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Matuku Bittern Conservation Workshop & Field Visit Hauraki-Coromandel Region

Thursday 8th February 2024 | The Dunes, Matarangi

Background

Bittern (matuku-hūrepo) have long been a species of concern and have recently garnered attention in Hauraki-Coromandel. In October, PFHCCT organised a Region-wide Matuku (Bittern) Survey, which found matuku presence widespread across the region. While matuku are rare, the survey results suggested that Coromandel is an important region and, perhaps, somewhere to focus recovery measures.

Stimulated by the survey and the enthusiasm for matuku conservation, PFHCCT will host a matuku conservation workshop | field visit on the Coromandel. This event will draw together conservationists, researchers, and concerned individuals alike. The purpose of this gathering is straightforward: to discuss and chart the path forward for bittern conservation in Hauraki-Coromandel.

Purpose

To provide an opportunity for those with interest and knowledge in matuku conservation to discuss strategies and possible actions on the Coromandel Peninsula.

Goal

To strengthen collaborative efforts in the recovery and sustainable management of the matuku population in Hauraki-Coromandel.



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Insights and Observations from Keynote Speakers

Karl McCarthy | Biodiversity Ranger DOC Tauranga

Bittern Ecology, Habitat & the DOC Recovery Plan

Karl is a passionate conservationist who shared his field observations from 8+ years working to protect bittern in the Tauranga region. Bittern sits at the highest threat level in New Zealand, one step away from extinction. Matuku are critically endangered but haven't garnered much national attention. They are secretive, inconspicuous, crepuscular (most active at dawn and dusk) and live in inaccessible habitats. These are some of the challenges to protecting them.

Threats to Matuku include:

- Predators (mammalian pests, hawks)
- Loss of wetland habitat
- Catastrophic events (floods, fires)
- Habitat degradation | sedimentation
- Lack of quality food sources causing chick starvation
- Pest fish
- Road-kill by cars & trains. Bittern are large, heavy birds with a big wingspan, making them vulnerable to road strike.

DOC Tauranga often receive juvenile bittern from members of the public who find them in their urban backyards, usually delirious and starved, weighing 400-500g. Karl estimates these chicks may be 1-2 months old, as they are not able to fly yet. Sadly, nearly half of these birds require euthanasia or do not survive. Local volunteers help to rehabilitate chicks, and once birds gain weight (at about 1kg) they are fitted with transmitters before being released into an estuary near Pukehina. Karl noted there is currently no special facility dedicated to rehabilitating matuku.

Q. Do we know what age and weight chicks leave the nest?

It is difficult to get this information without hands-on monitoring. Chicks stay on the nest for approx. 7 weeks before beginning to explore.

Karl presented maps of where male transmitted bittern have been tracked. Birds are highly mobile and range over wide distances, some moving to a new location every 2 days, perhaps looking unsuccessfully for a female mate. Karl showed an image of a bird that travelled 330 km in Canterbury and another travelled a long distance in the Waikato, prompting questions about their movements off the Coromandel.

Q. Does this also apply to female movements?

Karl isn't aware of any research tracking female matuku. Because they are territorial, male bittern can be caught in cage traps with a mirror and audio lure of another booming male. There is a female matuku live-capture trap under development. A limitation with current technology is that transmitters only last 2 years. They use weak-links so the transmitters can be shed if the bird becomes obstructed.

At night the transmitted male bittern returned to approximately the same place. When foraging, they often prospect farm drains. Drains should be viewed and managed as bittern habitat. Farmers Karl has approached have varied reactions. Many are excited by the news they have bittern on their property, others have never heard of these birds. Monitoring has been an incredible advocacy tool for the DOC Tauranga team. It has provided them with a wealth of information to initiate dialogue with stakeholders and prioritise sites for management.



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Q. Your transmitter monitoring data shows them foraging at midday. Is this accurate?

The data these transmitters collected was collated into two data points (12am and 12pm) to preserve battery life. We do not know if those birds are actively foraging during the day.

All the nests our team have monitored have been predated by Harrier hawks. Chicks very vulnerable to harriers. We found one female spending 5 hours off the nest at a time foraging.

Q. Are you seeing the local bittern population increase?

Our booming surveys indicate not much change. Because the birds are so mobile, it is important to do the survey on the same day to avoid double-counting individuals. Females are critical, and their presence affects the number of males in an area.

Q. How long do they live for?

We are not certain, but the Australian literature suggests around 11 years. Karl has evidence of a female living to 6 years before it was discovered dead with a broken leg.

The more we look into our population in New Zealand, the more cause we find for concern. Population estimates have been revised from 1500 to 1000 and now reduced to 800. Australia estimates they have around 1000 Bittern.

Q. For something so close to extinction what's going on at a national level? Is there a Matuku Working Recovery Group or national oversight?

Currently there is no formal recovery group within DOC. The Bittern Conservation Trust has recently been established in part to address this issue.

Hamish Kendal | Natural Solutions

Thermal drone research findings in wetlands across the upper North Island with DOC

Hamish is conducting research for DOC undertaking drone surveys using a thermal camera and zoom camera to locate matuku nests. This monitoring work began with a trial in 2021, and the programme (now in its third year) has been expanded to three regions (Northland, Waikato and the Bay of Plenty) covering 27 wetlands. Hamish has grid-searched over 1300ha of habitat looking for nests. From the drone he has detected approx 50 bittern this year. In the Coromandel, Hamish has surveyed 12 sites, conducting 74 drone flights, and searched 315ha. He found 15 bittern during these flights across 7 sites.

To date only three nests have been located; two at Little Waihi, Maketu; the other in Whangapoua, Coromandel. All three nests have been in estuarine salt marsh rush-lands.

Q. Can this method of aerial grid-searching easily miss nests?

Hamish is confident that the method works well in open vegetation. He is very concerned that the number of nests found is so low and suspects the female population may have crashed. The data depicts that bittern are in a critical situation, nearing extinction.

He presented fascinating aerial footage of matuku in their natural habitat. They don't appear to be disturbed by the drone, but Hamish keeps well back, setting the search height to 60m.



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Predation by Harrier hawks is a key threat. We need to think carefully how this can be managed. Chicks are vulnerable when their mother needs to leave the nest to search for food, sometimes for several hours. The drone surveys have provided insight into the behaviour of this secretive species. Hamish has observed a female matuku teaching her chicks how to consume whole food (rather than a regurgitated meal) at 3 or 4 weeks old.

Knowledge gap: We do not know what happens after these chicks fledge. We need to focus on learning more about females and chicks. Hamish believes the key question should be how can we turn chicks into adults? He agrees there is a risk we are overestimating the health of the population by only surveying males. Bittern may be on the brink of survival.

Q. Have you seen any evidence of female predation?

Not by drone.

Q. Are we looking in the right areas for nests? Should we be widening the search to include salt marsh wetlands?

The drone surveys have looked in a variety of habitats, and all the nests have been found to date in estuarine rushlands.

Q. Is it necessary to have your 102 Drone Pilot Certification for this kind of survey?

102 certification allows a pilot to fly outside normal drone pilot restrictions. This is invaluable when working in large wetlands, as you need to fly further than line of sight. Applications with Civil Aviation currently take a year to be processed.

Jude Hooson | CEO Predator Free Hauraki Coromandel Community Trust

Presenting the findings from the inaugural Regionwide Bittern Survey

Jude presented the results from the inaugural Coromandel Regionwide Matuku Survey. (See Appendix for the Full Report). This report is also available from www.pfhc.nz/blog/matuku-survey. She acknowledged Renee Denby, who coordinated the 2023 Survey and report.

The objectives of this survey were to:

- Conduct simultaneous surveys across various sites on the peninsula to determine whether there are multiple birds on the peninsula or if it is a few birds frequenting many wetlands.
- Make hypotheses about where there may be breeding pairs.
- Provide data to external sources that can use this to search for nest sites.
- Establish a baseline survey that can be repeated annually to track population distribution.
- Raise awareness about matuku.

The 2023 survey was completed over three days in October and included 24 sites crewed by volunteers and 5 acoustic recorder sites. The standard DOC protocol for Australian Bittern surveys was used. There has also been ongoing bittern monitoring by several local community conservation groups on the Coromandel.

This regionwide survey detected matuku at 16 crewed sites and 3 recorder sites. There were several instances where bittern were heard at multiple sites in the same listening period. For example, on the 14th of October they were heard at 4 sites simultaneously. This indicates there are at least several male birds present on the Coromandel. Anecdotal observations by listeners indicated the possible presence of females at several sites.



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Panel Discussion

Discussion and Q&A with Karl McCarthy, Hamish Kendal & Hans Rook facilitated by Alan Saunders.

Panelist Question One: What are the important threats or vulnerabilities that we need to manage?

Hans: The Hawkes Bay Recovery Plan for Bittern identifies 7 major threats. A key factor is wetlands that are no longer connected to the sea, which impedes fish access and movement. Bittern are wading birds so require water levels under 1m in wetlands. Wetlands may need fish passes for bittern food sources (like eels) to be adequate. Addressing this issue in the Hawkes Bay has meant we now have one of the few increasing populations of matuku. Look at wetlands in your area and identify if there are food sources and quality foraging habitat.

Karl: Locating booming males is a starting point. But we need to focus on finding females and nests because this is the current knowledge gap. Human disturbance in wetlands is a big threat. We observed that transmittered birds did not visit urban wetlands with high visitation numbers or board walks. Flooding is also a big threat. We have found a nest 200mm above water level. We are now looking at how to manage water structures in wetlands to divert or restrict flood waters.

Q. In regards to predator control, should we access the interior of the wetland, or simply focus efforts on the perimeter?

Karl: Our project focuses on mustelid and cat control, placing traps on existing tracks around the wetland perimeter. We feel rats are too difficult to control in this environment.

Hans: I am an advocate for keeping the public out of wetlands. Bittern won't tolerate disturbance and paths/boardwalks are detrimental. Place your traplines well back from the edge of the water. Best to target predators before they enter the wetland. There is a risk of leading predators into wetlands since they follow tracks. Target feral cats using Timms or Steve Allan traps. Feral cats have large territories.

Hamish: In agreement with the others. Predators will follow tracks. Best to keep out of wetlands as they are a very sensitive environment. We currently don't know whether rats are a threat to bittern.

Q. Does the TCDC Biodiversity team play a role in Matuku protection?

Not currently, but there has been a recent willingness from this agency to engage.

Q. Are we interested in restoring bittern habitat?

What is an ideal bittern habitat? Hans has outlined this in the Matuku Recovery Plan for the Hawkes Bay. It is essential to ensure they have enough habitat to live in.

Q. What is critical for the success of protecting Bittern?

Get to know your local farmers. Once farmers get onboard, you gain momentum. Hans shared the example of one farmer restoring a wetland by simply swapping over a flap gate.

We need to focus our effort on where the bittern are. It's not just about wetland management, as the catchment land-use affects down-stream water-quality.

Hamish: Reflect on which threats are most relevant to your area. It would be useful to make a prompt list of threats to reference.



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The importance of institutional support was acknowledged. The responsibility for matuku protection cannot sit just with the community. At Hot Water Beach, landowners are digging out drains in wetland areas 3-4 times/year with support from Regional Council. Habitat loss has occurred on a huge scale, with only one significant wetland remaining in the Haruaki Plains. For bittern to thrive, the National Wetland standards need to be enforced. It is critical for DOC, WRC, District Council and others to be advocates.

Ben Gordon (DOC Whitianga) is keen to support public efforts to protect bittern. A comment was made from Trudy Lane | Tiaki Repo ki Pūkorokoro about the slow, convoluted process their project has had working with diverse stakeholders to restore a wetland.

Panelist Question Two: What more do we need to know? How do we gain this knowledge?

- Is the risk of transmitters justifiable? Karl thinks perhaps they know enough about male behaviour but that there is still benefit in tracking females.
- Bittern may be on the brink. What are the acute threats for chicks becoming adults?
- What do they need to get food to their chicks?
- Have we looked into existing literature both here and abroad? A lot of research exists for the European Bittern which could be applicable.
- What are the key indicators that determine habitat and food sources? Should community conservation groups monitor a set of indicators eg. Water quality, food availability, water flow etc.
- How can we reduce the impact of harrier hawks on matuku? This was acknowledged as controversial. One idea was using wire to restrict predation from above. There is a risk that any interference with nests could cause female matuku to abandon. Harriers also are held in high regard from a Te Ao Māori perspective.

Moehau Environment Group have undertaken a few years of surveys with acoustic recorders to explore where nesting sites may be. Paul Johnson made the comment that birds are frequenting very small wetlands. Hans said to focus your efforts on the larger wetlands where the bulk of your males congregate, as this will likely be where your females are.

Q. Do we know what age a female starts to breed?

Karl suspected a chick they released nested at 2 years old. This is consistent with the literature.

We should take an adaptive management approach. Otherwise we risk "Science to extinction".

Q. With the nest cameras, have you lost eggs/chicks due to human interference?

Karl: No, all our nests were lost to Harrier predation. However, this could be a biased result, as these were nests able to be visually located from a drone. There was a comment made that birds have been observed escorting harriers out of a wetland. There is existing legislation around Harrier control. The literature also shows that they quickly recolonise areas where they are removed.

Q. Should we be doing Operation Nest Egg with nests we locate? Can Bittern raise eggs and chicks in captivity?

Alan: This is always a high-risk and expensive approach. Really a last resort option.

Karl has asked about this pathway within DOC. DOC want to focus on habitat restoration and have no appetite for initiating a captive breeding programme.



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Panelist Question Three: What recovery actions should be prioritised? On the peninsula & elsewhere?

Alan Saunders suggested that a Coromandel Matuku Recovery Plan be initiated for a coordinated approach. Ben Gordon (DOC Whitianga) and the Bittern Recovery Trust were both keen to support this initiative.

Hans made the comment that planting salt-marsh ribbonwood has proven successful in preventing road-kill along causeways in the Hawkes Bay.

Actions Identified:

- Circulate the Plan Hans Rook drafted for Recovery of Bittern in the Hawkes Bay.
- Establish a Working group to draft a Regional Matuku Recovery Plan in next 6 months
- Identify key indicators for success
- Make a prompt list of threats for Community Groups to reference
- Conduct a knowledge sweep of existing literature
- Conduct another Regionwide Survey in October, possible incorporating more sites
- Circulate the details of the upcoming TVNZ Programme featuring Matuku

Further Information Links

- Love Bittern! www.lovebittern.com
- Emma Williams | DOC present at the 2023 Australasian Bittern Conservation Summit <https://www.youtube.com/watch?v=eRBcSwt0Hfg>



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Appendix 1: Regionwide Matuku Survey 2023 Report

Appendix 2: Hans Rook's reference material



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Regionwide Matuku-hūrepo (Bittern) Survey 2023

Survey Date:
13 October – 15 October 2023

Report Prepared by Renee Denby
Published January 2024



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Acknowledgements

Thank you to all the volunteers who participated in our inaugural Matuku Survey. We are truly appreciative of the time and effort taken to go out on those early mornings and evenings to listen and look for matuku. Your commitment to protecting these endangered birds is invaluable.

To the team at Natural Solutions, Hamish Kendal and Meg Graeme, we cannot thank you enough for the immeasurable support and guidance you have provided that enabled us to get this survey up and running. To Department of Conservation Science Advisor, Harry Caley, we are exceptionally grateful for your expert knowledge and advice on how best to monitor these birds.

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1. Introduction

1.1 The Field Support Team

Predator Free Hauraki Coromandel Community Trust (PFHCCT) was established in 2017 to support community conservation groups on the Coromandel Peninsula. The project covers the 286,000 ha from Moehau to Te Aroha Maunga and encompasses over 60 conservation groups. Our goal is to see the Hauraki Coromandel region become predator free and we aim to do this by helping community conservation groups in their predator control and biodiversity enhancement endeavours. One such tool that has been implemented by PFHCCT is the formation of the Field Support Team who assists conservation groups with on-the-ground support including establishing new trap lines, communicating with local and regional governing bodies, and biodiversity monitoring. A key goal of PFHCCT, through the Field Support Team, is to implement regionwide biodiversity monitoring of selected significant species. Through the work that the Field Support Team has undertaken over the past year, they noticed a real enthusiasm from volunteers for the protection of the matuku-hūrepo (*Botaurus poiciloptilus*) and thus, that nationally critical species was selected for this survey.

1.2 Matuku-hūrepo

The matuku-hūrepo, also known as the Australasian bittern, is a wetland bird native to Aotearoa, Australia, and New Caledonia (Heather & Robertson 2015). There are fewer than 1000 birds believed to remain in New Zealand subsequently assigning them with the conservation status of nationally critical (Heather & Robertson, 2015; Robertson, et al., 2021). They live in the raupo and reeds of primarily freshwater wetlands but can also be found in other wet areas such as damp pasture (Heather & Robertson, 2015). Matuku-hūrepo, hereafter referred to as matuku, are very cryptic birds in both their behaviour and appearance. Their brown, mottled plumage allows them to effortlessly blend into their surroundings as they move through their habitat stealthily, often freezing when disturbed with their necks stretched up tall and their bill pointed to the sky (Figure 1) or conversely, they may drop down into the reeds to disappear (Heather & Robertson, 2015). Their secretive behaviour coupled with the fact that they live in areas that can be difficult to survey means that they are a challenging species to study (O'Donnell & Robertson, 2016).



Figure 1. Matuku-hūrepo in a freeze pose (Whitehead, 2022).

1.3 Threats to Matuku

There are many threats to matuku that contribute to their worryingly low population numbers but likely the most significant threat is habitat loss. Approximately 90% of the wetlands in New Zealand have been destroyed since human settlement to make way for farmland and townships; displacing the wetland species that live there (Figure 2) (Ausseil, et al., 2008; O'Donnell & Robertson, 2016; Heather & Robertson, 2015). The quality of the remaining wetlands is also a cause for concern. Changes in land use in the catchments surrounding wetlands regularly results in runoff that has detrimental effects for the vegetation and animals that live in wetlands (O'Donnell & Robertson, 2016). Matuku have a varied diet, feeding primarily on fish but also eels, freshwater crayfish, frogs, insects, lizards, molluscs, spiders, and worms (Williams, 2013; Heather & Robertson, 2015). The presence and abundance of these food sources in wetlands where matuku feed is dependent on the quality of the wetland itself. Therefore, if the water and surrounding vegetation in the wetland is of poor quality, there will be little for the matuku to eat. Additionally, matuku must also compete with rats for the food that is available. One consequence of food scarcity and habitat degradation is that matuku have been observed eating plague skinks (*Lampropholis delicata*) that sun themselves on roads as well as foraging in roadside drains. Unfortunately, a number of matuku have been hit by vehicles when foraging on roadsides, resulting in injury or death (RNZ, 2023; O'Donnell & Robertson, 2016). Ultimately, matuku have very few places to live and of those remaining wetlands, even fewer are suitable habitat for feeding and breeding.

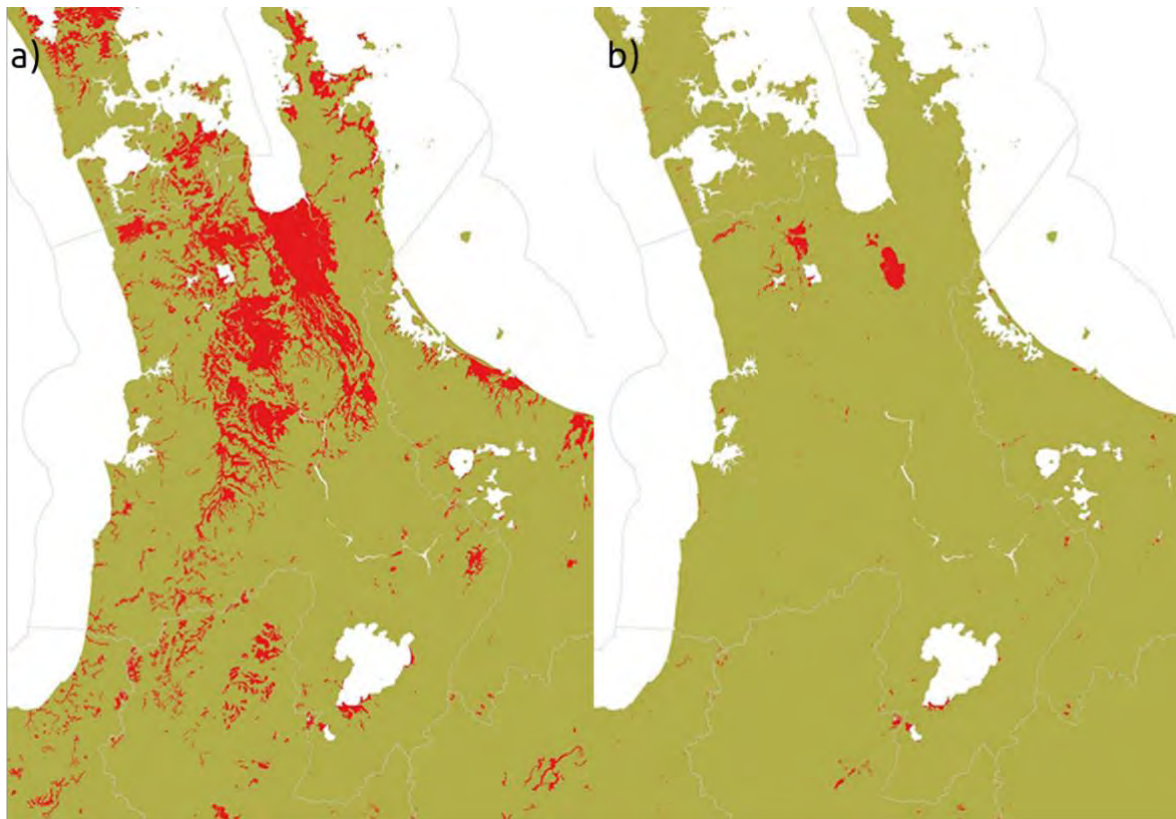


Figure 2. Wetlands in the central North Island, New Zealand (a) before human settlement and (b) present day (Sharpe, 2018).

Like most of the native manu in Aotearoa, matuku are vulnerable to introduced mammalian predators such as stoats, cats, and rats (O'Donnell, 2011; Williams, 2013). Native predators such as the kāhu (harrier hawk, *Circus approximans*) also prey on matuku eggs and nestlings (Heather & Robertson, 2015). Female matuku and their young are particularly susceptible to predation when they are on the nest (O'Donnell & Robertson, 2016). Females alone incubate the eggs for around 25 days and once hatched, the nestlings remain in the nest with the mother for approximately seven weeks (O'Donnell, 2011; Williams, 2013). For all this time, they are relatively defenceless. In a healthy, thriving wetland, a mother matuku should only need to be off the nest for a few minutes at a time to collect enough food for herself and her young. However, they have been observed off the nest for more than an hour which leaves ample time for the eggs or chicks to be located by predators (Kendal, 2023). Very few matuku nests have been found or studied which means that little is known about this time in their development. However, the lack of recruitment back into the population strongly suggests that they are struggling to raise their young to adulthood (O'Donnell, 2011; Williams, 2013).

1.4 Wetland Conservation in the Hauraki-Coromandel Region

Conservation work, primarily led by volunteers in community conservation groups, is widespread in the Hauraki Coromandel. There are extensive areas under protection, with a focus on predator control in forested areas that have North Island brown kiwi (*Apteryx mantelli*) (PFHCCT, 2023). In general, on the peninsula, wetlands are not as heavily protected as forests as far less is known about these habitats and they are not as well popularised with communities. Despite wetland protection not being the principal target of many groups, the majority of these groups have trap lines surrounding their local wetlands to protect the plethora of endangered animals and native plants that live there which may include matuku. The removal of invasive plant species and planting of native vegetation is also commonplace among many conservation groups (Wadey-

Barron, 2022). The efforts of these groups to protect the biodiversity in forests in the Hauraki Coromandel has been successful (PFHCCT, 2023).

1.5 Regionwide Matuku Survey

Anecdotally, matuku have been consistently observed on the Hauraki Coromandel Peninsula for many years but the number of individuals currently on the peninsula is unknown. In 2017, it was estimated that there were approximately two dozen males in the region (Stewart, 2017). As female matuku do not boom, they are considerably more difficult to observe and count, thus, most studies focus on the presence of male birds out of necessity (O'Donnell, 2011). The 2023 PFHCCT Regionwide Matuku Survey was realised through local volunteers' enthusiasm for learning more about this cryptic bird and how to better protect them. Although it is not conceivable to execute a census of the matuku population on the peninsula due to both resource availability and the birds' cryptic behaviour, a survey to discover where they may be breeding was conceptualised.

1.6 Objectives

The objectives of this survey were to:

- Conduct simultaneous surveys across various sites on the peninsula to determine whether there are multiple birds on the peninsula or if it is a few birds frequenting many wetlands.
- Make hypotheses about where there may be breeding pairs.
- Provide data to external sources that can use this to search for nest sites.
- Establish a baseline survey that can be repeated annually to track population distribution.
- Raise awareness about matuku.

2. Methods

The Department of Conservation (DOC) protocols for monitoring Australasian bittern were used as a guide to create methods for this survey (O'Donnell & Williams, 2015). DOC team members were consulted on how best to adapt these for our purposes.

2.1 Site Selection

We reached out to a small number of community conservation groups that had previously expressed an interest in matuku monitoring to ask if any volunteers would be interested in surveying a wetland in their area. As matuku are present in such low numbers, any wetland that could potentially be a breeding or feeding area for a bird was considered for a site. For this first year of the survey, the number of sites was initially expected to be a maximum of approximately 15. However, there was such great interest from volunteers that we were able to include 24 crewed sites and five automated acoustic recorder (AAR) sites (Figure 3).

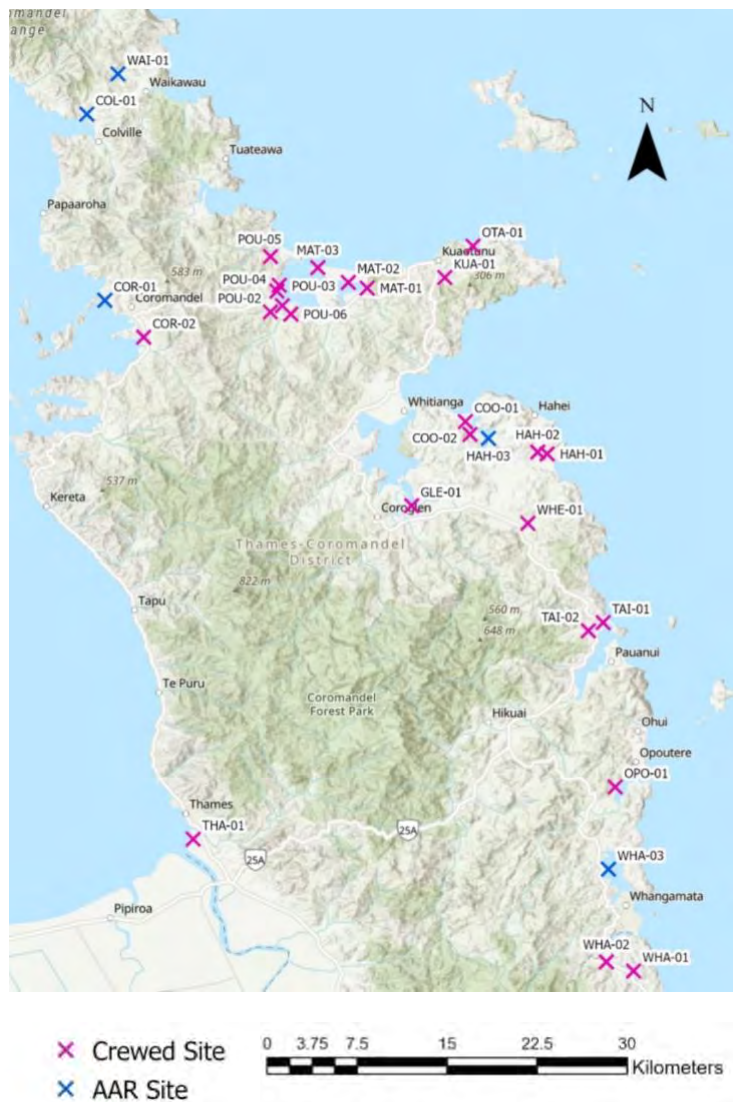


Figure 3. Crewed and automated acoustic recorder (AAR) survey sites across the Coromandel Peninsula.

2.2 Volunteer Training

We ran a training evening in Whitianga on the 5th of October 2023 with the option to attend online. The training covered the instructions for completing the survey and identifying matuku booms which fortunately are very distinct. We also discussed the situation facing matuku and the importance of monitoring their populations. Survey participants were given an instruction booklet and datasheets (Appendices 1 and 2) at the training. For those that could not make it in person, these were delivered to them the following week.

2.3 Survey Timing

The timing for the survey was set for mid-October to coincide with the peak egg-laying period of female matuku. One survey event is generally sufficient to achieve a snapshot of the wetland sites in an area, but multiple survey events were planned in case unpredictable weather prevented any of them from going ahead and the more information we could gather, the better. The survey was set for the weekend starting on Friday 13 October with six survey events to take place over three days.

The peak matuku booming period at dawn occurs for the one and a half hours before sunrise and the peak booming period at dusk occurs for the 30 minutes before sunset to one hour after sunset (O'Donnell & Williams 2015). After consulting with DOC Science Advisor, Harry Caley, we agreed that one hour rather than one and a half hours was sufficient observation time for our purposes. Local sunrise on the survey dates was at approximately 6:30 am and local sunset was at approximately 7:30 pm. We determined that the dawn survey events would be from 5:30 am to 6:30 am with dusk survey events from 7:00 pm to 8:00 pm. Thus, there were three each of dawn and dusk survey events from Friday 13 October to Sunday 15 October. Generally, it is recommended that when surveying with observers, the dusk survey events are preferred, however, our volunteers are very enthusiastic about matuku conservation, and many were happy to survey in both the morning and evening. Consequently, all volunteers were informed that they could survey at both dawn and dusk over the three days, however, the dusk survey event on Saturday 14 October was chosen as the one Principal Survey Event. While all six survey events would be used to make inferences about matuku, the Principal Survey Event would provide the most accurate snapshot of matuku presence on the peninsula as everyone would be observing for the same hour. Volunteers were also encouraged to note any incidental observations of matuku outside of the survey times but during the survey weekend.

2.4 Data Recording

During each survey event, volunteers were listening and looking for matuku for the designated hour. They were to record the time the observation was made, if the bird was heard or seen, and the direction and distance it appeared to be. In addition, if they were able to, volunteers were asked to identify whether it was the same bird or multiple birds. For the most part, it is difficult to determine whether booming is coming from one or multiple birds but in some instances it is possible. The datasheets had a column that allowed volunteers to note whether it was the same bird or not by noting, for example, Male A or Male B. We also asked volunteers to make any notes about observations that may indicate the presence of a female matuku. Such incidences include seeing two birds together, particularly of different sizes, or a bird flying to or from the direction of a booming male.

The DOC datasheets for the triangulation of matuku were used as a base for this survey's datasheets (O'Donnell & Williams 2015). A lot of information on the DOC datasheets was not relevant for this survey so a simplified version was created to

make data recording as straightforward as possible for volunteers (Appendix 2). Additional information was added to the datasheets to get a better understanding of the wetland itself, including the condition of the wetland and other bird species present.

2.5 Automated Acoustic Recorders

Five automated acoustic recorders were loaned to us from Waikato Regional Council. These were placed at sites that were of interest to us but that had no volunteers available to crew them. DOC AR4 acoustic recorders were deployed to these sites. They were installed on small trees at the edge of the wetlands at a height of approximately 1.5 m from the ground. The recorders were programmed to record for all six of the survey periods and set to record on the low setting to capture the low frequency of matuku booming.

2.6 Acoustic Data Processing

AAR soundwave data was analysed using Raven Lite software. Sites with matuku presence were mapped and the survey periods were split into 10-minute segments to analyse where matuku observations were overlapping in each area.

3. Results

3.1 Survey Observations

Matuku were observed at 16 of the crewed survey sites and at three of the AAR sites (Figure 4). They were observed in the areas in and/or surrounding Colville, Cooks Beach, Coroglen, Coromandel Town, Hahei, Kūaotunu, Matarangi, Ōpoutere, Otama, Waikawau, Whangamatā and Whangapoua. All but one of the sites that observed matuku heard booming. Site WHA-02 Otahu only saw matuku flying in and out of the wetland.

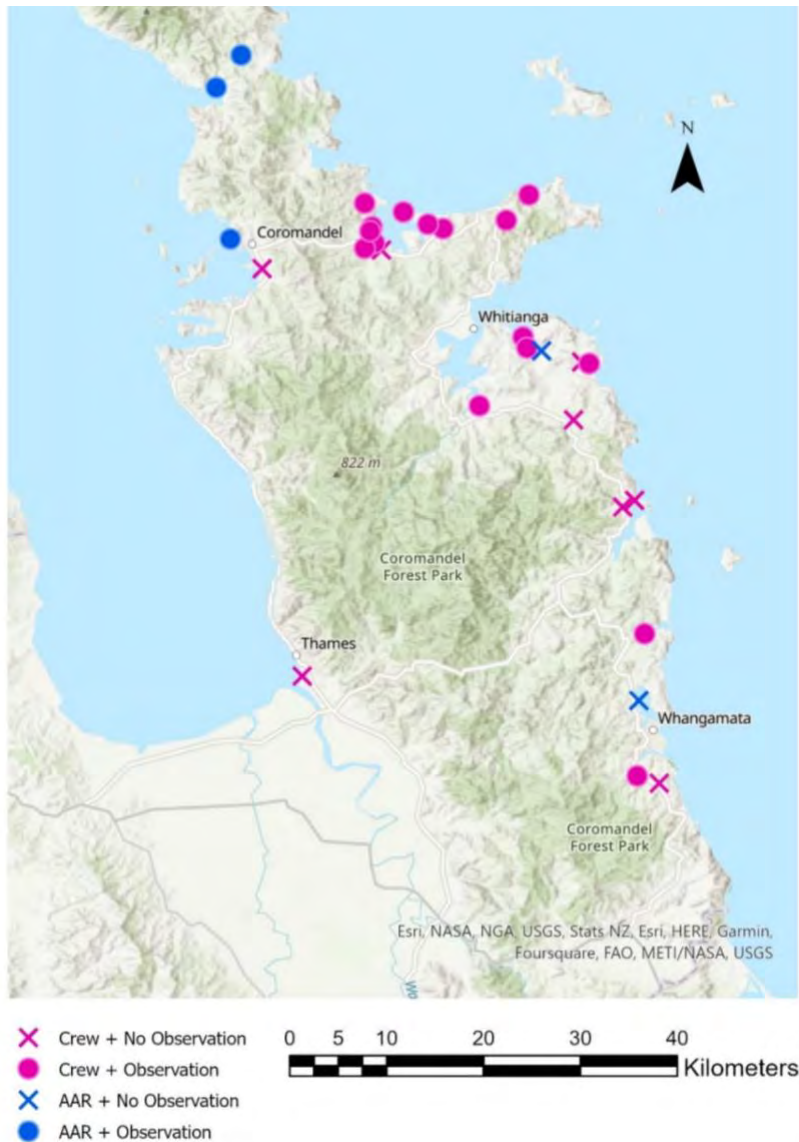


Figure 4. Sites with and without observations of matuku that were either crewed or deployed with an automated acoustic recorder (AAR).

Throughout the six survey events, observations of matuku were made at several sites at the same time (Figure 5). 25 out of the 29 sites were surveyed on the evening of the Principal Survey Event. During this event, matuku were observed simultaneously at five survey sites, although several of these could have been observing the same individual bird. On Sunday 15 October at dusk, matuku were observed simultaneously at six survey sites.

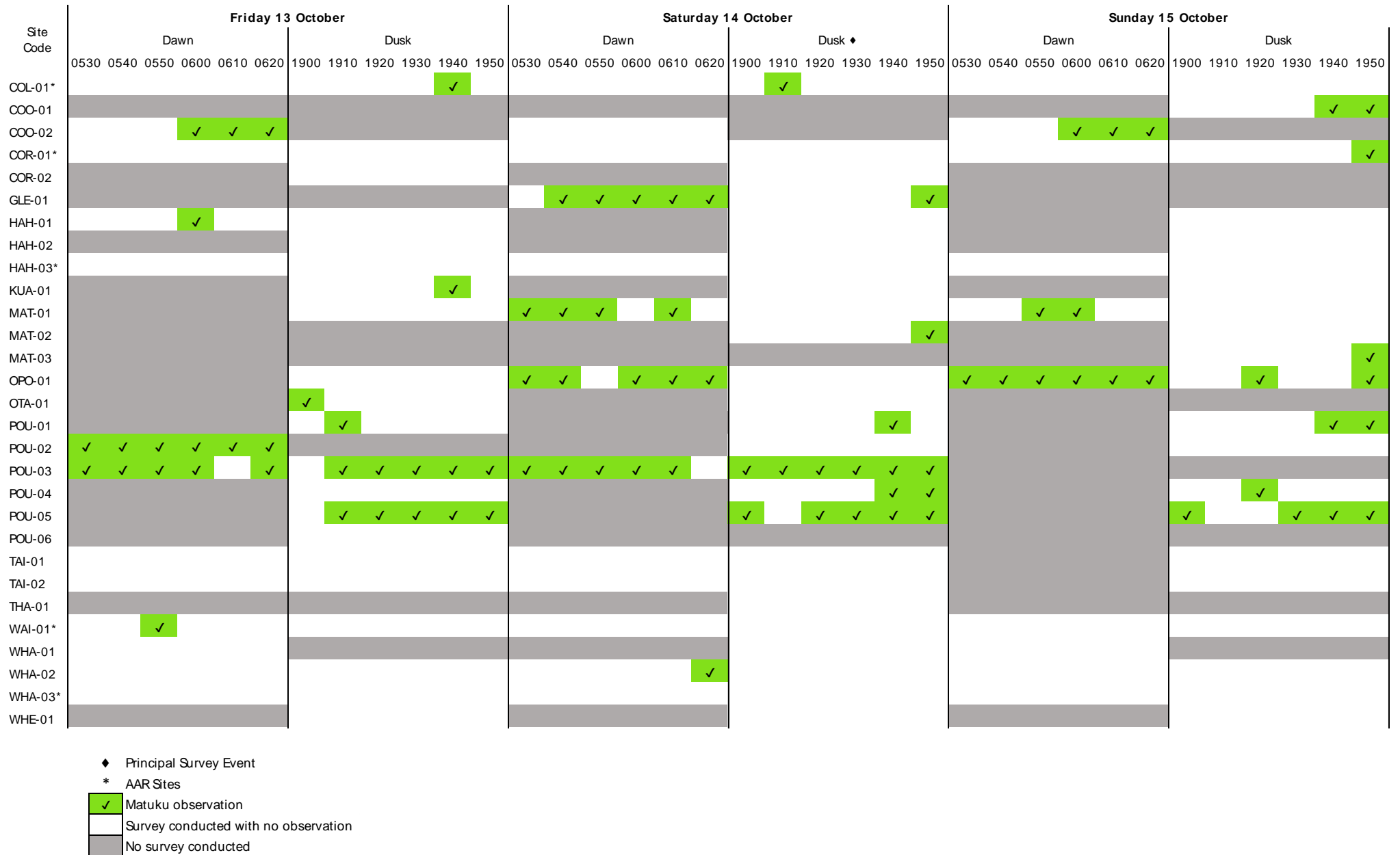


Figure 5. Each survey event, from Friday 13 October to Sunday 15 October, split into 10-minute time slots to see where observations overlapped at each of the sites.

3.2 Incidental Observations and Other Birds

There were a number of incidental observations of matuku throughout the survey weekend. Several sites observed matuku at times either side of the one-hour survey time slot but all of these also recorded matuku during the survey hour except for one site, WHA-02 Otahu. This site recorded matuku outside of the survey hour on three occasions: 13 October at 0722, 14 October at 1800 and 15 October at 0649.

A distressing incidental sighting occurred on 12 October at approximately midday when a matuku was hit by a car in Matarangi. The next day at around the same time, the matuku was retrieved by volunteers and while doing this, they spotted another matuku flying overhead.

Other birds that were observed at survey sites include, but are not limited to:

- Kāhu | harrier hawk (*Circus approximans*)
- Kōtare | kingfisher (*Todiramphus sanctus*)
- Moho pererū | banded rail (*Gallirallus philippensis*)
- Mātātā | fernbird (*Poodytes punctatus*)
- Matuku moana | white-faced heron (*Egretta novaehollandiae*)
- Pūkeko (*Porphyrio melanotus*)
- Pūtangitangi | paradise shelduck (*Tadorna variegata*)

3.3 Potential Female Observations

On three occasions, observations of matuku suggested potential female presence:

1. Site POU-02 Waingaro Wetland, 13 October dawn survey: matuku booming was heard consistently when a second matuku flew overhead that did not boom once it had landed.
2. Site WHA-02 Otahu, 14 October dawn survey: a noticeably smaller bird was sighted.
3. Site OPOP-01 Ōpoutere, 15 October dawn survey: two males booming constantly.

4. Discussion

4.1 Matuku Observations

Matuku were observed at 19 sites across 12 townships in Hauraki Coromandel and importantly, they were observed at sites across the peninsula at the same time which indicates that there are multiple birds present in the region. Matuku are very mobile birds and regularly use many wetlands, streams and drains as feeding sites (Williams, 2013). This means that anecdotal observations of birds across large areas does not always signify that there are multiple birds but rather that it could be one or two birds frequenting all sites. One aspiration for this survey was to ascertain whether this was the case in Hauraki Coromandel. There were a few sites that were close to each other where the same bird was likely heard at several sites such as across the Whangapoua catchment but in the cases where matuku were observed at the same time in different townships such as at dawn on Saturday 14 October when they were observed at Coroglen, Matarangi, Ōpoutere and Whangapoua, it is reasonable to conclude that these were different birds. It is excellent to confirm that there are at least multiple male matuku on the peninsula and this is valuable information to use as a baseline for comparison of surveys in future years. We hope to continue to observe male matuku in these wetlands as well as observing them in additional sites but equally, the lack of booming in future surveys at any of the sites where they were observed this year would give us cause for concern. However, it is important to note that male matuku are not the most reliable indicator of a healthy population. They are more common than females and they do not rear the young and are therefore far less vulnerable to predation (O'Donnell et al, 2013; Williams, 2013). Females are also solely responsible for raising the chicks to adulthood which is fundamental for population stability and growth. Thus, while we hope to continue to see the number of male matuku grow, observations of female matuku are far more crucial for estimating the overall population's success.

4.2 Possible Female Matuku

The three observations that were indicative of possible female matuku all occurred at different locations. The first observation, at Whangapoua, saw a second bird fly overhead and once landed, the bird did not boom. It is possible that this was a female matuku that heard the male that had been constantly booming at that site and flew in to investigate. The second observation, at Otahu, saw a clearly smaller bird fly overhead. A few sightings occurred at this site over the survey weekend, thus the one smaller bird was noticeable. It was originally thought to have been a juvenile however at this time of year, there would not be any juveniles around, suggesting that it could have been a female (Heather & Robertson, 2015). The last indication of potential female presence was the consistent booming of two males in Ōpoutere which can occur when males are competing for a female in the vicinity. This information on the potential presence of female matuku has been passed on to the Department of Conservation to support them in their search of matuku nests using a thermal imaging camera on a drone.

4.3 Matuku Absence

Although we have been able to confirm the presence of male matuku on the peninsula we cannot confirm their absence from sites at which they were not observed. At the various sites where there were no matuku heard or seen, it is of course possible that there are matuku in the wetland, but they were hidden and silent over the survey period (O'Donnell et al, 2013; O'Donnell & Williams, 2015). It is also important to note that a few sites only heard matuku at dawn thus by limiting the Principal Survey Event to one evening we have likely restricted our results. For example, site MAT-01 Matarangi Bluff only heard booming at dawn and if not for the volunteer's enthusiasm to survey at dawn as well as at dusk, we would not have

observed any birds at that site. Consequently, it is possible that similar accounts could have occurred at other sites where volunteers were not able to survey at both dawn and dusk.

4.4 Other Bird Species Observations

Several sites did not observe matuku in this survey but many of them reported observations of other threatened manu such as moho pererū (banded rail) and mātātā (fernbird). If we hope to see matuku in these wetlands in future surveys and continue to observe them in the wetlands where they were observed this year, predator control needs to be maintained and intensified. The protection of wetlands regardless of the current presence or absence of matuku is crucial for their further dispersal and establishment in the Hauraki Coromandel region. Matuku need safe and healthy wetlands in which to feed, live and breed. Thus the effort that volunteers continue to put into predator control around wetlands will hopefully ensure that they are habitable for matuku.

4.5 Limitations and Recommendations

One limitation of this survey is that some volunteers were not able to complete the Principal Survey Event as they had other commitments. Four of the 29 sites did not complete the survey event at dusk on Saturday 14 October. We did not want to discourage anyone from participating so it was decided that participants could survey any of the survey events for which they were available because that is still useful information. Since many volunteers surveyed at each of the dusk survey events, the sites that did not participate in the Principal Survey Event had other sites to compare to regardless. We recommend that future surveys include a Principal Survey Event at dawn as well as dusk. A few sites only had matuku booming at dawn, and their presence would have been missed if the volunteers had not opted to survey at dawn. Since many sites already had observers surveying at dawn, this would not be an unreasonable expectation for next year's survey.

Wetlands are often in very public places and some volunteers noted that there were people around fishing and participating in other water activities in the evening which made it difficult to survey. This is not something that we are able to avoid but by surveying at dawn as well as dusk we may be able to increase our likelihood of observing matuku.

Automated acoustic recorders are excellent for listening for matuku booming but they do not give us as much information about the observations as volunteers can. A volunteer can hear the approximate direction and distance that booming is coming from and if there are potentially two males in one wetland. They are also able to see if there are any matuku in the wetland or flying above the wetland. This information is necessary to help recognise that females are present. We will continue to use AARs in wetlands that we are interested in observing but have no volunteers available to crew them, however, it would be great if we could have volunteers at a few sites in the northern Coromandel. There are matuku known to be in the area and the recorders picked up on their booming thus it would be useful to have a volunteer there to discern more information about the possibility of a nesting pair.

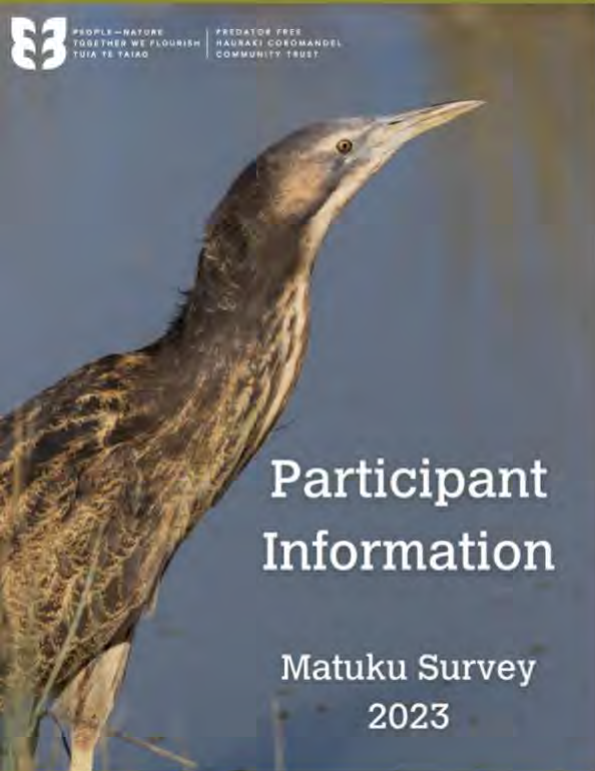
5. Conclusion

Male matuku were observed across many sites on the peninsula and as they were observed at the same time far distances away, we can conclude that there are multiple male birds in the Coromandel. This is important as anecdotal observations can suggest widespread presence but by surveying at the same time, we were able to have this confirmed. Female matuku are more reliable than males for estimating population health as they are considerably more vulnerable to predation and are solely responsible for raising young and recruiting them into the population. Thus, the potential presence of a few females is promising for the Coromandel matuku population. Further research is necessary to understand breeding success of resident females and population recruitment. The presence of other native birds in the wetland sites is encouraging and demonstrates that the work community conservation groups are undertaking to protect these areas is having positive impacts. We hope that in future surveys, we will continue to observe matuku at the sites that they were observed this year but additionally, in other sites where conservation groups are working hard to ensure a habitat suitable for matuku and our other native species.

6. References

- Ausseil, A.-G. E., Gerbeaux, P., Chadderton, W. L., Stephens, T., Brown, D., & Leathwick, J. (2008). *Wetland ecosystems of national importance for biodiversity: Criteria, methods and candidate list of nationally important wetlands*. Landcare Research.
- Heather, B., & Robertson, H. (2015). *The Field Guide to the Birds of New Zealand*. Penguin Random House New Zealand.
- Kendal, H. (2023). *Matuku Survey Training Workshop*.
- O'Donnell, C. F. (2011). Breeding of the Australasian Bittern (*Botaurus poiciloptilus*) in New Zealand. *Emu*, 119, 197-201.
- O'Donnell, C. F., & Robertson, H. A. (2016). Changes in the status and distribution of Australasian bittern (*Botaurus poiciloptilus*) in New Zealand, 1800s–2011. *Notornis*, 63, 152-166.
- O'Donnell, C. F., & Williams, E. M. (2015). *Protocols for the inventory and monitoring of populations of the endangered Australasian bittern (Botaurus poiciloptilus) in New Zealand*. Department of Conservation.
- O'Donnell, C. F., Williams, E. M., & Cheyne, J. (2013). Close approaches and acoustic triangulation: techniques for mapping. *Notornis*, 60, 279-284.
- PFHCCT. (2023). *Community*. Retrieved from Predator Free Hauraki Coromandel Community Trust: pfhc.nz/community
- RNZ. (2023, October). *Drivers asked to slow down after rare bitterns killed near Dargaville*. Retrieved from RNZ: [rnz.co.nz/news/national/499205/drivers-asked-to-slow-down-after-rare-bitterns-killed-near-dargaville](https://www.rnz.co.nz/news/national/499205/drivers-asked-to-slow-down-after-rare-bitterns-killed-near-dargaville)
- Robertson, H., Baird, K., Elliott, G., Hitchmough, R., McArthur, N., Makan, T., Miskelly, C., O'Donnell, C., Sagar, P., Scofield, P., Taylor, G., Michel, P. (2021). Conservation status of birds in Aotearoa New Zealand birds, 2021. New Zealand Threat Classification Series 36. Wellington: Department of Conservation.
- Sharpe, M. (2018). *Dramatic maps released showing state of crisis in nation's wetlands*. Retrieved from Stuff: <https://www.stuff.co.nz/environment/101092150/dramatic-maps-released-showing-state-of-crisis-in-nations-wetlands>
- Stewart, P. (2017). *Eastern Coromandel cryptic avifauna species inventory for wetlands of the Waikato Region*. Hamilton: Waikato Regional Council.
- Wadey-Barron, C. (2022). *Planting for the future with the Otama Reserves Group*. Retrieved from Predator Free Hauraki Coromandel Community Trust: <https://pfhc.nz/blog/planting-for-the-future-with-the-otama-reserves-group>
- Whitehead, T. 2022. Adult concealing itself in a clump of sedge. [Photograph]. NZ Birds Online. <https://nzbirdsonline.org.nz/species/australasian-bittern>
- Williams, E. 2013 [updated 2022]. Australasian bittern | matuku-hūrepo. In Miskelly, C.M. (ed.) New Zealand Birds Online. www.nzbirdsonline.org.nz

Appendix 1: Survey Participant Information



Participant Information
Matuku Survey 2023


Survey Info

PFHC's Matuku (Bittern) Survey 2023 will take place over three days from **Friday 13 October to Sunday 15 October**. You can survey at dawn, at dusk or both.

- At dawn: for the one hour before local sunrise.
 - Sunrise will be ~6:30 am, survey from 5:30 am to 6:30 am.
- At dusk: for the 30 minutes before and after local sunset.
 - Sunset will be ~7:30 pm, survey from 7:00 pm to 8:00 pm.

The evening is generally more practical for volunteers so we are encouraging everyone to survey at dusk. However, if you have other commitments and would prefer to survey at dawn, that is perfectly fine. Equally, if you are super keen and want to survey at both dawn and dusk, you are welcome to do so!

We do ask that you keep your surveying consistent over the three days. If you choose to survey at dusk, survey at dusk each day and vice versa with dawn. An exception to this is if you want to add in a bonus survey event, for example, if you are surveying at dusk each day but decide to add an additional survey event at dawn on Saturday, that is welcomed.



PFHC
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Weather Contingency

If the weather is going to be poor over the set dates, we will choose one evening over the survey weekend that will have the best weather to be our singular survey event. We will get more information from the survey if we are able to complete all three days but we can make do with one survey event. Matuku are very mobile birds so if we need to have just the one survey event, we need to make sure it is the same for everyone. This way we will not have any double up data with birds flying from wetland to wetland. We will let you know as soon as possible if this is going to be the case.



Gear You Will Need

- | | |
|--|---|
| <input type="checkbox"/> Torch (it will be dark either when you are heading out or going home)
<input type="checkbox"/> Fully charged cell phone
<input type="checkbox"/> Datasheets, one per survey event
<input type="checkbox"/> Pencils
<input type="checkbox"/> Warm clothing | <input type="checkbox"/> Rain jacket
<input type="checkbox"/> Binoculars*
<input type="checkbox"/> GPS*
<input type="checkbox"/> Chair*
<input type="checkbox"/> Gumboots*
*optional |
|--|---|



Instructions

Before The Survey Events

- Review the instructions for matuku observation and data recording.
- Familiarise yourself with the datasheet.
- Listen to some matuku booms.
- If you have **questions or need help** with any of this, please contact the PFHC team before the survey night. Please use the fst@pfhc.nz email as a first point of contact.

Health And Safety

- Ensure that you have appropriate gear for being out in the field. Spring weather is very changeable, so be prepared!
- Ensure that you are confident that you can safely get to your site and back, if you have any doubts, please let us know.
- Ensure that you have a fully charged cell phone.
- Take plenty of water and some quiet snacks.
- Make sure someone not involved in the survey knows where you are headed and when you plan to be back.
- Keep in contact with the PFHC team when you are out surveying.

Getting To Your Site

- Message Renee via WhatsApp or text when you are heading to your survey site.
- If the weather conditions prevent you from starting or completing the survey, please message us that you have had to cancel or cut short the survey for that day.
- Leave for your site with plenty of time to get to the site, unpack, and set yourselves up to be ready to start observing at the survey time.
- Familiarise yourself with the location and your surroundings. This is important for getting back out safely and for gauging distances.
- Take photos of your site and send them to us at fst@pfhc.nz.



Setting Up On Site

- Turn your phone to silent.
- Have everything you need (clothing, equipment, food etc.) unpacked before you start surveying to avoid noise interference later.
- Identify North so that you can use this to estimate the direction of calls later.
- Fill in all the site details and wetland observations on your datasheet before you begin.
- Note anything else you think could be valuable for us to know about the wetland's condition.

Matuku Observing

- Observe from the same spot for each survey event.
- Avoid making unnecessary noises. Do not mimic or play matuku booms or calls of any other animals.
- Listen in the dark if the sun has yet to rise or has already set, a torch can deter birds. Once you have heard a boom, you can turn on a torch to fill out the datasheet if you need to.
- Make notes about any significant changes in weather or sound that occur during the survey.

PFHC

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PFHC

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Recording Matuku Observations

- When you hear a boom or (if you're very lucky!) see a matuku, note the time and tick on your datasheet whether it was heard or seen.
- Note the approximate compass direction that you observed the matuku e.g., N, NE, SW.
- Estimate a distance in metres of approximately how far away you believe the bird to be.
- The perceived direction and distance will be helpful for us later when we are able to use other methods to try and locate matuku nests.
- If you hear any matuku booms or see any matuku outside of the designated survey time, please note them down. We would still love to hear about them! This includes any time during the survey day. For example, if you are driving back home after the survey and you see a matuku, take a waypoint and let us know!



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Identifying Individual Matuku

- It can be difficult to determine whether booming that is coming from one direction is multiple birds or a single bird, so if you are not sure, assume it is one bird.
- However, there are some instances when it can be apparent that there is more than one bird. For example:
 - If booming is coming from two completely different directions but you have not seen a bird fly from one area to another, it can be safe to assume it is two different males.
 - If you hear booming in one direction and see a bird fly to that area, it could potentially be a female flying to a male. If this happens, it is very important info!
- If you do suspect you have more than one bittern in your wetland, assign them alphabetical ID's on the datasheet e.g., Male A, Male B.
- If you are unsure about what you see, take notes!



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At The End Of The Survey

- Once you have reached the end of the survey time, pack up all of your gear and head out.
- Once you are safely out, message Renee.
- When you are home, take a photo of both sides of the datasheet and email them to us at: fst@pfhc.nz.
Please make sure that the datasheet is completed in full, that the photo of the datasheet is clear and that all the information on the sheet is legible.

Datasheet Key

- Time (24hr) – e.g., 1900 is 7 pm.
- Direction – compass direction e.g., N, NE, NW, SE etc.
- Distance - in metres, approximate.
- Matuku ID - if you are able to identify individual birds, ID them alphabetically e.g., Male A, Male B, Female A.



Datasheet Example

A completed 'Matuku (Bitem) Survey' form. The form includes sections for:

- Date:** 13/10/23
- Site Code:** 711-01
- Site Name:** Rapa-Aranga
- GPS Coordinates:** -36.4937, 175.6158
- Observers:** Renee, Renee
- Other Observers:** Talia, Louisa
- Notes:** Saw a nest!
- Weather:** Rain (checked), Wind Strength: N (checked), Wind Direction: NE (checked).
- Vegetation:** Native Vegetation Present (checked).
- Table:** A table with columns for Time, Height, Size, Direction, Distance, and Matuku ID. It contains handwritten entries for bird sightings.
- Other Wildlife Birds:** A list of bird species with checkboxes for their presence.



Matuku (Bittern) Survey



Date: _____ AM Survey or PM Survey Day: ___/___/3

Site Code: _____ Site Name: _____

GPS Coordinates: _____

Observers

Site Host: _____

Other Observers: _____

Notes

Blank area for notes.

- Rain** Nil Light Moderate
- Temperature** Cold Mild Warm
- Wind Strength** Calm Light Moderate Strong
- Wind Direction** N S NE SW E W SE NW Not applicable

- Non-Weather Noise** None Slight Moderate
- Cloud Cover** _____ %
percent of survey time under cloud cover

- Wetland Condition** Dry Wet Saturated
- Water Clarity** Clear Murky Very dark
- Native Vegetation Present** None Little Moderate All (No exotics)

- People Present** None Few Moderate
- Litter** None Little Moderate

Site Code: _____ Date: _____ AM or PM

Start Time: _____ Finish Time: _____

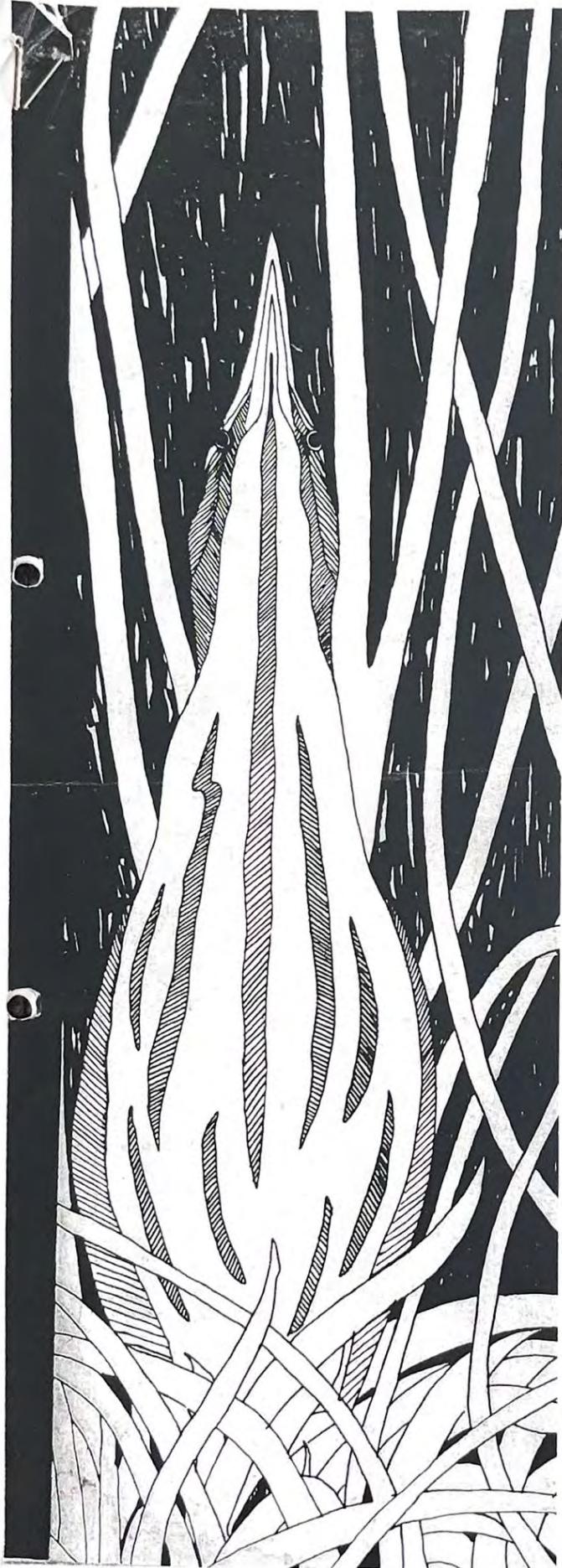


	Time (24 hr)	Heard	Seen	Direction (N, NW etc)	Distance (metres)	Matuku ID
0	1945	✓		NE	100	Male A
1						
2						
3						
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25						
26						
27						
28						

- Other Wetland Birds Seen or Heard**
- Koitareke (Marsh crake)
 - Kotare (Kingfisher)
 - Kotuku (White heron)
 - Mallard duck
 - Matata (Fernbird)
 - Matuku moana (White faced heron)
 - Moho pererū (Banded rail)
 - Pāteke (Brown teal)
 - Pukeko
 - Pūtiangitangi (Paradise shellduck)
 - Pūweto (Spotless crake)
 - Shag (specify if possible)

Notes

Blank area for notes.



*Bittern
In
Hawkes Bay*

*A Plan
For
Recovery*

John Cheyne

May 2011

Australasian Bittern (*Botaurus poiciloptilus*) In Hawke's Bay A Plan for Recovery

John Cheyne
May 2011

1. Introduction

The Australasian bittern (*Botaurus poiciloptilus*) or bittern (matuku) is under significant threat in New Zealand and Australia and indications are that the species is declining at some sites at an alarming rate. This is probably linked to a similar loss in freshwater wetlands and other factors. In New Zealand bittern are an indigenous species that is totally protected under the Wildlife Act and in 2008 was accorded nationally endangered status. The presence of breeding bittern in a wetland can provide a useful indicator of overall wetland health and the species is now being regarded internationally as a flagship species for wetland conservation.

Bittern numbers will continue to decline unless appropriate action is taken. This report hopefully helps in providing a path for bittern recovery in Hawke's Bay.

2. Population Levels

The Australian population is restricted to southern parts of Australia and estimated to be 1000 birds (Birdlife International 2011) while Heather and Robertson (2000) estimate that less than 1000 birds remain in New Zealand.

Anecdotal accounts indicate that both the national and Hawke's Bay regional populations of bittern have declined over the last 30 years as freshwater wetlands have continued to disappear and be modified by agricultural development.

In 2009 Hans Rook, DOC, Napier and I estimated that the Hawke's Bay population (Mahia - Central Hawke's Bay) was in the range of 40-50 birds. This figure is based on personal field observations over a combined 52 years experience with wetlands in the region and discussions with other ornithologists.

3. National Threat Status

An expert panel established by DOC (Miskelly et al 2008) reviewed the threats faced by New Zealand avifauna using a uniquely New Zealand based conservation status assessment tool. Bittern, together with black fronted tern and black billed gull, were accorded nationally endangered status which is the second highest category after

nationally critical which includes kakapo, takahe, white heron, black stilt, brown teal (South Island), Campbell Island teal and grey duck. Ranked below bittern were blue duck, wrybill plover, banded dotterel, North Island kiwi and North Island kokako which were placed in the *nationally vulnerable*, and brown teal (North Island) in the *at risk-recovering* categories.

The relative rarity of bittern in Hawke's Bay can also be compared to the regional populations of blue duck which are estimated to be greater than 100 birds and North Island brown kiwi estimated to be more than 300 birds. Fortunately both these species are responding positively at some sites under intensive conservation management programmes e.g. predator control, relocation and establishment of new breeding populations.

3. Breeding Behaviour

Bittern are a **secretive** bird that is more often heard than seen because of its shy nature, cryptic coloration and the densely vegetated wetland that it usually frequents. They are often heard during spring because of the fog horn type call that the territory holding males make to attract females and to also warn off other males. This call can be heard up to two kilometres away. Northern hemisphere studies of the great bittern *Botaurus stellaris* confirm that **only the male booms** and it is **polygamous**, with some individual males **attracting several females** that then nest in his territory. Some males are unsuccessful at attracting a mate. The female is **totally responsible for nest construction, incubation and caring for the young**. Our bittern is similar in appearance and indications are that it exhibits the same type of breeding behaviour.

Booming is a significant feature of bittern behaviour. From my experience at Lake Hatuma male bittern inhale air immediately before uttering a boom and a normal train of booms is four, all proceeded by the inhalation of air. If you are within 50-100 metres of bird in still conditions you can often hear this. When the booming sessions are less intense the number of booms in train may be only one and the volume much lower. It is sometimes possible to distinguish the calls from individual birds by tone.

4. Bittern Surveys

There are two types of survey; baseline (inventory) and long term monitoring. Baseline surveys help to identify the numbers of birds using a particular site and are normally one off surveys completed over 1-2 years. They are used to develop a baseline distribution map which will help identify critical sites and habitat types. Monitoring surveys are carried out to determine changes in bittern populations over the long term in response to ongoing threats or wetland management initiatives, or changes in general wetland health.

During the springs of 2007-09 a survey of booming males at Lake Hatuma confirmed the months of **most intense booming were October and November** (Cheyne and Owen 2010). The starting and finishing date of booming can vary each year depending on lake levels

and other factors. Peak calling was about one hour either side of dawn and dusk and often some birds periodically boomed throughout the day. Wind and rain can limit hearing birds but in ideal conditions we could hear birds up to 1.7 kms away. Depending on the accessibility to each site, listening points were either established on the shoreline of the lake and birds positions confirmed by triangulation, or bird's positions were more accurately identified by surveying the lake in kayaks and marking their position on aerial photographs. Kayaks were also used successfully on Lakes Poukawa and Oingo in 2010.

Surveys of booming males are very useful to record numbers and identify potential breeding areas and habitat use. Sight records throughout the year complement this. In 2010 baseline population surveys I organized recorded 14 males booming on wetlands west and south of Hastings and those organized by Helen Jonas, DOC, Wairoa in the Mahia - Whakaki area recorded 7 males (unpublished reports and field notes). These figures are consistent with the earlier estimate of 40-50 birds for the region.

Not all major wetlands were covered in these surveys and it is proposed that all major bittern habitats are surveyed for booming males to provide a more accurate indication of the regional population. Refer Table 1 for a list of these wetlands.

5. Habitat Restoration

Significant resources (> \$1,000,000) have been directed towards wetland protection and restoration across the region over the last 15 years by landowners and statutory agencies (Hawke's Bay Regional Council, Nga Whenua Rahui, QEII, Fish and Game Hawke's Bay Region, NZ Game Bird Habitat Trust, Biodiversity Condition Fund), conservation groups (Forest and Bird, Wetland Care NZ, Ducks Unlimited NZ) but only a modest amount of this work has been specifically targeted to enhancing bittern habitat.

Where this has occurred at Awatoto, Muddy Creek, Pekapeka Swamp, Lake Poukawa, upper Ahuriri Estuary, Opoutama Swamp and Whakaki Lake it has mostly been successful. Unfortunately new public walkways/cycleways at some locations has increased disturbance from people and dogs at key sites during the sensitive spring-early summer bittern breeding season, thereby negating some of the benefits of this wetland restoration work.

Bittern require quality habitat and size is important. Generally large areas (> 20ha) which is densely vegetated is required to support a breeding territory. They also require shallow water, the right mix of plants and access to a good food supply (eels, small fish, frogs). Bittern ecology and habitat requirements are a specialized field and not widely understood, particularly the reed/sedge/rush (raupo, marsh and lake club rush, Carex, Juncus) relationship with water depth and the ratio of open water to dense emerging vegetation, connectivity with other wetlands and food sources.

Few people in the region have a good knowledge of these requirements and the practical experience in managing bittern habitats. This has sometimes limited the benefits to bittern of some past wetland restoration projects in the region. The vegetation structure in shallow wetlands can change quickly and this can impact on the value of the site so regular monitoring/maintenance may be required to maintain the area in the desired condition for bittern.

6. Threats

The relative significance of threats faced by bittern in New Zealand is difficult to assess because of a lack of information and research. Continued loss of habitat is still a major threat along with the following:

1. **Habitat loss and modification** – drainage, changes to water levels, change in vegetation structure and density by grazing and willow encroachment, reduction in size of large areas of densely vegetated wetland important for breeding territories, and fragmentation of habitats
2. **Barriers to the migration of eel and native fish** to and from some wetlands affecting food availability – weirs, culverts, pump stations, pollution
3. **Predation of eggs, chicks and fledglings** by mammalian predators (stoat, ferret, Norway rat) and possibly also harrier hawk and pukeko - bittern normally nest on a platform of raupo/rushes over shallow water so are vulnerable to predation
4. **Human disturbance** – dogs, walkers, cyclists, motorbikes, power boats during the sensitive breeding season (August- January)
5. **Accidental deaths** - collisions with vehicles traveling on roads passing through wetland areas, overhead power wires crossing flight paths, and shooting

7. Research

In the first major survey of bittern and other freshwater wetland birds in New Zealand Ogle and Cheyne (1981) reported 145 male bittern from a two week survey of the 7100 hectare Whangamarino wetland in the Waikato. Bittern presence in this wetland was mapped against vegetation type and a distinct pattern emerged where the majority of birds were recorded in mineralized swamp, followed by semi-mineralised bog and acid bog. These areas supported distinctly different plant communities and were subject to slightly different water regimes and acidity.

A very useful study on the movement, habitat use and behaviour of bittern in the lower Waikato wetlands was completed by Phil Teal (1989).

Regular monitoring of bittern around Lake Hatuma over the last four years has also provided a good indication of their breeding territory requirements. Dense stands of raupo alongside sheltered shallow feeding areas were used by all males recorded.

Overall our knowledge of bittern requirements is lacking and a high priority has been placed by DOC on learning more about bittern and Colin O'Donnell (2010), states "*In order for conservation efforts aimed at reversing declines to commence, there is a need to develop a greater understanding of the ecology and habitat requirements of the Australasian bitterns and the threats they face*".

DOC have become more focused on bittern conservation and over the last two years have: completed an initial review of bittern distribution in New Zealand; completed a literature review of the breeding of bittern; is currently trialing a draft protocol for index counts; planned more detailed research/monitoring in the Waikato and Northland these being the two major New Zealand strongholds for the bird; commenced trialing an automatic booming recording device.

The majority of Hawke's Bay wetlands used by booming males are raupo dominated and this wetland type is generally typical of many other regions with small bittern populations. Research based in the region might therefore have some national benefits.

8. Conclusions

The bittern population in New Zealand is under considerable threat and has been accorded *nationally endangered* status, the second highest category. In 2009 the estimated population in Hawke's Bay was 40-50 birds, with 21 booming male bittern recorded in spring 2010 during some initial survey work. The regional population is subject to a range of significant threats and may be at crisis point. Maintaining a viable regional population will be a challenge for us all.

Habitat protection and management, reducing barriers to fish migration to protect important food sources, predator control, reducing human disturbance at key sites, minimizing accidental deaths, and educating and inspiring people will assist the recovery of bittern in Hawke's Bay. This work will also have significant benefits for other wetland biodiversity values.

The spring surveys of booming male bittern carried out to date have been useful but further baseline population surveys of all large freshwater wetlands in the region are required. This will provide more complete information on the numbers of bittern in Hawke's Bay, identify key wetland sites and what specific vegetation types are being used at each site. The survey should be complemented by a review of anecdotal records/observations to gain an insight of how the distribution and abundance may have changed over the last 30 years. It will help identify where future regional conservation actions should be focused to reverse the decline.

There is potential for further **bittern habitat enhancement** work at Waitangi/Awatoto, Muddy Creek/Tukituki, Ahuriri, Pekapeka Swamp, Lake Hatuma and Whakaki wetlands but it will require **specialist advice**.

The results of **national research on bittern** currently being carried out by DOC will assist regional conservation initiatives and, where appropriate, the region could become part of this national programme.

The increased awareness of the plight of bittern, low national and regional populations, and the high *nationally endangered* status for the bird justifies a higher priority for **bittern conservation action** in Hawke's Bay. Efforts to protect bittern habitat should be enhanced by the draft national policy statement on indigenous biodiversity and the recent **national policy statement on freshwater**. While some good results have been achieved to date with bittern habitat restoration work, future bittern recovery work in the region may benefit through the establishment of a **small local informal bittern recovery group**.

Iwi own a number of key wetlands in Hawke's Bay that support booming males and they have a traditional connection to these areas and a strong interest in the welfare of the water, plants, fish and birds. In addition, a number of treaty claims are nearing settlement which will include some additional key wetlands. While some hapu at Lakes Whakaki, Poukawa and Runanga, and Operation Patiki are already involved in wetland restoration work benefiting bittern it is important that Iwi are provided further opportunities to participate in future conservation actions.

9. Recommendations

1. **Baseline population surveys** - Complete a survey of **booming males** in spring 2011 (October-November) of all **wetlands listed** in Table 1 and prepare a distribution map and report. Repeat again in 2012.

Helen Jonas is organizing the survey of the Wairoa wetlands while I am organizing the survey of the wetlands south of Lake Tutira to Porangahau assisted by Hans Rook. Assistance is being kindly provided by OSNZ members and other volunteers.

The draft DOC protocols for index counts of Australasian bittern should be used but with additional information recorded on the habitat type/vegetation that the bird was calling from. Several visits to each site should be planned to ensure birds are not missed because of unsatisfactory weather conditions, changes in water levels and state of the lunar cycle.

It is not essential to include other wetland birds like spotless crane, marsh crane and fernbird in these surveys because the priority for them is not as high as bittern. In addition, the most convenient time of day for surveying these species doesn't quite align with bittern booming and they normally require the playing of bird calls to get a response. Any sightings however, should still be recorded.

2. **Long term population monitoring** - Identify a number of **key regional sites** (Hatuma, Poukawa, Oingo, Whakaki, Opoutama) for monitoring population trends over time and commence long term counts of booming male birds.

Because the regional population is relatively small, wetlands with the largest numbers of birds should be included to ensure the data is robust. Additional wetlands could be added following completion of the 2011 spring survey. Same protocols as 1 above to be used.

3. **Monitoring bittern response to wetland restoration projects** - Identify projects warranting this approach, design and implement appropriate monitoring programme

Monitoring (pre and post) of wetlands that are subject to significant habitat restoration is desirable so the response of bittern, if any, is recorded. The objective at a site may be to improve summer feeding areas so the monitoring methods used above, which focus on booming males, will not be suitable and an alternative method will be required eg sight records of birds, increased abundance of known food items like eel.

4. **Identify potential sites for large scale habitat restoration** on land managed by HBRC and DOC, prepare restoration plans and promote their implementation

There are good restoration opportunities on land under HBRC (Waitangi/Awatoto/Ngaruroro River) and DOC (Ahuriri, Hatuma) control which deserve restoration plans being prepared and implemented

5. Encourage and assist **landowners and Iwi**, to protect and restore habitat for bittern on **private land** which supports the majority of the regions bittern population

Privately owned wetlands support over 60% of the regions bittern population. There are similar restoration opportunities on private land which should be supported by the statutory agencies. The HBRC, Nga Whenua Rahui, QE II, Biodiversity Condition Fund, Fish and Game have in the past funded a number of wetland projects which have achieved some excellent outcomes for bittern, along with other improving other wetland values. It is essential that this work remains a high priority and receives adequate ongoing support.

6. **Support mammalian predator control at known key breeding sites**

Some good work is being carried out at Opoutama and Whakaki supported by HBRC. There is potential to extend this to Hatuma, which currently supports about 25 % of the regions population. This proposal is currently being discussed with Rod Dickson, HBRC.

7. **Eliminate barriers to native fish movement** to and from major habitats

Fiona Cameron, HBRC has recently completed an inventory of barriers to fish migration for much of the region. This will provide an excellent starting point to eliminate barriers that might be impacting on bittern.

8. **Reduce human disturbance** at key sites over the breeding season (August-January)

The recent decision not to locate the cycle way along the upper Ahuriri Estuary was a sensible one in terms of the key bittern habitat in that area. Unfortunately other cycle/walk ways have been established alongside sensitive wetlands. It is desirable a robust environmental impact assessment for all new routes is completed in future before commitments are made.

9. **Minimise accidental deaths**

Identify potential problem sites and minimize impact

10. Enable people to be **more aware** about the plight of bittern and wetlands and inspire them to assist their recovery

I am hopeful of obtaining sponsorship for the preparation of a small brochure promoting bittern which we should use as a flag ship species for overall wetland conservation

11. **Support national research/monitoring initiatives** where possible

Ongoing discussions with Colin O'Donnell

12. Consideration be given to forming an **informal regional bittern recovery group**

I have discussed this with a number of people working or interested in bittern and wetland conservation. There is support for it because it provides an opportunity to share ideas, identify priorities and coordinate activities. Some of us already meet casually to discuss bittern. A meeting will be convened soon to consider this.

13. Seek **sponsorship** to support bittern conservation work in the region

I have recently been successful in obtaining sponsorship from Wetland Care NZ, in association with Ducks Unlimited NZ, to support the 2011 spring survey of booming bittern. They will also considering sponsoring the information package for the awareness programme.

Acknowledgements

I am most grateful for the many discussions I have had with Hans Rook over the last 24 years about bittern and Hawke's Bay wetlands. Helen Jonas's recent bittern survey report for the Wairoa district has provided the prompt I needed to write down my thoughts and recommendations on the future of bittern in the region.

The local Ornithological Society of NZ members who have, over a number of years, willingly shared their observations of bittern with me - I am most grateful.

I also appreciate the support for the conservation of bittern and bittern habitat from landowners, Iwi, HBRC, QE II, Nga Whenua Rahui, DOC, Wetland Care NZ, Ducks Unlimited NZ, Fish and Game, Forest and Bird.

Many thanks also to Hans Rook, Louise McNamara, Fiona Cameron, Brian Watson and Gail Cheyne for assistance with the canoe surveys of local lakes last spring and all the landowners who have allowed us to visit their wetlands.

References

Birdlife International, (2011) Species Factsheet-Australasian Bittern (*Botaurus poiciloptilus*)

Cheyne, J.W., and Owen, K. L (2010) Wetland Bird Surveys and Monitoring presentation at National Wetland Symposium, Rotorua March 2010

Heather, B., and Robertson, H. (2000) The Field Guide to the Birds of New Zealand

Miskelly, M., et al (2008) Conservation Status of New Zealand Birds

Ogle, C.C., and Cheyne, J.W (1981) The wildlife and wildlife values of the Whangamarino wetlands. Fauna Survey Unit Report No 28. NZ Wildlife Service

O'Donnell, C.F.J. (2010) Breeding of the Australasian Bittern (*Botaurus poiciloptilus*) in New Zealand

Teal, P.J. (1989). Movement, habitat use and behaviour of Australasian Bittern (*Botaurus poiciloptilus*) in the lower Waikato wetlands. M.Sc thesis, University of Waikato

**Table 1: Major Bittern Habitats in Hawke's Bay
Population Surveys & Habitat Management**

Wetland (updated 5 May 2011)	Population Surveys		Habitat Management/Restoration	
	Male Booming & Other		Fencing F	Plant Pest Control P
	Existing Y	Proposed P	Animal Pest Control A	Vegetation Mgmt V
	Baseline (one off)	Monitoring (ongoing)	Existing	Potential (new work or additional)
Central Hawkes Bay				
Porangahau Estuary	P		F	
Lake Pirimu	P		P, W	P, V
Willow Dam	P			
Lake Hatuma	Y	Y	F, P	P, A, V, W
Lake Rotokiwa	P			
Lake Poukawa	Y	P	F, P	P, A, V, W
Pekapeka Swamp	Y		F, P, A, W	V
Fernhill/Western Areas				
Pig Sty Swamp	P			
Lake Oingo	Y	P		F, P, A, V, W
Lake Runanga	P	P	W	F, P, A, V
Lake Potaka	P			
Lake Hurimoana	P		F, W, P	V
Kautuku Swamp	P			
Timahanga wetlands	P			
Hastings/Napier				
Muddy Creek	P		P, A	V, W
Waitangi/Awatoto/Ngaruroro	P		F, W, A	F, W, V, A
Ahuriri Estuary	Y	P	F, W	F, W, V
Napier North				
Matches Lakes	P			
Pohukura wetlands	P			
Lake Tutira	P			
Wairoa				
Awamate Lagoon	P		F, W	V
Whakamahi Lagoon	P			
Ngamotu Lagoon	P			
Ohuia Lagoons	P			
Wairau Lagoon	P		F, W, V	
Lake Korito (Te Paeroa)	P			
Lake Whakaki	Y	P	F, W, P, A	V
Opoutama wetland	Y	P	F, P, A	V, W
Mangawhio Lagoon	Y	P		
Mahanga wetlands				

A photograph of a bittern standing in a wetland. The bird is the central focus, facing left. It has a long, straight beak and mottled brown and white feathers. The background consists of tall, thin grasses and a body of water that reflects the bird and the surrounding environment. The lighting is natural, suggesting a bright day.

HELPING BITTERN TO HELP THEMSELVES

Ahuriri Estuary Bittern Habitat Restoration Project

Hans Rook

Presentation to National Wetland Symposium 2018

photograph John Cheyne

Ahuriri Estuary - Bittern Habitat Restoration Project

INTRODUCTION

Only 1.9% of wetlands now remain in Hawke's Bay. In the Gisborne district that figure is even worse at 1.7%. Destroy their wetland habitats and you destroy bittern.

When I first joined the Wildlife Service in 1972 and prior to that, bitterns were not common, but they were not rare either if you were around wetlands. Many of those wetlands where birds were known in my youth have since been drained. Bittern have declined alarmingly in my lifetime and until relatively recent times, they have been the forgotten species.

It was that concern which initiated this project- the restoration of Ahuriri Estuary bittern habitat and many other sites over many years.

This project is aimed at building that essential, productive, shallow, prime bittern habitat and sharing with you all how that was done.

It is important to clarify here that this is not a research project, but a habitat management and predator control operation targeted at helping bittern.

Perhaps the better way of putting this is it is a research by habitat management approach and letting these birds tell us their story.



BRIEF HISTORY

These areas that we are working on today were once tidal mudflats. All that changed on the 3rd of February 1931 when the Napier earthquake struck, and this area was uplifted 2 metres in some areas.

During the years following the depression men were paid 10 shillings a chain (20 metres) to hand dig drains and many of those are still present throughout the wetlands today. Those drains are very valuable for bittern as these are the last water areas to dry out in late summer. As the summer water drawdowns occur, this effectively forces all aquatic food resources into those drains.

These drains are a bittern supermarket for want of a better way of describing them.

PRE – 2011 BITTERN SURVEYS

Prior to starting this project on adjacent Crown land only two male booming territories were known on adjacent private wetlands, formerly owned by Bruce Jans and now owned by Ginny & Lloyd Cave. I could account for only 1 female and the odd juvenile produced every 4-5 years.

Intermittent observation work began in 1984.

POST – 2011 BITTERN SURVEYS

In 2018 we have 9 recorded bittern booming sites and I can account for 5 and possibly a 6th female.

HABITAT CREATION

Upper Ahuriri Estuary Bittern Habitat Enhancement 2011 - 2018							
Block	Ha	Year	Bund (m)	Fencing (m)	M	F	Vegetation
1	6.5	2011	80	1,100	1	1	Giant Umbrella sedge
1A	0.5	2018	80	200			
2	6.5	2012	80	900	1	1	Juncus
3	3.3	2012		400			
4	5	2014		1,000	2		Juncus
5 Mareotara Valley	20	1988		2000	1	1	Juncus
6	4			800			
7	7	2012		1,300			Juncus
Poraiti Bay/Taipo Stream	5*				1		Raupo
* Nil mgment							
Ohingaora Wetlands	4*				1		Raupo
* Nil mgment							
Seafield Wetlands (3)	9	2015		1,000	2	2	1 Giant Umbrella sedge 1 Juncus
Total	70.8		240	8,700	9	5	



Background – Block 1 - 6.5 ha. Blocks 1a and 2 - 7 ha

The Eastern edges of these 3 wetlands are bunded by old drain tailings that now form low dam walls. This was purely by accident and not design decades ago when the main channel was dug. To the West, water levels are naturally contained by hilly pastoral country. All three of these areas were only wet for 10-14 days a year due to the old drains cut through these bund walls and out into the main drainage channel.

What we did was reverse this by simply plugging sections of the old drain tailings where these original drains entered the main drain and built low bund walls at 3 strategic places to harvest flood waters. We now have water for at least 9 months in all 3 wetlands today.

All blocks were fenced on their Western margins to exclude cattle but utilised light sheep grazing as a habitat management tool during late summer/autumn when these areas were dry.

This was a win-win situation for bittern and farmers as it provided emergency sheep grazing during drought conditions thereby creating magnificent open water areas for bittern when wetlands reflooded in early winter. This extensive good quality fencing infrastructure is highly valued by adjoining landowners.

It is relevant to add here that an adjacent 5th generation farmer, Philip Holt made the following statement. He had not seen or heard a bittern booming for 2 decades prior to 2011 and thought they had gone altogether. Phillip and his family regularly observe birds on their farm today and

can hear a booming bird during the breeding season, at the same location every breeding season in phase 5 block, since 2014.

The Holt and Cave families are very passionate about having bittern on their lands.

Monitoring of bird numbers is done during the booming season and throughout the year while servicing mammalian predator trap lines. These lines have been deliberately placed high up on ridges and spurs, for 5 reasons.

1. To intercept predators before they enter the wetlands.
2. Minimise human disturbance to bittern as they do not readily look up hill.
3. Observation work can be done non-invasively and at long range with high quality optics.
4. You will learn a great deal about bittern by simply watching them.
5. Service trap lines on foot as you will observe more predator sign.

Block 1 – Before and After



RESULTS OF BITTERN HABITAT CREATION

Block 1, 6.5 ha

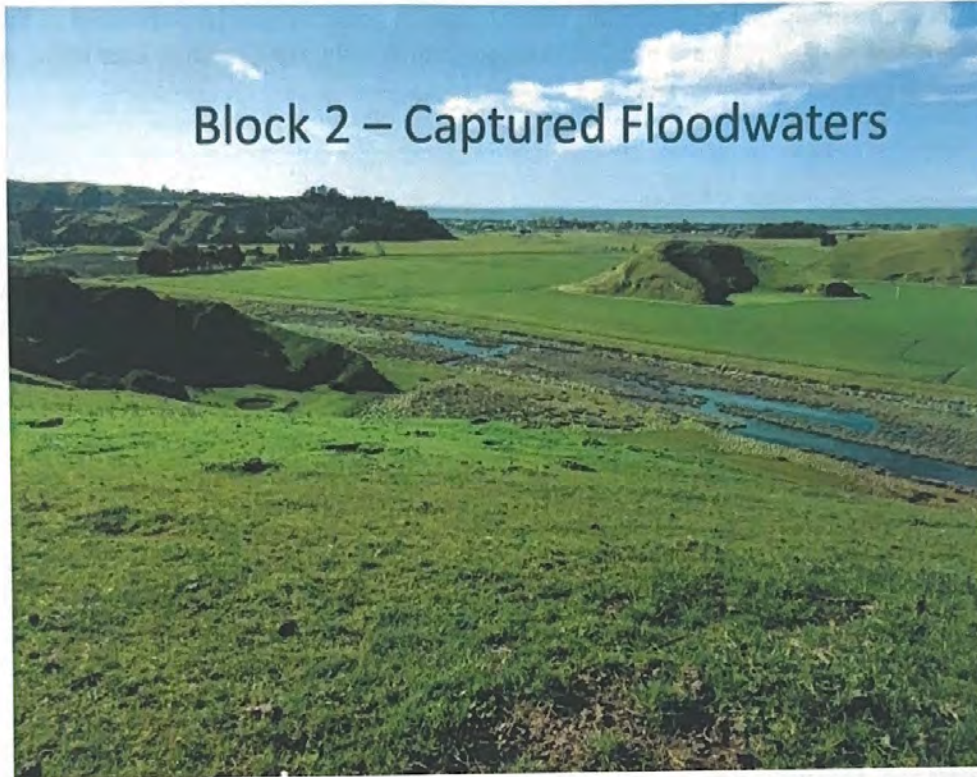
In the summer of 2011, we completed fencing and bunding infrastructure. It filled with water over winter.

During the booming season in 2011 a female was observed and then 50 metres away a bird was heard to boom. A bird has been recorded booming from the same location ever since.



Block 1 A, 5 ha

This small bund was constructed in June 2018 to create more bittern habitat between 2 blocks. Its primary function was to provide expanded feeding habitat for juveniles as it is the last area to dry out in summer when they desperately need these highly productive feeding sites.



Block 2 – 6.5 ha

In the late summer of 2012, we completed fencing and bunding work. This area filled with water over winter. In the booming season later, that year a new bird was heard to boom here together with the bird in phase 1. A bird has boomed from precisely the same location ever since. A female has been regularly seen with this male.

Block 3

This fence was built in the summer of 2012. A bird has been observed on the down stream edge of this block. I suspect that this site may hold a booming territory when desirable vegetation thickens up here in future.

Block 4 - 1000 m

This estuary margin was fenced 4 years ago. No birds were ever observed here but that changed in the booming season of 2015, one bird boomed at the top end and a second was heard at the bottom of that fence and both could be clearly heard. Bittern have been seen here regularly.

Block 5 - Maraetara Valley

This location already had good fencing infrastructure in place. A new bird appeared in the breeding season of 2014 and a bird has boomed from exactly same location ever since. A female has been observed with this male.

Block 6 – 600 m of estuary margin

This fence joins phase 5 and links up with phase 7. This section is scheduled to be built in the next few months. A short distance upstream of this planned fencing, two freshwater inflows enter the main body of the upper estuary. This area will be carefully watched in the coming years as it looks magnificent for another bittern booming territory.

Block 7 - 1.3 km in length, 7 ha in area

In 2012 Philip Holt of Maraetotara Farm, decided to take this out of farm production and has been replanted by the Holt family and volunteers. This block will be surveyed during the booming season of 2018. Anecdotal evidence has come to light of a bird that may have boomed here in 2017.

Poraiti Bay

3 years ago, I located a new booming male here and he has boomed from the same location ever since. This bird has been carefully observed over 3 breeding seasons but appears to be on his own. Prior to 2011, I had not seen a bird in the Taipo stream area for 2 decades.

Ohingaora Wetland

A booming bird turned up on this privately-owned wetland approximately 5 years ago and follow up work is required to learn more.

Private Wetlands Adjacent to Crown Wetlands

3 magnificent wetlands occur on Ginny & Lloyd Caves property and some priceless habitat enhancement work has been put in place here. Two of those wetlands have been fenced and planted, the 3rd has had the outlet raised and is already fenced. Two known booming sites occur here, and females are observed with the two males during the breeding seasons.

BIODIVERSITY NOT BIRO-DIVERSITY

Bittern have been successfully used as a flagship species to bring into focus the plight of our last remaining wetlands in New Zealand. It has been that vehicle we have utilised to gain access to finance to do something positive to address that plight.

We have approximately 20,000 North Island Brown kiwis but only approximately 750 - 1000 bitterns in New Zealand. Australasian bitterns have recently been reclassified as critically endangered nationally, giving them the same status as kakapo, takahe, NZ shore plover etc. That is a very powerful statistic and bitterns need all the help they can get.

However, many other wetland species, both bird and fish, have also benefited. Everything is connected.

This project has already proved to be a winner and only cost \$35,850.00.

MAMMALIAN PREDATOR REMOVAL OPERATIONS

Mammalian Predator Traps

- 2015 Trapping Network ●
- 2018 Expanded Network ●

Trapping Data 2015 - 2018	
Cat	79
Hedgehog	496
Rat	84
Mouse	6
Stoat	16
Weasel	14
Ferret	8
Other	25



Anecdotal evidence is known of feral cats taking bittern, I suspect that stoats and ferrets are also capable of doing like wise. Of weasels I am not sure but remove the lot anyway. Since this project started, 79 feral cats have been removed from the area up until 2018.

I suspect that female bitterns are vulnerable to predators especially during the breeding season. I am sure predators back scent on females traveling to and from the nest during food gathering trips which would increase significantly with hungry chicks a foot. John Cheyne and I are of the belief that this is the reason we have an imbalance of females in favour of males.

Heavy trapping and an increase in bittern numbers at Ahuriri would tend to support that suspicion.

The win-win for adjacent farmers is that feral cats carry toxoplasmosis which is passed on to sheep. Breeding ewes are vulnerable to this disease which causes them to abort their lambs, the vaccine is \$2 per animal.

We have developed some innovative methods of removing predators at the bittern blocks. Always remember the old saying – curiosity killed the cat! and this also applies to other species you are targeting. The key is to overload all their senses to draw them into your kill zones.

Always keep in mind that it is shallow ephemeral water and habitat that is the key for bittern management and your trapping work is a very important component but is the icing on the cake and must be done in tandem.



HUMAN DISTURBANCE

Bittern are a shy and reclusive species that are highly susceptible to human disturbance.

We must be acutely aware of this when walkways and cycle ways are promoted into our last remaining semi wilderness wetlands. 24/7 human disturbance and bittern will simply abandon sites. Several recent local instances of this are known in Hawke's Bay i.e. Lakes Rototuna and Rotoroa at Kuripapango, Westshore Wildlife Refuge and Muddy Creek.

The use of drones and trail cameras need to be carefully monitored. These critically endangered birds, particularly during the breeding season, should not be subjected to interference without sound reason.

Bittern appear to be on the cusp of population collapse as has happened with other species. We should be doing all we can to protect them from any interference during nesting.

THEIR FUTURE AND SURVIVAL IS IN OUR HANDS!

Acknowledgements

One man is not an island and this project could not have been achieved without help from others. I wish to acknowledge the following:

Landowners – The late Bruce Jans, former owner of Seafeld Farms and his manager Simon Adam. The Holt and Cave families, Pamu/Ahuriri Landcorp staff, particularly former manager John Ferguson.

The Department of Conservation Ahuriri/Napier staff.

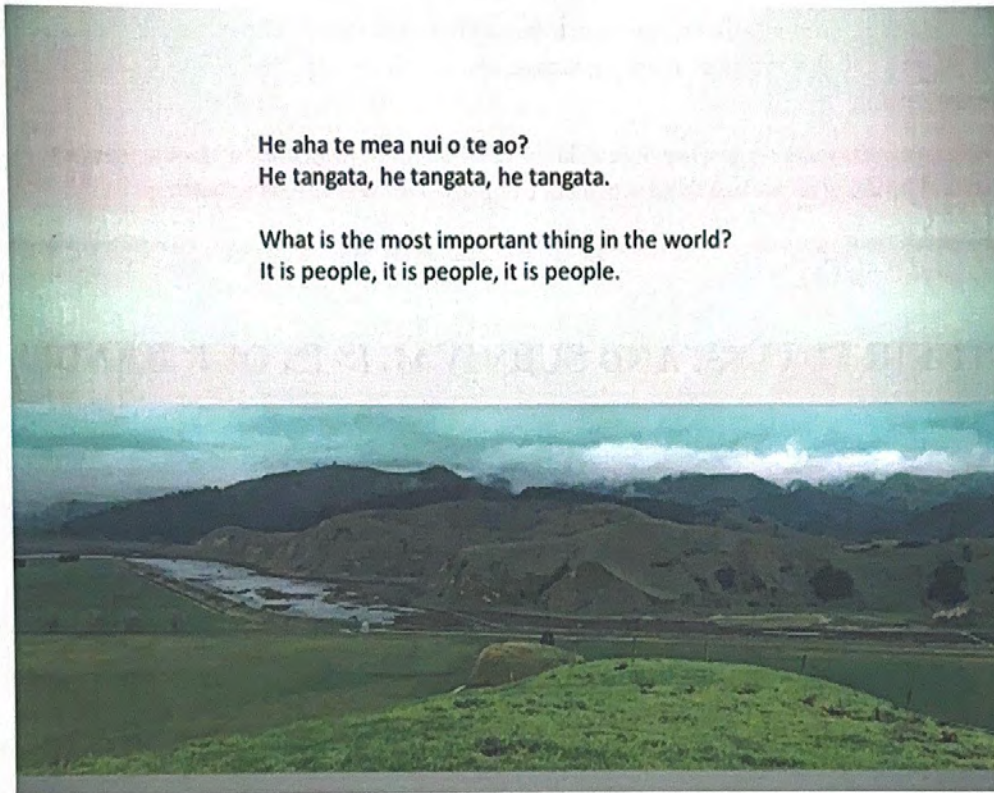
The Hawke's Bay Regional council and staff.

Local Iwi, particularly the old people and the late John Hohepa, Ranui Toatoa and Heitia Hiha.

Matua Wines for their donation of \$13,000 which got this project rolling.

Napier City Council.

My former Wildlife Service colleagues who generously passed on their knowledge and skills, particularly John Cheyne.



He aha te mea nui o te ao?
He tangata, he tangata, he tangata.

What is the most important thing in the world?
It is people, it is people, it is people.

Hans Rook

2018

Addendum 2024: PRE & POST CYCLONE GABRIELLE – 14 FEBRUARY 2023

Prior to the catastrophic Cyclone Gabrielle that hit Hawke's Bay on 14 February 2024, Hawke's Bay had faced several back-to-back summer and winter droughts that had severely impacted the Ahuriri Estuary wetlands. Many of the resident bittern had moved from the wetlands to parts unknown prior to the cyclone.

Bittern are long haul flyers and self-introduced to New Zealand from Australia, both North and South Island and the Chatham Island however they no longer occur on the Chatham Island today. They can travel long distances to find a suitable wetland when necessary. These droughts are not uncommon in Hawke's Bay and the birds will return once our wetlands reflood and food species re-establish.

Cyclone Gabrielle impacted many wetlands in Hawke's Bay and to date no booming has been heard at the Ahuriri Estuary. We will be monitoring the situation, however, once the water levels and food source return to previous levels I am quite confident that birds will return.



Ahuriri Estuary 6 February 2024

From: Colin O'Donnell
Sent: Wednesday, 22 May 2013 11:16 a.m.
To: Hans Rook
Subject: RE: MATUKU PAPER ON PREDATION OF THESE BIRDS

I have only come across 2 reports of cats killing adult matuku - which is not that surprising given their cryptic nature and the fact that a cat is unlikely to bring them home (like rails).

So yes I think it is an issue

Below is a list of the predators that have been recorded killing swamp birds

Cheers
 Colin

Species	Cat	Stoat	Ferret	Weasel	Rats	Dog	Unidentified predators	Sources
Australasian bittern	X							P. C. Taylor pers. comm.; P. Langlands pers. comm. Hayes & Williams 1982; Barker 1999; Holdaway 1999; Williams 2001; Parrish & Williams 2001; Barker & Williams 2002; Skilton 2009
Brown teal	X	X			X	X		Hamilton 1885; Fleming 1939; Stidolph, 1949; Stidolph, 1950; Stidolph, 1955; Sibson, 1957; Sibson, 1960; Westerkov, 1970; Edgar, 1972b; Edgar, 1976; Howell & Gaze, 1986; Kaufmann & Lavers, 1987; O'Donnell & West, 1996; Taylor, 2011; G. Tunnicliffe pers. comm.; S. Moore pers. comm.
Marsh crake	X	X				X	X	Hamilton 1885; Pycroft 1898; McKenzie, 1947; Stidolph, 1951; Bibby, 1954; Bell, 1955; Sibson, 1957; Sibson, 1961; Howard, 1962; McKenzie, 1963; Kendrick, 1966; Edgar, 1972b; St Paul, 1977; Ogle & Cheyne 1981; Kaufmann & Lavers 1987; Tennyson & Lock, 2000; Guthrie-Smith 1921, 1925; Falla, 1954; Sibson, 1958; Oliver 1955; Edgar, 1972b; Edgar, 1972a; Elliott 1983; Howell & Gaze, 1987; Marchant & Higgins 1993; Graeme & Parrish, 1994; Tennyson & Lock, 2000; Parker & Brunton 2004; Chau Phing Ong pers. comm.; B. Cash pers. comm.
Spotless crake	X	X	X		X	X	X	Guthrie-Smith 1914; Stead 1948; Oliver 1955; Bell 1978; Elliott 1978; Barlow & Moeed 1980; Fitzgerald & Veitch 1985; Kater 1999; Parker 2002; van Klink et al. 2012
Banded rail	X	X	X	X	X	X	X	Buller 1874; Moncrieff 1938; Roser & Lavers (1976); Rickard (1996)
Fernbird	X	X			X	X	X	
"Rails"	X	X	X			X	X	

WILDLIFE HABITAT REQUIREMENTS

Waterbirds require many specific conditions to meet their seasonal needs throughout the year and these should occur in the right proportions. The main requirements are as follows:

PERMANENT WATER

. Permanent water alone is not sufficient without some or all of the following.

SHALLOW WATER

. Waterfowl and wading birds do most of their feeding in shallow water areas less than 0.4 metres deep. This is because plant and animal food are more abundant because of physical factors and is more accessible to wading birds and swimming birds alike. Seasonally flooded shallows produce more food than those permanently covered in water.

SLOPING MARGINS

. Sloping margins are preferred by waterbirds allowing them to walk out of the water to rest or enter the water for food.

LOAFING SPOTS

. Open margins, low lying mud banks and half submerged logs provide ideal places where waterfowl can rest and sun themselves.

IRREGULAR EDGE

. As the edge of a wetland area provides most of the best places for feeding, loafing and shelter, the more irregular the edge, providing a longer length, the better.

ISLANDS

. Islands provide additional edge as well as the least disturbance for nesting and loafing sites.

GROUND COVER

. Patches of tall grass or low bushy shrubs close to, or within a wetland provide good nest sites. Ideally the extent of this type of cover should be about 50/50 open water, vegetation.

OVERHEAD COVER

. Trees such as some willow species e.g., weeping willow, overhang the water and provide cover for young birds before they can fly. Such trees or groups of trees also provide essential cover for moulting adults at a time of year when they are flightless and thus most vulnerable to predation. Sedges, rushes, or other emergent vegetation growing in the water also provide essential escape cover as well as secluded breeding and resting areas.