

2020–2021

Banks Peninsula/Horomaka Kororā Survey

MID-SURVEY REPORT

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Summary

Little penguins (kororā) are one of six species of penguins found in Aotearoa New Zealand. They nest in burrows, and are scattered in colonies around the coastline, sometimes up to 200-500 metres above sea level and up to 800 metres inland. In October 2020, a group of community leaders and over 60 volunteers surveyed Banks Peninsula on the South Island of New Zealand to identify penguin numbers, 20 years after the first significant peninsula-wide survey was performed. Classified as seabirds and indigenous marine biodiversity, little penguin populations provide a good overview of the health of the marine ecosystem, and so they are considered an indicator species. This mid-survey report presents the rationale, methods and initial survey results for what is a community-led citizen science effort bringing together multiple stakeholders and community groups with the support of local hapū. Using an innovative, custom-built Horomaka Kororā Survey smartphone app, the surveyors used a comprehensive search method, an adaptation of the last 2000/2001 survey design, to identify and describe active kororā nests at 59 colony sites across Bank Peninsula. This survey is expected to resume in late 2021 and be completed in early 2022. This work is a key starting point for getting a much better understanding of the health of the marine environment around Banks Peninsula and coastal Canterbury and a demonstration of effective collaboration educating communities in the region.

Introduction

Penguins in Aotearoa (New Zealand)

Penguins are seabirds that live almost exclusively in the Southern Hemisphere. They rely on land for nesting, breeding and moulting; however, they solely depend on the ocean as a food source (Bräger & Stanley 1999). There are 18 species of penguin worldwide and Aotearoa hosts six of these species (Mattern & Wilson 2019). These species include the yellow-eyed/ hoiho (*Megadyptes antipodes*), little/ kororā (*Eudyptula minor*), Fiordland/ tawaki (*Eudyptes pachyrhynchus*), Snares (*E. robustus*), eastern rockhopper (*E. filholi*) and erect-crested (*E. sclateri*) penguins (Mattern & Wilson 2019).

Little penguin, kororā (*Eudyptula minor*)

The little penguin (*E. minor*, Forster 1781), also known as kororā, is the world's smallest penguin weighing about 1 kg. They are blue dorsally and white ventrally, with no flashes or tufts (Allen, Helps & Molles 2011; Perriman et al. 2010; Meredith &

Sin 1988). Kororā are found in New Zealand scattered around coastlines in the North, South, Stewart, Chatham and various offshore islands, as well as Southern Australia and Tasmania (Allen, Helps & Mollies 2011; Dann 1984; Fleming, Lalas & van Heezik 2013; Mattern & Wilson 2019). Genetic (and slight morphological and behavioural) differences between Australian and New Zealand little penguins have revealed two distinct clades with little hybridisation between them (Banks et al. 2008; Flemming 2013; Birdlife International 2020). Currently, these penguins are considered by the 2017 IUCN Red List Assessment as 'Least Concern' (Birdlife International 2020) and by the New Zealand Department of Conservation (DoC) and New Zealand Birds Online as 'At risk-declining' (Flemming 2013).

Kororā are nocturnal on land, coming ashore after dark and departing before dawn (Allen, Helps & Molles 2011; Perriman et al. 2010). They have a generalist diet which varies between region and season. They largely feed on small nearshore pelagic fish,

cephalopods (i.e. juvenile pelagic squid) and crustaceans (Challies 2019; Mattern & Wilson 2019; Perriman et al. 2010). During their breeding season, July/August to November (Challies 2019), kororā are central-place foragers. This means they are restricted to areas close to their nest and are therefore more susceptible to regional changes in prey abundance and distribution (Fleming, Lalas & van Heezik 2013). They also return to their colonies outside of the breeding season during moulting and periodically in autumn and winter (Challies 2015). Kororā are the only penguin species to successfully rear two clutches of offspring in one year, in some instances four fledglings per season (Allen, Helps & Molles 11, Perriman et al. 2010; Williams 1995).

Anthropogenic threats to kororā have resulted in declines in population at many colonies in both Australia and New Zealand. On land, they are most at-risk from introduced predators such as mustelids (i.e., ferrets and stoats), domestic dogs and cats, wildlife-vehicle collisions,

and coastal development (Allen, Helps & Molles 2011; Flemming, Lalas & van Heezik 2013; Challies & Burleigh 2004; K.J Wilson, pers. comm. 2016). At sea, they are threatened by fisheries bycatch, oil spills and pollution, predation, and overfishing (Mattern & Wilson 2019). Kororā are directly affected by climate change, with an increase in the intensity and frequency of sea surface temperature (SST) anomalies and El Niño and La Niña climate perturbations changing marine productivity and food availability (Mattern & Wilson 2019).



White-flipped penguin (*Eudyptula minor albosignata*)

Kinsky and Falla (1976) recognised six subspecies of little penguin. These included the northern (*E. minor iredalei*); Cook Strait (*E. m. variabilis*); southern (*E. minor minor*); white-flipped (*E. minor albosignata*); Chatham Island (*E. minor chathamensis*) and the Australian (*E. minor novaehollandiae*) little penguins. Currently, however, there are no recognised subspecies of little penguin due to recent genetic studies (Banks et al. 2008; Waugh 2016). Instead, all of the previous New Zealand subspecies are considered part of the New Zealand clade and referred to as a morphological variant (or morphotype). Among these morphotypes is the white-flipped penguin which is endemic to Canterbury, New Zealand and

found only on Banks Peninsula and Motunau Island, 65 km north of Christchurch (Allen, Helps & Molles 2011; Bräger & Stanley 1999; Challies & Burleigh 2004; Mattern & Wilson 2019). As shown in the photograph above, white-flipped penguins (right) are often slightly larger (ca. 0.3 kg), lighter in colour, and have varying amounts of white in their plumage, mainly on their flippers but also other parts of their body (Allen, Helps & Molles 2011; Challies 2012; Kinsky & Falla 1976; Williams 1995). Some white-flipped penguins have been documented as having white plumage on their cheeks, flanks and rump (Challies 2012). Unlike their Australian conspecifics, white-flipped penguins (and New Zealand little penguins in general) do not typically double clutch or raft when returning from a foraging trip at sea.

The population size of kororā (including white-flipped) on Banks Peninsula, New Zealand was last estimated at 2112 breeding pairs (ca. 5870 penguins) during a survey completed during the 2000/01 and 2001/02 breeding seasons (Challies & Burleigh 2004). Prior to this, there was an element of doubt about the kororā's status as much of the coastline of the Banks Peninsula is not accessible from the land and had not previously been surveyed. Sixty-eight colonies, defined as a group of five or more nests separated from other nests by impassable terrain or 100 m, were found, of which 51 colonies (75%) contained 5-20 nests, 12 colonies (18%) contained 21-50 nests, and 5 colonies (7%) contained over 50 nests (Challies & Burleigh 2004). At 40 other sites on Banks Peninsula, less than 5 nests were found.

Although some colony sites have been surveyed since the 2000–2002 survey, there has not been another peninsula-wide survey. In order to estimate the current population size of kororā on Banks Peninsula and repeat past surveying efforts, the Horomaka Kororā Survey was started in 2020.

Banks Peninsula site



Banks Peninsula/Horomaka is on the east coast of New Zealand's South Island and is the site of the Horomaka Kororā Survey 2020/2021-2021/22. It was once home to a diverse and abundant native flora and fauna before increased human presence and habitation throughout the late 19th and early 20th centuries (Allen, Helps & Molles 2011; Mattern & Wilson 2019).

Eastward of the Canterbury Plains, Banks Peninsula is an elliptical area of deeply dissected hill country boasting a shoreline of 300 km. The land is of volcanic origin, extinct for 8 million years (Bräger & Stanley 1999; Challies & Burleigh 2004). Most of the land is pasture and shrubland however, dense native vegetation is present. The peninsula is a diverse region that contains

an array of environments across a heterogeneous landscape. Most of the coast has been extensively eroded by marine processes resulting in steep bluffs, some of which reach 25-150 m in height. Around the bays there are mudflats and stoney and sandy beaches (Challies & Burleigh 2004).

The two largest embayments include the Lyttleton and Akaroa Harbours (Challies & Burleigh 2004). Akaroa harbour is a taiapure, meaning the area has been recognised as a local fishery of special significance. This customary management tool puts in place additional fishing rules to manage the area. Within the taiapure there are two marine reserves. First, on the south-eastern coast of the harbour, Flea Bay (43° 52' S, 173° 0' E) makes up the main area of the

Pohatu Marine Reserve. Pohatu was the first established marine reserve on the east coast of the South Island established in 1999 covering 215Ha. The reserve is marked between Ounu-hau Point and Redcliffe Point. Second, the Akaroa Marine Reserve, situated 3 km away from Pohatu, was more recently established in 2014 (Land Information New Zealand). Banks Peninsula/ Horomaka also hosts a Marine Mammal Sanctuary created in 1988, which now covers approximately 14,310 km² (Department of Conservation). Since its establishment, the sanctuary has been extended to now encompass the area between the southern boundary of the Te Rohe o Te Whānau puha Kaikōura Whale Sanctuary, south to the Waitaki River and out to sea 20 nautical miles from the coast (Department of Conservation).

Community science

As demonstrated by previous research on kororā and the white-flipped morphotype, surveying requires an extensive amount of support to cover the large expanse of coastline in New Zealand and around the Banks Peninsula. Mattern & Wilson (2019) reiterate that with scientific guidance, much of the monitoring of population trends in kororā could be done by community groups or volunteers. The term "community scientists" (formally citizen scientists) refers to volunteers who participate as field assistants in a scientific study of ecological research (Cohn 2008) and provides a means by which large surveys and

data sets can be processed (Jones et al. 2018). Working with community scientists dates back to the National Audubon Society's annual Christmas bird count, which began in 1900. Another example of community science used for penguin research is 'Penguin Watch' hosted by the Zooniverse. On the Penguin Watch websites, community scientists classify images by tagging individual penguins and labelling them as 'adult', 'chick', 'egg' or 'other' (Jones et al. 2018). In addition to a dramatic increase in research efficiency and data processing, community science can be considered an effective strategy for public engagement

and education. Jones et al. (2018) explained that in a survey carried out by the Zooniverse in 2014 (Homsy, 2014) "90.6% of participating volunteers stated that they like to contribute to scientific progress, while 84.7% of people were fascinated by the projects in which they were involved".

It is both an exciting endeavor and a necessary requirement that community scientists and the DoC were involved in the Horomaka Kororā Survey 2020/21 and 2021/22 in order to effectively re-evaluate the population of Kororā.

Aim of the Survey

During the last survey of little penguins on Banks Peninsula in 2000-2002, the Department of Conservation reported 108 colonies. The extent of terrestrial and marine threats on little penguin populations on Banks Peninsula is currently unknown, even though many have been identified and linked to causes of past population declines. Kororā/ little penguins are considered indicator species, meaning their population can provide an overview of terrestrial and marine ecosystem health.

Methods

The Horomaka Kororā Survey of little penguins was conducted during the Banks Peninsula breeding season (September to mid-January) from 31 October 2020 to 31 January 2021. The reason for conducting the survey during this timeframe was a) to repeat methods from the 2000-2002 survey (Challies & Burleigh 2004) and b) kororā activity and their breeding attempts are best observed from November to mid-January as you can include late breeders during their incubation stage, nests during the guard stage, and also identify nests which have fledged in the survey.

A training day was held on 31 October 2020 for team leaders and community scientists to review survey objectives, health and safety protocols, data collection, and methods for identifying and marking active nests. A talk was given by Dr. Mātū Payne, Chair of Koukourarata hapū, on the protocols for reporting and respecting any Maori burial sites or remains found during the survey. Any teams accessing survey sites by boat or kayak received kayak self-rescue training in the Pohatu Marine Reserve, marine radio training, and more detailed health and safety training.

During this first phase of the survey (2020-2021), teams surveyed 59 sites around Banks Peninsula (Figure 1). These sites were either confirmed colony locations from the last survey (some of which can no longer be defined as a colony according to the definition above) or adjacent to known colonies where penguins were thought to be breeding (i.e., penguin activity, sign). Some survey sites were accessed by land, for

example bays with beach access, but the majority of sites were only accessible by kayak launched from volunteer tourism boats. An estimated total of c. 1,176 survey hours were logged. These included 20 people who surveyed for six hours on five days and four people who surveyed for six hours on 24 days.

During the survey volunteers were split into teams of more than four people (including one team leader). Each site was extensively searched using transect lines of volunteers. Where possible, teams would walk 5 m apart and scan the ground for signs of penguin activity for example, tracks or guano, and visible nests. Once located, the two volunteers on either side of the nest would assess whether it was active, meaning that a breeding attempt had been made during the breeding season. A nest was considered active if one or more of the following conditions were met:

- adults, chicks, or eggs or egg fragments were present;
- movement or vocalisations from inside a burrow were heard;
- substantial amounts of faeces around/inside a burrow were present;
- nesting material was present;
- indication that a breeding attempt was made this season.

During this assessment disturbance was minimised by following traditional nest surveying methods created by the Department of Conservation (e.g., Challies & Burleigh 2004). Entrances to the nests were observed using a pen light and penguins were not handled. These protocols and surveying methods were discussed with New

The main objectives of this survey were to estimate the total population size of kororā on Banks Peninsula, evaluate population change over the past twenty years, and collect important data on nest characteristics, occupancy, and location. Community scientists, groups, and volunteers participated in the survey, established a robust and vigorous surveying method and developed a custom-built smartphone app to ensure accurate and efficient data collection.

Zealand Penguin Initiative (NZPI) and the Department of Conservation during the consultation phase of the survey.

Once a nest was considered active, volunteers logged the required information as shown in Figure 2 using the custom-built Horomaka Kororā Survey smartphone app designed by Christchurch-based geographic information systems (GIS) company Orbica using KoBoToolbox (<https://www.kobotoolbox.org>). Data was recorded via the app off-line and then uploaded to KoBoToolbox once cell signal was obtained. Paper datasheets were used if required and then entered into the app. After data was collected the GPS location of the active nest was recorded and finally, the nest was marked with biodegradable flagging tape or chalk to prevent double counting.

Consultation

Blue Cradle is committed to Te Tiriti and principles of partnership, participation and protection. Since kororā are taonga (treasured) species, we are working closely with Koukourarata hapū. Our partners Pōhātu Penguins are working with Te Rūnanga o Koukourarata and Environment Canterbury, who provided funding for the survey, are working with the six Papatipu Rūnanga. This ensures local Rūnanga are involved in the decision-making process and have full transparency of data. Blue Cradle also consulted with the New Zealand Penguin Initiative (NZPI) and the Department of Conservation before the initial phase of the Horomaka Kororā Survey.

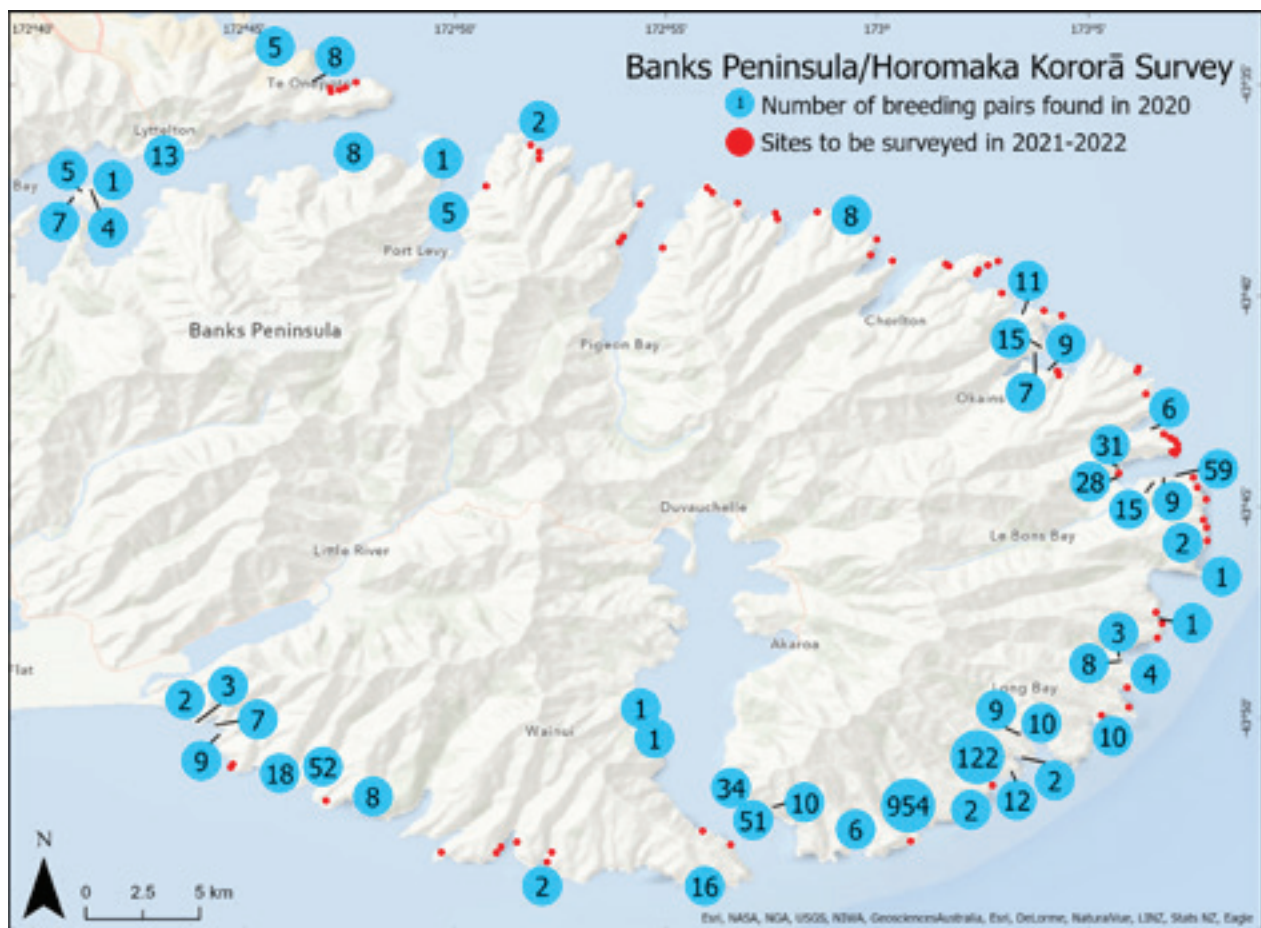


Figure 1. Map of all survey sites that were searched during the Horomaka Kororā Survey. Blue circles represent sites searched during the 2020-2021 breeding season, with the number summarising the total number of active nests found. Red circles are sites that will be searched during the 2021-2022 breeding season.

Results

The survey is ongoing, with 59 colony sites searched (13 of those were new sites) between October – December 2020. These include the colonies that had the largest populations in the 2000/2001 survey. A further 70 sites still need to be surveyed in the upcoming 2021 breeding season (Figure 2).

Across 59 colony sites searched by transects, we found 1617 nests were occupied with proof of a breeding attempt. Notably, our survey to date represents only approximately 39% of known nesting locations on the Banks Peninsula (Challies & Burleigh 2004). See Table 1 for a list of the breeding pair estimates for all surveyed breeding sites. The largest colony surveyed, Flea Bay had 954 breeding pairs (Figure 3). Due to the more frequent survey counts at Flea Bay (every four years), we have a better understanding of the population trends on a smaller temporal scale. Flea Bay had an estimate of 717 breeding pairs in 2000 which increased to 1264 pairs counted during the last survey in 2016. However, this means there has been a large decline of 310 pairs (620 penguins) in just four years (A. Parthonnaud, pers. comm).

We discovered 142 breeding pairs in Le Bons Bay and 122 breeding pairs in Stony Bay. Overall, there was a greater search effort compared to the 2000-2002 survey at many of the breeding sites such as Stony Bay. This makes it difficult to compare population estimates with past surveys. Once the survey is complete, however, a more detailed comparison will follow.

Figure 2. Static view of the custom-built Horomaka Kororā Survey data collection smartphone app designed by Orbica.

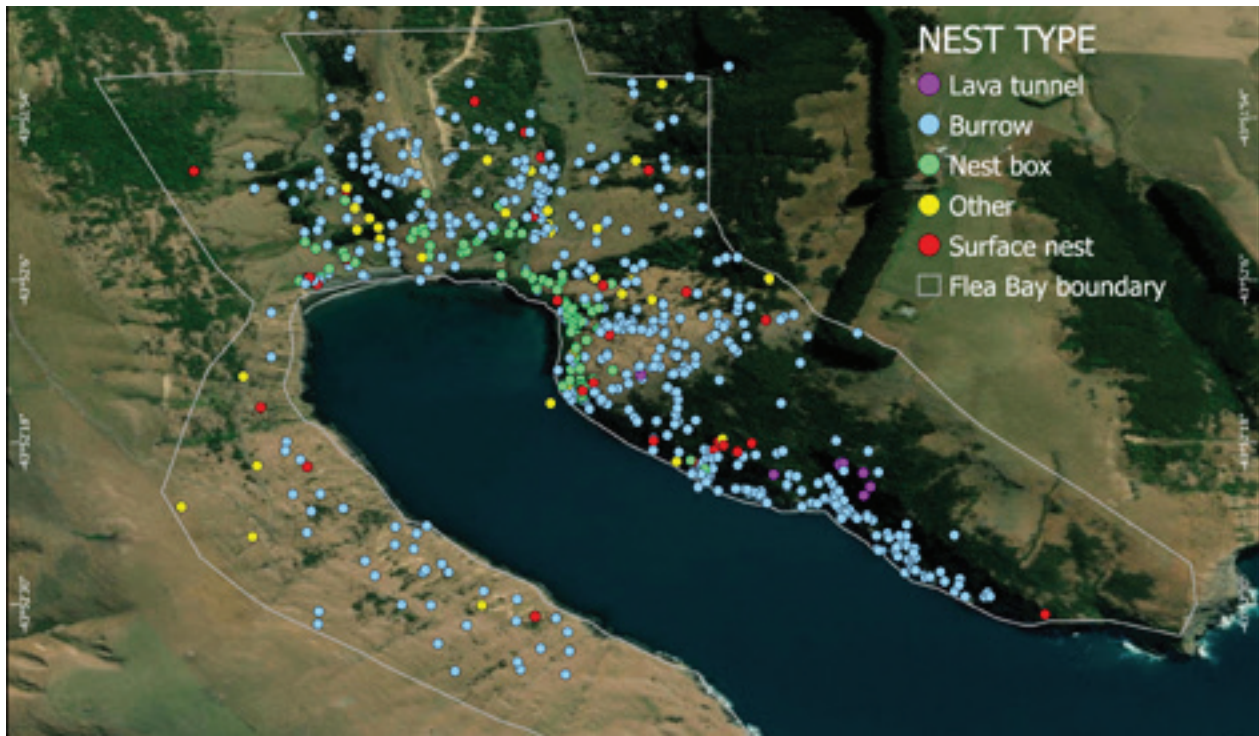


Figure 3. Map of all nest sites found at Flea Bay/Pohatu. Grey line indicates the Flea Bay search boundary and points are colored by nest type.

Table 1. Little penguin (*Eudyptula minor*) breeding pair counts on Banks Peninsula for sites surveyed. An asterisk (*) indicates sites that were newly surveyed in 2020. **Figure 3 shows the distribution of penguin nests in Flea Bay.** Sites ordered clockwise from Sumner (NW).

Location	Breeding Pairs	Location	Breeding Pairs
Sumner Beach*	5	Goughs Bay - beach	3
Taylor's Mistake	8	Goughs Bay - head	4
Otamahua/Quail Island- northwest	5	Goughs Bay - south*	8
Otamahua/Quail Island- north	1	Otanarito- inner bay left*	10
Otamahua/Quail Island	4	Otanarito - inner bay right	9
Naval Point*	13	Sleepy Bay	2
Otamahua/Quail Island- west	7	Reef Nook	12
Governor's Bay*	0	Stony Bay - cave, forested hillside	77
Camp Bay	8	Stony Bay - houses	34
Port Levy - Beacon Rock	2	Stony Bay - south side/steep hills*	11
Port Levy - Islet Pukerauauahe*	5	Redcliffe Nook*	2
Port Levy - west*	1	Damons Bay	6
Port Levy - east*	0	Flea Bay	954
Squally Bay	8	Akaroa Harbour - Wainui	1
Okains Bay right - wharf side*	9	Akaroa Harbour - Wainui south	1
Okains Bay left - to Spyglass Point*	7	Akaroa Heads - harbour right	10
Okains Bay - Spyglass Point	15	Akaroa Heads - harbour right	51
Okains Bay - West Head	11	Akaroa Heads - harbour right	34
Lavericks Bay - south	6	Akaroa Heads- Scenery Nook	16
Le Bons Bay - north	31	Akaroa Harbour - left side	0
Le Bons Bay - south	9	Akaroa Harbour - left side	0
Le Bons Bay - south	15	Island Bay	2
Le Bons Bay - south harbour entrance	59	Robin Hood Bay	8
Le Bons Bay - cave	28	Te Oka Bay	52
Hickory Bay	2	Tumbledown Bay	18
Hickory Bay- Putakolo Head	1	Hikuraki Bay	9
Hickory Bay - coast	1	Blind Bay	3
Hickory Bay - North Head	0	Tokoroa Bay	7
Red/Shell Bay	10	Oashore Inner Bay*	2
Total (58 sites)		1617	

Discussion & Conclusion

During the first phase of the Banks Peninsula/Horomaka Kororā Survey, little penguin burrows were successfully found across sites within shrubs, rock crevices, penguin nesting boxes, and deep holes. Sites surveyed during the 2000-2002 kororā survey were re-visited, and additional sites that were either inaccessible during the 2000-2002 survey or initially overlooked were searched as well. Search efforts during the 2020/2021 survey were also greater due to the number of volunteers and community scientists willing to participate in the survey. This mid-survey report establishes the rationale, protocol and some of the initial findings of the survey. While penguin burrows were successfully identified, we are yet to demonstrate an increase or decrease in the population estimate of Banks Peninsula kororā. The second phase of the survey will start this year (2021/2022) during the kororā breeding season. The final sites, as shown in Figure 2, will be surveyed using the same methods and volunteer efforts.

The main objective of this survey was to estimate the total population size of little penguins in Banks Peninsula, evaluate population change over the past twenty years, and collect important data on nest characteristics, occupancy, and location.

So far, 50 out of the 128 sites identified for the 2020-2022 Banks Peninsula/Horomaka Kororā Survey have been visited, with a count to date of 1617 breeding pairs at the surveyed sites. The three largest colonies during this first phase were Flea Bay, Le Bons Bay and Stony Bay. At the conclusion of the survey, analyses of population size and trends will yield a total number of breeding pairs. We will compare this to the 2112 breeding pairs (ca. 5870 penguins) estimated during the 2000-2002 breeding seasons (Challies & Burleigh 2004), factoring in the additional sites surveyed during the 2020-2022 seasons.

As an indicator species, little penguins are vulnerable to anthropogenic effects and threats, including (but not limited to) climate change, El Niño/La Niña climate events, introduced and marine predators, vehicle collisions, coastal development and erosion, fisheries bycatch, oil spills and pollution, decreased marine productivity, and overfishing (Allen, Helps & Molles 2011; Flemming, Lalas & van Heezik 2013; Challies & Burleigh 2004; K.J Wilson, pers. comm. 2016; Mattern & Wilson 2019). While previous work in the Banks Peninsula region on kororā is notable, a peninsula-wide little penguin monitoring programme (including the white-flipped variant endemic to Canterbury, New Zealand) has yet to be established. Therefore, once we understand the population size of kororā on Banks Peninsula and how it has changed over the last 20 years, we need to continue to monitor this species for future population declines and establish research studies to further understand site-specific threats to their populations.

Work must continue in order to gain a holistic understanding of the marine environment around Banks Peninsula. Considering kororā feed in the marine environment, it would also be beneficial to monitor these populations at sea using GPS tracking methods. Kororā are central-place foragers during their breeding season and have a generalist diet which varies between region and season. As prey abundance and distribution changes due to climate change (e.g., increase in the intensity and frequency of SST anomalies) or fisheries pressure, so too may kororā foraging locations (Fleming, Lalas & van Heezik 2013).

This survey was a combined effort from local groups, volunteers, community scientists, and larger organisations. In collaboration with Orbica, we incorporated a novel survey data collection technique in the form of the custom-built KoBoToolbox Horomaka Kororā Survey smartphone app. The app was an efficient and successful means for capturing data during this survey, and this type of technology can be adapted, improved, and used in future surveys of little penguins across Banks Peninsula. In addition, the immense response and support from volunteers and community scientists not only increased research efficiency and data processing, but effectively educated and engaged the public. The methods and lessons learned from this survey could be used as a model for future monitoring and research efforts of little penguins or other endemic species throughout New Zealand. Together we can gain a better understanding of marine ecosystem health.

COVID-19 & Outreach

This survey was the first significant project co-led by local ocean non-profit Blue Cradle. During the Covid-19 lockdown, many concerned citizens took it in their hands to find

started a partnership with Pōhatu Penguins/Plunge ecotourism company, who had lost 70% of their visitors due to the border closing. They sought to expand and grow

and co-designed the survey protocol with Pōhatu. Blue Cradle also incorporated outreach events around the survey, communicating widely in collaboration with local hāpū, Banks Peninsula Conservation Trust, and many others. Working with Kerepeti Paraone from Rāpaki, Blue Cradle Founding Director James Nikitine created a 30-minute documentary that was subsequently screened at the International Antarctic Centre in Christchurch during Seaweed 2021 for an audience of 120 people. Pōhatu Penguins started the outreach and education programme called Pōhatu Conservation Club, and Regenerate Banks Peninsula / Friends of Banks Peninsula and the seal and penguin group in Sumner perpetuated further conservation activities. Beyond the scientific objectives of the project, community outreach is very much embedded in its heart, as our overall objective is to boost ocean literacy around the region.



solutions to some of our biggest environmental challenges and also improve their own personal livelihoods. In the context of what rapidly became an escalating international crisis, Blue Cradle

their kororā monitoring programme. Supported by the Rātā Foundation and a community grant from Environment Canterbury Regional Council, Blue Cradle then managed to gain technical support from Orbica.



The Team

As a community-lead survey, many organisations, groups, and volunteers were involved. Pohatu Penguins/Plunge NZ Ltd. co-ordinated the survey with advice and help from the Department of Conservation, Banks Peninsula Conservation Trust. The following organisations provided support, land and sea transportation, technology development, and volunteer assistance

- Orbica
- New Zealand Penguin Initiative (NZPI)
- Trackme
- International Antarctic Centre
- Department of Conservation
- Local tourism operators, Black cat cruises and Akaroa Dolphins
- Te Rūnanga o Kōkourarata
- Geologist, Terry Wilson
- Quail Island Trust
- Lyttleton port company, Crystal Lansky
- Bunnings Riccarton



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- Geraldine Guillemot- Peacock
- Dan Helps
- Sue Ritchie
- Simon Garrod- Bell
- Andy Kindon
- Claire Edwards
- Mareike Babuder
- Mathias Meschkank
- Mark, Megan and Hugh Nixon Reynolds
- Fleur Van Eyndhoven
- Angu Chen
- Antony Johnson
- Jade Johnson
- Fran Johnson
- Henry Elsom
- Courtnee Archer
- Warwick Allan
- Aleisha Fisher
- Karen Gourley
- Carl croft
- Marion Croft
- Kahutia Fisher
- Phillip Helps
- Lorna Deppe
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- Zack Marion
- Sarah Flanagan
- Phil Crutchley
- Lea Reeves
- Sarah Wilson
- Edward Aitken
- Peter Marshall
- Bruce McCallum
- Carole Francis
- Gilda Otway
- Will Knapp
- Reagan Knapp
- Tom Boleyn
- Clara Winum
- Larry Anderson
- Ross Blanks
- Peter Marshall
- Mike Bowie
- David Miller
- Otanerito Bay
- Louisa Narbey
- Akaroa area school
- Duvauchelle school
- Bushfarm school
- Volunteer student army X 12 students
- Sumner NZ Pest/Nest group
- Sumner bays predator free group
- Sumner penguin community group
- Marine Kent

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2020-2021
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MID-SURVEY REPORT

