

Why did bellbirds (*Anthornis m. melanura*) return to New Plymouth, and why have they gone again?

DAVID G. MEDWAY
25A Norman Street, New Plymouth, New Zealand

Abstract Between the 1850s and the early 1900s, most of the native forest of western Taranaki was systematically destroyed. This destruction likely accounted for the disappearance of bellbirds (*Anthornis m. melanura*), and other native birds, from most of that area. The return of bellbirds to New Plymouth in the 1920s may have been a direct result of increased food that had become available to them there. However, bellbirds have recently become rare visitors to New Plymouth. This may be the result of a possible reduction in the population of bellbirds in nearby Egmont National Park and/or increasing ambient temperatures in cooler months of the year.

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INTRODUCTION

At the time European settlement of New Plymouth began in the early 1840s, dense native forest extended from near the coast over the lowland plains of western Taranaki and up the slopes of Mt Egmont. Dieffenbach (1843) gave a detailed description of the nature and extent of the forest inland of New Plymouth that he travelled through during his ascent of Mt Egmont in 1839. He specifically mentions the presence of stitchbird (*Notiomystis cincta*), North Is robin (*Petroica australis longipes*), "very common" North Is saddleback (*Philesturnus rufusater*), "flights" of North Is kaka (*Nestor meridionalis septentrionalis*), and Cook's petrel (*Pterodroma cookii*).

In c.1850-60, bird-life was a prominent feature of the forests inland from New Plymouth, with whitehead (*Mohoua albicilla*) among the most common birds. Whiteheads in flocks of c.30-40 used to frequent patches of forest in the gullies about the town, and were invariably accompanied by a pair of saddlebacks (Smith 1911). In Jun 1841, Weekes (in Rutherford & Skinner 1969: 84) described the dawn chorus in the forest near New Plymouth as "an incomparable Dutch concert". There can be little doubt that the bellbird (*Anthornis m. melanura*)

was also present in the forests near and inland of New Plymouth at that time, but I have found only 3 specific references to their occurrence there in the 1800s. Hursthouse (1849: 23) said that, in the forest near New Plymouth in the 1840s, "One of the most delightful songsters is the Makomako It is heard about sunrise, near the edges of the forest, when several sing together, and the effect can only be compared to the soft tinkling of numerous little bells". W. W. Smith (1925) mentioned that early settlers on the Frankley Road, near New Plymouth, still spoke of the exquisite dawn-music produced by the bellbird choir. Skinner (quoted in Medway 2002) recorded that in Sep 1885, at a bush camp near Inglewood, inland of New Plymouth, his survey party was "awakened at daylight as usual by the outburst of melody from the *tui* and *makomako* ...".

Between the 1850s and the early 1900s, almost all the native forest of western Taranaki, with the notable exception of forest within Egmont National Park, was intentionally and systematically destroyed by felling and burning. By 1907, only north and east Taranaki and Mt Egmont were still forest-clad (Fulton 1908). Extensive pastureland replaced the native forest between New Plymouth and Egmont National Park. Only small scattered patches of native forest remained, with narrow ribbons of native vegetation along the courses of the rivers and streams that radiate from the national

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*Correspondence: dmedway@xtra.co.nz

park towards the coast. It was reported that native forest birds were decreasing in Taranaki at this time, and destruction of the forest was the reason most commonly given for that decrease (Drummond 1907). There is no need to speculate about the causes of the continuing loss of native forest birds from western Taranaki at the time Drummond wrote. The role of deforestation in the elimination of birds should not be overlooked (McGlone 1989). The almost complete destruction of forest over most of western Taranaki would have been a sufficient cause in itself.

RETURN OF BELLBIRDS TO NEW PLYMOUTH

W.W. Smith, a leading New Zealand ornithologist and naturalist of his time, recorded the return of the bellbird to the New Plymouth area in the early 1920s: "A most cheering fact for those who earnestly wish for the preservation of the different species of our native birds has been the re-appearance and steady increase in numbers of the bellbird during the past three or four years. For a long time it was so rarely heard or seen as to be practically unknown in Taranaki, except in the most remote and inaccessible parts of the province, but now it is quite commonly met with, not only in the bush reserves, but in many localities much nearer town". Smith went on to mention that the bellbird was well-known at Lepperton, visiting gardens for the honey-bearing trees and shrubs, while much nearer New Plymouth 1 had been reported up Smart Road, not more than 4 miles from the centre of New Plymouth, and in Waitara 1 visited a garden in the main street, right in the middle of that town (Smith 1925). Six years later, Smith was able to record that "These glorious songsters continue to increase annually and during the last seven years individuals have returned to their haunts in many districts" (Smith 1931).

Guthrie-Smith (1914: 148) thought that bellbirds would travel miles for suitable food when they had finished breeding. He hoped that "gardens even at considerable distances from any of our large forest reserves, would be thronged with these small songsters". He was convinced that the planting of suitable "alien" shrubs was one of the ways in which the number of bellbirds could be increased. W. W. Smith, who lived in New Plymouth, expressed the hope that "since this musician has come so near to us, cannot we induce him to come a little nearer by planting more acacias, kowhai, flax, eucalyptus and abutilons in our parks and gardens?" (Smith 1925).

Bellbirds feed on nectar from many native and introduced plants (Baker 1986, Castro & Robertson 1997, Medway 2006, *pers. obs.*). An increasing number and variety of plants, including many native and introduced flowering plants, were being grown in parks and gardens in and near New Plymouth from the early 1900s. Many of those plants provide

nectar used by bellbirds. W.W. Smith had no doubt about the importance and necessity of planting suitable food-bearing plants for native birds. In the South Is, he had observed how many of the honey-eating birds, in a time of stress, "visited the settlers' gardens and subsisted for weeks on the blossoms of the wattle-trees, blue gums, fuchsias, pentstemons, and many other plants growing in the flower-borders" (Smith 1893). In New Plymouth, he saw the value of winter and spring flowering wattles and gums to silvereyes (*Zosterops l. lateralis*), tui and bellbirds. Those birds frequented the Henui Valley during winter where they subsisted largely on the melliferous flowers of the Australian brush wattle (*Paraserianthes lophantha*) which was plentiful there. The kowhai (*Sophora* spp.) and gums (*Eucalyptus* spp.) continued the supply through Sep, but "as the snow melts from the forest zone (on Mt Egmont) the birds return to it from the lower valleys to nest" (Smith 1931). Graham & Veitch (2002) considered that a significant increase in the number of bellbirds on Tiritiri Matangi Is may have been a direct result of increased food as a consequence of the recent planting of a large number of native trees on the island. The return of bellbirds to New Plymouth in the 1920s may also have been a direct result of increased food that had become available to them there, particularly during the cooler months of the year when their energy needs are greatest.

Pukekura Park in central New Plymouth was reserved in 1876 as a botanic garden and public recreation grounds. At that time it was covered with "fern, furze and tutu" (Scanlan 1978). Re-vegetation of the park began then. In 1934, a privately-owned contiguous area known as Brooklands, which contained some remnant areas of semi-coastal native forest, was gifted to the (then) New Plymouth Borough Council. Since then, Pukekura and Brooklands Parks have been administered as a single unit known as Pukekura Park. The park comprises c.52 ha, and is surrounded by urban development. It is now well-vegetated with remnants of native forest and innumerable other planted native and exotic trees and shrubs, and a great variety of other plants.

W.W. Smith was curator of Pukekura Park from 1908-20. Smith and successive curators ensured that plantings in the park included species that would provide food sources for native birds. It is apparent from Smith's above-quoted comments that he did not see or hear bellbirds in Pukekura Park during his time as curator, but they must have appeared there within the next few years. A visitor mentioned hearing a bellbird calling in the park in Sep 1925, Stidolph found Pukekura Park to be the "haunt" of the bellbird in Jan 1928, and bellbirds were said to have "made their home" in the native bush at Brooklands by 1933 (*Taranaki Herald* 19 Sep 1925, 2

Sep 1933, Stidolph 1931). The souvenir programme for the official opening of Brooklands Park on 10 Mar 1934 stated that "One of the richest charms of "Brooklands" is its possessions in native bird-life, tuis, bellbirds and other native songsters having here found a sanctuary...One of the responsibilities that is appreciated by the Pukekura Park Board is the necessity for increasing the natural food supply of the native birds, and to this end the policy of planting honey- and berry-bearing trees is to be steadily continued" (Anon. 1934). It appears that, by 1936, the notes of the bellbird could be heard "all the year round" (*Taranaki Herald* 8 Aug 1936). In 1939, the Pukekura Park Board was able to report that "The extensive plantings of kowhai and other nectar and bird food trees, all making rapid growth, are quite definitely increasing the native bird life within the parks, and the charm of the notes of the mokomoko and tui will year by year become an increasing attraction" (Anon. 1939). In May 1944, "large numbers" of tui (*Prothemadera n. novaeseelandiae*) and bellbirds were attracted by the fruit of the Himalayan dogwood (*Cornus capitata*). Thomas Horton, curator of the park at the time, remarked that it was "a good thing for the park, which is planted mainly in native trees, that these fruit-bearing trees from abroad were also planted because they were a great draw for these beautiful song birds" (*Taranaki Herald* 10 May 1944). In Sep 1952, even small kowhai (*Sophora* spp.) in Pukekura Park were regularly visited by tui or bellbirds (*Taranaki Herald* 13 Sep 1952).

I considered bellbirds to be increasing in number in New Plymouth in the 1950s (Medway 1957). Jack Goodwin, curator of Pukekura Park at the time, indicated they were present in "fair numbers" in the park, where they might be "more frequently found on the lower growing shrubs, particularly fuchsias and grevilleas" (Goodwin 1956). Camellia (*Camellia* spp.) flowers in the park, especially the single pinks and reds, were "beloved" by tui and bellbirds (Goodwin 1961). In Jul and Aug 1966, "even" bellbirds were frequent visitors to those flowers, and to the flowers of Formosan cherry (*Prunus campanulata*). Kowhais flowering in New Plymouth in Sep 1968 were attracting the "odd" bellbird. In Jun 1970, camellias in Pukekura Park were one of the main sources of food for the "occasional" bellbird, numerous tui and silvereyes and, in Jul 1970, those birds could also be seen foraging for nectar in Formosan cherry. The native birds, including bellbirds, seemed to be plentiful in New Plymouth in 1972. May was considered to be an excellent time of the year to observe the habits of tui, pigeons (*Hemiphaga novaeseelandiae*), silvereyes and "occasionally the tuneful bellbird". A group of coast banksia (*Banksia integrifolia*) in Pukekura Park was a popular food source for tuis and bellbirds.

In Jun and Aug, camellias were providing an important source of winter food for nectar-eating birds "notably" tui and bellbirds. In Sep, kowhai flowers were attracting tui, pigeons, silvereyes and the "occasional" bellbird. In Jun 1974, the flowers of red hot poker (*Kniphofia praecox*) growing in the park provided an attraction for silvereyes and the occasional bellbird or tui, and those birds could often be seen and heard in the single-flowered camellias. It was common to see tui feeding at the flowers of coast banksia in Apr 1975 and, "when they are not about, waxeyes and bellbirds can be seen and sometimes heard". The kowhais began flowering in late Aug 1975 and courting and territorial displays of fantail (*Rhipidura fuliginosa placabilis*), tui and bellbirds could be seen and heard throughout the park - "a sure sign that spring has arrived" (Jellyman & McDowell 1966-75).

Bellbirds repeated their "resonant" call in Pukekura Park in Jul 1977, and visitors in Aug and Sep 1978 were likely to see and hear bellbirds which were attracted by flowering kowhai and *Rhododendron arboreum* hybrids (McDowell *Daily News* 21 Jul 1977, 10 Aug 1978; *Taranaki Herald* 6 Sep 1978). Marshall (1985) reported a bellbird feeding young in Pukekura Park on 16 Jan 1984. This is the only known bellbird breeding record from that locality. I noted that bellbirds were seldom seen in New Plymouth at this time (Medway 1985). In winter 1989, at least once each day, single camellias in Pukekura Park were visited "even" by bellbirds (McDowell *Daily News* 1 Jul 1989). It was reported in Aug 1995 that bellbirds did the rounds of trees and shrubs having honey-bearing blossoms (McDowell *Daily News* 12 Aug 1995).

RETREAT OF BELLBIRDS FROM NEW PLYMOUTH

Between 2001-2009, I have spent 100s of hours throughout each year observing birds in Pukekura Park. I recorded bellbirds there on only 6 occasions during that time. I saw 1 female on 8 May 2002, 1 (not sexed) on 25 Jun 2003 foraging for insects and feeding at flowers of the red rata vine (*Metrosideros fulgens*), 1 male on 15 and 19 Jul 2004, 1 male on 3 Sep 2005 foraging for insects, and 1 (not sexed) on 18 Aug 2009.

Since 1983 my wife and I have kept records of bellbirds we have seen or heard on our well-wooded property which is c.250m from Pukekura Park. We have lived there since 1969, and by 1983 had come to expect visits by bellbirds during the cooler months of the year. As anticipated, we saw or heard them on several occasions every year from 1983 to 1990. However, after 1990 the number of bellbirds we recorded on our property decreased noticeably. In 1998 and 2000 we did not see or hear any. The last was a single bird on 1 Apr 2002.

Almost all our records were of birds seen or heard between Mar and Sep. This is the same pattern of visitation that Hamel (1972) noted for Macandrew Bay in Dunedin in the 1960s when bellbirds were generally away from that locality during summer and arrived back in Mar.

POSSIBLE REASONS FOR THE RETREAT OF BELLBIRDS FROM NEW PLYMOUTH

Tui have been a common breeding resident in the New Plymouth area for many years. The number of tui there increases in about Apr with the onset of cooler weather, and they are especially common from then until about the end of Sep when kowhai finish flowering (*pers. obs.*). It is well known that tui of both sexes dominate bellbirds. However, although tui will exclude bellbirds from nectar sources favoured by tui, bellbirds usually find other nectar sources in the vicinity that are not used by tui, or are not preferred by tui, or from which tui are temporarily absent (*pers. obs.*). There are considerable ecological differences between tui and bellbirds, and these differences are sizeable enough to allow the co-existence of the 2 species (e.g. Angehr 1986). Bellbirds and tui co-exist in many localities throughout New Zealand (Robertson *et al.* 2007), and they co-existed in Pukekura Park for at least part of the year over many decades last century. Therefore, exclusion of bellbirds by tui is unlikely to be the reason why bellbirds have recently become rare visitors to New Plymouth. Two possible reasons seem worthy of consideration.

Possible reduction of bellbird population in Egmont National Park

As far as is known, the forests of Egmont National Park, and of the contiguous Pukeiti Rhododendron Trust (Medway 2006), have contained the only permanent population of bellbirds in western Taranaki since most of its lowland forest was destroyed. At its closest point, the national park is c.11 km in a direct line from central New Plymouth. Egmont National Park is likely to be the place of origin of at least most of the bellbirds that have visited the New Plymouth area since the 1920s.

I considered bellbirds to be common in Egmont National Park in the 1950s and in the 1970s (Medway 1957, 1980). Cotton and Molloy (1986), who, in 1983-84, carried out the only definitive survey of the birds of Egmont National Park, found that bellbirds were common at all of their forest survey sites below 800m. I have gained the impression from numerous visits to many parts of the national park at all seasons over the last 5 decades that bellbirds may not be as common there now as they used to be, but I have no hard data to support this.

Various introduced mammals known to be detrimental to forest bird life have been abundant

in Egmont National Park during the last century, and some still are. Little is known about the ongoing effects of predation by those mammals on bird species, such as the bellbird, that are still relatively common (Kelly *et al.* 2005). However, recent studies have shown that introduced predators are still having an impact on mainland forest bird populations, and that the process of decline is continuing for many of them (e.g. O'Donnell *et al.* 1996).

The brushtail possum (*Trichosurus vulpecula*) has been present in Egmont National Park since c.1896. During some periods since then it was in very high numbers. What effect the possum may have had, and may still be having, on any members of the forest bird fauna of the park, either by competition for food or predation, is not known. It is only in recent years that much attention has been given to predation by possums on the eggs, young and adults of forest birds (e.g. Brown *et al.* 1993). However, their predatory behaviour in this regard may have been quite widely known many years ago because W.W.Smith observed that "The black rat, opossum and stoat are the fell destroyers of native birds. The three are agile and swift tree climbers, and devour alike the eggs, young and adult birds wherever procurable" (Smith 1930).

Stoats (*Mustela erminea*) and rats, nearly if not all ship rats (*Rattus rattus*), have been present in Egmont National Park for many years and both, particularly rats, are still abundant there. Nothing is known about the effects that stoats and rats have had, and undoubtedly are still having, on the forest bird life and other elements of the biodiversity of the park. W.W. Smith observed that the nests of the honey-eaters, like those of other species that were gradually disappearing, suffered from the attacks of rats (Smith 1893), but there do not appear to be any published observations of direct predation by rats on bellbirds. However, bellbirds were among the species that were either eliminated, or very significantly reduced in number, soon after ship rats reached and became abundant on Solomon and Big South Cape Islands in the 1960s (Blackburn 1965, Bell 1978). Kelly *et al.* (2005) considered stoats to be key predators of bellbirds at Craigieburn Forest Park in Canterbury. Adult bellbirds on the nest may be predated by mustelids more often than is realised. Fulton (1908) recorded that "A weasel has been seen to attack a bellbird on its nest, and, the two falling to the ground together, the weasel was despatched by the observer; but the bird was fatally injured".

The lack of relevant data from within Egmont National Park itself means it is not possible to know if the bellbird population of the park has undergone a reduction in number over the last few decades. The best evidence in that regard may actually come

from outside the park. If bellbirds which visit New Plymouth originate mostly from Egmont National Park, then the recent reduction in that visitation may indicate there are now fewer bellbirds in the national park than there used to be.

The effect of increasing ambient temperatures

There has been a strong global warming trend since the mid-1970s. In New Zealand, warming has been more marked in winter than in summer, and at night rather than during the day, and there has been a pronounced decline in the diurnal temperature range. The trend toward rising temperatures has resulted in an increase in the frequency of very warm days and nights, and a decrease in the frequency of very cool days and nights (e.g. Daw & Salinger 2000).

Studies of a variety of small passerine birds (e.g. Chan *et al.* 1990, Chan 1994) show that ambient temperature influences their energy expenditure and, hence, their body mass. Overnight and diurnal energy expenditure and requirements to maintain body mass are less when ambient temperatures are higher. Observations of bellbirds during the late winter-early spring period suggest they may be significantly less reliant on floral nectar as a source of energy when average ambient temperatures are higher than they are when those temperatures are lower (*unpubl.data*).

Bellbirds, particularly females, are very insectivorous (Gravatt 1971, Angehr 1986). In South Westland forests, O'Donnell & Dilks (1994) found that invertebrates were considerably more important for bellbirds than for tui, and Spurr *et al.* (1992) observed that bellbirds, although feeding on nectar like the tui, did not have large seasonal fluctuations in abundance, probably because of their greater use of invertebrates as a food source. Ambient temperature is a dominant abiotic factor that can directly affect invertebrate abundance (e.g. Kwok & Corlett 2002). The general supply of invertebrates available to bellbirds is almost certainly greater in warmer weather.

Consequently, if ambient temperatures are increasing in cooler months of the year, particularly at night, many bellbirds may not need to travel long distances to find adequate food with which to sustain their overnight and diurnal energy demands, and to maintain their body mass. It may be more than just a coincidence that the recent decline in the number of bellbirds visiting New Plymouth has occurred at the same time as there has been a marked warming trend in New Zealand's climate.

CONCLUSIONS

The return of bellbirds to New Plymouth in the 1920s may have been a direct result of increased food that had become available to them there. A

possible reduction in the population of bellbirds in Egmont National Park and/or increasing ambient temperatures in cooler months of the year may be responsible for the recent decline in the number of bellbirds visiting New Plymouth. There could be wider ramifications if increasing ambient temperatures in cooler months of the year are a factor in this decline. Bellbirds are known to feed on the nectar of several native New Zealand plants that flower during that time of the year, and bellbirds may be effective pollinators of some of those flowers (Castro & Robertson 1997, Anderson 2003, Medway 2006, *pers. obs.*). If ambient temperatures during those months are increasing, then it is possible bellbirds are becoming increasingly less dependant on nectar as a result, with the consequence that the effectiveness of bellbirds as pollinators of some elements of the New Zealand native flora may be reduced.

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