Hihi (Stitchbird) Breeding on Tiritiri Matangi Island

2014 – 2015 Breeding Season

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Note: There is a data embargo in place so please contact John Ewen prior to using data reported.

1. Summary

1.1 KEY RESULTS FOR THE CURRENT YEAR
This season saw a continued reduction in hihi numbers and productivity, with the lowest number recorded in a pre-breeding survey since 2008 and the smallest number of fledglings produced since the 1999-00 season. 141 and 133 individuals were recorded in the September 2014 and February 2015 censuses respectively. The first egg was laid on the 22nd October 2014 and the last chick fledged around 16th February 2015. 53 females bred over the course of 83 nesting attempts, with 295 eggs laid, of which 200 hatched and 88 fledged.

1.2 PIT-TAGGING
This year, we began applying PIT-tag-embedded rings to hihi. These rings are plastic colour bands slightly longer than those traditionally used, with an integrated passive transponder, similar in size to a grain of rice, running along their length. These rings act as unique identifiers for their bearers, which can be read wirelessly by a data logger mounted, for example, on a feeder. This technology would allow for richer and more accurate population data, amongst other possibilities.
About half of the adult population has been tagged. Tagging stopped when one individual was found with a ring slipped over his foot, causing injury to his toes. A second individual has since been detected with a similar injury.
Focus has now shifted to repositioning these tags to a position above the metal ring, where the risk of slippage over the foot is all but eliminated. This work continues while all individuals with PIT tags are being closely monitored for any issues.

2. Introduction

2.1 BACKGROUND
The hihi, or stitchbird (*Notiomystis cincta*), is an endemic forest-dwelling passerine that was once found throughout the North Island. The species declined rapidly in the late 1800s due to a loss of habitat, introduced predators, and possibly disease. The only remaining naturally occurring population is on Little Barrier Island. In addition, there are five translocated populations maintained on Tiritiri Matangi Island, Kapiti Island, Karori Sanctuary in Wellington, Maungatautari near Hamilton, and Bushy Park near Whanganui.
Hihi are sexually dimorphic, territorial cavity nesters with a mating system characterized by extra-pair and forced copulations. They breed between September and March, averaging two clutches of 4-5 eggs each. Hihi forage for nectar, fruit and insects and translocated populations rely heavily on provisioned sugar water in times of scarcity.

2.2 SITE DESCRIPTION
Tiritiri Matangi is a 220 hectare island roughly 3 kilometres long and one kilometre wide. It is located in the Hauraki Gulf, 28 kilometres north of downtown Auckland. Extensively farmed in the 1900's, Tiritiri has been replanted with over 280,000 trees since 1984 in an attempt to recreate the original northern broadleaf coastal forest.
The remnant mature forest on Tiritiriti Matangi is dominated by kohekohe, taraire and pohutakawa. Other species on the island include: taupata, karamu, hangehange, mahoe, mapou, whau, ngaio, puriri, totara, rewarewa, hoheria, hinau, pigeonwood, kowhai, karo, akeake, manuka, kanuka, kawakawa, five finger, houpara, wharangi, rangiora, cottonwood, mingimingi, taurepo, native broom, koromiko, kumarahou, astelia, flax, muehlenbeckia, native jasmine, supplejack, and tree ferns.
Tiritiri Matangi is free from introduced predators, although there are several pairs of morepork (*Ninox novaeseelandiae*) and they are known to eat hihi. Two species of honeyeater, tui (*Prosthemadera novaeseelandiae*) and bellbird (*Anthornis melanura*), occur naturally on Tiritiri and compete with the hihi for food. Aggressive bellbirds regularly displace hihi at the sugar feeders. Tui, however, are excluded from the feeder cages by virtue of their larger size.

2.3 PERSONNEL
The 2014-15 breeding season on Tiritiri Matangi island was managed and monitored by Donal Smith, for the second year running, and Rachel Shepherd, who arrived on the island in October 2014. Victoria Franks, starting her PhD fieldwork on Tiritiri, was part of the team at the start and end of the breeding season.
A major initiative was continued this season with DoC coordinating volunteers for bird work on Tiritiri Matangi working in close coordination with the hihi contractors. The idea being that a set range of jobs would be provided to volunteers who could book in from Sunday through Wednesday via DoC Warkworth. Depending on skill base these volunteers could be set various hihi related jobs, including nest box maintenance, nest checking, supplementary feeding, and band resighting. All volunteers this season were extremely competent and immensely helpful, especially during the busiest times at mid-season. They were: Christina Friis; Aaron de Raat; Robert Hunt; Sophie Kynman-Cole; and Hannah Marley.

3. Methods

3.1 SURVEYS
One pre-breeding and one post-breeding survey were carried out in September 2014 and February 2015 respectively. In each case, approximately 40 person-hours were spent recording band combinations at sugar feeders and surveying the bush patches where nest boxes are located and where birds were seen or heard. Less-experienced volunteers were enlisted for both surveys.

3.2 DISTRIBUTION AND PLACEMENT OF NEST BOXES
All major bush patches on the island contain hihi nest boxes. New boxes were placed in additional areas, Bunkhouse bush and towards Fisherman's Landing, before the start of the season and these were used by Hihi.

3.3 NEST SITE MONITORING
Lined nests were checked almost every day until eggs were laid. When nests had warm eggs or females were seen sitting on eggs for 2 consecutive days, they were not checked for another 12 days (during incubation), but then checked every day to determine hatching date. Nests were then checked every day until chicks were ten days old, after which nests were checked every other day until day 21 (banding), after which nests were not checked until day 29 (and thereafter every day) to obtain date of fledging.

3.4 NEST BOX MAINTENANCE
Nest boxes that were used for roosting during the winter were cleaned at the beginning of the season. As the season progressed, nest boxes that fledged or failed were brought back to base and scrubbed with water, sprayed with trigene, and left to dry in the sun before being replaced. Backboards to boxes were also sprayed with trigene before boxes were replaced.

3.5 SUPPLEMENTARY FEEDING REGIME
Sugar water was provided *ad libitum* in chicken-feeder-style plastic feeders placed in feeding stations at 5-6 locations on the island. Feeders were cleaned in hot soapy water, rinsed, and then sprayed with Trigene, allowing a minumum of 5 minutes contact time. These were then rinsed and left to dry. Feeding stations were cleaned and disinfected with Trigene on Mondays, Wednesdays and Fridays.

3.6 BANDING AND MEASUREMENTS
Nestlings were banded, weighed, measured and had blood drawn at 21 days old. Tarsus measurements were “to the notch” and “full length”; “head- to-bill” was measured from back of the head to the tip of the beak. Each nestling was given a C-size metal band and a combination of 3 plastic colour bands. All plastic bands used were celluloid and sealed using super glue (cyanoacrylate), as we suspect this combination carries the lowest risk of the band being lost. Similar to the previous two years, the alloted band combinations were randomised. Previously, siblings within a single nest box were often banded with 1 colour different between individuals, causing trouble when they became parents and lost bands, often appearing quite similar in both bands and genetics when trying to recreate family pedigrees. For a list of band combinations and measurements please contact John Ewen (john.ewen@ioz.ac.uk).

3.7 HEALTH
Mite control was carried out this year. Nestlings with mites were treated with frontline twice
before nest boxes were replaced with new boxes (as detailed in 3.4) and nests replaced with a fake nest made from wire mesh and polar fleece following the SoP.

4. Results

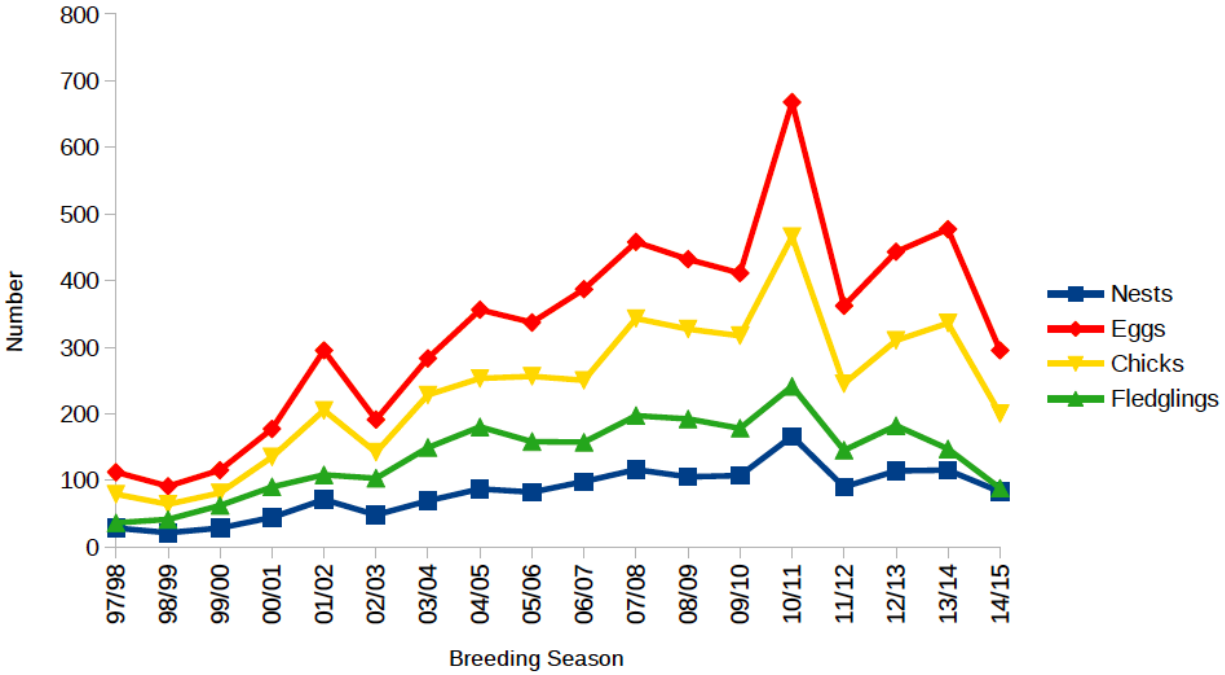

Figure 1: Number of nests, eggs, chicks and fledglings produced on Tiritiri Matangi from 1997 to 2014

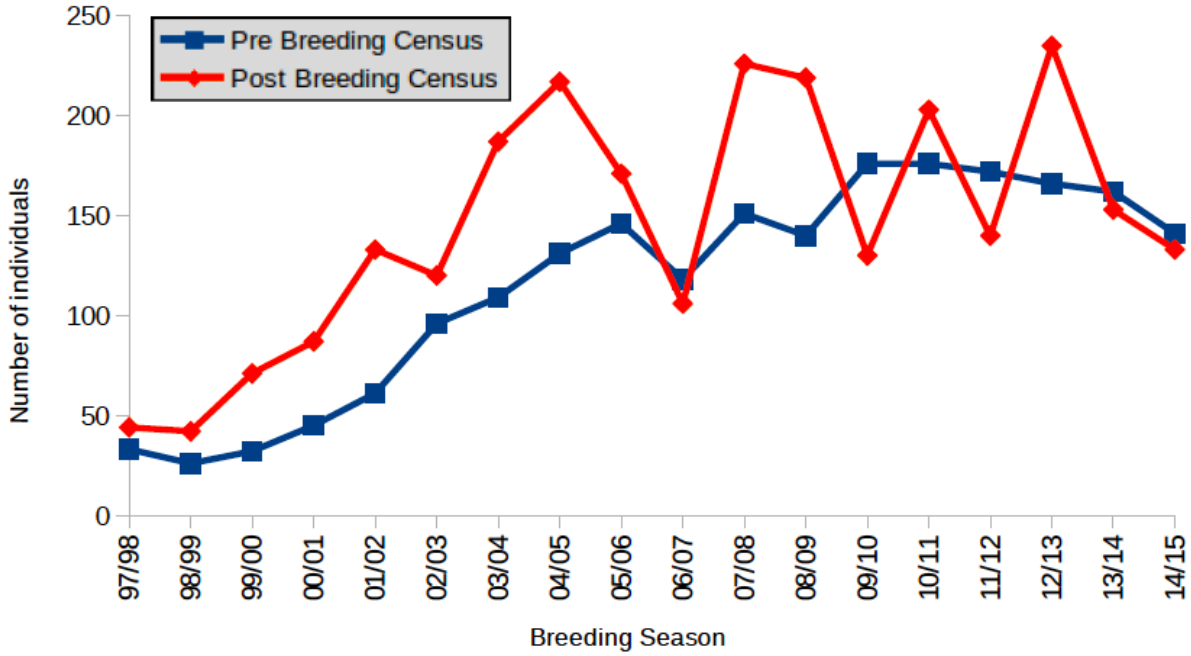

Figure 2: Number of birds recorded each year on Tiritiri Matangi in the two annual surveys from 1997 to 2015 (pre-breeding surveys took place in September/October and post-breeding surveys took place in February/March). Note that the post-breeding survey of 09/10 took place immediately after capture of juveniles for translocation.

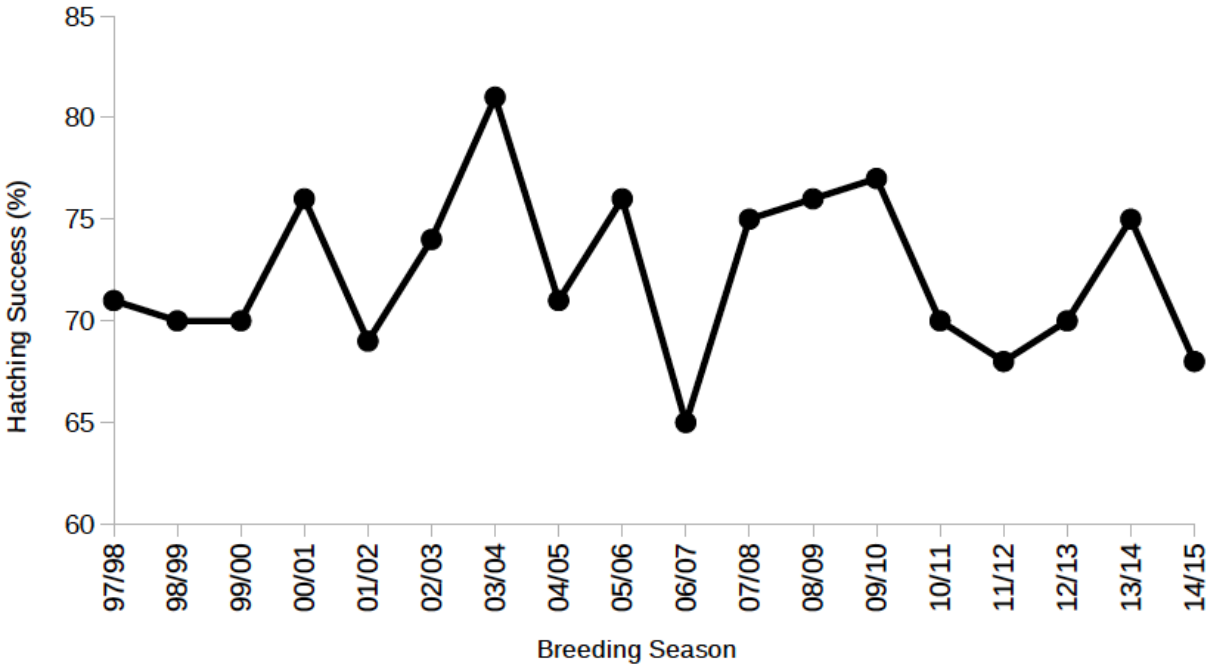

Figure 3: Hatching success on Tiritiri Matangi from 1997 to 2013

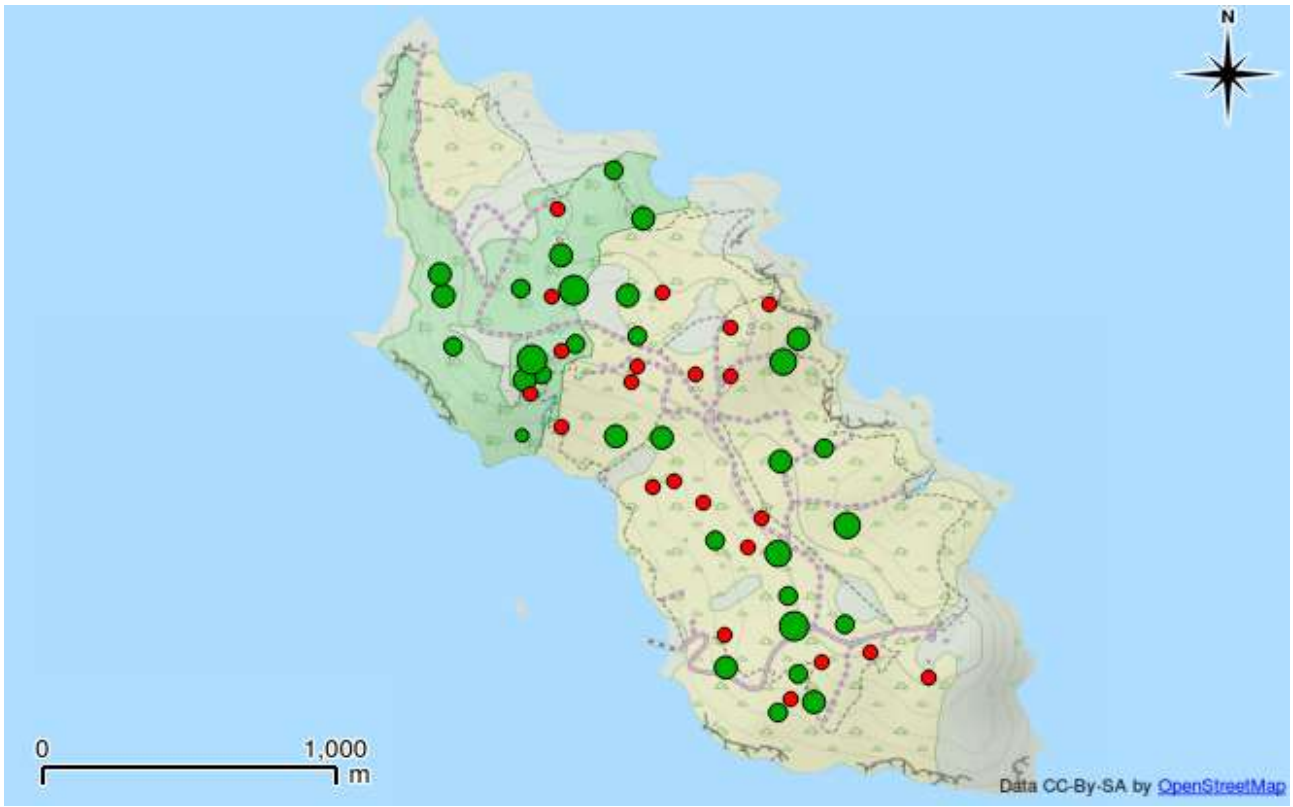

Figure 4: Distribution of breeding hihi pairs on Tiritiri Matangi island. Red circles show the breeding location of pairs unsuccessful in fledging offspring across all breeding attempts this season. Green circles show the breeding location of pairs that were successful in fledging at least one chick this season, their size reflects the number of chicks fledged across all breeding attempts.

5. Colour band loss

The loss of one or more colour bands from an individual hihi results in an incomplete colour combination, making identification during population surveys and breeding monitoring ambiguous. This problem has increased in recent years to the point that 26% of birds recorded in the September 2014 survey were missing one or more rings.

A major effort was made this season to resolve this problem by recapturing affected individuals and applying rings as appropriate and in the process identifying the factors involved in causing the problem.

Hihi on Tiritiri are ringed using butt-end colour bands. These can be composed of one of three different kinds of plastic: celluloid, darvic, and acetal (uncommon). Up until this year, the composition of bands used was not recorded, and a mix of plastic types was used in any given season. These rings were applied onto the birds' legs using a shoehorn-style ring applicator, and squeezed together to form a good join, but not sealed. The means by which rings are lost is not clear, but they have been found slipped over feet and above the tibio-tarsal joint.

The following preliminary conclusions have been made after recapturing 58 individuals with missing rings:

- **Composition:** Rings of all plastics have been lost, however, the firmer, thicker, celluloid rings appear to be the least likely to come off.
- **Sealing method:** super glue (cyanoacrylate) has provided the most resistant hold over months on all plastics. Ados solvent cement has been tested and found to provide a poor seal.
- **Band position:** Bands are lost from all positions, but are most frequently lost from an upper position, i.e. that closest to the tibio-tarsal joint. Sitting over the metal ring does not appear to promote band loss, but some wider darvic rings can slip over the metal ring, especially the narrower Porzana C-bands.

Recaptured adults had their missing rings replaced and sealed with super glue. All of this year's fledgings have been banded with celluloid rings sealed using super glue. The early results of this effort have been promising: just six (5%) of the 133 birds seen in the February 2015 survey were missing rings. The September 2015 survey should be informative as to whether these policies have lasting effects.

7. Acknowledgments

The Department of Conservation and the Supporters of Tiritiri Matangi (SoTM) are critical components of this project. Many thanks to Dave Jenkins and Jason Campbell, the ever-supportive Tiritiri rangers. So many SoTM members were helpful, enthusiastic and interested as always and we appreciate their commitment to the hihi and this island project. Hihi conservation also benefits hugely from the Hihi sponsors, Wesfarmers Industrial and NZ Safety Ltd, it was a great pleasure having the help of Peter Thorne of NZ Safety during September.