THE TAWAKI PROJECT

BOUNTY-ANTIPODES EXPEDITION 2024

10 OCT – 18 DEC 2024

ANTARCTIC RESEARCH TRUST

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The Tawaki Trust

GLOBAL PENGUIN SOCIETY

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PENGUIN RESEARCH

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Executive Summary

The Tawaki Project's Bounty-Antipodes 2024 expedition took place from **10 October to 18 December 2024**.

Bounty Islands (12-13 October 2024)

The expedition reached the Bounty Islands on the morning of 12 October. This visit was a collaborative effort between the Tawaki Project, the Department of Conservation's (DOC) Conservation Services Programme and the Museum of New Zealand Te Papa Tongarewa, aiming to:

- **Conduct ground counts of Salvin's albatrosses and Erect-crested penguins**,
- **Perform drone surveys of the entire archipelago for comprehensive population assessments of both species**,
- **Obtain blood samples from Fulmar Prions** to examine their genetic relationships with other prion species,
- and, collect **cloacal and choanal swabs for HPAI screening**.

Landfall on Proclamation Island occurred on two consecutive days (12 and 13 October), during which **transect counts of Salvin's albatrosses were conducted**. The time-lapse cameras monitoring albatross nests since 2022 were removed. No ground counts of penguins were performed, as egg-laying had only just begun.

HPAI swabs were obtained from:

- 10 Fulmar prions (also blood samples for genetic analysis)
- 10 Salvin's albatrosses
- 10 Erect-crested penguins

All major islands (except North Rock) were surveyed using drones. Most flights were launched from Proclamation Island, except for Molly Cap, which was surveyed from the vessel Evohe shortly before departure to the Antipodes Islands.

Antipodes Islands (14 October - 16 December 2024)

The expedition arrived at the Antipodes Islands on 14 October 2024. Over the next nine weeks, we examined the **foraging movements of Erect-crested penguins using GPS dive loggers** at two study sites: Anchorage Bay and Stack Bay.

- Incubation stage:
    - Anchorage Bay: **7 male penguins tagged, but only 1 device was recovered; 4 female penguins were tracked with devices recovered after 1-2 weeks**
    - Stack Bay: **8 male penguins tagged, 7 devices recovered after 3–4 weeks**
- Chick-guard stage:
    - Anchorage Bay: **14 female penguins fitted with devices, recovered 13 units**
    - Stack Bay: **7 female penguins tracked during the chick-guard stage**

Additionally, the **at-sea behaviour of Eastern Rockhopper penguins** was examined.

- Incubation stage: **3 males and 3 females were fitted with GPS dive loggers in Anchorage Bay**

Penguin Population Surveys

- **All known Erect-crested penguin colonies on the Antipodes Islands were surveyed using drones during the incubation stage**. This provided a more accurate breeding population estimate than previous years.
- Some colonies were surveyed multiple times to monitor fluctuations in numbers during incubation and chick-rearing.
- **First-Person View (FPV) drones were used to survey cave-dwelling penguin colonies**.

Ground Counts & Sample Collection

- **Ground counts of Erect-crested and Eastern Rockhopper penguin nests were conducted to validate drone surveys**.
- Daily monitoring was conducted at Anchorage Bay, while select sections of other colonies were surveyed.

- **Blood samples were collected from 20 Erect-crested and 20 Eastern Rockhopper penguins for stable isotope analysis**, complementing tracking studies.
- **HPAI screening: 10 penguins from each species were swabbed**.

Additional Observations

- **Elephant seal harems were documented, and pup counts were performed in Stella, Crater, Alert, and Mirounga Bay using drone surveys**.
- Hannah's Cave (Northwest Bay):
    - A previously reported rock cairn (2023 report) was re-examined via FPV drone and is now believed to be the remains of a collapsed rock wall, supporting theories of 19th-century sealer occupation.
- South Bay:
    - A collapsed rock wall overgrown by tussock was discovered, almost certainly part of the shelter built by the castaways of the Spirit of the Dawn in 1893.

The expedition **returned to Bluff on the morning of 19 December 2024**.

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Acknowledgements

Conducting research in the New Zealand subantarctic region is no small feat. The logistical challenges of reaching and working in such a remote environment are considerable, and the financial demands are equally significant. Once again, this expedition was only possible thanks to the generous support of numerous individuals and organizations. We are incredibly grateful to the following supporters, whose contributions made this research a reality:

- **Vontobel Foundation, Switzerland**
- **Antarctic Research Trust, Switzerland**
- **Global Penguin Society, Argentina**
- **The Tawaki Project Patreons** (https://patreon.com/TawakiProject)

We were once again fortunate to have exceptional teams. The core team for the penguin work included **Jeff White** (Cornell University) and **Myrene Otis** (Department of Conservation), who braved penguin bites, grueling climbs, and solitary nights in a leaky tent without complaint. On the Bounties, **Dave Houston** (DOC Auckland) and **Hannah Mattern** (Eudyptes EcoConsulting) joined the penguin contingent, while **Colin Miskelly** (Te Papa Tongarewa), **Theo Thompson** (University of Otago), and **Petrus Hedman** (Department of Conservation) took charge of other seabird research.

A special thanks to the skippers of the Evohe: **Steve Kafka** (for the Bounties and Antipodes) and **Marwane Latreche** (from the Antipodes), along with their crew, who ensured we reached our destinations safely. We are also grateful to the one and only **Graeme Loh**, who got us out of our bunks when the skies erupted in breathtaking *Aurora australis*. At DOC Murihiku, **Sharon Trainor**, **Janice Kevern**, and **Honorlea Mangion** expertly guided us through quarantine, while **Ros Cole** remained our go-to contact for all things subantarctic. Finally, huge thanks to **Johannes Fischer** and **Hollie McGovern** for their incredible scheduling skills, which somehow managed to fit our trips into the packed subantarctic timetable.

Expedition dates

8 – 9 October 2024	Expedition delayed due to weather.
10 – 12 October 2024	Dunedin to Bounty Is. on board of Evohe
12 – 13 October 2024	Two landings on Proclamation Island.
14 October 2024	Evohe arrives at Antipodes Is.
15 October 2024	Evohe leaves for Bluff.
15 October – 15 December 2024	Field work on Antipodes Is.
15 December 2024	Evohe arrives at Antipodes Is.
16 December – 19 December 2024	Antipodes Is to Bluff.

Expedition team

NAME	ROLE	AFFILIATION
Thomas Mattern	Expedition leader, Researcher, Drone pilot	Otago University, Tawaki Trust & Global Penguin Society
Myrene Otis	Researcher	Department of Conservation
Jeff White	Researcher, DOC rep (Antipodes)	Cornell University, NY, USA
Hannah Mattern	Drone pilot	Eudyptes EcoConsulting Ltd.
Dave Houston	Researcher	Department of Conservation, Tawaki Trust
Colin Miskelly	Researcher	Te Papa Tongarewa
Theo Thompson	Researcher, Doc rep (Bounties)	Otago University
Petrus Hedman	Researcher	Department of Conservation

Shaded rows indicate Bounty Islands only

Bounty Islands team, 13 October 2024 (from left): Myrene Otis, Theo Thompson, Jeff White, Dave Houston, Petrus Hedman, Hannah Mattern, Colin Miskelly, Thomas Mattern

Antipodes Island team, 15 December 2024 (from left): Thomas Mattern, Jeff White, Myrene Otis

Part I - Bounty Is: 12-13 Oct 2024

Bounties timeline & study sites

After passing biosecurity screening at the DOC Quarantine Store in Invercargill, the expedition equipment was transported by truck to Dunedin and loaded onto the *Evohe* on 8 October 2024.

Unfavorable weather conditions delayed departure by two days, and the vessel finally set sail for the Bounty Islands on 10 October 2024 at approximately 08:00 hrs. The night before arrival (11 October), a massive *Aurora Australis* was observed, beginning around 19:30 hrs and peaking just before midnight. The Bounty Islands came into view at around 06:00 hrs on 12 October, and the *Evohe* anchored outside Bucket Cove at approximately 08:30 hrs.

The first team (TM & DH) landed on Proclamation Island in excellent conditions at 09:30 hrs, followed by the rest of the expedition members (JW, MO, HM, CM, TT, PH) at 10:00 hrs. Between 10:30 and 15:30 hrs, the team:

- Conducted three drone missions over parts of the main group
- Dismantled albatross trail cameras and removed mounts
- Completed albatross transect counts
- Collected HPAI screening samples from albatross, penguins, and prions
- Took DNA (blood) samples from Fulmar prions
- Recorded albatross band re-sightings

By 16:00 hrs, the team had returned to the *Evohe*, which raised anchor as sea conditions deteriorated. The following morning (13 October), the *Evohe* anchored again at 07:30 hrs, and the expedition team landed on Proclamation Island at 09:00 hrs. The day's activities included:

- Completing drone surveys of the remaining main group and the central islands
- Conducting additional albatross transect counts
- Collecting remaining blood and HPAI samples

The team left the island around 14:00 hrs. The *Evohe* then steamed to the eastern group, where a drone mission was launched from the vessel to survey Molly Cap. A planned survey of North Rock was abandoned due to drone battery issues.

At 15:00 hrs, the *Evohe* departed the Bounty Islands, heading toward the Antipodes Islands.

Drone surveys of Erect-crested penguins and Salvin's albatross

Drone surveys were conducted by two teams, each consisting of a pilot (TM & HM) and a spotter (DH & MO). The primary purpose of these surveys was to establish the numbers of Erect-crested penguins and Salvin's albatrosses present on the islands at this stage of their annual cycle.

All missions were launched from the top of Proclamation Is, except for the final mission at Molly Cap, which was flown from the deck of the *Evohe*. Since albatross numbers are highest in the morning and late afternoon/evening, missions were scheduled to begin after 10:00 hrs and finish by 16:00 hrs. Compared to January 2024, when drone surveys were challenging due to the large volume of albatross in the air, bird numbers were significantly lower this time, posing no issues for the drone teams (Figure 1). No interactions between the drones and birds were observed.

The surveys covered most of the islands. However, a malfunction with a drone battery temporarily interrupted flying, leading to the abandonment of the mission that would have surveyed North Rock. The total mission time was 5 hours and 48 minutes, during which 5,679 images were captured. Proclamation Island was surveyed twice to assess whether bird numbers on the ground fluctuated between days.

Figure 1. *Hannah Mattern & Dave Houston flying the Tunnel Is drone survey with little Albatross traffic overhead, 12 October 2024.*

Table 1. *Overview of drone missions flown on the Bounty Islands on 12-13 October 2024. Missions flown on the 12th are shaded grey.*

SITE	PILOT	START	END	MISSION TIME	IMAGES
Proclamation Is	HM	13:25	13:58	00:33	616
Tunnel Is	TM	14:04	14:21	00:17	404
Ranfurly Is	HM	14:26	14:52	00:26	540
Lion Is	HM	10:13	10:37	00:34	203
Depot Is	TM	10:18	11:18	01:00	1,067
Ruatara Is	HM	10:41	11:10	00:21	392
Penguin Is	HM	11:13	11:40	00:27	497
Funnel & Prion Is	TM	11:25	11:35	00:10	224
Spider Is	HM	11:44	12:53	01:09	810
Proclamation Is	HM	12:50	13:22	00:32	493
Coronet Is	TM	13:20	13:29	00:09	189
Molly Cap	TM	15:16	15:26	00:10	244

Orthomosaic of Lion Is generated from 203 images captured during a 34 minute drone mission flown on 12 October 2024.

Ground counts of Salvin's albatross and Erect-crested penguins

In addition to drone surveys, ground truthing counts were conducted to contextualize the number of animals detected from aerial surveys with the actual number of nests on the ground.

For Salvin's albatross, these ground counts were carried out by TT and PH, primarily on 12 October 2024. The surveys involved transect counts across various areas of Proclamation Island to determine the ratio of birds on the ground to nests. This ratio will be used to estimate the number of breeding pairs based on drone data analysis.

Similar ground counts were planned for Erect-crested penguins. However, egg-laying had not yet been completed on Proclamation Island, meaning any counts would have likely underestimated the number of nests. Additionally, conducting a ground census at this stage was deemed too disruptive to the penguins. As a result, no penguin counts were conducted.

Pair of Erect-crested penguins with freshly laid egg, Proclamation Is, Bounty Islands, 12 October 2024.

Blood samples for DNA analysis of Fulmar prions

The visit to the Bounty Islands also provided an opportunity to collect blood samples from Fulmar prions for genetic analysis. This research, conducted by Colin Miskelly, Lara Shepherd, and Alan Tennyson from Te Papa Tongarewa, aims to compare these samples with other prion populations across the New Zealand region and beyond. The study focuses on understanding the complex relationships within prion species, whose taxonomy remains debated. A total of 10 Fulmar prions were captured and sampled on 12 October 2024. CM conducted the work with assistance from JW and MO.

HPAI screening Albatross, Fulman prions & Erect-crested penguins

At the request of the Department of Conservation, 10 individuals of each species—Salvin's albatross, Fulmar prion, and Erect-crested penguin—were captured for HPAI (highly pathogenic avian influenza) screening. Cloacal and choanal swabs were collected by JW, with assistance from CM and MO. All birds were opportunistically captured and were not incubating or sitting on active nests. Samples were subsequently delivered to the Department of Microbiology at the University of Otago (Jemma Geoghegan Lab).

Other activities

In addition to the activities described above, time-lapse cameras deployed on Proclamation Island since 2022 to monitor nest attendance and breeding success of Salvin's albatross and Erect-crested penguins were removed. All cameras were collected, and their mounts - galvanized steel eye bolts anchored in rock overhangs (see 2022 report) - were either pulled out or sawn off at the base. All camera data is being analysed and curated by TT. Additionally, most individually banded Salvin's albatross along the western end of the platform on Proclamation Island were inspected, and their band numbers recorded (Table 2). One of the banded albatross was carrying a GLS tag deployed in 2018; the device was removed.

Table 2. *Salvin's albatross recovered on Proclamation Is, Bounty Is, 12-13 October 2024. Data collated by Theo Thompson.*

DATE	METAL BAND	DARVIC	NOTES
12/10/2024	O-37112	B/W 504	
12/10/2024	O-37114	B/W 506	
12/10/2024	O-37137	*Not read*	
12/10/2024	O-37140	B/W 523	*GLS-BP826 removed*
12/10/2024	O-37188	B/W 500	
12/10/2024	O-37198	B/W 541	
12/10/2024	O-38026	W/R 053	
12/10/2024	O-38029	W/R 056	
12/10/2024	O-38037	W/R 064	
12/10/2024	O-38055	W/R 040	
12/10/2024	O-38057	W/R 042	
12/10/2024	O-38074	W/R 050	
12/10/2024	O-38093	W/R 097	
12/10/2024	O-38094	W/R 098	
12/10/2024	O-38099	W/R 103	
13/10/2024	*Not read*	W/R 028	
13/10/2024	O-37132	B/W 514	
13/10/2024	O-37143	B/W 530	
13/10/2024	O-37145	B/W 526	
13/10/2024	O-37148	B/W 531	
13/10/2024	O-37150	B/W 533	
13/10/2024	O-37191	B/W 534	
13/10/2024	O-37193	B/W 536	
13/10/2024	O-38014	W/R 014	
13/10/2024	O-38021	W/R 022	
13/10/2024	O-38050	W/R 035	
13/10/2024	O-38081	W/R 084	

Part II - Antipodes Is: 14 Oct - 16 Dec 2024

Preface: place names

Many of the bays and topographic features on Antipodes Island remain unnamed. This impedes communication of activities (such as on the intention board in the hut) and survey results as most penguin colonies are located in such unnamed bays. Over the course of this project, our team named several sites and added these to the map in the Antipodes hut. These place names will also be featured throughout this report and have been documented in Figure 2. To ensure that reports and subsequent scientific publications remain consistent with these place names, we have also submitted these as 'proposed place names' to Toitū Te Whenua / Land Information New Zealand.

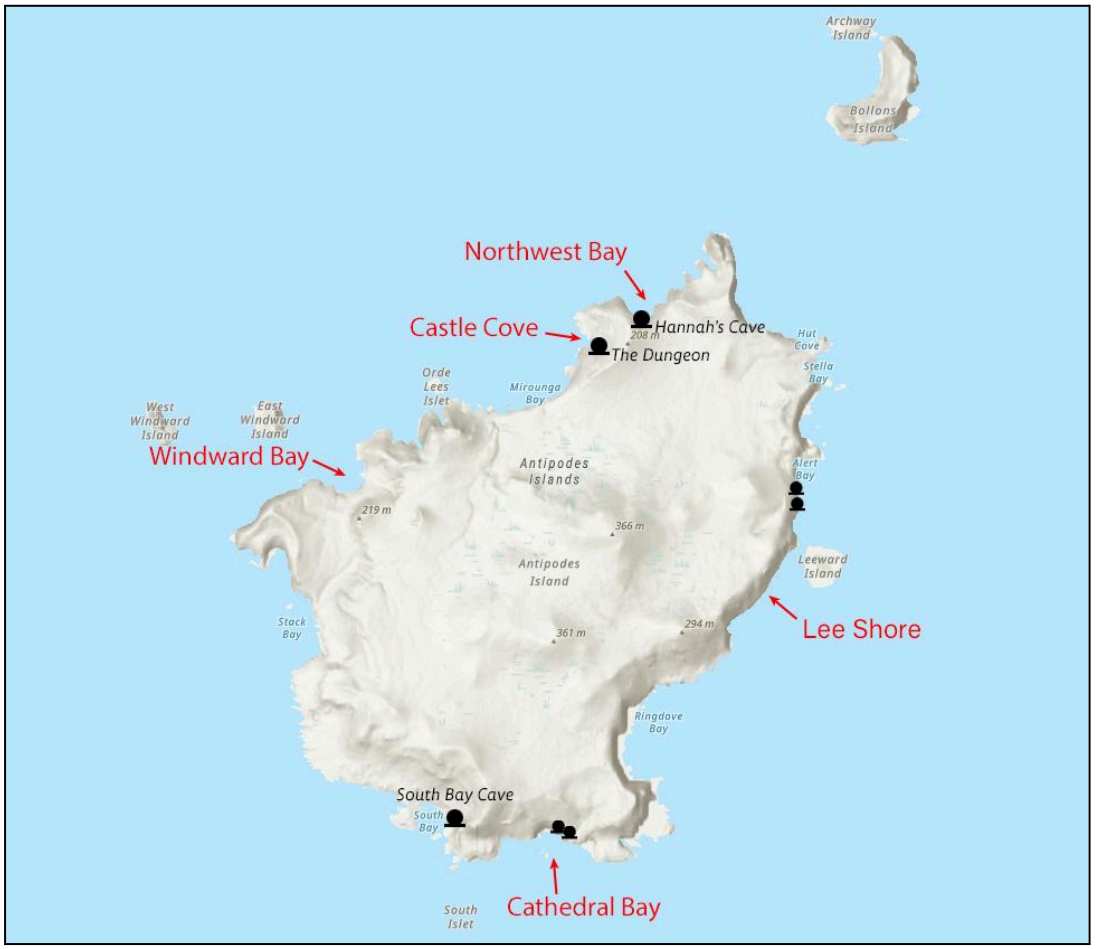


Figure 2. *Overview of sites on Antipodes Is; place name proposals submitted to Toitū Te Whenua indicated in red font. Sea caves occupied by penguins indicated by black icons, larger icons represent larger caves.*

Antipodes timeline & study sites

The expedition arrived at Antipodes Is around 09:00 hrs on 14 October 2024. Conditions in Hut Cove were still questionable when inspected with the dinghy although an initial shore party (TM, JW, DH & MO) were able to go ashore to rig the flying fox for unloading. Gear transfer commenced after midday and, with the assistance on the island of TT, PH and Graeme Loh (crewing on *Evohe*), took until 16:00 hrs. The *Evohe* spent the night in Alert Bay and left for Bluff in the morning of 15 October 2024 with TM, JW, and MO remaining as shore party on the island.

After spending the first full day with hut and track maintenance, the team started scientific work on 16 October with first drone missions flown over Reef Point, as well as Anchorage and Stella Bays. These sites were also the last to be surveyed with drones on 16 December 2024, the day of departure from the island.

Monitoring of the penguin colony on the rock platform in Anchorage Bay commenced on 16 October with mapping of active nests and transponder scanning of the majority of adults present. The first of many trips to other parts on the island occurred on 17 October to Crater Bay, with the last on 13 December to Orde Lees. The 33 excursions undertaken on foot ranged from 3 to 19 kilometers in length and amounted to a total of 304 km walked (per person) over the course of the two months (Figure 3).

GPS logger deployments on Erect-crested penguins commenced on 19 October and finished with the last round of device deployments on 1 December 2024. Only a limited number of GPS logger deployments occurred on Eastern Rockhopper penguins between 7-25 November 2024.

Study Sites

As in the previous year, our main study sites were in Anchorage Bay East and Stack Bay. All activities in Anchorage Bay were limited to the ‘study platform’ (Erect-crested penguins, Figure 4) and the ‘rocky corner’ (Figure 5) and ‘rocky cave’ (Eastern Rockhopper penguins, Figure 6). Access to the rocky cave was via

rope ladder lowered from the 'study platform' to the small cove next to it. In Stack Bay, only Erect-crested penguins from the top colony were fitted with devices (Figure 7); no deployments occurred on Eastern Rockhopper penguins.

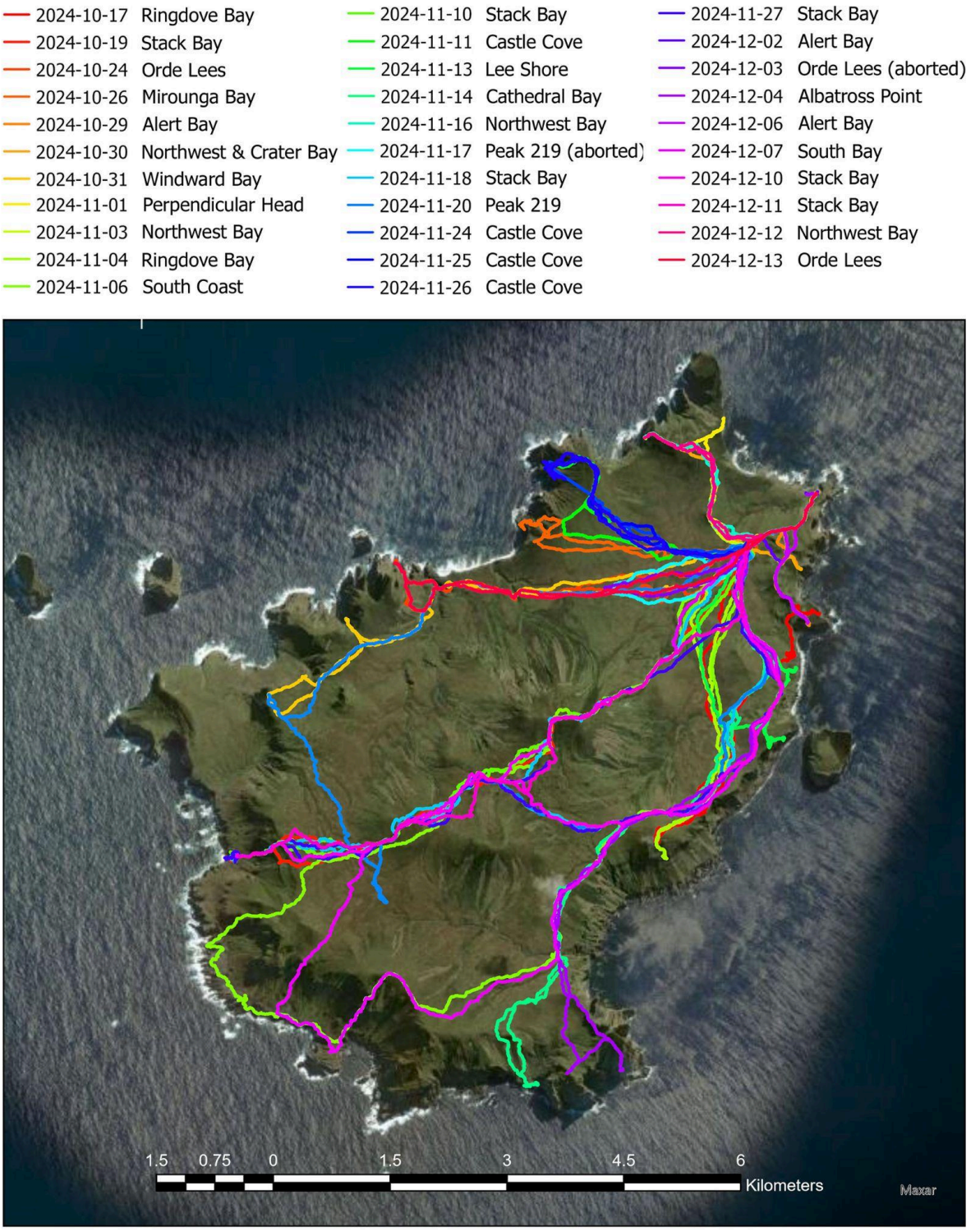


Figure 3. *Tracks of the various excursions undertaken over two months on Antipodes Island, October-December 2024.*

Figure 4. *Erect-crested penguin colony on the 'study platform' with Bollons Island in the background, 18 October 2024*

Figure 5. *Eastern rockhopper penguins in the 'rocky corner', Anchorage Bay East, 8 November 2024. Note the deployed GPS logger on one of the penguins.*

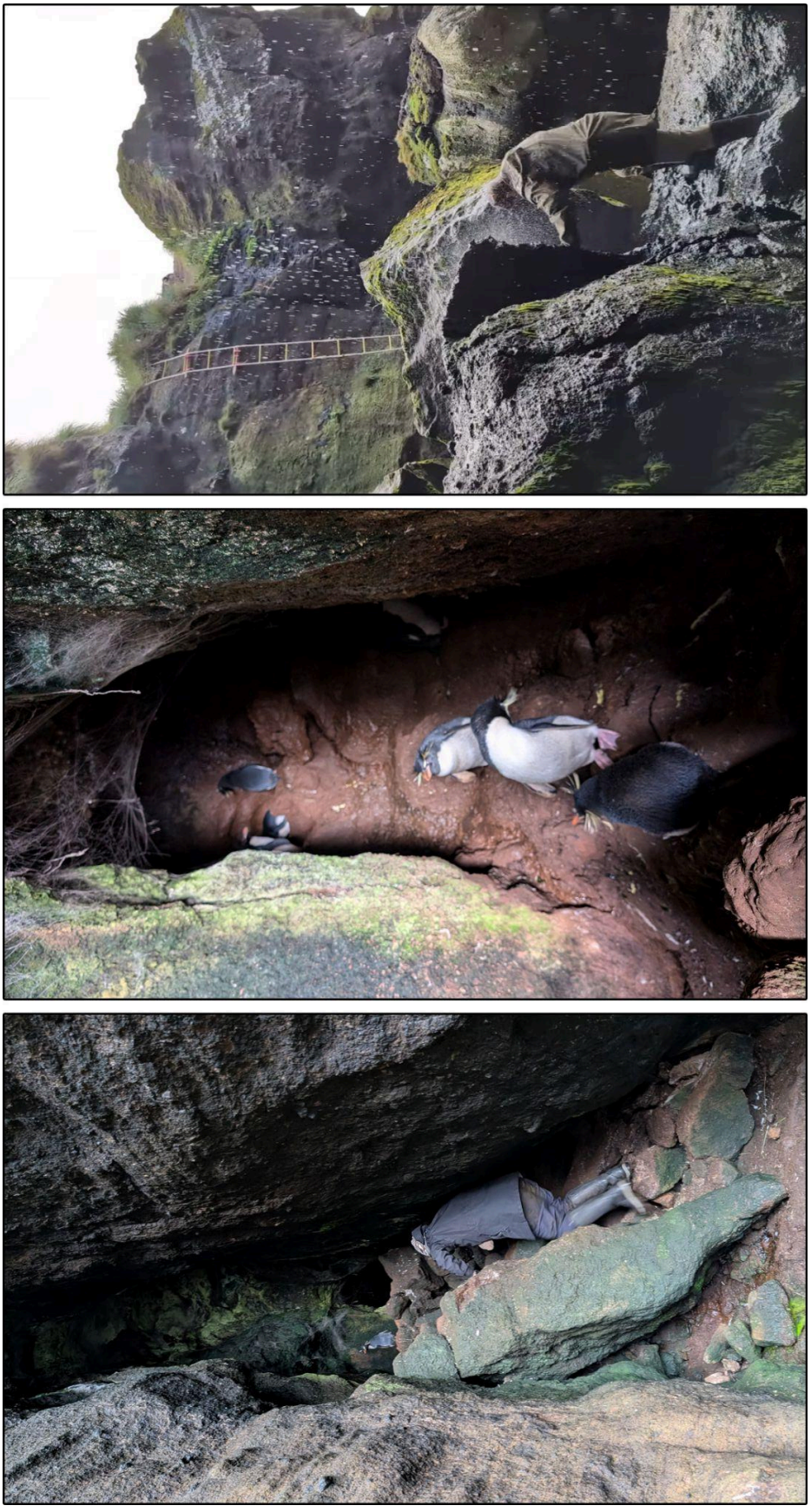


Figure 6. The 'rocky cave' in Anchorage Bay East, Antipodes Is.

Figure 7. *The Erect-crested penguin top colony (SKB-002) in Stack Bay, 19 October 2024*

Camp at Stack Bay

Like in the previous season, a camp was established in Stack Bay to facilitate device recovery. On 18 November, a tent was pitched at the same site as the year before (Figure 8), and remained at the site until 12 December 2024. The tent poles were removed and the fly weighed down with rocks when leaving the camp due to persistent stormy weather.

The camp was occupied for a total of four nights (Table 3).

Table 3. *Dates of overnight stays in Stack Bay for device recovery*

DATES	TEAM
18-19 Nov	Jeff White & Myrene Otis
6-8 Dec	Jeff White & Myrene Otis
10-11 Dec	Thomas Mattern

Figure 8. *The Stack Bay camp and Erect-crested penguin top colony, 18 November 2024.*

GPS logger deployments on penguins

Erect-crested penguins - Incubation

One goal of this season was to collect foraging data from erect-crested penguins during egg incubation. The team's arrival was timed to coincide with the first phase of incubation, when both males and females remain at the nest. Time-lapse imagery from previous seasons suggested that males would begin their incubation foraging trips around 20 October, with birds from Anchorage Bay leaving about two days later than those from Stack Bay.

To align with this timeline, GPS logger deployments began on 19 October 2024, in the top colony at Stack Bay. Eight male penguins attending their incubating mates in the lower southeast corner of the colony (Figure 7) were captured by hand, weighed, and fitted with standard AxyTrek GPS dive loggers (Figure 9a). Since all birds were unmarked, they were also tagged with PIT tags. The penguins weighed between 4,300 and 4,600 grams (mean: 4,350 g). After being released near their nests, all resumed attending their mates. On 20 October, seven male penguins from the study platform colony in Anchorage Bay East were equipped with AxyTrek Remote GPS dive loggers featuring a solar panel (Figure 9b). Penguins from both study sites left for their incubation foraging trips between October 22 and 25, returning about two weeks later, between 5 and 10 November.

Of the seven devices deployed in Anchorage Bay, only one was recovered. Although all tagged penguins returned to the colony, six birds had preened off their loggers, likely facilitated by differences in the tape attachment method required for the solar panels. A recovery attempt was made at Stack Bay on November 10. However, by then, all males had returned and were incubating alone (Figure 10), except for one intercepted en route to the colony. To avoid disturbing the clutches, further retrieval was postponed. Instead, six of the remaining seven devices were recovered after chicks hatched in mid-November. One logger could not be retrieved, possibly because it had been deployed on a non-breeding male mistakenly identified as nest occupant.

Figure 9. *The two types of GPS dive loggers used during the incubation period on Erect-crested penguins. (a) AxyTrek Remote with solar panel, (b) standard AxyTrek Marine (both devices manufactured by TechnoSmart, Italy).*

After recovering devices from the male penguins, GPS dive loggers were deployed on four females before they departed for their incubation foraging trips. These deployments took place on 7 and 8 November, with the females having a mean body mass of 2,935 g (range: 2,500–3,640 g)

All females left the colony the morning after being fitted with the devices, on either 8 or 9 November. They returned 6–12 days later, between 15 and 21 November. Their return largely coincided with the hatching of their chicks, except for one female who returned three days after her chick had hatched. This delay had no adverse effect, as the chick was still alive when the team left the island in mid-December.

Figure 10. *Stack Bay male Erect-crested penguins with GPS loggers incubating their eggs after returning from their 2-week incubation foraging trips, 10 November 2024.*

Erect-crested penguins - Chick-guard

The second half of the expedition coincided with the chick-guard stage of breeding in Erect-crested penguins. To examine inter-annual variations in foraging behavior, GPS dive loggers were deployed on 14 female penguins at the study platform in Anchorage Bay and on seven females raising chicks in the Erect-crested penguin top colony at Stack Bay. To minimize disturbance, birds from Stack Bay were selected from nests near the northern colony boundary.

At Anchorage Bay, two rounds of logger deployments were conducted: seven birds were fitted with devices on 21 and 22 November, and another seven on 1 December. At Stack Bay, deployments occurred on 27 November.

Devices were recovered from Anchorage Bay birds on 30 November (four birds), 8 and 9 December (one bird each); one female returned without the device. All devices from the second round of deployments were recovered between 8 and 11 December. At Stack Bay, all devices were retrieved between 6 and 11 December.

Eastern Rockhopper penguins - Incubation

Throughout November, six Eastern Rockhopper penguins were fitted with GPS dive loggers to study their foraging movements during the incubation period. Only penguins from Anchorage Bay were studied as logistics made deployments in Stack Bay untenable.

Three males - one from the "rocky cave" and two from the "rocky corner" - received devices on either 7 or 8 November. They left the colony between 9 and 11 November and returned between 16 and 19 November. Devices were retrieved only when the birds were not actively incubating eggs. As a result, two devices were recovered on 26 November, while the third remained on the bird until 8 December.

Three females, all from the "rocky corner," were fitted with GPS loggers on 21, 22, and 25 November. Two remained at the nest for several days, making only brief foraging excursions (0.5–3.5 hours) before departing for their incubation trips. Females left between 23 and 28 November and devices were recovered on the day of each bird's return, between 1 and 9 December.

Preliminary results - Incubation

Deployments of GPS loggers on 15 male Erect-crested penguins during egg incubation at both study sites yielded eight complete datasets, documenting entire foraging trips that averaged 15.3 days. The birds traveled up to 560 km south, with individuals from both sites heading toward the Subantarctic Front (Figure 11a). Their trip trajectories closely resembled the at-sea movements of Erect-crested penguins during the pre-molt stage, as recorded with satellite transmitters in February–March 2024 (see 2023 report). The penguins covered distances of up to 1,400 km, performing an average of 6,000 dives and reaching maximum depths of 165 m.

Four female Erect-crested penguins from Anchorage Bay undertook considerably shorter trips, averaging nine days. They traveled northeast, following patterns typically observed during the crèching stage of breeding. These females ranged up to 230 km from the island, covering distances of up to 550 km before returning to their nests. On average, they performed 3,500 dives per trip, with maximum depths reaching 90–110 m, though the average dive depth was around 30 m.

All deployments on Eastern Rockhopper penguins yielded complete datasets. The foraging movements of the three males closely mirrored those of male Erect-crested penguins, with trips lasting 9–16 days and covering up to 1,200 km. The birds traveled up to 610 km south of the island (Figure 11b), performing approximately 8,000 dives each, with an average dive depth of 30 m and maximum depths ranging between 90–112 m.

Female Rockhoppers undertook foraging trips lasting 8–14 days, covering around 400 km and reaching 200–300 km from the island. Two females made brief trips in the days leading up to their main incubation foray. One female then foraged 300 km south of the island, following a trajectory similar to that of the males. On average, females dived within the upper 25 m of the water column, though maximum depths ranged between 86–96 m.

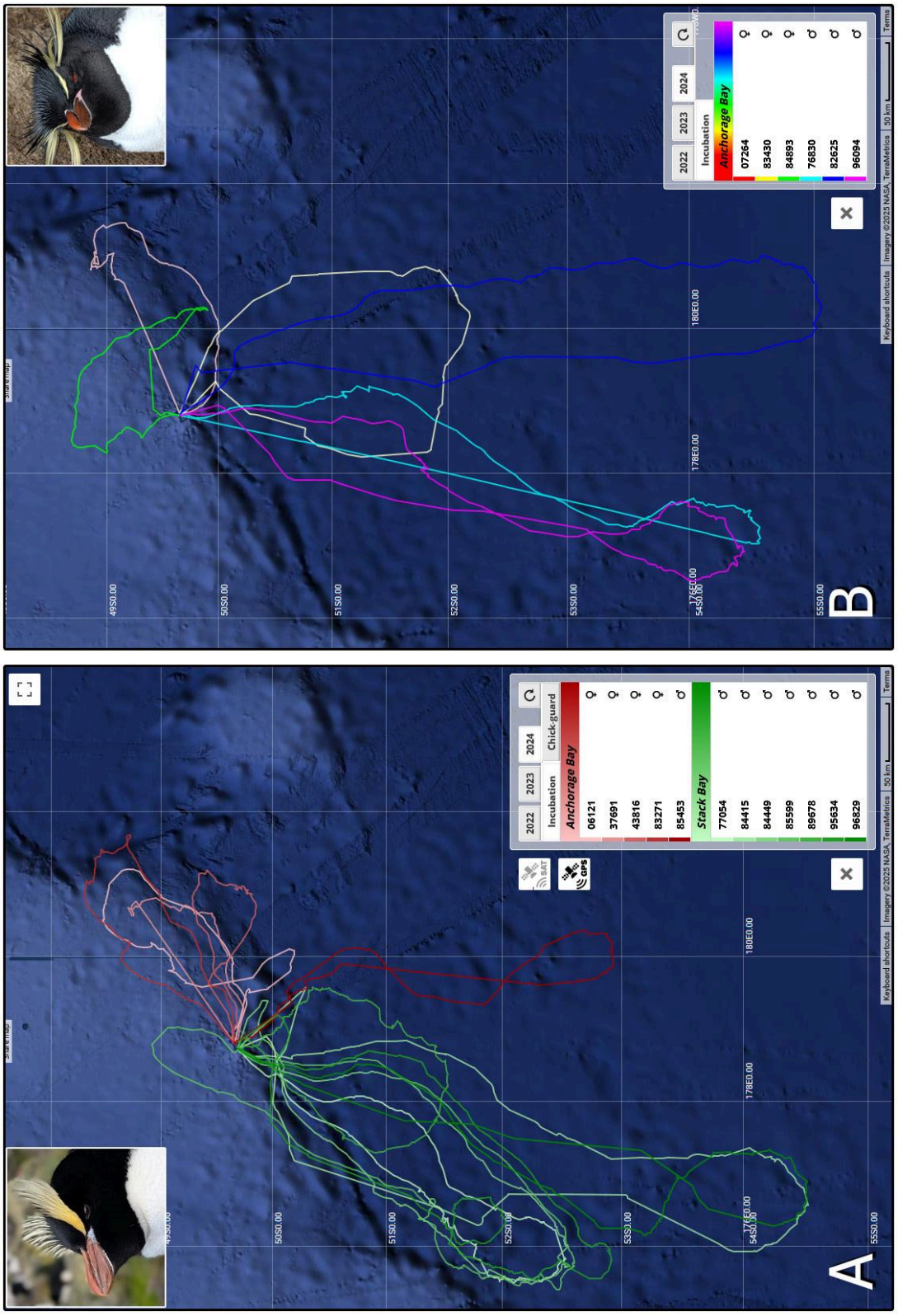


Figure 11. Foraging tracks of Erect-crested (A) and Eastern Rockhopper penguins (B) during the incubation stage of breeding, i.e. 22 Oct to 17 Nov for Erect-crested, and 09 Nov - 09 Dec for Rockhopper penguins. Interactive maps are available at https://ptx.lat/erg24in (ERP) and https://ptx.lat/rog24in (ECP).

Preliminary results - Chick-guard

During the chick-guard stage, data were recovered from 13 female Erect-crested penguins in Anchorage Bay and seven in Stack Bay. Their foraging patterns aligned with previous years, showing clear spatial segregation: Anchorage Bay penguins traveled north to east, while Stack Bay birds primarily foraged west to south (Figure 12). Interestingly, four Stack Bay penguins undertook extended foraging trips (>2 days) far to the east and even north. These trips, all occurring between November 28–30, suggest environmental conditions may have influenced their behavior. On subsequent trips, all birds returned to foraging west and south of Stack Bay.

Comparing basic trip statistics, Stack Bay females exhibited greater foraging effort. They traveled farther (34.9 km vs. 23.6 km), covered more distance (139 km vs. 56 km), and dived more frequently (810 vs. 571 dives). However, dive behavior was similar between groups, with mean depths of 28.5 m vs. 32.0 m and maximum depths of 107 m vs. 116 m.

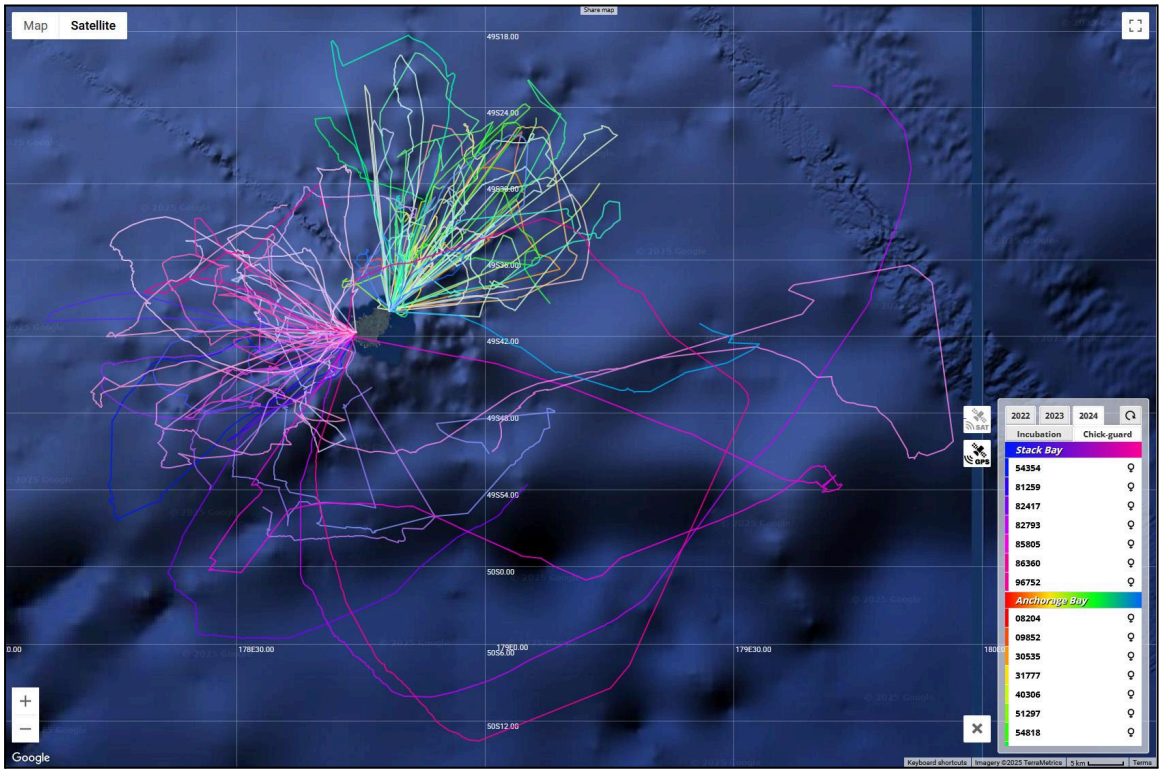


Figure 12. *Foraging trips of female Erect-crested penguins during the chick-guard stage of the 2024/25 breeding season recorded with GPS dive loggers. And interactive map can be accessed at https://ptx.lat/erg24cg.*

Surveys of penguin colonies during incubation and chick-guard stages

Orthometric drone surveys (open colonies)

The primary survey method used on Antipodes Island was orthometric drone surveys. These involve flying a drone at a constant altitude in a zigzag pattern over the target area, capturing high-resolution (20MP) images at regular intervals. Images are then processed using photogrammetry to create detailed gigapixel orthomosaics (Figure 13).

Between 16 October and 16 December, a total of 42 orthometric drone missions were conducted across 28 distinct regions, covering penguin colonies ranging in size from 45 to 14,400 m². During these missions, 13,265 images were captured (Table 4) and processed into orthomosaics using the cloud-based DroneDeploy service. Data was uploaded and processed via Starlink, which also facilitated the use of a new machine learning-based annotation service for penguins.

Figure 13. *Example of an orthomosaic of the South Bay penguin colony, generated from 739 images recorded during a 34 minute long drone mission flown on 6 November 2024.*

Table 4. *Drone missions flown on Antipodes Island between 16 October - 16 December 2024.*

SITE	DATE	START	END	MISSION TIME	IMAGES
Anchorage Bay East	16 Oct	16:25	16:36	00:11	133
Reef Point	16 Oct	13:25	13:47	00:22	429
Stella Bay	16 Oct	14:22	14:31	00:09	90
Crater Bay	17 Oct	16:01	16:05	00:04	72
Anchorage Bay East	18 Oct	16:30	16:38	00:08	164
Mirounga Bay	24 Oct	14:02	14:12	00:10	148
Orde Lees	24 Oct	12:42	13:24	00:42	613
Anchorage Bay East	26 Oct	18:22	18:25	00:03	54
Mirounga Bay North	26 Oct	11:50	12:42	00:52	584
Mirounga Bay	26 Oct	14:06	14:20	00:14	205
Castle Cove	26 Oct	12:54	13:06	00:12	185
Reef Pt	26 Oct	17:24	18:11	00:47	670
Stella Bay	26 Oct	18:16	18:21	00:05	83
Alert Bay	29 Oct	14:24	14:59	00:35	321
Crater Bay	29 Oct	13:17	13:31	00:14	187
Crater Bay	30 Oct	11:27	11:41	00:14	210
Orde Lees West	31 Oct	15:32	15:43	00:11	155
Windward Bay	31 Oct	13:48	14:01	00:13	237
Archway Is	1 Nov	11:20	11:24	00:04	65
Bollons Is	1 Nov	11:40	11:45	00:05	66
Anchorage Bay East	2 Nov	13:51	14:01	00:10	216
Anchorage Bay West	2 Nov	14:34	15:06	00:32	464
Northwest Bay	3 Nov	15:16	15:22	00:06	58
Albatross Point	4 Nov	11:34	11:39	00:05	70

Table 4 (continued). *Drone missions flown on Antipodes Island between 16 October - 16 December 2024.*

SITE	DATE	START	END	MISSION TIME	IMAGES
Ringdove Bay	4 Nov	11:52	12:39	00:47	338
South Coast West	6 Nov	11:35	14:11	02:36	1714
South Coast	6 Nov	14:40	15:35	00:55	1062
South Bay	6 Nov	16:26	17:00	00:34	739
South Bay Cave	6 Nov	17:04	17:07	00:03	62
Stack Bay	10 Nov	13:14	13:55	00:41	888
Castle Cove	11 Nov	11:22	11:37	00:15	264
Alert Bay	13 Nov	13:00	13:20	00:20	362
Lee Shore	13 Nov	10:57	11:24	00:27	316
Cathedral Bay	14 Nov	12:59	13:27	00:28	354
East Windward Is	20 Nov	13:26	13:28	00:02	11
Albatross Point (slope)	4 Dec	12:46	12:52	00:06	85
South Bay (far east colony)	4 Dec	15:00	15:03	00:03	26
South Bay	6 Dec	14:27	14:48	00:21	230
Orde Lees	13 Dec	16:07	16:36	00:29	577
Reef Point	16 Dec	09:44	10:12	00:28	501
Stella Bay	16 Dec	10:13	10:15	00:02	40
Anchorage Bay East	16 Dec	10:25	10:37	00:12	217
			TOTAL	**15:17**	**13,265**

FPV drone surveys (cave colonies)

Previous drone surveys identified several penguin colonies within sea caves. These colonies could not be surveyed using orthometric drone methods due to low cave ceilings, which prevented overhead photography. Earlier attempts involved capturing oblique-angle photos and stitching them into panorama images (see 2023 report). However, these methods often failed to capture entire colonies, as some nests were located deeper inside caves or obscured by visual obstacles.

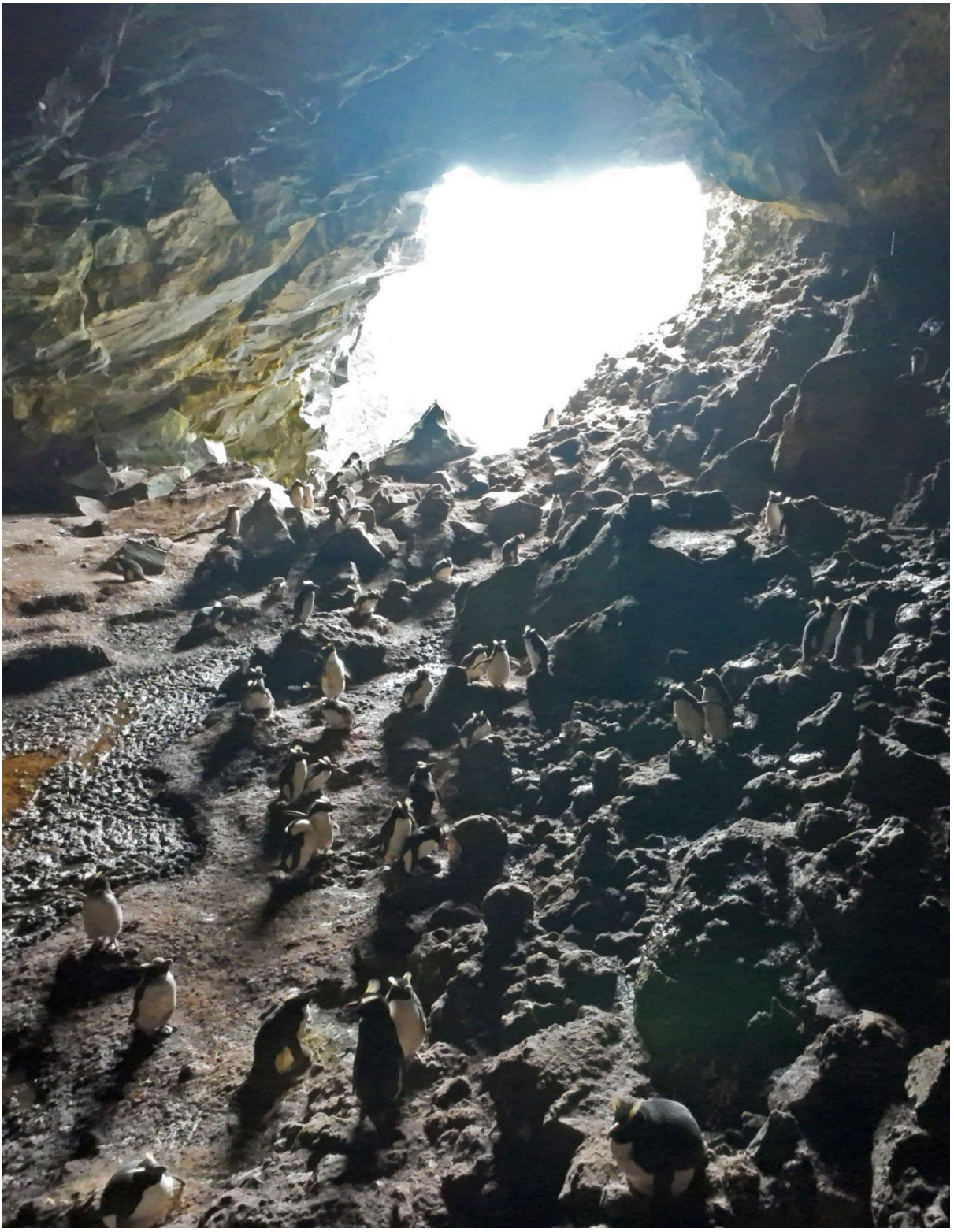
To address these limitations, a First-Person View (FPV) drone (DJI Avata 2) was added to the survey fleet. This drone is significantly smaller and more maneuverable than standard survey drones and does not require GPS reception to maintain position, making it ideal for cave environments. FPV drone surveys consisted of fly-throughs of the cave colonies while recording high-resolution (4K) video footage. Still images extracted from this footage allowed for penguin counting and basic colony mapping (Figure 14). The raw FPV video footage is accessible on YouTube (Table 5).

Figure 14. *Screen grab of FPV drone footage recorded in Hannah's Cave, Northwest Bay, Antipodes Is, 16 November 2024*

Despite flying much closer to the penguins (approximately 2–5 meters above) compared to the survey drones (30–60 meters above), the FPV drone did not elicit any visible reaction from the penguins. This lack of response was likely due to the drone's small size (comparable to a fairy prion) and the high ambient noise levels in the colonies, which likely masked the drone's operating sounds. Additionally, while fairy prions sometimes attacked the larger survey drones flying above the island, they showed no reaction to the FPV drone when it passed near cave entrances.

Table 5. *FPV drone missions flown on Antipodes Island, November-December 2024. Youtube IDs can be used to access raw footage of the FPV missions by adding the listed ID to the following URL: https://youtu.be/ID, e.g.* https://youtu.be/ZDeJB7uXgPU.

SITE	DATE	START	MISSION TIME	YOUTUBE ID
Hannah's Cave, Northwest Bay (NWC-005)	16 Nov	14:54	13 mins	ZDeJB7uXgPU
The Dungeon, Castle Cove (NWC-008)	6 Nov	13:27	4 mins	tsWROppAjOQ
Alert Bay	6 Dec	15:19	8 mins	rJPgSdj8R3I
South Bay Cave (SHB-003)	7 Dec	15:30	5 mins	RxWwS82VnT4
Hannah's Cave, Northwest Bay (NWC-005)	12 Dec	12:36	5 mins	lFrOUVmkz34



The Dungeon in Castle Cove surveyed with FPV drone, Antipodes Is, 24 November 2024

Ground counts

For ground-truthing of drone surveys, ground counts were conducted at various sites immediately after drone missions were completed. A team of two observers used binoculars to count nests and birds on the ground. With the exception of penguins on the study platform in Anchorage Bay, counts were performed in subsections of larger colonies. Both observers used tally counters and compared their results at the end of each count. If there was a significant discrepancy, a recount was conducted. Final counts were averaged unless both observers recorded identical numbers. The ratio of nests to birds on the ground was used to estimate nest numbers from drone survey data.

Figure 15. *Jeff White & Myrene Otis conducting ground counts in South Bay, Antipodes Is, 6 November 2024*

Preliminary results

Machine learning analysis of orthomosaics from the Antipodes Islands identified 39,587 Erect-crested penguins and 2,715 Eastern Rockhopper penguins. Using the average ratios of birds on the ground to nests determined from ground counts (ECP: 0.70, ERP: 0.31), the estimated number of breeding pairs is 27,710 for Erect-crested penguins and 840 for Eastern Rockhopper penguins.

Compared to the last full survey in 2011 (ECP: 34,226 pairs, ERP: 2,475 pairs), these figures suggest a population decline of 20% for Erect-crested penguins and 66% for Eastern Rockhopper penguins over the past 14 years. However, further analysis is required to verify these numbers.

Rockhopper penguins pose a particular challenge for drone surveys due to their cryptic breeding behavior. Especially along the south coast, many breeding Rockhopper penguins nest under boulders and in rock burrows, making them difficult to detect via drone imagery. Nonetheless, preliminary findings strongly indicate a continued, significant decline in both species.

Large slip in Mirounga Bay partly displacing penguins

During a drone survey of Mirounga Bay, a significant landslip was noticed (Figure 16).

Mirounga Bay is bordered by towering basalt cliffs, approximately 50–70 meters high. Eight clusters of breeding Erect-crested penguins, ranging in size from 20 to 500 pairs, and four smaller clusters of breeding Eastern Rockhopper penguins (5–60 pairs) are located in the eastern third of the bay (MRB-006 to MRB-012). These colonies primarily occupy the rocky foreshore and low-lying rock platforms above the high tide mark, nestled at the base of the basalt cliffs.

At the western edge of the breeding area, a cliff collapse spanning roughly 30 meters deposited substantial rock debris and sediment onto the rocky shore below. This slip completely covered a rock platform previously used by approximately 50 pairs of Erect-crested penguins for breeding (Figure 17). However, since penguins were observed nesting on top of the slip debris (Figure

18), it appears the event occurred over the 2024 winter months, before the penguins returned to breed.

A comparison of penguin numbers in the affected colonies (MRB-010 & MRB-011) suggests that nests were displaced rather than lost. A drone survey on 27 November 2022 counted 832 penguins in the two clusters (Figure 17), with chicks hatched and many pairs attending nests. On 26 October 2024, 419 penguins were counted in the same sections while birds were still incubating eggs, with only one bird per nest present. The nest estimates for both years remain comparable: 416 nests in 2022 (832 divided by 2) and 419 nests in 2024.

Figure 16. *View of the slip in Mirounga Bay, Antipodes Is, 26 October 2024*

Figure 17. *Nadir view of the Mirounga Bay slip area with penguin colonies MRB-010 and MRB-011 on 27 November 2022 during chick-guard (top) and on 26 October 2024 (incubation).*

Figure 18. *Erect-crested penguins breeding on top of the slip debris, Mirounga Bay, Antipodes Is, 26 October 2024.*

Resighting of isabelline penguin

For the third consecutive year, the only known isabelline ("brown") Erect-crested penguin was resighted in the large southwestern colony (SCW-004). On 6 November 2024, the bird was observed incubating an egg, confirming its status as part of the breeding population (Figure 19). Its nest was located in the same area where it was previously recorded in 2022 and 2023 (-49.702483°, 178.739889°).

After reviewing the full drone survey dataset from 2022 to 2024, it can be concluded that this is likely the only isabelline Erect-crested penguin on Antipodes Island. This aligns with the estimated incidence of isabelline variants in the closely related Snares penguin, which is approximately 1 in 50,000.[1]

Figure 19. *Isabelline Erect-crested penguin incubating an egg in the southwestern colony (SCW-004) on 6 November 2024, Antipodes Is. Arrow indicates location of the isabelline penguin's nests in a topographic context.*

[1] Everitt DA, Miskelly, CM. 2003. A review of isabellinism in penguins. *Notornis* 50:43–51.

Unusual bird observations

During the time on Antipodes Island, several unusual bird species were observed.

On 17 October 2024, while flying drone missions in Alert Bay from the top of the cliff near the handpointer, the team noticed a **Black Shag/Māpunga (*Phalacrocorax carbo*)** flying northwards across the bay below their vantage point. The bird had been first spotted in Stella Bay by Jeff White on the day of arrival, 14 October 2024. No photographic evidence can be provided as all encounters were only brief.

On 12 November 2024, while monitoring penguins in Anchorage Bay, the team heard what sounded like a goose honking. Shortly after a **Canada goose/Kuihi (*Branta canadensis*)**, probably startled by the human presence flew off from below the tussock slope before the point that separates the penguin colonies below the ladder (HTC-002) and the rock slope colony (HTC-001). The bird remained in Anchorage Bay for a number of days and spent most of its time around the grass patch sometimes occupied by fur seals below the eastern extremes of the slope colony (Figure 20). After a week, the patch was largely grazed off and littered with goose droppings. The bird was not seen again after 20 November 2024.

On 6 December 2024, a **Pacific/Fork-tailed swift (Apus pacificus)** was seen over the hut plateau just below the Crater Bay ridge by Thomas Mattern who was on route to Alert Bay following the top of the ridge. The bird flew close by and passed below him allowing observations of key identification features, most notably the white rump. The bird was too fast to take photos with the devices at hand (i.e. smart phone), but a short 4K video of the bird flying allows confirmation (see https://youtube.com/shorts/r4WIwSi3Gl8).

Other observations of unusual but more commonly observed bird species on the Antipodes were

- a **European goldfinch/Kōurarini (*Carduelis carduelis*)** that arrived and stayed in the vicinity of the hut for a number of days in October following a westerly storm
- a **Common redpoll (*Acanthis flammea*)** similarly stayed around the hut in early December for a few days
- and, individual **Common starlings (*Sturnus vulgaris*)** were observed over Reef Point and when the team visited the southwest coast penguin colony.

Figure 20. *Canada goose in Anchorage Bay East, Antipodes Is, 13 November 2024. Photo by Jeff White.*

Breeding population of Elephant seals

This year, the expedition arrived at Antipodes Island earlier than in previous years, allowing the first drone surveys to capture the brief nursing period of Southern Elephant Seals in October. On 15 October 2024, a significant presence of elephant seals was recorded in Stella Bay.

A large elephant seal harem was identified on the southern beach of Stella Bay and surveyed by drone on 16 October 2024. Additional known breeding sites - Crater Bay, Alert Bay, and Mirounga Bay (Figure 21) - were surveyed over the following 10 days. Across the four harems, counts recorded 5 bulls, 77 females, 31 pups, 39 weanlings, and 12 yearlings (Figures 22–25).

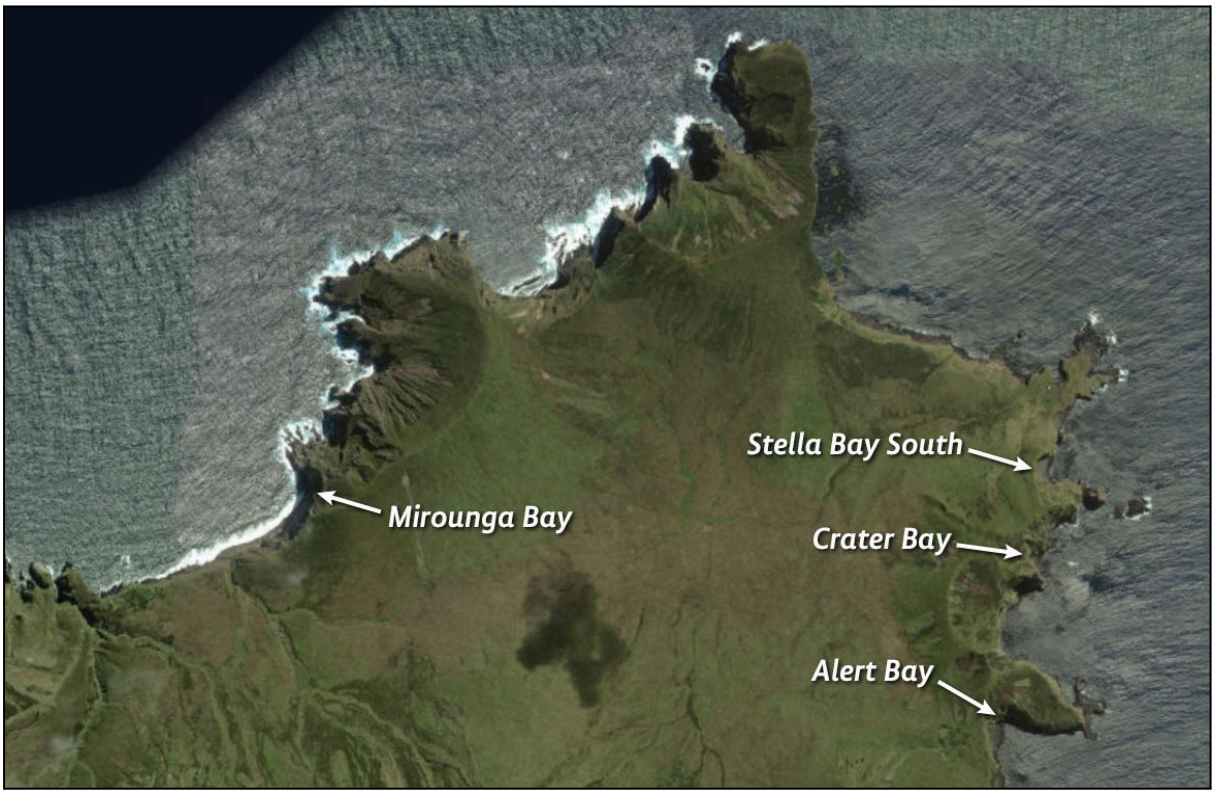


Figure 21. *Map of elephant seal harem locations surveyed in October 2024, Antipodes Is.*

Beyond the harems, elephant seals were observed at various locations, primarily along the northern coastline between Anchorage Bay and Alert Bay. A single yearling was spotted on a pebbly beach in South Bay. On the northern beach of Stella Bay, elephant seals were observed encroaching on incubating penguins (Figure 26).

Figure 22. *Elephant seal harem in Stella Bay (southern beach), 16 October 2024, Antipodes Is.*

Figure 23. *Elephant seal harem in Crater Bay, 17 October 2024, Antipodes Is.*

Figure 24. *Elephant seal harem in Crater Bay, 17 October 2024, Antipodes Is.*

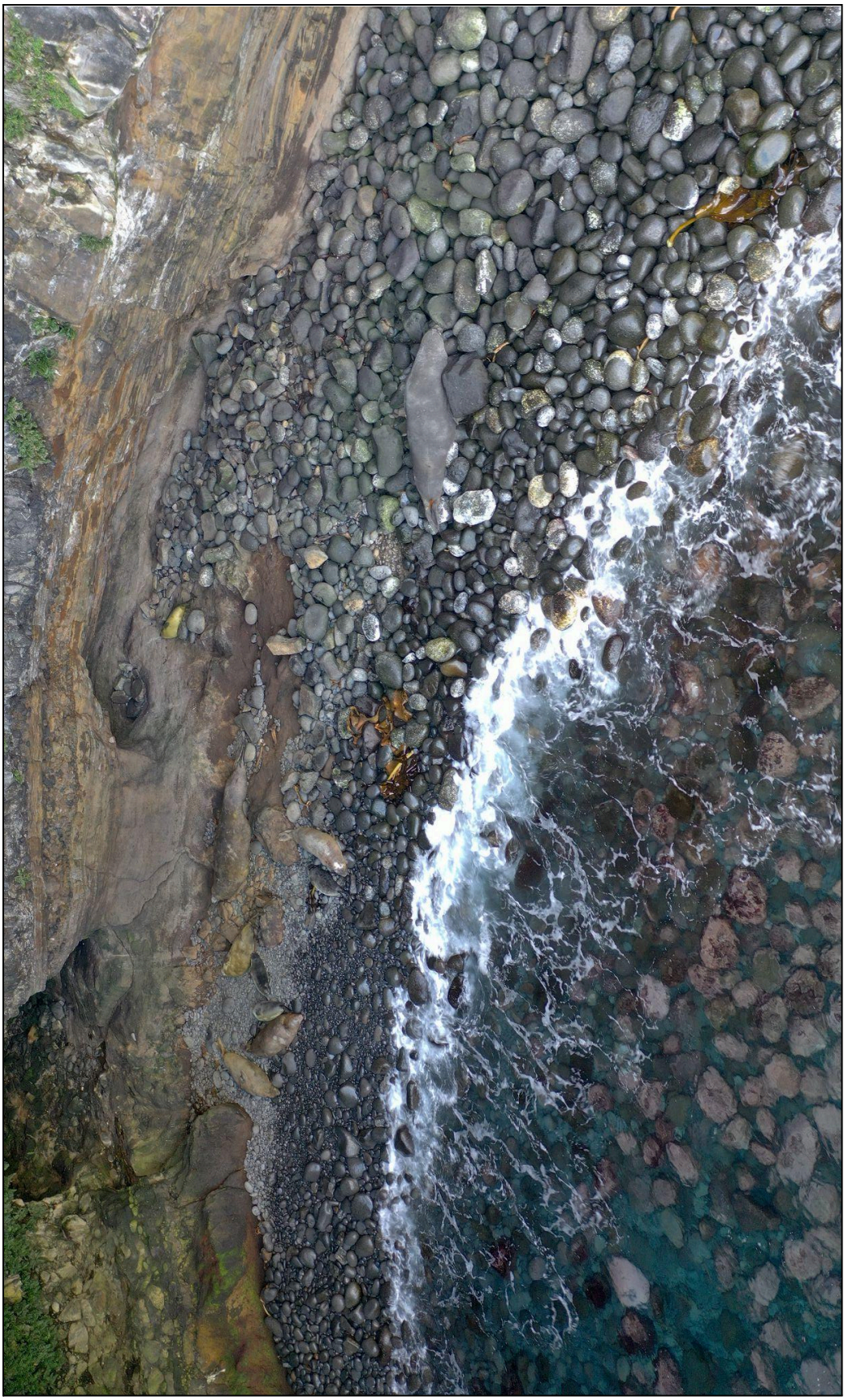


Figure 25. Elephant seal harem in Mirounga Bay, 26 October 2024, Antipodes Is.

Figure 26. *Elephant seals encroaching the Stella Bay penguin colony, 15 October 2024, Antipodes Is.*

Archeological observations

Further investigations of the rock cairn in Hannah's Cave, Northwest Bay

Drone surveys of the penguin colony in Hannah's Cave, Northwest Bay, in 2023 revealed a possible rock cairn (Figure 27). After reviewing footage, the University of Otago's Department of Geology concluded it was almost certainly man-made (see 2023 report). However, the available Mavic 2 Pro drones prevented closer inspection.

The use of an FPV drone overcame this limitation. During two missions flown into Hannah's Cave on 16 November and 12 December 2024, the cairn was examined from multiple angles . Based on the recorded footage, the structure previously identified as a rock cairn now appears to be part of a collapsed wall. Several large, flat rocks aligned along the edge of the rock platform resemble a foundational layer of a rock wall (Figure 28) . Similar rocks were found at the base of the platform on the inside of the cave, suggesting they may have once been part of the wall before falling from the platform (Figure 29).

Another notable feature are what appears to be carvings on the central rock of the cairn structure (Figure 30). It is imaginable that these served as a man-made socket for horizontal wooden beams, potentially used as ridge beams for a hut or tent structure, or as curing beams for drying seal pelts.

Although no artifacts, such as bottles, are visible in the footage to confirm human activity, it is important to note that the cave floor appears to be primarily composed of penguin guano. Any artifacts would likely be buried rather than resting on the surface. The cave would have been an ideal base for sealers, not only due to the shelter provided by the rock platform but also because of a large chamber behind the platform, which offers ample storage space (Figure 31).

Northwest Bay has a significant population of breeding fur seals, making historical sealing activity in the area highly likely. Given this context, it is plausible that Hannah's Cave was used as a base by sealers, warranting further archaeological investigation. The full drone footage of both missions can be accessed in 4K resolution on YouTube (see Table 5).

Figure 27. *Hannah's Cave in Northwest Bay. The rock platform and cairn are visible in the right half of the frame.*

Figure 28. *Series of flat rocks that may represent the foundational layer of a rock wall.*

Figure 29. *Further rocks at the base of the rock platform on the inside of the cave.*

Figure 30. *Apparent rock carvings (indicated by arrows) in the centre rock of cairn.*

Figure 31. *Back chamber of Hannah's Cave located behind the rock platform with the rock structure.*

Stone wall built by castaways of the "Spirit of the Dawn"

Detailed summaries of the archaeological sites associated with the castaways of the *Spirit of the Dawn*, which shipwrecked off the south coast of the Antipodes Islands on 4 September 1893, are provided in Taylor (2006)[2] and Petchey et al. (2023)[3]. The reports describe a series of low caves south of the main penguin landing, where the castaways spent the final month of their ordeal. Before moving to the caves, however, they initially established a "shelter with walls of tussock, roofed by the boat's sails".

The exact location of this first campsite has remained uncertain. Petchey et al. (2023) suggest:

> *"[T]heir first camp was probably under the continuous line of low bluffs that runs across the isthmus of the peninsula that forms the western shore of South Bay. In 2001, Kath Walker and Graeme Elliott found a low rock overhang with a dense mat of dry tussock beneath it, about two-thirds of the way westward along the bluffs."*

On 7 December 2024, Thomas Mattern followed this line of bluffs, starting at the western end. Staying close to the bluff to avoid deep tussock, he discovered what were clearly the remnants of man-made wall constructed from pebbles and small rocks, now overgrown with ferns and tussock. Though largely collapsed, the stacked nature of the rocks is still visible beneath the vegetation (Figure 32). Additional stacked rocks and pebbles protruding from the peat layer atop the bluff's rock formation appear to be the upper part of the wall.

Given its structure and location, it seems reasonable to assume that the wall was built by the castaways, marking the site of their first camp. The geographic coordinates of the stone wall are: -49.709389, 178.753303, placing it closer to the penguin landing than the "two-thirds of the way westward along the bluffs" described by Petchey et al. (2023). The exact location is shown in Figure 33.

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[2] Taylor RH. 2006. *Straight through from London: the Antipodes and Bounty Islands, New Zealand*. Christchurch, New Zealand: Heritage Expeditions New Zealand.

[3] Petchey P, Taylor RH, Walker K, Elliott GP. 2023. *Archaeology of the Antipodes Islands*. Wellington, New Zealand: Department of Conservation.

Figure 32. *Stonewall at the likely site of the "Spirit of the Dawn" castaways' first camp, South Bay, Antipodes Is, 7 December 2024.*

Figure 33. *Location of the stonewall likely built by the castaways of the "Spirit of the Dawn" for their first camp along the bluff running across the isthmus of the South Bay peninsula. The arrow indicates the location of the stone wall.*

Expedition Log

8 October 2024	Quarantine of gear in Invercargill. Transport back to Dunedin and loading onto *Evohe*. Departure delayed by weather.
9 October 2024	Departure delayed again by weather.
10 October 2024	Leave Dunedin around 08:00 hrs, out of Otago Harbour by 09:30 hrs.
11 October 2024	 In transit to Bounty Islands. Observed massive *Aurora australis* between 19:00 hrs and midnight.
12 October 2024	First sight of Bounty Islands around 07:00 hrs. Anchored off Proclamation Is around 09:00 hrs in fair, calm conditions. Full team ashore by 10:00 hrs. Drone surveys, Albatross ground counts, removal of time lapse cameras, HPAI screening, Fulmar prion blood sampling. Team off the island around 15:30 hrs. *Evohe* circles around the archipelago overnight due to rough conditions.

13 October 2024	 2nd day on Bounty Islands. Team ashore by 10:00 hrs. Completes drone surveys of Main and Centre Groups. Further Albatross ground counts and resightings. Team off island by 14:00 hrs. *Evohe* steams to the Eastern Group to fly Molly Cap drone mission. Departure towards Antipodes by 15:30 hrs.
14 October 2024	Arrival at Antipodes Is. around 09:00 hrs. First team (TM, DH, GL) ashore by 11:00 hrs to set up flying fox while waiting for conditions in Hut Cove to improve. Unloading commences at 14:00 after JW, MO, TT & PH landed. All gear unloaded by 16:00 hrs. Helpers (DH, GL, TT, PH) depart island by 17:00 hrs. *Evohe* anchors in Alert Bay to wait out weather system.
15 October 2024	*Evohe* leaves for mainland around 07:00 hrs. Antipodes team (TM, JF, MO) settle in for good. All day devoted to getting hut in order. StarLink and solar panels installed and hut fully operational by afternoon. Visit to Stella Bay around 18:00 hrs. Large presence of elephant seals noted.
16 October 2024	Drone surveys of Anchorage Bay East, Reef Point and Stella Bay, including survey of Elephant seal harem.

17 October 2024

Sunny day, but very gusty from the West. Team walks to Ringdove Bay but conditions too rough to fly drone. Back along the east coast to fly drone missions in Alert Bay and Crater Bay. Back at the hut by 17:hrs.

18 October 2024

Preparing GPS loggers for deployments over the next few days.

19 October 2024

Team leaves hut around 08:30 hrs and walks to Stack Bay. Arrives at top colony at 11:30 hrs. Deploys GPS dive loggers on eight male Erect-crested penguins between 12:45 and 14:00 hrs. Back at the hut by 18:30 hrs.

20 October 2024

Afternoon deployment of six GPS dive loggers on male Erect-crested penguins in Anchorage Bay East.

21 October 2024

Strong westerly winds prevent drone surveys. Setup of video stream camera at Anchorage Bay penguin colony.

22 October 2024

Winds still too strong to fly drones. Hut day.

23 October 2024

Winds do not abate, no drone missions possible. Hut day.

24 October 2024

Misty day, but wind has settled. Team leaves hut around 09:30 hrs to walk to Orde Lees. Drone missions flown to cover all of Orde Lees penguin colonies despite occasional rain. Additional drone mission flown along Mirounga Bay from Orde Lees. Team walks back in foggy conditions and arrives back at hut around 17:30 hrs.

25 October 2024

Strong winds are back. Rest day at the hut.

26 October 2024

Sunny and windless. At 09:30 hrs team walks to Mirounga Bay North, up southern end of Banana Ridge and down to the top penguin colonies. Drone surveys of entire area as well as re-survey of Mirounga Bay beach colonies. Examination of major rock fall. Back at

	the hut by 17:00 hrs. Drone missions flown over Reef Point, Stella bay and Anchorage Bay East.
27 October 2024	Easterly storm forecast although the day starts sunny. Conditions deteriorate fast by 10:00 hrs with gale force winds by midday. Hut day.
28 October 2024	Easterly storm persists. Hut day.
29 October 2024	 Wind has changed to westerly again. But massive seas still crashing onto the eastern shores. TM & MO make their way to Crater and Alert Bay, to fly drone missions and document effects of massive seas on the penguin colonies.
30 October 2024	Around 09:30 hrs, team heads towards Northwest Bay to fly drone missions but aborts attempt due to high westerly winds on that side of the island. Walk over to Crater Bay instead to fly drone missions again due to poor image quality of yesterday's drone surveys. Back at the hut by 15:00 hrs.

31 October 2024

Big walk to Windward Bay to fly drone missions of penguin colonies. Team leaves hut around 09:00 hrs and reaches Peak 219 by 11:00 hrs. Wind conditions prevent survey of East Windward Island. Drone missions flown from top of the cliffs towering over first plateau. By 14:00 hrs. Team relocates to Orde Lees South and flies drone missions from the bottom of narrow slip. Back at the hut but 18:00 hrs.

1 November 2024

A rare day with close to zero wind, but overcast. The team leaves the hut around 09:30 hrs to go to the top of Perpendicular Head. Reach the ridge after an hour and settle half-way to the end of the point to fly drone over to Bollons and Archway Island. Drone missions successful before light rain starts. Back at the hut by 15:00 hrs.

2 November 2024

Thick fog all day. Hut day.

3 November 2024

Team goes to Northwest Bay in fair conditions, leaves

hut by 10:30 hrs. Strong southerly winds, but hope is that the bay will be sheltered enough to fly FPV drone to Hannah's Cave. Attempt at flying the drone from the top of the cliff around midday. Drone gets quickly blown off course and mission is aborted. Team returns to hut by 14:00 hrs.

4 November 2024

Brisk northwesterlies make droning in Ringdove Bay a possibility. Team leaves hut around 09:00 hrs and reaches the top of Peak 294 on the East coast by 11:00 hrs. Fly drone from the first cliff below peak at the base of an old slip. All of Ringdove Bay and the Albatross Pt cave colonies surveyed. Back at the hut by 17:00 hrs.

5 November 2024

Rest day at the hut in preparation for long day to South Coast the next day.

6 November 2024

Team leaves hut at 08:00 hrs and makes it to the southern slopes above Stack Bay by 10:30 hrs. Fly

drone to check on GPS logger penguins in top colony. At least one logger bird home. Then continue down the northern creek to Southwest Coast colonies. Arrive at SCW-010 around 11:00 hrs. Drone missions of entire southwest and south coast colonies flown between 11:30 and 15:30. Team continues to South Bay and gets there by 16:00 hrs. Drone mission of South Bay (SHB-006) and South Bay Cave (SHB-003) colonies successful. Attempts to South Bay fly far east colony (SHB-001) aborted due to high winds. Back to the hut via eastern route. Arrive just before dark at 20:45 hrs.

7 November 2024

Foggy, damp day. Logger deployments on one female ECP and one male Rockhopper in Rockie Cave. Too wet for further deployments.

8 November 2024

Still misty. Wind too gusty from the West to do anything. First GPS logger male back - without device. Three devices deployed on female ECP and one male rockie.

9 November 2024

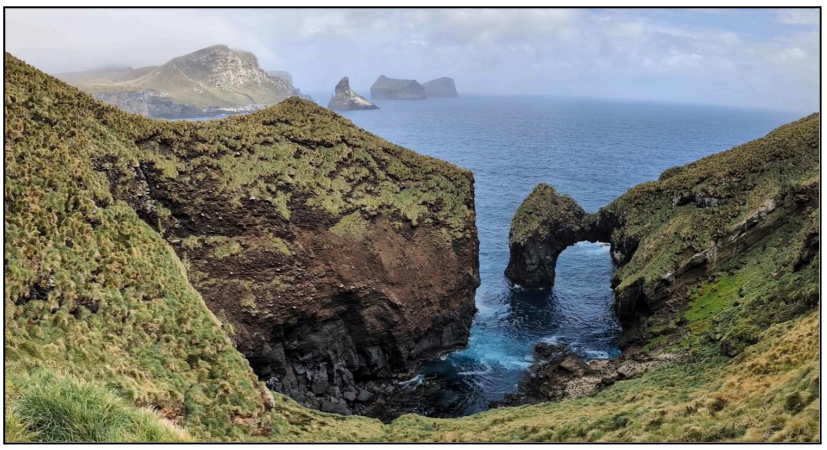
Two more logger birds back, one with one without a device. Rain from midday. Hut day.

10 November 2024

Team goes to Stack Bay to recover GPS loggers from males. Leave at 09:30 hrs and arrive at the top colony in Stack Bay around 13:00 hrs. One logger bird is just returning and device can be recovered. Six other logger birds are incubating eggs and cannot be handled. The eighth bird is nowhere to be seen. Very

warm day. Team leaves Stack Bay around 16:00 hrs; back at the hut 19:30 hrs.

11 November 2024



The team walks to Castle Cove to fly drone missions of penguins. Leave hut at 10:30 hrs and reach the bluff half way down to the inside of the cove by midday and fly drone from there. Notice another cave with breeding penguins the team names “The Dungeon”. Arduous track back to the ridge around 13:00 hrs. Back at the hut before 15:00 hrs.

12 November 2024

Hut day. Canada goose in Anchorage Bay.

13 November 2024

Hut day.

14 November 2024

Team walks to Cathedral Bay in the southeast of the island. Clear day with gusty northwest wind. Leave the hut at 09:00 hrs. Reach the ‘amphitheatre’ above Cathedral Bay at 11:45 hrs before descending to ocean cliffs at the bottom. Fly drone missions from 12:30 hrs.

	Start return trip at 14:30 hrs and reach the hut around 18:00 hrs.
15 November 2024	Rain most of the day. Hut day. First Erect-crested penguin chicks hatch in Anchorage Bay.
16 November 2024	 To Northwest Bay for another attempt to fly FPV drone to Hannah's Cave. Leave hut around 13:00 hrs, arrive at the top of the eastern cliff at 14:30. Fly successful FPV drone mission into Hannah's Cave before wind picks up again around 15:30 hrs. Back at the hut just before 17:00 hrs.
17 November 2024	First GPS logger female returns to Anchorage Bay colony. Device recovered. Hut day.
18 November 2024	Team goes back to Stack Bay to establish camp and recover GPS loggers from males. Leave hut in summery conditions at 09:45 hrs and reach the top colony by 13:00 hrs. Two devices can be recovered before TM leaves to return to hut around 16:00 hrs. JW & MO stay and recover a further three loggers. TM walks back via central plateau and eastern route arrives back at hut 19:30 hrs.
19 November 2024	TM stays at hut, JW & MO recover last devices and collect blood samples before returning to hut around 19:00 hrs.

20 November 2024	 Wind conditions good to fly drone on west coast. Team leaves hut at 10:30 and walks to Peak 219 above Windward Bay. Misty conditions about the peaks but clouds lift enough to fly drone when team arrives at its destination around 13:00. TM flies drone over to East Windward Island but frequently loses connection to drone as the eastern "wall" of the island blocks the signal. Regardless, successful capture of series of images of the island colonies. Team walks back via the central plateau (with an unintended side-trip towards the Ringdove Stream flats) and eastern route. Back at the hut at 17:00 hrs. One female Erect-crested penguin with GPS logger recovered.
21 November 2024	Very windy. Two female Erect-crested penguins with GPS loggers recovered. Hut day.
22 November 2024	Very windy. Hut day.
23 November 2024	Stormy, impossible to fly drone.

24 November 2024

Still exceedingly windy. JW stays at hut with knee problems. TM & MO walk to Castle Cove in the hope of flying the FPV drone into The Dungeon. They leave around 11:30 hrs and reach the rocky shore inside Castle Cove by 13:00 hrs. The inside of the cove is sheltered from the wind so the FPV drone can be flown. However, during second pass through the cave, the drone hits the cave ceiling and crashes into a mud pool. Cannot be restarted. TM & MO examine the cave entrance but find it inaccessible without abseiling gear to get down a 5 m peat bluff. Return to the hut by 16:00 hrs.

25 November 2024

Whole team walks back to Castle Cove with abseiling gear in an attempt to recover drone from The Dungeon. Leave hut around 10:00 hrs and reach the cave entrance. When trying to abseil into cave it becomes clear that bluff too crumbly. Back to the hut without drone by 15:30 hrs.

26 November 2024	 Second trip to Castle Cove to recover drone by whole team. Arrive at the cave entrance around 13:30 hrs. Cover bluff with tarpaulin and drop rope ladder. TM descends and enters the cave. Recovers mud covered drone from back of the cave.
27 November 2024	Whole team heads to Stack Bay to deploy GPS loggers on female Erect-crested penguins. Leave hut at 09:30 hrs and reach Stack Bay at 12:30 hrs. Total of 7 devices deployed in northern section of top colony. Leave colony around 17:00 hrs and arrive back at the hut by 20:00 hrs.
28 November 2024	Northwest storm. Hut day.
29 November 2024	TM walks to Stella Bay to conduct ground counts of Erect-crested penguins. Still significant elephant seal presence encroaching on penguins. Subantarctic fur seal seen amongst NZ fur seals. Still high winds.
30 November 2024	High winds and rain. Hut day.
1 December 2024	High winds and rain. Hut day.

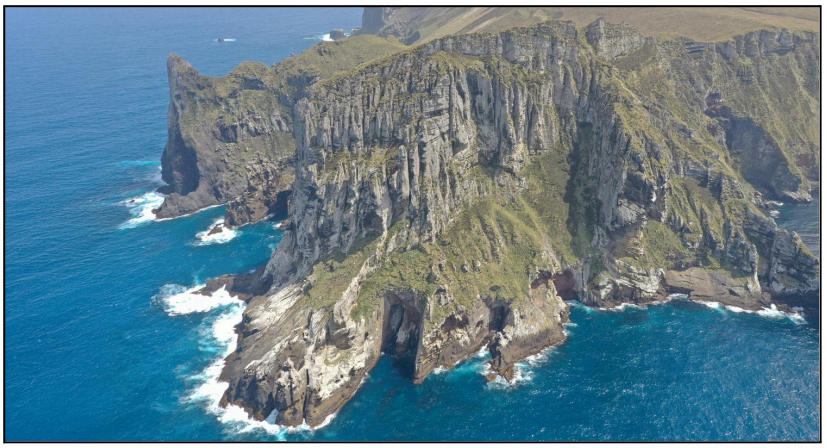
2 December 2024

Team walk along Crater Bay ridge to fly drone missions in Alert Bay around 14:00 hrs. But high winds prevent that, so return to hut by 16:30 hrs. First Rockhopper chicks have hatched.

3 December 2024

TM & MO try to make it to Orde Lees to conduct drone surveys around 10:30 hrs but abort the attempt about halfway there when they see whitecaps off Orde Lees Islet and drizzle sets in. JW stayed behind because of stomach issues.

4 December 2024



Team walks to Albatross Point to fly drone survey of the small slope colony. Leave the hut at 09:30 hrs and reach the Albatross Point ridge end by 13:00 hrs. After surveying the Albatross Point colonies, they traverse to the point above the Cathedral Bay organ pipes to attempt to fly the far east South Bay colony with mixed success. Back at the hut around 18:30 hrs.

5 December 2024	Hut day.
6 December 2024	JW & MO walk to Stack Bay to recover GPS devices from female Erect-crested penguins. Leave hut around 10:00 hrs and arrive in Stack Bay at 13:30 hrs and manage to recover four of the seven devices by 21:00 hrs. They stay overnight in the camp. Thomas walks to Alert Bay to fly the FPV drone and survey the small cave colonies at the base of the cliffs. He leaves the hut around 14:00 hrs and is back by 16:30 hrs. Spots a Pacific swift on the wing while walking along Crater Bay ridge.
7 December 2024	 Jeff & Myrene stay in Stack Bay to get the last loggers. Manage to recover two more with one still MIA at the end of the day. Thomas walks alone to South Bay to fly the cave with FPV drone. Leaves at 08:30 hrs and has lunch at the old south coast campsite around midday. Reaches South Bay at 14:00 hrs. Comes across stone wall of the "Spirit of the Dawn" castaway camp. Successful drone mission of South Bay Caves. Leaves South Bay at 16:30 hrs and returns to the hut via east coast by 20:00 hrs.
8 December 2024	JW & MO return to hut from Stack Bay in deteriorating conditions around 14:30 hrs. Very windy and wet on Galloway. One logger bird still missing in Stack Bay.

9 December 2024

Massive northwest storm buffets island all day. Water at hut disconnected to avoid tainting of fresh water with salty spray. TM visits penguin colony at Reef Point in the afternoon.

10 December 2024

TM walks alone to Stack Bay to recover final GPS logger. Leaves hut at 13:30 and makes it to Stack Bay by 16:45 hrs. Logger bird still not home, but chick alive and guarded by father.

11 December 2024

After staying a night at Stack Bay, frequently checking on the logger nest, TM finds the logger bird's chick dead in the nest in the morning. Missing female finally returns midday, about 12 hours too late for her chick. TM recovers logger and leaves Stack Bay around 16:30 hrs. Back at the hut by 20:00 hrs.

12 December 2024

JW & MO walk to Stack Bay to break down camp. They leave at 10:30 hrs and are back at the hut at 17:30 hrs

with the rest of the camping gear. TM walks back to Northwest Bay to drone Hannah's Cave again for chick counts. Leaves hut around 11:00 hrs and is back at the hut 3.5 hours later.

13 December 2024

Thick fog in the morning. Heritage Expedition cruise ship in Anchorage Bay. Afternoon: TM & MO to Orde Lees for final drone survey. Cruise ship steams past with passengers spotting the team on its way back to hut (later reported via social media).

14 December 2024

Packing up gear. Cleaning hut in anticipation of arrival of *Evohe*. Flying fox rigged.

15 December 2024

Evohe arrived in the night. Conditions in Hut Cove unsavoury to start unloading until 11:00 hrs when Albatross team lands on the island to help hauling gear. Shifting of gear to and from Evohe takes all afternoon. The full shore party - penguin and

	albatross teams go to *Evohe* for the night. Evohe anchors in Alert Bay.
16 December 2024	Penguin and Albatross team go ashore again as *Evohe* waits out a passing front. Final drone missions flown over Anchorage Bay, Reef Point and Stella Bay. Penguin team leaves island around 12:00 hrs. *Evohe* departs for Bluff at 12:30 hrs.
17 December 2024	In transit.
18 December 2024	Mainland in sight around 17:00 hrs. Arrival in Bluff 01:30 hrs