Conservation Services Programme (CSP)

Salvin's albatross population size at the Snares Western Chain

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Executive Summary

Salvin’s albatross is listed as Nationally Critical and is the second most at-risk species in the New Zealand fisheries risk assessment. There have been declines in estimated numbers of breeding pairs at the main population on the Bounty Islands. However, the population on Tini Heke / Snares Western Chain has not been surveyed since 2015. Here we provide an updated estimate of the population size of Salvin’s albatross at Toru Islet, Western Chain. On 1 Nov 2025 we found 420 active Salvin’s albatross nests (bird with an egg/chick) on Toru Islet. Correcting for nest failures prior to survey, we estimate that there were 710 pairs of Salvin’s albatrosses breeding on Toru Islet in the 2025–26 season. Previous counts were conducted 25 to 45 days before this year’s effort, so for ease of comparison counts in 1996, 2009–11 and 2015 were also corrected for nest failures before the survey. Extrapolating to Rima based on historic proportions, the total Salvin’s albatross population on the Western Chain was estimated at 1,060 annual breeding pairs. The estimated number of Salvin’s albatrosses breeding on the Western Chain has decreased progressively since the mid-1990s to a current low. Given past counts varied substantially from year to year, we suggest repeating ground counts next season.

Introduction

Salvin’s albatross *Thalassarche salvini* is listed as Nationally Critical, and is the second most at-risk species on the updated NZ fisheries risk assessment (Robertson *et al.* 2021; Edwards *et al.* 2023). The majority of the species breed on Moutere Hauriri / Bounty Islands, and there are accurate, up-to-date estimates of the size of the population from three recent drone-based surveys (Thompson 2025). However, the other, smaller population of Salvin's albatross on Tini Heke / Snares Western Chain has not been surveyed since the 2015 breeding season (Sagar *et al.* 2014). Being the second breeding site of a threatened species, population updates are inherently valuable, but particularly so since the Bounty Island population has experienced historic declines, with substantial fluctuations in numbers more recently (e.g., Amey & Sagar 2013; Thompson 2025). Tracking efforts have showed spatial segregation between the two Salvin’s albatross populations (Thompson *et al.* 2014), which would result in different exposure to threats, and thus potential differences in population trajectories.

To obtain the most accurate counts of Salvin’s albatross breeding pairs at the Snares Western Chain, surveys are best conducted in early October during the early incubation period, before too many nest failures have occurred. For this reason, most surveys have been conducted end Sept/early Oct (Sagar *et al.* 2011b). Similarly, no resights of previously banded birds have been made since 2015, it would be useful to add to the demographic dataset. Additionally, data on breeding success from the Western Chain are limited to 16 days’ monitoring during a small part of the breeding period (Sagar *et al.* 2011a). Nest cameras to collect data on breeding biology, phenology, and success can fill this data gap. Nest cameras are best installed early in the breeding season and subsequently collected either at the end of the breeding season or the following season (see Thompson 2025). Finally, another major data gap is the at-sea distribution of juveniles, as none have been tracked to date. To fill this gap, a visit to the island in late March is required. Such a visit would also enable the banding of juveniles to contribute toward a demographic dataset for estimating juvenile survival.

Project Objectives

We aimed to visit the Snares Western Chain islets during the 2025/26 season twice (once in October and once in March) to fulfil multiple project objectives, supported through various means:

1. To provide an updated population estimate for the Western Chain population (October trip; supported by CSP POP2025-05)
2. To contribute to the demographic dataset to enable estimates of adult survival (October trip; supported CSP POP2025-5)
3. To obtain estimates of breeding success for the Western Chain population using remote cameras (October and March trip; supported by DOC Uplift funding)
4. To track adults with high resolution satellite tracking devices paired with altimeters to obtain insights into flight parameters (October trip; supported by Monash University and the Australian Department of Climate Change, Energy, the Environment and Water).
5. To track juveniles using high resolution satellite tracking devices (March trip; supported by DOC Uplift funding)
6. To band a juvenile cohort to add to the existing demographic dataset and enable future estimates of juvenile survival (March trip; supported by DOC Uplift funding).

Methods

Study site

The Tini Heki / Snares Western Chain (48.06°S, 166.50°E) is a small group of rocky islets, mostly unvegetated, situated about 7 km south-west of The Snares. The group consists of five named islets which rise steeply out of deep water to about 80 m above sea level, and a number of unnamed rock stacks. Salvin’s albatrosses breed on Toru and Rima Islets, and a small number breed on an unnamed stack just east of Toru. Rima typically holds a third and Toru two-thirds of the Snares Western Chain population, with the ~5 nests on the unnamed stack included in Toru totals (Sagar *et al.* 2011b; Thompson 2025).

Logistics

Following abandoned attempts to get to the Western Chain by boat earlier in the season, the field team (Paul Sagar, Ursula Ellenberg, Thomas Mattern, and Kalinka Rexer-Huber) were on standby from 21 Oct to target weather conditions appropriate for helicopter operations (Appendix A). On 1 Nov, the team departed in a Southern Lakes twin-engine helicopter from Invercargill airport at 7.10 am, refuelling at Taukihepa / Big South Cape. After careful site inspection and wildlife monitoring from the air (Appendix A), the helicopter team landed the ground team at the chosen site on Toru Islet at 48.05846°S 166.50415°E at 9.12 am. The helicopter crew powered down at nearby Snares Northeast Island (Seal Point, 48.022°S 166.612°E) before returning to pick up personnel from Toru (Appendix A). The team was picked up from Toru at 3.20 pm and returned to the mainland by 4.45 pm.

Revisiting the island in March 2026 was not possible. Despite a favourable weather forecast over the period the Evohe was around the Snares and the Western Chain (19–22 March) and several attempts at landing, the sea state did not ease enough to enable the team (Graham Parker, Te Arawhetu Waipoua, PS and KRH) to be landed on Toru Islet.

Appendix A provides more detail on target conditions, constraints, and wildlife considerations for helicopter- and boat-supported landings for planning future work at this challenging site.

Population estimate

Counts

A whole-island ground count of breeding pairs on Toru followed the procedure used for previous counts in 2009–2011 and 2015 (Sagar *et al.* 2011b; Sagar *et al.* 2014). (Note that year is the year that chicks fledge; so surveys in Nov 2025 are for the 2026 breeding season). PS and KRH systematically searched the entire area for Salvin's albatross nests, including searches of deeply overhanging areas and fissures, and recorded whether an adult and an egg were present, which allowed for calculation of the proportion of apparently nesting albatross that were in fact sitting on an empty nest (i.e. without an egg). Nests with an abandoned egg or freshly broken eggshell present were recorded separately. Nests counted were sprayed with stock marker to avoid duplicate counting. We also recorded whether a nest would be obscured (out of sight in an aerial photograph).

Planned aerial photographic counts (DJI Matrice drone, pilot and spotter TM and UE) of both Toru and Rima were to be supplemented by ground-count data from a portion of Toru. Unfortunately, drone photography was not possible on the day despite several launch attempts, with too much wind up the windward side and on the crest for safe drone flight. Once that was apparent, the scope of ground counts was expanded to the whole of Toru, with UE & TM joining the ground-count team to search as comprehensively as possible in the time available (3 hrs). No count of Salvin's albatrosses nesting on Rima was possible.

Annual breeding pairs

Counts were conducted 25–45 days later than in previous years in the 2026 season. For comparability, we corrected the number of active nests on the date counted with a Salvin's albatross daily nest survival rate based on previous work (see below) to estimate of the number of annual breeding pairs for each count year.

Daily nest survival rate (DSR) was 0.933 from daily monitoring of 165 nests on Toru over a 16-day period during incubation in 2011 (Sagar *et al.* 2011a); and a incubation-stage DSR of 0.991 (95% CI: 0.985–0.995) from more comprehensive, more-recent data from the Bounty Island population (data 2019–25) (Thompson 2025). The 2019–25 DSR was used to estimate the 2026 breeding population, and the 2011 DSR was used to estimate annual breeding numbers 2009–15 and earlier. Specifically, we corrected active nests counts on survey date for nests likely to have failed prior to survey using the temporally-closest incubation-stage DSR, raised to the number of days between mean lay and the year-specific survey date lay (mean lay 4 September, following Thompson 2025).

Trends for the Salvin's albatross population on the Western Chain as a whole were visualised following the approach in Fischer *et al.* (2026). In brief, following a standardised abundance processing framework, all existing data for Salvin's albatross from the Western Chain were transformed into annual breeding pairs at the start of the breeding period using a series of generalised linear mixed-effects models (using a similar principle as above), while uncertainty was propagated accordingly in a Bayesian modelling approach. Subsequently, a Bayesian state-space model was fit to the standardised abundance estimates to provide a continuous timeseries, while continuing to communicate uncertainty.

Nest cameras

To collect data on the breeding biology, phenology, and success of Salvin's albatross breeding at the Western Chain, we placed five remote nest cameras (Swift Enduro) on Toru Islet (Figs. 1, 2). Cameras were programmed to take 24 mp photos hourly from 6am–8pm. It was not possible to collect the cameras in March, but they should continue to record through the better part of a year, retaining the data until they can be collected.

Figure 1. Salvin's albatross nest camera (circled orange) on Toru Islet

Band resightings and tracking

We recorded the band ID of any banded birds seen on Toru Islet to inform demographic parameter estimates, checking metal bands in case repairs were needed. Five banded Salvin's albatrosses were resighted, banded as breeding adults in 1995 (one bird), 2008 (two), 2009 (one) and 2010 (one) (Clark 1996; Charteris *et al.* 2009; Carroll *et al.* 2010; Sagar *et al.* 2011a), so the oldest will be at least 37 years old. During the survey of Toru we recorded two Chatham albatross; one bird incubating and a further bird loafing (banded with white darvic H49). The banded Chatham albatross was one of a cohort of chicks hatched on The Pyramid, Chatham Islands, in 2017 then translocated to a site on main Chatham Island in an attempt to establish a breeding population there (Bell 2026). Chatham albatrosses have been recorded nesting on Toru on several occasions (e.g., Sagar *et al.* 2011a). All resightings were submitted to the FALCON banding database.

Contributing to a wider study on albatross flight behaviour and offshore windfarm risk (Mark Miller, Monash University), satellite transmitters with pressure sensors were attached to breeding adults using back-feather mounts. Two Salvin's albatrosses could be equipped in the 20 mins available between ground-count completion and helicopter pickup. The remaining devices were later deployed on Salvin's at the Bounties. Data will be analysed and reported separately.

Results

Population estimate

A total of 420 active Salvin's albatross nests (bird with an egg/chick) were counted on Toru on 1 November 2025, not including 19 broken/abandoned eggs of the season (Table 1). There had been a significant storm in Southland on 23 October with winds >70 kn, but we found no evidence of impacts at the Western Chain (e.g., site damage, unusual numbers of empty nest pedestals or broken/abandoned eggs). Coverage was substantial, with the full nesting extent visited over the course of 3 hrs (Fig. 2), but we expect a small number of nests (potentially ~5%) will have been missed when searching the southwest of Toru during the final hour before pickup.

We estimate that there were 710 (95% CI: 562–1,009) breeding pairs of Salvin's albatrosses in the 2025–26 season on Toru (Table 1), based on the nest failures over the 58 days elapsed since mean lay using the most-recent DSR. We have no count for Rima, but since Toru typically comprises 0.667 of Salvin's counts in the Snares Western Chain (Thompson 2025), we estimated that there were 1,064 Salvin's albatross breeding across the Western Chain in 2026.

Table 1. Counts of active Salvin's albatross nests on Toru Islet, Snares Western Chain. Active nest - nest with a bird incubating/brooding an egg/chick; DSR - Daily nest survival rate; Days since lay - the number of days between mean lay and count date

Year	Active nests	Count date	Count source	DSR #	Days since mean lay *	Annual breeding pairs estimate
1996	1,021	5 Oct 1995	(Clark 1996)	0.993	31	**1,277**
2009	828	6-7 Oct 2008	(Charteris *et al.* 2009)	0.993	33	**1,051**
2010	783	2 Oct 2009	(Carroll *et al.* 2010)	0.993	28	**959**
2011	780	28-29 Sept 2010	(Sagar *et al.* 2011a)	0.993	25	**934**
2015	817	17 Sept 2014	(Sagar *et al.* 2014)	0.993	13	**897**
2026	420	1 Nov 2025	Current study	0.991	58	**710**

DSR (Daily nest survival rate) from Toru in 2010 (Sagar *et al.* 2011a) is used to estimate the number of annual breeding pairs in years 2009-15, and the DSR from the Bounty Island population 2019-2025 (Thompson 2025) is used for the 2026 breeding pairs estimate.
* Note mean lay is taken as 4 September following Thompson (2025)

Figure 2. Salvin's albatross counts on Toru Islet. Left: tracks showing island coverage by counters. Helicopter landing location and nest camera locations also shown. Right: boulder jumble characteristic of Salvin's albatross nesting areas on the Western Chain. Rua and Tahi in the mid-ground, Snares Northeast Island in background.

Once accounting for breeding failure using DSR (Table 1), it became apparent that the number of Salvin's albatrosses breeding on Toru each year declined from an estimated 1,277 breeding pairs in 1996 to 897 pairs in 2015 (Table 1). A decade later, an estimated 710 pairs bred on Toru in 2026 (Table 1). The same trajectory is seen clearly when trends in annual breeding pairs are modelled across the Western Chain as a whole (Fig. 3), with the Salvin's albatross breeding population peaking in the 1996 count and declining since.

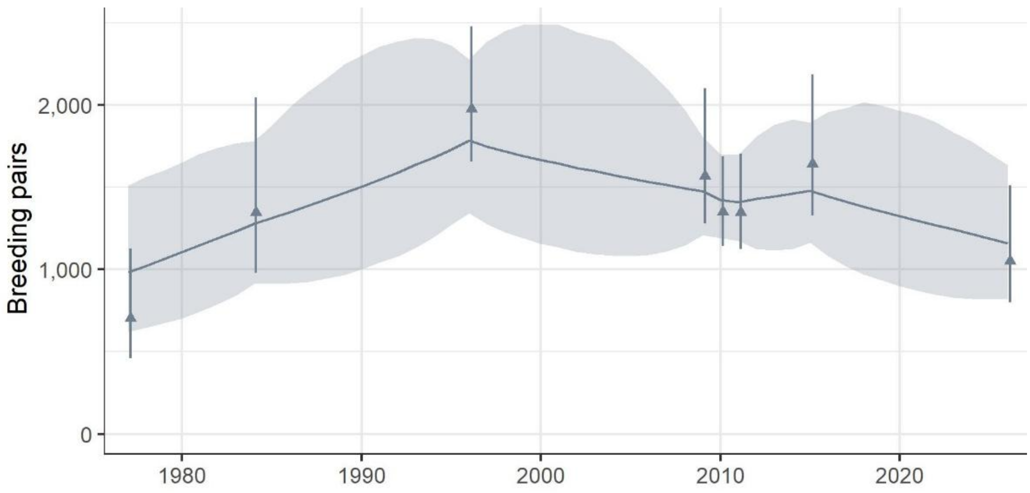

Figure 3. Trends in annual breeding pairs of Salvin's albatrosses at the Snares Western Chain islets derived through a standardised abundance processing and modelling framework (Fischer et al. 2026). Symbols with error bars indicate standardised estimates of annual breeding pairs (medians with 95% credible intervals); line with shaded area indicates the fitted state-space model (median with 95% credible intervals).

Although drone-based aerial photo counts were planned, we suggest that aerial counts may not be suitable at the Snares Western Chain. The islets consist of large-boulder jumble, with a lot of deep crevices and overhangs that obscure birds from view (Fig. 2). We estimated that 22% of ground-counted nests would not have been visible in drone photographs.

The has-egg rate, or proportion of apparently nesting albatross that were in fact sitting on an egg, was 0.88 (228 birds on egg or chick out of 259 apparently-nesting albatrosses). Ground-truthing recording the state of birds as well as nest contents showed a smaller proportion actively breeding and a higher proportion loafing than during similar sampling in 2015. Of 475 birds checked during the ground-truthing period, 228 (48%) were incubating/brooding, 31 (6.5%) were on empty nests and 216 (45.5%) were loafing in 2026. The higher proportion actively breeding (10% more) and lower proportion loafing (12% less) in 2015 (Sagar *et al.* 2014) is not surprising given the 45-day difference between the two visits.

Discussion

An estimated 710 pairs of Salvin's albatrosses bred on Toru Islet, Snares Western Chain in 2026. This is lower than the 897 pairs in 2015, and lower still than the estimated 934–1,051 pairs breeding each year 2009–11. Annual breeding pair estimates enable comparison of counts that were conducted up to 45 days apart; without correction for nest failures occurring before the count date, differences in raw counts of active nests (birds on eggs) are amplified (e.g., 415 active nests on Toru in November appears much worse than the 817 nests there in September 2014). However, easier comparison via date-corrected estimates did not change the trend apparent in the raw counts: there are progressively less Salvin's albatrosses breeding on Toru over time.

It is not clear whether this year's low count is just a poor year, or whether it reflects the new normal. We expected some damage in Snares Western Chain albatross colonies from a significant storm that caused widespread wind damage in Southland on 23 October, just before this year's survey. However, we found no evidence of storm impacts at the Western Chain, nor at nearby Northeast Island and Broughton Island. Northeast and Broughton islands have large forested areas, but there was no sign of recent windfall in the *Olearia* forests; windfall would have been widespread had the extreme winds in the Southland storm extended to the Snares Western Chain.

The planned Rima Islet count, using drone photos, could not be conducted this year. However, we estimate that the Western Chain supported ~1,064 pairs of breeding Salvin's albatrosses in 2026, since Toru typically comprises two-thirds of the Salvin's albatrosses at the Snares Western Chain (0.667, Thompson 2025).

Although drone-photo counts were planned, we suggest that aerial counts may not be appropriate at the Snares Western Chain. The islets consist of large-boulder jumble, dominated by deep crevices and overhangs that obscure nearly a quarter of nesting birds from view. The challenge of surveying from the air with accuracy, given the number of nests under rocks or overhangs and caves, has been noted before (Charteris *et al.* 2009; Sagar *et al.* 2011a). The Snares Western Chain's barren, rocky, steep-sided islets are superficially similar to the Bounty Islands, but the extent of obstruction is noticeably greater, meaning detection probability in aerial surveys will be substantially poorer. If aerial counts were to be conducted at this site or at Rima, our work here provides a potential correction factor to be used to account for the challenging terrain.

When all Western Chain survey data are standardised and robust trend models are applied, the progressive decline since the mid-1990s across the whole Western Chain mirrors the trends seen when using just surveys at Toru Islet. More broadly, the Western Chain decline fits somewhat with the trend at the Bounty Islands, the Salvin's albatross stronghold, yet the decline at the Western Chain in recent years appears substantially more severe (Thompson 2025; Fischer *et al.* 2026). The causes of this divergence remain unclear. It is possible that differences in at-sea distributions are linked to different declines, as seen for Buller's albatross from southern vs northern colonies (Fischer *et al.* 2023; Fischer *et al.* 2026). As discussed, this year's low count is unlikely due to failures from the windstorm that occurred in Southland just before survey, since we saw no evidence of the kind of damage that would be expected. Repeating the count in 2027 would help clear up whether 2026 was simply a bad year for Salvin's at the Western Chain, or whether these low breeding numbers are now normal at this colony.

Recommendations

Repeat ground counts in 2027 season: There was substantial variation among counts conducted each year 2009–11, and it has now been more than a decade since the last count.

Conduct counts from ground instead of from the air: Given that nearly a quarter of active nests were obscured from aerial view by rock overhangs and caves at the Western Chain, population size estimates will be more accurate from ground counts of nests than from aerial (plane/helicopter/drone) photos.

Use helicopters to access the site: Despite an optimal forecast for boat operations, the sea state did not ease enough for landing by tender in March. This is likely a common problem because the Western Chain islets run in a rough line SW – NE, so there is no shelter from the prevailing dominant westerly swells. Being unaffected by sea state, helicopters may have more opportunity for landing researchers on the islets than boats, despite the (potentially) long standby periods required to target suitable flying conditions, and the biosecurity requirements that require careful consideration.

Band and track juveniles: Another attempt is worthwhile, given the value of the data

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Appendix A: Target conditions and wildlife considerations for helicopter- and boat-supported landings at Snares Western Chain

Helicopter-supported landings

Operating constraints

Pre-departure, the helicopter team were looking for a maximum of 25-30 kn winds in forecasts, ideally with a buffer of the same conditions for the morning after the trip. It took eleven days from 21 Oct before suitable conditions appeared.

For 1 Nov the forecast was gusting 25-30 kn westerly, stable over the day although increasing marginally later in afternoon, with low precipitation forecast (<0.2 mm) (Windy, with forecast location pin on Snares Western Chain). This corresponded to on-island conditions relatively well.

Potential helicopter sites were identified during previous teams' visits to the islands (Carroll & Charteris 2009) but these sites were not used at the time, since those teams were landed by boat (Fig. A). On 1 Nov the SE site had too much dumping wind (gusts dropping downward off the crest) to attempt landing, and the saddle site had too much wildlife activity. The helicopter team instead identified a flattish spot at almost the highest point that enabled a hovering disembarkment with one skid partly touching rock. This 'helipad' was at 48.05846°S 166.50415°E (purple arrow, Fig. A).

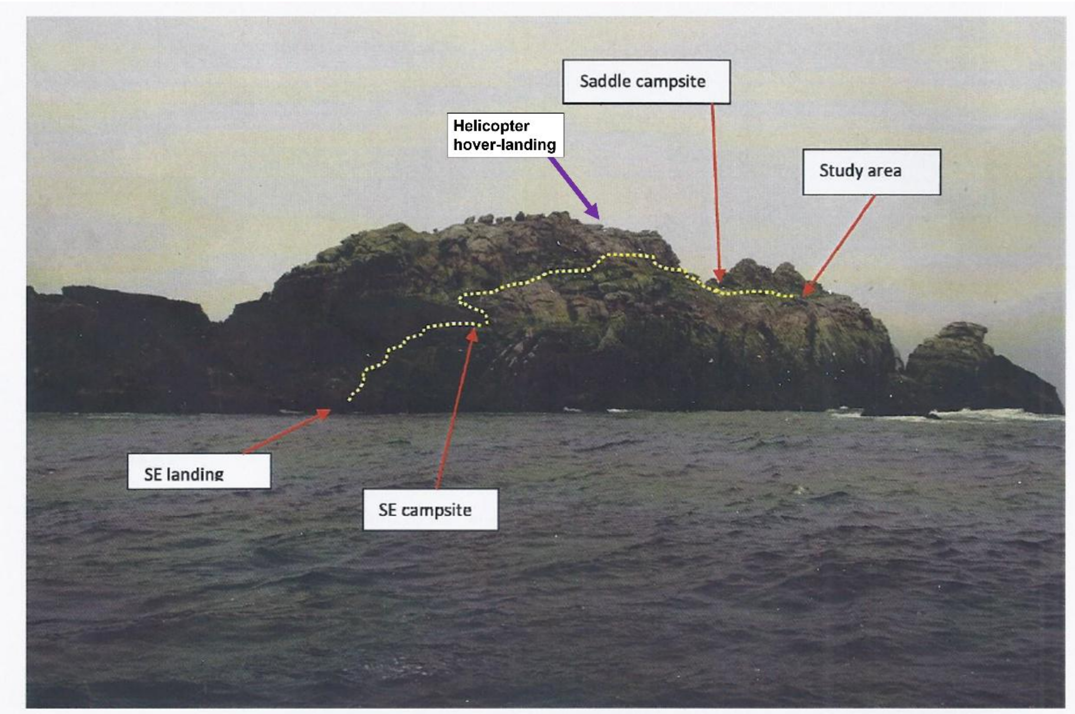

Figure A. Toru islet access by boat (SE landing, yellow dotted route) and potential helicopter landing sites identified in 2009-10 (SE campsite and Saddle campsite). The helicopter site used in November 2025 is also shown (purple arrow, Helicopter hover-landing). Modified from (Carroll & Charteris 2009)

Wildlife responses

All aboard the helicopter viewed wildlife responses carefully during slow approaches to the islet. Nesting albatrosses and those loafing reacted differently. Loafing birds on the next level down (~10–20 m below platform where we landed) showed disturbance; standing up, flapping and ten birds also walked away fast. There were no loafing birds at the level of the platform where we landed. However, incubating birds on both lower and landing levels, stayed on nest and seemed calm. This was also the case when the helicopter returned for pickup: nesting birds remained on nest and were not visibly disturbed. There were no loafers in the area on pickup. The helicopter pilot observed that disturbance of loafers (and other birds present) could be mitigated by coming in from higher, at a steeper angle, therefore staying further from the loafing birds on the platform below, an approach that should be taken from hereon.

Biosecurity

After the usual biosecurity support on the mainland from the Murihiku Quarantine store team, between-island biosecurity was in the hands of the helicopter team. At Big South Cape, only pilot and crew disembarked to refuel, with passengers staying aboard with doors open. they took off the shoes worn for refuelling and put on biosecured boots before heading to the Snares Western Chain and Northeast Island. Shoes worn at Big South Cape were stowed in ziplock bags. This approach seemed a quicker and safer solution than standing on a tarp while refuelling.

While waiting for the island team, the heli team powered down at nearby Snares Northeast Island, on the rocky Seal Point headland (48.022°S 166.612°E) near the hut. Seal Point and the Nort Prom tussock plateau (48.016°S 166.598°E) have both been used by helicopters in the past. The North Prom site typically has less density of wildlife using it, so is preferred, but on 1 Nov there was substantial wind at North Prom so the heli team settled at Seal Point instead. There was quite a lot of wildlife activity at Seal Point, so the team stayed mainly in the helicopter to minimise disturbance. Boots and the part of the skid that touched down on Western Chain were carefully checked on Northeast Island to ensure no between-island transfer.

Times required

Both island and helicopter teams were on standby from 21 Oct to target weather conditions appropriate for helicopter operations (see above). On 1 Nov, the team departed in the Southern Lakes helicopter from Invercargill airport at 7.10 am, refuelling at Big South Cape. The team were landed on Toru Islet at 9.12 am, with the helicopter departing immediately for Snares Northeast Island to wait there. As agreed to prior, the island team staff were ready in flight suits at 3.00 pm, called the heli team at 3.15 to confirm readiness, and were picked up at 3.20 pm. Flying via a brief stop at Big South Cape to pick up empty fuel jerries, the team returned to the mainland by 4.45 pm.

Comms island-to-helicopter

Agreed hourly comms check-in between island and helicopter teams were carried out from noon, in case of rapid changes in weather requiring earlier pickup. VHF does not reach from Western Chain to Northeast Island, so the team used satphone calls to reach the helicopter's satphone. Iridium satellite connections were poor and unreliable, with calls dropping frequently. We also trialled OneNZ satellite text messaging (not yet functioning from Western Chain in November, though this was operational by March) and InReach text messaging (fast message send, without the lag to receive that sometimes occurs with these devices). For future work we suggest using satellite text messaging, with InReach text messaging as backup (take an InReach for both heli and island teams).

Boat-supported landings

In March 2025, efforts by SV *Evohe* to land a team on Snares Western Chain islets (while in the area supporting other work) were thwarted by the sea state preventing an attempt at a landing.

During the week in Oct 2025 in which a boat -supported trip was originally scheduled, weather conditions and sea state ended up being so poor that even had the vessel been at the islands, there would have been no opportunity to land on the Snares Western Chain by tender.

While the team was on Toru islet on 1 Nov, conditions were more moderate than the storms earlier in October, but the sea state would still have prevented landing by boat on that day.

In March 2026, the weather forecast was favourable over the period the SV *Evohe* was around the Snares and the Western Chain (19–22 March), with winds between 10–12 kt NW and 10–16 kt SW. Despite that, the sea state did not ease enough to enable the team to be landed on Toru Islet. Landings were attempted on the 20th and 22nd, but on both days there was too much surge to safely land from a tender (2.1–2.3 m SW swell and 2.3–2.4 m swell, respectively). Risk of injury was high given the limited handholds (coralline algae covered rock) and the brief window when leaving the tender (1–2 second pause at the top of the surge before the tender dropped ~2 m) to secure those handholds. If a person did not successfully get onto the rocks, they'd have fallen into the surge with the aluminium tender on top of them. Both the southeast side of Toru (landing shown in Fig. A) and northwest side were inspected each time.

We note that the orientation SW-to-NE of the Western Chain's chain of islands means the Chain does not offer any lee from the prevailing westerly swells (unlike islands like Proclamation in the Bounties, which otherwise seem similarly exposed).

Nonetheless, before Nov 2025 all work on the Western Chain has involved people landed by boat. Therefore, appropriate conditions for safe landing from a tender obviously do occur. We suggest that teams coming by boat should be prepared for a potential wet landing; that is, equipped with head protection and wetsuits to minimise the consequences of slip/fall into the water.