban birds are not isolated from conspecifics in natural habitats, and, consequently, speciation of populations in cities does not occur (Erz 1966). Thus, factors that have favoured the Myna for association with man are pre-adaptations evolved in another habitat, open woodland. Woodland and urban habitats are comparable in several respects: both have vertical structures (trees or buildings) suitable for nests, roosts and shelters widely spaced over ground with short or no cover of vegetation. Similarity of these two habitats is probably the primary factor that allows Mynas to exploit the urban environment. Ali & Futehally (1967: 87) suggest that a social disposition and omnivorous feeding habits favour the Myna for commensalism with man. Communal sleeping is, in part, an adaptation for avoidance of predators (Counsleman 1974, see also Gadgil 1972), and ground predators (e.g. rats, cats, mice, dogs and men) are more common in cities than in rural areas (for New Zealand see Kikkawa 1966). During the day, however, Mynas in cities appear to be less social than Mynas in rural areas, and sociality *per se* is not a prerequisite for urban dwelling (e.g. Blackbirds). A large proportion of urban species feed on a mixed diet (Winterbottom 1960 and 1966), and omnivorous feeding is perhaps the second most important pre-adaptation of Mynas for living in cities. It allows birds, except nestlings younger than 10 days, to eat a wide variety of foods besides those in their natural diet, and these foods are likely to be less seasonal in abundance than

insects, fruits or seeds. Nesting in holes is probably an advantage, but not a necessity (e.g. Pigeons), for urban living because holes are safer from predators and weather (Nice 1957) and more abundant in cities than good sites for open nests. The three most common species in Auckland, House Sparrows, Starlings and Mynas, all nest in holes or crevices.

Possession of a territory and home range apparently confers a number of benefits. Both areas may help maintain pair bonds by isolating pairs during the day. Also, three of four copulations I saw in the field were interrupted or nearly so by other pairs; still, interference with copulations or nesting activities is likely to be less within than outside a defended area (Nice 1941). The significance of interference, however, is not known (Snow 1956). In most cases the territory provided a large proportion of food for adults, nestlings and fledgelings, but in a few cases, where disturbances were numerous, territories (especially Nos. 14 and 44) provided little food although the area defended was large. A home range probably provides a familiar area for feeding during winter and ensures a good area for breeding. Pairs that were present in the study area both before and after the 1970-71 breeding season produced significantly more fledgelings than other pairs. Also, waking and roosting times at the Parnell roost indicated that birds remaining in the city during winter were not pressed for time for foraging (Counsilman 1974; cf. Kluijver 1950: 111). Likewise, populations of House Sparrows (Summers-Smith 1963) and Blackbirds (Snow 1958) in suburban habitats did not experience shortages of food during winter.

Sengupta (1968) reports an average size for 12 territories of Mynas in India as 0.012 ha., which is 1.4% of the mean size of 51 territories in Auckland — far too small to provide much food or isolate pairs. Bertram (1970) found intense competition for holes in trees among Indian Hill Mynahs (*Gracula religiosa*), Indian Mynas and other species. Because of their smaller body size in India and the richer avifauna there Mynas must compete with many more species than in New Zealand to obtain and retain a nest-site. Such competition usually leads to the evolution of defence of a nest area and not defence of a food and nest territory (von Haartman 1957).

Although the urban environment is generally considered to be rich in food for birds (Erz 1966, Snow 1958 & Summers-Smith 1963), nesting success of Mynas was 14% in Honolulu (Eddinger 1967) and 22% in Auckland but 61% (Lamba 1963) and 76% (Sengupta 1968) in two non-urban areas in India and 33% in a non-urban area in New Zealand (Wilson 1973). The importance of predation in Auckland is not known, but it would be expected, like weather, to lead to complete rather than partial failures of nests (Nolan 1963, Ricklefs 1969). A 55% rate of complete failures of nests of Mynas is similar to rates found for Blackbirds and Song Thrushes (*Turdus philomelos*) in Dunedin, New Zealand, where predation accounts for about half of all nest losses (Kikkawa 1966). But, Blackbirds and Song Thrushes

nest in the open. In England, predation on nests of Blackbirds (Snow 1958) and Robins (Lack 1943) was high in wooded areas but not in gardens. Shortages of food, on the other hand, result in both complete and partial failures of nests, and probably most nests in the study area had at least one death of eggs or nestlings.

Starvation of nestlings has been suggested as a major cause of mortality in nests of the Myna by Eddinger (1967), Lamba (1963), Sengupta (1968) and Wilson (1973). Bertram (1970) believes that, in the absence of man, reproduction by the Indian Hill Mynah is limited by abundance of food for nestlings and availability of sites for nests. Sites for nests are not in short supply in Auckland. And, the same number of complete failures of nests during incubation as during brooding indicates that a shortage of food for nestlings is not the only cause of mortality in nests in Auckland. Adult Mynas in urban areas, like adults of House Sparrows (Summers-Smith 1963) and Blackbirds (Snow 1958), may also experience a shortage of food during the breeding season. In India, incubating (Lamba 1963, Whistler 1949) and probably also brooding are largely performed by the sun, but in New Zealand this is not possible, at least to the same extent. Thus, pairs with occupied nests in New Zealand must either spend less time foraging or incubate and broods less efficiently than pairs in India. Disturbances may indirectly accentuate shortages of food by interfering with foraging and, as in aviaries, may directly cause some infertility, deaths of embryos and nestlings and desertions of nests. In Honolulu, 25% of 56 eggs did not hatch (Eddinger 1967); an average of about 12% appears normal for passerines in non-urban habitats (see Ricklefs 1969: 4). Heavy infestations of mites on nestlings have been found in Auckland, Hawke's Bay, New Zealand (Wilson 1973) and Hawaii (Eddinger 1967) and are likely to contribute to mortality in nests when food for nestlings is scarce. Only 13% of the 48 complete failures of nests are known to be the result of weather, a small entrance to the nest-site and destruction by man.

In England, Robins (Lack 1943), House Sparrows (Summers-Smith 1963) and Blackbirds (Snow 1958) have smaller clutches and higher densities in gardens than woods. Likewise, clutches of Mynas in Auckland and Honolulu averaged smaller than clutches in non-urban habitats in India and New Zealand. And, although possibly the highest densities of Mynas in New Zealand occur in fruit growing districts, Mynas certainly are not as numerous in other cultivated areas as in cities. Finally, Erz (1966) suggests that higher temperatures in cities favour longer breeding seasons than found in natural habitats. The 1970-71 season in Auckland was indeed longer than the same season in Hawke's Bay (Wilson 1973).

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AGE-RELATED SPATIAL DISTRIBUTION OF ADELIE PENGUINS

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ABSTRACT

During the period 20-21 December 1972 while travelling from Wellington, New Zealand, to Hallett Station, Antarctica, observations were made on the spatial distribution of Adelie Penguin age groups. It was found that during this period one-year-old birds were found at a noticeably greater distance from an established breeding rookery than were the birds two years old or older.

INTRODUCTION

In January 1902, Edward Wilson observed that the summer range of young Adelie Penguins (*Pygoscelis adeliae*) extended noticeably farther north than that of adults (Murphy 1936). Even though this has been known since this time very little information exists on this phenomenon in spite of the fact that many scientific parties have traversed the antarctic waters in recent years. The purpose of this paper is to report on observations relating to this subject taken while I was on board the USCGC *Glacier* from 15-21 December 1972 traveling from Wellington, New Zealand, to Hallett Station, Antarctica. *Material and Methods:*

All observations were taken on 20-21 December 1972 starting at 67° 04' S, 176° 56' E and continuing until 72° 02' S, 171° 18' E when it became necessary to cease observations to prepare for departure to Hallett Station. Birds were aged on the basis of presence or absence of a white throat. Juvenile Adelie Penguins have a white throat until about 14 months of age at which time the white throat feathers are replaced by black feathers when they moult (Sladen 1955). The throat is then black throughout the remainder of the bird's life. Thus, by this technique birds could be placed into two age classes by field observations alone. In this paper I have used Class J to represent juvenile birds one year old, and Class A to represent sub-adults and adults two years old or greater with black throats.

All observations were carried out on the bridge of the icebreaker during six one-hour intervals throughout the day. A pair of 7 x 35 binoculars aided in identification, and all birds within sight that could accurately be assigned to an age class were counted.

A problem existed in interpretation of the data because at least two major Adelie Penguin rookeries are located in the immediate area (Watson et al. 1971). Since distance from the nearest established rookery was wanted for analysis, it was assumed that penguins from both Cape Adare and Cape Hallett could be seen and counted during

my observations. Thus, the distances recorded in Table 1 represent distances from the point of observation to the nearest Adelie Penguin rookery (either Cape Adare or Cape Hallett).

RESULTS AND DISCUSSION

As can be seen by examination of the data in Table 1 the younger age class of Adelie Penguins was found predominately at a greater distance from the nearest breeding rookery than was the older age group. The first penguins seen were sighted on 20 December at a distance of about 500 km from Cape Adare. These were all juvenile birds of Class J. Observations continued with only Class J birds being seen until about 200 km out except for two black-throated individuals seen at a distance of 473 km from Cape Adare. From about 200-120 km from the nearest rookery was a transition zone where groups of both Classes J and A were seen. At distances of

Table 1. The relationship between the number of Adelie

Penguins seen and distances from the nearest rookery.

<u>Distance from Rookery (km)</u> ¹	<u>No. in Class J</u> ¹	<u>No. in Class A</u> ¹
500	3	
491	2	
473	2	2
464	2	
455	1	
431	1	
417	3	
400	1	
373	6	
364	5	
349	3	
318	1	
291	4	
278	14	
220	3	
198	2	
187	2	2
182	2	5
136		1
133	3	
124		8
122	4	
118	2	4
116		12
113		4
111		2
109		17
107		8
105		23
101		41

¹See text for explanation of terms

less than 120 km from a rookery mostly birds of Class A were seen. For the purpose of simplicity observations in Table 1 were discontinued at 100 km from Cape Hallett when it became apparent that few Class J birds were being seen. At distances of less than 100 km well over 500 individuals were observed with all belonging in Class A except for three individuals. The difference between means of the data for both age classes presented in Table 1 was compared by use of a Student's t-test (Steel & Torrie 1960) and found to be highly significant ($P < .01$).

Not enough is known about the oceanic distribution of the Adelie Penguin to make many conclusions from my data. However, several conclusions are readily apparent. LeResche & Sladen (1970) state that very few of the one-year-old birds return to the rookery to establish territories or moult. On the other hand, many sub-adults of ages two or greater return to establish territories and moult even though few actually breed until four or more years of age. These sub-adults and other breeding adults arrive at the rookery during October and November. Thus, it seems reasonable that these older birds with stronger reproductive ties with the rookery would be found closer to the breeding area during the summer season, while the juvenile birds would range a greater distance out to sea. Since only two individuals of Class A were observed at distances greater than 200 km from an established rookery, it is probably safe to assume that these birds and many of the other Class A birds in the perimeter areas were non-breeding birds also. This aspect of the natural history of the Adelie Penguin is certainly of interest and should be further studied in different areas and at different seasons.

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FIELD RECORDING OF NATURAL SOUNDS, WITH A NEW ZEALAND BIRD DISCOGRAPHY

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ABSTRACT

This account discusses how to record natural sounds in the field, outlines a history of bird sound recordings and compares recording equipment used over the years since 1889 with what is used to-day. Uses of bird recordings are discussed, and a discography of recordings commercially available of the songs of New Zealand birds is added.

HOW TO RECORD NATURAL SOUNDS IN THE FIELD

There are three ways of tackling the problems of recording of the sounds made by animals in the wild. One way is to make a detailed study of the habits of the animal, whether it be a bird, insect or a bat or a frog, to find the place where the subject vocalises most often. A microphone is then placed in a convenient location as close as possible to the source of sound. It is essential for most birds and other larger animals to camouflage both microphone and the cable when using this method of recording which requires a great deal of patience but can result in recordings of exceptional quality. After placing the microphone and cable satisfactorily the next stage takes place at the tape recorder which should be at least 50 metres away in a sheltered spot. Once the subject to be recorded appears near its vocalising station the recorder can be switched on and made ready to record. Some tape recorders have a manually operated pause that can be used at this point; most machines suitable for field work will also allow the use of headphones which are a must for this type of work. Once the subject reaches its actual singing post the operator should start recording. I usually use the first few seconds of sounds to make any adjustments to the recording level that may be needed. At the end of recording one should make a note of the name of the species, time, place and any other relevant data that may need to be referred to at a later date for writing up field notes, etc. It can take many years to get a good recording of a bird by this method; on the other hand, many good recordings that are available have been produced in this way.

A more common method of recording natural sound particularly birds is by the use of an apparatus called a 'parabolic reflector.' This method was first used by Peter Keane and Arthur A. Allen of Cornell University, New York, in 1932. Parabolic reflectors are made in various sizes from a 12 inch (30cm) model to about a 48 inch (120cm)

diameter. The most common sizes in New Zealand seem to be the 18 (45cm), 24 (60cm), 36 (91cm) and 40 inch (102cm) sizes. The greater the diameter of a reflector, the greater is the increase of working range and frequency response. On one occasion I was able to record Tuis (*Prosthemadera novaeseelandiae*) at a distance of 800 metres with an 18 inch (45cm) reflector, the usual range of which is about 35 metres. I now use a commercially made 24 inch (60cm) reflector which is about as big as I can handle on my own for any length of time. When recording with this rig, I set the microphone at the focal point in the reflector (i.e. the point where all the reflected sounds converge), in this instance 7 inches (18cm), and train it on the bird that I am recording. I have two ways of telling if I am on to the subject being recorded: one is by a lift in volume in the headphones, and the other way is by lining up with the peep sight on the reflector. I use both of these methods in the field and I always use the reflector hand held in the field, usually with a short microphone cable. This arrangement would allow the use of tape recorders not otherwise suitable for this work. If tape recording in the field is done by a group of two, one person can take over the reflector and the other the tape recorder. This of course allows the use of bigger reflectors and long lengths of cable. The biggest advantage in using a parabolic reflector instead of an open microphone is in the fact that a reflector is a very directional piece of equipment and this becomes more noticeable as reflectors get bigger. The usual working range for the 24 inch (60cm) reflector is about 50 metres.

The third method of recording uses what is technically known as a shotgun microphone. These are very expensive but can give very good results. The microphone diaphragm is built into the end of a long tube that looks rather like a shotgun, hence the name. To make a recording using this method all one has to do is to point the microphone at the subject. Headphones would be essential when recording by this method. Another method uses an instrument called a "snoopscope" which is essentially a series of tubes of an internal diameter of one inch (2.5cm). There are 36 tubes the longest of which is 36 inches (91cm) long, the shortest one inch (2.5cm). These are arranged so that any one of these can be fitted over the head of the microphone at will. This arrangement is extremely directional but has drawbacks in that it is a two man job to carry a metal snoopscope anywhere. In spite of this they are used in South Africa and elsewhere. I have heard some good bird recordings made with the method.

A HISTORY OF BIRD SOUND RECORDING

In 1889, Ludwig Koch made a recording of an Indian Shama (*Copsychus malabaricus*) at Frankfurt on a wax cylinder. This recording is reproduced on a disc called "A Salute to Ludwig Koch." This is the earliest known bird recording to be made. The world had to wait a further seven years until the first commercial disc of a human imitation of a bird call came on the market, in America,

on a Berliner record (No. 403). The first reference in the scientific literature to the reproduction of bird song came in 1898 in Washington, D.C., with a gramophone recording of a Brown Thrasher (*Toxostoma rufum*) by Dr Sylvester D. Judd. In 1900, Cherry Kearton, in England, made the first recordings of wild birds there with the song of the Nightingale (*Luscinia megarhynchos*) and a few Song Thrush (*Turdus philomelos*) notes. Between about 1905 to 1909, Ludwig Koch, working in Frankfurt, started on the first attempt anywhere in the world to make a collection of wild bird recordings. He used a machine that recorded directly on to wax cylinders; this was in Frankfurt, Germany. In May 1910 the first commercial gramophone record ever published with a bird voice on it was issued by the Gramophone Company in England as a 10 inch (25cm), 78rpm, single-sided disc (number 6439) featuring a captive Nightingale from the aviary of Carl Reich in Berlin. Also about 1910, the first disc presenting the voices of wild birds appeared, published by the Beka Gramophone Company of Berlin. The first field recordings to be made in Russia appear to have been made late in 1912. On 18 May 1929, the first recordings of wild birds in the North American region were obtained. They were made by the Fox-Case Movietone Corporation under the ornithological direction of Arthur A. Allen and Peter Paul Kellogg at Ithaca, New York. The recordings made were on film synchronised with moving pictures, and included Song Sparrow (*Melospiza melodia*), Rose Breasted Grosbeak (*Pheucticus ludovicianus*) and House Wren (*Troglodytes aedon*). Also in 1929 the first recording of a wild bird from the Ethiopian area was obtained by Ludwig Koch, the bird being a Superb Glossy Starling (*Spreo superbus*). This recording appears on the disc entitled "A Salute to Ludwig Koch" published by the BBC. In 1931 the first Australasian recording of a wild bird was made by R. T. Littlejohns with the aid of motion picture equipment. On this occasion the Lyrebird was the performer. The year 1932 saw the first use of the parabolic reflector in ornithology when two Americans, Peter Keane and Arthur A. Allen, did some experimental work. The first "Sound Book" devoted to birds was published in 1934 at Munich under the title "The Wood Resounds." This was a 10 inch (25cm) 78rpm record and a 40 page book by L. Koch and L. Heck. Then in 1934 the first bird sounds from the Antarctic were recorded on 3 December of that year. This recording of the Emperor Penguin (*Aptenodytes forsteri*) was made on an aluminium disc and was the first recording made anywhere in the world using a radio link. The first recordings from the Oriental area appear to be those made by the Coolidge Carpenter Expedition of 1937. About 1943 the first field recordings from the Neotropical region were made on Barro Colorado Island, Panama. The first recordings of birds on magnetic tape appear to be those made by Sture Palmer of Sveriges Radio on the island of Gotland in Sweden in 1946. Guillemots (*Uria aalge*) and Razorbills (*Alca torda*) were recorded on this occasion. The first commercially available records of oriental bird songs became available from Japan in 1954. Carl and Lise Weismann of Denmark commenced recording New

Zealand birds in September of 1956. Kenneth and Jean Bigwood were also active at this time. The year 1959 saw the first commercial discs of bird songs released in the USSR and in New Zealand. The first occasion when a scientific paper, as such, was illustrated by sound recording was in 1960 (see Boswall, 1969: 470). The Puerto Rican Whip Poor Will (*Caprimulgus noctitherus*) was rediscovered by the use of a sound recording of its voice in 1961. The song of the Musician Wren (*Leucolepis modulator*) recorded in Brazil by Johan Daglish Frisch was transmitted to the world via a satellite in space orbit in 1963 as part of an international television hook-up. In 1963, also, was the publication of the first bird record in stereophonic sound. The record called "Birds In Stereo" was issued by Biophon in Sweden and was a 7 inch (18cm) 45rpm, EP, by Sten Wahlstrom and Sven Aberg. References to all these historical events can be found in the paper by Boswall (1969) in a special issue of *Recorded Sound* (see Br. Inst. Rec. Sd 1969). Other relevant literature can be found in the papers by Boswall in 1963, 1964 and 1970 and by Boswall & North (1967) and also in Boswall & Prytherch (1969) which lists an especially interesting Antarctic discography.

In New Zealand, J. L. Kendrick of the Wildlife Service of the Department of Internal Affairs started working on the National Collection of Wildlife Sounds in 1963 (see Kendrick 1973 and Anon. 1974) and several catalogues of the Collection's unpublished recordings have been issued. The Orange-fronted Parakeet (*Cyanoramphus malherbi*), formerly thought to be extinct, was rediscovered in the Durville Valley during 1965 by the use of recordings from this collection.

RECORDING EQUIPMENT OVER THE YEARS

The earliest recordings were made directly on to a wax cylinder on an Edison cylinder machine. The sound that was being recorded was focused into a horn which had a stylus attached to its trailing end. Any sound picked up by the horn caused the stylus to vibrate and the louder the sound the greater was the vibration. This stylus was set on to the outer edge of a wax cylinder so that it would cut a groove as the cylinder revolved at a set speed, usually 160 rpm. At the same time the stylus moved slowly across the cylinder faithfully transcribing on to the wax the vibrations caused by the horn picking up a sound signal. In the 1930s disc cutters were used in the field. These machines were very cumbersome things but technically much advanced over the cylinders in use earlier. To use these machines successfully one had to be very patient indeed. Most of the recordings available used the open microphone technique described earlier. The microphones had to be set up in a suitable locality and long cables run to the recording plant up to a mile away. The operator had to monitor the incoming signal continuously on headphones or on a small speaker. Once a satisfactory signal was received one could lower the cutting stylus on to the disc which revolved at 78rpm and cut a recording in the normal manner. These discs could be 10 (25cm) or 12 inches

(30cm) and ran from 2½ to 4 minutes respectively per side. The recordings are usually referred to as acetate discs because they are an aluminium disc covered with a thin coating of acetate. In the USA and in Australia movie picture equipment was used on a few occasions to record bird sounds. This technique apparently recorded the sound on to an optical sound film at the same time as the moving film was being exposed. The next development was the parabolic reflector which made field recording very much easier, even of species which are usually very wary. Perhaps the greatest advantage of this method is that the operator and equipment can be some distance away from the subject being recorded thus causing less stress to it.

A more recent method is using the shotgun microphone which is very directional but suffers from a lack of range for this type of work. This type of microphone can be used successfully in windy conditions where the other techniques cannot be employed satisfactorily. This factor is a big advantage to consider when deciding what method of recording is to be used. In some difficult situations radio transmitting equipment is used as part of the set up. This entails the use of a portable radio transmitter which is set up to broadcast the signal from the microphone back to a radio receiver which is connected, in turn, to the tape recorder. This was a practical proposition in earlier days when tape recorders were big, heavy, cumbersome machines not easily carried about, but today's light weight portables may be lighter than the portable radio transmitter.

RECORDING EQUIPMENT TO-DAY

Tape recorders are by far the most popular medium for recording natural sounds, several different makes and models being used with differing characteristics, and some doing a better job than others.

The best tape recorder made for this type of work would be without doubt the Nagra, a machine with several interesting features according to the model. These machines will record and play both of the major recording curves in use today (CCIR & NAB) and are full track variable speed machines. Most laboratory workers have access to these or to the Uher machine. Second to the Nagra would perhaps be the Uher 4000 series, particularly models L and S. These machines have the disadvantage of being limited to a 5 inch (13cm) reel of tape with a consequent reduction in playing time. The Nagra will take a 7 inch (18cm) reel of tape. Another problem with the Uher for field work is that they are half track machines, but they are considerably lighter than the Nagra and very solidly built. If the recorded tape is likely to be replayed on a studio machine with a full track head, one should record a half track tape, one track only, otherwise both tracks would be heard together with one of them going backwards. These comments also apply to four track machines as well. The Uher tape recorder plays and records to the NAB standard.

Many field recordings have been made on Ficord tape recorders. While these are not as good as the two previous makes they can

produce some excellent recording. The two models I have seen are limited to a 4 inch (10cm) reel of tape and work to the CCIR standard. One of the first portable machines to become available was the EMI L2 series, not especially designed for field recording but frequently used there. These machines were made for recording on the spot interviews, for radio broadcast work and allied use. The EMI L2 is still in use in some places as a broadcast machine after twenty years. These machines had a 5 inch (13cm) reel of tape and recorded to the CCIR standard. Most of the birds on the record "A Treasury of New Zealand Bird Song" were recorded on an EMI L2. Volumes 4 and 5 in "Sounds of New Zealand Birds" were also recorded on these machines; volumes 1, 2 and 3 were recorded on the Uher 4000. Another machine used in North America is the Magnemite although rarely seen in New Zealand. This machine operates at the high speed of 15 inches (38cm) per second and is a half track model. The only other machine mentioned that will reach this tape speed is the Nagra, all the rest having a maximum of $7\frac{1}{2}$ ips (19cm) except the EMI L2C which also operated at 15 ips (38cm).

MICROPHONES

A directional dynamic type is most suited to field work for several reasons, one of the most important being the rugged heavy duty construction of these microphones. The two I use myself have good responses from 20Hz to 20000Hz in one instance and from 40Hz to 18000Hz in the other case. Most of the better microphones in this class have a good output and drive most tape recorders well without having to use transformers or amplifiers. For field work low to medium impedance microphones (15 to 600 ohms) are essential particularly if long cables between microphone and tape recorder are being used. If an operator uses high impedance microphones, transformers and possibly line amplifiers may be needed particularly on long runs of cable.

I use AKG D200 and Grampian D4 microphones for my own recording work and have found these to be very satisfactory indeed for use in the field. Other microphones that are suitable are certain models from the Electrovoice Altec, and STC ranges. Some recording work in the field is being done with excellent results with both Moving Coil and Condensor microphones now. However, both of these types of microphones are not as robust as the other kinds of dynamic microphones and are much more prone to damage. Crystal microphones are not really suitable for field work as they cannot be used with a long lead without serious technical problems occurring. Another factor against these microphones is a reduced frequency response.

POSSIBILITIES OF OTHER TAPE RECORDERS

Although professional tape recorders give the best results if properly used, this does not mean that the domestic recorder cannot be used in the field. I have in my collection a recording of a New Zealand Black-browed Albatross (*Diomedea melanophris impavida*)

that was recorded on a cassette recorder on Campbell Island during December 1972. The quality of this recording is very good indeed and is better than some professional tapes that I have heard. I also have a recording that was made on a National portable machine of the White-winged Triller (*Lalage sueurii tricolor*) seen in Dunedin in 1969 (see MacPherson, 1973). This recording while not of the highest standard mostly due to the circumstances in which it was recorded has richly repaid the work that was devoted to it during the copying process. It will be published, I hope, on disc in 1976. The portable battery operated machine can be used in the field with a short microphone cable and careful attention to recording technique with great results. The faster the tape speed employed the better the resulting recording should be, all other things being equal. This is because a tape travelling at a high speed can handle high levels of high frequencies better than the same tape at half the speed. Mains operated tape recorders can be used in the field also but with considerable difficulty. If recording is being done in a location well away from an AC power supply one can use a car battery and a converter that will supply the correct voltage and cycles with a good chance of acceptable results. The long playing record by Myles E. W. North entitled "Voices of African Birds" contains examples of birds recorded in this way.

USES FOR YOUR FIELD RECORDING

Once your field recording has been made the problem arises of what to do with it. Tape recordings of natural sounds are used in a variety of ways for differing projects. Anyone who has listened to radio serials or some TV programmes will have heard natural sounds used to create an atmosphere. Recorded tapes are sometimes used for the sound track of both movie and TV films. In these circumstances the original tape is copied and edited on to a second tape which is, in turn, used in the appropriate place on the finished film.

Another very important use for your field tape recording is that of scientific research into the life and habits of birds, insects and other kinds of wildlife. For this work a recording should be a good clean one with little or no background sound. A great deal of analysis is carried out today using the audio spectrograph, a machine which prints out a graph of the sound that is being studied. The graph shows a frequency reading against a time base and can be fairly easily related to the original recording if the need arises. This instrument also can be used to show the intensity of the sound being analyzed. Differing races of birds have been separated in this way in recent years. Perhaps the most well known way of using a field recording is by publication of a gramophone record using a copy of the original recording. This can be done in two ways: one is to splice all the required recordings together in the correct sequence and to have a master disc (matrix) for a gramophone record produced from this. This method has the disadvantages of not allowing a uniform standard of audio level and quality control. The second method involves more

work but gives much greater control over both levels and quality. The field recordings selected are copied directly on to the master tape, the levels of sound being kept to constant volume. Any filtering that may be necessary to improve the quality of a recorded field tape is done at this stage. Any identifications are fed in at this point as well. Tape recordings of bird calls have been used to keep birds away from certain areas such as airfields and orchards and other places where they are a nuisance. Birds formerly thought to be extinct have been rediscovered by playing a recording of their voices in the area where they were last seen. A more recent innovation is the formation of a national collection of such recordings. There are few collections in existence on a zoogeographical basis anywhere in the world at present but most notable would be Cornell University Library, Institute Echo of France, and the BBC in England.

FILTERING

When field recording is being done for eventual use on disc or inclusion in a library of natural sounds the ideal is for the recording to be free from all extraneous noise. This is not always possible in New Zealand, the worst problem being wind. However, a recording of fair quality that has wind, water or even traffic noise on it can often be improved to an acceptable standard by filtering, thereby removing the unwanted sound and leaving the rest. As an example, all the recordings on volumes 4 and 5 of "Sounds of New Zealand Birds" have been improved in this way. I check all my field tapes when I am listening to them and write down on my field notes any filtering that might be needed at a later date. The filter that I use is a home made one that can remove up to 30 decibels per octave below any of six set frequencies up to 1000 hertz or 30db per octave above 1200Hz either independently or together as may be required. This filter was recently checked by the Engineering School of the University of Canterbury and was found to be accurate to 0.5 db, a figure equal to that of the best equipment available.

CONCLUSION

It is a sound practice to duplicate all your field tapes and to keep a copy in a separate place in case the original is destroyed or lost. It is for this reason that copies of all my tapes are to be deposited with the British Library of Wildlife Sounds which is a division of the British Institute of Recorded Sound in London.

A NEW ZEALAND DISCOGRAPHY OF BIRD SONG

BIGWOOD, K. & J. 1959. "A Treasury of New Zealand Bird Song." Three 7 inch (18cm) 45rpm extended play discs, EC14, EC15 and EC16. Published by A. H. & A. W. Reed, Wellington, New Zealand (Kiwi Records). These records came as a boxed set with a 40 page booklet by Gordon R. Williams of the New Zealand Wildlife Service who also introduces the 30 species presented.

EC14

Kea
North Island Kaka
Yellow-crowned Parakeet
Takahe*
Western Weka
White Heron
Blackbird
Song Thrush
House Sparrow
Dunnock

EC15

Tui
Bellbird
Grey Warbler
Yellowhead
South Island Robin
Yellow-breasted Tit
Redpoll
Greenfinch
Chaffinch
Goldfinch

EC16

South Island Kiwi
Morepork
Pied Stilt
Banded Dotterel
Blue Duck*
Paradise Duck
Yellowhammer
Skylark
Starling
White-backed Magpie
(*recorded by G. R. Williams)

BIGWOOD, K. & J. (1961). A Treasury of New Zealand Bird Song, No. 4.

One 7 inch (18cm) 45rpm extended play record, EC25. Supplement Number One. Booklet by Gordon R. Williams. A. H. & A. W. Reed, Wellington.

North Island Kiwi	Whitehead
New Zealand Falcon	Brown Creeper
Pukeko	New Zealand Pipit
Shining Cuckoo	Silvereye
New Zealand Kingfisher	Black Swan

WEISMANN, C. & L. (1963). New Zealand Bird Songs.

Two 4 inch (10cm) reels of tape recorded at 7½ips (19cm). Tape numbers 21 & 22.

No. 21

Grey Warbler
Pied Tit
Whitehead
North Island Robin
North Island Fantail
Bellbird
Tui
North Island Weka

No. 22

North Island Kaka
Kea
Morepork
Fairy Prion
Paradise Duck
Northern Blue Penguin

McPHERSON, L. B. (1970). Sounds of New Zealand Birds, Volume One.

One 7 inch (18cm) 45rpm extended play disc, No. PR575. McPherson Natural History Unit, Christchurch.

House Sparrow	Shy (White-capped) Molly-
Starling	mawk
Song Thrush	Black Oystercatcher
Stewart Island Weka	Sooty Shearwater
South Island Saddleback	South Island Pied Oyster-
Red-billed Gull	catcher

BIGWOOD, K. & J. (1971). A Treasury of New Zealand Bird Song.

One 12 inch (30cm) 33 1/3 rpm record, No. SLP 25. This is a re-issue of the first set of records in this discography; also available as a tape cassette, No. TCSLP 25.

WILLIAMS, G. R. & N.Z. WILDLIFE SERVICE (1972). A Treasury of New Zealand Bird Song. Supplement No. 2. Seabirds Calling.

One 7 inch (18cm) 45rpm extended play recording, No. EC34.

Wandering Albatross	Sooty Shearwater
Australasian Gannet	Fluttering Shearwater
Northern Blue Penguin	Wedge-tailed Shearwater
White-fronted Tern	Southern Diving Petrel
Caspian Tern	Broad-billed Prion

McPHERSON, L. B. (1972). Sounds of New Zealand Birds, Volume Two.

One 7 inch (18cm) 45rpm extended play disc, No. PR629.

Goldfinch	Paradise Duck
Tui	Canada Goose
South Island Fantail	Peafowl
Rock Pigeon	California Quail
Erect-crested Penguin	Spotted Shag

McPHERSON, L. B. (1972). Sounds of New Zealand Birds, Volume Three.

One 7 inch (18cm) 45rpm extended play disc, No. PR641.

Budgerigar	Chukor
Blackbird	Yellowhammer
Crimson Rosella	Mallard
Black Swan	Black-billed Gull
Grey Partridge	Grey Warbler

McPHERSON, L. B. (1973). Sounds of New Zealand Birds, Volume Four.

One 7 inch (18cm) 45rpm extended play disc, No. PR699.
Field recordings by C. & L. Weismann.

Tui	North Island Fantail
Bellbird	Silvereye
North Island Robin	Brown Creeper
Whitehead	Pied Tit
South Island Fantail	Long-tailed Cuckoo

McPHERSON, L. B. (1974). Sounds of New Zealand Birds, Volume Five.

One 7 inch (18cm) 45rpm extended play disc, No. PR739.
Field recordings by C. & L. Weismann.

North Island Weka	Kea
Red-fronted Parakeet	Pukeko
North Island Kaka	Fairy Prion
Northern Blue Penguin	Indian Myna
Morepork	Australasian Gannets

McPHERSON, L. B. (1975). Sounds of New Zealand Birds, Volume Six.

One 7 inch (18cm) 45rpm extended play disc, *in preparation*.
Field recordings by C. Paulin*, H. Best† and J. Hutchinson**.

Adelie Penguin*	Mottled Petrel†
Snares Crested penguin†	Southern Diving Petrel†
Yellow-nosed Mollmawk**	Southern Skua†
Bullers Mollymawk†	Southern Black-backed Gull
Antarctic Tern†	Snares Cape Pigeon†

McPHERSON, L. B. (1976). Sounds of New Zealand Birds, Volume Seven.

One 7 inch (18cm) 45rpm extended play disc, *in preparation*.
Field recordings by H. Best† and B. McPherson*.

Rook	Yellowhead
Skylark	North Island Saddleback
Redpoll	South Island Fernbird†
Welcome Swallow	Yellow-breasted Tit
White-winged Triller*	South Island Robin

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CLASSIFIED SUMMARISED NOTES

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Selected extracts from notes supplied to the Recording Scheme during 1973/74.

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NORTH ISLAND KIWI (*Apteryx australis mantelli*)

Little Barrier, Te Maraeroa, Jan 74, seven seen, one of which was an albino (TRH); Apr 74, calling behind bunkhouse, four seen on paddocks and one on Summit Track at 1000 ft a.s.l. (BB).

STEWART ISLAND KIWI (*A. a. lawryi*)

May 73, seen and heard in area of Te Aika homestead (RJP). 23/4/74, in forest 1 km. south east of Glory Cove wharf, while sitting in water fern watching for deer I noticed movement in the fern. Carefully parting the fronds I saw two kiwis, one about 33% larger than the other, facing each other and apparently asleep, each with its head tucked along the side of the other. I gently touched the "tail" of the larger bird; it shook it slightly, sleepily lifted its head and peered about, then returned to its previous position (L.A. Bell per RDL).

GREAT SPOTTED KIWI (*A. haasti*)

A Spotted Kiwi captured and later released on Mt Ears, D'Urville Island in 1974 was described by Mrs Moleta as a large bird standing nearly 2 feet high. Two feathers taken from this bird were sent to FCK, who writes "except for the very long back feathers of *A. haasti*,

single feathers of *A. haasti* and *A. oweni* cannot be separated from each other. I cannot therefore be sure from which species the feathers originated but my guess is *A. haasti* " (ML).

October 1973, on a trip from Perry's Saddle on Heaphy Track over Mt Goul, Mt Goulard and Mt Flanagan to Mt Domett, 2-3 feet of snow was encountered most of the way and I was snowed in for two days near Mt Flanagan, 4625 ft a.s.l. Great Spotted Kiwis called frequently at night, and in the morning I could see by their tracks that they had visited sheltered parts of the alpine vegetation, although this was covered by snow; the nearest scrubby beech would be 2-300 yards below. Their method of feeding seemed to be different from the probing methods used in the lower valleys and swampy areas, and may be their normal way of feeding in alpine vegetation, which is rich in insect life, even under snow. The call of *A. haasti* is different from other kiwis; this was established on a previous trip to Goulard Downs where W. V. Ward made recordings, now lodged in National Museum (HFH). A female bird with 6½ inch beak, seen by S. Sparrow at Greenpark Game Farm June 73, had been caught in a possum trap near the bushline above NZFS No 3 hut, Hurunui Valley (JRJ).

Apteryx sp. Upper reaches of Karamea river, Mar 74, calls heard at night agree closely with Henry's description for S.I. Kiwi quoted in Oliver 1955 (JMC). Calls heard round Lake Minchin Hut, Poulter Valley by R. McKay, Jan 74 (JRJ). Dusky Sound, Jan 74, calls heard at Sportsman Cove and the Basin (S.E. of Earshell Beach) where at 0400 hrs a shrill "kee-wee" was immediately answered by another at lower frequency (CAF).

BLUE PENGUIN (*Eudyptula minor*)

March-May 1974, heavy mortality in Northland. Dead birds, east coast beaches from Cape Rodney to Parengarenga South Head, 3294; west coast beaches, Dargaville area, 598; Reef Point and 90 mile beach, 92. (D. E. Crockett).

WHITE FLIPPED PENGUIN (*E. albosignata*)

Hokio Beach, Manawatu, 31/1/74, one dead, identification confirmed by FCK (EBJ). Palliser Bay, June 74, one dead (PCH).

FIORDLAND CRESTED PENGUIN (*Eudyptes pachyrhynchus*)

Breaksea Island, 12/1/74, moulting sites found; one occupied by a bird beginning its moult, others had completed moult (CAF).

ERECT CRESTED PENGUIN (*E. p. sclateri*)

June 74, one recovered by BCH at Palliser Bay. This species nests on NZ Sub-Antarctic islands and over-winters in Cook Strait; birds occasionally come ashore to moult but no dead specimen has previously been recorded (PR). Kaka Point, 24/2/73, one moulting (RJP).

SOUTHERN CRESTED GREBE (*Podiceps cristatus*)

Lake Ianthe, 11/12/73, two (JAF). Glenmore Tarns, near Lake Alexandrina, two pairs; courtship display on Hartley Tarn 10/11/73 (RJP). Lake Monowai, mating display 21/10/73 (MLB).

N.Z. DABCHICK (*P. rufopectus*)

Muriwai Lakes 17/3/74, 89 (SMR). Waiwera Wildlife Refuge 16/12/73, two pairs with two and three well grown young respectively

making nine birds in all; 27/4/74, one pair with a single young, pointing to egg laying in March. Orewa purification ponds 13/3/74, one (RBS). Karaka, 7/3/74, two on a new dam (RBS, DAU): still present 21/7/74 (BB). Hawkes Bay, Westshore 7/4/74, 3 (NBM): Lake Tutira 9/6/74, 13 counted in sheltered bays (KVT). Manawatu, Lake Horowhenua 4/8/73, 30; small numbers March-July but 12 on 12/5/74 (EBJ).

Diomedea sp.

Off Mayor Island 28-29/7/73, two *exulans*, one *melanophris*, two *cauta cauta*, all adults; two adult and one juvenile *melanophris* 30/9/73; one juvenile *exulans* 25/2/74; 29-30/6/74, one juvenile *melanophris*, single adults of *bulleri*, *cauta cauta* and *cauta salvini*. The *melanophris* on 30/9/73 and the *cauta* on 29/7/73 were very tame; we were able to hand feed them and got close-up photographs (PL). Halfmoon Bay, Stewart Island, 22/5/73, 110 *bulleri* and 55 *cauta cauta* counted in the harbour while fishing boats were dumping refuse (RJP). NELLY (*Macronectes giganteus*)

Wellington harbour, 40 on 9/10/73 was our maximum count for that year; 8 birds at Ngauranga outfall on 18/1/74 was a considerable reduction from previous years (JMM). White phase birds, one at Bay of Islands 8/6/73 (D. E. Calvert), one off south Napier 27/10/73, sparse black spots on body (KVT), one dead in Bay of Plenty 7/9/74 (RMW).

ANTARCTIC PETREL (*Thalassoica antarctica*)

Storm cast specimen recovered on Dargaville beach 23/9/73 (D. E. Crockett) and one at Cape Kidnappers 16/12/73 (FCK).

CAPE PIGEON (*Daption capensis*)

Kaikoura 16/6/74, c.100 feeding close inshore by wharf, during southerly storm (JAC).

GREY-FACED PETREL (*Pterodroma macroptera*)

Opoutere 1/1/74, one freshly dead on hillside; G. Nicholson found old burrows high on pine forest-clad hill across the harbour (BB).

BLACK-WINGED PETREL (*P. hypoleuca nigripennis*)

7/4/74, M. O'Reilly picked up a storm-cast specimen on Uretiti beach, Northland east coast; one recovered on Dargaville beach 1/6/74 (D. E. Crockett).

Pachytila sp.

One of the largest wrecks of prions recorded in New Zealand occurred on the west coast of North Island in June and July 1974. About 130 birds per mile were recovered on Dargaville beaches, of which 47 miles was patrolled on 30 June and 38 miles of this stretch covered again on 6 July. Of 5996 prions recovered approximate percentages were *vittata* 5%, *salvini* 41%, *desolata* 30%, *belcheri* 10%, *turtur* 4%, sp. unid. 10%. 90 Mile Beach of which the whole 54 miles were patrolled on 7 July, yielded 1018 prions or about 19 per mile; approximate percentages were *vittata* 2%, *salvini* 35%, *desolata* 25%, *belcheri* 6.5%, *turtur* 3.5%, sp. unid. 28% (D. E. Crockett). As in Northland, *salvini* was the preponderant species on the coast of South Auckland (BB). On Wellington West Coast the dominant species was *vittata* (41%), followed by *salvini* (27%), *turtur* (15%), *belcheri* and *desolata* (8%) (PR).

WHITE-CHINNED PETREL (*Procellaria aequinoctalis*)

Rarely found on Muriwai beach, but two in Oct 73, one each in Nov and Dec 73 and in March 74 (SMR). 23/11/73, between Ashburton river mouth and Wakanui beach, one flying south along the coast was observed at a range of 25 metres; twice it flew straight through the waves (ML).

FLESH-FOOTED SHEARWATER (*Puffinus carneipes*)

March 74, north of Chickens, a number of birds flew close to the boat, apparently walking on the water in their eagerness to feed on scraps of bait thrown overboard (ATP).

BULLER'S SHEARWATER (*P. bulleri*)

About 250 feeding in Tolaga Bay Jan 5-7 1974 (GF). Fiordland, Jan 10-15-74, several off West Cape and one off Gulches Head (CAF).

SOOTY SHEARWATER (*P. griseus*)

17/11/73, 250 off Cape Terawhiti (HLS). Pipinui Point, near Makara, where there used to be a colony of Sooty Shearwaters, visited 17/11/73; no definite evidence of breeding but some burrows were found and birds seen very close inshore at dusk (JAF). Late April 74, during very rough weather from Anzac Day onwards many recovered alive in various parts of Wellington region, two in Upper Hutt and one at Tawa being well inland (PR); two found alive near Palmerston North (HAR). Early May 74, a major wreck of young birds on Southland coast and inland (RRS); two immature birds still with downy collar picked up at Alexandra 4/5/74 (PC). Two heard in Paterson Inlet evening of 22/5/73 and two seen in Foveaux Strait 22/5/73 (RJP). 1/6/73, five birds seen 5-10 miles offshore between Waiau and Awatere river mouths (JRJ).

FLUTTERING SHEARWATER (*P. gavia*)

Bay of Islands. a very large raft close inshore at Paihia 21/3/74 (GR). Individual birds feeding with gannets, May 72 (*Notornis* 19, 366); similar behaviour seen in May 74 (D. E. Calvert). Bream Islands, Mar 74, c.3000, feeding with White-fronted Terns (ATP). Large flocks close inshore at Waipu, summer 74 (TGL). 4500 off Channel Island, Colville, 14/1/74 (AJG). Manawatu estuary, thousands passing south Feb and March 73; 100 in Wellington harbour Aug 73, 50 in April and June 74 (JMM).

HUTTON'S SHEARWATER (*P. huttoni*)

16-18 Mar 74, many landed in Kaikoura township at night during a misty southerly storm; 150 banded and released (JAC).

SUB-ANTARCTIC LITTLE SHEARWATER (*P. assimilis elegans*)

Pataua, June 74, storm-cast bird recovered; identification checked at Auckland Museum; apparently the first North Island record (ATP).

WHITE-FACED STORM PETREL (*Pelagodroma marina*)

1973, still breeding on Saddleback Island off New Plymouth (DGM). Mayor Island Jan 74, feeding in flocks of c.40 (JHS).

AUSTRALIAN GANNET (*Sula bassana serrat*)

Coromandel, hundreds offshore Te Hope - Fletcher Bay 19/1/74 (BB). Horuhoru fully occupied by nesting birds 13/11/73 (HRMcK). Sightings of young birds, 20/3/74, one three miles north and ten 3 miles south-west of Tiri Tiri; on two occasions adults were seen to feed immature birds on the water; 11/3/74, five immatures from just

north to seven miles south of Tiri Tiri (JJ). Wellington harbour 14/3/74, 3 (JMM). Kaikoura, 14/9/73, one over bay; 24/6/74, one off Ohau Point (JAC). Jan 74, odd birds near entrance to Preservation Inlet and Breaksea Sound (CAF). Off Stirling Point, Bluff, Colin Robertson saw 10 on 21/2/74 (RRS).

BLACK SHAG (*Phalacrocorax carbo*)

Mangonui harbour, July 74, a party shepherding a shoal of small fish into shallows, as might Little Black Shags (D. E. Calvert). Waiotira, a few pairs resident on Manganui river (TGL). 10 on a farm dam at Taporā 23/2/74 (BB). Little Barrier, one seen Dec 73 near Waipawa creek; this bird had been injured, was treated, and has remained in the area (TRH). Kaiaua, 20/9/73, one ate an eel about 25 inches long, then bathed, keeping its head upright, apparently of necessity. 24/11/73, nests on an offshore rock at Ngatutara Point, south of Waikato Heads (BB). Hawkes Bay, Westshore, 73 on 7/4/74 (NBM). Pelorus Sound, May 74, flock of 300 just outside Havelock (GAT). Upper reaches of Karamea river, Mar 74, frequently seen from below Kendall's Creek to the gorge; some juveniles in a party of 8 below the confluence of Jupiter Creek and Karamea river; there is said to be a colony just up river from Thor Hut (JMC). Central Otago, one immature on 10/11/73 at Black-backed Gull colony, Campbell's Creek, west side of Old Man Range, at about 3400 ft a.s.l., an exceptionally high altitude for the species (PC). Waituna swamp colony, 62 nests on 17/9/73, some young fledged but some nests still had eggs; breeding just finished on 16/1/74, some big juveniles still flightless (RRS).

PIED SHAG (*P. varius*)

Bay of Islands, Urupukapuka, 22/3/74, birds on nests and some still building; Kerikeri seasonal lake, nesting Nov-Dec 73 in mixed colony, *carbo*, *varius*, *sulcirostris* and *melanoleucos*, but total nests only 40 (ATE). Muriwai Lakes 17/3/74, only 3 (SMR). Taporā, Seaview farm, 23/2/74, 160 (BB). Little Barrier, Dec 73, 26 counted in area of nest colony included some almost full grown young (TRH). Karaka, 29/1/74, strong SW breeze, a bird made nine circles to gain height and flew towards the east coast (HRMcK). One at Port Howard, Wellington harbour, 17/7/73 (JMM); one fishing in Hutt River 9 and 11 Jan 74 (HLS). S.W. Fiordland, Jan 74, a few in each sound (CAF). At a tarn 4 km inland from Mason Bay, 16/5/73, one bird sitting and a few unoccupied nests (RJP).

LITTLE BLACK SHAG (*P. sulcirostris*)

Muriwai Lakes 17/3/74, two (SMR). Manukau harbour, one on 11/11/73, 403 on 21/7/74; Firth of Thames, a single bird on 16/12/73 and on 23/6/74; 7 at Port Waikato 10/6/73 (BB). Maraetai old wharf, 31/5/74, 16 (HRMcK). Lake Whangape, 25/11/73, 50 plus (BB). Rotorua, Sulphur Bay, 26/2/74, 500 plus; a pair playing at nest building, Motutara Point (RBS). Hawkes Bay, Westshore, 7/4/74, 140 (NBM). Manawatu estuary 19/1/74, 14 (JMM); Lake Horowhenua 1973/74, small numbers, up to 12 in March and 14 in June (EBJ); Lake Pukepuke, 23/11/73, a flock of 12 arrived, fished as a pack without success for ten minutes and then flew off to the north-west (WJP). Wellington harbour, 16 on 15/8/73, 6 until 1/10/73; 12 on 30/5/74 and 10/6/74 (JMM). Lake Wainono 20/1/74, one, watched swimming and flying and compared with Black and Little Shags (RJP).

LITTLE SHAG (*P. melanoleucos*)

Tapora, Seaview farm dam, 23/2/74, 100, 12 plus nests (BB). Muriwai lakes 17/3/74, 15 (SMR). Opoutere, about 20% pied phase; April 74, in beautiful weather, little shags in the shallows were just lying on the surface with necks outstretched, dipping for fish (BB). Hawkes Bay, Westshore, 7/4/74, pied phase 4, white-throated 126 (NBM). Manawatu Lake Horowhenua, white-throated usually in small numbers but 40 on 8/1/74; 3 little pied on 25/7/73 (EBJ). Wellington harbour July 74, several specimens of little pied present (HLS). April 73, one at Ahuriri river mouth, 10 at Godley mouth; Ashley mouth 19/1/74, 5; Opihi 23/12/73, 15; Wainono 16/12/73, 4; Akatore Creek 2/6/73, 3 (RJP). Lake Monowai, 20/10/73, two breeding colonies in beech trees on shore; Lake Murihuku, a new colony; 21/1/74, 18 nests occupied and a few old nests from last year. Thomson's Crossing near Winton, colony of about 20 nests, on lagoon (RRS). Invercargill estuary 7/6/74, adult feeding yellow billed juvenile on a post (MLB). South-west Fiordland, April 73, single birds at Gaer Arm, Revolver Bay, Northport, two at Breaksea Sound and Cascade Cove, six at Coal Island (DGM); Jan 74, seen at Preservation Inlet, Dusky Sound, Vancouver Arm, one or a few each record (CAF).

SPOTTED SHAG (*Stictocarbo punctatus*)

Hauraki Gulf launch trip 13/11/73, 2000 plus (HRMcK). Taramaire 26/5/74, 500 flying low over water toward roost at Tarata Point. Kapiapia rocks, south of Waikato Heads, 24/11/73, breeding colony; 220 birds present, very few non-flyers left (BB). March-April 74, steady streams of Spotted Shags from Taiaroa Head coming into Otago harbour during the day, following shoals of small mackerel and mullet that are feeding on large numbers of clear shrimp (JH, AW).

WHITE-FACED HERON (*Ardea novaehollandiae*)

Bay of Islands, usual nesting sites are in tall trees, mangroves or pohutukawas; 7/1/74, a late nest on a rocky islet some distance offshore in Kerikeri Inlet, the nest placed on a flat shelf between two rock pinnacles, two eggs, bird on nest (ATE). Muriwai Lakes 17/3/74, 7 (SMR). 1973/74 Manukau harbour counts steady at 286 summer, 295 winter (BB). 8/4/74, 165 in the vicinity of Mangere airport (RBS); frequently seen in winter flying over King's College, moving between nesting sites on Middlemore golf links and feeding ground in Manukau harbour (TGL). Firth of Thames summer count 16/12/73, 181. Opoutere, Jan 74, 112; a big count for a small harbour, conditions must be ideal (BB). Tanner's Point, Tauranga, 22/10/73, 11 nests in pohutukawas, 4 nests in a tall pine growing amongst the pohutukawas, and one in a solitary pine 100 m. away across paddock (JFC). Kaituna cut, 11/5/74, 30 (PL). Present at Otamangakau, a new hydro dam west of Rotoaira, 25/2/74 (RBS). Hatepe, Lake Taupo, constantly present along lake shore, numbers increased over the past 2-3 years (WAW). Hawkes Bay, Westshore, 7/4/74, 188 (NBM). Lake Horowhenua, 10/8/73, Mrs Duguid saw 13 on a fence, displaying and flapping wings. 13/10/73, a young bird catching a fish instead of merely lunging with its bill leapt forward and flopped into the water (EBJ). Lake Wainono, where 70 were present on 9/2/73, produced counts of 18 in March, 4 in April and June; 14 in Dec 73 and Jan 74 and only 4 in February. A farmer at Lake Ellesmere said he and others saw very few herons after Feb 73 and and coastal sightings

elsewhere have been of small numbers. Inland numbers seem to be normal or even above normal, e.g. in Methven district and up into the high country; summer 73, still birds at Cass river and delta, Glenmore tarns, Ahuriri delta. It is possible that reduction of numbers in coastal areas may be due to dry conditions, though numbers did not fall so low during 1969 drought. Movement away from dry areas seems likely — birds are often seen where paddocks are irrigated (RJP).

WHITE HERON (*Egretta alba*)

Port Waikato, 30/9/73, 4 fishing in shallows (BB). Firth of Thames 14/10/73, one (WFC). Matata lagoon 18/8/73, one (RWJ). Foxton, two on 11/10/73 (EBJ). Pukepuke lagoon, 4/5/73, one (WJP). Ngamotu lagoon, Wairoa, 18/11/73, one (GF). Tutaekuri estuary 1/12/73, one (KVT). Lower Opawa river, Blenheim, Apr-June 74, one (ES). Motueka, Mar 74, one (FHB). Apr 73, one at Twizel river, two at Ahuriri mouth; Merton, 18/3/73, one; Lake Ellesmere, Aug 73, one at Kaituna, two at Greenpark (RJP). Hooper's Inlet, 31/3/74, one (AW), 18/5/74, one (MLB). North end of Inchclutha, one on small lagoons all 1973-4 summer; seen Dec 73, Feb-Mar 74 (LO). Waituna lagoon, 16/11/73, one (RRS).

LITTLE EGRET (*E. garzetta*)

Hawkes Bay, Westshore, three on 13/10/73, and in November; two all summer; one on 7/4/74 (NBM, JL, KVT). Manawatu estuary 27/7/74, one (JMM). One at Opihi 23/12/73, one at Merton 18/3/73 (RJP).

REEF HERON (*E. sacra*)

Paua, 5 on 13/12/73 (ATE). 1973-74 season, reported from Hatfield's beach, Waiwera, Feb; Karaka (2), Nov; Clark's Beach, May; Duder's Beach, Oct; Waiheke, Feb; Taramaire (2), Sep; Parawai, June (BB); Kawakawa Bay, Maraetai, Three Sisters Islands off Waiheke (HRMcK); Bowentown, Jan, perched on an old maimai (JFC); Opoutere (3), Jan; Coromandel, Waiaro estuary, Jan (BB). Buffalo Beach, May (ABJ). Volcanic Plateau, Lake Rotoiti, 7/4/74, one fishing for smelt at Twin Streams; when waves broke over its tarsal joint it rushed back to the beach, then dashed forward for another fish. A White-faced Heron was further along the beach (RMW). One at Porirua June 74 (EBJ). July 74, dead bird on Petone beach; two birds at Pukerua Bay, one of which flew 100 yards along the shore, while the other flew to a small Karaka grove and hid behind one of the trunks; as I approached it climbed a sloping trunk and hid in the canopy (MLF). One at Kaikoura (The Point) Mar 74 (JAC). Dusky Sound, one at Anchor Island harbour, Jan 74 (CAF).

CATTLE EGRET (*Bubulcus ibis*)

Mangere, Oct 72, two, later one (TRH); 11/11/73, 2 (SMR). Near Port Waikato, Sep/Oct 73, 5 (DMW). Manawatu Lake Horowhenua, Sep 73, 3, later 4; Oct, 5; 17 Nov, 3, straw colour on head and neck; 23 Nov and 1 Dec 73, one, head neck breast and back bright buff, bill yellow, legs black (EBJ). Two at Lower Opawa river, Blenheim, April 74 (ES). Longwood, near Riverton, one on 29/3/74 (IAM); Gorge Road, one on 2/4/74 (RRS).

AUSTRALIAN BITTERN (*Botaurus stellaris*)

Jan 74, one at Te Werahi (GF), two at Spirits Bay (HAR). Mar 74, Muriwai Lakes, 11 (SMR). Mangatawhiri river, Wyburn's

Lagoon, 30/3/74, 20 birds visible in swamp around lagoon (AH). Bay of Plenty, near Waihou Bay, Aug 73, one walking across the road from one swamp to another, neck fully extended at an angle of 45° from vertical, walked with long strides, paying no attention to a passing car (JFC). Kaituna cut, one in May 74; formerly bred in swamp at Papamoa beach, habitat spoilt by drought, burning and grazing (PL). Foxton, Jan 73, one (JMM). Ahuriri river mouth, Apr 73, one (RJP). Southland, peat swamp at Awarua Bay, Dec 73, one (RRS).

GLOSSY IBIS (*Plegadis falcinellus*)

Manawatu, March 73, four birds observed catching and eating small eels at Lake Pukepuke; 7/4/73, two at Foxton No 3 lake. Lake Pukepuke 1974, 3 on 23 Jan, 4 on 25 Jan, regularly recorded till April (WJP).

ROYAL SPOONBILL (*Platalea leucorodia*)

Mangere, single bird reported Nov 73, Mar 74 (SMR). Hawkes Bay, Westshore, 2 on 7/4/74 (NBM). Manawatu, maximum count for 1973, 36 on 21 Apr (JMM); 8 on 11/9/73, two on 11/10/73 (EBJ); two in breeding plumage 25/12/73 (JAF). EBJ reports a greyish bird which kept apart from the others on 19/7/73 and HAR one on 28/2/74 which was ash grey, with part of a plume on its nape. 1974, 4 in January (JMM), 24 in February (HAR), present Mar-June, highest count 33 on 4/5/74 (JMM). Collingwood, one, Mar 74; Waimea estuary, 11 in Mar-April, at least 5 on 8/6/74 (FHB). Marlborough, junction of Opawa and Wairau rivers, two, Oct 73 - Mar 74. These birds built a stick nest about 18-20 inches across and 12-15 inches deep with a shallow depression in the top, which the birds made some attempt to line with rushes; no eggs were laid. The impression was that they were juveniles having a trial run at nesting (ES, JAC). Lake Ellesmere, 2/1/74, one at Kaituna, two at Lakeside. Wainono, 16/12/73, 6 (RJP). Invercargill estuary, one 27/10/73 and 24/11/73; Waituna lagoon, 3 on 24/11/73, 6 on 8/2/74 (RRS).

MUTE SWAN (*Cygnus olor*)

Lake Ellesmere, 42 at Lakeside 2/1/74, 6 including two cygnets at Kaitorete Spit 27/1/74 (RJP).

BLACK SWAN (*C. atratus*)

Paua, present in harbour Feb-July 74, counts 100-350 birds (ATE). Muriwai Lakes 17/3/74, 99 (SMR). Taporu, Feb 74, hundreds offshore, harried by poachers (BB). Lake Whangape, 25/11/73, 3000 (BB). Hawkes Bay, Westshore, 7/4/74, 420 (NBM); 9/6/74, some families of small cygnets at Lake Tutira (KVT). Lake Horowhenua, usually small numbers but up to 150 in January 74 (EBJ). Opawa river near Blenheim Oct 73, two adults with cygnets; has not bred here for some years (ES). Southland district, census count 18/11/73, 1655; 17/4/74, 2743. Breeding success in the normal spring-summer breeding season was low at 102 cygnets; in March 74 water levels in Waituna lagoon were ideal; there was an upsurge of breeding and a count in April revealed a minimum of 61 broods, estimated 225 cygnets; brood loss may have been substantial or hatching success poor. In view of the limited breeding success of the last two seasons it may be that the marked increase in Southland swan population is due to an influx from elsewhere (RRS).

CANADA GOOSE (*Branta canadensis*)

Ngamotu lagoon, Wairoa, pair nesting, 4 eggs on 8/12/73, later washed out by blockage of Wairoa river bar. 27/4/74, 40 on Little Ohuia lagoon, Wairoa, and 4 on Whakaki lagoon (GF). Lake Taupo, Hinemaiaia (Hatepe) stream, 14/4/74, 6 with a mixed flock of ducks (WAW). Lake Wainono, 21/2/74, c 2000 (RJP).

PARADISE DUCK (*Tadorna variegata*)

Paua, 24/4/74, 32 (ATE). Muriwai Lakes, 17/3/74, 13, first record from area (SMR). Hawkes Bay, Westshore, 7/4/74, 225 (NBM); Lake Titira, 9/6/74, 100 plus (KVT). Lake Horowhenua, 13/7/74, 40 (EBJ). Lower Opawa river, Blenheim, 150 feeding on barley stubble 28/4/74 (ES). Dog Hill, Ward 1973-74, more birds than usual on paddocks, perhaps because Lake Elterwater dried out; clutch of 8 all reached flying stage (TJT). Head of Lake Rotoiti, 14/2/73, 50 (PJ). Karamea river upper reaches, scattered, total seen 27, March 74 (JMC). S.W. Fiordland, 13/4/73, 40 at mouth of Camelot river (DGM); Jan 74, pair at Puysegur Point, one at head of Vancouver arm (CAF). Southland, population and breeding range still extending; Waimatuku lagoon, a brood of flying young of the year, first coastal breeding record for many years; 14/1/74, moulting birds on lagoon for the third year in succession, this year 218; 1973/74 season, 22 broods at flying stage averaged 5.8 young per brood (RRS). Mason Bay, May 73, two females (RJP).

MALLARD (*Anas platyrhynchos*)

Birds nasal saddled (white) in Waikato seen in Northland at Lake Owhareiti and Kerikeri in April, Whau Valley in May 74 (KH). Of 1874 mallards at Westshore, Hawkes Bay, 7/4/74, one had a yellow (Manawatu) nasal saddle (NBM). Mayor Island, Jan 74, 50, in eclipse, on Black Lake in the crater (JHS). S.W. Fiordland, Jan 74, possibly the commonest duck; 7 in Sportsman Cove, several in Vancouver arm (CAF).

GREY DUCK (*A. superciliosa*)

Muriwai Lakes, 17/3/74, 33 pure, 694 grey/mallard or mallard (SMR). Westshore, Hawkes Bay, 7/4/74, 11 (NBM). Near Hamilton, nest in a hollow in willow on a stream bank, 10ft above water level; 8 eggs, six hatched on 25/9/73; ducklings later seen swimming with parents (JFC). Upper Karamea, March 74, 34 grey ducks (JMC). Maori Lakes, Aug 73, 30 greys, 50 mallard; Glenmore Tarns, Oct 73, 6 greys, 3 mallard (RJP).

GREY TEAL (*A. gibberifrons*)

Whau valley dam, near Whangarei, 13/5/74, 35; only two have previously been recorded here; one bird had a white (Waikato) nasal saddle (KH). Muriwai Lakes 17/3/74, 32, the first recorded here (SMR). Mangatawhiri swamp 30/4/74, 100 plus; Lake Rotorua 27/2/74, pair with six downies (RBS). Hawkes Bay, Westshore, 7/4/74, 38; also present on Horseshoe Lake 7/10/73 (NBM). Manawatu, Lake Kaikopu, 30/3/74, 78 (WJP). Lake Grassmere 1974, 40 plus in January, 100-150 Feb, 135 March (TJT). Lake Tekapo, 21/4/73, 42 (RJP).

BROWN TEAL (*A. aucklandica chlorotis*)

Early 1974, Spirits Bay, in lagoon of Waitahora stream, 12 birds thought to be this species (HAR). Whananaki river, 15/12/73, 40

(AMM). Waikaraka (Whangarei harbour) 6/8/72, six (PM.) One accidentally shot on Piako river, 1973; Waiaro estuary, Coromandel, 19/1/74, 15 beside stream on mudflats (BB).

NORTHERN SHOVELER (*A. clypeata*)

Wryburn's lagoon, Mangatawhiri river, 30/3/74, with F. V. Thompson, one male bird seen; breast white, side and belly to flank chestnut brown, a white patch directly behind the flank; upper and lower tail coverts black; head and neck glossy black all over (AH).

NEW ZEALAND SHOVELER (*A. rhynchotis*)

Muriwai Lakes, 17/3/74, 26 (SMR). Hawkes Bay, Westshore, 7/4/74, 291 (NBM).

BLUE DUCK (*Hymenolaimus malacorhynchos*)

Nov 73, Tongariro National Park, one pair on Mangahua river and another at top of Mahuia rapids (MPG). Jan 74, Waikohu river, Poverty Bay, a pair which had evidently lost their young associating with a pair of Grey Ducks which had certainly lost theirs (JAF). Karamea river, Mar 74, none seen between Taipo bridge and Trevor Carter Hut; Blue Ducks are said to frequent the fast water side creeks, e.g. Thor and Venus creeks. One pair seen in the main valley, 4 km downstream from Ferris Creek-Karamea confluence; the river bed was wide and the water relatively slow compared to much of the river upstream and downstream of the ducks (JMC). A rare bird in Mt Aspiring National Park east of the main divide; only seven adults seen in 1973-74 season, a male above top gorge in Rockburn, a pair with chick in upper North Routeburn, pairs in Upper Makarora and Siberia (Wilkin) gorges (PC).

NEW ZEALAND SCAUP (*Aythya novaeseelandiae*)

Muriwai Lakes 17/3/74, 5 (SMR). Otamangakau, new hydro dam lake west of Rotoaira, colonised 25/2/74 (RBS). Lake Tutira, in past years up to 100, only 36 counted 9/6/74 (KVT). Lake Rotoiti, near St Arnaud township, 11/8/73, one (PJ).

HARRIER (*Circus approximans*)

Courtship display, tumbling in air, Waipu, 26/8/73 (TGL), Lake Horowhenua, 29/9/73 (EBJ). Westshore, Hawkes Bay, 7/4/74, 10 (NBM). Karamea river, Mar 74, three between the Bend and the last earthquake lake (JMC). Mt Aspiring National Park, east of main divide, uncommon in montane watersheds; of 32 main valleys visited in 1973-74 only ten contained a harrier and most of these were records of single birds. The only one seen above the treeline was 12/4/74, 3800 ft a.s.l., Blue Duck stream, western tributary of Upper Dart. 15/3/74, one eating roe and innards of a large trout stranded in a paddock near Mt Aspiring homestead after floodwaters of Matukituki river had receded (PC).

NEW ZEALAND FALCON (*Falco novaeseelandiae*)

Waitomo, one, Feb 74 (RBS). Male or female occasionally over Gisborne suburb, flying SW and returning NE; one at Tahunga, 65 km from Gisborne, 2/12/73 (AB). One about cliffs above Waingakia river, Mt Hikurangi, 20/4/74; Mokau Inlet, Waikaremoana, one 18-20/5/74 (GF). Urewera National Park, on road near Ikawhenua summit, one on 13/4/74, probably chasing something, flying very low and fast (PL). Masterton, Dec 73, one flew over garden in pursuit of two homing pigeons (RHDS). Ward, one near house,

Apr 74 (TJT). Kaikoura, Mar 74, one above Upper Kowhai river (JAC). Mt Robert road lookout, one in Mar 73 (PJ). Karamea river, Mar 74, probable sighting of two birds, flying to high limestone bluffs between confluences of Crow and Lesley with main river (JMC). Homer Tunnel, Dec 73, one (JAF).

CHUKOR (*Alectoris chukar*)

Dog Hill, Ward, 17/12/73, during mustering, one made aggressive display at a dog; after the dog was withdrawn the bird made an unusual hissing noise, withdrew some distance and called her chicks, which answered. May 74, six seen (TJT). Tarndale, hydro road, two seen 26/12/73 (PJ).

GREY PARTRIDGE (*Perdix perdix*)

18/2/74, reliable report of a covey of 9 at Heddon Bush, Southland, almost certainly a family covey from current breeding season (RRS).

BROWN QUAIL (*Synoicus ypsilophorus*)

Two miles west of Opotiki, Dec 73 (JFC). Storm Bay, near Pauanui, Jan 74, 6 on forestry tracks; Opoutere, Easter 74, heard daily (BB). Sep 73, Whakarewarewa State Forest, 5-8 ft radiata pine, lupin and broom, three birds; 6 at Royden Downs, 4 miles north of Rotoiti (RWJ).

CALIFORNIAN QUAIL (*Lophortyx californica*)

Dec 73, 5 in manuka scrub 4 miles north of Tikitiki (JFC). Ward, 18 wintered near farm buildings and bred Nov 73-Mar 74; Flaxbourne river bed, Jan 74, covey of 50-60, more than usual (TJT).

PEAFOWL (*Pavo cristatus*)

Rehia, south-east of Dargaville, Dec 73, a male bird in a paddock in scrub country; shy, and ran very fast — possibly gone wild (CDC). Mahia Peninsula, Sep 74, J. Henley recorded a small flock of feral peafowl including 5 fine cocks (AB).

BANDED RAIL (*Rallus philippensis*)

Port Albert, Kaipara harbour, 9/3/74, at about 20 ft range watched a rail do a sort of dance; it ran and flew in front of the mangroves for about a chain, then returned in the same manner; it then appeared to dart and dive, jumping in the air displaying almost its whole back and both wings, like a cock pheasant does in front of a hen, but this was rapid movement in a figure-eight pattern. It did this twice, then ran a little and finally walked into the mangroves (AH). Karaka, Oct and Dec 73 (RBS, BB). Clevedon launch landing 23/1/74, two adults and 4 full sized immatures (HRMcK). Raglan, 24/11/73, Ocean beach road, 1600 hrs; an adult rail emerged from long grass on to the road, crossing from left to right, and appeared agitated when about one metre from the left grass verge. We stopped the car about 20 metres away. The rail stood momentarily and three black downy chicks emerged and furtively crossed the road; the adult, still agitated, returned to the left side and when a fourth chick emerged, hurried it across to the right hand grass verge; before they had reached cover a second adult emerged from the left hand verge, crossed the road and disappeared into the grass with the first adult and chick. The whole episode took 2-3 minutes (RDL). Opoutere, Dec 73, seven seen at one creek mouth; 26/1/74, two adults and four downy young (BB). Ohiwa harbour, 9/1/74, one on mangrove flats by main road (GF).

NORTH ISLAND WEKA (*Gallirallus australis greyi*)

Birds liberated by King's College Bird Club at Middlemore golf links, 1972. Six seen in July 73; a bird on four eggs 25/10/73, one chick hatched on 20/11/73; the nest was in long grass 2 ft from mown fairway (TGL).

WESTERN WEKA (*G. a. australis*)

Karamea river, Mar 74, three wekas seen at Belltown hut and one upstream from the head of Moonstone Lake; calling at dusk was frequent and continued periodically till 2200 hrs (JMC). Jan 74, R. McKay heard wekas at Poulter River, above Casey; Between 1950 and 1964 I several times saw wekas by the road between the Fox and Cook Rivers; no recent records, but Mr Rennison, Ranger, reports wekas by Fox Glacier village, Dec 73. For many years they have been present on Chancellor ridge. 21/12/73, in the moraine below Douglas Glacier terminal lake, a weka nest where one was found in Dec 65. Dec 72, S. Sparrow reports wekas in the head of Tunnel Creek, Paringa valley, after some years absence (JRJ). S.W. Fiordland, Apr 73, heard at Gaer Arm, Snug Cove (Doubtful Sound), Secretary Island; Jan 74, heard and seen at several points near head of Vancouver Arm, Breaksea Sound (CAF).

STEWART ISLAND WEKA (*G. a. scotti*)

Papatiki Bay, 21/4/74; fine and warm; the sandy beach, about 300 m. long is bordered generally with short tussock, second growth scrub, gorse and some macrocarpa trees; estimated weka population c.20 birds. Mating was observed at 0930 hrs, the mating pair being aware of but apparently unconcerned by the presence of an observer. The ceremony began with a period of throat drumming during which the birds moved in circles, walking stiffly with necks stretched and curved downwards; the male momentarily stood on the female; she moved off about a metre and stood, facing away from the male and with her beak touching the ground. The male then mounted on her back; the female arched her neck further till the top of her head rested on the ground; the male seized her neck feathers with his bill and copulation took place, both birds trying to maintain an upright stance (RDL).

MARSH CRAKE (*Porzana pusilla*)

Westshore, Hawkes Bay, winter 1974 (NBM). Lake Reserve, Wairarapa, 23/2/74 (IAF). Southland, birds caught in Shoveler traps, Jan 74, at Invercargill airport, Lake Murihuku, Lower Waikiti Creek; showed aggression when handled before being released. Also reported at east end of Awarua lagoon and in Waituna swamp (RRS).

SPOTLESS CRAKE (*P. tabuensis*)

Hunua, June 74, in a farm gully swamp, growth mainly toetoe, flax, basket willow and some raupo, 4 heard or seen; answered taped calls; three different calls recorded from the birds. One bird watched feeding for some time in still pools and stream under willows, taking food from just under the surface; swam for a few feet and briefly flew with dangling feet. AH noted one bird as having a yellow tip to its bill (BB et al.). Bred in long swamp, Papamoa beach; habitat spoilt, drought and fire (PL). Lake Pukepuke, seen regularly (WJP per IGA). Located with tape recordings in a number of swamps from Waitarere (Manawatu) south to Plimmerton, and in Wairarapa; 16 positive locations include a lagoon north of Waikawa beach (7);

Waitohu stream, Otaki; Waikanae estuary (5); Wairarapa Lake Reserve; 5 seen and 12 heard in 3 acres of raupo swamp at Tuturumuri on the Tora road (JAF, MLF). Southland, Awarua Bay, one in swamp at east end 30/8/73 was the first record in the district for many years; Jan-Feb 74, birds flushed by dog in Waituna swamp (RRS).

PUKEKO (*Porphyrio porphyrio*)

Appears to be nomadic; disappears quite suddenly from suitable habitats and appears unexpectedly in others (AB); population around a 5-acre lake on Kerikeri farm has fallen from 35 in 1971 to 6 in 1973, for no apparent reason; similar decrease noted in a large seasonal lake in the same area (ATE). Muriwai Lakes 17/3/74, 102 (SMR). Westshore, Hawkes Bay, Apr 73, 15; Apr 74, 22 (NBM). Lake Horowhenua, June 73, 30; 3/11/73 eight, displaying, flying about and flapping, almost dancing, breasts held low and under tail coverts displayed (EBJ). Nelson, Lake Rotoiti, two, Black Valley stream, Nov 72 (PJ). Invercargill, Lake Hawkins, June 73, 36 feeding in evening; frequently seen swimming across Waihopai river from one feed area to another, low morning temperatures, July 74 (MLB).

AUSTRALIAN COOT (*Fulica atra australis*)

Lake Tutira, Sep 73, 84 (RDC); June 74, 200, feeding in one particular area where most of them stayed for several hours (KVT). Masterton sewage ponds, 8/10/73, one with mallards, shovelers and a black swan, the first coot I have seen in Wairarapa (RHDS). Maori Lakes, mid-Canterbury, 18/8/73, 4 (RJP).

S.I. PIED OYSTERCATCHER (*Haematopus ostralegus finschi*)

Paua, May 74, 80 (ATE). Whangarei, Mar 74, 340 (AMM). Kelly's Bay, Kaipara, Apr 74, 1200 (CDC). Manukau, Nov 73, 1132; July 74, 12272 (BB); Apr 74, 90 at Huia Bay; a partial albino with brown-gingerish dustings moved from Wiroa Island to Kiwi esplanade, where at very big tides SIPO now come up on to the mown parkland (RBS). Firth of Thames Dec 73, 773; June 74, 4822 (BB). One at Buffalo Beach, Coromandel, 9/5/74 (ABJ). Waitare beach, May 74, 100; Manawatu estuary Mar 74, 83 (EBJ). Aramoana, Jan 74, 1000 (JH). Invercargill estuary Feb 74, 1500 (RRS). Stewart Island, May 73, 4 at Paterson Inlet, one at Mason Bay (RJP).

VARIABLE OYSTERCATCHER (*Haematopus unicolor*)

Paua, Apr 74, 150 (ATE). Ruakaka, Nov 73, 15 (AMM). Oct 73, 2 on Motuora island (very unusual), 2 at Whangaparaoa (SC). Port Waikato, Nov 73, 13; Opoutere, Apr 74, 32 (BB). Whitianga harbour, June 74, 6 blacks; Simpson's beach, Apr 74, 20, only two showing any white (PL); Muriwai lagoon, Sep 73, 8 blacks (AB). D'Urville Island, Patuke, Feb 74, 9, all some white feathers showing, one with a white cap (ML). Blacks present at most beaches SW Fiordland, Breaksea Island to Puysegur Point; Jan 10-15 1974, some still territorial; copulation at head of Vancouver arm; head of Cunaris Sound, pair with three young and single adult with two non-flying juveniles (CAF). Stewart Island, May 73, 3 at Halfmoon Bay, 27 at Mason Bay, 13 in a flock (RJP).

SPUR-WINGED PLOVER (*Lobibyx novaehollandiae*)

Breeding reported 1973 in Upper Manawatu, Dannevirke area; at Lake Pukepuke, and at Paekakariki, where on 6/10/73 a pair with three chicks less than a week old were seen, plus three other adults.

One at Waikanae, 23/3/74; at Paekakariki a pair had three chicks, hatched 6-9/7/74, colour banded 20/7/74. Two of this clutch were alive and well on 22/8/74, when a second nest, 5 eggs, was found (MLF, BDH, NBM). Lower Opawa river, Blenheim, Apr 74, 50 on salt flats (ES). Nelson Lake Rotoiti, 8/12/73, 6 at head of lake (PJ). Lynton Downs, Kaikoura, P. Adams saw one Dec 73; 5 on 7/6/74 (JAC). Lake Ellesmere, 3/2/74, 41 at Greenpark (RJP). Sighting near Mt Torlesse Station homestead 20/10/73 (MB). Said to be doing well in Lake Heron area; can be seen all the way down Ashburton and Hinde rivers: May 74, 24 between Lake Emma and the road; 9 at Wakanui in swampy ground behind the beach, 10 at Ashburton river mouth, 18 in a paddock near Eiffelton (ML). Akatore Creek, Otago, June 73, 5 (RJP). Ewing's Bay, West Wanaka, June 74, 426, where ten years ago there were 60 (PC). Stewart Island, two flew over Oban 15/5/73 (RJP).

PACIFIC GOLDEN PLOVER (*Pluvialis dominica fulva*)

One on dunes at Spirits Bay 28/10/73 (AMM). Pua, spring influx of 200 in Oct reduced to 50 in Nov 73; summer influx, 250 in Jan 74 reduced to 60 in Feb; only 7 in Apr 74 (AMM, JHS, ATE). Whangarei, Nov 73, 20 (AMM). Kaipara, 20 at Jordan's Dec 73 (RBS), 18 at Taporā, Feb 74 (BB). Manukau, Nov 73, 77 (BB), Mar 74, 69 (AH). Firth of Thames, Dec 73, 65 (BB). Ngamotu lagoon, Wairoa, Dec 73, 14 (GF). Westshore, Hawkes Bay, Mar 74, 42 (JL. KVT); Apr 74, 32 (NBM). Manawatu estuary, Feb 74, 13; Rangitikei estuary Mar 74, 5 (RL, HAR). Wairarapa Lake Reserve, Feb 74, 30 (JAF). One on Wairau lagoon Mar 73 (SRK). Farewell Spit, Dec 73, 15 at mile 5½, high tide; 7 at mile 8½, low tide (RJP). Lake Ellesmere, 14 at Kaituna Dec 73, 4 at Greenpark Jan 74 (RJP). Fortrose estuary Nov 73, 14; Dec 73, 40 resting on high peat swamp, Invercargill (SLL).

NEW ZEALAND DOTTEREL (*Charadrius obscurus*)

Karaka, 1973, while chicks were being banded an alarmed adult, after a broken wing display, alighted on the water and swam (BB). New localities — Tarawera mouth, 18/8/73, pair, coloured (RWJ); Marokopa, North Taranaki, one on 21/10/73 (RNT); Christchurch, Heathcote-Avon estuary, one first seen by MMD in June 73, later by DWH and an OSNZ field trip in Mar 74, still present on 1/5/74 (JRJ). Many records from other areas confirm or extend the population estimate in *Notornis* 16, 85-100; these are filed for future reference.

BANDED DOTTEREL (*Charadrius bicinctus*)

Spirits Bay, 28/10/73, 13 on grass behind beach (AMM). Pua, fewer than usual this season, maximum c.800 in Feb 74, less than half that number thereafter, until July (ATE). Hamlin's Hill, Auckland industrial suburbs, 6/6/74, 120 (RBS). Mt Tarawera, on northernmost peak, agitated bird near edge of Black-backed Gull colony, 25/11/73 (RWJ). Lake Pukepuke, March 74, a small flock arrived to take advantage of the low shore-line (WJP). Nelson harbour, July 74, c.100 in two flocks (FHB). Feb 74, 1000 at Lake Ellesmere and 275 at Lake Wainono (RJP). Ashburton-Methven highway, a pair apparently nested on the mound formed by spoil from a recently dug ditch 5 metres from road; two chicks poked their heads out from under a crouching parent, 11/11/74 (ML).

MONGOLIAN DOTTEREL (*C. mongolus*)

Probable sighting, two birds, Hokio, 20/3/74 (EBJ).

LARGE SAND DOTTEREL (*C. leschenaulti*)

Manukau, one on 11/11/73 (BB). Lake Ellesmere, Kaitorete Spit, 6/11/73, three, with Banded Dotterel, seen by Mrs E. Graham (PDG).

BLACK-FRONTED DOTTEREL (*C. melanops*)

Kaituna cut, 11/5/74, one (PL); Matata lagoon, one on 13/8/72 (PL); one, perhaps juvenile, May-June 74 (NRH, RMW). Hawkes Bay, one in a backwater of Wairoa river, 5/8/73 (GF); Westshore, 7/4/74, 50 (NBM). Pukepuke lagoon, one on 18/1/73; Apr 74, 5, later 8; 5 on 1/5/74, one on 4/6/74; Oroua river near Kopane, 2 on 17/3/74 (WJP). Hokowhitu lagoon 7/4/74, 4 on exposed muddy bottom (IGA). Wairau river diversion 2/9/73, two below traffic bridge (PJ); 30/12/73, one adult and 3 half grown chicks which were feeding on the mud near water edge (RJP). Lake Elterwater, one on 23/9/73, (JAC, TJT). Opihi river, 22/10/73, 11 adults (3 pairs) downstream from Arowhenua bridge on State Highway No 1; upstream, two pairs plus one chick about 3 days old, on 2½ miles of riverbed. None found on 6 miles of Orari riverbed or on 2 miles of Rangitata riverbed (PC).

WRYBILL (*Anarhynchus frontalis*)

Paua, 21/7/74, 32 (ATE). Tokerau Beach 13/4/74, 20 (TGL). Whangarei, one on Ocean Beach 28/12/73 (PM); harbour counts, Nov 73, one; Mar 74, 92; 101 at Portland on 9/3/74 (AMM). Kaipara, Jordans, 80 on 16/9/73, 18 on 30/9/73, one on 16/12/73 (RBS); Taporu, 65 on 24/2/74 (BB), 27 on 9/3/74 (AH). Karaka, 1973, Sep, 385; Oct-Dec, 10-20; 1974, Apr, 200, July, 730 (BB); Sep, 65 (RBS). Firth of Thames, Dec 73, 163 (BB); Feb 74, 3000 (SMR); 23/6/74, 3807 (BB), 25/7/74, 3500 (RBS). Island opposite Omokoroa, 13/1/74, 52, at a very high tide (JHS); Sulphur Point, Tauranga, 13/5/74, 50 (RVMcL). Kaituna cut, 1974, Jan, 2 (JHS), May, 6 (PL). Westshore, H.B., Apr 74, 7 (NBM). Manawatu estuary, Feb-April 74, 18; 21 May, 20 (JMM, EBJ). Waikanae estuary, 24/8/74, 4 (seen by Mr Griffin), gone by 29 Aug (MLF). Few records from the northern part of South Island; Wairau Pilot Station reserve, 30/12/69, 7 (RBS). One still present at Cass delta 21/4/73, chased by dotterels. Lake Ellesmere, Greenpark mudflats, 40 on 16/2/74; 1973, single birds at Wainono, Aug, and at Opihi, Dec (RJP). Waimatuku mouth, 2 in March-April 74 (MLB, RRS). Fortrose estuary 9/10/73, 5 (SLL). Stewart Island, the Sandspit, 18/4/74, 5 (RDL).

LONG BILLED CURLEW (*Numenius madagascariensis*)

Paua, Oct-Nov 73, Dec 73-Jan 74, one; not seen again till 3 on 21/7/74 (ATE). Kaipara, Jordans, 3 on 16/9/73, 4 on 30/9/73 (RBS). Karaka, 28/10/73, one heading a small godwit flock; one on 21/7/74 (BB). Miranda, 8/3/73, 10 (SMR, PTC); 16/12/73, 3 (BB); 13/1/74, 4 (HRMcK); 23/6/74, one (BB). Awarua Bay-Waituna lagoon, 16/12/73, 12 on a peat swamp (RRS).

ASIATIC WHIMBREL (*N. phaeopus variegatus*)

Paua, 10 on 31/10/73 (JHS); flock reduced to 8 and later to 4 during November; not seen again till 8 on 24/4/74 (ATE). Rangi-

puta, one on 30/10/73 (JHS). Mangonui, 26/11/73, 6 (D. E. Calvert). Whangarei, 17/11/73, 12 (AMM). Karaka, 10/2/74 one ?sp and Firth of Thames 23/6/74, 5 ?sp (BB). Kawhia, 19/8/73, 2 (JHS). Ashley River mouth 19/1/74, one (RJP).

LITTLE WHIMBREL (*N. minutus*)

Lake Ellesmere, 19/2/74, 3 in a flooded paddock at Greenpark, feeding with stilts; one on Kaituna mudflats with stilts and godwits. Lake Wainono, 3/11/73, one (RJP).

ASIATIC BLACK-TAILED GODWIT (*Limosa limosa*)

Miranda, one with stilts, 2/12/73 (RBS).

BAR-TAILED GODWIT (*L. lapponica*)

Paua, 300 in July 73; 1000-1500 Oct-Nov, few Dec 73-Jan 74, 2000 Feb, 1000 Mar, 600 Apr-May, 400 June-July 74 (ATE). Houhora, Oct 73, 500 (JHS). Rangiputa, July 73, 500 (ATE); 31/10/73, 2500 (JHS). Whangarei harbour, Nov 73, 3056; 2500 at Portland 9/3/74, but count for whole area 16/3/74 was 1430 (AMM). Tapora, Feb 74, 2500 (BB); 9/3/74, 750 (AH). Manukau, Nov 73, 21089; July 74, 2130 (BB). Firth of Thames, Dec 73, 10700; June 74, 975 (BB). Opoutere, Jan 74, 1000 (BB). Tairua, Dec 73, 150 (AH). Bowentown shellbank Jan 74, 2500 (JFC). Sulphur Point, Tauranga, up to 3000 summer, 100 in May 74 (RVMcL). Maketu, Dec 73, 80 (PL). Ohope beach, Jan 74, 100 (HL). Westshore, HB, Apr 74, 61 (NBM). Manawatu estuary c.400 Dec 73, Feb 74; May 74, 47 (JMM). Feb-Mar 74, 50 at Turakina beach, 32 at Rangitikei estuary (RL). Pauatahanui Inlet Oct 73, 35 (JAF). Masterton sewage ponds, Oct 72 and Oct 73, a single godwit, with stilts (RHDS). Wairau Bar, Dec 73, 3 (RJP); Pakawau, June 74, 200 over-wintering (EMG). 1973-74, 50 at Ashley mouth, 220 at Lake Ellesmere, one at Opihi, 5 at Wainono (RJP). Ewing's Bay, West Wanaka, Nov 73, two, with plovers and oyster-catchers, after a period of NW storms (PC). Aramoana, June 73, 18; July 73, 76 (RJP); Jan 74, 600 (JH). Invercargill, mixed flock of godwits, knots and turnstone arrived at estuary night of 26/9/73; c.1800 on 3/2/74 (RRS). Fortrose estuary Nov 74, 144 (SLL). 400 on pasture at Awarua, 5/5/74 (MLB).

LESSER YELLOWLEGS (*Tringa flavipes*)

April 14-25 1973, a yellowlegs present at Westshore, H.B. (NBM, KVT). Karaka, one seen from Oct-Dec 73 and on 9/3/74. Upper surface at first brown, heavily spotted white, later fading to greyish with spots hardly noticeable; in March a scaly pattern was noted. Exceptionally active feeder, resting much less than other waders. Jinking flight, flashing white rump and projecting yellow legs show up well (BB). One at Farewell Spit, seen on 9-10/3/74 (RMW, BB); Lake Pukepuke, one from 18/3/74 till 19/4/74; when first seen it was feeding along the edge of the drought-reduced main lagoon; behaved like the 1962 Porirua bird, pecking at water and bobbing its head (IGA).

GREENSHANK (*T. nebularia*)

Ashley mouth, 8/5/73, one well seen (PG); one on 31/12/73, 19/1/74. Lake Ellesmere, Cooper's lagoon, 19/2/74, one (RJP).

WANDERING TATTLER (*T. incana*)

Kauri Mountain beach, Whangarei, 9/11/73, one calling frequently before I disturbed it (PM). Ashley river mouth, 3/12/73,

19/1/74, one; tended to keep apart from 3 Siberian Tattlers, was slightly larger, darker, streakings on wings and back, call of 5 notes (RJP).

SIBERIAN TATTLER (*T. brevipes*)

Spirits Bay 16/1/74, one on reef; nasal groove clearly seen (GF). Rangiputa, one 30/10/73 (JHS). Portland, one March-April 74 (AMM). Manawatu estuary, one seen Feb-Mar 73 was probably the same bird already reported for Jan 73 (IGA). Ashley mouth, 3, Dec 73-Jan 74. Aramoana 24/5/73, one (RJP).

TATTLER SP.

Paua, Jan 74, 3 (HAR), Mar-Apr 74, one (ATE). Waituna lagoon, 31/12/73, two (SLL).

COMMON SANDPIPER (*T. hypoleucos*)

Port Albert 23/2/74, one watched as it fed over mud, perched on rocks and roots, bobbed continuously (BB).

TEREK SANDPIPER (*Xenus cinereus*)

Manukau harbour, reports of one bird seen at Wiroa 16/9/73, 19/9 and 17/10 at Karaka, 27/12 at Pollen Island, 8/4/74 at Wiroa (RBS, BB, SMR). Firth of Thames, two on 31/10/73, one on 14/11, 1/12; two on 16/12, 3 on 12/3/74 and one on 31/3/74 (BB, MEMcK, TRH). Westshore, H.B., one present prior to Nov 73 harbour count, on 14/2/74 and on 16/2/74 (NBM, KVT). Manawatu estuary, one on 28/10/73, 8 and 22/12/73 (JMM) and on 23/2/74 (RL).

TURNSTONE (*Arenaria interpres*)

Paua, two over-wintered 1973; influx Oct-Nov, 350-700; very few Dec-early Jan 74; 1000 late Jan, 5-600 Feb-April 10, 34-70 April-June, 10 on 21/7/74 (ATE). Rangiputa Bank, 31/10/73, 50 (JHS); Tokerau beach 13/4/74, 30 (TGL). Whangarei harbour, 17/11/73, 3 (AMM), 12/1/74, 11 (PM). Jan 74, Te Arai-Pakiri 7, Waipu 13 (RBS, TGL). Taporā, 23/2/74, 230 (BB), 9/3/74, 94 (AH). Manukau, 1973, Sep, 10-60; Nov, 334; 21/7/74, 292 (BB). Firth of Thames, 20/9/73, 22; 31/10/73, 100; 16/12/73, 31; 1974, March, 311; May, 50; June, 41 (BB, MEMcK). Jan 74, 10 at Kaituna cut (JHS); 170 at Bowentown shellbank, feeding in compact flocks and usually roosting apart from other waders (JFC); a big tide boosted numbers to 250 (RBS). Hawkes Bay, 10 at Tutaekuri estuary 30/12/73 (KVT); Manawatu, only ones and twos reported 73/74 (JMM, HAR, JAF, RL) and one at Waikanae Dec 73 (MLF). Lake Grassmere, Dec 73-Jan 74, up to 12, and a flight of 12 arrived on 14/3/74 (TJT). Kaikoura, usually 6-9, but increased by 25 during a June 74 storm (JAC). Jan 74, 6 at Ashley mouth, 15 at Lake Ellesmere, 3 at Opihi mouth (RJP). Invercargill estuary, arrived 26/9/73, 4-500 on 3/2/74 (RRS); 25/5/74, 80 wintering, paddocks behind Oreti beach (MLB).

KNOT (*Calidris canutus*)

Paua, 1000 on 31/10/73, down to 400 at end Nov; 1974, Jan-Mar, 14-20; April, 40, May, 6 and July, 11 (ATE). Houhora, 1350, Rangiputa about 2500, Oct 73 (JHS). Whangarei harbour counts, Nov 73, 1975; 16/3/74, 1180; but 2000 at Portland on 9 Mar, reduced to 1500 on 13 Mar 74 (AMM). 40 at Waipu estuary, Jan 74 (TGL). Taporā, Feb 74, godwit/knot flock c.2500 (BB); only 30 knots on 9/3/74 (AH). Manukau, 1220 on 11/11/73, 6500 on 10/2/74, 132 on 21/7/74. Firth of Thames, Sep 73, 100; 16/12/73, 5295; a big

wintering flock of 3000 in June (BB) still present 25 July (RBS). Manawatu estuary, 37 in Dec 73, 46 in Mar 74, present till 12 April (JMM); 18 at Tutaekuri, Hawkes Bay, Nov 73 (KVT). Odd birds at Pauatahanui and Petone, and 8 at Wairarapa Lake reserve on 23/2/74 (JAF). Dec 73, Ashley mouth, 8, Kaitorete Spit, 11; Ashburton, one in an irrigated paddock; Wainono, 9 (RJP). Invercargill, arrived with godwits 26/9/73, at least 45 still present Feb 74 (RRS).

SHARP-TAILED SANDPIPER (*C. acuminata*)

1973/74 season, Pua, 6 in Nov, 10-11 Feb-Mar (ATE). Portland, Feb, 4 (AMM). Kaipara, Dec, 4 (RBS). Manukau, Nov, 4 (RBS). Firth of Thames, Dec, 4; June, 3 (BB). Kaituna cut, Jan, 2 (JHS). Manawatu estuary, 15 in Feb 73, only 2-3 in 73-74 season (JMM). One at Rangitikei, Apr (RL) and a probable sighting at Pukepuke, with Banded Dotterel, Mar (WJP). 3 at Wairarapa Lake reserve, Feb (JAF). One at Ashley mouth, Dec; 19 at Lake Ellesmere, Feb; Lake Wainono, 23 on 9/2/73, 3 in Feb 74 (RJP). Invercargill, 4 in Feb 74 (RRS); Waimatuku, 2 in Sept, 3 in Oct 73 (MLB).

PECTORAL SANDPIPER (*C. melanotos*)

Ruakaka, one in Nov 73 and Jan 74 (AMM). Kaituna cut, 30/12/73, 3 (PL). Westshore, H.B., 14/2/74, 2 (NBM). Manawatu estuary, single birds seen in Feb, Oct and Dec 73; two in Jan, one in Mar 74 (JMM). Wairarapa Lake reserve, 23/2/74, 4 (JAF). Lake Ellesmere, Greenpark, one on a flooded paddock about a mile from mudflats, 3/2/74; 19/2/74, 3 at Greenpark flats and 2 at Cooper's lagoon. Wainono, 21/2/74, one (RJP). Waimatuku, 3 on 28/12/73, 4 on 10/2/74 and 4/3/74 (MLB); Invercargill estuary, 2 on 3/2/74 (RRS).

DUNLIN (*C. alpina*)

Tapora, 24/2/74, one seen by D. Metherell, DMW, JAB and BB (SMR).

CURLEW SANDPIPER (*C. ferruginea*)

Pua, 31/10/73, 14 (JHS); 26/1/74, 15; Mar and Apr 74, one (ATE). Portland, 9/3/74, 2 (AMM). Manukau, 11/11/73, 6 (BB); 30/3/74, a fine red bird, with wrybills (RBS). Firth of Thames, 20/9/73, 9, some with colour (HRMcK); 16/12/73, 12 (BB); 10/4/74, 18, mostly reddened; 1/5/74, 9, all reddened (RBS). Whakaki lagoon, Wairoa, 4/1/74, one (JAF). Lake Ellesmere, Kaitorete Spit, 27/1/74, 25; Greenpark mudflats 3/2/74, 33; 16/12/74, 14; only two seen round lake on 19/2/74. Wainono, 16/12/73, one (RJP). Fortrose estuary, 9/10/73, one (SLL); Invercargill estuary 3/2/74, 4 (RRS).

RED-NECKED STINT (*C. ruficollis*)

Pua, 29 on 31/10/73 (JHS), 35 in Jan 74 (HAR); 37 in Feb; 5, red, on 10/4/74; 2 (one red) on 24/4/74; two in June and July 74 (ATE). Rangiputa, 30/10/73, 9 (JHS). Tapora, 24/2/74, 5 (BB). Manukau, Wiroa island 1/7/73, 11, a wintering flock (RBS, TGL); 11/11/73, 14 (BB); 3/12/73, 20 (RBS); 9/2/74, 57 (AH); March, 24; April, 21; 12/5/74, 5 (BB). Firth of Thames, 20/9/73, 13 (HRMcK); 1/12/73, 17 (BB); 21/1/74, 22 (WFC); 31/3/74, 6 (TRH). Hawkes Bay, Westshore, 6 on 3/2/74 (KVT). Turakina beach, 24/2/74, 2; Rangitikei estuary 24/3/74, 7 (RL). Lake Grassmere, Jan 74, 10, feeding with Turnstones at saltworks intake (TJT). Lake Ellesmere, Kaitorete Spit, 17/11/73, 56; Greenpark mudflats 19/2/74, 61 (RJP). Invercargill estuary, 25/9/73, 26; 3/2/74, 47 (RRS).

SANDERLING (*C. alba*)

Lake Ellesmere, Kaitorete Spit, one on 1/12/73, at the same place where one was seen on 19/12/71 (RJP).

PIED STILT (*Himantopus himantopus*)

Paua, 1974 June-July counts at 1000-1200 were considerably higher than in past years when the autumn concentration did not exceed 700. Numbers were down to 600 in early August and practically all had gone by September (ATE). Winter counts 1970-1974, Manukau, 4624, 5502, 3376, 4746, 3058; Firth of Thames, 3922, 3341, 1406, 2506, 3289. These figures do not necessarily indicate maximum winter population; before the winter count some birds may already have left the census area, e.g., the 1970 figure of 3922 for Firth of Thames was recorded on 27/6/70; on census day 26/7/70 the number counted was 2316 (HRMcK, BB). Westshore, H.B., 7/4/73, 1044; 7/4/74, 1459 (NBM). Lake Ellesmere, 19/2/74, 3200 (RJP). Karaka, 25/4/74, stilts seen to take small fish (AH).

BLACK STILT (*H. novaezelandiae*)

Manukau, March-April 1973, "smudgies" at Onehunga and Karaka (SMR); 1/7/73, 4, black or smudgy (HRMcK); Wiroa roost, 21/7/74, one black, two smudgy (BB, RBS). Lake Pukepuke, Jan 9-26 1974, one with white feathers showing only on face, belly and under tail (WJP). Lake Elterwater, 23/4/73, one in a group of Pied Stilts had Pied x Black characteristics (TJT). One at Lake Wainono 21/2/74 (RIP). N.Z. population of pure blacks thought to be about 40 pairs. One of 11 chicks banded between 1966 and 1968 turned up in 1972 as a 5-year-old bird; as an adult it has turned out to be a near-black, i.e., black with small white patches on the flanks. Parents were a pure black and a Potts-type bird with black well down to the breast. The banded bird was mated with a Potts-type bird, and about 19 miles from the place of banding (JH).

SOUTHERN SKUA (*Stercorarius skua lonnbergi*)

Reported at Puysegur Point, a few or occasional; Jan 74, one seen flying away from outermost Gilbert Island (CAF). Jan 74, four Great Skuas seen near Te Paki stream, Ninety mile beach (HAR).

ARCTIC SKUA (*S. parasiticus*)

Many sightings reported from Bay of Islands, Hauraki Gulf, Coromandel, Bay of Plenty, Tolaga Bay, Manawatu, Wellington, Canterbury coast and estuaries, Nov 73-Apr 74. Skuas seldom come right into Russell, but on 17/4/74 one systematically worked on White-fronted Terns sitting on a marker buoy amongst the moorings, making a series of passes at each of which one tern was disturbed, pursued and forced to disgorge (GC). 14/4/74, off Motiti island, Red-billed Gulls attacked by a skua formed a tight flock of about 200 birds about 300 ft. a.s.l. Each time the skua tried to get above them the flock rose as a body, changing formation in a confusing manner. When the skua dived in pursuit of one gull, one or two others would detach from the flock, dive on the skua and drive it off, then return to the flock. After several unsuccessful attacks the skua suddenly dived to sea level in a dazzling display of twists and turns and then flew off (JHS). Off Papamoa, skuas appear with some regularity to harry terns feeding at kahawai shoals that appear in Feb-April; six pale birds at one time in Dec 71, 8 in Feb 72 (PL).

BLACK BACKED GULL (*Larus dominicanus*)

Buffalo Beach, Whitianga, 21/1/74, one all white except for a few brown feathers on back, with normal gulls. Northernmost peak of Mt Tarawera, 25/11/73, N. Davenport saw 150 nesting (RWJ). SW Fiordland, Jan 74, on territory in many parts of Dusky and other Sounds, one with two downies on Anchor island. Lower population density in Fiordland contrasts with super-abundance near towns (CAF).

RED BILLED GULL (*L. novaehollandiae*)

Dargaville, late 1972, a pure white bird (BCC). Coromandel, R. Strongman reports 30 pairs bred 1973-74 on Ruffin's rock, for the first time he knows of in 25 years (BB). Nelson, Dec 73, a bird in a breeding colony had lost both feet and the remaining half-inch of tarsus was so callused as to be almost rounded. The bird seemed in no way incommode and made use of its tail to maintain its balance (FHB). Populations in Fiordland ubiquitous but small (CAF).

BLACK-BILLED GULL (*L. bulleri*)

Taramaire, Miranda, 15/1/74, 25 adults, 22 chicks near flying; some probably had flown. One Red-billed and one Black-billed Gull repeatedly swimming fast with head under water, 5-7 seconds each time (HRMcK). Wairoa river estuary, 150 wintered 1973; June 74, 80; c. 50 present previous December (GF). Hokio beach, Mar 74, 60 (EBJ); Manawatu estuary, May 74, 30 (JMM). Farewell Spit, 1973-74 season, 10 nests beyond lighthouse, 24 birds in attendance (FHB). Breaksea Sound, one, Apr 73; Jan 74, about 18 associated with Red-billed Gulls at head of Vancouver arm (CAF).

BLACK-FRONTED TERN (*Chlidonias hybrida*)

Two at Tarawera river mouth 18/8/73 (RWJ). 30/6/74, an adult bird still in breeding plumage flying about 50 ft up four miles from and towards Mayor Island (PL). Hokio, one apparently immature, 7/2/74 (EBJ); May 74, 7 at Manawatu estuary (JMM); Mar 74, 7 at Waikanae estuary (JAF). Confluence of Hutt and Wakatikei rivers, one on 27/1/74 (HLS). Dec 73, c. 10 nesting on Opihi beach (RJP). "Port Preservation," A. and C. Begg, p. 157, states 15/12/69, near Cording Islands, Preservation Inlet, some diving on a shoal of fish; checked, and apparently authentic (PC). Oreti river near Dipton, 4/11/73, 66 adults, 21 plus nests; while counting nests I was struck on the head at least 20 times, sometimes by the same bird coming round and round again. Two terns high above nesting area harassed and eventually drove off a Harrier. Magnificent camouflage on the stony river island, even the brilliant red bill simulating red sorrel leaves and stalks scattered among the stones (MLB).

WHITE-WINGED BLACK TERN (*C. leucoptera*)

Bowentown shell bank, one on 4 and 26 Jan, two on 27 Jan 74, on each occasion with White-fronted Terns; the two birds, though at one time only one metre apart, apparently ignored each other. A white-fronted tern chick approached one of them and begged for food; the WWBT adopted an aggressive posture and stabbed at the chick, then flew a short distance (JFC). Kaituna cut, records of one bird seen 9 and 29 Jan 72; 4/6/73, in summer plumage; on three occasions in Dec 73; on 14/7/74 (PL) and 21/7/74 (RMW). Usually alone, whether flying or at rest; once with a party of Pied Stilts. Normally hawking insects over the lagoon, but twice hovered above me uttering a sharp "queet queet" (PL). Westshore, H.B., 25/11/73, one in

breeding plumage flew over the lagoon for perhaps 10 minutes hawking for insects, not seen again (NBM). Wairarapa Lake Reserve, one on 23/2/74 (JAF).

GULL-BILLED TERN (*Gelochelidon nilotica*)

Wairau Bar (Marlborough) 20/12/73, one adult with complete black cap, close to Caspian Terns at roost with gulls and waders (RJP).

CASPIAN TERN (*Hydroprogne caspia*)

As all 1973-74 records of nesting received by the Recording Scheme have presumably also been sent to Wildlife Branch in response to their request, these are not repeated here.

CRESTED TERN (*Sterna bergii cristata*)

One at mouth of Piako River, Firth of Thames, 30/3/74; had a yellow bill and was flying with a Black-backed Gull about 6 m. above the water (AH).

FAIRY TERN (*S. nereis*)

Waipu estuary 13/10/73, a pair (AMM), 2/1/74, 4, of which 2 immature (PM). Mangawhai Spit, 12 on 15/12/73, 10 on 31/12/73, at least three pairs bred, two chicks banded (SMR). Post-breeding birds at Portland, 9/3/74, 13 (AMM). Port Albert, one on 1/2/74, 3 on 9/3/74 (SMR, AH). Tapora, 3/11/73, 2 pairs (AMM).

LITTLE TERN (*S. albigrons*)

Selwyn Huts, Lake Ellesmere, 23/12/72. 10 (PC). 1973-74 was a record year for Little Terns in New Zealand. Two were reported in Manukau (dark bills) on 29 Sep, and a freshly dead bird found at Waikanae on 15 Oct. In the last four days of October 81 were recorded — Paua, 4; Rangiputa, 61 (JHS, ATE); Manukau, 16 (BB, JU). No further figures are available from Rangiputa, but it seems likely that dispersion took place; at Paua, there was only one bird in Nov. 3 Jan-Mar, one April (ATE). Whangarei, 12 in Nov, 22-23 in Feb-Mar, 6 in April (AMM). A single bird at Kohukohu, Dec (ATE). Tapora, Feb, 13; Mar, 6 (BB, AH); Manukau, 22 (Nov), 17 (Dec), 8 (Jan), 3 (Feb), 8 (Mar); 18. later 8, two with yellow bill and black tip, in April and 3 on 12th May. Firth of Thames, 4 (Nov), 20 (Dec), 18 (Jan); 15, black bills (Feb), 19 (Mar), 13 (Apr) and 6 on 26th May (BB, AH, JU, RBS, HRMcK). Three birds at Kaituna cut 30/1/74; one of them hovered over another as if offering food, the recipient adopted a begging pose, bill upright, wings slightly extended (JHS). Ohope beach 1/1/74, 10 (RWI). Tutakuri, one or two birds 5/1/74-2/2/74 (KVT). One at Manawatu Jan-Mar (IMM); one at Waikanae Jan (CAF). Farewell Spit, one in Dec (RJP) and 5 in March. Lake Ellesmere, 1 (Nov), 2 (Dec) and 8 in February (RJP). It may be noted that of the 81 Little Terns known to be in New Zealand in Oct 73, 67 were accounted for in Feb and 65 in Mar 74.

WHITE-FRONTED TERN (*S. striata*)

A bird banded at Kaikoura in 1973-74 summer was recovered dead at the mouth of Yarra river, Victoria (IAC). Small numbers well distributed in SW Fiordland; still feeding flying young in Edwardson Sound, 14/1/74 (CAF).

GREY TERNLET (*Procelsterna cerulea*)

Astrolabe reef, north of Motiti Island, 27/2/74, 3 (PL).

N.Z. PIGEON (*Hemiphaga novaeseelandiae*)

Anderson Park, 31/5/74, one almost fledged young in a nest on top of elm tree; fledged by 7/6/74 (RRS).

MALAY SPOTTED DOVE (*Streptopelia chinensis*)

Abundant between Mangere and Otahuhu railway stations, nests in disused stock wagons on sidings (TGL). Redhill, Papakura, seen and heard 20/10/73, still present May 74 (BB).

WHITE COCKATOO (*Cacatua galerita*)

McCallum's Beach, Clevedon, two seen 3/9/73 by Mr and Mrs R. McKenzie (HRMcK).

N.I. KAKA (*Nestor meridionalis septentrionalis*)

Wandering individuals at Kerikeri in an orchard and round homestead Nov 26-30 1973, and in Waihue Valley near Dargaville, late Feb - mid-April 74, where it flew up and down the valley between clumps of totara trees; was harassed by mynas and chased them from time to time (ATE, CDC). Moumoukai, 23/12/73, feeding on epiphytes on a tall dead tree (BB). Mayor Island, Jan 74, calling frequently (JHS). Reported numerous at Pukerimu reserve, Mamaku State Forest, Mar 74 (RWJ). Tunnel Gully, North Rimutaka range, two in high canopy of rimu and rata forest (HLS).

S.I. KAKA (*N. m. meridionalis*)

Karamea river, Mar 74, near third earthquake lake (JMC). Nelson Lakes, June 73, N. Judd reports one making a call almost exactly like the mew of a cat (FHB). Present Paparoa range, Grey-mouth, some years on gums at Marsden, New River; common in Taramakau valley above Aickens, found Jan 73 by BK and PM near west coast road to Taipo river; not found during mapping trips in Rough Wainihinui, Kawaka, Arahura, Styx, Kokatahi, Toaroha or Mikonui valleys; B. Detslaff reports present Jan 73 at Kea Flat, Waitaha valley (JRJ). Jan 74, heard at Cascade Cove, Sportsman Cove, the Basin (Resolution Island), head of Edwardson Sound and Cunaris Sound (CAF).

KEA (*N. notabilis*)

Upper Karamea, Mar 74, two feeding on the severed head of a red deer upstream from Slippery Creek; heard at Belltown hut; said to be quite common in the river valley in winter (JMC). SW Fiordland, Cook did not discover Keas at Dusky, but A. C. and N. C. Begg recorded them at Cascade Cove; Jan 74, calls heard from a bluff at Vancouver arm less than 100 m. a.s.l. (CAF). Mt Aspiring National Park east of main divide always a few present 1973-74 in headwaters of most valleys, but nowhere abundant; largest flock, 17 in head of Matukituki (PC).

CRIMSON ROSELLA (*Platycercus elegans*)

July 74, young bird reported seen in Wellington Botanic Gardens (HLS).

EASTERN ROSELLA (*P. eximius*)

Present in hills behind Waipu, visits coastal areas in winter (TGL). Wellington region, centred around the foothills of the Tararua, predominantly on the eastern side and the head of Hutt Valley (PDG). A Rosella, almost certainly Eastern, reported at Reikorangi early 1974 by Group-Captain Steff-Langston, is the first record from west of the Tararua (JAF).

RED-CROWNED PARAKEET (*Cyanoramphus novaezelandiae*)

Re-introduced to Tiritiri Matangi Island, Hauraki Gulf, 35 birds on 11/1/74; to Cuvier Island, 30 birds on 22/3/74 (CRV). Little Barrier, Apr 74, noisy flocks feeding on kanuka and coprosma sp. (BB). 1974, 4 in Whiteman's Valley area (JMM). Upper Karamea, Mar 74, parakeet sp. heard in the tops of hinau trees near Silvermine Creek; Mr Meyers informs me that a small number of red-fronted are found downstream from Venus hut (JMC). S.W. Fiordland, Apr 73, parakeet sp. at Astronomers Point, Dusky Sound, but none recorded anywhere during Jan 74 visit (CAF).

YELLOW-CROWNED PARAKEET (*C. auriceps*)

Little Barrier, Jan 74, 3 on main track above 700 ft a.s.l., one on a ridge east of Waipawa creek among stunted kanuka, about 300 ft a.s.l. (TRH); Apr 74, one seen (BB). Leith Valley, few reports of recent years; mid-Feb 74, Mrs J. Thetford saw a single bird on two occasions about a mile below Leith saddle in second growth forest; description fits this sp. (JH).

SHINING CUCKOO (*Chalcites lucidus*)

1973, first calls reported 11/9, Ponui (P. Chamberlain), 13/9, Clevedon (AJG), 16/9, Kerikeri (ATE), 19/9, near Gisborne (AB), 20/9, Rotorua (RWJ). Great Barrier, first week of Jan 74, three separate young cuckoos in 10 acres, two still being fed by Grey Warblers (AJG). Alexandra, 4/4/74, very late specimen caught by cat; fully coloured, small and light, had a blackish (viral) infection half way along each mandible, causing a wart-like growth (PC).

LONG-TAILED CUCKOO (*Eudynamis taitensis*)

Little Barrier, New Year 1974, constant calling at all levels; 16 recorded on main track, 7 on Thumb track; one in pohutukawa near bunkhouse closely attended by Bellbirds (TRH). Jan 12-15 1974, SW Fiordland, heard at Edwardson Sound, Sportsman Cove, the Basin (CAF).

MOREPORK (*Ninox novaeseelandiae*)

Little Barrier, New Year 74, twice heard calling at midday (TRH). Hamilton, 13/10/73, nest with two eggs, 10 ft above ground in a hole in kahikatea; eggs hatched 8/11/73; on 12/11/73 young found to have been taken, probably rats (JFC). Hatepe, Lake Taupo, seems to have decreased over recent years (WAW). Upper Karamea, Mar 74, heard at Stay Flat Hut and around earthquake lakes (JMC). SW Fiordland, Jan 74, at Sportsman Cove, the Basin and Edwardson Sound (CAF).

RIFLEMAN (*Acanthisitta chloris*)

Little Barrier, New Year 74, 18 recorded; parties, each of four birds, were noted (TRH). Waikareiti track 14/4/74, 20 (PL). Apparent decline in numbers, Tararuas and Rimutakas (HLS). Hanmer State Forest lookout, Mar 74 (SCS). SW Fiordland, none seen Apr 73 or in 14 bush landings in Jan 74 (CAF).

ROCK WREN (*Xenicus gilviventris*)

Homer Tunnel 19/12/73, pair with two or three fledged young (JAF).

WELCOME SWALLOW (*Hirundo neoxena*)

Auckland area, increase spectacular and phenomenal; 1973-74, nesting at Lower Nihotipu and the new Lower Huia Dam, 20 birds seen at each locality in Apr 74; Whitford, Waikopua valley, bred, 12 reported winter 74 (RBS). Low over fields at King's College (TGL). Mangatawhiri dam, Nov 73, 2 (AJG). Ponui Island, 31/8/73, south end, two at lighthouse; did not nest (HRMcK). Te Maiha, Kawhia harbour, 3 flying over small swamp; Tanner's Point, 22/10/73, three nests under road bridge over tidal stream; old nest in abandoned launch on mudflats; nest, 4 young, on side of beam under eaves above front door of a recently built holiday house (JFC). Opoutere, 9/1/74, flock of 50 (BB). Gordon, a nest 2-3 miles to north 27/10/73 (RWJ). Coromandel, Port Charles, pair nesting 2/2/74, three birds at Waikawau (SMR), 7 at Whangapoua beach 25/1/74 (RWJ). Seen by M. P. Moore at Kuratao dam, SW Taupo, in 1971; two at Tokaanu jetty 25/2/74 (RBS). Westshore, H.B., 37 on 7/4/74 (NBM). 1973-74, nesting pair at Te Horo stream; extended family of 14 birds roosting at bridge in Ngarara road area, Waikanae, where there was a three-tiered compound nest (CAF). Wairarapa Lake Reserve 23/2/74, 50 (JAF). Commonly seen from Lake Elterwater to Lake Grassmere, 1973 (TJT). Greenpark Huts, Lake Ellesmere, 40 on 16/2/74; birds back at the bridge between Ashburton and Methven, 1973; 10 at Opihi, Apr 73 (RJP). Temuka, near railway bridge over Opihi river, 21 on 20/10/73 (PC). Wainono 1973, 30 in April, 3 in Aug, one in Nov (RJP). Dunedin, June 74, many birds seen, mostly in early morning or late evening and mainly in the area of Hooper's Inlet; 30 at Murry's Pond on 20/6/74 (AW). Stirling, Inchclutha, swallows first seen this year in last week of March 73; April, 19 roosting on clothes lines and garden shrubs close to the river (LO). Southland, no evidence of breeding 1973/4; in October 73, birds were seen at Oreti beach (1), Wallacetown (4) and West Plains (2), but no mid-summer records. The first autumn sighting was 14/2/74 at Lake Murihiku; over 30 at Waimatuku mouth on 17/2/74; many sightings in autumn (RRS).

HEDGE SPARROW (*Prunella modularis*)

First song, Waipu, 19/8/73 (TGL); Rotorua, 1/7/72 (HL), 9/8/73 (RWJ). Red Hill, Papakura, seems to be disappearing, none seen or heard since Spring 1973 (BB). Upper Karamea, Mar 74, one near Kendall Creek Bluffs (JMC). SW Fiordland, two at Astronomer's Point, Dusky Sound, Apr 73 (DGM); Jan 74, Puysegur Point, outermost Gilbert Island, Pigeon Island (CAF).

N.I. FERNBIRD (*Bowdleria punctata vealeae*)

Jan 74, two at Cape Reinga, two at Spirits Bay (GF). Clark's Bay, Manukau, 7/10/73, one seen, three heard (BB). Great Barrier, Kaitoke swamp, 19/3/74, birds calling both sides of Claris-Whangaparapara road (AJG). Opoutere, still plentiful Jan 74 (BB). Volcanic Plateau, Feb 74, widespread, often among heather (*Calluna*) along northern edge of Tongariro National Park to Otamangakau and Rotoaira (RBS); Lake Ngahewa, Rainbow Mountain, Rotorua, 28/12/73, calling in raupo on lake edge (HL).

S.I. FERNBIRD (*B. p. punctata*)

Karamea, Aug 72, 10 in pakihi, bulrush and coprosma (RJP). Confluence of Landsborough and Haast rivers, S. Westland, in a swamp, Oct 72 (PC). Port Molyneux, Clutha Mouth, two, Feb 73 (RJP).

BROWN CREEPER (*Finschia novaeseelandiae*)

Ward, Flaxbourne Hill, June 72, several (TJT). Hanmer State Forest lookout, Mar 74 (SCS). SW Fiordland, Apr 73, several at Gaer Arm, Bradshaw Sound (DGM); Jan 74, only one pair seen in 14 landings between Breaksea Sound and Puysegur Point, at head of Vancouver Arm, Breaksea Sound (CAF).

WHITEHEAD (*Mohoua albicilla*)

Waikareiti track, Apr 74, 10 plus (PL). North Rimutaka range, Dec 73, calling from beech and rimu in lower part of Tunnel Gully; recorded close by 10 years ago; several present on ridge top, 2000 ft a.s.l. in beech forest (HLS). Eastbourne, Jan 74 (JMM).

YELLOWHEAD (*M. ochrocephala*)

Three among a flock of creepers 100 yards from Cameron's Hut, Hurunui Valley, 26/4/74. D. W. Cowlin, Forest Ranger, writes (July 73) "... a recent visit to the headwaters of the Clarke Valley revealed a high population of these birds, as did another trip to the headwaters of the Rough or Otututu Valley in Paparoa range. I have seen them in the Upper Grey catchment but never in the numbers present in Clarke Valley" (JRJ).

GREY WARBLER (*Gerygone igata*)

Upper Karama, Mar 74, one near Belltown Hut and one near Kendall's Creek (JMC). SW Fiordland, rather local (or else silent); recorded Apr 73 Gaer Arm, Bradshaw Sound, Cascade Cove and Astronomer's Point, Dusky Sound; Jan 74, Cascade Cove, Sportsman Cove, Outer Gilbert Island, head of Vancouver Arm, Cunaris Sound (DGM, CAF).

NORTH ISLAND FANTAIL (*Rhipidura fuliginosa placabilis*)

Bay of Plenty, 1630 hrs on a fine evening, 5/5/74, at the old river bed lagoon in the swamp at the mouth of Kaituna river, from my point of observation I counted 28 fantails in flight. Further visits to the area during the ensuing week confirmed my impression that the concentration of fantails in this locality was greater than I have observed in any other area. All birds seen were pied (RDL). Manawatu, April 74, K. Couchman reports seeing a fantail chase, catch in flight and carry away a Monarch butterfly. Predation by birds on the Monarch butterfly is regarded as very rare (IGA).

Black Fantails recorded Feb-June 74 at Whakarau road, 28 miles from Gisborne, where one was seen 4-5 years ago (AB); on forest edge at Te Marua, North Rimutaka range, 31/12/73 (HLS); in Lansdowne garden, Masterton, in late March 74 (RHDS).

SOUTH ISLAND FANTAIL (*R. f. fuliginosa*)

Ward, 1972; a fantail, probably first year bird, developed the habit of coming into the house in Jan-Feb and was still doing so in June, often spending more than half the daylight hours indoors. When no door or window was open it uttered a sort of distress call to be allowed in and a similar call when it was inside and wanted to get out. In summer it fed on blowflies, which were safe as long as they were on the window but taken as soon as they flew; at first it seemed to find the flies difficult to swallow but improved with practice. It sat on the table at meal times and ate small scraps of meat, vegetable, bread or dough provided these were flicked of the tables and became

airborne in its vicinity; it would sometimes sit on the edge of a mixing bowl while my wife was making a cake of custard and drank from a few drops of water on the bottom of the sink (TJT). Karama river, Mar 74, common in almost all localities but nowhere as common as Tomtit. Pied and black phases often seen together, ratio of pied: black roughly as 12:5 (JMC). S.W. Fiordland, Apr 73 and Jan 74, present but not common (CAF).

PIED TIT (*Petroica macrocephala toitoi*)

Warawara forest, Dec 73, a pair (ATE). Moumoukai, Dec 73, seems to be increasing (BB). Little Barrier, seen at all levels (TRH); song heard on 7/4/74 (BB). Summit of Mt Pirongia in sub-alpine scrub, Nov 73, one seen, several heard (JFC).

YELLOW-BREASTED TIT (*P. m. macrocephala*)

Karama river, Mar 74, common in pairs or singles (JMC). Cromwell, a male in willows on bank of Clutha river, Dec 73; no native bush in vicinity (JAF). S.W. Fiordland, Apr 73 and Jan 74, virtually ubiquitous; a very orange-breasted male on Breaksea Island (CAF).

NORTH ISLAND ROBIN (*P. australis longipes*)

Little Barrier, Nov 71, dawn song just below summit, another near junction of Summit and Thumb tracks; 7/4/74, singing at 400 ft a.s.l. (BB). Volcanic Plateau, two in Kaingaroa forest July 72; two at Mamaku, tawa ridge and valley, Dec 72; two seen and c. 12 heard, Dansey scenic reserve, Dec 73 (RWJ). 3 miles south of Atiamuri, 19/7/73, 1030 hrs, one singing strongly in pines (BB). Hatepe, Lake Taupo, one in low bush near lakeside cottage Apr 74, the first seen here for several years (WAW).

SOUTH ISLAND ROBIN (*P. a. australis*)

Nelson, Lake Rotoiti, sightings at south end Jan 72 and at north end Apr 72. Alfred river, track to Lake Daniells, many seen Feb 73 (PJ). Karama river, Mar 74, seen from Taipo bridge to Jupiter creek, nowhere very common; virtually fearless, usually seen in pairs (JMC). Dart Valley, Apr 74, small numbers in forest of valley floor all the way up as far as Whitburn junction (PC). Breaksea Island, vigorous population, observed by Sir Robert Falla 25 years ago, confirmed on 12/1/74; may be the only robins in S.W. Fiordland (CAF) — but see *Notornis* 19 supp., p. 82. Southland, Sep 73, in beech forest, Piano Flat; small population found in pine plantation at Waikaia; breeding reported but not confirmed (RRS).

STEWART ISLAND ROBIN (*P. a. rakiura*)

Rakeahua river catchment, Nov 71, 2-3 males singing (JAF). Heard abundantly from lower part of freshwater valley to south end of Ruggedy range, Feb 74, obviously thriving (WAW). May 73, seen at Freshwater hut, in manuka along Scott burn and one at Doughboy Bay (RJP).

SONG THRUSH (*Turdus philomelos*)

Clevedon, 16/8/72, one picked up a blade of dry grass and approached another in a manner indicating courtship; the offer was ignored. Have seen Blackbirds behave like this but until now, not thrushes (HRMcK). Mayor Island, Jan 74 (JHS). Levin, noticeable decrease, possibly due to poisoning of snails and slugs which were very

bad in 1973 (EBJ). Nelson 1974, when rain came after a long drought, one seen bathing in water held within the leaves of an endive plant in garden (FHB). Karamea river, Mar 74, one singing near Thor Hut and two seen nearby in bush; common from Crow to Lesley rivers (JMC). Ashburton, a young thrush fed by parents 23-24/6/73 was fending for itself on 26/6/73 (ML).

BLACKBIRD (*T. merula*)

King's College, Auckland, beginning to sing 14/6/73; full song 27/7/73 (TGL). Rotorua, a plastic sprinkler with saucer-like edge was just overflowing on to bare soil, 18/1/74; a male Blackbird drank from the saucer edge, stepped back and scratched a depression in the soil, large enough to bathe in when it filled with water; a female tried to bathe but was chased off (RWJ). Ward, Oct 73, on a cold day, one eating fat from a sheepskin hung over a branch (TJT). S.W. Fiordland 1973-74, seen at head of Vancouver arm, Edwardson and Cunaris Sounds; Harbour Island, Breaksea Sound (CAF, DGM).

SILVEREYE (*Zosterops lateralis*)

Little Barrier, none recorded 5-7/4/74 (BB) or 29/12/73-2/1/74 (TRH). Levin, May 74, eating beakfuls from strawberry tree fruits already partly eaten by Blackbirds. Many years ago, in Wellington, Silvereyes were regularly fed in the garden in winter. On August 6th about 20 birds had just flown up from their feeding place to a holly tree, from which came a burst of song as a number of the birds sang in chorus (EBJ). Normandale, Hutt Valley, two "yellow" Silvereyes banded in 1972 and four more in 1973. All six had a strong yellowish tinge over the whole under surface from throat to vent, and the green of the upper surface also looked yellower than usual; any one of these could easily be detected amongst normal birds at the feeding station by their lighter, more yellow appearance. One 1973 bird was particularly yellow — twice as yellow as any of the others (MLF). Ashburton, "yellow" birds reappeared in Sep 73 (ML). Photographs and notes were sent to FCK who confirms that they are flavistic *Z. lateralis*. Karamea river, Mar 74, common everywhere in small parties (JMV). S.W. Fiordland, Apr 73, Jan 74, not abundant but observed at Breaksea and Dusky Sounds, Facile Harbour, Breaksea and outer Gilbert Islands (CAF, DGM).

BELLBIRD (*Anthornis melanura*)

Mayor Island, Jan 74, very numerous (JHS). Karamea river, Mar 74, while rafting the top half of the last earthquake lake, towering limestone walls acted as a soundshell for the thousand small cathedral bells in early morning sunlight (JMC). Both Bellbird and Tui feed on wattle bloom, which contains no nectar; presumably they are consuming pollen of which wattle has a good supply (SCS). Stavelly, 12/4/74, two very young birds just out of the nest and learning to fly, attended by six adults making excited calls. Both young birds were on the forest floor and could have been caught by hand, but managed to fly up into the branches. They were one on either side of the track, separated by 4 metres, and may have had different parents. Eggs would have been laid about mid-March when weather was cold, strong NW gales and 5 cm. snow, followed by a week of southerly wind, rain and snow (ML). S.W. Fiordland, Apr 73 and Jan 74, ubiquitous but nowhere abundant, perhaps most common on Breaksea, Gilbert and Cooper's Islands (CAF).

TUI (*Prosthemadera novaeseelandiae*)

Clevedon, 12 Feb-6 Mar 74, immature in garden, learning to sing; no adult present at any time; head and neck grey, throat tuft hardly showing (HRMcK). Mayor Island, Jan 74, plentiful near summit (JHS). Foxton Beach, 23/12/73, only the second seen here in 5 years (JMM). Mt Holdsworth, 26/2/74, two juveniles feeding on kaikamako berries, tree bearing both green and ripe berries and also flowers (RHDS). Nelson, Mar 74, none seen in Little Wanganui valley nor in Karamea catchment above Moonstone lake; common towards Lesley hut and around earthquake lakes (JMC). Mt Aspiring National Park, a relatively rare bird in beech forests east of the main divide; there seem to be two well established "pockets," one in vicinity Makarora ranger station up the valley for a few km towards Cameron Flat and Haast, where there is some mixed forest with some West Coast elements in it; the other near mouth of Bean's Burn, western Dart tributary, a very wet area with red, silver and mountain beech plus a good mixture of scrub. Odd birds, apparently seasonal visitors, in Lower Routeburn and East Matukituki (PC). One at Akatore Creek, Otago, June 73 (RJP). S.W. Fiordland, scarce; not seen Apr 73 but recorded Jan 74 at Cascade Cove, Dusky Sound and Islet Cove, Cunaris Sound (CAF).

CIRL BUNTING (*Emberiza cirrus*)

Marsden Valley, Stoke, one, 18/6/73 (HFH). Ward, numbers increase late August-early September each year. They do not mix with Yellowhammers. Nov 73, taking seed from heads of barley grass, which no other bird has been seen to take (TJT). Methven, 9/8/73, one on 2 ft of snow (RJP).

CHAFFINCH (*Fringilla coelebs*)

Waikato Heads, June 73, flock of 11 on upper tide flat (HRMcK). Karamea river, Mar 74, heard at various localities between Trevor Carter hut and second earthquake lake (JMC). S.W. Fiordland, Sportsman Cove, The Basin, Pigeon Island (Dusky Sound) and head of Cunaris Sound, Jan 74; Astronomer's Point, Apr 73 (CAF).

GREENFINCH (*Carduelis chloris*)

Northland, Karikari Bay, 1/7/74, large mixed flock, with Goldfinches (ATE). Levin, scarce (EBJ). Hutt Valley, many banded Spring 72 (MLF). Stewart Island, area Duck Creek, flock of 10 (RJP).

GOLDFINCH (*C. carduelis*)

Kerikeri, June 73. Goldfinches, Greenfinches and Sparrows probing a lawn, apparently feeding on underground stems of kikuyu grass (D. E. Calvert). Stewart Island, May 73, single birds at Mason Bay (RJP).

REDPOLL (*Acanthis flammea*)

Papamoa, late Aug 73, huge mixed flocks of Redpolls, Greenfinches, Goldfinches, Chaffinches and Yellowhammers on farmland; Redpolls were the dominant species in these flocks and at times must have numbered thousands in a large field behind my home. Kaituna cut, 16/1/72, breeding in lupins, successfully reared 4 young (PL). Opoutere, Jan 74, several, including juveniles (BB). Wairoa golf course Oct 73, c.60; unusual in this district (GF). Levin, 28/8/73,

six in garden; the first I have noticed in town (EBJ). S.W. Fiordland, Jan 74, at head of Vancouver Arm and Cunaris Sound (CAF). Stewart Island, May 73, conspicuous in most areas (RJP).

HOUSE SPARROW (*Passer domesticus*)

Kerikeri, May 74, a hatch of insects from the soil of a flower bed; about ten sparrows flying up and "flycatchering" (ATE). Mayor Island, Jan 74 (JHS). Rotorua, June 73, feeding on seed of birch tree (*Betula* sp.) hanging from branches as do Silvereyes or Tits (*Parus*); one female drove off a male by pecking at his face (RWJ). Levin, Oct 72-June 74, a female with white secondaries (EBJ). Christchurch, early morning 6/12/73, feeding on nectar from blossom of bottle brush (JRJ).

STARLING (*Sturnus vulgaris*)

Tanner's Point, 25/11/73, nest with young, in a hole left for a light switch in the concrete block wall of a partially built house (JFC). Rotorua, C. Low saw a Starling land, lay an egg, try to pick it up but failed to do so and left (RWJ). Ward, May 74, 15 Starlings taking insects on the wing (TJT). South of Karamea, evening of 14/3/74, several hundred Starlings settling to roost in two large podocarps set in dairy pasture. As a Harrier approached a large mob of Starlings rose from one tree and attacked it; the Harrier fled, the Starlings wheeled to return to the tree; another mob rose and continued the pursuit. The whole incident took no more than 30 seconds (JMC).

INDIAN MYNA (*Acridotheres tristis*)

Little Barrier, Jan 74, at least 24 (TRH). Mercury Bay, 28/12/73-4/1/74, two mynas with a juvenile Starling in constant attendance; on three separate occasions one of the mynas fed the Starling. It seems possible that the mynas took over a Starling's nest containing a fertile egg which subsequently hatched (SCS). Opoutere, 9/1/74, mynas flying up from power poles at dusk, chasing moths or beetles (BB). Roger's beach, Bay of Plenty, 1/1/74, mynas coming out of holes in pumice cliff (RWJ). Hamilton, Oct-Nov 73, predation of Starling nest boxes; two eggs eaten and shells dropped below the box entrance; two 3-week-old young killed inside the box by pecking about head and neck; after I removed the dead chicks three more eggs were laid but later eaten. Three 3-day-old young were removed from another box and dropped 10-15 metres away. A third box about 20 m. distant was unmolested (JFC). Tikitiki, Dec 73, five birds on a farm 4 miles north of settlement; local residents say mynas only established in the area during the recent few years. Manutuke, 27/8/73, several hundred mynas roosting in an isolated patch of bush (IFC). Trentham, seen for three years, still present spring 1973 (HLS).

NORTH ISLAND KOKAKO (*Callaeas cinerea wilsoni*)

Moumoukai, 19/12/73, first call 0445 (sunrise 0456 hrs), preceded by Tui at 0350 and Blackbird at 0415 hrs; on this day no calls heard after 0715 hrs. 23/4/74, two in tawa near road, call barely audible: one appeared much browner and had wattles greyish, slightly tinged blue (AJG). Heard in the vicinity of Kaimai youth camp; R. St Paul reports them from bush above Waitekuri and at a location near Te Aroha (RVMcL). Hauturu North road, east of Kawhia

harbour, a pair said to have bred in 1972; heard calling across valley, Oct 73 (CS). Kaharoa, Oct 73, Kokako called with tape of Rotoehu birds; the local bird had a deeper note (RWJ).

BLACK-BACKED MAGPIE (*Gymnorhina tibicen tibicen*)

Reports 1972 and 1973 from Tangimoana, Oroua river, Parouta-whao and Levin (EBJ, JMM).

WHITE-BACKED MAGPIE (*G. t. hypoleuca*)

Auckland, one dead on road at Newmarket, Jan 74 (SMR); Middlemore golf course, 6/6/73, two, first noted here for 5 years; still present 24/9/73 (TGL). Tikitiki, Dec 73, flocks up to 30 (JFC). Manawatu, 150-200 near Tangimoana; numbers increase in May-June, decrease in the breeding season. Oct 73, a flock of c. 50 appeared near Aokautere, seem attracted to newly ploughed fields (HAR). 25/3/74, from north of Levin to near Palmerston North via Shannon, none seen where usually dozens; this strip of country is an old marine terrace between the foothills of Tararuas and Manawatu flood plain and must be very dry after a long hot summer; do magpies shift in dry weather? (EBJ). Akatore Creek, Otago, 2/6/73, 2 (RJP). Southland, Dipton, 27/8/73, 2. Pahia, small colony apparently established from a pair brought from Canterbury in 1970. 3, 5 and 4 young reared in successive seasons, population in May 74 c.14 birds (RRS).

ROOK (*Corvus frugilegus*)

Miranda, 31/10/73, 12 (BB); 12/3/74, 29 left shell bank and flew towards rookery (AH). Papaaroha, Coromandel, one on 3/2/74 (SMR). Flock of 13 near Nuhaka, 1/11/73; Tolaga Bay 3/6/74, 6 (GF). Lake Wairitoa (Wanganui district), a lone Rook observed 19/5/73, 6/6/73. Manawatu, many sightings reported Oroua Downs area 1970-72 (WJP); 3 over Palmerston North city 4/10/73, one at Aokautere, breeding reported near Colyton (HAR); still present around Kiwitea (IGA). Ward, one or two occasionally, Aug-Oct 73 (TJT). Dunedin district, a single bird part of 1973-74 summer; lone Rook at Kaikorai estuary 15/11/73; one flying north over Aramoana Spit chased by Black-backed Gulls 24/11/73; a dead juvenile sent to Otago museum in Feb 74 from Palmerston could have been from the small Sutton rookery (JH).

SHORT NOTES

ADELIE PENGUINS AND LEOPARD SEALS — A FURTHER NOTE

At the time of writing the review of the predation of Leopard Seals on Adelie Penguins presented earlier this year (Dawson 1974), I had not been able to see the edited journal of Edward Wilson's experiences on the *Terra Nova* expedition (Wilson 1972) in which he gave some records of the numbers of Leopard Seals seen at this time, which is relevant to the figures quoted on page 52 of my account.

Wilson wrote on 20 December 1910 (p. 82): "We saw two Sea Leopards . . . which were the first we had come across . . ." and noted the ship's position as 68° 41' S, 179° 29' W. On 29 May 1911, he wrote (pp. 130-131):

"The Owner [i.e. Captain Scott] and Bowers and I went out on skis to Inaccessible Island [about one mile south of Cape Evans, McMurdo Sound]. We found and killed a young Sea Leopard on the sea ice. I followed its tracks and found that it had come about a mile over the ice from the tide crack. This was a great piece of luck as we haven't had one before. After lunch skinned it with Cherry [i.e. Cherry-Garrard] and buried it with the skeleton in the big drift behind the hut [at Cape Evenas]." Later, on 24 October 1911, he summarised the work of the expedition and noted (p. 188): "We were lucky in securing several Crabeaters and one Sea Leopard during the winter, otherwise vertebrate zoology has been unsuccessful."

Apparently, therefore, Wilson's dramatic pencil sketch of a Leopard Seal in pursuit of an Emperor Penguin (Scott Polar Research Institute 67/4/3), as shown on p. 85 of his *Diary*, is but a rather delightful figment of his imagination rather than a record of an actual field observation.

Some more recent figures of the relative abundance of Leopard Seals in the Antarctic are given in a report from a University of Idaho project on the status and population dynamics of Antarctic seals led by Dr Albert W. Erickson which completed aerial censuses of seals along 249 nautical miles of pack ice. It was reported (NSF 1974: 54) that —

"The density of seals observed this year [i.e. January 1974] in 10 traverses between 122° E and 136° E was 8.32 per square nautical mile of pack ice. This density is twice that observed in 1973 and one-third greater than density values developed for the Amundsen and Bellingshausen seas in 1972. Species composition this year was 81.5% crabeater, 4.9% leopard,

8.7% Weddell and 4.9% Ross . . . Eight shipboard censuses for 50.7 square nautical miles were also performed . . . These resulted in a density value of 12.04 per square nautical mile."

Crabeater seals formed 93% of the observations, and the relative rarity of the Leopard Seal is again demonstrated, as well as the implied caution that some seasonal and geographic variation may be expected.

In a recent description of an Antarctic journey, *The Sea and the Ice* by Professor L. J. Halle (1973), some further comments on predation by Leopard Seals are given which are worth adding here to be read in conjunction with what has been said already (Dawson 1974) —

(pp. 155-156). ". . . the individual penguins find a relative security in numbers. This makes individuals reluctant to be the first into the water at rookeries where seals are waiting. They gather along the edge of the ice blocks that constitute the remains of the ice-foot, where the sea-ice was once attached to the shore, crowding ever more against the brink as more birds arrive, until at last one is crowded over the edge, whereupon the others leap in after it. The seal is presented with a sudden shower of penguins, an embarrassment of riches."

(pp. 241-242): "The Leopard Seal also spends the greater part of its life among the floes of the pack-ice, although many individuals, at least, pass a season along the shores of the continent, attaching themselves, like the skuas, to the Adelie Penguin colonies on which they feast."

(p. 242): "I suppose that Killer Whales, although they hunt in packs, must at least hesitate to attack the most formidable of seals as long as there is any other prey available. This may explain why the Sea Leopard is not as exclusively attached to the vicinity of the ice as the other true Antarctic species. For the fact is that stragglers are recorded north of it. The availability of penguins, rather than its own safety, may well be the chief factor that keeps it about the pack-ice. Who can say that inside the head of a Sea Leopard there is not an intelligence equal to that of a dog, of a Sea Lion, or of a dolphin?"

The most original of Halle's statements is the account on p. 154 of a visit to Cape Crozier on 6 January 1971 where, with Dr & Mrs Muller-Schwarze who were engaged in "a study of the adaptations that enable the Adelie Penguin to cope with the predation of the Leopard Seal," he witnessed a Leopard Seal catching a penguin and shaking another "a moment later."

Here, once again, we see that curious mixture of "history, legend and fact" as documented in my previous account.

I referred, then (p. 43), to Sir Raymond Priestley as the "last surviving member of Scott's Northern Party." A link with the heroic era of Antarctic exploration has now been broken with Sir Raymond's death on 24 June at the age of 87. An even older "last survivor," Hugh Blackwell Evans (briefly mentioned by me on p. 41), now in

his 100th year, has recently provided his own account of the *Southern Cross* Expedition led by Borchgrevink (Evans 1974) and some interesting sidelights on the expedition itself and the personalities involved in it are revealed.

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NON-BREEDING ADELIE PENGUINS FEEDING CHICKS

On two occasions in January 1973 observations were made on non-breeding Adelie Penguins (*Pygoscelis adeliae*) feeding chicks at Hallett Station, Antarctica (72° 19' S, 170° 13' E). Both non-breeding birds involved were known to be two years old (banded as chicks in 1971), and in both cases subsequent observations proved they were not the parents of the chicks.

On 5 January 1973 a two-year-old penguin that was guarding a scrape was approached by a chick. The two-year-old bird began displaying and vocalizing to the chick using typical penguin behaviour (Penney 1968). The chick then assumed the food-begging posture and was fed. The chick was fed only once and then returned to its creche. During the next two days the chick was not observed to approach the two-year-old bird again.

On 17 January 1973 two different individuals were similarly observed. The chick approached the non-breeding bird, and after displays and calls by the two-year-old bird, the chick assumed the food-begging posture. The chick was fed four times within three minutes and then returned to its creche. It returned a short time later but was not fed again.

The role of non-breeding Adelie Penguins has been reviewed extensively by LeResche & Sladen (1970). They state that young Adelie Penguins will incubate the eggs of nesting birds, either on the original nest or when eggs have rolled from nest to nest, and they will serve as creche guardians after both parents leave to feed at sea. However, they make no mention of young birds feeding chicks. To my knowledge this represents the first reported cases of non-breeding Adelie Penguins actively feeding chicks. In both cases the parents of the chicks were still alive and came regularly to feed them. Many other observations were made of chicks approaching non-breeding birds and begging for food, but they were never fed. Since very few chicks derive food in this manner, the survival value of this activity is probably low.

This observation was made while I was engaged in work supported by the NSF Antarctic Research Program Grant No. GA 23744 to John R. Baker of Iowa State University.

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KEA OBSERVATIONS IN THE TARARUA RANGE

Oliver (1955) noted that in 1942 a Kea was reported as having been seen in the Tararua Range, but adds that the species is not established in that area.

On the evening of 8 January 1974, shortly after arriving at Alpha Hut in the Tararua Range, Mr B. Manly and the writer were fascinated to see a male Kea (*Nestor notabilis*) in the vicinity of the hut. The bird entered the hut door for scraps of food, and displayed all the roguishness characteristic of its species, but in stubborn silence. The bird had no leg band or special identifying marks. Shortly after dark the Kea, doubtless resenting the lapse of attention then being paid to it, flew off with unmistakable raucous cry. The next morning it returned, posed for photos, and followed us for a short distance along the track.

The photographs were submitted to Mr F. C. Kinsky for confirmation of the observation.

Dr P. C. Bull, Ecology Division, DSIR, informs me that a Kea was also observed at Totara Flats in the south eastern Tararua Range, on 2-3 March 1974.

The possibility of Keas flying across to the Tararuas from the South Island has long been the subject of speculation, but it would be unwise to assume that the bird or birds observed in the Tararua Range this year had in fact made the journey directly.

Three Keas are held at Staglands Wildlife Park in the Aka-tarawa Valley, about 13 kilometres in a direct line from Alpha Hut. Two of these are males which are allowed free access to the Tararua Range. These birds have no identifying marks or leg bands, and it is not known whether they were absent from Staglands on the days when Keas were observed in the Tararuas. I am informed that Keas are also kept at Reikorangi, near Waikanae, and that there are several other places around the periphery of the Tararua Range where Keas have been kept in the recent past.

For providing information on this subject I am grateful to the following:— Mr J. R. Simister, Staglands Wildlife Park; Dr P. C. Bull, Ecology Division, DSIR; Mr K. M. McGee, N.Z. Forest Service, Upper Hutt; and Mr B. J. McKinnon, Department of Internal Affairs, Wellington.

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FERAL BARBARY DOVES IN MASTERTON

In the autumn of 1971 one or two Barbary Doves (*Streptopelia risoria*) appeared in our garden. As my wife puts out food for birds it was not long before more doves turned up and in the winter of 1972 as many as 30 were to be seen on most days. Occasional nests were reported to me in gardens in neighbouring areas. The 1973-1974 breeding season seems to have been a successful one as at least five juveniles (with pale bills and lacking the black neck band) were present in the garden. The breeding season evidently is fairly extended as on 11 October 1973 a young one still soliciting food appeared. At the beginning of the same month a pair built a nest in an Akeake in the garden but strong winds displaced the egg, which lay broken on the ground a day or so after it was laid. On 19 January 1974 a dove was watched in the garden searching for twigs and eventually flying off with one.

The Barbary Dove is by nature exceptionally confiding, so much so that it is doubtful if it would really succeed in the wild state

unless it changed its habits. It seems to be dependent on food being made available and when this is provided will readily enter buildings to obtain it. One, for instance, comes regularly to the kitchen window, which is then opened for it to come inside and have a feed on the bench. Up to a dozen, if doors are left open, march boldly into the kitchen for food. One which was nursed with a wing injury and released allows itself to be picked up.

This dove appears prone to suffer injury. We have had several with ruptured crops, in one case requiring surgery, though all seemed to recover after "hospital" care. Another turned up with a foot dangling but after a week or so at rest in a cage, the fracture had mended and the dove was released in good shape.

Liberated initially by private individuals, the doves have become feral in a restricted area in Masterton Park and in the suburban region to the west of the town, where there is an abundance of trees and shrubs.

According to Goodwin (1964; 1969) the Barbary Dove is regarded as the domestic form of the African Collared Dove (*Streptopelia roseogrisea*) which is now considered as a subspecies of the Collared Dove (*S. decaoto*).

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MATING BEHAVIOUR OF BROWN KIWI IN CAPTIVITY

A pair of North Island Brown Kiwi (*Apteryx australis mantelli*) housed in the Otorohanga Zoological Society's nocturnal house have been under observation for approximately three hours daily since 1 October 1972.

Mating behaviour was first seen on 19 July 1973. The female subsequently laid two eggs — the first on 6 August and the second 196 days later on 18 February, 1974. Regrettably, both eggs were found broken shortly afterwards.

Both birds are relatively young, the female being estimated at two years old and the male at three years old. It is thought that both were mating for the first time. In addition to the apparently successful copulations, the male frequently abandons the attempt at any stage of the procedure often to return moments later to continue. The birds have mated, or attempted to mate, virtually daily since the first

observation up to the present time (8/3/74) and on one occasion, three apparently successful copulations occurred in the three hour period. The submissive attitude of the female during mating was in sharp contrast to her aggressive behaviour toward the male prior to this period. Slight variations were apparent during the different matings and the following notes, based on observations by Society members, describe the usual sequence.

The male approaches at right angles to the female and with his bill, taps on the centre of her back. This tapping may extend to stroking. She responds by crouching low — her feet tucked up under her belly and her neck and bill extended anteriorly along the ground. Latterly a single tap on the back will evoke this response. The male then mounts and, lacking the stabilizing role of wing movements, often grasps the female's lower neck or back feathers while treading. The bill is also used at this point to thrust through the feathers on each side of the hen in sharp probing movements. The female, who has her eyes closed throughout, has her plumage all awry through the treading, but does not appear to lose many feathers. The male then lowers himself posteriorly, his feet sliding down the hen's flanks. The female simultaneously elevates her cloaca and copulation occurs for a brief moment at this point. There is no post-copulatory contact — the male wanders off while the female continues to remain prostrate for up to five minutes.

Mating displays do not occur, but this is hardly surprising considering the poor vision and lack of suitable display apparatus (wings, external tail, colour flashes, etc.) in this species. On several occasions however, the mating has been preceded by apparent excitement on the part of the male (e.g. calling, or the irregular behaviour often exhibited when rain falls on the roof).

We would like to acknowledge the assistance received from Mr Brian Reid of the Wildlife Service in the preparation of these notes.

B. E. ROWE

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AVIFAUNA OF CAPE BIRD, ANTARCTICA

Cape Bird (lat. 77° 13' S, long. 166° 30' E) is on the northern end of Ross Island in McMurdo Sound. This coastal area may be ice and snow free for several weeks in the summer. Sea-ice conditions are variable. Pack-ice is common and fast-ice may be present for up to five months of the year. During the summer season a 20 metre wide pebble beach is exposed. Behind this are moraines deposited by the Mt Bird ice cap. The University of Canterbury Antarctic Research Unit has maintained a station at Cape Bird since the summer of 1966-67. I was at the station from 11 November 1971 to 30

January 1972, 31 October to 6 December 1972 and 23 November 1973 to 2 February 1974. During this time I kept a record of my bird observations.

Adelie Penguins (*Pygoscelis adeliae*) and McCormick Skuas (*Stercorarius skua maccormicki*) breed at Cape Bird and were recorded throughout my presence there. I recorded the following casual visitors to the Cape Bird area.

Emperor Penguin (*Aptenodytes forsteri*):

13/11/71 Two adults ashore for a few hours, remaining in the same area until moving off to sea.

14/11/71 Six adults ashore and behaving similarly.

15/11/71 One adult on south-moving pack-ice.

18/11/72 Two adults on north-moving pack-ice.

27/11 & 2/12/73 One juvenile on south-moving pack-ice.

These birds probably came from the nearby breeding colonies of Beaufort Island and Cape Crozier.

Snow Petrel (*Pagodroma nivea*):

14/11/71 Two flying south together.

15/11/71 One flying south.

23/11/71 Large numbers (20-50).

30/11/71 Seen in groups of two and three throughout the day.

10 & 12/11/72 One flying south.

13/11/72 Two flying up and down the beach.

22/11/72 One flying south.

24/11/72 Two flying south together.

26/11/72 Four flying south together.

25/11/73 Three flying south singly.

26/11/73 Two flying south together.

This was the most commonly observed vagrant. It was most often seen flying just over and parallel to the beach, although at no stage did it land at Cape Bird.

Wilson's Storm Petrel (*Oceanites oceanicus*):

21 & 23/12/71 One flying north along the moraines.

15/12/73 One flying south along the beach.

18/12/73 Three flying south, 90-180 metres offshore.

20/12/73 Four flying north along the beach.

This bird also did not land in the area although it was observed flying along the beach.

PAUL M. SAGAR

A COMMON SANDPIPER NEAR NEW PLYMOUTH — THE THIRD NEW ZEALAND RECORD

The *Annotated Checklist of the Birds of New Zealand* (OSNZ 1970: 48) accepts two sight records of the Common Sandpiper (*Tringa hypoleucos*) for New Zealand — the first at New Plymouth in October 1964 (Pengelly et al. 1965) and the second at Kerikeri in March 1969 (Edgar 1969). Since then a third Common Sandpiper has been recorded near New Plymouth between February and April 1972 and more recently, in November 1972, Dr C. A. Fleming saw at Waikanae a bird which he describes as almost certainly a Common Sandpiper (Fleming 1973). Another Common Sandpiper was observed on the Kaipara Harbour in February 1974 and an account has already been given in *Notornis* (Brown 1974). My original manuscript was completed during 1972 but apparently was lost in transit so that, chronologically, my New Plymouth bird represents the third record in New Zealand.

Since the 1972 New Plymouth bird was seen on five separate occasions, and on some observed for considerable periods at close quarters, it seems appropriate to place on record such observations as were made.

A strange 'black and white' wader was first seen by W. F. Cash at the mouth of the Waiongona River, about 5 miles north of New Plymouth, on 13 and 27 February 1972. No detailed observations of the bird were made on those occasions. On 5 March the writer and W. F. Cash returned to the Waiongona River mouth. Almost immediately upon our arrival we disturbed a solitary wader resting on a sand bank about 300 yards from the mouth of the river. The bird flew low and swiftly down-stream and was found at a small salt water lagoon near the mouth of the river. Such lagoon was surrounded almost entirely with a great quantity of logs, branches and boulders with very little open sand. Here the bird was found and observed for a short time, initially feeding on the only sandy portion of the lagoon edge. The first noticeable feature in addition to a bobbing up and down motion of the head was an independent frequent up-and-down rythmical motion of the whole of the hind part of its body. The wader was slim and graceful appearing to be about the size of a Banded Dotterel (*Charadrius bicinctus*). Its legs were yellowish-green, the bill longish, dark brown or black and straight. The underparts including the rump were pure white except for the upper breast which was brownish. The upper parts were brown, the eye dark with a dark streak from the bill through the eye with a white streak above the eye. A white patch on the body at the angle of the wing was noticeable. The bird fed actively, picking in the sand just above the water's edge. It appeared to be very alert and shy. After some ten minutes of observation the bird was put up and it flew low away from us showing a clear black and white upper surface pattern.

It was not found again that day or on 26 March. However, on 1 April the river mouth was again visited and the bird disturbed feeding at a very small sandy inlet close to the edge of the river. It flew rapidly downstream away from us about two feet above the water. Shortly after it was found again at the salt-water lagoon where it was feeding on the sandy margin. It was disturbed by our approach and flew very low over the lagoon. It flicked its wings rapidly, glided for a short distance, then flicked its wings again. During the gliding motion the wing tips were seen clearly to be curved downwards. The white wing bar was noticeable and the bird was a strong flier. After a wait of almost two hours the bird returned to the lagoon, flying in at a low level, quietly and swiftly. It was then observed closely at a distance of as little as 40 yards for almost thirty minutes. Again it was seen to feed very actively, walking and occasionally running with a frequent bobbing up and down of both the head and the whole hind part of the body. It picked and occasionally probed in the sand just above and in the water and among the logs and branches at the lagoon edge. As it moved along it frequently stood on logs lying on the ground and occasionally perched for short periods on them before feeding again. As on previous occasions it appeared to be very alert and shy, unlike the Kerikeri bird which apparently did not appear at all shy.

Under ideal conditions a closer inspection of the bird was possible. The dark brown straight bill, dark streak from bill through dark eye, white streak above and a white ring around the eye were all noticeable. The whole of the under parts were white except for the upper breast which was white flecked with brown. The upper parts were a uniform mottled brown and the white shoulder patch was again noticeable. The legs were greenish yellow. When the bird was disturbed and flew away from us its dark upper parts with white wing-bar and white sides and tip of tail were very noticeable. The bird was followed and found perched on a log a few feet above the edge of the river. When disturbed it flew rapidly and strongly downstream about three feet above the level of the water.

The sandpiper was seen again by the writer on 9 April when it was disturbed in the same inlet as previously and flew rapidly downstream about 18 inches above the water. It was found at the salt-water lagoon where it was again disturbed and flew in a low direct flight about 300 yards back to the river and upstream where it alighted on the sandy edge. It was further disturbed from there and flew some 200 yards upstream and out of sight. The well defined and distinct black and white upper body pattern was again most noticeable.

At no time on any occasion when the bird was under observation was it heard to call and on every occasion it was solitary, shy and alert. It was obvious that its favourite feeding area was the salt-water lagoon where it was most frequently observed. It was not seen again after 9 April.

We found that one of the most useful aids in the initial identification of our bird was the excellent description of the bird seen by Edgar at Kerikeri. Such identification was further confirmed by consultation of the authorities to which Edgar and Fleming have referred and in addition Hollom (1962: 206-8). There remained only one problem. The Common Sandpiper closely resembles the Spotted Sandpiper (*Tringa macularia*). While no difficulty in identification of the respective species presents itself when the birds are in breeding plumage most authorities hold the view that immatures and adults in winter plumage are indistinguishable in the field. I am indebted to Mr F. C. Kinsky for drawing my attention to an article by Wallace (1970) who reaches the conclusion that previous statements that in immature and winter adult plumages Spotted Sandpipers are not separable in the field from Common Sandpipers have not been borne out, at least in the case of immatures, and that certain diagnosis is possible. Even more important in reaching a final determination of our bird were the excellent photographs of Spotted and Common Sandpipers accompanying a note by Bonham (1971). A close comparison of the appearance of the New Plymouth bird with those illustrations leaves me in no doubt whatsoever that the bird seen by us was a Common Sandpiper, a conclusion which is supported even further by a consideration of the known distribution of the two species.

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LETTERS

The Editor,
Sir,

RECORDINGS OF NEW ZEALAND BIRDS — III

My latest additions to the collection of bird calls and songs that I have on tape, as previously listed (1972, 1973), are — Great Spotted Kiwi, Fiordland Crested Penguin, Kermadec Petrel, Black-winged Petrel, Wedge-tailed Shearwater, Hutton's Shearwater, White-faced Heron, Northern Shoveler, Bobwhite Quail, North Island Weka, Broad-billed Sandpiper, Antarctic Skua, Sooty Tern, White-capped Noddy, Grey Ternlet, Oriental Cuckoo, Channel-billed Cuckoo, Kingfisher and Greenfinch.

These recordings are available for research purposes. Anyone who may wish to add material to this collection or to use it is asked to write to me at the address below.

Your readers might like to know that a full discography of recordings of New Zealand birds has been accepted for publication in the March issue of this journal.

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P.O. Box 21-083,
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12 October 1974



The Editor,
Sir,

REVIEW OF "THE FIAT BOOK"

What a very disappointing review of *The Fiat Book of Common Birds of New Zealand* from your reviewer "R.B.S."

The book's immense popularity is surely an indication of its value and usefulness. And "R.B.S."s criticism of Janet Marshall's paintings, and his use of a very outmoded and inappropriate Latin proverb, indicates that he is simply 'not with it.'

Better things are really expected from a semi-scientific journal.

F. N. HAYES

17 Wise Street,
Wainuiomata
10 June 1974

The Editor,
Sir,

REEF HERONS WITH WHITE BILLS

I would like to ask you, or any reader of *Notornis*, for help. I have seen two Reef Herons (*Egretta sacra*) with white bills. All my books state that it has a brown bill, which most of them do have. However, the white phase of this bird has a yellow bill which is closer to white, but not pure white.

I saw one opposite the boat ramp at Warkworth and the other at Pearts Finger, Raglan. They were definitely Reef Herons.

They have puzzled me for months and I would very much like to know if there is an explanation for it.

DUNCAN C. WATSON

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24 August 1974



SHORT NOTE

FRENCH-BANDED LESSER BROAD-BILLED PRION ASHORE

Earlier this year, while on a beach patrol, I found a dead prion on the northern west coast of the North Island. It was identified as a Lesser Broad-billed Prion (*Pachyptila salvini*) and carried a band F.L. 13456. Inquiry showed that it was banded on 6 March 1974 as a chick on Pig Island in the Crozet Islands. The bird was found about 3 miles south of Charles Gorge on the coast near Dargaville on 30 June 1974. The Annotated Checklist (OSNZ 1970) lists the New Zealand records of this species as *P. salvini salvini* (Mathews, 1912), breeding on Marion and the Crozet Islands and ranging eastwards to New Zealand, but it is also stated: "Small-billed *P. salvini* occur in the Tasman Sea in winter and are sometimes storm-wrecked. They have been treated as *P. salvini crozeti* Mathews, 1932, the type specimen of which is understood to have been collected on the eastern Crozet Islands." The Banding Officer, Wildlife Service, has been notified of this recovery.

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REVIEWS

The Sea and the Ice — A Naturalist in Antarctica. By Louis J. Halle. Houghton Mifflin Company. Boston, Massachusetts. 1973. 286 pp. US \$8.95.

Halle journeyed to the Antarctic during the 1970-71 season and was given the opportunity of seeing more of the continent than most Antarctic naturalists see in a lifetime. The result of his experiences are contained in this well-written book.

The book contains 15 chapters covering such subject matter as the Antarctic Convergence, pack ice, historic explorations, seabirds, penguins, skuas, the South Pole, whales, and seals. The epilogue which follows was printed in *Audubon* in March, 1973. Three appendices follow — the Coriolis effect, the Royal Albatrosses of Tairaroa, and international agreement on measures of conservation in the Antarctic.

Halle has written this book in non-technical language, but at the same time cites references throughout. He seems to have done a good job of reviewing the existing material before going to the Antarctic. I can find few statements with which I disagree, and most of these disagreements are of a personal nature rather than scientific. However, there are a few errors. One such statement, found on p. 135, reads "The Emperor is, I believe, the only bird in the world that . . . does not have a nesting territory that it defends." I am sure he would agree that some parasitic birds maintain no nesting territory.

These few errors aside, however, I can highly recommend this book as a well-written and tremendously interesting account of one of the most fascinating areas in the world — the Antarctic.

R. D. C.



PEDERSEN, LIS. 1974. Bibliography of Scientific Studies of Wellington Harbour: biology, geology, hydrology. *N.Z. Oceanographic Institute, Misc. Pubs.* 56: 48 pp. Obtainable from the Director, N.Z. Oceanographic Institute, P.O. Box 8009, Wellington.

Wellington Harbour has been for a long time the scene of many environmental issues ranging from extensive reclamations to the discharging of domestic and industrial wastes, in addition to the ever-present threat of oil pollution. The bird life of the harbour and its shores has been intimately involved in every one of these conflicts of land and sea use. The discharges from the now defunct plant of the Wellington Meat Export Company at Ngauranga provided a food source for many seabirds. Ornithologists travelling daily along the Hutt Road were able to glimpse Giant Petrels, Wandering Albatrosses, Fluttering, and perhaps Hutton's, Shearwaters within a stone's throw of the railway track. The estuary of the Hutt River not so long ago provided extensive muddy flats for waders; the sandy beach at Petone

and the rocky shores of the eastern bays are still good places for oystercatchers, terns and shags, and even the occasional Reef Heron. But the birdwatcher, whether he be an ardent conservationist or not, will be aware of the dwindling of suitable habitats around this fine harbour, and will be bound to ask — how long before the scene is ornithologically sterile?

Many years ago, one of our most senior members, Mr R. H. D. Stidolph, wrote a series of articles on the bird life around Wellington (*Emu* 21: 290-4, 247, 1922; 25: 204-7, 1926) and set the scene for what we have continued to observe and enjoy in the intervening years. Another of our well-known members, Mr J. M. Cunningham, a resident of the eastern bays of Wellington Harbour since 1960, has taken up cudgels on behalf of the birds of the harbour and their threatened environment, recently documenting some of his observations of 14 years residence in a Letter to the Editor of the *Hutt News* (9 July 1974: 74 "Birds of the estuary") as well as in his stimulating self-illustrated supplement to the local paper *The Eastbourne Sun* (March 1970: 3-4, "Conservation begins at home. The despoiling of our beaches") in which, amongst other things, he contrasts Charles Heaphy's account of the bird life of Wellington Harbour in 1839 ("... I well remember especially, the enormous numbers of waterfowl frequenting the shallows at the mouth of the Hutt River, cormorants, ducks, teal, oystercatchers, plovers, sand pipers, curlew and red-legged waders, were there in parties, detachments, and masses ...") with the sight to-day of oil tanks and wool stores, soap works, scrap yards and gravel dredges where only a year or so ago a few Banded Dotterels found a last resort and oystercatchers and godwit now barely find a space for themselves.

The N.Z. Oceanographic Institute has been conscious of the need to establish a base-line in terms of assembly of the published information on vulnerable or threatened parts of the New Zealand seascape. It publishes its own series of "Oceanographic Summaries" which document particular places of immediate concern and commissioned a bibliographic study of what scientific information has been published on one of the most vulnerable parts of the whole New Zealand coast, i.e. Wellington Harbour.

Miss Pedersen, at the time assistant librarian of the N.Z. Oceanographic Institute, presented this bibliography as part of the requirements for the Diploma of the N.Z. Library School. Subsequently it was amplified by additional items kindly forwarded by Professor J. T. Salmon of Victoria University and with extra help from staff of the Institute. As with every such bibliography, there are probably a number of significant references left out or incorrectly given but the scope is comprehensive and much of what is included may be new to many of us.

Birds were not included in the original draft but later combing the *Emu*, *Notornis*, and other periodicals, has yielded 21 items dealing with birds of the harbour. Accordingly, a good base on which to build up a more detailed study of the birds of this important region is now available. Both ornithologists, as such, and those wanting a source of information on the natural history of Wellington Harbour will welcome this booklet. It ought to serve as an example to others to document their own areas in a similar way. Only then can one

counter the claims of the developer and the speculator that no one cares about mudflats or knows what goes on there anyway. The developer is entitled to ask the conservationist why a particular area is worthy of consideration and the question must be answered with adequate documentation and not rely solely on emotion or airy-fairy beliefs. It is incumbent on all of us, therefore, to dig deep into our bottom drawers and publish our field notes which, often, may represent the only information available about a particular place of conflict.

E. W. D.



FORDHAM, R. A. & OGDEN, J. 1974. An Ecological Approach to New Zealand's Future. Compiled for the Council of the N.Z. Ecological Society. Supplement to its *Proceedings*, Vol. 21. Price \$1, from The Secretary, N.Z. Ecological Society, P.O. Box 1887, Wellington.

One of the most provocative, although not necessarily stimulating, statements on man's place in nature as portrayed in the New Zealand ecological scene has been forwarded to the Editor of *Notornis* for review as has been done apparently for all similar journals in the country. It would take many pages for anyone well-versed in to-day's eco-literature to do justice to what is a brave and honest attempt by two biologists, one of them even an ornithologist, to point to ways in which New Zealand could become the mistress of her own destiny. Your Editor read this in draft form when it was offered to the Royal Society of New Zealand for sponsorship and had misgivings then about whether it could be treated as anything but a personal dissertation of sometimes questionable substance revealing an apparent shallowness of background information and abundant non-sequiturs. Nevertheless, the N.Z. Ecological Society, to which many members of the Ornithological Society of New Zealand belong, commissioned it and acknowledged the author's work by publishing and distributing it. One always wonders, in such cases, how much an elected Council, deputising for a Society's membership, can really demonstrate the collective opinion (if such a concept is really so) of the Society as a body.

This publication has already received a number of reviews, ranging in nature from a superficial, unappreciative of the belief that ecology begins at home, assessment by H. Daellenbach in the *New Zealand Monthly Review* of October 1974 to a devastatingly scholarly, in-depth probe by J. D. Stout taking up 8 pages of *New Zealand Soil News*, Vol. 22, No. 4 entitled "The Apocalypse of Thomas Robert Malthus." An abbreviated version of the original Supplement has been published in *New Zealand Engineering* 22 (10): 281-5, 15 October 1974, and one ought to watch for the next revealing issue of *New Zealand Soil News* in which Dr Stout's ability to select and quote may be questioned in its turn.

Although some might accuse me of picking up stray feathers, I do commend this allegedly "unscientific and unscholarly" publication with its "worthless" recommendations for critical examination by all members of the OSNZ, who, as intelligent, broad-minded naturalists, care for what the future holds for New Zealand, its natural habitats and man's place in them.

E. W. D.

Tahuna-Torea Nature Reserve. Glendowie Sandspit. An illustrated leaflet published jointly by the Auckland City Council and the Auckland Institute and Museum. Text by E. G. Turbott; text illustrations by Jeanne Goulding and J. E. Morton; photography by G. J. H. Moon [1974].

Not everybody knows the difference between a goose and a swan. In the Auckland Magistrate's Court recently a 62-year-old Post Office worker was convicted and fined \$75 and costs for mistaking a Black Oystercatcher for a Pukeko and shooting it dead on Great Barrier Island. His Honour succinctly observed that the onus was on the accused "to learn the difference between one species of fowl and another" and assured him that had he been right about the bird's identification he still would have been in trouble since it was the closed season for Pukeko. The moral of this little homily is that you don't always know what you're looking at unless you're told. And so it is with us. We cannot expect those who ask us what there is about a particular part of our environment, the local beach, estuary, swamp or forest tract perhaps, that merits protection from the hand of the developer and the blade of the bulldozer. Education in what we value in the local scene begins with us. We have an obligation to share our knowledge and what better way than to persuade local authorities and institutions in whom the control of the landscape is vested to make our information and enthusiasm public in palatable form. Some time ago we drew attention to the remarkable public relations work being done by the Hauraki Gulf Maritime Park Board with its variety of literature for public consumption. Now we must commend the leaflet "Tahuna-Torea: the Gathering-place of the Oystercatcher," published jointly by the Auckland City Council and the Auckland Institute and Museum to both of whom we offer our congratulations on their enterprise and imagination. In their leaflet we are given a guided tour, complete with bus route numbers, of the habitats and their denizens along the Glendowie Sandspit on the Tamaki River close by Auckland City. This Reserve is owned by the Crown but is administered as a public domain by the Auckland City Council. A Reserve Advisory Committee advises the Council on all aspects of management, and if this leaflet is indicative of their thinking they deserve our praise. Mr Turbott's informative and accurate text, coupled with some of Professor Morton's characteristic sketches, provides a fine example of what every local body ought to tell of the reserves and domains that it holds in trust for us. How clearly can we then tell the world why it is that we enthuse over a mudflat or a swamp !

E. W. D.

FROM THE EDITOR'S DESK

"21" is a number traditionally associated with "coming of age." *Notornis* came of age, in fact, when it fledged from *New Zealand Bird Notes* and donned its new plumage as Vol. 4, No. 1, in July 1950. Twenty-one volumes of ornithological annals is something of which the Society and its contributing members can be well proud. Some of the papers within these covers are epoch-making, some quietly memorable, some rather profound, some trivial, perhaps, and there may be some that should not have darkened the printer's page at all. But they are the stuff of which ornithology, as a science recording observations and interpreting them, is made. Let us rejoice, then, that we have come of age again with the completion of our 21st volume!

The final part of Vol. 4 of the Society's journal (June 1951) dealt largely with observations made on *Notornis* immediately following its rediscovery by Dr G. B. Orbell in 1948. Readers will recall that the four articles in this number were issued as a special publication of the Society under the title "The Takahe" for sale to the general public, and how this attractive booklet proved to be a great aid in drawing in new members. Since then a great deal of work has been carried out on the Takahe by the Wildlife Service of the Department of Internal Affairs. Regrettably, rather little of their success or progress has been published, newspaper accounts tending to point out the deaths in captivity or the more sensational aspects of an allegedly rapidly decreasing population so relevant in this day of doom-prophets.

We are privileged, therefore to be able to present a batch of papers from Brian Reid and his co-workers which tell something of what the Wildlife Service has been doing with *Notornis*. These are valuable documents, although, admittedly, they will not command every reader's interest, and it is particularly fitting that we should be able to publish them as a 21st birthday tribute for our own *Notornis*.



ANOTHER GOOD CHRISTMAS PRESENT!

Those of us who like to combine bird-watching with other outdoor activities, whether at the end of a fly-rod or not, will enjoy another book from the house of William Collins which comes in time for someone's Christmas stocking. The publishers say of *A Fisherman's Year* by John Parsons — "... a book for everyone who enjoys good writing of life outdoors. An Englishman who came to New Zealand over twenty years ago, John Parsons still remembers with nostalgia the many hours of pleasure he enjoyed in his homeland. But to him New Zealand was, and remains, a fisherman's paradise, with Taupo as its Mecca. This pleasure, excitement and sheer joy he communicates to the reader in a book that is not only for the angler, but to be read and enjoyed by the naturalist, the lover of wild life and the armchair adventurer." It should, therefore, be a welcome addition to the shelves of most members of the OSNZ!

ABOUT OUR AUTHORS

JIM COUNSILMAN writes of himself: I first became interested in birds through my father, a veterinarian and Pigeon-fancier. However, I studied history for three years as an undergraduate at Fresno State College in California before recognizing the opportunities for research and travel in ornithology as a profession. After completing a Bachelor of Arts in Biology I moved to New Zealand and entered the University of Auckland, where I received a Master of Arts (First Class Honours) in Zoology in 1971. My Master's thesis included research on display behaviour and communal sleeping activities of the Indian Myna as well as the work presented in this issue of *Notornis*. At present I am completing a Ph.D. at the University of Queensland under a Post-graduate Scholarship from the Commonwealth of Australia. My research is on the time-activity budget and feeding ecology of a communal-breeding bird, the Grey-crowned Babbler (*Pomatostomus temporalis*).

BRIAN REID was introduced to readers in the September 1972 issue of *Notornis*. On 10 July of this year he left for a temporary appointment at Mendi, Papua New Guinea, where he will advise on the management of cassowaries as a food source at the request of Foreign Aid Division of the New Zealand Government. Cassowary numbers have been declining rapidly within recent years because of overhunting and the inability of the local people to rear young birds in captivity. Brian Reid hopes to put some of his Mt Bruce experiences to good use during his six months away and will investigate the feasibility of setting up cassowary farms along the lines of the ostrich farms of Africa.

RICHARD D. CRAWFORD is an Instructor in the Fisheries and Wildlife Section, Iowa State University, Ames, Iowa, and hopes to complete his Ph.D. in wildlife biology in May 1975. Although he has taught general ornithology, vertebrate biology and wildlife ecology, his major interests are in seabird ecology and the biology of waterfowl. His doctoral research is based on the effects of age on reproduction in the American Coot. Previous research has dealt with Mourning Doves, Great Horned Owls, age-related studies of Red-winged and Yellow-headed Blackbirds, and on the polyandrous breeding of Short-billed Marsh Wrens. His work on Adelie Penguins is based on three months in Antarctica during the austral summer of 1972/73 while on a National Science Foundation Grant.

LES McPHERSON was born in Dunedin on a cold, snowy day, 1 June 1943. At the age of about 15 days he migrated south to Invercargill where he stayed for the next 17 years. For his first 12 years he lived in the city but later moved to a farm at Awarua Bay, about 8 miles south of Invercargill. He believes that this is where his interest in birds first began to show and he can well remember watching a Grey Warbler on the nest in the scrub on this property when he was about 14.

He relates — "I left home to strike out on my own at the age of 16½ after some differences of opinion with my stepfather and stayed for about three months in Dunedin. The first commercially published records of New Zealand bird song came on the market about this time, and I bought myself a set of these which started me off on a collection on an international scale. I reached Christchurch a week before my 17th birthday and I'm still here after 14 years. My interests are centred on collecting records of bird calls and making tape recordings on a commercial scale. For a living I pack feminine lingerie, a job much removed from my spare time interests, but, despite this, I'm still single!"

Another profile of Mr McPherson, reprinted from the Christchurch newspaper, *The Press*, appeared in *Notornis* 20 (2): 185-6, June 1973. Most of his commercial recordings of bird song have also been reviewed in *Notornis*.

A. T. EDGAR, author of the report of the Wildlife Service/OSNZ 1974 visit to Farewell Spit in the last issue of *Notornis*, and indefatigable compiler of the annual Classified Summarised Notes, is known to his friends as "SANDY." He has lived in New Zealand since 1959 and has played a prominent part in the Society's activities. Sandy Edgar was born in 1900 and was educated in Scotland. He lived in Malaya from 1919 to 1940, managing a rubber plantation in Perak. He is the author of *Manual of Rubber Planting* published in 1938, rewritten in considerably enlarged form and republished in 1960. His war service from 1940 to 1945 in the Malayan Local Forces, and later the Indian Army, included 3½ years as a prisoner of war in Singapore and on the notorious Siam Railway. Mr Edgar returned to Malaya in 1946 as Planting Adviser to a number of rubber companies and he came to New Zealand in 1959.

He says — "Watching birds has been my favourite spare-time occupation for sixty years, even as a P.O.W. in Siam where the birds were good but the Japanese took away our binoculars and some slight vitamin deficiency temporarily dulled one's eyesight."

Services to the Malayan Local Forces earned Mr Edgar the MBE in 1939, the ED in 1950 and the OBE in 1953, and for services to the Malayan rubber industry he was awarded the JMN in 1960, a Malayan decoration roughly equivalent to the CBE.

Sandy Edgar's ornithological work has included regular correspondence in pre-war years with F. N. Chasen, then Director of the Raffles Museum in Singapore and part author of *The Birds of the Malay Peninsula* (1929-1937, 4 vols). He collected eggs of some Malayan birds at the request of the British Museum (Natural History) and published a 41 page paper on the nidification of some Perak birds in the *Bulletin of the Raffles Museum* in 1933. Later he had regular correspondence with Dr C. A. Gibson-Hill during the preparation of his annotated checklist of the birds of Malaya published in the *Bulletin of the Raffles Museum* in 1949. Mr Edgar was joint founder and first Secretary of the Malayan Nature Society in 1940, President in 1952, and subsequently an Honorary Life Member.

Sandy Edgar joined the OSNZ in 1947 while on leave from Malaya. He was Regional Representative for the Far North/Northland from 1960 to 1973, Hon. Secretary of the OSNZ from 1962 to 1967, and has been Recorder and Compiler of the Classified Summarised Notes since 1963. His publications in *Notornis* include articles on the Mercury Islands, the Kermadecs Expedition, N.Z. Dotterel, Welcome Swallows, Nankeen Kestrels and reports on field study courses.

J. W. (JOE) ST. PAUL, co-author of "The Kokako . . . in the Hunua Ranges" in the last issue of *Notornis*, came to New Zealand in 1899 at the age of three years and, after several moves, his family settled on a farm in Moumoukai Valley in the area now known as the Hunua Ranges. On leaving school he did farm development and other work and bush-felling each winter until he went to World War I in 1917. Severely wounded, he returned in 1918 and soon took up a "soldier farm" on the edge of the main bush, marrying in 1926. Later, the farm was bought by the Auckland City Council for water catchment and he was appointed a ranger, doing surveying, tending rain gauges, controlling animal and vegetable pests and other work. In all of this time he observed the birds and the trees of the forest, gaining a wide knowledge of both of these. Of special interest to him was the Kokako and when he retired in 1963 he very frequently returned to the bush, often camping out and still enjoying his studies. His interest was shared by his wife and family. After joining OSNZ in 1941 he regularly contributed to the Classified Summarised Notes and also supplied some short articles. In recent efforts to save the declining Kokako he has played a major part. He still has hopes of finding and saving from pests another nest of this bird. The Editor apologises to him for removing the full stop from the prefix to his surname as it appears throughout his article.



JUST PUBLISHED !

A Kea on my Bed, by Molly Falla. 40 pp., illus. Auckland and London: Collins. 19 September 1974. \$3.50.

Another delightful book of watercolours and photographs by Lady Falla telling of the activities of a Kea chick brought into the Falla home at the age of 3 weeks and quickly becoming a dominant personality in the household. A charming text with some unusual illustrations of the growth and development of a bird known only to most of us as a raucous adult high amidst the South Island mountains and careering down the tin roof of an alpine hut. Lady Falla's book requires no further recommendation to her admirers, and appears just in time for a good Christmas present for young and old alike. Thank you author and publisher !

E. W. D.

SIR GILBERT ARCHEY, 1890-1974

It is with great regret that we note the death in Auckland on 20 October of Sir Gilbert Archey, Director Emeritus of the Auckland War Memorial Museum. Sir Gilbert was a scholar in the finest sense of the word and played a most significant role in the development of both the arts and the sciences in New Zealand. He was best known for his contributions to the study of Maori art forms and it is particularly pleasing to know that he had been able to complete his latest work, *Whaowhia Maori Art and its Artists*, shortly before his death. We will always be grateful for his *South Seas Folk*, a handbook of Maori and Oceanic ethnology published by the Auckland Institute & Museum in 1937 and now in its third edition (1967), and for another handbook *Sculpture and Design: an Outline of Maori Art* published in 1953 and now also in a new edition (1960) as well as for *The Art Forms of Polynesia*, Bulletin No. 4 of the Auckland Institute and Museum, published in 1965.

Sir Gilbert began his career as a zoologist under Professor Charles Chilton at what was then Canterbury University College, making pioneer studies of New Zealand centipedes which have not been surpassed today. He provided a link between the older generation of classical biologists and the modern computer-orientated worker. He was Assistant Curator of the Canterbury Museum from 1914 to 1923 but devoted the remainder of his life to serving the Auckland Institute and Museum, a task well rewarded by the knighthood bestowed on him in 1963. Sir Gilbert's post on the University Grants Committee and on the Senate of the University of New Zealand allowed him to make a continuing contribution to the development of university facilities in New Zealand for which we must be grateful. Latterly he served on the Maori Purposes Fund Board, the Waitangi National Trust Board, the Queen Elizabeth II Arts Council, and several other important bodies, to each of which he brought his wisdom and knowledge.

Sir Gilbert Archey paved the way for today's studies of the birds of the Chatham Islands with his paper of 1924 written with Charles Lindsay in the *Records of the Canterbury Museum* (2: 187-201), "Notes on the birds of the Chatham Islands." But he will always be remembered for his monumental treatise *The Moa. A Study of the Dinornithiforms* published by the Auckland Institute and Museum as Bulletin No. 1 in 1941. Sir Gilbert's own contribution to the discovery of moa remains with his cave-searching team, Sir Frank Mappin, Sir Carrick Robertson and Mr A. T. Pycroft, from 1930 to 1944 is related in his parts of the *Centennial History of the Auckland Institute and Museum 1867-1967* to which the reader should turn to learn of Sir Gilbert's achievements in making this noble institution what it has become since he was appointed its Director in 1924. Visitors (and research workers alike) to the Auckland Museum, set in its lofty splendour above the city and the incomparable harbour, have good cause to honour the name of Sir Gilbert Archey. As it was said of another great man — *Si monumentum requiris, circumspice*.

E. W. D.