

Results of the second kaka and bellbird survey across the Kiwi Coast



North Island kaka in flight. © Eugene Polkan.

Prepared for the Kiwi Coast by:

Wendy Ambury, Dayna Davies, Phoenix Gale, Evan Thom, and Dai Morgan
Applied and Environmental Sciences
NorthTec
Whangarei

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Abstract

To help quantify the success of mammalian predator management within projects linked to the Kiwi Coast, an 'Indicator Species Monitoring Program' has been established where several iconic Northland birds are repeatedly surveyed using different protocols and at different frequencies. Kaka and bellbird / korimako are two of the species in this monitoring program and both are relatively rare in Northland. Between January – February 2016, their presence or absence was recorded in 25 sites across the Kiwi Coast using a specifically developed survey protocol and future surveys were planned at 4-5 yearly intervals. Here we present the results of kaka and bellbird surveys that were conducted using the same protocol at 35 sites between January – April 2021 (23 of which were visited as part of the 2016 survey). In 2016, bellbirds were only detected in one site and while in this study they were again detected there, they were also observed at an additional five sites. Kaka were only detected in one site in the current survey but were present in three different sites in 2016. Despite the slight changes in the numbers of sites that detected or did not detect these species, the data suggest that the distribution of kaka and bellbird are still very restricted across the Kiwi Coast. If mammalian predation is limiting these species', it is hoped that with continued predator management the distribution of these species will be greater when the surveys are repeated in 2026.

Introduction

Since forming in 2013, the Kiwi Coast has been a collaborative initiative that currently links 159 largely community-led conservation groups and projects in the Northland region. These projects collectively manage over 198,000 ha of land for mammalian predator control and biodiversity recovery, extending from the Mangawhai Heads in the south to Aupouri in the north (Sullivan 2020).

The Kiwi Coast has a number of strategic goals that primarily revolve around building capacity within Northland's community-led projects to increase the size of the Northland brown kiwi (*Apteryx mantelli*; 'kiwi' hereafter) population by promoting a connected landscape-scale approach to conservation (Kiwi Coast Trust 2017).

To quantify the success of conservation efforts, the Kiwi Coast supports the annual regional kiwi call count surveys that are coordinated by the Department of Conservation (DOC); the results of which indicate that kiwi populations in Northland are generally doing better than populations in the rest of mainland New Zealand (Sullivan 2020). Furthermore, the Kiwi Coast also coordinates the 'Northland Kiwi Listening Blitz' whereas many Kiwi Coast projects are surveyed for the presence of kiwi using acoustic recorders to track changes in their distribution over time.

In addition to kiwi monitoring, the Kiwi Coast, in partnership with NorthTec and DOC, has also established an 'Indicator Species Monitoring Program' where the recovery of other iconic Northland species are monitored over time to quantify the success of conservation activities. The species included within this program are pateke / brown teal (*Anas chlorotis*), kaka (*Nestor meridionalis*), and bellbird / korimako (*Anthornis melanura*).

The rationale behind the Indicator Species Monitoring Program is that even though kiwi recovery is the Kiwi Coast's primary objective, a wide variety other species also benefit from pest control. The birds selected to be part of the monitoring program all have relatively different resource preferences

and behavioural patterns (Heather and Robertson 1996). Therefore, they could be viewed as representatives of different avian guilds and increases in these species would likely mean increases in birds with similar resource or behavioural overlap.

Kaka and bellbird are both very conspicuous species that have a limited distribution across Northland (Robertson *et al.* 2007). They are known to permanently reside on several offshore islands close to the east coast of Northland but there are relatively few areas on the mainland where resident populations occur (Robertson *et al.* 2007). The kaka and bellbird component of the Indicator Species Monitoring Program involves surveying as many forest remnants across the Kiwi Coast to record the presence or absence of these species to determine their distribution.

In 2016, 25 sites were surveyed for these species and of those, kaka were only detected at Bream Head Scenic Reserve, Taurikura Ridge, and Manaia Ridge Scenic Reserve, while bellbird were only detected at Bream Head (Sullivan *et al.* 2016). Accordingly, the aim of the current study was to conduct another kaka and bellbird survey across the Kiwi Coast to determine if the distribution of these species has increased, decreased, or remained static.

Methods

Sites were surveyed using the protocol developed by Sullivan *et al.* (2016). Briefly, bellbird and kaka presence or absence was recorded by at least two observers while they walked at a moderately-slow (c. 3-4km⁻¹) pace across predetermined routes within each site. In each site, searches for birds were predominantly done in areas of preferred kaka and bellbird habitat, such as broadleaf-podocarp forest, to increase the probability of detection. Surveys were only done during periods of relative fine and calm weather to increase the probability of detection (Ratkowsky and Ratkowsky 1979).

In addition, pre-recorded bellbird vocalisations were broadcast through either a FOXPRO® Firestorm Digital Game Caller or a UE Boom Bluetooth speaker every 10-15 min for durations of 45-60 s to increase the chance of detecting this species (see Sullivan *et al.* 2016 for details on the source populations of the bellbird vocalisations used). Bellbird vocalization files are available on request from the Kiwi Coast coordinator.

The survey was concluded at a site if both species were detected, or a sufficient amount of time had been spent looking for the birds (see below).

The amount of time observers spent searching for kaka and bellbird at each site was based on search effort calculations reported in Sullivan *et al.* (2016). In that study it was conservatively estimated that 2x 45-60 min searches would be needed to have a high probability of detecting kaka and bellbird in a 540-ha forest fragment known to contain each species. Accordingly, the amount of time we spent searching sites in the current study was adjusted according to whether they were larger or smaller than 540 ha.

Surveys were conducted between 7 January to 7 March 2020; although one site (Mt Aubrey) was surveyed on 1 April 2021. In addition, we tried to do surveys between the hours of 0700 – 1100 to avoid the warmest part of the day; however, this was not always possible and approximately 30% of sites were surveyed between 1100-1700.

We attempted to resurvey all sites that were visited in 2016 and we also tried to follow the same route that was originally taken. When the 2016 survey notes were not complete or the route taken in that survey could not be determined, we generally followed established walking tracks, trap lines, or ridges that covered a representative proportion of the site. Comprehensive field notes were compiled for all sites so that routes can be easily resurveyed in the future and are available from the Kiwi Coast coordinator.

During the current study we also surveyed several sites that were not visited in 2016. These sites were selected based on whether suitable habitat existed in them, their proximity to areas known to have resident populations of kaka or bellbird (e.g., coastal sites close to offshore islands), or whether reputable anecdotal reports of these species existed (e.g., from eBird reports). When a site was identified, survey routes were planned as described above.

Finally, three additional sites within urban Whangarei were also surveyed over January 2021 (Mt Parihaka Scenic Reserve, Mackesy Bush, and Coronation Reserve). These sites were surveyed as part of another project by members of Birds New Zealand using the five-minute bird count method (Dawson and Bull 1975) instead of the protocol described above. Briefly, count stations were established at least 200m apart along walking tracks and all birds detected were identified and counted over a five-minute period taking care not to double count any individual. Observers also noted the presence of kaka or bellbird while moving between count stations (Dai Morgan, NorthTec, *unpublished data*).

Results

In total, 35 sites were surveyed for kaka and bellbird (Figure 1; Table 1). Of the original 25 sites surveyed in 2016, 23 were revisited. The two sites that were not resurveyed in 2021 were Taurikura Ridge and Pukenui Forest.

Of the 35 sites surveyed, bellbirds were detected at six locations: Bream Head Scenic Reserve, Mt Aubrey, Manaia Ridge Scenic Reserve, Mangawhai Cliffs, Kauri Mountain, and Otamure Bay (Whananaki North) (Table 1). Kaka were only detected at Bream Head Scenic Reserve (Table 1).

Discussion

Changes in kaka and bellbird distribution since the 2016 survey

Our data suggest that the distribution of resident kaka and bellbird populations are still very restricted on the Kiwi Coast. During the 2016 surveys, bellbirds were only detected at Bream Head so while it was encouraging that in this study they were again observed at this site and an additional five locations, three of these locations were new to the 2021 survey (Table 1). Accordingly, it is possible that bellbirds may have been present at Mangawhai Cliffs, Kauri Mountain, and Otamure Bay if surveys were done there in 2016. However, it is likely that the birds in these newly visited locations were residents because surveys were conducted close to the end of this species' breeding season (Heather and Robertson 1996).

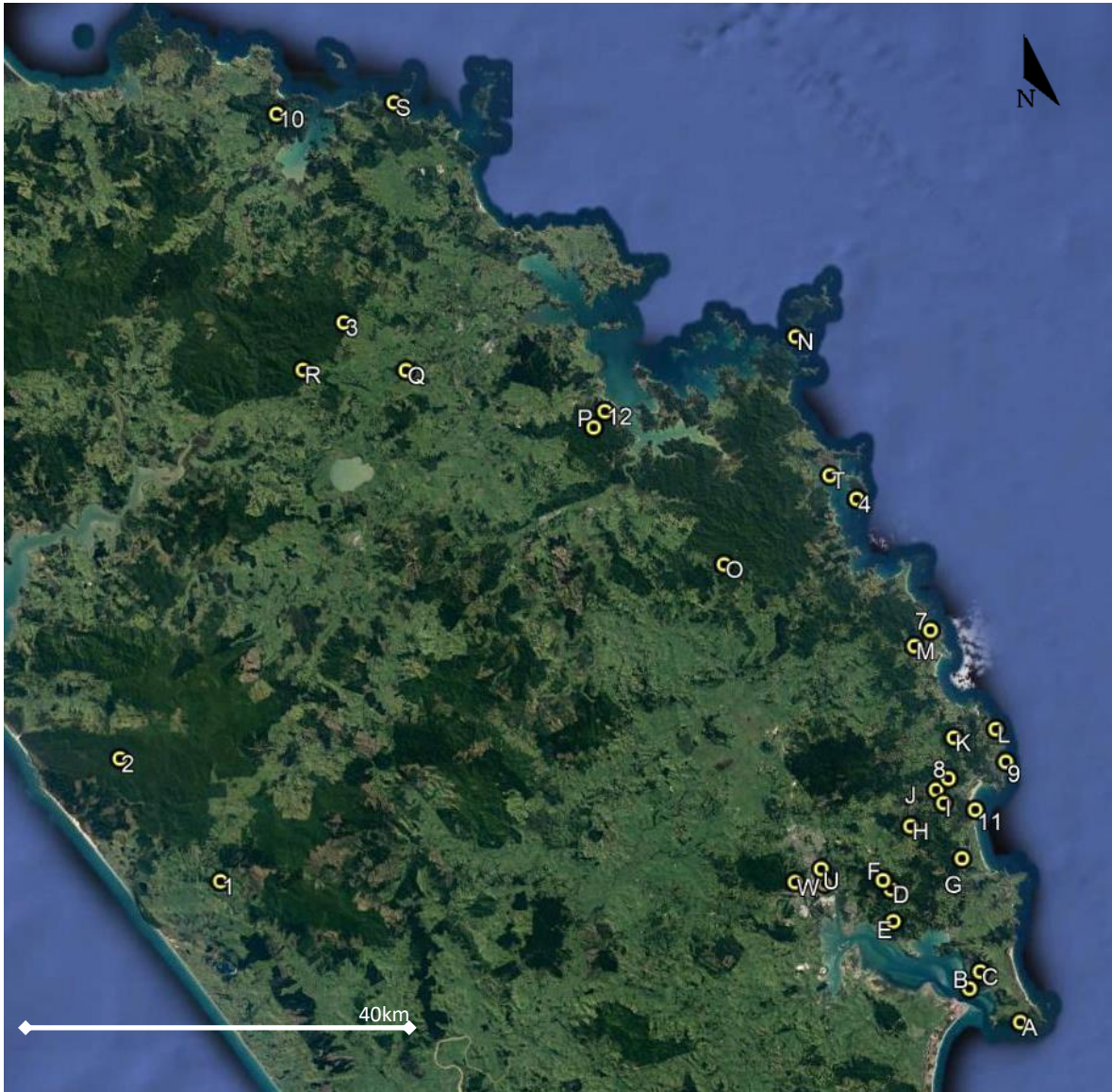


Figure 1. Sites surveyed for bellbird and kaka. Letters or numbers refer to each site (see Table 1 for site names). Image adapted from Google Earth.

In addition, bellbirds were also observed at Mt Aubrey and Manaia Scenic Reserve after not being detected there in 2016. Due to the close (c. 3-4km) proximity to Bream Head Scenic Reserve, where there is a resident population of bellbirds, it is possible that a colonisation event may have occurred. However, bellbirds can easily disperse over such short distances (Brunton *et al.* 2008) and it is also possible that the birds detected at Aubrey and Manaia were simply visitors. Additional research, such as confirming that breeding is occurring in these sites, is needed to determine if Aubrey and Manaia do indeed have resident populations of bellbird.

It was disappointing that kaka were only detected at Bream Head Scenic Reserve in the current study after also being detected at Manaia and Taurikura in 2016; although, Taurikura Ridge was not surveyed in this survey. Kaka are strong fliers capable of flying great distances (Heather and Robertson 1996), so it is entirely possible that they could have expanded their range since the 2016

surveys. It is also possible that these species were simply visiting Manaia and Taurikura from Bream Head when observed in 2016.

Table 1. Sites surveyed to determine presence/absence of bellbird and kaka. Sites with alphabetical map references were also surveyed during the 2016 survey (Sullivan *et al.* 2016); sites with numeric map references were new to the 2021 survey.

Site	Bellbird detected	Kaka detected	Map reference [^]
Bream Head Scenic Reserve	Yes	Yes	A
Mt Aubury	Yes	No	B
Manaia Ridge Scenic Reserve	Yes	No	C
Owhiwa	No	No	D
Waikaraka	No	No	E
Whareora	No	No	F
Pataua North	No	No	G
Taheke	No	No	H
Ngunguru Ford Rd	No	No	I
Ngunguru River	No	No	J
Tutukaka	No	No	K
Tawapou	No	No	L
Whananaki North	No	No	M
Cape Brett	No	No	N
Tapuhi	No	No	O
Paihia	No	No	P
Puketotara River Catchment	No	No	Q
Puketi Forest	No	No	R
Mahinepua–Radar Hills	No	No	S
Whangaruru Peninsula	No	No	T
Parihaka*	No	No	U
Mackesy Bush*	No	No	V
Coronation Park*	No	No	W
Trounson Kauri Park	No	No	1
Four Sisters (Waipoua Forest)	No	No	2
Upper Waipapa/Puketi Nature Trail	No	No	3
Whangaruru North (North Head Track)	No	No	4
Mangawhai Cliffs	Yes	No	5
Kauri Mountain	Yes	No	6
Otamure Bay (Whananaki North)	Yes	No	7
Hugh Crawford Reserve (Ngunguru)	No	No	8
Tutukaka Lighthouse Walk	No	No	9
Wairakau Stream Track (Totara North)	No	No	10
Whakareora to Horahora	No	No	11
Paihia School Track	No	No	12

* Sites surveyed using a different protocol (five-minute bird counts [Dawson and Bull 1975]; see text)

[^] Refer to Figure 1 for site locations; each site has a GPS route (contact the Kiwi Coast Co-ordinator for more information on these routes)

There are many possible abiotic and biotic explanations for why kaka may not have dispersed across more of the Kiwi Coast since the last survey in 2016 (e.g. Mott 2010) but it was not within the scope of this study to investigate these. One likely reason, however, may be that the population is not at

carrying capacity within the only known mainland Northland site (Bream Head) (Adam Willetts, Bream Head Conservation Trust ranger, *pers. comm.*). Accordingly, it would be unlikely that kaka would colonize alternative sites outside Bream Head until they were at a density where intraspecific competition started to be a limiting factor (Newton 1998). If this does occur in the future, it would be likely that sites closest to the established population would be the first areas to be colonized, as observed in Wellington where kaka are more likely to be observed in areas close to Zealandia where a founding population was established (McArthur *et al.* 2015). It is hoped that the survey will be conducted again in 2026 to determine if this is the case

Limitations of the survey protocol

The use of presence/absence surveys is often criticised because they are not able to determine the abundance of a population (e.g. Joseph *et al.* 2006). However, we adopted this type of monitoring protocol because kaka and bellbirds are known to be relatively rare across Northland (Robertson *et al.* 2007) while the potential amount of suitable habitat available to them is large. Our survey method allowed us to visit many sites as we were only concerned with whether a species was present or not (and not their relative abundance, which would have meant that we would have needed to be in each site considerably longer) (Jones 2011).

Furthermore, challenges exist with presence/absence protocols because determining the amount of search effort required to be sure that there is a high chance of detection can be difficult (Joseph *et al.* 2006). Few animals are so conspicuous that they are always detected if present at a site, and it is often recommended that multiple visits are required to estimate detection rates when using presence/absence protocols (e.g. Crossland *et al.* 2005). For logistical reasons, we were not able to make multiple visits to the same. In addition, it was not our intention to survey all available habitat within a site as the resources required to do this would have reduced the total number of sites able to be visited. Instead, we aimed to survey a representative amount of suitable habitat within each site to allow for the greatest probability of detecting kaka or bellbird in a single survey. Accordingly, if bellbird or kaka populations were in low numbers within an area, it is possible that we may not have detected them using our protocol. It is hoped that if we did miss resident populations in areas where they were relatively rare, the size of the populations will hopefully increase if predator control is maintained, and they will be detected when the surveys are repeated in 2026.

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