

Motuhara seabird research: field trip report January 2022



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Introduction

Motuhara (the Forty-Fours) is Maori Freehold Land with over 200 registered owners. I discussed this research, and access to the island with the senior owners of Motuhara, and I am grateful to the island owners for granting permission to land and camp on the island to undertake this research.

Northern Royal Albatross (*Diomedea sanfordi*), Northern Buller's Mollymawk (*Thalassarche bulleri plateri*) and Northern Giant Petrel (*Macronectes halli*) all have significant breeding populations on Motuhara (43°96'S, 175°83'W) (Checklist committee 2010).

Northern Royal Albatross have been counted on Motuhara using aerial photography from 2006-2009, with an average count of 2,209 breeding pairs (range 1,879-2,692 pairs), although a ground census in 2016 recorded only 1,400 breeding pairs (Bell *et al.* 2017). A larger number of birds are also found breeding on The Sisters, where the average count was 3,336 pairs over the same period (Scofield 2011), although again down to 2,250 breeding pairs in 2017 (Bell *et al.* 2018). A small population of 30-40 pairs also breeds at Taiaroa Head, Dunedin.

Northern Buller's Mollymawk have been counted on Motuhara in 2007, 2008 and 2009, with an average count of 14,699 nests (range 14,185-15,238 nests) (Fraser *et al.* 2010). A repeat census in 2016 recorded 17,682 nests with the increase in numbers considered to reflected improved methodology rather than a true increase (Bell *et al.* 2017). This represents the largest breeding colony of the species, with approximately 3,200 pairs also breeding on The Sisters (Bell *et al.* 2018) and a small population of 15 pairs on Rosemary Rock, in the Three Kings Islands (northern North Island).

The number of Northern Giant Petrels breeding on Motuhara has never been systematically counted, but the breeding population was estimated at 2,000 pairs in 1993 (Robertson and Sawyer 2004). Extrapolating from a census during mid chick rearing in 2016 the population of Motuhara was estimated at 1,935 breeding pairs (Bell *et al.* 2017); making Motuhara the largest colony of this species in New Zealand.

In January 2021 a field trip to Motuhara was carried out to undertake seabird research. During which GLS devices deployed on Buller's Mollymawk, and cameras were set up to recording breeding activity at Royal Albatross, Buller's Mollymawk, and Giant Petrel breeding areas. As it is required to recover devices to obtain the data further trips to the island were planned in August 2021, and January 2022. Unfortunately, due to the August 2021 Covid-19 lockdown a trip was not possible in August, but one was carried out in January 2022. This report summarises the results of this field trip and summarises research undertaken on Northern Buller's Mollymawk, Northern Royal Albatross and Northern Giant Petrel; including recovering GLS tracking devices on birds and data from cameras established at colonies.

Results

Field trip

A team of two, Mike Bell and Levi Lanauze camped on Motuhara from January 25th to February 2nd, 2022. We landed on the northern landing at first light, and immediately ferried our gear up to the usual campsite. We had our campsite setup and all gear safely stowed by 10am. The weather throughout the trip was variable, during the first three days on the island we encountered some wild weather, the most rain, and highest winds I had experienced on Motuhara to date, providing an interesting insight into the island during such weather.

January 26th was quite wet (c.20mm rain), and this caused significant flooding across the island, especially on the western (Buller's) end of the island (Figure 1). Numerous puddles, pools and small lakes formed, and small gullies becoming streams. This caused nest failure in some areas of the Buller's Mollymawk breeding sites, especially in gullies where streams formed and these washed-out nests. The Eastern end of the island where the Royal Albatross nest was less effected, and although it was wet, no standing water formed, and no streams, so Royal breeding was not impacted.

The next day, 27th January there was a strong SW gale (c.45 knots) which led to us moving camp to a more sheltered location, protected from that wind direction. Although the wind strength was by no means out of the ordinary for the Chatham's it did have some effect on breeding of both Buller's Mollymawk and Royal Albatross. In parts of both colonies, we found a small number of chicks that had been blown out of nests. Although both species were still brooding chicks at the time, we found the chicks beside nests, and it seemed likely that these chicks had been blown out of nests when partners had swapped over at the nest, leaving chicks exposed briefly.

Being on the island during these weather events, although neither were particularly extreme in terms of Chatham's weather, highlighted the risk to seabirds breeding on these islands and the potential impacts of climate change. With a predicted increase in the severity, and frequency of adverse weather events there is increased risk to breeding, and as the effects of climate change take hold, we should anticipate a reduction in productivity.

As during last year's field trip, and a continuation of the trend over the past two decades, during this trip we found the island to have relatively deep soil and well vegetated. The poor weather we experienced had little impact on the vegetation.

Figure 1. Photo of part of Buller's mollymawk colony showing water pooling during a c.20mm rainfall event.



Northern Royal Albatross

Study plot re-sighting and banding

Within the two study plots established last year we re-sighted 71 birds banded. As biennial breeders, these will be birds that failed during the early chick rearing phase and returned to breed this season. A much longer data series will be needed to attempt any survival analysis. For sites where we could locate the nest tag, these birds were nesting at the same nest site as the previous season. Throughout both study plots a further 226 breeding adults were banded to increase the marked population (Table 1).

Table 1. Number of nests, and nests where one, or both partners were banded in each study plot on Motuhara Jan 2022.

Study colony	Study nests	One partner banded	Two partners banded
Tuamata	97	13	52
Māwake	95	15	47
Total	192	28	198

Recoveries of older banded birds

Only 4 previously banded Royal Albatross were recorded during the trip, along with a closed metal band around a leg bone found on the surface – this band showed some wear, so was likely to have been on a chick that did fledge and died later as an adult at the colony. Three of the birds, and the dead bird, were all banded as chicks on Motuhara on 23 May 1994, making them 26.5 years old. With one bird banded on 16/11/2007 as an adult. These band returns have been submitted to the FALCON banding database.

Aerial study grids

Five study grids were established within the main breeding area on the eastern end of the island to support future aerial survey work in January last year, and these were counted on January 29th (Table 2). There was some difference between years in the two plots, but as Royal's are biennial breeders these fluctuations are likely and a longer time series is needed to determine any population trends.

Table 2. Nest counts from 5 newly established study grids in the main Royal Albatross breeding area on Motuhara Island, January 2021 (top table), January 2022 (bottom table).

Study grid	Egg	Chick	Failed	Total
Grid 1	10	21	2	33
Grid 2	5	21	3	29
Grid 3	8	17	3	28
Grid 4	8	27	3	38
Grid 5	7	22	2	31

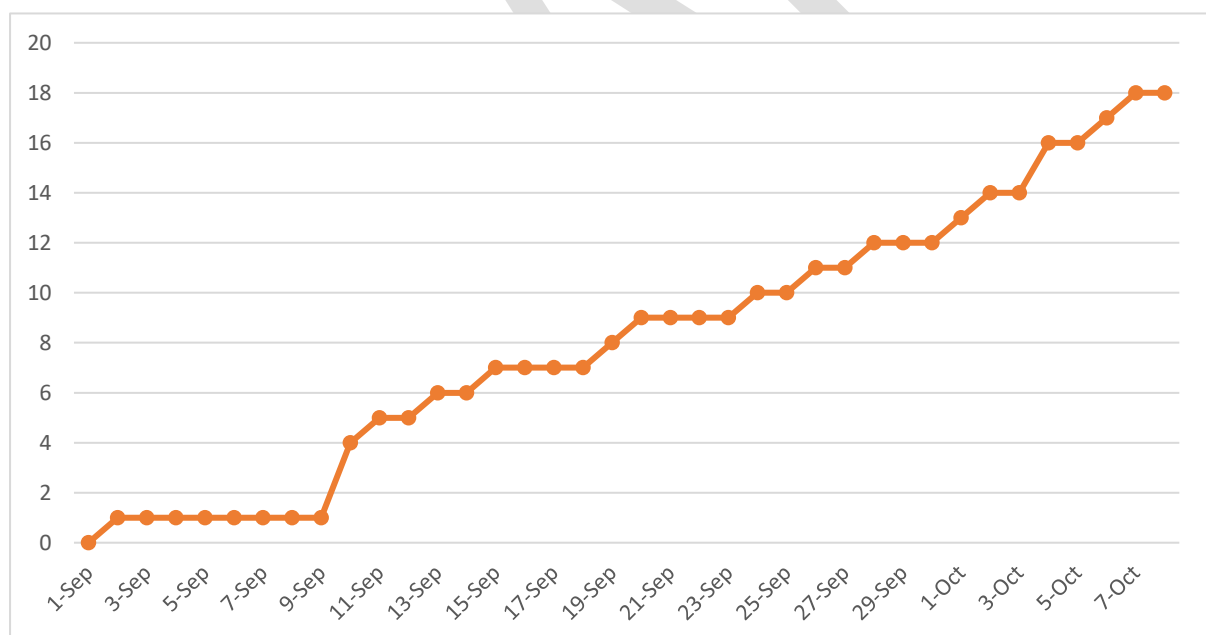
Study grid	Egg	Chick	Failed	Total
Grid 1	7	16	0	23
Grid 2	12	17	2	31
Grid 3	12	26	1	39
Grid 4	10	20	5	35
Grid 5	8	20	2	30

Fledgling success from static cameras

Five trail cameras were set up within the main Royal Albatross breeding area at the eastern end of the island in January 2021 to determine fledgling success. The cameras were programmed to take an image every hour, with a trip planned to the island in August to download cards ensuring capacity would not be exceeded. However due to the Covid-19 Lockdown in August 2021 this trip could not go ahead as planned, and the cards were only recovered during this trip. As a result, this meant that the SD cards in all cameras filled up by mid-late October. Fortunately for Royal's this meant that it was still possible to determine the proportion of chicks present in January 2021 that went on to fledge, but that we missed most of egg laying for the 2021/22 season. In addition, one of the five cameras with the Royal colony (one of the Reconyx Hyperfire cameras) malfunctioned and stopped working on 11th July 2021 prior to chick fledging.

The four cameras that worked throughout the season covered a total of 24 nests where the fate of chicks could be followed through to fledging. Vegetation growth from August and the movement of chicks as they aged meant following the fate of individual chicks was often difficult and limited the field of view and hence nests which could be followed. Of the 24 chicks present in January 2021, 3 died, but a further 4 went "missing" in early August, these birds disappeared from the field of view, and were considered too young to have fledged, so are considered to have perished. A total of 17 chicks fledged, 70% of chicks observed, from September 2nd to October 7th (Figure 2).

Figure 2. Culminative number of Northern Royal Albatross chicks fledged as recorded by cameras deployed on Motuhara, September/October 2021.



Northern Buller's Mollymawk

Study plot re-sighting and banding

Two study plots were set up on Motuhara to establish a marked population to begin a demographic research project in January 2021. This season, across both study plots 68% of nests were active whilst we were on the island. The Hopuni study colony had a higher failure rate, and this is likely to be as this colony is in a gully, which is subjected to a greater flood risk during rainfall events (Table 3).

Table 3. Proportion of active nests at Buller's Mollymawk study colonies on Motuhara, Jan 2022.

Study colony	Study nests	Active	Empty/ failed nests
Hopuni	102	61 (60%)	41 (40%)
Roto	104	81 (78%)	23 (32%)
Total	206	141 (68%)	131 (32%)

From 317 adult breeding Buller's Mollymawk were banded within these two study plots in January 2021, 80% were re-sighted in Jan 2022 (Table 4). A lower proportion of birds were re-sighted in the Hopuni study colony, most likely a result of the higher nest failure rate in this area, so birds will have already departed the island. A longer time period is needed to undertake a meaningful survival analysis. A further 88 Buller's Mollymawk were banded within the study colonies, mostly partners of birds missed last year, as we continue to build up this marked population.

Table 4. Proportion of Buller's Mollymawk banded in January 2021 re-sighted in January 2022 at two study colonies on Motuhara.

Study colony	Study nests	Banded birds 2021	Re-sighted Jan 2022	%
Hopuni	102	147	106	72.1
Roto	104	170	148	87.1
Total	206	317	254	80.1

Recoveries of older banded birds

Only one older banded Buller's Mollymawk was captured, M-81078, a bird banded on 9 November 2008 as an adult, giving this bird a minimum age of 28 years. This record has been submitted to the FALCON banding database.

GLS recovery

A total of 55 GLS devices were deployed on breeding Buller's Mollymawk from within, or near the Hopuni Study Plot in January 2021. Of these 49 birds were re-captured, data recovered and the GLS deployed on the same bird (5 GLS were removed from birds as the data could not be downloaded in the field and returned to Aotearoa to try to recover data). A number of these birds were on failed nests, and regular checking of nests, especially in the evening picked up these birds. Analysis of the data was not part of this project and has been supplied to the Department of Conservation who will process the data and map the movements of these birds.

Study grid counts

The 5 existing 10x10m study grids and the 5 newly established grids last year were counted (Table 5). Nest counts in most of the grids were higher than last year, and some grids have increased significantly since in 2016 (Bell *et al.* 2017), when the last full island census was conducted. Given potential increases in nest density in study grids, it is recommended to undertake an island wide census, to determine the population trend.

Table 5. Nest counts from the 5 existing and 5 newly established study grids on Motuhara Island, January 2022.

	Study grid	Egg	Chick	Empty	Total
Existing	Grid 1	5	29	18	52
Existing	Grid 2	11	45	29	85
Existing	Grid 3	7	39	31	77
Existing	Grid 4	2	55	18	88
Existing	Grid 5	5	53	17	75
New	Grid 6	3	61	26	90
New	Grid 7	2	45	11	58
New	Grid 8	9	52	14	75
New	Grid 9	6	41	21	68
New	Grid 10	3	37	14	54

Breeding ecology from static camera deployment

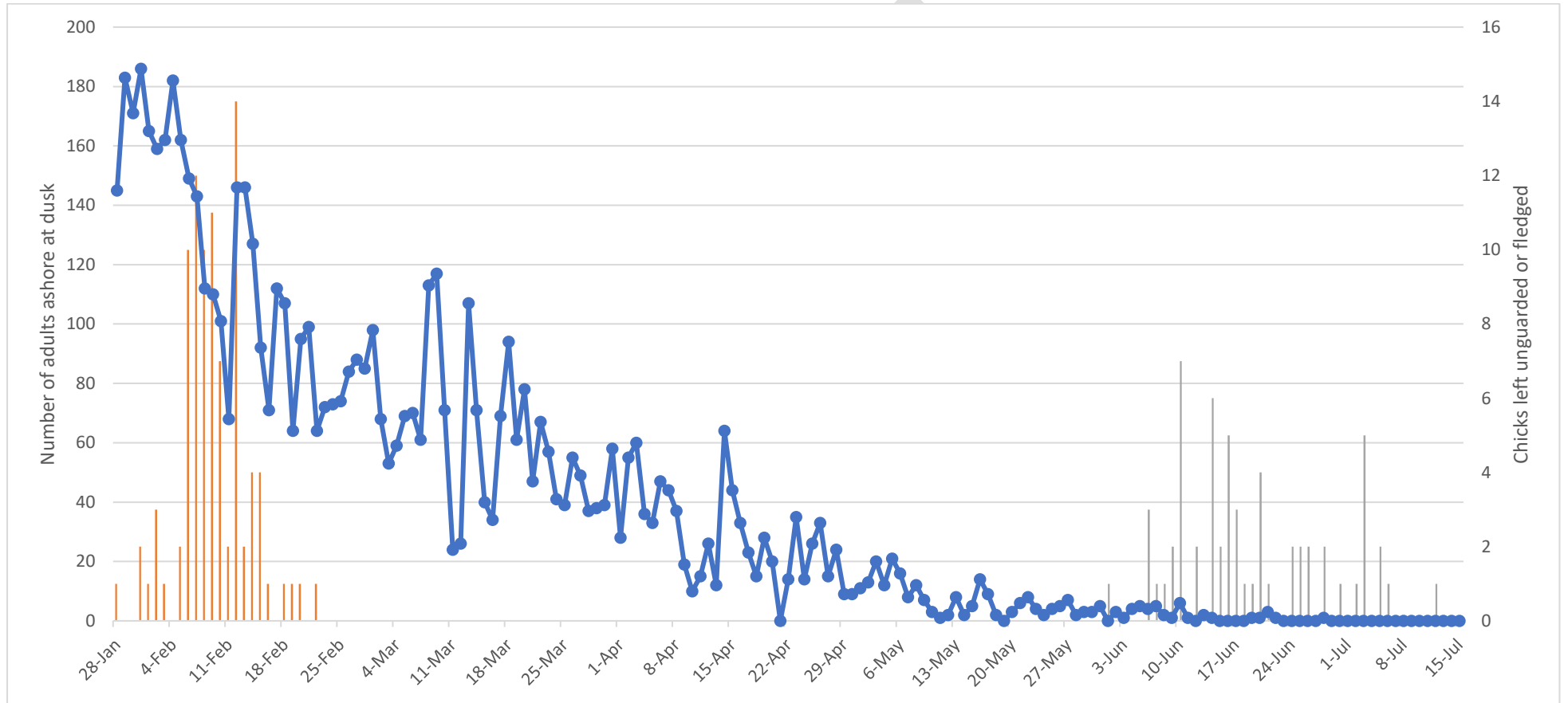
Five trail cameras were set up within the main Buller's Mollymawk breeding area at the western end of the island to investigate aspects of breeding ecology of the species in January 2021. As mentioned, cameras were timed to take an image every hour and as the August 2021 trip was cancelled due to the Covid-19 lockdown SD cards filled up by mid-late October. This did enable us to investigate chick rearing and fledgling, but unfortunately meant although the return of adults to the colony was recorded, we could not determine the timing of egg laying.

Other than SD cards filling up, the five cameras worked through to mid-late October without malfunction. These covered a total of 81 nests (9-33 nests per camera) where chicks could be followed. With little vegetation throughout the Buller's end of the island, there was no issues with vegetation growth obscuring camera view. When first set up and recording started (28 January 2021) all nests had adults brooding young chicks.

To investigate adult attendance at the colony we counted the number of adults present in the last colour image each day. Trail cameras took colour images when there was enough light, but black and white images when they went into night mode and used infrared light to capture images. Buller's Mollymawk activity at Motuhara was seen to peak in the evening, and then decline pre-dawn, hence a dusk count is a good measure of adult colony attendance. Using the last colour image each day, before the camera goes into night mode, ensured the count was adjusted for day length throughout the season.

Initially the highest numbers of adults were present at the colony each evening, but as the post-guard stage progressed, the number of adults ashore each evening rapidly dropped (Figure 3). Failed breeders stopped visiting nests, and it is likely that pre-breeders departed the colony at this time also. The first chick was left unguarded on January 28th, the last almost 4 weeks later on February 22nd. The number of adults ashore each evening remained relative static until April, when it dropped, and by May, adults only seldomly stayed ashore at night. Although the cameras seldom recorded chicks actually being feed, this period likely coincided when it was only adults attending growing chicks returning to the colony. As chick demands increased, adults progressively spent less time at the colony. The first chicks fledged on June 1st, the last on July 12th, with peak fledging between June 6-28th. Fledging success was relatively high, with 73% of chicks alive when the cameras were established going on to fledge.

Figure 3. The number of adult Buller's Mollymawk ashore each evening (blue line), chicks left unguarded for the first time (orange bars) and fledged (grey bars).



Northern Giant Petrel

Chick banding

The timing of this field trip overlapped with fledging of Giant Petrels, with chicks actively fledging whilst we were on the island, and we banded a total of 350 chicks on the verge of fledging.

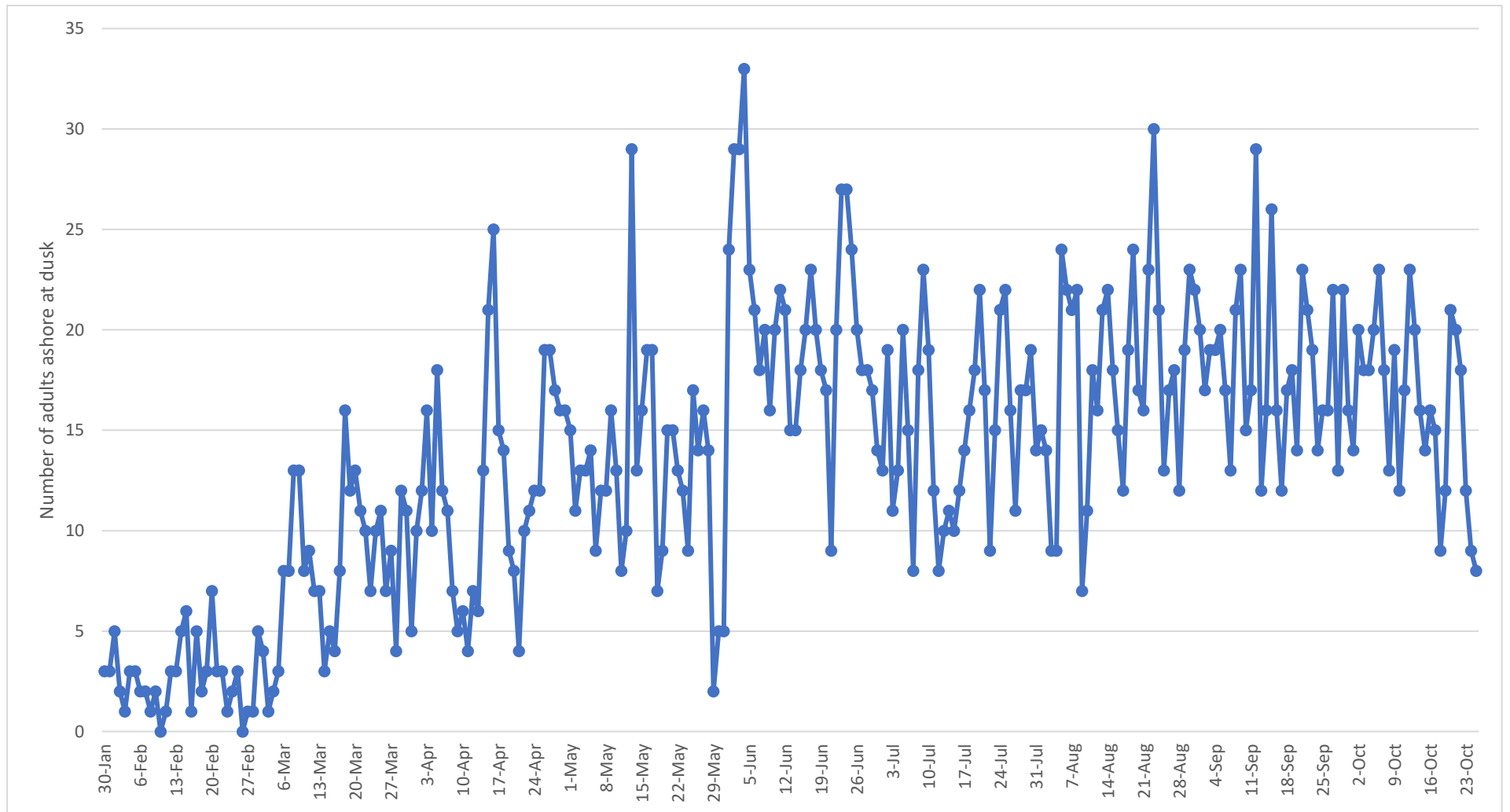
Static camera deployment

Two trail cameras were set up with an overview of areas of Giant Petrel nests to investigate aspects of breeding ecology of the species. As Giant Petrel nesting is relatively dispersed on the island, and most birds breed on the flatter eastern end of the island, it was only possible to deploy a camera where a small number of nests were within the cameras field of view (2-5 nests per camera). As with the other cameras, due to the Covid-19 lockdown SD cards filled by mid-October, preventing confirmation of chick fledging.

One camera covered 3 nests, the second 6 nests, whilst 3 further nests could be followed in cameras deployed in Royal Albatross breeding areas. On the last colour image each evening the number of adult Giant Petrels ashore were counted to assess adult colony attendance (see Buller's Mollymawk section for more details). Immediately post-fledging (with the last chick fledged by mid-February), the number of Giant Petrel on the colony was low. This gradually increased throughout March, April and May, then remained high through to September but had started decline in October when the SD cards filled up (Figure 4).

The first egg was laid on July 30th and the last two weeks later August 13th. Chicks were first seen from October 5th, suggesting an incubation period of 66 days but this is likely to slightly over-estimate incubation as often a hatching could not be confirmed for several days. One nest was abandoned during incubation, potentially due to a fight at the nest with a Royal Albatross. The first chicks were just starting to be left unguarded in mid-late October when the cameras filled up and stopped recording.

Figure 4. The number of adult Giant Petrel ashore each evening at dusk, Motuhara Jan-October 2021.



Acknowledgements

Motuhara is a privately owned Island and I am grateful for the island owners allowing me access to the island to undertake this research. Thanks to Chris Morrison for providing access to the island and my brother Paul for his company and hard work on Motuhara. This work was funded by the Department of Conservation Conservation Services Program and I thank Graeme Taylor for managing this.

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