Kororā monitoring and research at Pōhatu/Flea Bay

Annual Report 2022-2023

Submitted by Dr. Rachel Hickcox to
the Helps Pōhatu Conservation Trust Annual Meeting
14 March 2023

Helps Pōhatu Conservation Trust

This report was presented by Dr. Rachel Hickcox at the Helps Pōhatu Conservation Trust annual meeting 14 March 2023. It summarises the monitoring and research activities conducted at the Pōhatu/Flea Bay kororā/little penguin colony from 1 September 2022 to 14 March 2023.

Horomaka/Banks Peninsula Kororā Survey 2020-2021

- Mid-year report written jointly with Blue Cradle, presented to Environment Canterbury www.shorturl.at/qzJR5.
- Final nest count data cleaned for analysis.
- Rachel is preparing a scientific paper, which presents the final counts, a map, and other pertinent information. This paper will be submitted to a New Zealand journal for publication in 2023.

Pōhatu Survey 2022

- Volunteers and Pōhatu team leaders conducted a nest count survey in October 2022 in the 'horse paddock' subsection of the Pōhatu colony.
- Used the burrowscope to verify occupancy of nests.
- There were 171 nests in 2020 and 117 nests in 2022.

Monitoring 2022-2023

- We monitored 211 nest boxes in the kororā colony during breeding season 1 September 2022 – 31 March 2023 (Table 1, Table 2).
- We recorded data using the Memento app in purpose-built libraries originally designed by the New Zealand Penguin Initiative.
- The first eggs were laid on 24 August and first chicks hatched on 9 September. However, generally breeding was slightly later than normal based on observations. All chicks fledged or were released by the end of February.
- On 28 December, the team noticed dead chicks in nest boxes and underweight chicks that had not reached 700g at 6 weeks. We proceeded to weigh chicks and based on significant weight loss in many chicks and considering with poor viewing on tour with very few adults seen in the bay in the evening, we concluded that adults were not coming back to feed chicks. This is the third year of La Niña weather patterns causing higher than average sea surface temperatures, which resulted in a marine heatwave during December-January. We suspect poor food availability forced adults to abandon chicks in preparation for moult.
- We decided to supplementary feed and/or rehabilitate underweight chicks, since we had the resources to do so (Table 1). All rehabilitation information will be provided to the Department of Conservation before 1 June.

- Moulting is ongoing, and like breeding, was later than normal. The first moulter was found 9 January and is expected to extend into early April. We weighed the first moulters to make sure they were not underweight, but there was no evidence of starvation like during breeding so only a select few individuals were weighed to determine average moult weights for next season.
- Rachel developed an interactive dashboard (Figure 1) to track key metrics such as the number of marked birds, active nests, chicks, eggs, and failed nests across the colony. The web application is implemented using the Shiny package in R (version 4.2.1). The app is hosted on the Shinyapps.io cloud https://rphickcox.shinyapps.io/pohatuapp/.
    - Includes four tabs, each of which summarises different aspects of the monitoring and research project at Pōhatu.
    - The main page (Figure 6) has tiles for specific metrics pertaining and a map of nests and their activity status for the most current monitoring round.
    - There is also a graph showing the number of eggs/chicks and failed nests over time.
    - The other tabs include information about how many birds have been marked in which nest box, and a map of GPS tracking data.
    - Development of the app is ongoing but will eventually be available for registered users via GitHub and the Shinyapps.io cloud.

Table 1. Summary of monitoring and rehabilitation.

Monitoring	
Nest boxes	248
Monitored nest boxes	211
Active nests (eggs laid)	178
Active nest boxes	171
Eggs laid	353
Chicks hatched	269
Chicks fledged	194
% Chicks marked	74%
Eggs failed	84
Chicks dead	74
Rehabilitation	
Adults rehab	5
Chicks rehab	90
From nestboxes	71
From natural nests	19
Fledged from rehab	79
From nestboxes	63
From natural nests	16

Table 2. Counts of chicks or eggs by their fate. Some eggs did not hatch (preface 'E'), and chicks either died, fledged, or fledged with through intervention/rehab (preface 'C'). Some chicks were *CDead-nos* if cause of death was not confirmed.

EC Fate	**Count**
CFledged	127
CFledgedAssisted	67
CAbandoned	1
CDead-medical	1
CDead-nos	21
CDead-weather	14
CMissing	17
CPredated	7
CStarved	13
EAbandoned	25
EBroken	12
EEmbryodeath	3
EFailed-nos	21
EMissing	18
EOutsidenest	5
Total	**352**

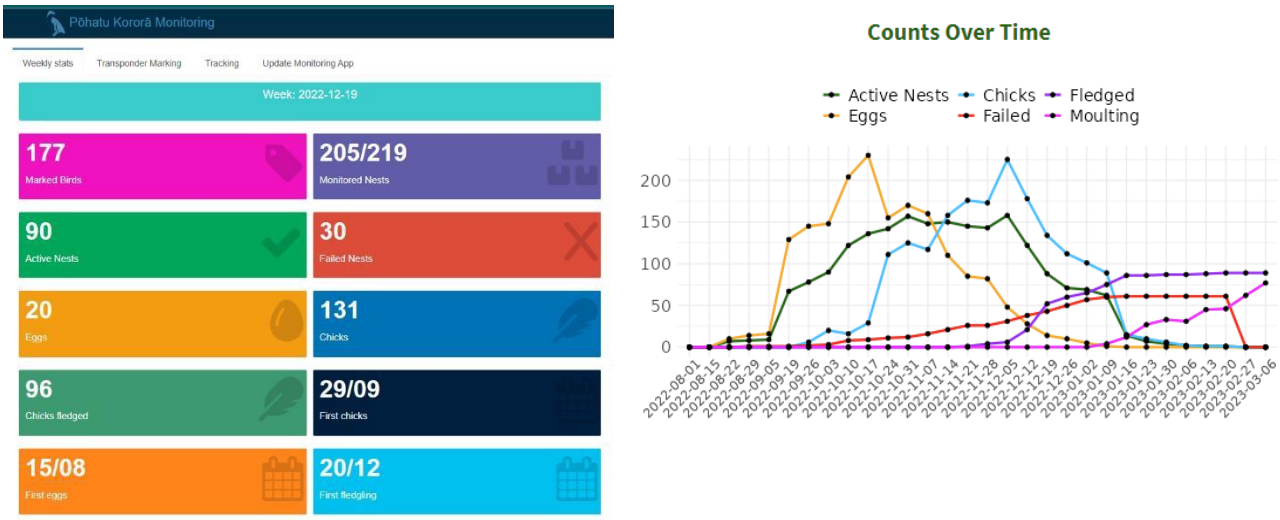

Figure 1. R Shiny dashboard homepage with weekly monitoring information in the coloured boxes, a graph showing number of nests, eggs, chicks, and failed nests over time.

Marking 2022-2023

- We began inserting transponders in adults and chicks > 6 weeks old and 700g, including all rehab birds (Table 3).
- Kevin Parthonnaud is now a level 2 operator, Averil Parthonnaud is waiting for level 2 authorisation. The following are in training for level 2: Joey Cataliotti, Geraldine Guillemot-Peacock, Benoit Navarron, Lucy Howell (UC), Georgia Gwatkin (UC), Alexandra Strang (UC), Michelle LaRue (UC), Sarah Flanagan (UC).
- All marking data will be submitted to the NZ National Bird Banding Scheme by April 30.

Table 3. Summary of transponder marking, summarised for adults and chicks per location.

Marking	Adult	Chick	Total
Flea Bay	**105**	**99**	**204**
Chick in nest	-	84	-
Adult breeding	94	-	-
Adult non-breeding	11	-	-
In rehab/soft release	-	15	-
K&T rehab	**-**	**12**	**12**
Parthonnaud rehab	**1**	**47**	**48**
Total	**106**	**158**	**264**

Research 2022-2023

- We purchased 5 Axytrek marine GPS + time depth recorders (TDR) from Technosmart, Italy, funded by Pub Charity Ltd. and Proteus Research and Consulting.
- We tracked kororā at sea during guard using GPS devices. Devices were retrieved 3-5 days after deployment.
- 1 device was lost in January 2023 on a post-guard adult, who has not been resighted since deployment (box H22).
- The distance the birds travelled (in a straight line) from their nest ranged from 7.9 – 23.5 km. The penguins were foraging south of Flea Bay mostly outside of the Pōhatu marine reserve, with one bird foraging at the mouth of Akaroa Harbour (Figure 2).
- Data analysis in the coming year will determine dive behaviour, general marine distribution and habitat use, and overlap with both the Pōhatu and Akaroa marine reserves.
- Rachel is currently adding all tracking data to Movebank, an online repository widely used for tracking data storage, management, and ease of accessibility.

Table 4. Numbers related to GPS tracking.

Research	
Tracking	Oct 2022
Devices	5 (-1 lost)
Deployments	15
Tracks	13
With GPS + TDR	11

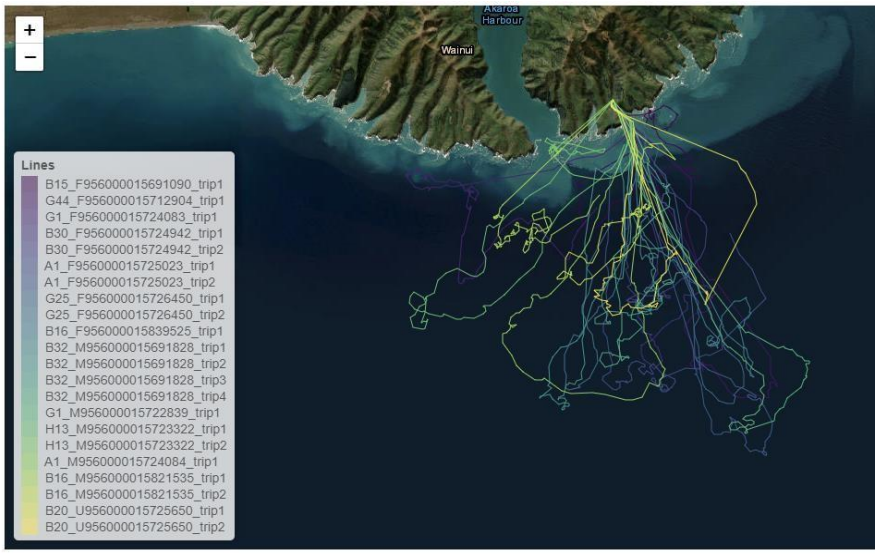

Figure 2. Guard stage foraging tracks for kororā from Pōhatu/Flea Bay, Banks Peninsula. Naming convention in the legend is as follows: *Nestbox number_Sex(F/M)BirdID_tripnumber*. Each line is an individual foraging trip per penguin from a specific nest box.

Planned monitoring, marking, and research 2023-2024

- Winter: fortnightly monitoring 1 April to 1 September 2023.
- Breeding season: weekly monitoring 1 September 2023 to 31 March 2024.
- Intensive GPS tracking during incubation, guard, and postguard.
- Considering premoult and winter tracking.
- Collecting faecal and feather samples for sexing and DNA sequencing.
- Marking additional breeding adults and chicks.
- Rachel will write a general operating procedure for the colony, including a health and safety plan, that outlines the expectations and guidelines for students and researchers while they are on Pōhatu property (see minutes).
- Rachel will write a methodology to collect observational data for the number of penguins observed in the marine reserve.

Collaborator and student projects

Summer students 2022-2023

- **Georgia Gwatkin and Alexandra Strang** (University of Canterbury).

University of Canterbury

- **Lucy Howell**, PhD candidate – study on how behaviour influences kororā health with regards to parasite load, stress hormones.
- **Georgia Gwatkin**, MSc student – TBD.
- **Dr. Sarah Flanagan**, Senior Lecturer in the School of Biological Sciences - kororā diet and genetics using faecal, feather, and blood samples.
    - DOC permit application currently under review.
- **Professor Michelle LaRue**, Associate Professor in the School of Earth and Environment.

University of Otago

- **Kaitlin Bowe**, MSc student – TBD.

Manaaki Whenua/Landcare Research

- **Dr. Chris Niebuhr** – ticks, TBD.

University of Waikato (on hold)

- **Dr. Ang McGaughran**, Senior Lecturer – discussed potential collaboration about eDNA and joint grant applications, but project on hold right now.

New Zealand Penguin Initiative (on hold)

Conferences

11th International Penguin Congress (IPCXI), 4-9 September 2023 in Viña del Mar, Chile

- Poster abstract submitted, waiting for decision (see Appendix 1).
- Rachel will begin planning for the trip.

Oamaru Penguin Symposium, 3-4 May 2023

- Some representatives of Pōhatu will attend (see minutes).
- Rachel may try to attend or present virtually.

2023 NZ Bird Conference and AGM of Birds New Zealand

- Will not attend/present this year.

Funding

Helps Pōhatu Conservation Trust, Adopt a Penguin

- Varying amount for rehabilitation and gear costs.

Environment Canterbury, Waitaha Action to Impact Fund

- $10,000 in 2022-2023 for wages, gear, etc.
    - Annual report submitted for 2022-2023.
- $30,000 in 2023-2024 for wages, gear, etc.
    - Annual report for 2023 due 1 July.

Christchurch City Council, Biodiversity Fund

- $30,462 in 2022 for wages (3 trappers, 1 field assistant, 1 research scientist).
    - Annual report submitted for 2022-2023.

Pub Charity Ltd.

- $7,438.68 for GPS devices and microchip reader.

Lyttelton Port Company

- $6,500 for gear, nest boxes, etc.

Proteus Research and Consulting

- $1,380 for GPS device.

University of Canterbury – in kind donation

- 300 microchips.

Forest and Bird North Canterbury – donation

- 50 microchips.

International Antarctic Centre – donation

- Many boxes of fish.
- Donation from soft toy sales, varying in amount and frequency.

Pōhatu Penguins/Plunge – donation

- Transportation and other costs, see minutes.

Department of Conservation Community Fund - applied

- Current application being considered for $72,030 for wage, gear, etc.

French Embassy French Related Research Projects (F2RP)- preparing application

- Preparing application for $10,000 for penguin bioacoustics research, potential collaboration with **Dr. Nicolas Mathevon**, University of Lyon/Saint-Etienne.

Appendix 1

Abstract being considered for a poster at the 11th International Penguin Congress (IPCXI).

The quest for long-term monitoring, research, and conservation of the little penguin/kororā

Rachel P. Hickcox[1*], Averil Parthonnaud[1], Kevin Parthonnaud[1]

[1]Helps Pōhatu Conservation Trust
[*]Email: rphickcox@gmail.com

Long-term research projects are vital to implementing effective conservation management and advancing knowledge about a species. In some instances, repeated data collection over many years results in post-recognition of the project as long-term. Alternatively, a project is started with the intention of becoming a long-term programme. While some actions are unique to managing a specific project, both ways follow a common process of (1) conceptualisation and defining objectives, (2) creating the initial project plan, (3) applying for permits and funding, (4) refining protocols and methodologies, (5) preparing for field work, (6) training, (7) annual data collection, (8) data analysis, and (9) sharing results and measuring conservation success. Here we present these steps specific to the establishment of the Pōhatu/Flea Bay little penguin (*Eudyptula minor*) long-term monitoring and research programme by the Helps Pōhatu Conservation Trust. On the quest to better understand the population dynamics of the largest mainland colony of little penguins in New Zealand and to develop effective conservation strategies, we monitor a subsection of over 200 nest boxes using a combination of field observations, transponder marking, and GPS tracking. We are also conducting research on penguin habitat use, foraging behaviour, and diet. Our collaboration with several organisations provides opportunities for training and research for students and early career researchers. We believe that this programme provides a model for the establishment of similar long-term projects for other penguin and marine species around the world.