



POP2022-01

## TĀKOKETAI BLACK PETREL POPULATION MONITORING

Captures at sea



FINAL REPORT – May 2024

This report has been prepared by Chris Gaskin and Edin Whitehead, Project Coordinators Northern New Zealand Seabird Trust for the Department of Conservation's Conservation Services Programme (CSP), final report for POP2022-01 Black Petrel Population Monitoring, Captures at Sea.

15 May 2024



Figure 1. Black petrels feeding with pilot whales and bottle-nosed dolphins, off Cape Brett 5 April. Photo: Edin Whitehead.

Cover image: Black petrel seen approaching through the net after it was fired. The petrels were generally undisturbed by the person with the net gun, compared to other methods used. Photo: Edin Whitehead.

Back cover image: Extraordinary calm seas, no wind, no swell in the Far North off Cape Kerikeri. Photo: Edin Whitehead.

# Introduction

## Context

The CSP Seabird Medium Term Research Plan (CSP Seabird Pan) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This project extends on past demographic work funded by commercial fisheries levies and DOC/MPI since 1996.

Black petrels are the species at highest risk from commercial fisheries in northern Aotearoa New Zealand. Continuing research on this species is necessary to gather current rates of adult mortality, breeding success, juvenile survival and recruitment until suitable mitigation methods significantly reduce the capture risk to this species.

This at-sea capture project continues work started in 2022 to look at survival and return rates of juvenile black petrels not visiting the main study areas. Capture, mark-recapture of black petrels in the Hauraki Gulf will also provide information from a random sample of birds away from the study colonies to help estimate current population size of this species.

The main objective for the 2023-24 season was to capture black petrels at sea to determine the proportions of unbanded birds versus banded birds. This information will be used to assess if apparent low juvenile survival is biased by dispersal away from study colonies. Information collected from marked versus unmarked birds in this study will be analysed in a separate project to estimate the overall population size of black petrels.

## This report

This final report provides details of the methods used to capture black petrels and results of all information collected for black petrels collated from earlier progress reports prepared by the Northern New Zealand Seabird Trust. We provide comments on what worked and didn't and include photographs illustrating the methods used. The results are presented in summary tables within the main text and all the raw data collected in the field are in the Addendum. Finally, we provide recommendations for future capture projects.

## Field trip summary

**9-10 December 2023** (one full day, one half day) – 16 captures, no recaptures (i.e. previously banded birds), all new bands applied, key measurements taken and breeding status (i.e., brood patch) checked. For the most part black petrels did not come close to the vessel and most captures were made using the tender, often having to row up to 100m away from vessel to capture either birds sitting in rafts or on the wing. 14 captures using net gun, 2 using hoop net. Variable conditions. A rusty hook was removed from the wing of one of the birds.

**30-31 January 2024** (one full day, one quarter day) – 32 captures, two recaptures. New bands applied to previously unbanded birds, key measurements taken and breeding status (i.e., brood patch) checked. Used the tender in the late afternoon/evening (30 Jan), then, as birds were coming close to the vessel (in contrast to the earlier trip), switched to a method of working from the stern (i.e., a line attached to the net allowing for both net and captured bird to be hauled to the stern). 30 captures using the net gun, two with the hoop net. Mixed conditions.

**7-8 February 2024** (one full day) – 34 captures, no recaptures. New bands applied to previously unbanded birds, key measurements taken and breeding status (i.e., brood patch) checked. All birds captured with the net gun from the vessel (i.e. not from the tender). One marked bird was inadvertently captured using the hoop net and released, missed an unbanded bird next to it. Trip cut short when Trevor (skipper) ruled out overnighting at the Mokohinau Islands – this was based on forecasts which had overnight winds gusting up to 20kns which would have meant an uncomfortable night at the confined Arches anchorage. Also, predicted strong easterlies developing on the following day trip was cut short due to the skipper's read of the forecast overnight conditions.

**19 February 2024** (one quarter day) – no attempts at captures. Used *Kuaka* the DOC Whitianga boat to head out north of Red Mercury for an hour-long chumming session to see numbers of black petrels. Two birds came in close and would have been catchable. No banders available.

**12 March 2024** (one quarter day) – no attempts at captures. Again, used *Kuaka* the DOC Whitianga boat to head out south of Red Mercury for an hour and half-long chumming session at the -200m line. Two birds flew by but showed no interest in the chum. With no wind, and so few birds we ended the session.

**21-22 March 2024** (one full day, one half day) - 75 captures, 4 recaptures. New bands applied to previously unbanded birds, key measurements taken and breeding status (i.e., brood patch) checked. Most birds captured were from the vessel with the net gun, two using the hoop net. 56 first day, then 19 on the second, a slow-going day with little wind most of day. Day was curtailed because of skipper commitments early the following day for DOC island-based transfers.

**2-5 April 2024** (three full days, one quarter day) - 110 captures, 5 recaptures (including one bird banded by us on 8 Feb). New bands applied to previously unbanded birds, key measurements taken and breeding status (i.e., brood patch) checked. Most of the birds were captured with the net gun from the main vessel, 6 were from the inflatable. This trip was out of Opuia, Bay of Islands, and included catching locations spread between North Cape and Cape Brett, some in challenging conditions. After departing late afternoon on 2 April, we managed a brief chumming session in calm conditions before dusk. This was a chance for the whole crew to become familiar with the catching operation. The first challenging day was one with no wind, no swell, but an incredible array of marine fauna (whale shark and great white shark, Bryde's and short-finned pilot whales, common dolphins, manta rays, albatrosses, even paper nautili). The lack of wind was challenging as it was impossible to lay a scent trail, however we managed to attract and capture 38 birds. Forty-four birds captured on the second day in better conditions including six using the inflatable when the wind got up. The third day was another challenging day but for very different reasons. The wind was up to 20kns with a big sea from daybreak (not forecast), but we gave the catching a go late morning once we had a few petrels in our wake capturing six, then three. With the conditions worsening, we found a pod of pilot whales and bottle-nosed dolphins and plenty of petrels off Cape Brett. Managed 28 birds total despite the conditions.



Figure 2. One black petrel (right) and a flesh-footed shearwater close to boat, north of Red Mercury Island. Photo: Chris Gaskin

# Results

## Totals summary

268 birds captured

11 recaptures (including one bird banded by us on 8 Feb).

9 days on the water, with daylight hours getting progressively shorter during the season.

6.82 mins average processing time from capture to release. Shortest 3mins, longest 17mins.

15 of the captures were two birds caught together (30 birds).

## Trip effort

Table 1: Trip effort metrics for Black petrel at-sea captures 2023-2024

DATES	TOTAL TRIP CAPTURES	TOTAL CHUMMING EFFORT (HRS)	CAPTURES/HR
9-10 December 2023	16	15.89	1.01
30-31 January 2024	32	11.05	2.9
8 February 2024	34	10.69	3.18
21-22 March 2024	76	16.22	4.69
3-5 April 2024	110	17.2	6.21

## Recaptures

Table 2: Bird details for previously banded Black petrels recaptured at sea 2023-2024

BAND NUMBER	DATE BANDED	AGE/SEX AT BANDING	LOCATION	LOCATION COORDINATES	RECAPTURES
H-42747	4/05/2017	P/U	Mt Hobson/Maunga Hirakimatā, Great Barrier Island/Aotea	-36.1862, 175.4126	First recapture
H-44517	21/01/2022	A/U	Mt Hobson/Maunga Hirakimatā, Great Barrier Island/Aotea	-36.1862, 175.4126	First recapture
H-29695	28/01/2001	1+/Male	Mt Hobson/Maunga Hirakimatā, Great Barrier Island/Aotea	-36.1862, 175.4126	Last caught in GBI study burrow in 2022
H-41245	12/12/2022	A/U	Little Barrier Island/Te Hauturu-o-Toi	-36.1970, 175.0790	Last caught in LBI study burrow in 2022
H-41182	29/04/2016	P/U	Little Barrier Island/Te Hauturu-o-Toi	-36.1970, 175.0790	First recapture

<b>H-28071</b>	7/01/2001	1+/U	Mt Hobson/Maunga Hirakimatā, Great Barrier Island/Aotea	-36.1862, 175.4126	Last caught in GBI study burrow in 2018
<b>H-41236</b>	01/2016	A/U	Little Barrier Island/Te Hauturu-o-Toi	-36.1970, 175.0790	Last capture in LBI study burrow in 2022
<b>H-42966</b>	5/05/2017	P/U	Mt Hobson/Maunga Hirakimatā, Great Barrier Island/Aotea	-36.1862, 175.4126	Last caught in GBI study burrow in 2023
<b>H-40663</b>	8/02/2024	A/U	At sea – outer Hauraki Gulf	-35.80322 175.08587	Recapture at sea
<b>H-40223</b>	1/05/2018	P/U	Mt Hobson/Maunga Hirakimatā, Great Barrier Island/Aotea	-36.1862, 175.4126	First recapture
<b>H-38747</b>	15/12/2012	3/Male	Mt Hobson/Maunga Hirakimatā, Great Barrier Island/Aotea	-36.2167, 175.4000	Last caught in GBI study burrow in 2024

## Geographic coverage

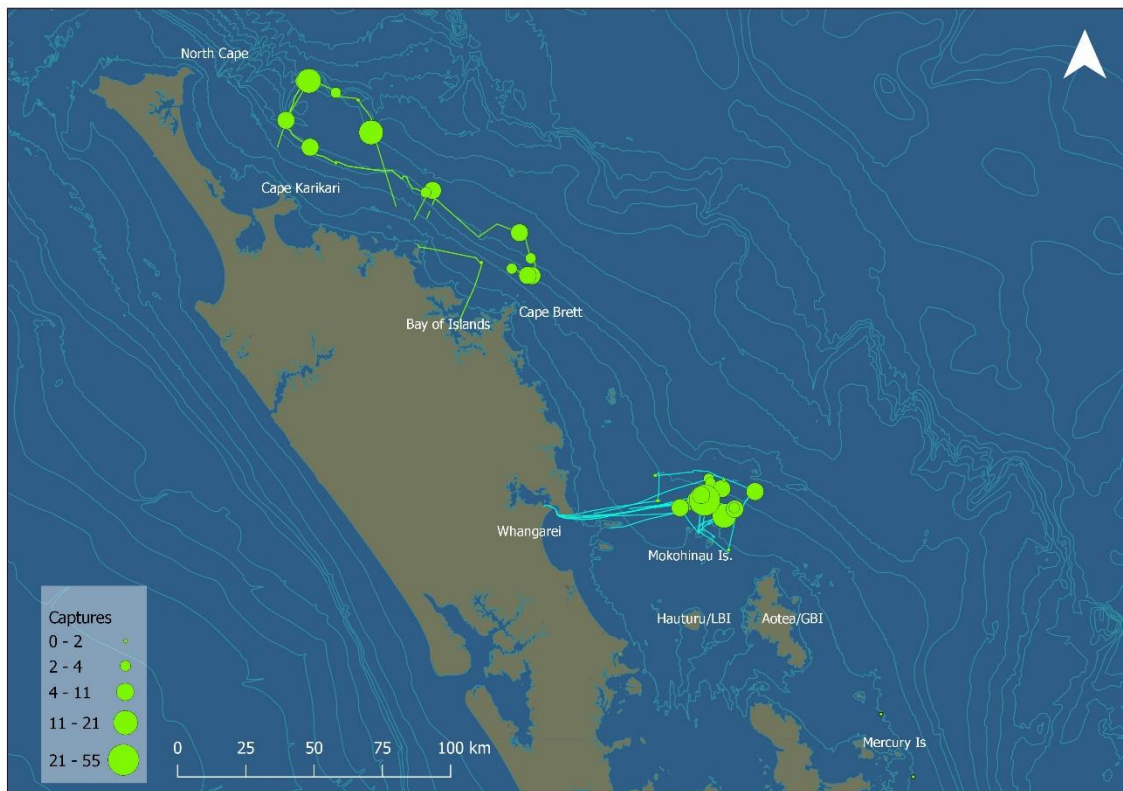


Figure 3. Catching locations and numbers captured at locations. Four trips from Whangarei/Marsden Cove Marina; one from Opuia, Bay of Islands; the two recce trips from Whitianga are also included.

## Capture locations

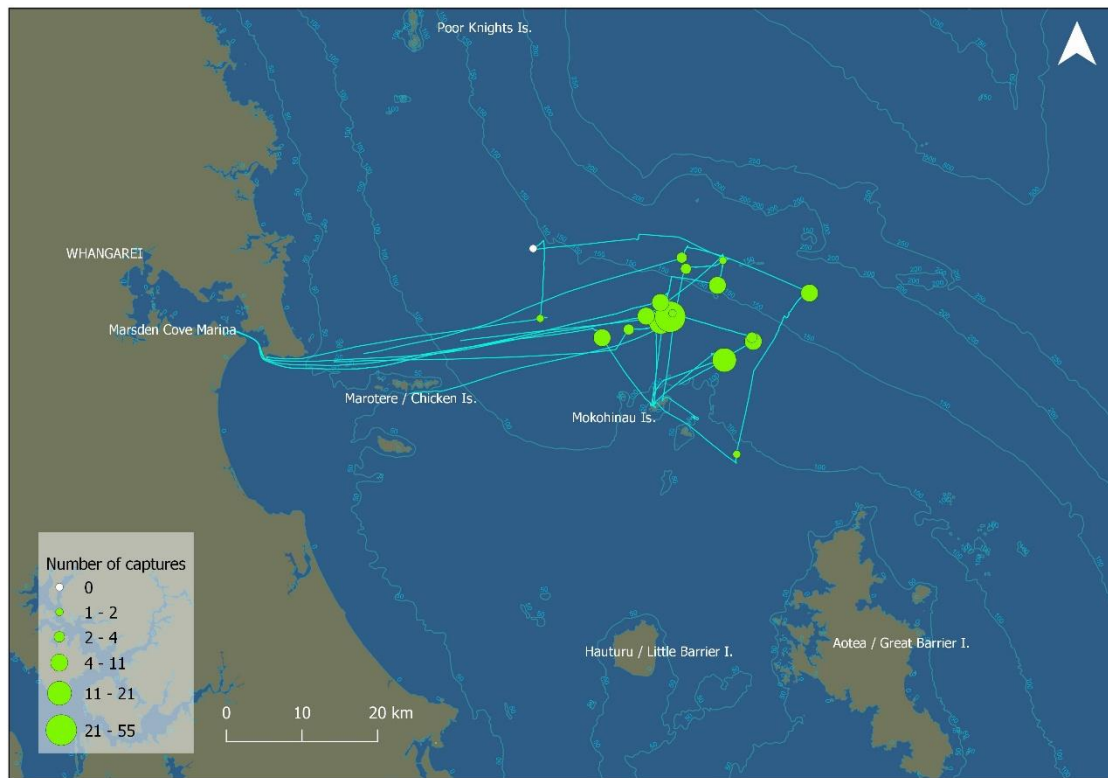


Figure 4. Capture locations, outer Hauraki Gulf.

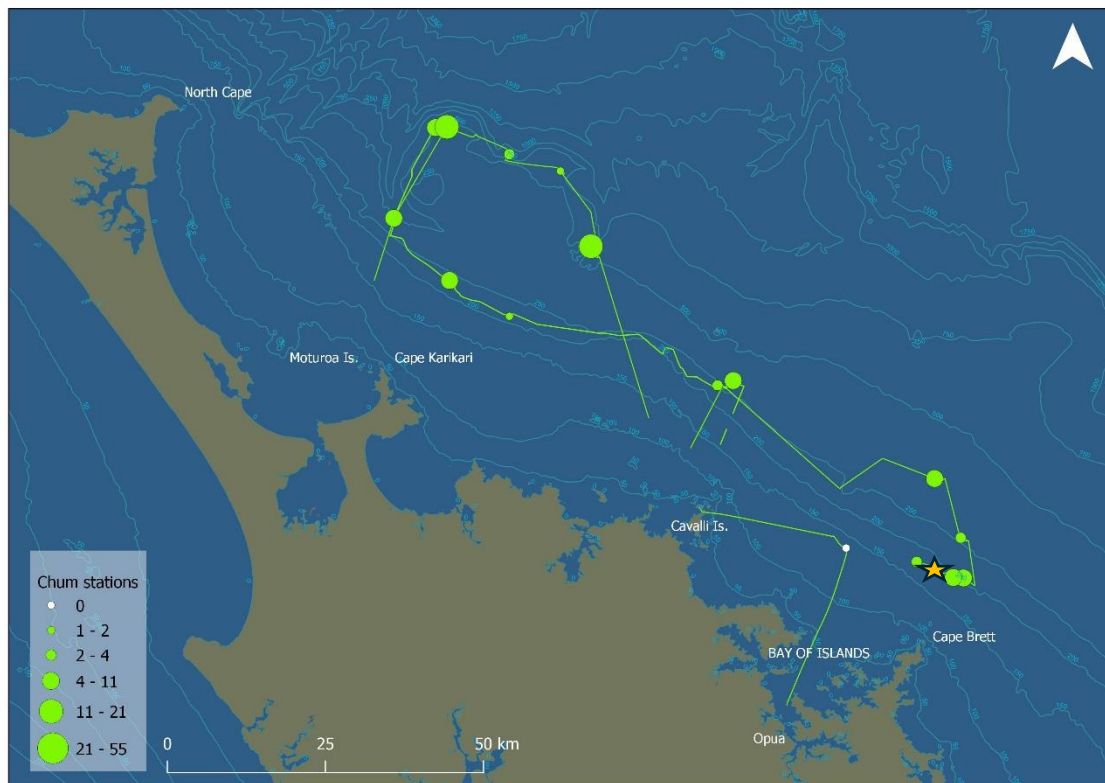


Figure 5. Capture locations, Cape Brett to North Cape. Orange star denotes black petrels feeding in association with a large pod of pilot whales.



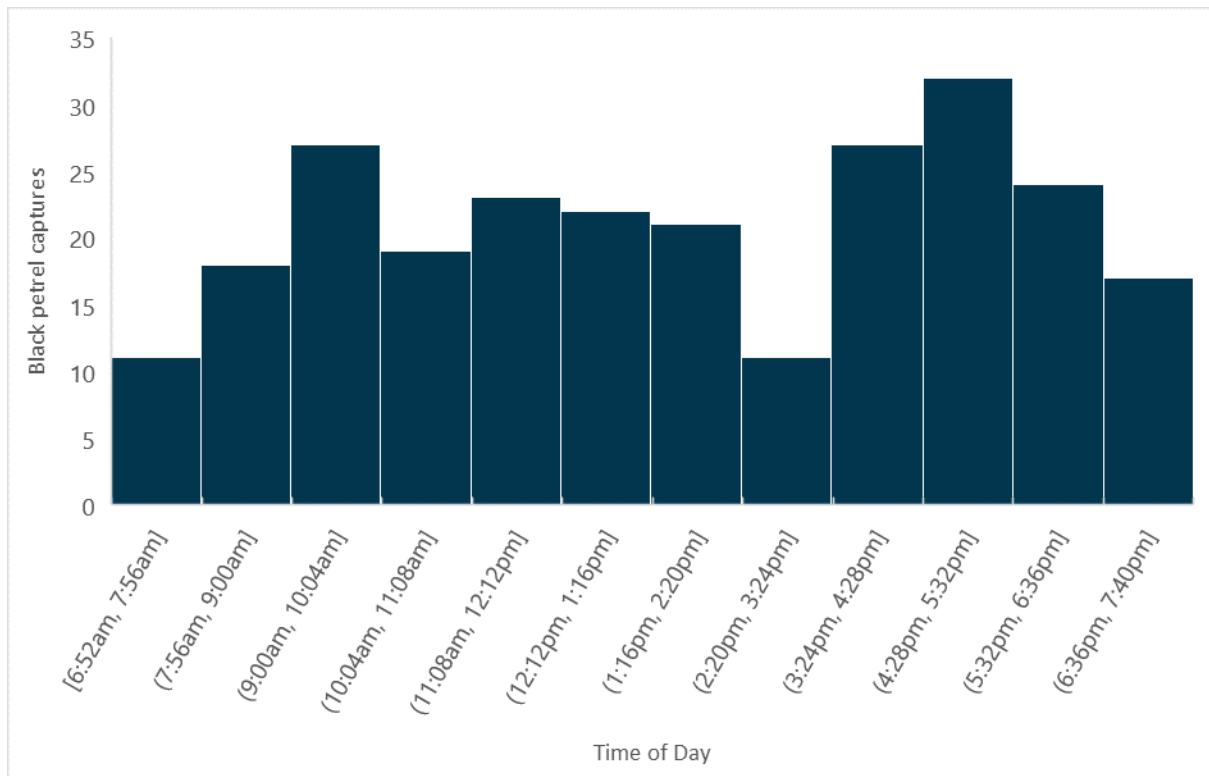


Figure 6: Black petrel captures by time of day, binned into approximate hour-long periods.

## Capture methods

Three capture methods were trialed – net gun, hoop net and pole net.

Hoop net – 6 captures

Net gun – 262 captures

Pole net – 0 captures

Of the three methods used, the net gun proved to be the most effective and versatile. Birds could be captured close to the two vessels used (from the stern of one vessel, from the high starboard side on the other). They could be captured from an inflatable, which was especially useful when birds did not come close to each of the main vessels (e.g., the December trip when birds rafted up to 50m away). Birds could also be captured on the wing, and on a few occasions overhead. Also, individuals (and pairs of black petrels) could be targeted from amongst other species, thus reducing the chance of bycatch. That is, other species or birds previously captured in the same session as identified by forehead Twink/White-out.

After using the fine mist net type mesh (2.5m X 2.5m) for the December captures, we had new nets (1.7m X 1.7m) made by Milligan Trawls, Waipu, using dyneema braid, a heavier gauge than the mist net-type nets, and with a larger mesh size. This significantly sped-up the extraction process and reduced handling time.



Figure 7. Capture of a black petrel from the high starboard side of *Manawanui*, three albatross in proximity, undisturbed. Photo: Edin Whitehead.



Figure 8. Capture of a black petrel from the inflatable, showing the net wide open and flying towards the bird. The petrel was captured. Other birds are NZ and Wilson's storm petrels, and a fairy prion. Photo: Edin Whitehead.

The hoop net, like a cast net, works when the birds are very close to the vessel. However, the mesh became heavy and unwieldy when wet, compared to the monofilament of the cast net used by Wildlife Management International Limited (WMIL). However, bird extraction with the hoop net was very easy, reducing handling time.



Figure 9. Capture attempt using the hoop net. Photo: Edin Whitehead.



Figure 10. Capture attempt using the pole net. Photo: Edin Whitehead.

While it is likely that with some refinements and practice, the hoop and pole nets would be more effective, the aim of the project was to capture as many black petrels as possible across the season and with a good geographic spread, and this meant we reverted to using the net gun method for its accuracy, versatility, and reliability. Having at least two people skilled at using the net gun, mitigated the effects from long hours catching, thus reducing the number of missed shots due to fatigue.



Figure 11. Waiting for birds to approach within range. Photo: Karen Baird.

## Petrel processing

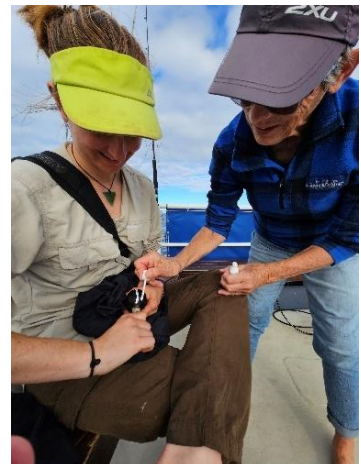
All the petrels were processed by three Level 3 banders (Edin Whitehead, Cathy Mitchell, Karen Baird) and one Level 2 bander (Stephanie Borrelle). The dyneema nets proved to be excellent in terms of the ease of removing the birds after capture, a big improvement from the mist net-type nets used at the start. Birds were extracted from nets and placed in dark handling bags for processing. New bands were applied to previously unbanded birds, already-present bands read and checked, key morphometric measurements and weight taken, and breeding status (i.e., brood patch) checked. As previously noted, one bird had a rusted hook removed from the wing – this was the only significant injury noted in all the captured birds.



Figure 12: A black petrel with aberrant white feathering under the chin doing a very good impression of a white-chinned petrel.



Figures 13 & 14. Extracting petrels from the dyneema nets. Photos: Chris Gaskin



Figures 15 -17. Bird processing. Photos: Karen Baird, Chris Gaskin

## Post release

All birds flew away strongly after capture and processing. They had been marked with Twink/White-out so were easy to spot flying around and on the water. In fact, we were surprised, reassuringly so, to see up to six 'twinked' petrels coming quite aggressively into the chum which we used to attract birds to the boats or following in our wake. The birds enjoyed their immunity from further capture and continued to feed during the chumming session, some even following the vessel between different chum stations on the same day.



Figure 18. Marked or 'twinked' birds; one black petrel with another unmarked petrel (top right) and a flesh-footed shearwater. Photo: Chris Gaskin.

Figure 19. (below). One of the 'twinked' petrels following in our wake. Photo: Edin Whitehead.



## Discussion

Of the three methods trialled during this project the net gun proved the most successful and was relied on to ensure good numbers of birds were captured. The most telling aspect is the versatility of the method, when compared to those methods that rely heavily on the birds being attracted close to the stern of the main boat. While there was no direct comparison with the cast net used in the early black petrel catching project, like the hoop net it also relies on birds gathering close the main boat (Burgin 2022). The net gun enables trained operators to target and capture birds >5m away from the vessel. There was no difference in the chumming used to attract birds between all four catching methods

When black petrels could not be attracted to the main boat in numbers (this was particularly noticeable in December), the net gun could be used from the tender by either slowly approaching rafting birds, or by chumming to attract birds (Fig. 7).

When using the net gun from the main boat we used a light line tied to one corner of the net and so were able to retrieve both the net and the captured bird. Having new nets made using the heavier gauge dyneema mesh (and larger mesh size) greatly improved the ease and speed of extracting the birds for processing.

Across the season the capture rate (birds caught/hours chumming) increased significantly (Table 1). As noted above, in December few birds were attracted close to the stern of the boat, either hanging off 20m or so, or gathering in small rafts up to 100m away. When that happened we used the tender with two persons and rowed over to the birds, netted a bird then rowed back for processing. If close enough to the main boat the tender with one person for catching could be pulled back using a long rope. As the season progressed the petrels were more easily attracted close to the main boat through chumming, but we still had the tender option if the situation required, and conditions allowed.

Black petrels (and flesh-footed shearwaters) following and feeding in association with cetaceans (false-killer whales, pilot whales, bottle-nose dolphins) is something we have recorded previously (Gaskin, 2017). In those situations the petrels are less likely to be attracted away from that feeding activity to chumming, although not impossible as we found out off Cape Brett in April.

However, the attraction of feeding on discards from the cetaceans' feeding (i.e., allowing the birds access to prey from depths beyond which they can dive) appears an extremely strong one. For example, during the March trip, after a very promising start with good numbers of birds attracted by our chumming (reflected in the numbers of birds caught) there was a marked drop off later in the day. Initially we put this down to lack of wind, when chumming is less effective, but later learnt (as we were returning to port) that a pod of false killers whales had been located by researchers studying them several nautical miles north of where we had been. They said that the whales were accompanied by "many petrels!". In situations like this when cetaceans and petrels are encountered, and when the sea conditions are suitable, then the tender with an outboard could be deployed allowing the catching crew to work closely amongst birds which would be distracted by the whales' activity.

False killer whales will likely provide better feeding opportunities because they dismember large prey at the surface rather than swallowing them whole, which is typical of Pilot whales (J. Zaeschmar pers. comm.)

The geographical spread of trips and captures, that is beyond the outer Hauraki Gulf and extending to the northern Northland coast, adds robustness to the overall population estimate that this at-sea capture work will generate.

## Recommendations

We make the following recommendations for future black petrel catching work:

- Continue to utilise the more versatile net gun method for captures, as this takes actual capturing away from the reliance of attracting birds in close to the main boat. Although, that will likely remain where most birds will be caught through the season.
- In terms of timing, we believe the capture season could be extended through to the end of April, although it is possible capture rates would drop as normally non-breeders depart ahead of the chick fledgling period which starts at beginning of May. Adults will still be around in late April. However, the overall project budget determines the numbers and duration of charters that can be undertaken.
- Seek out those events where black petrels are feeding in association with cetaceans. There are two reasons for this:
  1. It provides opportunities for catching birds when the chumming method is less likely to be successful.
  2. We believe this feeding association should be fully investigated. The occurrence of false killer and pilot whales is seasonal and there is a significant overlap with black petrel breeding. The first sightings of the false killer whales is usually in early December and the last ones in late April, sometimes in early May. Pilot whales can be seen all year round, however peak in December to May (J. Zaeschmar pers. comm.).
- Capturing black petrels further offshore (i.e., 200-500m bathymetry line) as well as from Repanga / Cuvier Island to the Far North would further increase the robustness of the overall population estimate. This would include areas outside Aotea / Great Barrier Island.
- There is significant potential to maximise data return from these captures. Currently we are taking standard morphometrics and checking brood patch status. Taking blood and/or feather samples from a sample of captured birds would enable additional analyses to complement this research. For example, stable isotope analysis of dietary shifts throughout the season. This would add minimal processing time (~2 minutes) and could be done during 'slow' capture periods. There are a wide array of analyses that can be done with small blood and feather samples, including population health assessments via energetic, physiological, and nutrition metrics in addition to the dietary usage noted above.
- Occasionally birds will regurgitate, with squid eyes and extremely smelly slurries most dominant. These samples could provide some dietary insight which could contribute to



understanding seasonal prey targeting of black petrels throughout the breeding season. Samples could be either preserved in ethanol for visual identification where intact, or frozen, for further genetic identification and/or energetics analyses (e.g. bomb calorimetry). A better understanding of prey species of seabirds in northern Aotearoa New Zealand is required for informing ecosystem models and assessing the indirect threats posed by commercial fisheries.

## References

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## Our team

Karen Baird, Edin Whitehead, Cathy and Peter Mitchell, Inka Pleiss, Stephanie Borrelle and Chris Gaskin (catching and processing team); skippers Trevor Jackson and Jochen Zaeschmar; crew members (*Manawanui*) Martin Bonham and Gier Sveass.



