

 <p>Agreement on the Conservation of Albatrosses and Petrels</p>	<p><b>Third Meeting of the Population and Conservation Status Working Group</b> <i>La Serena, Chile, 5 – 6 May 2016</i></p> <p><b>New Zealand White-chinned Petrel population research update</b> <b><i>Kalinka Rexer-Huber, Graham Parker and David Thompson</i></b></p>
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### **SUMMARY**

The White-chinned Petrel *Procellaria aequinoctialis* is one of the most frequently observed seabird species captured in fisheries bycatch, yet some populations remain virtually unstudied. In the New Zealand region, the priority programmes to fill key information gaps included surveying, tracking and collecting demographic data from White-chinned Petrels in the Auckland Islands. Survey of the Campbell Island population and clarification of taxonomic uncertainty in the New Zealand region were secondary aims. This information paper provides a progress update and reports some preliminary findings. An estimated 186,000 (95% CI: 131,000–248,000) White-chinned Petrel pairs breed in the Auckland Islands, and the Campbell Island group supports around 22,000 (15,000–29,000) breeding pairs. A tracking programme in the Auckland Islands has retrieved 38 geolocators from White-chinned Petrels to date. Our work on phylogenetic affinities of White-chinned Petrels supported the idea of an NZ regional population, with all three breeding islands grouping together. A study was initiated to collect demographic data from White-chinned Petrels at Adams Island, Auckland Islands. Two years of data have since been collected.

## **Actualización sobre la investigación demográfica del petrel de barba blanca en Nueva Zelanda**

### **RESUMEN**

El petrel de barba blanca (*Procellaria aequinoctialis*) es una de las especies de aves marinas que es capturada con más frecuencia en las pesquerías, según indican los datos de observación. Sin embargo, existen algunas poblaciones que prácticamente no se han estudiado. En la región de Nueva Zelanda, los programas prioritarios destinados a llenar vacíos de información incluían censos, seguimiento y recopilación de datos demográficos relativos al petrel de barba blanca en las islas Auckland. El censo de la población de la isla Campbell y la clarificación de la incertidumbre taxonómica de la región de Nueva Zelanda eran objetivos secundarios. Este documento informativo brinda una actualización del progreso y presenta algunos hallazgos preliminares. Se estima que unas 186 000 (95 % I.C.: 131 000–248 000) parejas de petreles de barba blanca se reproducen en las islas Auckland y que unas 22 000 (15 000–29 000) parejas se reproducen en el grupo de islas Campbell. Al día de hoy, un programa de seguimiento ha retirado 38 dispositivos de geolocalización colocados en petreles de barba blanca en las islas Auckland. Nuestro estudio de las afinidades filogenéticas de los petreles de barba blanca respaldó el concepto de una población regional en Nueva Zelanda, considerando que las tres islas donde se reproducen estas aves forman parte de un mismo archipiélago. Se inició un estudio a fin de recopilar datos demográficos relativos al petrel de barba blanca en la isla Adams, islas Auckland. Desde entonces, se ha recopilado información a lo largo de dos años.

## **État des lieux de la recherche menée sur la population de Puffins à menton blanc de Nouvelle-Zélande**

### **RÉSUMÉ**

Le Puffin à menton blanc (*Procellaria aequinoctialis*) est l'une des espèces victimes des captures accessoires dans les pêcheries les plus souvent observées, bien que certaines populations ne soient que peu étudiées. Dans la région de la Nouvelle-Zélande, les programmes de priorité visant à combler les manques d'informations-clés incluaient la collecte, l'analyse et le suivi des données démographiques sur les Puffins à menton blanc des îles Auckland. L'étude de la population de Puffins à menton blanc de l'île Campbell et une étude visant à éclaircir certaines questions taxonomiques en Nouvelle-Zélande constituaient des objectifs secondaires. Ce document informatif fait le point sur les progrès effectués et fait part des conclusions préliminaires. On estime que 186 000 (95 % IC : 131 000-248 000) couples nicheurs de Puffin à menton blanc se reproduisent sur les îles Auckland, alors que l'île Campbell en abrite près de 22 000 (15 000-29 000). Un programme de surveillance dans les îles Auckland a récupéré à ce jour 38 géolocalisateurs sur des Puffins à menton blanc. Nos travaux sur les affinités phylogénétiques des Puffins à menton blanc ont soutenu l'idée d'une population régionale en Nouvelle-Zélande, les trois îles de reproduction ne formant qu'un groupe. Une étude a été amorcée en vue de collecter des données démographiques sur les Puffins à menton blanc sur l'île Adams (îles Auckland). Nous disposons maintenant de deux années de données.

## 1. CONTEXT

White-chinned Petrels *Procellaria aequinoctialis* breed on islands around the Southern Ocean and remain a major component of commercial fisheries bycatch throughout their range. In the Pacific sector, they breed on the subantarctic Auckland, Antipodes and Campbell island groups (Fig. 1), but very little is known about any aspect of these White-chinned Petrel populations.

Priority gaps identified for this species at previous ACAP working group meetings centred on the Auckland Island group. Key gaps included survey, tracking and collecting demographic data from White-chinned Petrels at the Auckland Islands. Census guidelines for the species were also identified as a priority. Regional prioritisation further highlighted the need for population data from Campbell Island (medium priority), and to revisit the taxonomic relationships among White-chinned Petrel populations in the New Zealand region (New Zealand petrels workshop, Wellington 2012).

A research programme to fill these key information gaps was developed in 2013 by the University of Otago, in collaboration with New Zealand's National Institute of Water and Atmospheric Research (NIWA) and the NZ Department of Conservation's Conservation Services Programme (DOC CSP).

Three studies have since been completed that address key gaps in population data, a study on the genetic relationships among New Zealand populations has been finalised, and census guidelines for *Procellaria* petrels have been developed. Tracking and demographic studies are in progress. This information paper summarises findings and provides updates on projects still underway.

## 2. RESEARCH PROGRESS

### 2.1. Population estimates

Key population gaps in the New Zealand region include survey of White-chinned Petrels at the Auckland and Campbell Island groups. The only prior assessment at the Auckland Islands was at Disappointment Island in 1988 (Taylor, 1988);

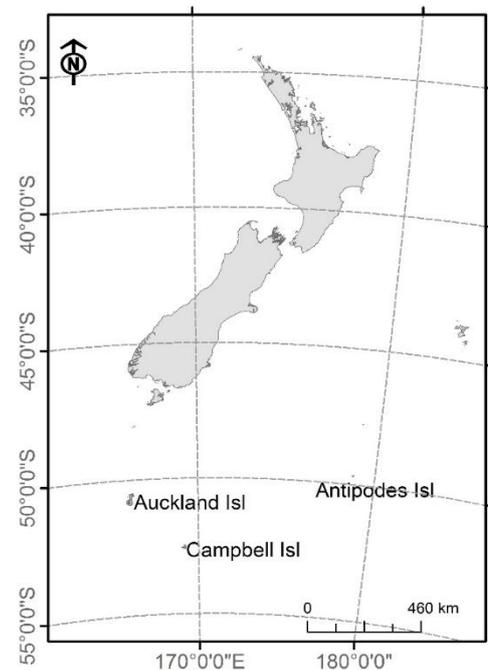


Figure 1. Subantarctic islands of New Zealand where White-chinned Petrels occur

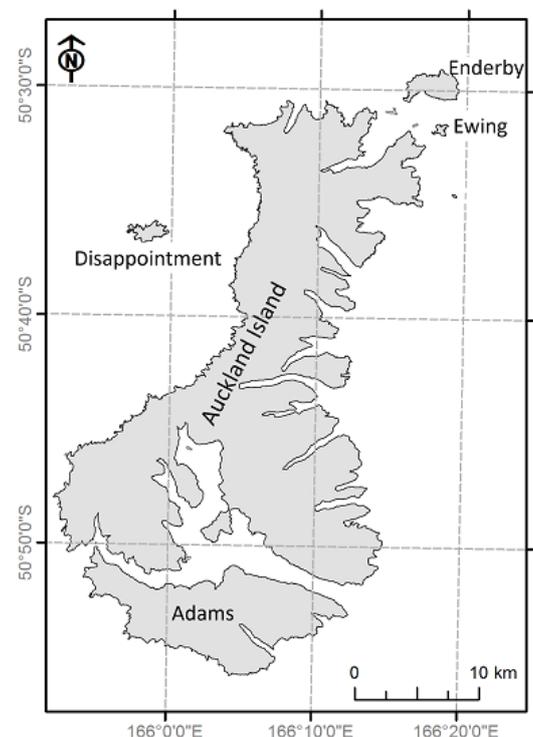


Figure 2. Auckland Island group, New Zealand

however, this was not a systematic estimate and there has been no other survey. Campbell Island has not been surveyed for White-chinned Petrels.

We developed census guidelines for *Procellaria* petrels following extensive literature review. While the focus was not exclusively on White-chinned Petrels, studies on the species formed a central part of the review and discussion. For more detail please see the full paper (Parker and Rexer-Huber, 2015), available at <http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2014-15/literature-review-on-estimating-population-size-of-burrowing-petrels/>.

### **2.1.1. Auckland Islands**

White-chinned Petrels are known to breed on three islands in the Auckland Islands group: Disappointment Island (330 ha), Adams Island (11,300 ha), and in very small numbers on Ewing Island (68 ha) and Enderby Island (816 ha) (Fig. 2). Of these, Disappointment is thought to be the main breeding site (Taylor, 1988). They may also breed on main Auckland Island (53,700 ha, Fig. 2), but the island has feral cats, mice and pigs, and very few White-chinned Petrel burrows have been found there (Fig. 2). However, we expect that areas inaccessible to pigs on main Auckland will support some petrels.

The size of the Disappointment Island population was estimated in January 2015. Burrow numbers were sampled using line-transect distance sampling at 80 stratified random sampling points across the island. Burrow contents were viewed by burrowscope to calculate burrow occupancy rates. We estimated burrow density using program Distance 6.2 (Thomas et al., 2010), then estimated burrow numbers by multiplying density by slope-corrected area, corrected for non-burrows. The number of breeding pairs was estimated as burrow numbers multiplied by burrow occupancy. White-chinned Petrel burrow density was estimated at 644 burrows/ha (95% CI: 503–823 burrows/ha) and mean burrow occupancy was  $0.73 \pm 0.03$ . We estimated 153,100 (119,700–195,700) breeding pairs of White-chinned Petrels on Disappointment Island during mid incubation. The relatively high occupancy and density of burrows suggest that Disappointment Island is a key breeding site for White-chinned Petrels. More detail on this work can be found in a recent report to ACAP (Rexer-Huber et al., 2015).

At Adams Island, burrow density and occupancy data were collected in December 2015. The difficult cliff-shelf terrain used by White-chinned Petrels on Adams Island limited sampling to density sampling plots. A stratified random design produced 10 strata with 327 sampling plots in total. Observer effects and detection probability were also tested. Burrow density was calculated from plots; otherwise, analyses were as outlined above for Disappointment Island. Mean burrow occupancy was  $0.64 \pm 0.04$ . We estimated 32,900 (11,700–52,600) breeding pairs on Adams Island at early incubation.

White-chinned Petrels breed on Ewing Island, in the north of the Auckland Island group (Fig. 2). The colony is very small so every burrow was counted in December 2015; this number was corrected by the overall 2015–16 season Auckland Island burrow occupancy estimate. We estimated 33 breeding pairs on Ewing Island.

Taken together, these estimates suggest that the Auckland Islands support a breeding population of 186,000 (131,000–248,000) White-chinned Petrels. Small numbers probably also occur on areas inaccessible to pigs on main Auckland Island despite feral cats and mice. It would be valuable to identify the extent of pig-free habitat, which is likely limited to the cliff shelves of the north-western coast.

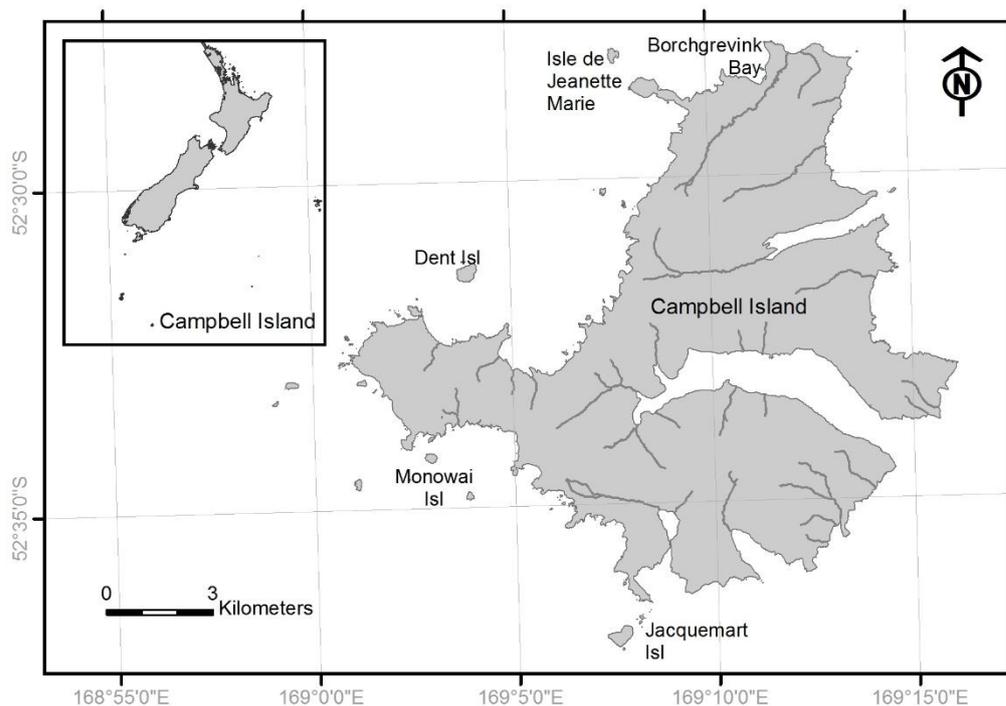


Figure 3. Overview of the Campbell Island group, New Zealand

### 2.1.2. Campbell Island

White-chinned Petrels breed on a number of the small islands surrounding main Campbell Island, particularly Monowai and Dent islands (Taylor, 2000) which have never had introduced predators. They were last recorded on the main island in the 1950s (Bailey and Sorenson, 1962) but that population was destroyed by Norway rats (Taylor, 1986). Rats were eradicated in 2001.

We visited Monowai (8 ha) and Dent Islands (24 ha) (Fig. 3) in January 2015 to sample burrow numbers with randomised sampling plots over the whole of each island. Burrow density was extrapolated to the slope-corrected area of the islands. Occupancy data could not be collected so occupancy estimates from the same breeding season at Disappointment Island, Auckland Islands, were used to estimate the number of breeding pairs for each island.

We searched areas of likely White-chinned Petrel habitat on main Campbell Island (12,800 ha) in August 2014 and January 2015. Small numbers were found so every burrow was counted. We also documented White-chinned Petrel burrows on Isle de Jeanette Marie, Cossack Rock, and an unnamed islet in Borchgrevink Bay (Fig. 3) using binoculars and photographs from a boat within 80 m since we were not able to land there. White-chinned Petrels also breed on Jacquemart Island (27 ha) (Taylor, 2000) (Fig. 3). The numbers of burrows at these islets were estimated using the average density from Monowai and Dent Islands and occupancy from Disappointment as above.

An estimated 8,100 (95% CI: 5,800–10,300) and 8,800 (5,300–12,300) White-chinned Petrel pairs breed on Monowai and Dent islands, respectively. In addition, 44 were found on main Campbell Island, an estimated 600 (450–750) breed on Isle de Jeanette Marie, 240 (200–

300) on Cossack Rock, 50 (40–70) on the Borchgrevink Bay islet, and an estimated 4,100 (3,000–5,100) pairs breed on Jacquemart Island.

Taken together, we estimated that the Campbell Island group supports 22,000 (15,000–29,000) breeding pairs of White-chinned Petrels. This estimate is of lower reliability than that for the Auckland Islands for two reasons: the largest island supporting White-chinned Petrels, Jacquemart Island, could not be sampled; and density estimates were corrected with Auckland Island occupancy figures since local occupancy data were not available. Given that the population on main Campbell appears to be in the establishment phase, there is considerable scope for growth in the overall Campbell Island White-chinned Petrel population.

### **2.1.3. NZ regional summary**

Our estimates of 186,000 and 21,900 breeding pairs of White-chinned Petrels on the Auckland and Campbell island groups, respectively, are considerably higher than previously thought. Taylor (2000) proposed that the Auckland Islands support around 100,000 pairs and Campbell Island 10,000 pairs, but noted that these should largely be considered 'intuitive guesses'. On Antipodes Island, initial quantitative estimates appeared lower than previously thought, suggesting a breeding population between 59,000 and 91,000 pairs (Sommer et al., 2010; Sommer et al., 2011) rather than 100,000 pairs (Taylor, 2000).

## **2.2. Tracking programme**

To look at the at-sea distribution of White-chinned Petrels from the Auckland Islands, we deployed 62 geolocator trackers (GLS; BioTrack and Migrate Technology) over the 2013–14 and 2014–15 breeding seasons. Of these, 38 have been retrieved yielding 31 usable datasets to date. There has been no significant difference in resighting rates between GLS and non-GLS individuals (48 control birds banded without GLS). We are comparing habitat use between populations tracked in the NZ region (Auckland and Antipodes islands) and more broadly (South Atlantic and Indian Ocean islands; data courtesy P. Catry, A. Stanworth, R. Phillips, P. Ryan). Analyses are ongoing.

## **2.3. Population genetics**

Two independent approaches have suggested that White-chinned Petrels comprise two taxa (at sub-species rank), rather than one global taxon (Fraser, 2005; Techow et al., 2009). However, the geographic limits of the two taxa differ between morphometric (Fraser, 2005) and phylogenetic approaches (Techow, 2007). The ambiguity centres in the NZ region and can be resolved by asking specifically whether White-chinned Petrels from Antipodes Island are distinct from their Auckland Islands counterparts.

We looked for island-specific genetic variation in the mitochondrial cytochrome *b* and nuclear  $\beta$ -fibrinogen genes, to determine whether any populations in the New Zealand region are distinct.

White-chinned Petrels from the Antipodes and Auckland Islands grouped together, supporting the idea of a New Zealand regional taxon genetically distinct to the remainder of the global population (Techow et al., 2009). Samples from Campbell Island birds corroborated the pattern of a NZ regional taxon noted using Antipodes and Auckland Island birds.

For more detail please see the full paper (Rexer-Huber and Robertson, 2015), shortly available at <http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/>.

#### **2.4. Demographic information**

A project has been initiated to collect demographic data from White-chinned Petrels at the Auckland Islands. A mark-recapture study was established in December 2013 in a small study colony on Adams Island, Auckland Islands. Resight data have been collected annually since then. Monitoring should continue for the project to yield useful demographic data.

### **3. ACKNOWLEDGEMENTS**

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