

# Matuku Hūrepo (Australasian Bittern) 2023 Northland Survey



June 2024

*Cover photo: Cryptic matuku in Ruakaka wetland, 2023. Photo: Kieran Pullman, QEII National Trust.*

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## Introduction

The Australasian bittern (*Botaurus poiciloptilus*), also known as matuku hūrepo, is a large wetland bird belonging to the Heron group. A secretive bird with a distinctive booming call, it is more often heard than seen.

Australasian bittern are found in New Zealand, Southern Australia and New Caledonia. In New Zealand, bittern have a threatened status of 'Nationally Critical' – it is thought that there are less than 900 birds left. In Australia they number less than 1000 and New Caledonia less than 50 (Williams, 2013).

The bittern or matuku is a cryptic species, rarely seen and rarely heard. They live in shallow, densely vegetated wetlands and have been seen at wetland edges, in drains, flooded paddocks and on roadsides. Their habitat is generally inaccessible and this, together with their secretive behaviour and well camouflaged plumage, means few are usually spotted. When startled, they freeze with their bill pointing to the sky which makes them very difficult to distinguish from the surrounding vegetation (Whiteside, 1989).

Matuku feed on fish (including eels), small birds, mice, frogs, lizards, koura, molluscs and insects. They are large stocky birds (up to 74cm tall), with males larger (1400 grams) than females (900 grams). They have a thick neck, heavy yellow bill, short yellow legs and beige-brown plumage (Williams, 2013).

Breeding occurs from June to February which is when the males can be heard 'booming' in the early morning, evenings or on dull days. Female bittern do not boom, making them more difficult to detect. The female makes a platform nest out of reeds 20-30 cm above the waterline. Three to five eggs are laid from August to December and these are incubated for around 25 days. Nestlings are found September to February and are in the nest for 7 weeks. Fledging occurs from November to May, with only the female rearing the young (O'Donnell, 2011).

Bittern numbers are low and decreasing which is mostly due to loss of habitat. Up to 90% of wetland habitat has been lost across New Zealand, through drainage for other land use such as agriculture. In addition, predation by mustelids, cats and dogs and poor water quality has resulted in food scarcity. Nest disturbance by humans and road and power line kills have also contributed to the decline of the bittern population (Williams, 2013).

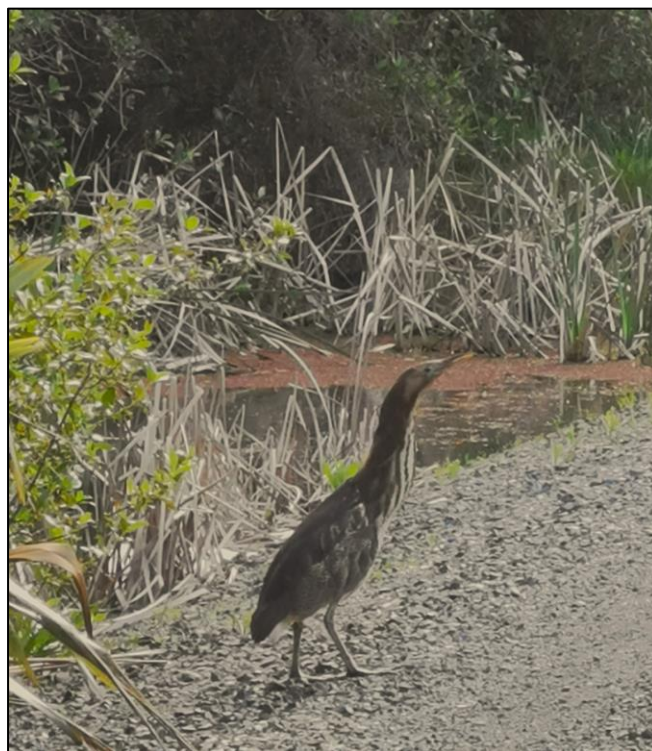


**Bittern on the Purerua – Mataroa Peninsula. Photo: Mike Cadogan**

## Northland “Matuku Mahi”

Currently, there is only a limited understanding of Northland’s matuku hūrepo distribution and no regional population trends have been established to identify if the region’s bittern population is declining, stable or increasing. Research work across Northland up until 2022 has included:

- DOC Kauri Coast – now at Year 3 of monitoring sites on Northland’s west coast, including the Pouto Dune Lakes and Pamu Omamari as part of the wind farm development. Two matuku-hūrepo struck by cars have been rehabilitated and released, and are currently being followed remotely via telemetry
- NRC – mapping of anecdotal reports and observational data for the past two years
- Tutukaka HVA – a number of sites monitored in 2022, including several QEII covenanted wetlands
- Love Bittern Trust – monitored sites in Ngunguru in 2022
- Shorebird Trust – monitored sites from Marsden Point to Mangawhai in 2022



**Matuku encountered at the Harambee Rd wetland during 2023 Kiwi Coast survey.**

At some sites where monitoring has established bittern presence on the Kauri Coast, the focus has now shifted to recording the peak male booming activity on an annual basis as a way of beginning to establish a population trend at key sites. This is being carried out either with human listeners (active listening) or acoustic recording devices (passive listening) by the Department of Conservation.

In 2023, the first stage of a collaborative “Matuku Mahi” or Australasian bittern monitoring project was carried out across Northland. The monitoring project brought together hapū, community-led conservation projects, interested landowners, farmers, covenantors and bittern enthusiasts with a shared goal of better understanding the distribution of matuku hūrepo and their status in Northland as a nationally critical threatened species.

Kiwi Coast worked together with the QEII National Trust (QEII), Northland Fish & Game, Northland Regional Council (NRC), the Department of Conservation (DOC), Royal Forest & Bird Society, Love Bittern and the Shorebird Trust. The collaborative aim was to investigate bittern distribution (presence) as a first step towards better understanding how well bittern may, or may not, be faring in the region. This work aligns with national bittern monitoring programs including DOC ‘Species on the Brink’ project and the goals of the Love Bittern Trust. A series of planning meetings were held between July and August 2023 to plan coordinated fieldwork across the region. For efficiency and to cover as many sites as possible, each organisation focused their survey fieldwork on a different area in Northland.

This report presents the findings of the Kiwi Coast, Northland Fish & Game and QEII National Trust 2023 field survey. It is anticipated that in time, these data will be combined with those collected by the other organisations involved in the Northland Matuku Mahi project to gain a fuller understanding of Northland bittern and help to reverse their decline.

## 2023 Survey

Kiwi Coast, QEII regional reps, Fish & Game staff and community-led groups carried out fieldwork from September through to November in 2023, deploying acoustic recording devices in response to landowner invitations and reported sightings, particularly in the eastern Whangarei area.

This fieldwork was undertaken simultaneously as DOC, NRC, Love Bittern and the Shorebird Trust investigated other sites across the region, for the 'Matuku Mahi Project'. Technical advice was provided by DOC bittern specialists as part of the National "Species on the Brink" initiative.

### METHOD

#### Site selection

Wetlands, saltmarsh areas and estuarine fringes were selected for monitoring sites. Areas where bittern had recently been seen, heard or recorded were given priority. These reports were usually made by landowners within the Kiwi Coast area or to QEII, Kiwi Coast and Department of Conservation staff. Further wetland sites were selected that had been identified as being of significant size and ecological diversity by Wildland Consultants (2011).

#### Fieldwork protocols

Acoustic recording devices (ARDs) were used to determine the presence/absence of booming male bittern at each site using protocols set out by O'Donnell and Williams (2015).

ARDs were deployed during the peak bittern booming period of September and November (O'Donnell and Williams, 2015) for approximately two weeks at each site. Where possible, a fine weather window of at least five nights was selected for each deployment. If more than one device was deployed at each site, these were stationed at least 500m apart. ARDs were set 1.5m above the ground and secured to trees or posts. Sites were selected for minimum noise interference such as from vehicles, the ocean and rustling foliage. ARDs were deployed in geographic blocks to reduce the possibility of detecting the same bittern moving between sites.

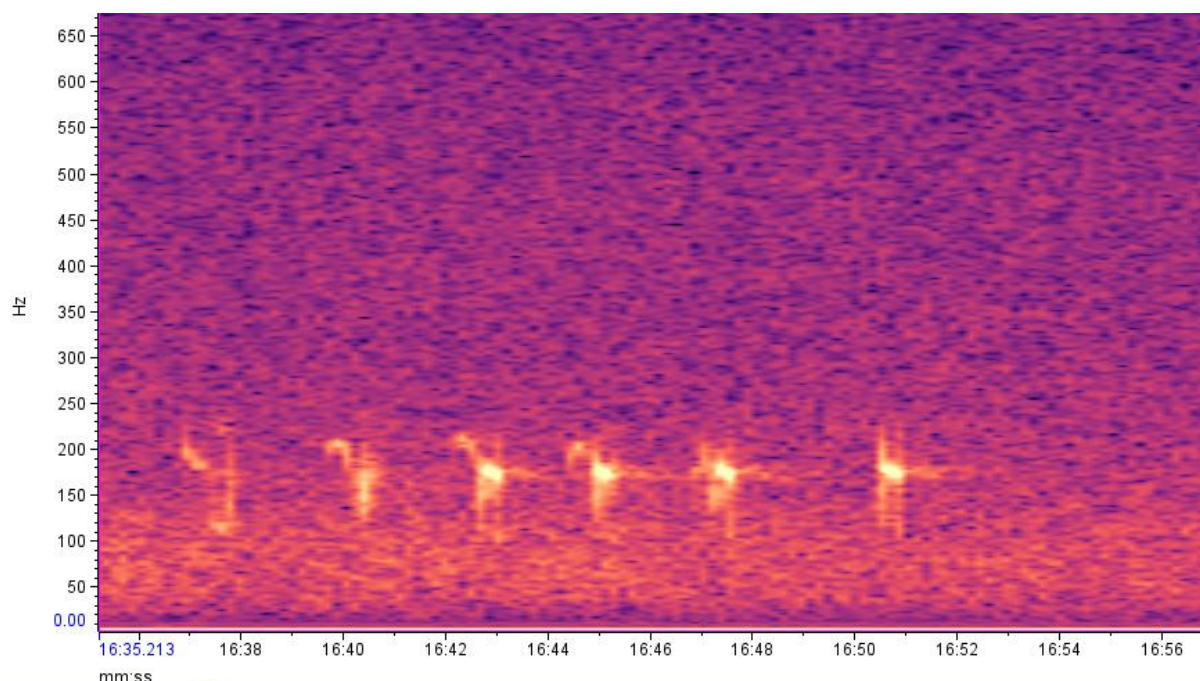
O'Donnell and Williams (2015) suggested recording 90 minutes before sunrise and 30 minutes after sunrise, and 30 minutes before sunset and 90 minutes after sunset to capture peak bittern booming (four hours per day). For this survey we chose to record two hours either side of sunrise and sunset (eight hours per day). We did this to maximise the likelihood of detecting bittern as booming also occurs outside of the times suggested in the protocols (O'Donnell and Williams, 2015).



**Tiff Browne deploys an ARD at the Awa Way wetland**

## Data Analysis

The software program Raven was used to analyse acoustic recordings and determine bittern presence. Recordings were viewed as spectrograms (soundwave pictures). As male bittern booms have identifiable soundwave pictures (Figure 1), they were able to be distinguished from other sounds and bird calls.



**Figure 1: Spectrogram of a Male Bittern Boom Sequence (Source: Kiwi Coast).**

Data analysis identified bittern “presence” or “non-detection” at each site. Bittern were regarded as “not-detected” at sites, rather than as being “absent” to allow for the possibility that bittern may still have been present, despite no booms being identified. This could have occurred if a female bittern was present as they do not boom. In addition, bittern booms may have not been detected due to distance, background noise, interference, the analyser failing to detect the booms or a fault with the ARD.

All acoustic recordings were analysed to investigate presence during both sunrise and sunset times. The protocols established by O’Donnell and Williams (2015) were followed for analysing times; for sunrise, 1.5h before sunrise until 0.5h after sunrise and for sunset, 0.5h before sunset until 1.5h after sunset. Additional data collected outside these timeframes was stored for future use, but not included in the analysis.

At the sites where bittern were “present”, analysis stopped after five sunrises and five sunsets. At the sites where bittern were “not-detected”, seven sunrises and seven sunsets were analysed. The additional two days were analysed in case a bittern boom could be detected within the wider time frame.

Where bittern were found to be “present”, a Bittern Boom Log Table was made for each site, showing dates and times for each bittern boom sequence, along with the number of booms per sequence. Notes were made regarding the clarity of the recorded boom sequences and were classified as clear or vague.

## Survey Results

The 2023 Bittern Survey included 78 sites. Appendix 1 lists the sites surveyed and the results found.

The ARDs recorded sufficient data to generate a confident analysis at 64 sites. Bittern were detected at 69% (n= 44) of these sites.

Of the 44 sites where bittern were detected, 12 sites only detected bittern at sunrise. No sites only detected bittern at sunset.

At five of the sites, bittern booms were only detected on either day 6 or day 7 of the analysis. As this is over 10% of the sites with detection it suggests the extra two days of analysis were worthwhile.

However, at 14 sites analysis was inconclusive. This was due to either insufficient clear data being recorded (n=4) or failure of the acoustic recording device (n=10). Insufficient clear data often related to too much background noise, strong winds or competing activities. For example, a number of sites investigated for bittern presence in early November also recorded fireworks. As well as causing difficulties for analysis, the effect of fireworks on bittern booming is unknown.

Map 1 shows the location of sites surveyed by Kiwi Coast, QEII Trust and Northland Fish and Game, and where bittern were detected. As the monitoring was part of a collaborative regional survey, large parts of Northland were surveyed by other organisations and agencies and those data are not presented here.

Interestingly, five sites recorded over 1,000 bittern booms during the fortnight the ARDs were deployed. These sites were:

<b>Rank</b>	<b>Site</b>	<b>Total no. of bittern booms</b>	<b>Monitoring date</b>
1	Fish and Game: Greenheart Wetland, Poroti	1,689	18 - 25 Oct
2	Awa Way, Taraunui	1,376	3 - 14 Oct
3	Te Kowhai Point Road, Bay of Islands	1,172	21 Nov - 15 Dec
4	Campbell Rd 2, Parua Bay	1,037	3 - 14 Oct
5	Tahi Saltmarsh, Pataua North	1,004	3 - 16 Oct

Map 1: 2023 Bittern Survey Results





## Discussion

The first year of bittern survey has been a success, with a good number of sites surveyed detecting bittern at key locations of interest in the agreed focus area for Kiwi Coast, QEII and Fish and Game. The enthusiasm encountered for bittern during the survey by landowners, farmers and covenantors shows there is a high level of interest and regard for these birds.

Despite being a 'Nationally Critical' species with a nationwide population estimate of 900 (Williams, 2013), male bittern calls were detected at 42 sites from our part of the regional survey alone. As it is not possible to distinguish individuals by their booming, it is not known if sites that detected bittern contained single or multiple birds. While bittern booming activity is a courtship behaviour (Williams, 2013) as females do not boom it is unknown if females were also present at sites. However, the detection of bittern at 42 sites in year one of the two-year survey is a pleasing result and it will be interesting to compile these results with those of the other organisations involved to get a more comprehensive understanding of Northland bittern distribution.

Given that matuku are large birds, capable of flying large distances in a short time (Williams, 2022), it is possible that the same bittern were detected at more than one site. However, the results are still valid for informing bittern management practices. Due to the small, fragmented and degraded nature of many of Northland's wetlands (Wildlands, 2011) it is likely that bittern need to utilize a number of wetlands in an area to gain sufficient resources. In order to help Northland matuku, all the wetlands being used, whether by the same bittern or not, would still benefit from animal and plant pest control, fencing from stock and water quality protection.

## Recommendations

The next step is to compile these data (where landowners are willing for their data to be shared) with that collected by DOC, NRC, Love Bittern and The Shorebird Trust in 2023 to generate a deeper understanding of Northland matuku hūrepo presence across the region.

Kiwi Coast has committed to a two-year matuku distribution survey, to be carried out from September – November in 2023 and 2024. When pooled with additional data gathered by other organisations as part of the Matuku Mahi project, it will contribute to a greater understanding of bittern distribution in Northland. This may lead to the establishment of further long-term key Northland matuku monitoring sites to help measure population trends on an ongoing annual basis, such as the sites established on the Kauri Coast by the Department of Conservation (DOC).

This research may not only improve knowledge about Northland bittern, but also assist with focussing management to help bring matuku hūrepo back from the brink of extinction and enable them to thrive once more.

## Acknowledgements

Many thanks to all the private landowners, farmers, covenantors, bittern enthusiasts and wetland lovers who invited us on to their properties to investigate or confirm bittern presence.

Thanks to the tireless Kiwi Coast fieldwork crew Tiff, Mae, Lesley, Andy, Stephen; Nan, Malcolm and Kieran from the QEII National Trust; Graham from Fish & Game; Nik from Russell Landcare Trust; and James, Jess and Martin from Whangarei Heads Landcare Forum; who all helped to deploy acoustic recorders, traipsing around muddy wetlands, ponds and paddocks.

Thanks to Henry/Harry Caley, from the Department of Conservation for providing technical advice, and to Northland Department of Conservation staff for providing information regarding potential monitoring sites.

Thanks also to Forest and Bird Whangarei for providing additional acoustic recorders.

Finally, thanks to Foundation North and Northland Regional Council for funding the survey.

## Appendix 1: Matuku-hūrepo/Bittern 2023 Survey Results

Site No.	Location	Site Name	Present Not Detected
1	Campbell Rd	CampbellRd1	Present
2	Campbell Rd	CampbellRd3	Present
3	CampbellRd	CambellRd2	Present
4	Taiharuru	Olsen	Present
5	Haruru Falls Track	BOI#3	Faulty recording
6	Hoanga	Underwood Wetland	Present
7	Horeke	Okaka B	Present
8	Horeke	Okaka Wetland Site 1	Insufficient clear data
9	Kaikohe	Mataraua Lake	Insufficient clear data
10	Kaikohe	Mataraua Wetland	Insufficient clear data
11	Kawakawa	Kawakawa Wetland	Not Detected
12	Kerikeri	BOI#1	Present
13	Kerikeri	BOI#2	Faulty recording
14	Kohinui	Grandma Kahikatea	Faulty recording
15	Kohinui	Skullers Wetland	Not Detected
16	Mamaranui	Flaxmill Wetland	Present
17	Matapouri	Clements Road Bridge	Not Detected
18	Matapouri	Matapouri Horse Paddock	Faulty
19	Matapouri	Ritchie	Present
20	Matapouri	Mackie Edge	Present
21	Matapouri	Pullman Lane	Not Detected
22	Matapouri	Tawapou Raupo	Present
23	Mimiwhangata	Kaituna Wetland	Not Detected
24	Mimiwhangata	Cattleyard Wetland	Not Detected
25	Mimiwhangata	Upper Kaituna Dam	Present
26	Mimiwhangata	Lake Surprise	Present
27	Opara Peninsula	Opara C	Present
28	Opara Peninsula	Opara Peninsula salt marsh site A	Not detected
29	Opuā	Opuā Cycleway 1	Not detected
30	Opuā	Opuā Cycleway 2	Not detected
31	Owhiwa	Martins Wetland	Not Detected
32	Panguru	Guest Farm Motukauri - wetland	Insufficient clear data
33	Panguru	Guest Farm Motukauri - harbour	Present
34	Parua Bay	LambRd1	Faulty recording
35	Parua Bay	LambRd2	Present
36	Parua Bay	Parua Bay 1	Present
37	Parua Bay	Parua Bay 2	Present
38	Pataua North	Tahi Salt Marsh	Present

39	Pataua North	Tahi Main Pond	Present
40	Pataua North	Johns Pond	Not Detected
41	Pataua North	Telfer Farm Wetland	Present
42	Pataua North	Telfer Road Wetland	Present
43	Pataua North	Mase3	Faulty recording
44	Pawarenga	Julia's Farm in mangroves. Site1	Present
45	Pawarenga	Julia Site2	Present
46	Poroti	Greenheart Wetland	Present
47	Poroti	Bisset Wetland	Present
48	Pukenui, Far Nth	Arethusa Site 1	Not detected
49	Pukenui, Far Nth	Arethusa Site 2	present
50	Purerua	Landing1	Faulty recording
51	Purerua	Landing2	Present
52	Purerua	MatakaBP	Not Detected
53	Purerua	Wairoa Swamp	Faulty recording
54	Purerua	MatakaRS	Not Detected
55	Russell	Pipiroa	Present
56	Russell	Manowar	Present
57	Russell	Omata	Present
58	Russell	Ureti	Present
59	Russell	Paroa Bay	Present
60	Russell	OrongoBay Walkway	Present
61	Sandy Bay	Dreamstay Sandy Bay	Not Detected
62	Tahere	Tahere1	Present
63	Tahere	Tahere2	Not detected
64	Taiharuru	Tidesong	Present
65	Takahiwai	Takahiwai	Present
66	Taraunui	Bittern Awa Way	Present
67	Taurikura	Taurikura1	Present
68	Taurikura	Taurikura2	Present
69	Taurikura	Martins Pond	Not Detected
70	Teal Bay	Teal Bay Estuary	Not Detected
71	Tutukaka	Camm Raupo	Not Detected
72	Waikare Inlet	BOI#4	Present
73	Waimamaku	Te Marae Farms	Not detected
74	Whananaki	Hailes Rd Runoff Bridge	Present
75	Whananaki	Hailes Rd Runoff East KC3	Faulty
76	Whananaki	Hailes Rd Runoff Headland	Present
77	Whananaki	McKenzie Pollock Grazed Saltmarsh	Faulty recording
78	Whananaki	McKenzie Pollock Grazed Saltmarsh Seaward end	Present

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