

# BCBC2020-25 Mercury Islands seabird population census



Whakau Red Mercury Island

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Cover: Troy McDonald, David Sagar, and Claudia Mischler on Hakea Clearings on Whakau Red Mercury Island.

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DOC - xxxxxxxx

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# 1 Introduction

In a world facing a biodiversity crisis, islands comprise just 5.3% of Earth's land mass but have hosted ~75% of recent species extinctions and currently support 36% of species classified as Critically Endangered on the IUCN Red List (Diaz et al. 2019). The impacts of invasive species and habitat modification are exacerbated in island systems due to the ecological singularities and fragilities of these insular environments, which typically have high levels of endemism (Holmes et al. 2019). While in need of dire conservation intervention, islands offer unique opportunities for significant biodiversity gains, and can also act as refugia for habitats and species threatened elsewhere.

The seven islands of the Mercury Island group (Fig. 1) form the largest of four archipelagos in the Mercury Islands Ecological District. The islands, with the exception of Great Mercury Island, are highly protected Nature Reserves, which reflects their biogeographical value. Connected to the mainland as little as 7000 years ago, these islands provide vital refugia for threatened or locally endemic species that have been extirpated from the mainland by the presence of invasive pests (Towns et al. 1993). These include rare milk tree (*Streblus banksii*) forest, tuatara (*Sphenodon punctatus*), Mercury Island tusked wētā (*Motuweta isolata*), Whitaker's skink (*Oligosoma whitakeri*), robust skink (*Oligosoma alani*), and the largest populations of Pycroft's petrel (*Pterodroma pycrofti*), particularly on Whakau Red Mercury.

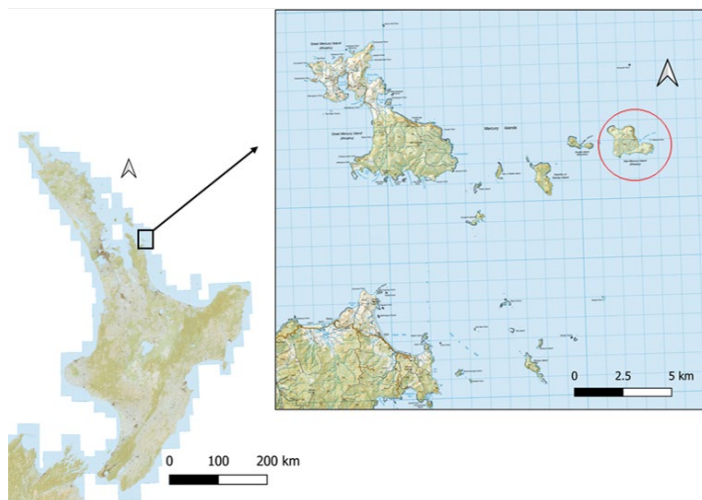


Fig. 1. Map showing the location of the Mercury Islands group relative to the North Island of New Zealand, with the Mercury Islands group enlarged within the inset and Whakau Red Mercury circled in red.

Five of the larger islands in the group (Fig. 1) were modified through human inhabitation and burning in relatively recent history (<100 years ago; Atkinson 2004). Kiore (*Rattus exulans*) were present on all islands except Green (2.3 ha) and Middle (13 ha), while rabbits (*Oryctolagus cuniculus*) were also present on Kawhitu Stanley Island (100 ha) and Korapuki Island (18 ha). Following pioneering island rodent eradications in the 1980s, the eradication of mammalian terrestrial pests from the Mercury Islands was completed in the early 1990s, beginning with smaller Korapuki Island running through to Red Mercury Island (225 ha), the largest of the islands. These eradications provided critical step-change in eradication capability, including a proving ground for aerial bait application (Towns & Broome 2003). Relict populations of

endemic species remained on most of the islands, though their restoration was also facilitated by the translocation of extirpated species (e.g. tusked wētā, tīeke *Philesturnus rufusater*) (Towns et al. 1993).

This report focuses on the work that was carried out on Whakau Red Mercury Island in January 2021. The island lies 15 kilometers from the mainland (Opito Bay) or 30 kilometers from Whitianga, and is 225 ha in area (Fig. 2). Some of the coastline is basalt, and it is home to ‘nationally endangered’ Cook’s scurvy grass (*Lepidium oleraceum*) and the ‘at risk’ tawapou (*Planchonella costata*). The last recorded burn was in 1936, and kiore were eradicated in 1992. The island consists of kowhai (*Sophora chathamica*), pōhutukawa (*Metrosideros excelsa*), and regenerating coastal broadleaf such as mahoe (*Melicytus ramiflorus*) and kohekohe (*Dysoxylum spectabile*) and tall remnant broadleaf and hardwood forest. Tīeke were the first species to be translocated to the Mercury Islands and released on Whakau from Taranga Hen Island in 1966, little spotted kiwi (*Apteryx owenii*) from Kapiti Island in 1983 and again in 2016 to augment genetic diversity, robust and Whitaker’s skink from Middle Island in 1994/95, Mercury Islands tusked wētā from a captive program in 2000, and tuatara from the Auckland Zoo captive program in 1996-98. The Pycroft’s petrel population on the island has also been a source for introduction to Cuvier Island in 2000-03 and to Motuora Island in 2012-14, and little spotted kiwi were moved from Whakau to Cape Kidnappers in 2016. The island holds a number of lizards, such as the Duvaucel’s gecko (*Hoplodactylus duvaucelii*), Pacific gecko (*Dactylocnemis pacificus*), egg-laying skink (*Oligosoma suteri*), shore skink (*O. smithi*), and copper skink (*O. aeneum*).



Fig 2. Map of Whakau Red Mercury Island showing the landing site, camp site, and track system.

## 2 Trip goals and objectives

Flesh-footed shearwater (*Puffinus carneipes*; FFSH) are a ‘nationally vulnerable’ seabird species which breeds in the Chicken Islands and the Mercury Islands group such as Ohinau and Middle Island. Historical records for most of the Mercury Islands group are scarce. Approximately ten burrows were occupied by FFSH in 2003 on Korapuki and in 1988-90 on Moturehu Double, and one pair confirmed occupying a burrow on Kawhitu Stanley Island in 1998 and 2003 (Waugh et al. 2013). Also, Pycroft’s petrel are endemic to New Zealand, and Whakau Red Mercury is the stronghold of the

breeding population. With the removal of kiore in 1992, it was suspected that FFSH may be breeding on Whakau Red Mercury Island, and that the number of Pycroft's petrels could have increased. The two major aims of the trip were:

1. Establish whether FFSH are breeding on the island. If present, estimate the numbers into orders of magnitude.
2. Survey the island for Pycroft's petrel burrows to estimate density.

Additional aims were:

3. Identify other breeding seabird species, such as fluttering shearwater (*Puffinus gavia*) and sooty shearwater (*P. griseus*).
4. Band Pycroft's petrel and collect recoveries of previously banded birds from the 1980s, 1990s, and 2000s.

For any additional information on other sightings, please refer to Corson (2021).

### 3 Transport and work schedule

The trip on Whakau Red Mercury was split as shown in Table 1.

Table 1. Staff and the respective dates working on Whakau Red Mercury Island during January 2021.

Date	Staff
12 - 16 January 2021	Claudia Mischler (Team lead), Troy McDonald, David Sagar, Marie Everth, Pete Corson
17 - 21 January 2021	Claudia Mischler (Team lead), Troy McDonald, David Sagar, Jamie Carey, Iris Ronald

All staff met and were briefed at the DOC office in Whitianga in the morning of 12 January. Gear was sorted, packed, and quarantined. Departure to island was in early afternoon, and landing was at Lunch Bay. All transportation between Whitianga and the island were with DOC Whitianga's boat *Kuaka* operated by James Blackmore. Marie Everth and Pete Corson were picked up in morning of 16 January at Roly Poly due to poor weather/swell conditions. Jamie Carey and Iris Ronald were dropped off at Lunch Bay in the morning of 17 January.

Table 2. Dates, time worked (day or night), and tasks undertaken by staff on Whakau Red Mercury Island in January 2021. FFSH – flesh-footed shearwater. Figure 2 can be used as a reference for locations mentioned below.

Date	Time	Tasks
12 January	Day 1	Drop off at Lunch Bay, carry gear to camp, set up camp, Health and Safety briefing
	Night 1	FFSH survey at Roly Poly (dusk on 12 Jan), near Heli pad and behind camp (dawn on 13 Jan)
13 January	Day 2	Walk around island using mix of tracks to examine habitat
	Night 2	FFSH survey at Roly Poly, Heli pad and Te Awa (two teams, both areas at dusk on 13 Jan and dawn on 14 Jan)
14 January	Day 3	Introduction to Pycroft's transects, transects done off Te Huhu/Von Luckner tracks and near camp
	Night 3	FFSH survey at Roly Poly and East Valley (two teams, dusk on 14 Jan), and Trig/Link track and Hakea Clearings (two teams, dawn on 15 Jan).
15 January	Day 4	Pycroft's transects off East Valley, Northern Circuit, Te Awa/Trig tracks
	Night 4	FFSH survey at Northern Circuit (dawn on 16 Jan)
16 January	Day 5	Pycroft's transects at northern end of Te Awa track and Folkerts Folly (Pete and Marie depart in am)
	Night 5	FFSH survey at Folkerts Folly (NW corner) (dawn 17 Jan)
17 January	Day 6	Pycroft's transects around camp area (Jamie and Iris arrive in am)
	Night 6	No night work
18 January	Day 7	Pycroft's transects along Te Awa/Rogans track and around Hakea Clearing and in Von Luckners Cove
	Night 7	Pycroft's petrel band recapture Roly Poly (dusk 18 Jan)
19 January	Day 8	Pycroft's transects at Roly Poly and along Link and Folkerts Folly tracks
	Night 8	Pycroft's petrel band recapture Von Luckners Cove (dusk 19 Jan)
20 January	Day 9	Pycroft's transects along Rogans, Te Huhu, Southern Motorway, Trig and Stairway to Heaven tracks; pack up gear
	Night 9	Pycroft's petrel band recapture Camp area (dusk 20 Jan)
21 January	Day 10	Take down camp, carry gear to beach and depart in morning from Lunch Bay. Back to Whitianga to clean gear. Travel to Auckland mid-afternoon

## 4 Native species monitoring

### 4.1 Flesh-footed shearwater survey

The main aim for the flesh-footed shearwater survey was to detect presence or absence on the island. And if present, estimate the numbers into orders of magnitude.

#### 4.1.1 Methods

Since FFSH are nocturnal, surveys were carried out at night. The birds are very noisy with a very distinctive call (shriek) at the high end of the medium-sized shearwater call spectrum (sound like cats having a fight) and can be heard from a long distance away. The surveys originally involved walking slowly, stopping, looking, using play-backs, and listening while

traveling to/from and sitting at a vantage point at dusk (approximately 2100 hrs to midnight or 0100 hrs), and repeating this again at dawn (approximately 0300 hrs to 0530 hrs). Teams generally listened and used play-back at vantage points for about an hour with the remaining time spent walking, looking, listening, and using play-backs. Both vantage points and tracks used for travel to/from these points were selected to maximise coverage of the whole island, and two teams were used to increase the area covered each night (Fig. 3). Conducting surveys at both dusk and dawn over the course of three nights resulted in the team becoming very fatigued due to lack of sleep, and surveys were therefore only carried out at dawn for the remaining two nights of the FFSH surveys because FFSH are known to be the most active at dawn during the exodus (Taylor 2013, Mischler 2016) (Table 2).

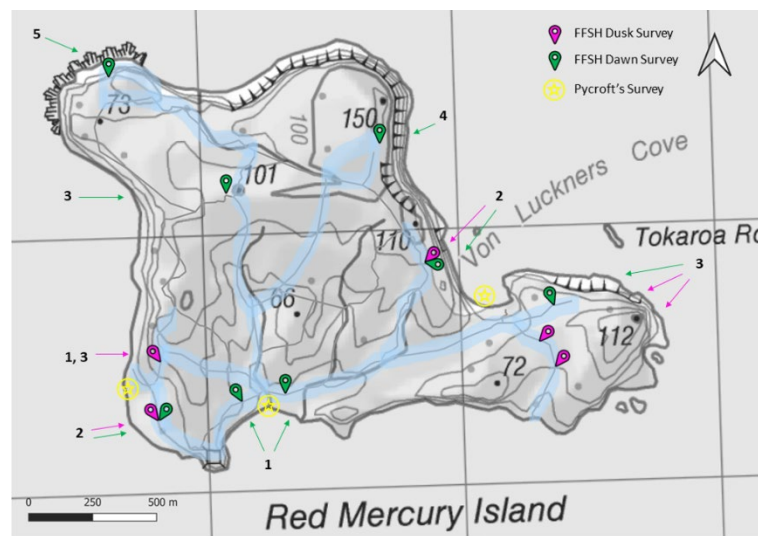


Fig. 3. Map showing vantage points used for flesh-footed shearwater (FFSH) listening and play-back surveys carried out at dusk (pink) and dawn (green). Numbers are indicative of the trip night each survey was done, and should be used in conjunction with Table 2. Blue shading shows the tracks used for travel to/from vantage points along which listening, looking, and play-backs were also conducted. Yellow stars show areas where band recapture surveys of Pycroft's petrels were done.

#### 4.1.2 Results

Three nights of both dawn and dusk surveys were carried out, one night with the whole team together and two nights with two teams split to cover different areas. An additional two dawn surveys were conducted by one team.

No FFSH were heard or seen anywhere on the island.

#### 4.1.3 Discussion

There were no FFSH heard or seen on the island. It is questionable whether or not FFSH had ever bred on Whakau Red Mercury because Falla (1934) recorded them as present in the 1930s but Fogerty & Douglas (1972) did not. In 1990, it was noted that they occupied burrows but a count of zero was given (Waugh et al. 2013). Two nearby islands, Atiu Middle and Ohinau, hold large FFSH populations (Fig. 4) and it would therefore be possible that FFSH would also be present on Whakau Red Mercury. The population estimate on Atiu Middle is 5822 breeding pairs, the largest in New Zealand (Bell & Boyle 2017), and Ohinau holds 4007 occupied burrows (Crowe 2018). Atiu Middle Island lies 6 km southwest of Whakau Red



Mercury and was never subjected to any introduced mammals, whereas Ohinau lies 12 km southwest and had kiore, mice, and rabbit introduced (although they were all eradicated in 2005). An additional 50-100 pairs were found in January 2021 on KawhITU Stanley Island where there had previously only been one pair confirmed in 1998 and 2003 (Waugh et al. 2013, Sagar 2021).

It is possible that FFSH are not moving to Whakau Red Mercury because the other two key sites, Atiu and Ohinau, are incredibly noisy and attract all birds. KawhITU Stanley lies immediately east (2 km) of Atiu Middle and it is therefore possible that birds have shifted from Atiu to KawhITU due to its close proximity and small numbers present previously. Competition for burrow space from other seabird species such as grey-faced petrel (*Pterodroma macroptera*) are unlikely because grey-faced petrels are winter breeders and the two species co-exist in large numbers on Ohinau (Mischler 2016). Whakau Red Mercury holds the largest number of Pycroft's petrels; however, FFSH are much bigger than the Pycroft's and it is therefore unlikely that Pycroft's would prevent FFSH from breeding.

Timing of season may have influenced the results. FFSH chicks are known to hatch around late January to early February (Taylor 2013). Birds are usually noisiest early in the season during pre-breeding as breeders and non-breeders are actively calling to attract mates but adults are still expected to be calling for the duration of the breeding season. This was confirmed by the team on KawhITU Stanley Island where FFSH were heard calling and a colony was found (Sagar 2021).

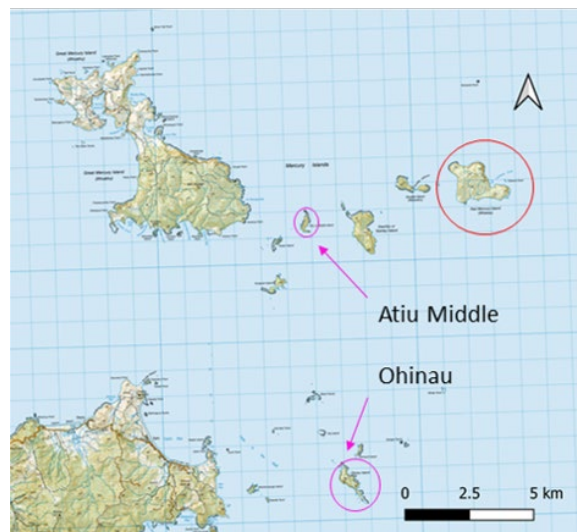


Fig. 4. Map showing location of Atiu Middle Island and Ohinau Island (pink circles, name labelled) relative to Whakau Red Mercury Island (red circle). Large populations of FFSH are present on Atiu Middle and Ohinau Island but none were found on Whakau Red Mercury.

## 4.2 Pycroft's petrel density survey

One of the main goals of the trip to Whakau Red Mercury was to survey the island for Pycroft's petrel burrows to estimate density. This information would potentially be used to calculate a population estimate, and to determine whether or not the burrow density has increased since kiore were removed in 1992. For a comprehensive and detailed summary of

the Pycroft's petrel density survey work completed on Korapuki, Moturehu Double, Kawhitu Stanley, and Whakau Red Mercury islands, see Mischler (2021).

### 4.3 Band Pycroft's petrels and collect recoveries of previously banded birds

Pycroft's petrels were previously banded in three areas on Whakau Red Mercury during the 1980s, 1990s, and 2000s. These areas are Roly Poly, Camp, and Von Luckners (Fig. 3). An attempt was made to recapture as many of these banded birds as possible for survival data. No new birds were banded as numbers on the ground seemed low.

#### 4.3.1 Methods

The three areas where Pycroft's petrels were previously banded were targeted over the course of one dusk session at Roly Poly while simultaneously conducting the FFSH survey, and one night each at Roly Poly, Von Luckners Cove, and Camp specifically for Pycroft's petrels only. The entire team spread out across the colony area just before birds began to arrive at dusk (birds arrived shortly after 2115 hrs on most nights), waited quietly in the dark, and picked up birds off the surface as they were seen or immediately after landing. Movements around the colony were slow due to the fragile ground, and birds were not chased if they ran away to avoid collapsing burrows. Red lights were used as much as possible to avoid blinding and confusing the birds. Legs were checked for bands. If no band was present, the bird was counted, twinked on the head to avoid recapture, and released by placing it on the ground and gently letting go. If a band was present, the number was recorded, the bird was twinked on the head, and released. Any birds with twink on the head were not captured. Birds were not removed from burrows unless it was accessible via a previously installed man-made hatch.

#### 4.3.2 Results

Numbers of birds captured per surveyed night at a given location is shown in Table 3, divided according to banded and unbanded. Band history details are given in Table 4.

Table 3. Date, specific colony location, and number of banded and unbanded Pycroft's petrels captured on Whakau Red Mercury Island.

Date	Area	Number of banded birds	Number of unbanded birds
12 January	Roly Poly	3	43
13 January	Roly Poly	2*	Unknown
18 January	Roly Poly	3	66
19 January	Von Luckners Cove	8	63
20 January	Camp	5	30

\*birds recaptured by chance

Banding histories of individual birds were looked up in the Department of Conservation's FALCON Database (online access: <https://app.birdbanding.doc.govt.nz>).

Table 4. Date, specific colony location, band details, and history of Pycroft's petrels captured on Whakau Red Mercury Island.

Date	Area	Band	History
12 January	Roly Poly	D-201373	All banded as age 1+ on 27 January 2011
		D-201376	
		D-202040	
13 January	Roly Poly	D-199587	No history found
		D-199666	Banded as age 1+ on 17 December 2009
18 January	Roly Poly	D-175722	Banded as a chick on 14 March 2001
		D-199648	Banded as age 1+ on 17 December 2009
		D-170912	Banded as a chick on 22 January 2000
19 January	Von Luckners	D-196561	No history found
		D-191987	Banded as age 1+ on 15 December 2009
		D-191985	Banded as age 1+ on 15 December 2009
		D-190980	Banded as a chick on 8 March 2015
		D-207593	Banded as a chick on 7 March 2014
		D-207580	Banded as a chick on 6 March 2014
		D-190979	Banded as a chick on 7 March 2015
		D-180022	No history found
20 January	Camp	D-201383	Banded as age 1+ on 29 January 2011
		D-196507	No history found
		D-172515	Banded as age 1+ on 24 October 1998
		D-196556	No history found
		D-196558	No history found

### 4.3.3 Discussion

Not as many birds as expected were landing in the colonies at night. The number flying and calling in the air seemed high on most nights (based on noise levels), but numbers on the surface seemed low. During previous trips, birds on the surface numbered in the hundreds (G. Taylor, pers. comm.). This might be due to time of night the survey was conducted (dusk) or timing within the breeding season. The trip in January was during chick hatching whereas previous trips were during late chick rearing (G. Taylor, pers. comm.).

## 4.4 Other species observations

Other seabird species were recorded as seen on the ground while walking during dusk and dawn surveys, and also listened for during dusk and dawn work while doing FFSH or Pycroft's petrel work. Play-backs for a variety of species were used to encourage calling (Table 5). Notably, little shearwater were seen at camp and on the track towards Roly Poly on 12 and 13 January. Fluttering shearwater were seen next to the track on the way to Roly Poly and heard flying over camp at dawn. A quick burrow/crevice search along Lunch Bay beach resulted in one fledgling being seen in a crevice at the southwestern corner, and a dead adult under a pōhutukawa tree closer to and west of the beach track (Fig. 2). Flutterers were also heard at night at the north east corner of the island (Fig. 3, FFSH dawn survey night 5), and at Von Luckners Cove during Pycroft's petrel band recapture work (Fig. 3).

Table 5. Seabird species seen and/or heard on Whakau Red Mercury Island.

Common name	Scientific name	General comments
Grey-faced petrel/ōī	<i>Pterodroma macroptera</i>	Widespread
Little penguin/kororā	<i>Eudyptula minor</i>	Common
Fluttering shearwater/pakahā	<i>Puffinus gavia</i>	Uncommon
Little shearwater	<i>Puffinus assimilis</i>	Relatively common
Pycroft's petrel	<i>Pterodroma pycrofti</i>	Widespread

Non-seabird bird species and non-bird species were recorded on an opportunistic basis (Table 6), and detailed information can be found in Corson (2021).

Table 6. Non-seabird bird species and non-bird species seen and/or heard on Whakau Red Mercury Island.

Common name	Scientific name	General comments
North Island saddleback/tīeke	<i>Philesturnus rufusater</i>	Widespread
New Zealand fantail/pīwakawaka	<i>Rhipidura fuliginosa</i>	Widespread
Bellbird/korimako	<i>Anthornis melanura</i>	Widespread
Tūī	<i>Prothemadera novaeseelandiae</i>	Relatively common
Kākā	<i>Nestor meridionalis</i>	Relatively common
Little spotted kiwi/pukupuku	<i>Apteryx owenii</i>	Common
Red-crowned parakeet/kākāriki	<i>Cyanoramphus novaezealandiae</i>	Common
New Zealand pigeon/kererū	<i>Hemiphaga novaeseelandiae</i>	Widespread
Grey warbler/riroriro	<i>Gerygone igata</i>	Widespread
Australasian harrier/kāhu	<i>Circus approximans</i>	Uncommon
Kingfisher/kōtare	<i>Todiramphus sanctus</i>	Common
Morepork/ruru	<i>Ninox novaeseelandiae</i>	Relatively common
Welcome swallow/warou	<i>Hirundo neoxena</i>	Common
Robust skink	<i>Oligosoma alani</i>	Very rare
Whitaker's skink	<i>Oligosoma whitakeri</i>	Very rare
Duvaucel's gecko	<i>Hoplodactylus duvaucelii</i>	Very rare
Pacific gecko	<i>Dactylocnemis pacificus</i>	Common
Shore skink	<i>Oligosoma smithi</i>	Common
Tuatara	<i>Sphenodon punctatus</i>	Uncommon
Mercury Islands sheetweb spider	<i>Cambridgea mercurialis</i>	Widespread
Tusked wētā	<i>Motuweta isolata</i>	Common

## 5 Health and safety

Health and Safety was well organized during this trip. A document written pre-departure was read and signed by all field teams. Procedures to be followed while traveling on the boat *Kuaka* were also clearly outlined by the skipper. Landings were led by experienced members of DOC Whitianga (Marie Everth and Troy McDonald) with assistance from Pete Corson. Wetsuits worn by Marie and Pete were helpful in moving gear on and off the dingy attached to a rope. All gear was in buckets or waterproof drums.

Once on the island, another briefing was done by the team leader and everyone was aware of the expectations. Before a new task was started, an informal Job Safety Analysis (Toolbox Talk) was carried out. All work was done in teams of at least two people, and everyone on the island was always informed of where the other members were. Guidelines around time to return to camp were also set out. At night, all members had to be able to see the light of at least one other person at all times.

Spark phone coverage was good across most of the island. The team leader scheduled in with DOC Whitianga (James Blackmore) on a daily basis at 10.30am.

The team had more than enough food left over in case of a poor weather event that would prevent pick-up. There was also a large amount of propane gas for the cooker available, and plenty of drinking water. Drinking water was brought from Whitianga, and dishes were washed with water from the stream near camp. This stream does not flow and should not be ingested without boiling.

## 6 Tracks and infrastructure

Tracks were incredibly well cut and tidy thanks to the DOC Whitianga team that had cleared those before the trip. The names of tracks were also clearly marked at junctions. This made travel around the island very efficient, and reduced the risk of getting disorientated at night time.

The hut on the island is no longer usable (Fig. 5a). It is very untidy inside with random items left behind, and full of lizards and droppings. It was not used for anything during this trip. The cover over the kitchen area was very convenient as it offers a nice area during wet weather, but the space underneath does heat up significantly when the sun shines on it in the middle of the day. The benches and table are easy to wipe and keep clean, and the sink is helpful for washing dishes. There are enough trees around the kitchen area to store buckets with food in the shade.

Each team member had his/her own tent near the kitchen area. There is sufficient flat space for five tents without the risk of collapsing or blocking Pycroft's petrel burrows (Fig. 5b).



Fig. 5. a) Hut and kitchen area under cover, b) tent site had sufficient space for five tents.

## 7 Acknowledgements

Thank you to my amazing team members, particularly Troy McDonald and David Sagar who were present on the island for the entire trip. Thank you also to Marie Everth, Pete Corson, Jamie Carey, and Iris Ronald for helping. The vast amount of knowledge in all different types of areas, whether lizards, vegetation, or spiders, was incredible and wonderful to share. Everyone worked amazingly hard, and the enthusiasm and laughs never faded. It was also wonderful to have local knowledge.

Thank you to Graeme Taylor for making this trip possible, and to Chris Gaskin (Northern New Zealand Seabird Trust) for organizing all the details and logistics. Thanks to James Blackmore for checking in with us daily and for the boat ride. The work was funded by DOC's Biodiversity Contingency fund (BCBC2020-25).

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