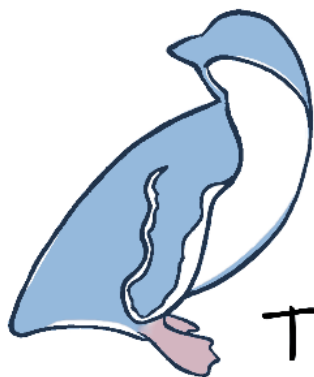


# Kororā monitoring and research project at Pōhatu/Flea Bay

2023-2024 Annual Report

*Prepared by Dr. Rachel Hickcox*

*10 June 2024*



Helps  
Pōhatu  
Conservation  
Trust

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# 1 Overview

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This report summarises the monitoring and research activities conducted at the Pōhatu/Flea Bay kororā/little penguin colony from 1 September 2023 to 30 April 2024. It includes information on the kororā/little penguin monitoring program, tracking at sea, and rehabilitation as well as predator trapping and community outreach and education.

## 2 Permits

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**94750-FAU** Wildlife Authority issued to the **Helps Pōhatu Conservation Trust**, 20 October 2021-29 September 2031.

**96058-FAU** Rehabilitation Authority issued to the **Helps Pōhatu Conservation Trust**, 1 November 2021-31 October 2026

**103681-FAU** Wildlife Authority issued to the **University of Canterbury**, 7 March 2024-6 March 2034.

## 3 Health and Safety, Standard Operating Procedures

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A health and safety plan and standard operating procedures for research and monitoring were written in 2023. These are provided to all trustees, students, researchers, and long-term volunteers and outline the expectations and guidelines that must be followed while on Pōhatu property and within the colony. They can be supplied on request.

## 4 Funding

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Activities/gear	Total received	Reporting
<b>Helps Pōhatu Conservation Trust, Adopt a Penguin</b>		
Scientist wage, gear	\$28,891	HPCT financial report
<b>Environment Canterbury, Waitaha Action to Impact Fund</b>		
Scientist wage, gear	\$10,000 (2022) \$30,000 (2023) \$10,000 (2024)	Annual report and final report
<b>Christchurch City Council, Biodiversity Fund</b>		
3 trappers	\$32,110 (2023)	Annual report
1 field assistant	\$7,668.10 (2024)	
<b>Pacific Development and Conservation Trust (Department of Internal Affairs)</b>		
Virtual reality, map, short documentary	\$15,000	Annual report Public release of VR platform
<b>Pub Charity, Ltd.</b>		
5 Axy-trek GPS; Transponder reader	\$7,438.68 (2022)	Invoice
6 Axy-trek GPS	\$7,741.77 (2023)	Invoice
<b>Department of Conservation</b>		
1 trapper	\$810	Invoice
<b>Proteus Research and Consulting</b>		
1 GPS device	\$1,380.00	Invoice; updates
<b>Forest and Bird South Canterbury</b>		
50 transponders	\$347.50	n/a
<b>International Antarctic Centre donations</b>		
Boxes of fish	In-kind	n/a
Scientist wage, gear	\$6,398	Invoice
<b>University of Canterbury (in-kind)</b>		
200 transponders	\$1,598.50 (2022)	n/a
300 transponders	\$2,397.75 (2024)	n/a
3 students field assistance	In-kind	n/a
<b>Pōhatu Penguins/Plunge</b>		
Transportation, gear, wages	\$14,029.75	n/a

## 5 Pōhatu annual survey

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Pōhatu team leaders (Rachel, Averil, Joey) and eight volunteers conducted a nest count survey on 12-13 November 2023 in the ‘horse paddock’ subsection of the Pōhatu colony. We used the burrowscope to verify occupancy of nests. Kobo Toolbox was used again to record the data, and nests coordinates were determined using handheld GPS units. Paths were tracked for one person in a pair. There were 171 nests in 2020, 129 in 2021, 117 nests in 2022, and 126 nests in 2023. Dr. Rachel Hickcox is also preparing a scientific paper of the final counts, a map, and other pertinent information from the Horomaka/Banks Peninsula Korora Survey 2020-2021. This paper will be submitted to a New Zealand journal for publication, hopefully by the end of 2024.

## 6 Monitoring program

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### 6.1 Monitoring – breeding season

We monitored over 230 kororā nestboxes weekly from 1 September 2023-31 March 2024 and fortnightly thereafter until the start of the 2024-2025 breeding season. At each nest, we recorded the nest activity (breeding, non-breeding, moulting), occupancy (number of adults, eggs, or chicks), and general observations including chick age and body condition. We recorded all data like last year using the Memento app in purpose-built libraries. In 2022-2023, the first eggs were laid on 10 August and first chicks hatched on 27 September. In 2023-2024, the first eggs were laid on 23 August and first chicks hatched on 25 September. **Table 1** shows breeding season statistics. Breeding season demographics are very similar to those reported by Allen et al. (2011)<sup>1</sup>.

Dr. Hickcox developed an interactive dashboard in 2022 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) and hosted on the Shinyapps.io cloud <https://rphickcox.shinyapps.io/pohatuapp/>. It includes four tabs, each of

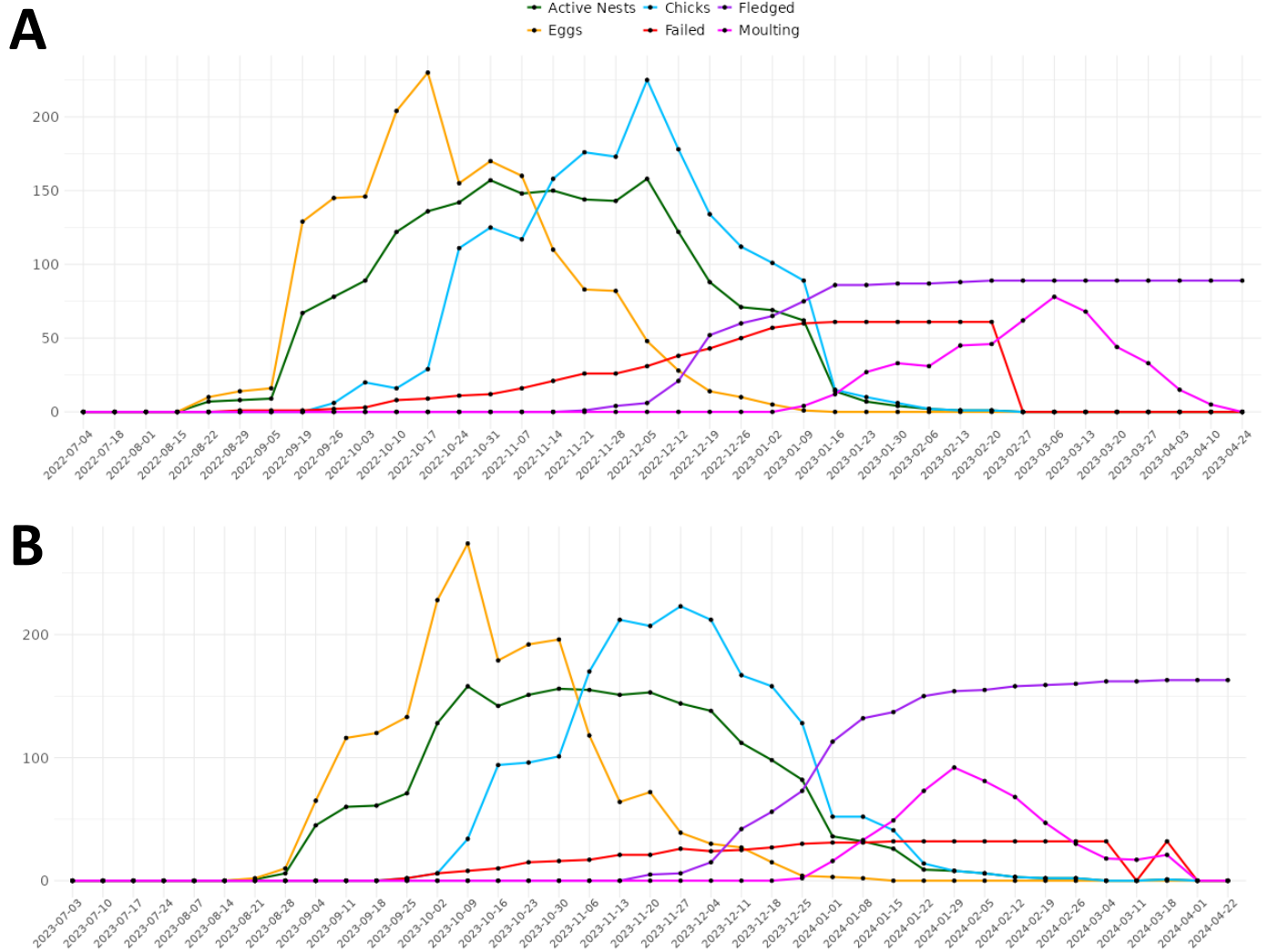
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<sup>1</sup> Allen, W. J., Helps, F. W., & Molles, L. E. (2011). Factors affecting breeding success of the Flea Bay white-flipped penguin (*Eudyptula minor albosignata*) colony. *New Zealand Journal of Ecology*, 35(3), 199–208.

which summarises different aspects of the monitoring and research project at Pōhatu. The main page 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 (**Figure 1**). The other tabs include information about marking and the generation of notifications, supplying a table showing which chicks need to be marked per week. Development of the dashboard is continual.

**Table 1.** Breeding statistics for 2022-2023 and 2023-2024.

	2022	2023
Nests/breeding pairs	178	180
Nestboxes	171	174
Nestboxes with multiple clutches	14	12
Failed nests	56	33
Nests with uplifted chicks	50	13
Nests with fledged chicks	72	134
Eggs laid	353	355
Single egg nests	3	5
Nests: no eggs hatched	28	21
Nests: one egg hatched	31	29
Nests: two eggs hatched	210	239
Chicks hatched	269	289
Chicks fledged	195	248
Natural	127	230
Assisted (rehab, SF)	68	18
Supplement fed (SF)	27	4
Hatching success (%)	76.2	81.41
Fledging success (%)	72.49	85.81
Natural fledging success (%)	47.21	79.58
Hatching Success (hatched chicks per pair)	1.51	1.61
Fledging Success (fledged chicks per pair)	1.1	1.38
Fledging Success (natural fledged per pair)	0.71	1.28
First lay date	10 Aug	23 Aug
Mean lay date	2 Oct	30 Sep
Last lay date	17 Dec	20 Dec
First hatch date	27 Sep	25 Sep
Mean hatch date	8 Nov	2 Nov
Last hatch date	1 Jan	12 Jan
First fledge date	15 Nov	5 Nov
Mean fledge date	1 Jan	26 Dec
Last fledge date	25 Feb	9 Feb



**Figure 1.** Counts for the (A) 2022-2023 and (B) 2023-2024 breeding season per monitoring week. The numbers of nests that failed (red line) and chicks that fledged (purple line) are cumulative, while all others are provided per week. Note different x axes.

On two separate occasions, two male sea lions spent 2-6 days on the beach during November and December. We also had a crested penguin spend about 3 weeks moulting near Black Hole, a land-inaccessible area of rocks and boulders.

## 6.2 Monitoring – moult season

Throughout the breeding and moult seasons, we resighted 10 juveniles that were marked last year, many of which were ex-rehab chicks. The first moult was sighted on 1 January 2024 and concluded by 1 April 2024. The peak of moulting occurred significantly earlier in late January this year compared to early March in 2022-2023. Of all the marked adults and juveniles in the colony, we resighted 113; 73 birds were not resighted during the moult.

## 6.3 Marking

Continuing from the 2022-2023 season, we marked both chicks and adults from some of the active boxes with a passive integrated transponder (PIT or microchip) to identify each penguin in the box. When marking, we recorded bird weight and bill measurements, took photos of the flippers (to classify morphology based on unique markings), and took feather samples for future DNA and isotope analyses. Transponders are inserted by a qualified person (according to the New Zealand National Bird Banding Scheme through the Department of Conservation), following best practice. Dr. Rachel Hickcox is a qualified Level 3 trainer, so she oversees all marking at the colony and is currently training members of the Trust and students/staff from the University of Canterbury. We also work in close collaboration with the Oamaru Blue Penguin Colony and DOC as a training location. For instance, we welcomed a staff member from Wildlife Management International for two days of training.

Several HPCT trustees and students were trained this year and are currently waiting for a decision from the Department of Conservation Bird Banding Office about advancement from level 1 to level 2 in the NZ National Bird Banding Scheme.

- Averil Parthonnaud (L2 2022)
- Kevin Parthonnaud (L2 2022)
- Lucy Howell, University of Canterbury PhD student (L2 2024)
- Joey Cataliotti (L2 under consideration)
- Geraldine Guillemot-Peacock (L2 under consideration)
- Georgia Gwatkin, University of Canterbury Masters student (L2 under consideration)
- Kaitlin Bowe, University of Otago Masters student (L2 under consideration)
- Benoit Navarron (L1, complete L2 training 2024 breeding season)
- Jess Helps (L1, training 2024 breeding season)



- Michelle LaRue, University of Canterbury (L1 2022)
- Sarah Flanagan, University of Canterbury (L1 2022)
- Alexandra Strang, University of Canterbury (L1 2022)

**Table 2** summarises the total number of adults and chicks that have been marked in the colony, including those marked at Christchurch Penguin Rehabilitation and subsequently released at Pōhātu. In total, 521 birds are marked with transponders. All marking records for both Pōhātu and Christchurch Penguin Rehabilitation were submitted and accepted in April 2024 into the FALCON database maintained by DOC, as part of the NZ National Bird Banding Scheme and annual reporting process.

**Table 2.** Marking statistics for 2022-2023 and 2023-2024.

	2022	2023	Total
Marked adults (Pōhātu)	110	44	154
Marked adults (Pōhātu rehab)	2	2	4
Marked adults (Christchurch rehab)	3	2	5
<b>Marked adults (total)</b>	<b>115</b>	<b>48</b>	<b>163</b>
Marked chicks (Pōhātu)	101	177	278
Marked chicks (Pōhātu rehab)	45	11	56
Marked chicks (Christchurch rehab)	16	8	24
<b>Marked chicks (total)</b>	<b>162</b>	<b>196</b>	<b>358</b>
<b>Percent fledged/released chicks marked</b>	<b>~83%</b>	<b>~79%</b>	<b>~80%</b>
<b>Total</b>	<b>277</b>	<b>244</b>	<b>521</b>

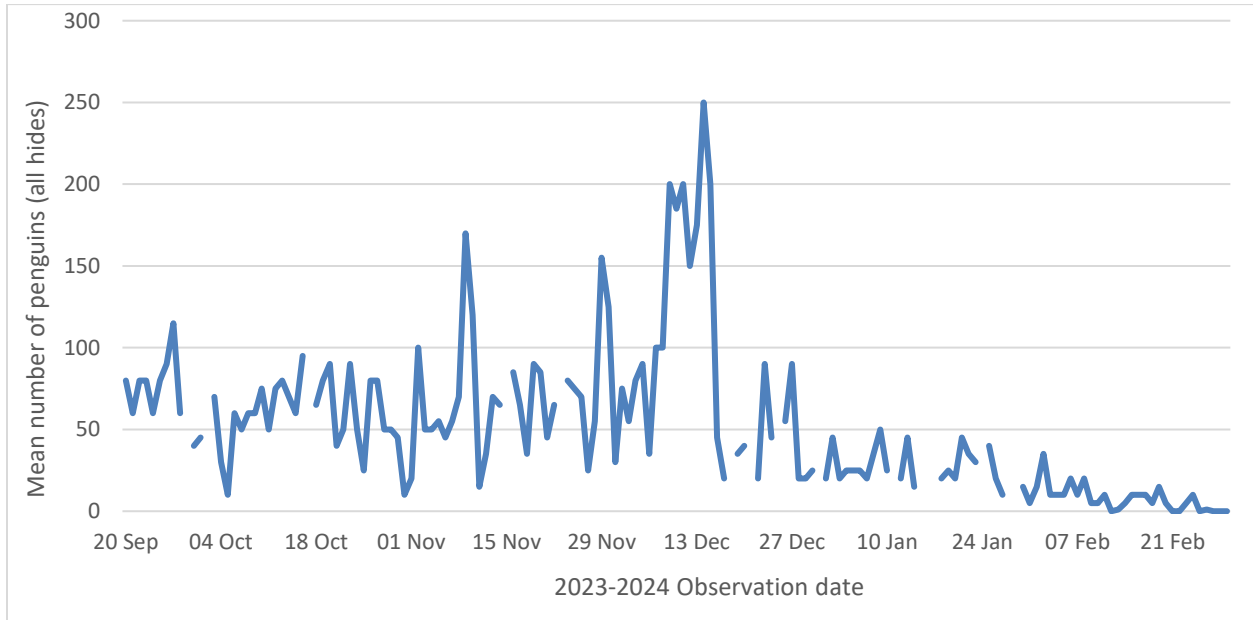
## 6.4 Bay counts

To get a better idea of intraseasonal trends, this breeding season, we began recording how many penguins we were observing on the water and on the rocks during evening tours. This data has been graphed (**Figure 2**), showing the decline in numbers beginning in February. Tours did not occur in March due to the low return rate of penguins. Due to the amount of missing data and the variation in responses due to the written diary method we employed, a [Google forms](#) was created to record all pertinent information for all tours (not just the evening tour). The form went live on 1 June 2024. Guides input the time, date, and tour. They then record observations as tick boxes (categorical) for the number of penguins on the water that they

observed from each hide (0, 1-5, 5-10, 10-20, 20-30...), the number of rafts (2 or more penguins), the number of penguins onshore at various locations, the weather conditions, and if it was a full moon. See this document to view the form questions.



Google forms questions



**Figure 2.** The mean number of penguins observed in all hides during the 2023-2024 evening tours by guides.

## 7 Research projects

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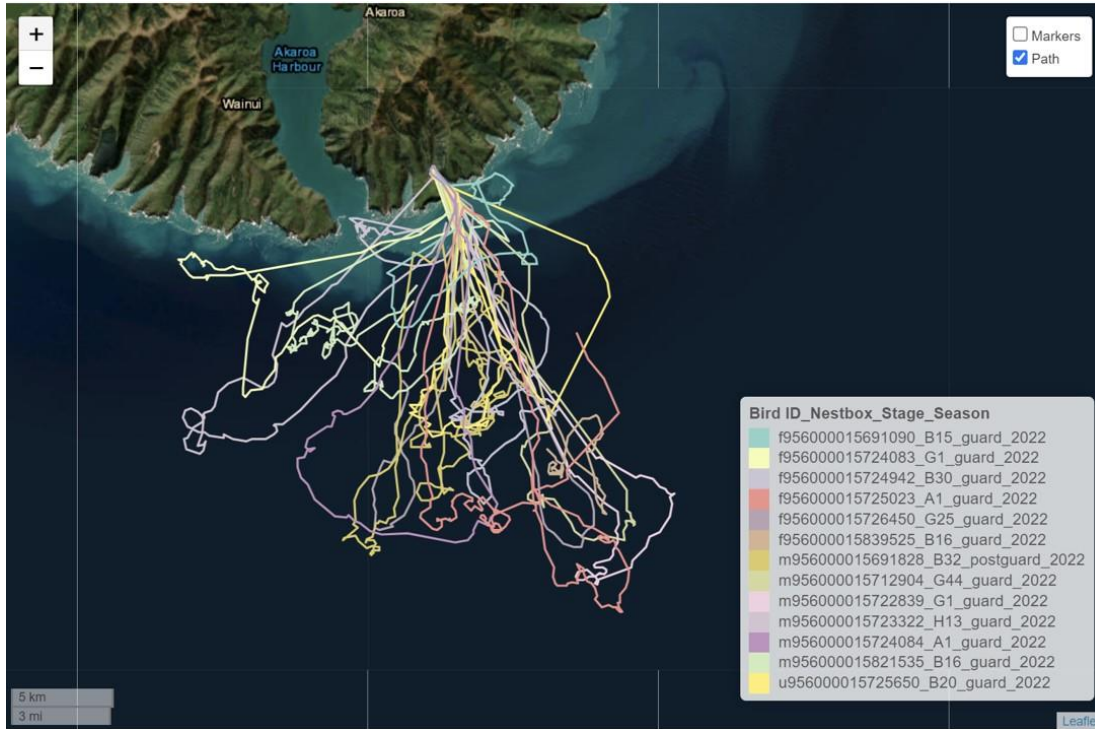
### 7.1 Tracking at sea

We carried on GPS tracking at sea, but also tracking during incubation and post-guard this year. We received funding for an additional six Axytrek marine GPS/dive loggers (see Section 2), so now we have 10 devices. In 2022-2023, 15 adult kororā guarding chicks were tracked (**Figure 3**). Unfortunately, one adult was never resighted at the nest box or around the colony, so the GPS was not retrieved. It is unclear if this penguin was a breeding adult, so it could have possibly been a visiting non-breeder. Thus, we had 14 successful deployments with 22 daily foraging trips paths from 13 of those. In 2023-2024, we deployed 18 times, seven during incubation, five during guard, and six during post-guard (**Figure 4**). Three birds never went to sea during incubation over the 5-day tracking period, so only four incubation deployments were successful. Thus, we had 15 successful deployments with dive data, and no devices were lost.

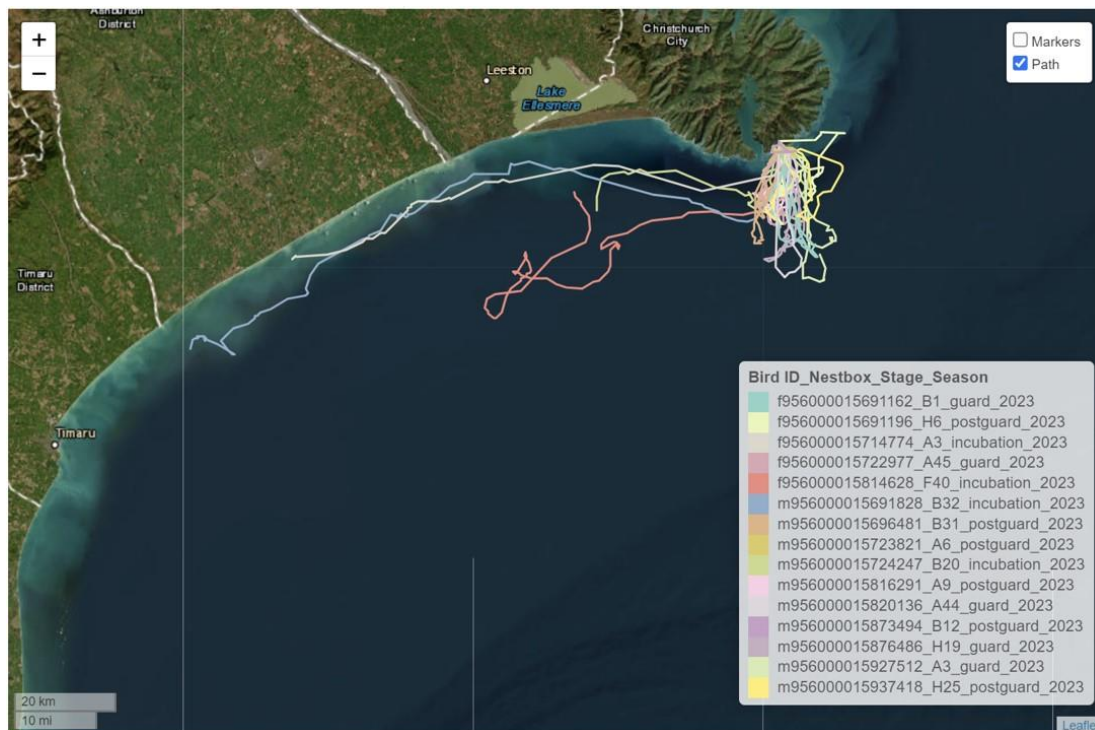
All the birds tracked during incubation undertook long 9+ day trips travelling southwest into the Canterbury Bight (>120km from Pōhatu). Due to the batteries dying after three or four days, we do not have the return journeys from these trips, so their total foraging distance could be much further. We will investigate different GPS settings for incubation next year to try to extend the battery life and obtain more of the foraging trip. While these distances are not uncommon for other colonies (e.g.  $102 \pm 69$  km, maximum 214 km in Marlborough 2015<sup>2</sup>), this is the first time it has been described for the Pōhatu colony. Two individuals stayed less than 1km from shore during their entire post-guard foraging trip, foraging in Damons Bay to the west and around the headlands. Additional dive and foraging data analysis is ongoing. All tracking data is available on the online repository Movebank (<https://www.movebank.org/pohatupenguins>).

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<sup>2</sup> Poupart, T. A., Waugh, S. M., Bost, C., Bost, C.-A., Dennis, T. E., Lane, R., Rogers, K., Sugishita, J., Taylor, G. A., Wilson, K.-J., Zhang, J., & Arnould, J. P. Y. (2017). Variability in the foraging range of *Eudyptula minor* across breeding sites in central New Zealand. *New Zealand Journal of Zoology*. <https://doi.org/10.1080/03014223.2017.1302970>



**Figure 3.** Foraging tracks during the 2022-2023 guard stage. Naming convention in the legend is: Nestbox Number\_Sex(F/M) BirdID\_tripnumber.



**Figure 4.** Incubation, guard, and post-guard foraging during the 2023-2024 breeding season.

Dr. Hickcox is currently developing an R Shiny app for GPS and dive data processing (**Figure 5**). It allows users to upload raw files obtained from the Axytrek devices and then runs a series of functions to clean extraneous points, identify different foraging trips, calculate metrics including distance travelled, trip length, number of GPS points, etc., and interpolate to a consistent fix rate (e.g., every 3 minutes). Under development is the dive data processing, which will similarly clean the uploaded data, determine dive events, associate GPS locations to each dive, and calculate metrics including the number of dives, min/mean/max dive depth, and dive profiles. All data can then be exported for further use. Additionally, several maps are created to visualise both GPS and dive data. The application is implemented using the Shiny package in R (version 4.2.1) and will be available on GitHub upon request.

### GPS and Dive Analysis

**Instructions**

This app processes GPS data for little penguins tracked at sea with Technosmart Axytrek marine 3D devices.

1. Choose a CSV file exported by X Manager.
2. File should be named as 'Nestbox\_senID\_stage\_year\_file.csv' e.g. A44\_m956000015820198\_guard\_2023\_S1.csv
3. Select the interpolation interval (time between each regularised point: default 3 minutes. Select the time gap between trips (minimum time between each trip: default 2 hours).
4. Click 'Process Data' to process data once the status bar says complete.
5. Outputs are shown on each tab.
6. Download various datasets by selecting folder and clicking 'Download'.

GPS processing
Dive processing
All processed data


BIRD ID  
m956000015816291

NEST ID  
A9

STAGE  
postguard

BREEDING SEASON  
2023

Trip	Bird ID	Nestbox	Season	Nestyear	Start time	End time	N points	Duration (hr)	Total Distance (km)	Distance Nestbox (km)	Distance Land (km)	Interpolation (min)	Trip interval (min)
1	m956000015816291	A9	postguard	2023	2023-10-10 04:12:00	2023-10-10 20:52:00	310	16.6667	34.97	14.28	11.07	3	120
2	m956000015816291	A9	postguard	2023	2023-10-11 04:41:00	2023-10-12 20:50:00	759	40.15000	74.47	16.14	12.97	3	120
3	m956000015816291	A9	postguard	2023	2023-10-13 04:45:00	2023-10-13 18:52:00	280	14.11667	28.25	13.27	9.73	3	120



**1. Upload files**

Choose CSV:

Browse... A9\_m956000015816291\_postguard\_2023\_S1.csv Upload complete

Select interpolation interval (minutes):

Select time gap interval (minutes):

**2. Download processed data**

Choose a dataset to save:

GPS

**Figure 5.** GPS and dive analysis R Shiny app, under development.

## 7.2 Student projects

There are three students currently working with Pōhatu (**Figure 6**). They participate in weekly monitoring while simultaneously collecting data for their projects.

### **Georgia Gwatkin, MSc Biology, University of Canterbury**

*Supervisors:* Michella LaRue, Sarah Flanagan, Rachel Hickcox (associate supervisor)

*Thesis:* Where to live: habitat selection and intra-seasonal

*Expected completion:* February 2025

The aims of Georgia's Master's research are (1) to determine how fine-scale, terrestrial habitat characteristics are related to kororā nest box occupancy and (2) to determine the spatial patterns of intra-seasonal movement of kororā around the colony. In addition to the weekly monitoring data, she is collecting information on tick presence/quantity at the nest, nestbox habitat characteristics (e.g., soil wetness, temperature, vegetation, etc.), and resightings.

### **Kaitlin Bowe, MSc Marine Science, University of Otago**

*Supervisors:* Will Rayment, Steve Wing

*Thesis:* Foraging ecology of kororā from Pōhatu Bay, Banks Peninsula, New Zealand

*Expected completion:* February 2025

The aims of Kaitlin's Master's research are (1) to determine the foraging distribution of kororā at Pōhatu, (2) quantify the important environmental variables effecting their behaviour, (3) visualize whether they overlap with commercial fisheries, and (4) determine their trophic position using stable isotope analysis (SIA) to predict whether they are relying on distinct prey at various stages of the breeding season. She is assisting with the GPS tracking and will analyse the foraging tracks while also collecting feather and faecal samples for SIA.

### **Lucy Howell, PhD Biology, University of Canterbury**

*Supervisors:* Tammy Steeves, Elissa Cameron

*Thesis:* Optimising non-invasive sampling for assessing kororā (*Eudyptula minor*) health:

Enhancing long-term management strategies at the Pōhatu/Flea Bay Colony, Horomaka, Banks Peninsula

*Expected completion:* July 2025

The aims of Lucy's PhD research are (1) to DNA sex penguins from feathers, (2) to determine the prey species comprising kororā diet at Pōhatu using faecal DNA metabarcoding, and (3) to quantify stress baselines using non-invasive corticosterone sampling to investigate links between stress and breeding success, and diet. In addition to weekly monitoring and marking information, she is collecting feathers and faecal samples, along with behavioural observations of stress encounters.

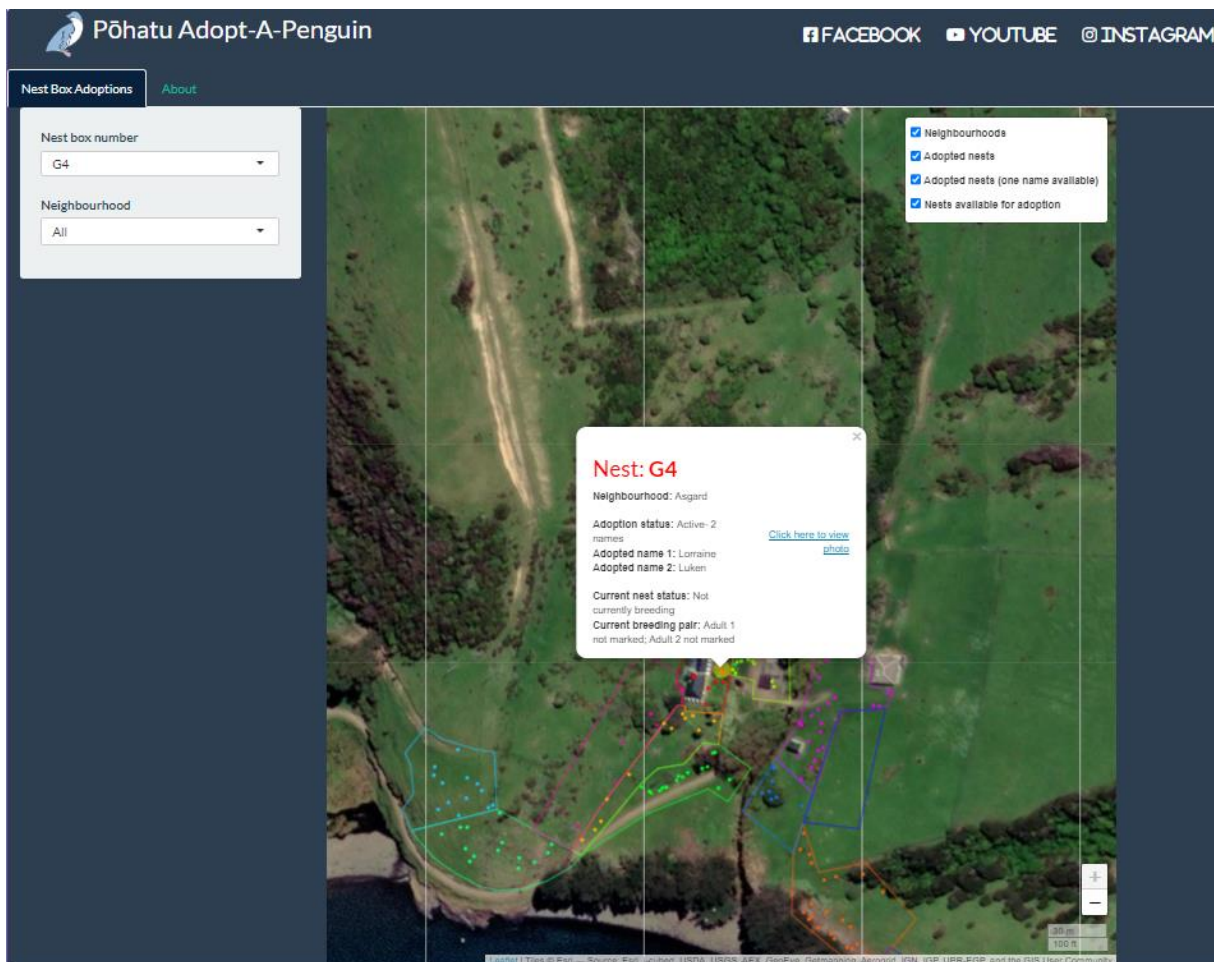


**Figure 6.** From left: Dr. Rachel Hickcox, Kaitlin Bowe, Georgia Gwatkin, Lucy Howell.

## 8 Other projects

### 8.1 Adoptions map

Dr. Hickcox developed an R Shiny app to display a map with nest box adoptions, which is currently hosted at [https://rphickcox.shinyapps.io/Pohatu\\_Adoptions/](https://rphickcox.shinyapps.io/Pohatu_Adoptions/) (**Figure 7**). This map will be available to adopters through the Trust website. They create a login which gives them access to the map. They can search for specific nest boxes, and a popup is shown when clicked that provides the nest box adopter name, current status (breeding, moulting, not breeding), whether there are marked penguins in the box, and a photo of the box. Not only will this be used by adopters, but it will be used by the Pōhātu team when administering the adopting certificates and nametags.



**Figure 7.** Adoption map showing the nest boxes and an example popup with information about nest G4.



## 8.2 Virtual reality Pōhatu

*Funding:* \$5,000 - \$10,000

*Funder:* Pacific Development Conservation Trust, Department of Internal Affairs

*Timeframe:* 6 Nov 2023-5 Nov 2024

*PI:* Dr. Rachel Hickcox

*Partners:*

- James Nikitine, Blue Cradle
- Iain Cook-Bonney, Learning Architects, Digital technology and PBL facilitator
- Gabe Baker, Frame VR
- Sarah Washbrooke, TENZ, Duputy chair

The aim of this project is to create a virtual reality using a platform called Frame VR ([learn.framevr.io](http://learn.framevr.io)) where the public can interact with and virtually walk around the kororā colony at Pōhatu/Flea Bay for scientific, educational, and outreach purposes. This is a collaborative project, relying on the expertise of Iain Cook-Bonney to lead the development of the VR. We are hoping that this learning experience will be worked into current New Zealand school curriculums with the help of Technology Education New Zealand (TENZ). We are also currently discussing a venture with Smith City to display the VR in their stores for guests to experience upon their visit.

The virtual reality will have an augmented map of Pōhatu with a main landing spot (conservation center). From there, you will be able to portal to other locations around the colony, to a 3D version of one of the team members. When clicked, a short video with an interview will play. There will also be other types of content, such as photo galleries, posters, sound recordings, downloadable documents, information panels, and much more. Users can interact with items to learn more. The main places include the standup/main hide, the beach, multiple spots throughout the colony, the marine reserve, around the house, at the Māori Pā, etc.

We had initial scoping meetings in December and January after the awarding of the grant. Then on 26 April 2024, James, Iain, and Averil presented our proposal to the HiT lab at the University of Canterbury, with the aim to borrow some 360 cameras and other filming gear. Then, James and Iain visited the colony on 27-28 April, where we had a hui to discuss the project. We also took a significant number of photos and 360 videos to aid in the rendering of the VR environment.

The next steps over the coming months will be developing of the VR, with Pōhatu providing content and guidance on our vision for the final product. We hope to present the virtual world during a public reception in early October 2024.

### 8.3 Interactive map of monitoring and research data Pōhatu

*Funding:* \$5,000 - \$10,000

*Funder:* Pacific Development Conservation Trust, Department of Internal Affairs; Pōhatu Penguins subsidiary

*Timeframe:* 6 Nov 2023-5 Nov 2024

*PI:* Dr. Rachel Hickcox

*Partners:*

- Professor Michelle LaRue, University of Canterbury
- Dr. Carolynne Hultquist, University of Canterbury (Spatial Data Science lecturer)
- Lilian von Kaenel, student at the University of Canterbury
- James Nikitine, Blue Cradle

We are developing a mapping interface to present various types of data to show kororā terrestrial and marine distribution across Banks Peninsula and Pōhatu/Flea Bay for scientific, educational, and outreach purposes. We anticipate the map being displayed in our office, in the new Pōhatu Conservation Centre, possibly at the International Antarctic Centre in Christchurch, and during education programs including Conservation Club.

The map is inspired by the Adoptions map, but with more data, layers, and functionality. Data will include: Horomaka/Banks Peninsula little penguin survey nest counts (2000-2002, 2020-2022), annual Pōhatu survey nest locations/counts/statistics, distribution of Pōhatu nest boxes, information about each nest box (bird IDs, occupancy, current status, last visit, reproductive success, etc.), and at-sea foraging tracks.

Development of the map is ongoing, although it is mostly likely to be a R Shiny app, similar to the other applications made for this project. The aim is to complete the map by October 2024, although continual maintenance and data refreshing/input will be required.

## 8.4 Tick abundance, habitat, occurrence, load

*Funding:* TBD

*Funder:* TBD

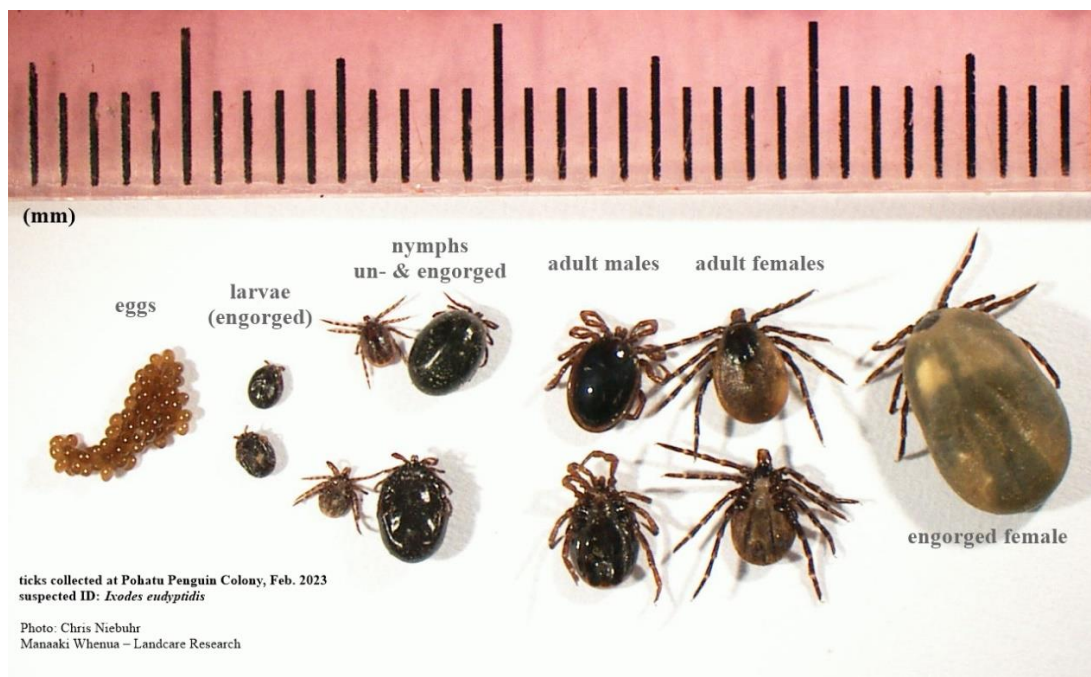
*Timeframe:* 2023-Ongoing

*PI:* Dr. Chris Neibuhr (Landcare Research)

*Partners:*

- Professor Michelle LaRue, University of Canterbury
- Dr. Sarah Flanagan, University of Canterbury

In conjunction with Georgia Gwatkin's master's project, a study on tick abundance at the Pōhatu colony is underway. Although still in the early concept stages, Dr. Chris Neibuhr from Landcare Research has conducted some field sampling of ticks at nest boxes and on penguins, and identified *Ixodes eudyptidis* (NZ seabird tick), endemic to New Zealand and Australia, occurring at Pōhatu (**Figure 8**). Last September, 'artificial tick habitats' were installed under the lids of five nest boxes (A10, A31, B20, D4, G53) to collect ticks and test dry ice traps. Both methods need to be improved for future wide-scale use. Future work is also being discussed, such as establishing typical tick load, predicting detrimental tick loads to penguin survival and breeding success, and trialing tick management actions including natural remedies to reduce presence on boxes and treatments to reduce load on the penguins themselves.



**Figure 8.** Life stages of the *Ixodes eudyptidis* tick collected at Pōhatu in February 2023.

## 8.5 Portable RFID readers

*Funding:* TBD

*Funder:* TBD

*Timeframe:* 2024-Ongoing

*PI:* Dr. Rachel Hickcox

*Partners:*

- Vincent Attenasio, Tuned In Engineering LLC (Hawaii, US)

After visiting the colony during a tour, Vincent Attenasio got in touch with the Trust to volunteer his engineering services, particularly regarding the GPS tracking and nest monitoring. After some discussion, we posed the idea of further developing portable RFID transponder readers for the nest boxes. Portable readers have been used by other groups both in New Zealand and abroad. Dr. Hickcox discussed this technology in 2022 with the Hutton's Shearwater Charitable Trust and the Department of Conservation, and Vincent is going to research current and proposed readers that could be used for our applications. Specifically, we are requesting 10 low-cost, portable units that can be positioned and moved to different nest boxes (perhaps attached to the lid or the front entrance). We are exploring different logger or transmitter options as well as solar capabilities to extend battery life.

## 8.6 Videography

Rachel George has been employed by Pōhatu Penguins as a videographer (**Figure 9**). Providing in-kind services to the Helps Pōhatu Conservation Trust, she has been filming various activities since January 2024 and editing both short and longer videos to help visualise conservation in action at Flea Bay. Her videos will be used in many ways; for instance, on social media, as short website blog posts, for grant applications and reporting, on the virtual reality platform, and for various education and outreach purposes.



**Figure 9.** Rachel George (right) filming a conservation monitoring day with Geogia Gwatkin (left) and Kaitlin Bowe (middle).

## 9 Rehabilitation

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Part of monitoring a penguin colony is maintaining a healthy population and taking ethical responsibility for our taonga wildlife. We work with a network of groups and individuals around Christchurch, including the Christchurch Penguin Rehabilitation and the South Island Wildlife Hospital at Willowbank Wildlife Reserve, to provide the best care possible for sick, injured, or starving penguins, or those found in unsafe locations or nesting in areas affected by natural disasters such as flooding. We also operate a rehabilitation facility at Robinsons Bay on Banks Peninsula (permitted under a Wildlife Act authority), which allows us to immediately care for uplifted birds. The outcomes of our rehabilitation efforts are due in large part to the dedication of Kristina Schuett, Thomas Stracke, Dr. Pauline Howard, Averil Parthonnaud, and Kevin Parthonnaud.

To be released, a penguin must be healthy, at a suitable weight, and waterproof. They must demonstrate the ability to swim and search for prey. To facilitate release, we maintain a soft-release area at Pōhatu to transition penguins gradually and naturally from captive care back to the wild. We work closely with the Department of Conservation, local iwi, and rehabilitators to coordinate the release of other species, including yellow-eyed/hoiho, Fiordland/tawaki, erect-crested, Snares, and rockhopper penguins at Pōhatu.

Every year we typically have penguins in care from October to March. From 26 October 2023 to 5 May 2024, we cared for 42 penguins (17 adult, 25 chicks). Ten adults were released (6 died/ethanised and one still in care). 21 chicks were also successfully released (4 died). Rehab release rate was about 73%. Most deaths were due to extreme injury or soon after uplift. The average length of care was 22 days. We seemed to observe more injured penguins than last year. Several injuries were due to suspected boat strike or predation.



**Figure 10.** Two fledglings being released after several weeks in rehab.

## 10 Predator trapping

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The “Pōhatu penguin predator control” project, as named on Trap.NZ, is a network of 182 traps over 10 trap lines covering 315 hectares (**Figure 11**). Three main trappers are responsible for checking the existing traps. Traps and baits have been provided by Pest Free Banks Peninsula. Additional traps are deployed around the colony and checked more frequently as needed, particularly in areas where recent predation or suspected predation is thought to have occurred. We use DOC 150, DOC 200, BT200, Trapinator, and Timms traps, which are baited with rabbit, hare, goose, chicken chicks, deep fried dog roll, eggs/mayonnaise, salmon, and other lures. We record all trap locations, baits, and captures using the TrapNZ app. Over the last year, we checked traps weekly during the spring and summer and fortnightly during late autumn and winter. In total, 292 predators including feral cats, mustelids, possums, hedgehogs, rats, and other introduced mammals have been trapped (**Table 3**).



**Figure 11.** Trap lines at Pōhatu, as shown in the TrapNZ app.

**Table 3.** Total captures of introduced mammals per trap line at Pōhatu/Flea Bay from 1 April 2023 to 1 April 2024.

Line	Bird	Cat	Hedgehog	Mouse	Possum	Rabbit	Rat	Stoat	Weasel	Other	Total
Ridge Run	0	0	10	0	0	0	2	0	0	0	12
Cottage Line	0	0	2	2	0	1	19	0	1	0	25
Valley Line	0	0	21	1	0	0	25	1	0	1	49
Penguin Colony	1	1	24	3	0	0	51	1	3	0	84
Tutakakahikura Line	1	1	5	0	0	0	14	0	0	0	21
F Line	0	0	13	0	0	1	9	0	0	0	23
Mabel Hope, Dry Falls	1	0	0	1	2	0	30	1	2	0	37
Osborne Line	0	1	4	4	0	0	2	0	3	0	14
Ferret PFBP Line	0	0	0	0	0	0	0	0	0	0	0
Indian rock Line	0	0	3	0	0	0	2	0	0	0	5
[no line]	0	0	11	0	4	0	6	1	0	0	22
	3	3	93	11	6	2	160	4	9	1	292

## 11 Collaborations

We are working alongside several organisations as collaborators. Dr. Hickcox is working closely with students at the University of Canterbury and Otago as an external supervisor or advisor. Additionally, we are collaborating with New Zealand Penguin Initiative (NZPI) as part of the NZ kororā monitoring program. We have shared the 2022-2023 monitoring data to aid in their development of a [dashboard](#) for breeding statistics from multiple colonies of kororā across New Zealand. We also submitted an annual 2023-2024 breeding season report.

We are also working with Penguins International, an American-based non-profit that “actively participates in penguin conservation and research” while engaging with zoos/aquariums and education platforms to promote penguin awareness and protection. Our collaboration began in 2022 with discussions about developing education material for the New Zealand curriculum. Each year they select a penguin species to highlight and focus their conservation messages around. 2024 is the year of the little penguin. They chose Dr. Rachel Hickcox for the [2024 Scientist Spotlight](#), where they interviewed her about her work and research with penguins, particularly kororā. They are also working to promote the Helps Pōhatu Conservation Trust in various ways. For instance, [Cappy Trails](#), a creative business selling stickers, pins, and other artwork to support wildlife conservation, is selling little penguin stickers and merchandise, and donating 10% to Penguins International and Pōhatu. Penguins International is also promoting

the Trust during events such as the World Ocean Day #PickUp4Penguins beach clean-up. They are also helping to develop education materials for the VR platform, which will be tailored to the New Zealand curriculum by TENZ.

## 12 Conferences

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Two trustees attended the Oamaru Penguin Symposium, 3-4 May 2023, and networked with other individuals involved in the conservation and research of penguins in New Zealand and internationally.

Trustees Kevin Parthonnaud, Averil Parthonnaud and Benoit Navarron, our penguin scientist Dr. Hickcox, and PhD student Lucy Howell attended the 11th International Penguin Congress (IPCXI), 4-9 September 2023, in Viña del Mar, Chile. Dr. Hickcox presented a poster on our ‘quest for kororā conservation’, which will explain our process of implementing a long-term research and monitoring program (**Figure 12**). Lucy gave an oral presentation on her research methodology.

Dr. Hickcox will also present this poster at the annual Birds New Zealand Conference in Nelson on 1-2 June. Master’s student Georgia Gwatkin will give an oral presentation on her methods and preliminary results of her nest selection and movement research.



**Figure 12.** Dr. Rachel Hickcox and her poster at the International Penguin Congress in September 2023 (left).



## 13 Community outreach and education

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Each year the Helps Pōhatu Conservation Trust participates in or hosts events for public outreach and education. Our trustees visit area schools to talk about conservation, penguins, and the history of Pōhatu. We welcome schools and groups to Pōhatu wanting to learn about wildlife, marine reserves, forest restoration and penguin conservation. Additionally, we host a school holiday Pōhatu Conservation Club, and in July 2023, we began an after-school Pōhatu Conservation Club, where children participate in a range of activities such as arts and crafts, tree planting, weaving, orienteering, and team building, all highlighting our connection to the environment (**Figure 13**). Additionally, the Trust sends a quarterly newsletter to adopters and subscribers which communicates happenings at the colony, such as stories about individual penguins, monitoring findings, research highlights, and program updates. These newsletters, along with social media, are key to our community outreach.

In October 2023, we had a stall at the French Fest in Akaroa in October, which included a public exhibition of the work we are doing at Pōhatu (**Figure 13**). We also held two Seaweeek events in March 2024. The first was a free public Akaroa Seaweeek Celebration (**Figure 14**). There were educational activities about the marine environment, stalls from community groups and organisations displaying their work to protect and research the ocean, local vendors selling handmade arts and crafts, a scientific poster display, and photography exhibit. We also hosted a variety show where local musicians, dancers, and singers performed, followed by an ocean-inspired costume competition for kids.



**Figure 13. (left)** Nest box installation by the Conservation Club 2024. **(right)** Kevin Parthonnaud and Dr. Hickcox representing the Helps Pōhatu Conservation Trust at French Fest 2023, Akaroa.



**Figure 14. (left)** The Helps Pōhatu Conservation Trust table at Seaweed Celebration, showing families a life-size little penguin, a nestbox, and the gear we use to monitor penguins, including the transponder reader, GPS devices, smartphone, and burrowscope. **(right)** Participants in the costume competition.

The Trust also hosted an evening of scientific talks about marine birds. We learned about the titi colony on Banks Peninsula, the three student projects at Pōhatu, and the Master's research of Alexandra Strang (University of Canterbury) about Adelie penguin remote sensing surveys **(Figure 15)**.



**Figure 15.** Scientific Birds Night presentations. From left back: Georgia Gwatkin, Averil Parthonnaud, Kaitlin Bowe, Alexandra Strang, Kevin Parthonnaud, Shireen Helps, Francis Helps. From left front: Rachel Hickcox, Lucy Howell.

## 14 People involved

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This project is a unique opportunity to facilitate collaborations between many groups, whose aim is to protect wildlife, especially penguins, on Banks Peninsula. Monitoring is conducted by trained trustees of the Helps Pōhatu Conservation Trust and/or employees of Pōhatu Penguins/Plunge NZ Ltd. Penguin scientist and ecologist Dr. Rachel Hickcox is the principal investigator on behalf of the Trust. The following individuals, organisations, and groups have participated in, supported, or funded the project.

- **Helps Pōhatu Conservation Trust**

Project leaders, monitoring, research, rehabilitation, health & safety, transportation, protocols.

*Dr. Rachel Hickcox (research scientist)*

*Kevin Parthonnaud (trust manager)*

*Averil Parthonnaud (trustee and rehab manager)*

*Geraldine Guillemot-Peacock (trustee)*

*Joey Cataliotti (trustee)*

*Benoit Navarron (trustee)*

*Thomas Stracke (trustee)*

*Robin Burleigh (trustee)*

*Dan Helps (trustee)*

*Shireen Helps (trustee)*

*Jess Helps (trustee)*

- **University of Canterbury** - *Dr. Michelle LaRue, Dr. Sarah Flanagan, PhD/MSc students*

Conducting research and helping with monitoring, data analysis, result publication, funding; training to handle, microchip, measure, deploy/retrieve GPS devices. Currently, a PhD student is studying kororā behaviour and diet using faecal and feather samples. Two Master's students are also assisting with weekly monitoring and in other aspects of the projects while collecting data and samples their projects.

- **International Antarctic Centre**

Providing fish for rehab penguins, funding; aiding microchip training of staff/volunteers.

- **Christchurch Penguin Rehabilitation** - *Kirstina Schuett and Thomas Stracke*

Rehabilitating injured or sick penguins.

- **South Island Wildlife Hospital at Willowbank Wildlife Reserve** - *Dr. Pauline Howard*

Treating injured or sick penguins who need emergency or intensive medical care.

- **Koukourarata Rūnanga**  
Consulted during permit process and during the project; updated periodically on progress.
- **Shireen and Francis Helps, landowners**
- **Pōhatu Penguins/Plunge Ecotour business**
- **Volunteers**
- **Funders and other organisations**

<i>Environment Canterbury</i>	<i>Pest Free Banks Peninsula</i>
<i>Christchurch City Council</i>	<i>Forest and Bird – North Canterbury</i>
<i>Department of Conservation</i>	<i>Lyttleton Port Company</i>
<i>Pōhatu Penguins/Plunge</i>	<i>Orbica</i>
<i>Blue Cradle</i>	<i>Pacific Development Conservation Trust</i>
<i>Pub Charity Limited</i>	<i>Technology Education New Zealand (TENZ)</i>
<i>Proteus Research and Consulting</i>	<i>Penguins International</i>
<i>Banks Peninsula Conservation Trust</i>	<i>New Zealand Penguin Initiative</i>

It is our intention that the activities and research being conducted by the Helps Pōhatu Conservation Trust will provide a comprehensive and holistic view of the kororā population at Pōhatu. We aim to understand the health of the population on land by examining population trends, breeding behaviour, reproductive success, and recruitment, and at sea by understanding their foraging behaviour, distribution, diet, and habitat selection. Over the past year, we have made considerable progress towards these goals by increasing our predator trapping efforts, tracking penguins at sea, monitoring active nesting boxes, rehabilitating injured and sick birds, and surveying breeding pairs. The Helps Pōhatu Conservation Trust, as well as our volunteers and collaborators, will continue this work in the upcoming year to maintain and further expand this critical, long-term conservation program.