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Preliminary exploration of the cultural and ecological history of seabird colonies along the north-eastern Otago coast

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Tēnei te mihi ki te hau kāinga, ki a Kāti Huirapa, ngā kaitiaki i te whenua, ngā kaipupuri o te mana. He mihi kau ake ki a koutou, nā koutou i tahu te ahikā ki tēnei takiwā, i nga wā o nehe, ā, e kā tonu nei tae noa ki tēnei rangi.

Heoi, ko te tūmanako kei roto i tēnei kete he kupu mā koutou hei kīnaki atu ki te mātauranga ā-iwi nei e mātau kē ana koutou mō ā koutou manu inu tai.

Contents

Summary

Project

This report supports the development of the Return of the Tītī seabird habitat restoration initiative on the north-eastern Otago coastline. Return of the Tītī is part of a larger-scale community-led restoration project, Beyond Orokonui, which has developed in partnership with Kāti Huirapa, a hapū of Ngāi Tahu, who have traditional authority over the north-eastern Otago coast. Our research aims to help build a picture of the cultural and ecological history of seabird colonies along this part of the Otago coast since the arrival of Māori. This information will be used to support community engagement in the development and implementation of the Return of the Tītī initiative.

Methods

The study area was the Otago coastal landscape from Waikouaiti River mouth (170°39'40.39", –45°38' 20.58") in the north to Aramoana (170°43'2.79", –45°47'12.52") in the south. We first identified nine focal species that are known, or thought, to breed in the area (sooty shearwater, little penguin, yellow-eyed penguin, spotted shag, Stewart Island shag, black shag, southern black-backed gull, red-billed gull and white-fronted tern). We then conducted literature searches using variants of their scientific, Māori and English names, seeking data that might inform our understanding of ecological and cultural history in relation to seabirds within the study area.

The review covered (a) archaeozoological records (1250–1800); (b) traditional evidence collated by Ngāi Tahu for the Treaty of Waitangi Claim (Wai 27) on the cultural significance of seabirds (1790–1990); (c) historical local newspaper articles documenting early colonial interests in seabirds (1861–1930); (d) contemporary newsletters published by the Otago Ornithological Society (1963–2015) and by Ngāi Tahu (2008–2015); and (e) contemporary records of local seabird colony locations and status (1967–2016). These sources were supplemented by information provided through discussions with the local community representatives.

Results

Cultural significance of seabirds to local iwi

Seabirds such as shags and sooty shearwaters appear frequently in Māori oral tradition, including waiata (song) and whakataukī (ancestral sayings) (e.g. Grove & Mead 2001). Six of the nine focal seabird species are listed as taonga (or treasured) species by the South Island iwi Ngāi Tahu:

- sooty shearwater (tītī)
- little penguin (kororā)

- yellow-eyed penguin (kororā)
- black shag (kōau)
- southern black-backed gull (karoro)
- white-fronted tern (tara).

Archaeological finds from eight midden sites in or near the study area show that spotted shag (kōau), little penguin and yellow-eyed penguin (hoiho) bones occur in the majority of these sites. Sooty shearwater, white-fronted tern, southern black-backed gull and red-billed gull (tarāpuka[1]/tarāpunga/akiaki) bones were seldom identified. Nonetheless, the latter four species were among the most frequently mentioned species in the Ngāi Tahu Treaty Claim papers, where they are described as important kai or food resources.

Ngāi Tahu Claim papers state that eggs and adult birds were collected and often cooked as part of whānau-wide annual expedition or events. Tītī harvesting continues to be a central and vibrant part of southern Ngāi Tahu activity and identity, and tītī is the most frequently mentioned bird species – marine or otherwise – in contemporary Ngāi Tahu newsletters. 'Tītī' is also one of the few Māori bird names used by early European settlers, as well as more recent local ornithological newsletters and Ngāi Tahu newsletters, likely reflecting the strong cultural significance of this species to southern Māori.

Early colonial interests in seabirds

In our search of local newspaper articles from 1861 to 1930, penguins and shearwaters were the most frequently mentioned groups in the subset of relevant articles that specifically discussed the seabirds of interest. The next most frequently mentioned were shags, gulls and terns (Table 2). Interest in the seabirds varied. Some articles focused on the natural history of the birds (e.g. the movement and behaviour of vast flocks of shearwaters; the grace and beauty of the terns), others on resource use (e.g. harvesting penguins for sport, skin and oil) or human interactions with the birds, either attempting to make them pets (e.g. penguins and gulls) or identifying them as pests (e.g. gulls and shags).

Contemporary interests of local ornithologists

Penguins (in particular yellow-eyed ones) were the most frequently mentioned of the focal seabird groups through the 1990s and 2000s in ornithological newsletters, whereas gulls were the most frequently mentioned group before and after these dates. Southern black-backed gulls occurred slightly more often in the newsletters than red-billed gulls. Generally, shags (particularly black shags) were mentioned less frequently than the other groups.

[1] Tarāpuka/tarāpunga- in the southern Māori dialect a 'k' is used in the place of an 'ng'. We use the 'ng' here with the exception tarāpuka and where a 'k' was specifically used in a source document.

Contemporary seabird colony records

The black shag is the only one of the focal seabird species not currently breeding in the study area. For the other focal species, 33 colonies across 14 locations were identified, with colony sizes varying from one breeding pair for yellow-eyed penguins to 1,000 pairs for white-fronted terns. Taking into account all the available records, three locations emerged as 'hotspots': Huriawa Historic Reserve, Doctors Point and Aramoana. Southern black-backed gulls, red-billed gulls and white-fronted terns were recorded at all three locations. In contrast, spotted shags, little penguins and yellow-eyed penguins were each only found at one location.

If we specifically consider information derived from formal surveys done within the last 6 years, colony records are only available for three species across five locations: red-billed gulls at Karitāne, Doctors Point and Heyward Point Islet), yellow-eyed penguins at Kaikai Beach and Aramoana, and white-fronted terns at Doctors Point and Aramoana. A shortage of studies in the study area coastline means it is difficult to identify areas that support, or have previously supported, seabird colonies.

Recommendations

- This summary of the cultural and ecological history of seabird colonies along the north-eastern Otago coastal provides a starting point for discussion with the wider community about the development of the Return of the Tītī project. Further discussions with the community about why they value local seabird colonies will add depth and richness to this summary. We recommend this as the next step in the project.
- The establishment of systematic and regular surveys to monitor seabird colonies along the north-eastern Otago coastline would support the restoration goals of the Return of the Tītī project. Currently, few species and colonies are systematically surveyed on a regular basis, and there is no survey information available for large areas of the coastline.
- Further research into understanding the historical values of the seabird colonies should be undertaken.

1 Introduction

This report supports the development of the Return of the Tītī seabird habitat restoration initiative on the north-eastern Otago coastline. Tītī (sooty shearwaters) are immensely important to Ngāi Tahu identity as the last seabird harvest maintained without interruption by iwi (Hunter et al. 2000). The Kāti Huirapa hapū of Ngāi Tahu have been present in this area for more than 300 years and hold mana whenua (authority over the land). The Return of the Tītī project is part of the 55,000 ha Beyond Orokonui community-led restoration project, in which Kāti Huirapa is a partner.

The area of interest for our study extends from the Waikouaiti River mouth (170°39'40.39", –45°38'20.58") in the north to Aramoana (170°43'2.79", –45°47'12.52") in the south (Figure 1). It includes the Pūrākaunui and Blueskin Bay inlets, and several coastal headlands, including Heyward Point, Potato Point, Māpoutahi and Huriawa.

When Māori first arrived in New Zealand, there were approximately 29 seabird species present in the South Island (Holdaway et al. 2001). Currently 20 seabird species are found across Otago, nine of which have, or could potentially have (i.e. there is at least one record of the species, with or without evidence of breeding), multiple colonies along the stretch of coastline between the mouth of the Waikouaiti River and Aramoana (Table 1). These nine species (due to their current/potential presence in the study area) are the focus of our study. We focus on species that breed or potentially breed in the area, as the wider goal of the Return of the Tītī is habitat restoration of coastal areas to facilitate protection of these species.

Our research aims to highlight the cultural and ecological value of seabird species, specifically seabird colonies in the north-eastern Otago region from Māori arrival to the present day. Values are shared beliefs about preferred modes of conduct and desirable outcomes in terms of practice and world view (Peng et al. 1997). We envision the information gathered here as helping to build community awareness and in the longer term build engagement in the development and implementation of the Return of the Tītī project. For example, this report can provide background information for the preparation of educational materials, and for discussions with community members to set specific monitoring and management goals for the initiative, in addition to highlighting areas for further research and development.

Table 1 Scientific, Māori and English names of seabird species that are currently breeding, or likely to be breeding, along the north-eastern Otago coastline (as given in Hand 2014)

Species group	Scientific name	Māori name(s)	English name(s)
Shearwaters	*Puffinus griseus*	Tītī	Sooty shearwater Muttonbird
Penguins	*Eudyptula minor*	Kororā	Little penguin Southern little blue penguin
	Megadyptes antipodes	Hoiho	Yellow-eyed penguin*
Shags	*Leucocarbo chalconotus*	Kōau	Stewart Island shag
	Phalacrocorax carbo	Kōau	Black shag
	Stictocarbo punctatus	Kōau	Spotted shag
Gulls	*Larus dominicanus*	Karoro	Southern black-backed gull* Kelp gull
	Larus novaehollandiae	Tarāpuka Tarāpunga Akiaki	Red-billed gull*
Terns	*Sterna striata*	Tara	White-fronted tern*

* Literature searches included these names with and without hyphens, and without macrons, as macrons are rarely used in early material but we did not search using double vowels.

Figure 1 Overview map of the Otago coastal area. The inset shows the location of the study areas relative to the South Island (red dot). Key locations for seabird populations are marked. Huriawa, Māpoutahi, Pūrākaunui and Long Beach are all archaeological sites with dated evidence from middens, as are Ōmimi and Ross's Rocks (not shown). Karitāne township is a settlement on this coastline, with a strong Kāti Huirapa presence.

2 Methods

Information on the historical, cultural and ecological value of seabirds along the north-eastern Otago coastline was primarily derived from the following textual sources:

- archaeozoological records (1250–1800)
- traditional evidence collated by the local iwi, Ngāi Tahu, for the Ngāi Tahu Treaty Claim (1790–1990)
- historical English-language newspapers from the Otago region (1861–1930)
- recent local Ornithological Society (Birds NZ) newsletters (1964–2015) and Ngāi Tahu newsletters (2008–2015)
- recent seabird colony records (1967–2016) from reports and published literature.

The searches of these various sources for references to the nine focal species were based on the birds' scientific, Māori and English names, as listed in Table 1. We also searched using general names for species that represent species groups (e.g. 'penguin', 'petrel' and 'shag' or 'kawau'). These terms reflect the terminology used by Māori and Pākehā and are based on the known taxonomic groups for focal species.

2.1 Archaeozoological records (1250–1800)

Evidence of seabird use by Māori in our study area was primarily derived from Smith and James-Lee (2010), who collated and reviewed archaeozoological evidence from coastal Otago of marine animal resource use since first human occupation. To do so, they examined the presence/absence of marine taxa in archaeozoological assemblages, as well as relative abundance of taxa where suitable data were available using the published archaeological literature, as well as student theses and reports. They focused on sites with reliable chronologies (based on radiocarbon dating) that enabled information on seabird use to be placed securely in time.

Smith and James-Lee (2010) identified six chronologically reliable sites in or adjacent to our study area, from Huriawa peninsula in the north to Long Beach in the south (Figure 1; Table 2). Bird assemblages for these sites were compiled into three time periods:

- Early (c. 1250–1450 AD, soon after Māori arrival in New Zealand)
- Middle (1450–1650 AD, about the middle of Māori occupation)
- Late (1650–1800 AD, before European whaling and sealing).

Assemblages overlapping these time periods were classified as either Early/Middle or Middle/Late. Information on the frequency of specimens occurring in the middens was recorded as the minimum number of individuals (i.e. the smallest number of individual animals necessary to account for all the remains of a particular species in a site). This method provides an indication of the species that made up a significant proportion of the animals harvested.

Table 2 Archaeozoological data were available from eight archaeological layers at six locations within or close to the study area*

	Time period			
	(c.1250–1450 AD) Soon after Māori arrival	(1450–1650 AD)		(1650–1800 AD) Before the European whaling
Midden site	**Early (*n* = 1)**	**Early/Middle (*n* = 3)**	**Middle/Late (*n* = 2)**	**Late (*n* = 2)**
Huriawa				■
Ross's Rocks	■		■	
Ōmimi		■		
Māpoutahi				■
Pūrākaunui		■		
Long Beach		■	■	

* For Ross's Rocks and Long Beach, two separate layers with assemblages were excavated at each location. See Table 2 in Smith & James-Lee 2010 for further information.

2.2 Evidence and historical records: Ngāi Tahu Waitangi claim (1790–1990)

To identify which seabird species hold cultural significance for Ngāi Tahu, we reviewed the Ngāi Tahu Māori Trust Board papers relating to the Ngāi Tahu claim brought before the Waitangi Tribunal (Wai 27).[2] These documents record submissions and evidence given on behalf of the claimants, Crown and other parties for the claim. We assume that species mentioned more often are more likely to have high cultural value to Ngāi Tahu.

We first used the key words 'mahinga kai' to search paper titles in the Ngāi Tahu Waitangi claim submission. We then searched the papers containing the key word phrase to identify any references to the focal bird species, or species group (i.e. 'shag', 'petrel' and 'penguin'). We documented all references to these birds. Focal species listed as Ngāi Tahu taonga species in the Ngāi Tahu Claims Settlement Act (1998) were also recorded.

2.3 Historical records: Local newspaper articles (1861–1930)

To identify which seabird species held cultural significance for early colonials we examined material that referred to seabirds in the regional English-language newspaper, the *Otago Daily Times* (1861–1930) by searching the online resource Papers Past[3]. We used the Māori,

[2] Ngāi Tahu Maori Trust Board : Papers relating to Kai Tahu claim brought before the Waitangi Tribunal (Wai-27) (1790-1990). http://hakena.otago.ac.nz/scripts/mwimain.dll/144/DESCRIPTION/WEB_DESC_DET_REP/SISN6264?sessionsearch

[3] http://paperspast.natlib.govt.nz/cgi-bin/paperspast

English[4] and scientific version of each species name to search (Table 1), using "All content types" and "All your words" specifications. These searches included both the singular and plural versions of the English species group names. We then refined these searches to identify relevant articles (by skim reading titles and articles to exclude indirect references to the species, such as place or boat names that did not provide information about the species of interest *per se*). We documented all text that included information relevant to people's interests in seabirds and recorded the number of articles that mentioned each focal species over each 5-year period. As above, we assume that species mentioned more often have high cultural value.

2.4 Contemporary records: Local ornithological club newsletters (1964–2015)

To identify which seabird species held cultural significance for contemporary society we searched the local Otago branch of Birds NZ newsletters (the Ornithological Society of New Zealand; OSNZ) from 1964 to 2015 (Figure 2) for references to the nine focal species, using all known bird name variants. We also recorded whether birds were referred to by their Māori or English names, and were thus able to calculate the percentage of mentions of each species using their Māori or English names. We assume that species mentioned more often have high culture value and infer from the language of the name (i.e. Māori or English) the relative influence of each culture.

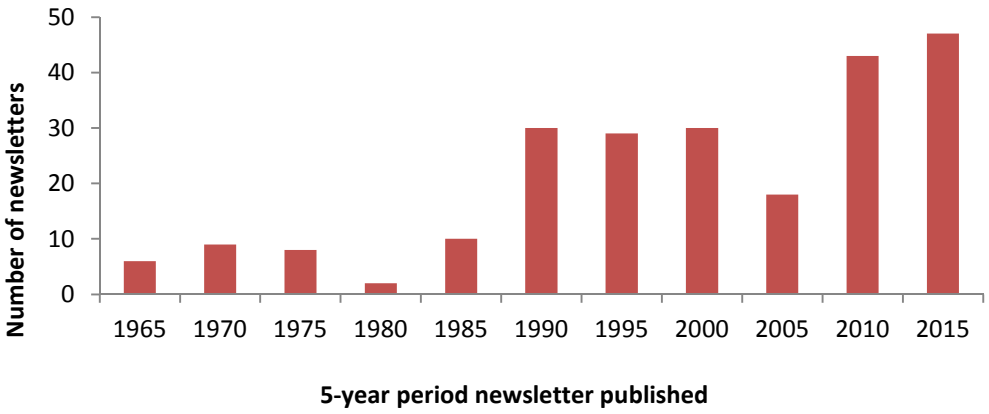

Figure 2 Number of newsletters published by the Otago branch of the Ornithological Society within each 5-year period (*N* = 232 in total).

[4] Where appropriate, we searched both with and without the hyphen in the species name (e.g. 'yellow-eyed penguin' and 'yellow eyed penguin').

2.5 Contemporary records: Ngāi Tahu newsletters (Te Pānui Rūnaka, 2008–2015)

To identify which seabird species hold cultural significance for contemporary Ngāi Tahu we searched the *Te Pānui Rūnaka* newsletters. *Te Pānui Rūnaka* newsletters from Ngāi Tahu have been published on an approximately monthly basis (http://www.tepanui.co.nz/) from 2008 onwards (Figure 3). The newsletters consist of news, views and reports of activities happening that involve Ngāi Tahu people, sent in by the hapū and taura here (network) groups of Ngāi Tahu. We searched the 2008–2015 newsletters for any mention of the nine focal species using all known bird name variants. We assume that species mentioned more often have high cultural value. As with the OSNZ newsletters, we recorded whether birds were referred to by their Māori names or English name, and calculated what proportion of mentions used the Māori or English name for each species.

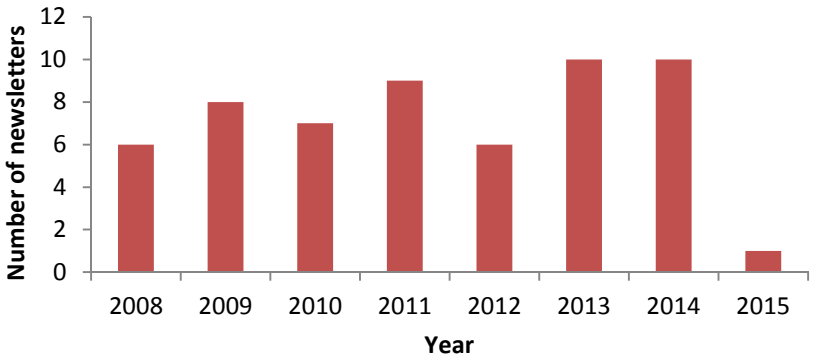

Figure 3 Number of *Te Pānui Rūnaka* newsletters published by Ngāi Tahu per year (*N* = 57 in total).

2.6 Contemporary records: Seabird colony records (1967–2016)

Information on the conservation status of the nine focal species was derived from Robertson et al. 2013. We conducted a search of the scientific literature, looking for records of bird survey results in the study region to identify which seabird species had/have colonies in the study region. While there are numerous published papers of relevance, a recent report by Hand (2014) incorporated both published and grey literature as well as local expert knowledge to summarise the recent past and current state of seabird colonies for the Otago area as a whole. The Hand report and the data within it were used to create the list of seabird species, along with colony size and locations in the study region.

3 Results

3.1 Cultural significance of seabirds to local iwi

3.1.1 Archaeozoological records from middens

Of the nine focal species, the spotted shag was the only one consistently detected in all eight excavated archaeological middens within or near the study area and, therefore, in all time periods. Little and yellow-eyed penguins were also relatively widespread in middens, being recorded in 60% or more of the middens (Table 3; Appendix 1). In contrast, southern black-blacked gulls and tītī were recorded in relatively few middens, with the southern black-backed gull occurring only in the later periods and tītī limited to one location, Long Beach. Three focal species (red-billed gull, white-fronted tern and black shag) did not occur in any of the eight middens surveyed within or close to our study area (Smith & James-Lee 2010).

Other Early midden records from the Waihemo village (inland and north of our study area) show that tītī, little penguins and yellow-eyed penguins were eaten by Māori, but that the latter two species were rarely identified in middens from later periods (Prebble & Mules 2004).

Species group data based on the minimum number of individuals (MNI) identified showed a high number of petrels and shags in Middle/Late period middens (Smith & James-Lee 2010) (Figure 4). Overall numbers of seabirds identified in middens also increased during this period. Both petrel and shag MNI dropped sharply in the Late period middens; the proportion of seabirds also dropped as a proportion of all identified birds in Late period middens.

Table 3 Number of middens for each time period in which the species was detected (where *n* is the number of middens sampled). Dark and light shading indicate the species was either present in all middens sampled within that time period or just a subset, respectively. Data source: Smith & James-Lee 2010

Species	Soon after Māori arrival	Middle of Māori occupation	Before European whaling		Percentage of sampled middens
	Early (*n* = 1)	Early/Middle (*n* = 3)	Middle/Late (*n* = 2)	Late (*n* = 2)	
Spotted shag	1	3	2	2	100%
Little penguin	1	3	2		75%
Yellow-eyed penguin		1	2	2	63%
Stewart Island shag		1	1	2	50%
Tītī		1	1		25%
Southern black-backed gull			1	2	38%

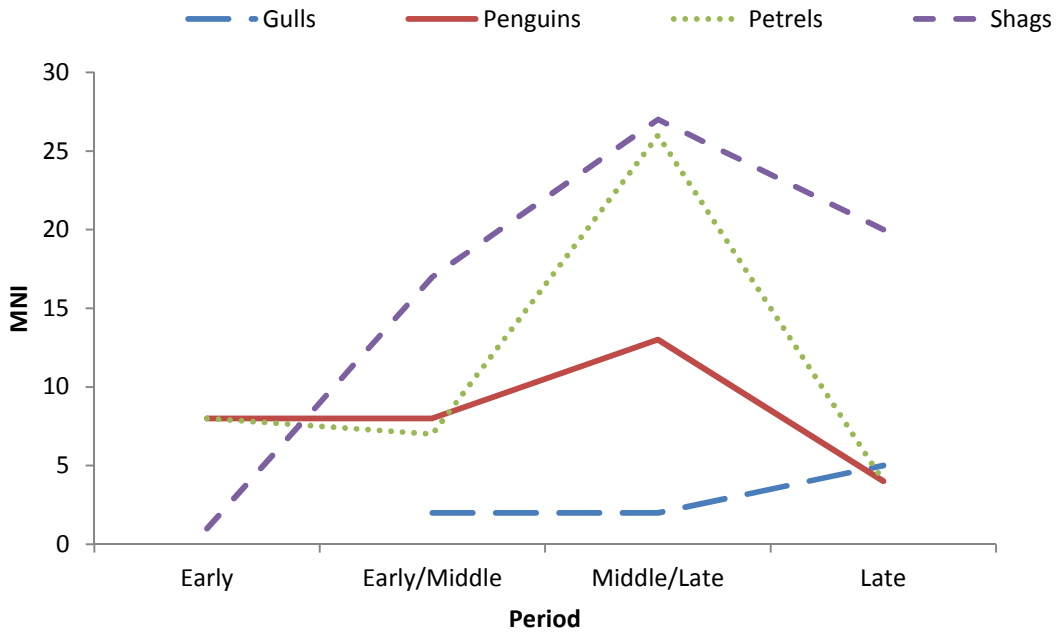

Figure 4 Minimum number of individuals (MNI) for different species groups identified at midden sites on the north-eastern Otago coastline within or adjacent to the study area. 'Gull' includes black-billed and southern black-backed gulls. 'Penguin' includes little penguin, NZ crested penguin and yellow-eyed penguin. 'Petrel' includes common diving petrel, fluttering shearwater, sooty shearwater, white-faced storm petrel, fairy prion, broad-billed prion and little shearwater. 'Shag' includes Stewart Island shag, spotted shag, pied shag and little shag. All species groups include some individuals that were unable to be identified to species level. See Table 2 for allocation of midden sites to time periods.

3.1.2 Evidence from Ngāi Tahu settlement claims

The key words 'mahinga kai' were found in 28 titles of the c. 600 Ngāi Tahu Māori Trust Board papers, and 12 of these titles cited the focal seabird species (or species groups). Tītī were mentioned in all 12 documents, but other species were identified in only a few records (Table 4). Six of the nine focal species are listed as Ngāi Tahu taonga species (Table 4; Ngāi Tahu Claims Settlement Act 1998).

Tītī

Tītī is the common name used by many Māori for the shearwaters, but most often refers to the sooty shearwater or muttonbird. The term 'tītī' may also be used for the process of harvesting seabirds, or muttonbirding (Anderson 1997). Historically, tītī were a substantial part of the annual food supply and economy, and were traded with northern iwi (Prebble & Mules 2004). The tītī harvest remains a major part of the southern Māori economy and an important part of Ngāi Tahu society. Tītī harvesting and population dynamics in southern New Zealand have been the subject of scientific study (e.g. Anderson 1997; Hamilton et al. 1997), in part because tītī harvesting is currently the only large-scale customary bird harvest by Māori in New Zealand.

Within the Ngāi Tahu Waitangi Claim papers there are multiple references to travelling to and working on the Tītī Islands in the south of the South Island. However, tītī colonies previously existed along the Canterbury and Otago coast, as well as at other locations. For example, a tītī colony near Akaroa on O te Pātūtū in Canterbury was harvested, but in decline, in the mid-19th century [H6]. The waiata (Box 1) raises Māori concerns about tītī decline, asking the patupaiarehe (fairies/spirits) to leave the tītī alone.

Box 1 Waiata

Tītī whakatai aro rua	*O Tītī bird of the sea*
E nōki rē koe	*Bird of the hilltop cave*
Ki o te Pātūtū	*Come back to O te pātūtū*
Ki te pa whakatangi	*To the lofty dwelling*
Ki te kōauau	*Where the sweet sounds are heard*
Ki tuwere ai	*The sound of the fairy flute*
E raro i au e!!	*The music of the mountains*
	That thrilled me through and through

In the 20th century, birds were still harvested in Otago from Taieri Island, Otago Heads and Moeraki (Anderson 1997). These species were likely to have nested on the coastal cliffs and hilltops along the Waikouaiti coast prior to the introduction of mammalian predators (e.g. rats) (Prebble & Mules 2004). There are also reports that there was suitable habitat for tītī on an area on the Otago Peninsula, and on islands nearby and to the south where there were bird colonies that were a local source of kai or food [H12].

Table 4 Summary of Māori use of seabirds, based on (1) midden records *(n* = 4 sampled per time period); (2) documents submitted as evidence to the Ngāi Tahu Claims Settlement Act 1998 that included the key words 'mahinga kai' (*n* = 28); and (3) other relevant sources. For number of documents: the numbers in brackets indicates references to the species group (shags, penguins or gulls) rather than specific species by name

Species names			Midden records		Treaty claim evidence		Resources used
Māori	**English**	**Scientific**	**Early or Early/Middle**	**Middle/Late or Late**	**No. of documents**	**Taonga species[c]**	
Tītī	Sooty shearwater; muttonbird	*Puffinus griseus*	25%	25%	(43%)	Yes	Young caught by hand (Prebble & Mules 2004)?
Kororā	Little penguin	*Eudyptula novaehollandiae*	100%	50%	(4%)	Yes	Likely to have been eaten (Prebble & Mules 2004)??
Hoiho	Yellow-eyed penguin	*Megadyptes antipodes*	25%	100%	(4%)	Yes	Likely to have been eaten (Prebble & Mules 2004)?
Kōau	Stewart Island shag	*Leucocarbo chalconotus*	25%	75%	(4%)	No	Adults caught by hand or snared in their roost (Prebble & Mules 2004)
Kōau	Black shag	*Phalacrocorax carbo*	0%	0%	(4%)	Yes	Adults caught by hand or snared in their roost (Prebble and Mules 2004)
Kōau	Spotted shag	*Stictocarbo punctatus*	100%	100%	(4%)	No	Adults caught by hand or snared in their roost (Prebble & Mules 2004)
Karoro	Southern black-backed gull; Kelp gull	*Larus dominicanus*	0%	75%	14%	Yes	100s of eggs collected from cliff areas; adults snared on beach using bait/māunu (Prebble & Mules 2004) [H12], [H8]
Tarāpuka; Akiaki	Red-billed gull	*Larus novaehollandiae*	0%	0%	(14%)	No	Adults snared on beach using bait/māunu. (Prebble & Mules 2004)
Tara	White-fronted tern	*Sterna striata*	0%	0%	(28%)	Yes	100s collected from beaches and rocky cliffs; young also caught (Prebble & Mules 2004) [H10], [H8]

Other seabirds

Oral traditions recount how adult red-billed gulls (tārapuka), southern black-backed gulls (karoro) and shags (kōau) were caught by hand or snared using bait (māunu) on the beach or at their roosting sites (Prebble & Mules 2004). Southern black-backed gulls and tern eggs also featured in the diet of early Māori in Otago. In the past, egg collection expeditions were a whānau-wide event, with eggs collected by the hundreds and cooked on the beach in umu (ovens). Within the study area, eggs were collected from nesting gulls around cliff areas and from Māpoutahi Pā to the Long Beach area:

> There were many karoro nesting areas around the cliff faces facing the ocean. It was a favourite pastime to gather the eggs of the karoro to supplement the diet. This was a dangerous task as it meant scaling the cliff faces in search of nests. In order to get fresh eggs a regular run of nests would be harvested every other day so the eggs were no more than two days old. This activity took place from Pukekura at various points to Pikiwhara (Sandymount) up until recent times. [H12]

Further to the north, in the area around Waitaki River mouth, 'sea martins' (terns) were also caught and their eggs were collected and eaten [H10]. Penguins, however, only briefly appear in the Ngāi Tahu Waitangi Claim documents relating to Rakiura [H13].

3.1.3 Contemporary Māori interests in seabirds

Shearwaters or tītī, including the sooty shearwater, are the most frequently mentioned seabird group in the contemporary Ngāi Tahu newsletters (Figure 6). Terns do not appear, and other species groups appear rarely. Many of these references are in relation to harvesting for food.

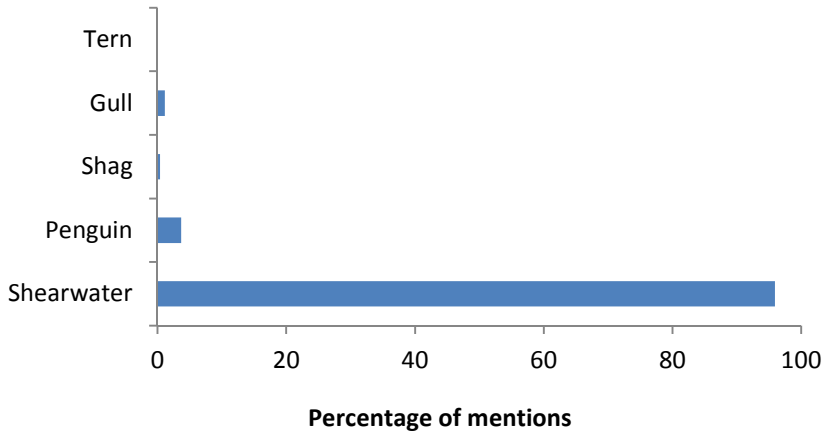

Figure 5 Percentage of mentions for each focal species group in the Ngāi Tahu newsletter *Te Pānui Rūnaka* (2008–2015); total number of mentions = 291. All names recorded for each species group, in English and Māori, are summarised together. 'Shearwater', for example, also encompasses references to 'tītī' and 'muttonbird'.

3.1.4 Historical and contemporary use of Māori bird names

During the early colonial period the use of Māori names in the *Otago Daily Times* newspaper articles varied among the species groups (Figure 6). In articles relevant to the species (or species group), Māori names were used, most frequently for shearwaters but rarely for penguins.

In contemporary newsletters published by the Otago Ornithological Society, Māori bird names were primarily limited to shearwaters and very rarely used for penguins and red-billed gulls (Figure 6). In the contemporary Ngāi Tahu newsletters, Māori names were most often used for shearwaters but were also used for gulls and penguins.

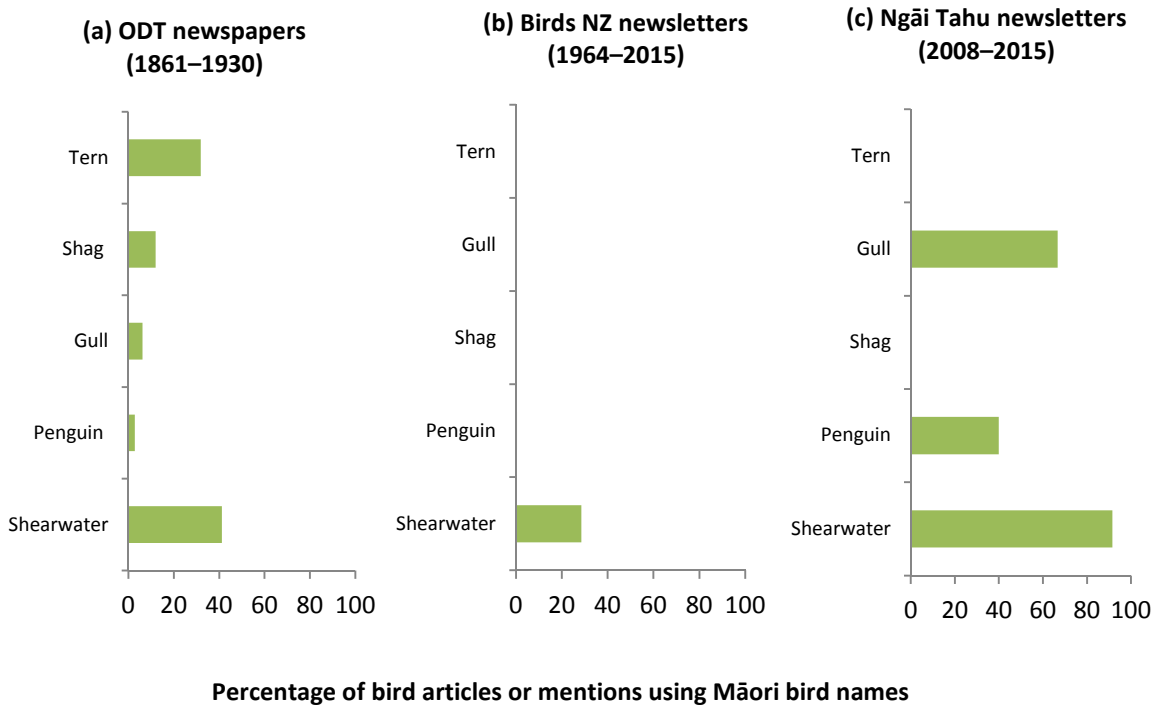

Figure 6 Variation in use of Māori bird names among publications: (a) percentage of historical newspaper articles (*Otago Daily Times* 1861–1930) for each species group that used Māori names (based on 102 relevant species-specific articles); (b) percentage of species group mentions that used Māori names in contemporary local ornithological society newsletters (Birds NZ 1964–2015); (c) percentage of species mentions within each group using Māori names in Ngāi Tahu newsletters (2008–2015).

3.2 Early colonial interests in seabirds

To better understand some of the early settlers' interests in the seabirds, we explored which species or species groups were most frequently mentioned in local newspapers. We then show the context in which they were discussed. Here we quote stories in full to provide a flavour of the historical thought. Our aim is to link readers directly with past observers and provide them with the raw materials they can build on. This also allows for more in-depth contextual analyses to be undertaken if desired. Despite their length, they provide valuable insights into historical views of these bird species. However, we also summarise these preoccupations to provide an overall picture.

3.2.1 Species by groups, names and relevance

A search of local newspaper articles published in the *Otago Daily Times* (1861–1930) revealed that at least one of the search terms (relating to the five species groups) appeared in 37,159 articles published during the period. Shags were mentioned in 60% of these articles, three times more often than terns and penguins and six times more than gulls (Figure 7a). Tītī or shearwaters were mentioned in less than 1% of articles. Although the proportion of all references that concerned shags declined over the study period, this species group was mentioned more frequently than all others (Figure 8).

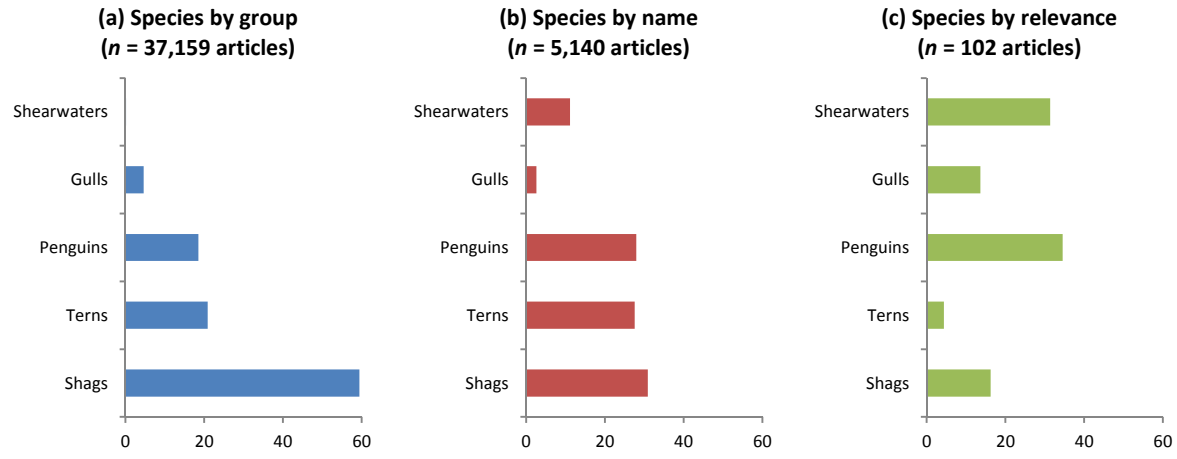

Figure 7: Percentage of the total number of local newspaper articles (*Otago Daily Times*: 1861–1930) including at least one mention of: (a) the species group mentioned by name (singular or plural); (b) the species mentioned by either its Māori or English name; and (c) articles with relevant information about the species by either its Māori or English name.

Altogether, 5,140 articles included one or more of the nine focal species. Within this subset of articles, specific shag, penguin and tern species were mentioned at a similar rate (c. 30% of articles each; Figure 7(b). Tītī were more prevalent (occurring in c. 11% of articles) in the species-specific searches than in the species group ones, but gulls slightly less so (Figure 7(a) & Figure 7(b)).

Closer examination of this subset of references to seabirds showed they were mainly indirect references to the species or groups of interest. These seabird references highlight the public's appreciation for the focal species groups; records included, for example, seabird names for places, boats or houses. For example, the peak number of references to 'penguin' in the late 1890s (Figure 8) was in part due to reports of the trading activities of a ship called the *Penguin* that later sank.

When the searches were refined further to identify articles specifically relating to the species (rather than indirect references to them, as in place or boat names), the subset of relevant articles was reduced to c. 100. In the articles examined in this refined search, shearwaters and penguins were the predominant species groups of interest, with terns being of least interest (Figure 7(c)). In spite of the strong Māori interest in muttonbirding, mentions of shearwaters were low until the early 1900s, peaking around 1915.

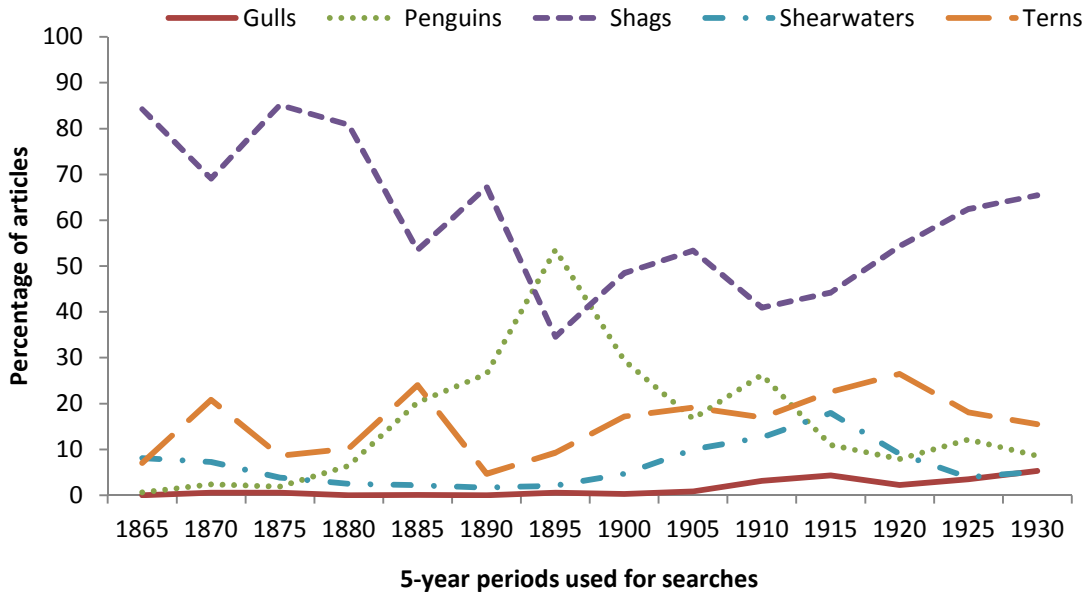

Figure 8 Percentage of local newspaper articles (*Otago Daily Times*: 1861–1930) returned by the searches that included at least one mention of the species (or group) by either its Māori or English name within each 5-year period.

3.2.2 Tītī: remarkable numbers

Early European colonists were interested in the tītī colonies in and around our study area. The following two local newspaper extracts show how natural historians were struck by the vast flocks of these birds all along the coastline locally and beyond, recording the timing of their arrival and departure as well as their interactions with them.

> The Mutton-bird flight. There is a tradition that all mutton birds lay on November 25, and such as cannot reach land in time drop their egg during flight or while resting on the water. But that Mr Guthrie-Smith proved to be far from true. He went to the island early, and, as a result, witnessed the arrival of the

mutton birds, and this, is how he describes their advent. About seven the earliest of the kuaka began to arrive; at first here a bird and there a bird; then almost at once it began to hail kuaka; then to sleet kuaka, and lastly to snow kuaka. They reached the island in dozens, scores, hundreds, thousands, hundreds of thousands, and, I verily believe, perhaps in millions. At first they hurtled themselves in like hailstones, then fell, later, with some degree of regard to their safety, and, lastly, lit softly as snow, and with hardly a rustle. The kuaka never circles or hesitates, but always flies very fast and straight in from the sea, but the final drop is vertical, or not a glass in the whare windows could have remained intact.

This amazing influx continued for about half an hour, although, for long after that, large parties of stragglers continued intermittently to arrive. Each morning we might have gathered them in as the Israelites gathered from the wilderness their quail, each morning the bird-fall overnight had landed petrels in the kerosene tin used for carriage of water – on one occasion there were three birds in it. Every empty box flat on its base contained birds. They fell down the chimney; they floated in our water cask.[5]

The birds usually appear on the coast between Timaru and Otago Heads, linger perhaps in their journey south for a short time between Oamaru and Cape Saunders, or even as far as Nugget Point, and then go south to what are usually known as the Muttonbird Islands, and the Southern West Coast Sounds – though some numbers of birds breed regularly off Moeraki, and others go as far north on the West Coast as Greymouth.

The time of the first arrival varies between the last weeks of September and the middle of November, although the breeding season commences with great regularity between November 15 and 30. The arriving flocks, as a rule, are somewhat scattered, but not so the departing flocks, for at the end of the breeding season the exodus is a general and complete one – strictly a matter of necessity for arriving flocks consist entirely of old birds, and departing flocks of old and young ones of the season.

I have mentioned the general exodus at the end of the nesting season. On a day at the end of March observed small scattered flocks of muttonbirds passing by the lighthouse point from the direction of the West Coast toward the Bluff. This was about mid-day, and as the afternoon gave way to dusk the flocks were becoming larger and more frequent. Next morning the migration was on in full force. At daybreak the flocks had changed to a steady stream, and, all around as far as could be seen with a good telescope, the countless thousands passed as if with a fixed purpose. Throughout the long day they continued to pass, and at nightfall there was no apparent decrease in the mighty throng. The birds flew steadily ahead and close to the surface of the sea. Another day and night passed,

[5] Our public schools. 1914, 2 April. Otago Daily Times, p. 2.

> and yet another, and still they continued to pass, but on the fourth day, just after daylight, there was a noticeable falling off in numbers. Then came irregular groups, then a few stragglers, and by 9 o'clock not a single muttonbird was in sight. The multitude had passed—not to be seen again for seven months! [6]

3.2.3 Penguins: a curious resource

There are numerous stories of hunting penguins for sport, skins and oil from the 1800s and very early 1900s. While these stories were clearly of interest to the local community at the time, the hunting expeditions generally occurred on the subantarctic islands or Antarctica.

Macquarie Island, for example, seems to have been a main centre for harvesting penguin oil (probably the royal penguin, as the story refers to golden-crested royal penguins). At the peak of the harvesting, 100,000 to 500,000 penguins per annum were taken, with each penguin yielding about 280 g (half a pint) of oil. While there were laws protecting sea life on the subantarctic Islands (fur seals, etc.), they were repealed in 1914 to allow for more harvest to help the failing, and not very profitable, oil trade[7]. Similar records were documented for colonies even further afield in Antarctica and the Kerguelen Islands:

> A Norwegian whaler declares that half the whale oil taken at the Antarctic in such enormous quantities is from penguins slaughtered ruthlessly on the ice in millions.[8]

> Whaling and hunting of sea elephants is still carried on at Kerguelen, but compared with the luxuriance of seal and penguin life crowding its shores 100 years ago it is now comparatively desolate.[9]

Europeans (mostly on the subantarctic Islands) ate them as well, making penguin soup or eating the eggs, which were said to be 'alright anyhow you like to cook them.'[10]

> We will all long, remember the warm shelter of that hut and the appetising penguin egg prepared on the small but efficient stove.[11]

By the 1920s and 1930s opinion on taking penguins appears to change. In one story the killing of 25 penguins (crested, yellow-eyed and rock-hopper) is described as 'a gross case of what may be termed bird murder'[12]. Penguins are protected birds again by 1930.

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[6] Muttonbirds. 1928, 5 January. Otago Daily Times, p. 3

[7] Macquarie Island. 1919, 13 October. Otago Daily Times, p. 8.

[8] Maori nature notes. 1930, 31 May. Otago Daily Times, p. 27.

[9] In the Far South. 1930, 19 July. Otago Daily Times, p. 18.

[10] At the Macquaries. 1913, 17 August. Otago Daily Times, p. 8.

[11] In the Far South. 1930, 19 July. Otago Daily Times, p. 18.

[12] Otago Daily Times. 1930, 7 February, p. 8.

> Speaking to a *Daily Times* reporter yesterday on the subject of the penguin oil works at Macquarie Island, concerning which there has been some correspondence between the Society for the Prevention of Cruelty to Animals and the Premier of Tasmania, Mr Joseph Hatch, the former, lessee of the island, said that the allegation made that it was the custom of those working on the island to boil penguins alive was absolutely without foundation. He said that during the time he held a lease over the island he had never known an act of cruelty to take place there. Further, owing to the irresponsible statement made concerning the workers 'at the island,' an oil industry which should be encouraged at the present time was being crushed. He purposed delivering an address in Dunedin on this question, when he hoped, by a series of lantern slides, to show the people how the industry had been conducted.[13]

Early European colonists' perspectives on penguins were mixed, being seen either as a resource (penguin oil) or entertainment. There are stories of penguins being bashed with clubs and tossed over cliffs to see if they would survive[14]. The following is a story printed in the *Otago Daily Times* from the Snares Island and probably about the Snares crested penguin[15] :

> No words can adequately describe the excessive uniqueness of these curious creatures. They overawe' you with their self-importance; they excruciate you with their utter absurdity; and all the time you are conscious that they are doing their level best. Of course we molested them; we stole their eggs and abducted their children, and otherwise made ourselves otherwise obnoxious to them; took them by the scruff of the neck and put them in baskets for the ultimate delight of naturalists and curiosity seekers; but they were quite polite all the time, and did no more than mildly protest and deprecate our bad taste.

Sighting of a penguin (again it is not clear which species) at Waikouaiti/Karitāne beach in 1927 was of enough interest to warrant a mention in a tramping club trip report[16].

3.2.4 Terns: beauty and grace

Early European colonists called the white-fronted tern a 'sea swallow'. The story in the paper goes on to describe its beauty and grace[17]. This story also notes that the white-fronted tern is very plentiful but the black-fronted species is rapidly and mysteriously declining. And apparently the natural enemies that civilisation introduced into the country had not seriously menaced these beautiful birds. The white-fronted tern was protected by

[13] The rabbit nuisance. 1920, 19 March. Otago Daily Times, p. 4.

[14] In touch with nature. 1913, 23 September. Otago Daily Times, p. 9.

[15] In search of fresh air. 1891, 25 November. Otago Daily Times, p. 5.

[16] Otago Tramping Club Otago Daily Times. 1927, 17 February, p. 4.

[17] In touch with nature. 1909, 31 December. Otago Daily Times, p. 2.

Parliament in 1921. There is a report that white-fronted terns used to nest on Bird Island, Tomahawk Beach and Black Head until driven off by humans[18].

3.2.5 Penguins, gulls and shags: pets or pests

Penguins

Making or attempting to make pets of yellow-eyed penguins is another reoccurring theme. There are multiple articles on Pompey, a tame penguin that lived at Akaroa[19]. A man from Timaru tried to make a pet of another bird:

> A few months ago we had a visit from a penguin and his beauty tempted us to capture him. He had canary yellow tufts on each side of the head. I can tell you I had a contract to put my hand on him. However, I did so, and he was placed in the garden, where there was a huge dam well stocked with goldfish. He seemed satisfied for about a fortnight and was quite at home, coming into the office and walking around finishing up straightening his feathers in front of the fire. He was quite tame and could be handled in fact, seemed to enjoy having his head stroked. What upset him I don't know, but one morning he was dead. I have him at present frozen, and should like to know if it would be expensive to have him stuffed, or if one of the museums would like him.[20]

And some people walking along a Dunedin beach considered taking a bird home:

> Some short distance farther along, in a corner at the foot of the precipice, we observed a Penguin (the Ho-i-ho of the Māoris) sitting quietly on a stone. We rushed him at once, and after some time, and no little trouble, for he fought hard for his freedom, using his formidable bill with effect against our legs and hands; but by getting a hat over him we got him down, fastened his bill with a bit of string, and carried him off. However, after carrying Mr Penguin along the beach for some distance, the thought of how we were to get him up the precipice, and through the bush to the road, and 30 (miles?) to town, induced us to take him to the water's edge and set him at liberty. Once in the water, he was soon beyond harm's way, and it was very interesting to watch him dive and swim under the water, coming up only for an instant for breath and then disappearing.[21]

[18] Naturalists' Field Club. 1923, 4 June. Otago Daily Times, p. 10.

[19] In touch with nature. 1912, 30 March. Otago Daily Times, p. 7.

[20] In touch with nature. 1925, 15 September. Otago Daily Times, p. 2.

[21] Rambles round Dunedin. 1869, 18 March. Otago Daily Times, p. 7.

Gulls

Akiaki, the Māori name for the red-billed gull, according to one source means 'to dash'[22]. This possibly refers to how it breaks open shells. It is also known as the 'mackerel gull'[23]. This gull was considered very plentiful on the New Zealand beaches and many of the islands[24].

> The red-billed gull has earned a quaint reputation for itself on account of its systematic plunder of the oyster-catcher. The latter is an expert in catching crabs and other crustaceans. The red-billed gull cultivates its society, and impudently robs it of its little luxuries.[25]

The southern black-backed gull was blamed for killing lambs and sheep by pecking out their eyes,[26] and the language in stories about southern black-backed gulls is not very positive. In these descriptions the birds are anthropomorphised. The black-backed gull, for example, is a common seabird around New Zealand (and due to its colouring is named for the Dominican friars). It "has little of the charm associated with most birds", and the birds "are known nest robbers and scavengers, and considered to have no economic status".[27] It is described as "a large bird, rather graceful when on the wing, but it is clamorous, quarrelsome, and gluttonous"[28].

In contrast, others tried (unsuccessfully) to capture and tame gulls as pets:

> On one occasion Mr Farquharson went to a gull rookery to obtain a young gull, which he hoped to tame. When he found an accessible nest he drove the old birds away and took possession of the chick. In order to deceive the parents, he placed the captive inside his coat and retraced his steps. He thought that he had completely outwitted the gulls, but a brief investigation at the nest when they returned, convinced them that he had robbed their home, and they followed him closely screaming at him in frenzied tones. He placed the young one in a box out of sight of the parents, and went inside the house thinking that it would, be a case of out of sight out of mind, and that the gulls would soon forget their loss. He had not adequately gauged the depths of affection in the birds' breast. They settled at once on the top of the box, and stayed there for two days, crying incessantly day and night, on the morning of the third day Mr Farquharson, in admiration for this genuine affection, freed the captive. He says that the slight

[22] Maori nature notes. 1929, 21 December. Otago Daily Times, p. 14.

[23] In touch with nature. 1910, 3 September. Otago Daily Times , p. 14.

[24] In touch with nature. 1929, 26 March. Otago Daily Times, p. 2.

[25] In touch with nature. 1908, 8 August. Otago Daily Times , p. 4.

[26] In touch with nature. 1929, 26 November. Otago Daily Times, p. 2.

[27] In touch with nature. 1929, 22 October. Otago Daily Times, p. 2.

[28] In touch with nature. 1908, 8 August. Otago Daily Times, p. 4.

> sacrifice he made was amply compensated for by the manifestations of joy made at the reunion.[29]

Shags

Although the spotted shag, was often described in positive terms, it was also viewed by some as a pest. It was described as

> not [a] gaudy bird, but as far as quiet colouration and artistic restraint are concerned it is unsurpassed amongst New Zealand's sea birds.[30]

> They are no friends of the fishermen, who accuse them of taking more young flounders and other fish than they might reasonably be considered entitled to.[31]

In late 1800s and early 1900s shags were referred to as the 'bird that will never be missed'[32] and 'The Outlaw'[33]. It was thought they competed with anglers for trout. The Otago Acclimatisation Society, the Anglers Association and the local council all promoted the shooting of shags. Bounties were offered: 1 shilling for nestlings to 3 shillings for old birds[34]. The rookeries or 'shaggeries' along the Waikouaiti River were often targeted, and in one reported case, blown up. Contrast this with possums being granted protection around the same time[35].

By the 1930s society was questioning if the black shag was really such a menace to trout, and at this time other species of shag were being protected[36]. A letter to the editor states that the Acclimatisation Societies were using shags eating trout as an excuse for the poor fishing. The story goes on to name deforestation in the headwaters as the reason for the fish declining[37].

Another newspaper article documents a traditional Māori story featuring shags[38]:

> Some Māori believe that a female demon named Hine was transformed into a shag when she died, and that in that form she dwells forever in the dark valley of Toi. When death or disease was about to come upon the Ngati-Whare tribe, to

[29] In touch with nature. 1910, 3 September. Otago Daily Times, p. 14.

[30] In touch with nature. 1912, 17 February. Otago Daily Times, p. 7.

[31] In touch with nature. 1912, 17 February. Otago Daily Times, p. 7.

[32] New Zealand birds photographed. 1888, 11 September. Otago Daily Times, p. 2.

[33] Our public schools. 1914, 2 April. Otago Daily Times, p. 2.

[34] Otago Acclimatisation Society. 1914, 20 June. Otago Daily Times, p. 12.

[35] Otago Acclimatisation Society. 1914, 20 June. Otago Daily Times, p. 12.

[36] The case for the shag. 1930, 28 August. Otago Daily Times, p. 5.

[37] The kea and the shag. 1930, 26 August. Otago Daily Times, p. 10.

[38] In touch with nature. 1928, 24 July. Otago Daily Times, p. 2.

> which Hine had belonged, she left the valley and soared above the ill-fated village or war-party. Tribesman in Tuhoe Land feared, probably still fear, the same bird. They know it as Hine-Ruarangi. She was a daughter of Toi, who was their ancient ancestor. Misfortune or death overtakes a member of the tribe to whom she appears. When she leaves her haunts in the valley and flies over a village or a war party, the chief will die, and the war party will meet with disaster. War parties are things of the past, but chiefs still die, and their lives are banefully influenced by the demon shag.

The Stewart Island Shag was granted 'absolute protection' in 1930[39].

3.3 Contemporary ornithological interests

In the contemporary newsletters published by the Otago Ornithological Society, the most discussed species groups were penguins (in particular yellow-eyed penguins) and gulls (with southern black-backed gulls discussed slightly more than red-billed ones) (Figure 99). Interest in penguins peaked in the 1990s and 2000s, before and after which gulls were the most frequently mentioned group (Figure 1010).

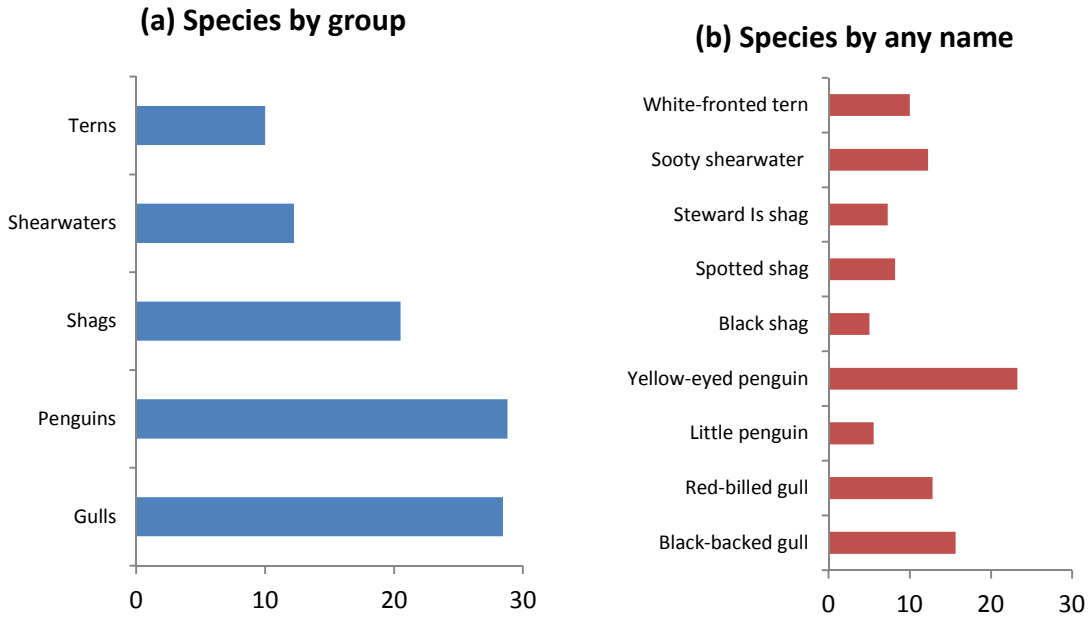

Figure 9 The percentage of the total number of species mentions in the local ornithological society newsletters (1964–2015) by (a) species group and (b) species irrespective of the name used.

[39] Otago Daily Times. 1930, 27 May, p. 13

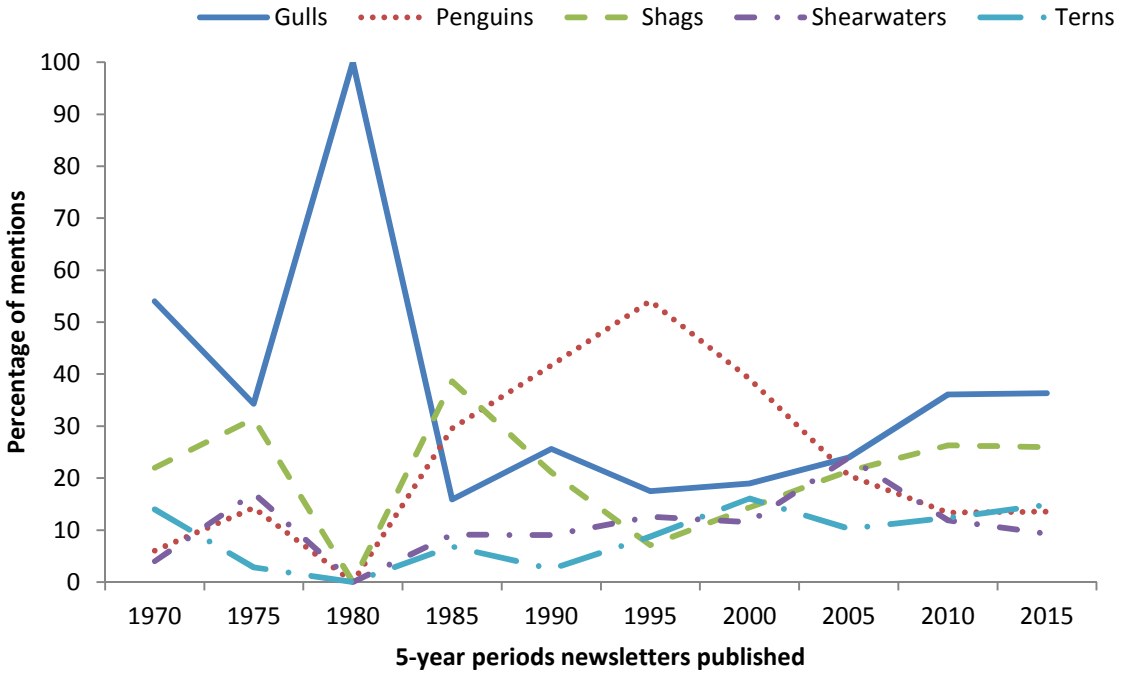

Figure 10 The percentage of species group mentions in Birds NZ (OSNZ) newsletters published within each 5-year period.

3.4 Contemporary seabird colony records

3.4.1 Conservation status

The national conservation status of the nine species ranges from 'not threatened' (southern black-backed gull and spotted shag) to 'nationally vulnerable' (yellow-eyed penguin, Stewart Island shag and red-billed gull) to 'at risk' (little penguin, tītī and white-fronted tern) (Robertson et al. 2013).

3.4.2 Colony locations and size

Within the study area, 33 colonies have been identified for the nine focal species in the last 50 years (Figure 11; Appendix 3; Hand 2014). These colonies were distributed across 14 locations (Figure 1 and Figure 11), with the mean colony size ranging between one breeding pair for yellow-eyed penguins, to 1,000 pairs for white-fronted terns (Appendix 3). The black shag, the only species currently not breeding in the study area, has a colony nearby at Otafelo Point in the Otago harbour (Figure 11). Two species (sooty shearwaters and Stewart Island shag) were only recorded breeding at one site at the time of this report, while one species (red-billed gull) was recorded at nine locations in the area of interest.

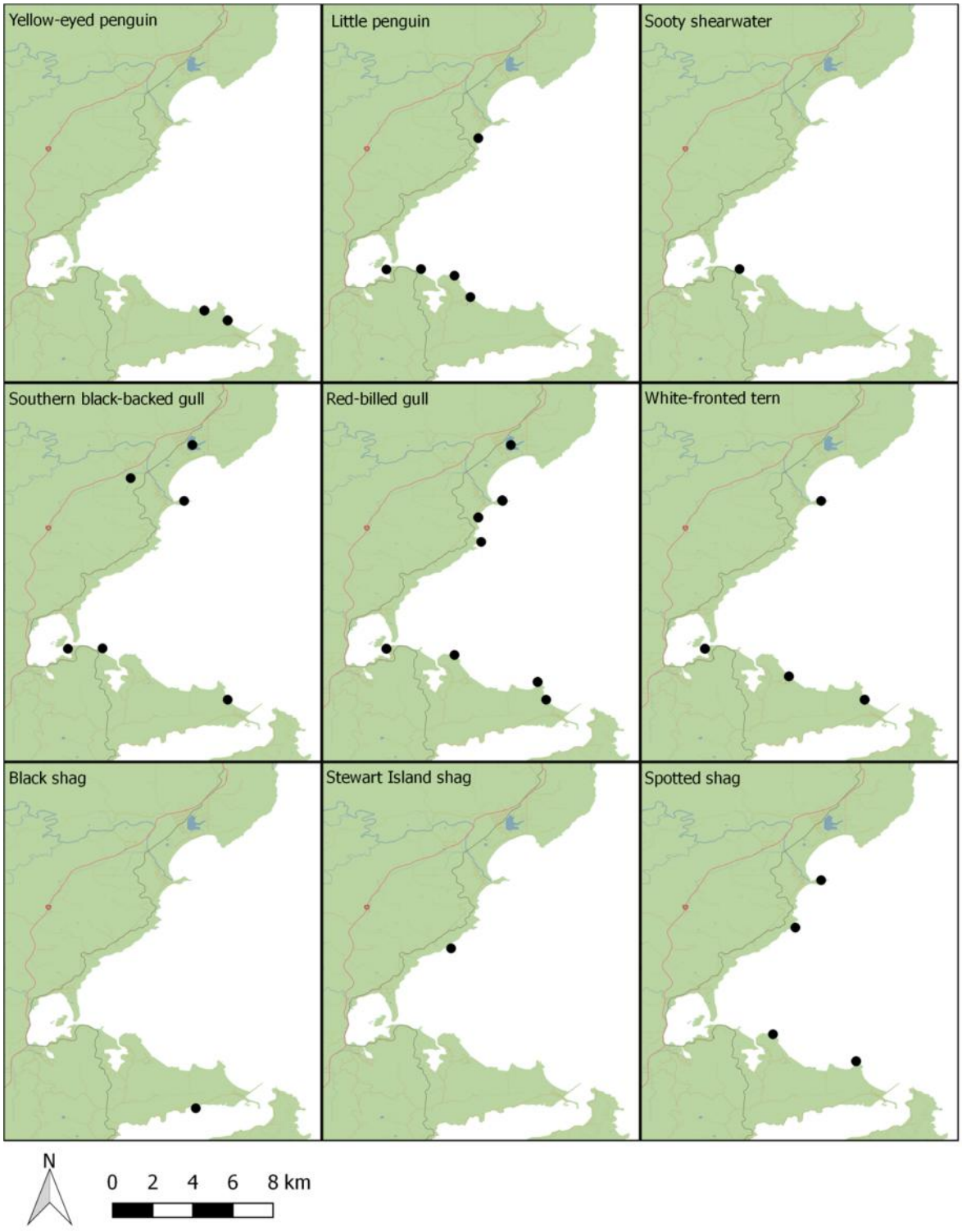

Figure 11 Current colony locations for the nine focal seabird species. Data from Hand 2014.

Table 5 Many of the available colony records (Hand 2014; Appendix 3) were based on personal reports provided by experts (see light-grey shading), or rather formal surveys (prior to 2011: dark grey shading; 2011 or later: black shading). Locations in bold are seabird 'hot spots'

Colony location	No. of species	Sooty shearwater	Little penguin	Yellow-eyed penguin	Stewart Island shag	Black shag	Spotted shag	Southern black-backed gull	Red-billed gull	White-fronted tern
Hawksbury Lagoon	2									
Merton Arm	1									
Huriawa Historic Reserve	4									
Karitāne	2									
Green Point	1									
Brinns Point	1									
Seacliff	1									
Doctor's Point	4									
Māpoutahi	3									
Potato Point (Pūrākaunui)	3									
Long Beach	2									
Kaikai Beach	1									
Heyward Point	2									
Aramoana	4									
(Otafelo Point)	(1)									
Total		**1**	**5**	**2**	**1**	**(1)**	**4**	**6**	**9**	**5**

When taking into account all the available colony records (irrespective of whether they were based on formal surveys or personal reporting), three locations emerge as 'hotspots': Huriawa Historic Reserve, Doctor's Point, and Aramoana (encompassing the estuary, beach and mole). Colonies were reported for at least four species at each of these locations (Table 5; Appendix 3). Southern black-backed gull, red-billed gull and white-fronted tern were found at all three locations, whereas spotted shag, little penguin and yellow-eyed penguin were only found at one location each (Huriawa Historic Reserve, Doctor's Point and Aramoana, respectively).

If we only consider information derived from formal surveys within the last 6 years (Appendix 3), colony records were only available for three species across five locations: red-billed gull (Karitāne, Doctor's Point and Heyward Point Islet), yellow-eyed penguin (Kaikai Beach and Aramoana) and white-fronted tern (Doctor's Point and Aramoana).

3.4.3 Population trends

Evidence of population trends is limited, with only two species (red-billed gulls and yellow-eyed penguins) repeatedly surveyed at the same location over a period of 5 or more years (Hand 2014). However, there are reports of population fluctuations and declines for a number of species.

- **Yellow-eyed penguins:** The minimum number of nests at Kaikai beach remained steady between 1999 and 2004 (two nests) then dropped to one nest for 2005 through to 2007. The minimum number of nests at Aramoana beach was between two and seven nests between 1998 and 2011.
- **Sooty shearwater:** The total number of breeding colonies in the Otago coastline between Oamaru Harbour and Tunnel Beach, Dunedin, declined by 54% (CI 27–67%) over the last 50 years of the 20th century (Jones 2000). This trend was also reflected in recent anecdotal reports from locals (see Appendix 3).
- **Spotted shag:** *S. punctatus* nests at Heyward Point in 1977/78 numbered 90; this rose to 300 nests in 1985/86, but by 1993/94 had dropped to 100 nests (Hand 2014 data).
- **Stewart Island shag:** Colonies appear to come and go. For example, the Taiaroa Head colony nesting population has gone from a 'large colony' in 1886 to 'attempted breeding' in 1940, to records of 310 nests in 1973 (Watt 1975).
- **Black shag:** Lalas (1993) recorded breeding at Stoney Creek between 1978 and 1983 but the site was then abandoned.
- **Red-billed gull:** The minimum number of red-billed gull nests recorded dropped at Doctor's Point (from 20 in 1992 to eight in 2011, and at Karitāne Peninsula (from 56 to 21 between 2001 and 2011; Hand 2014).
- **White-fronted tern:** The population in 1995 consisted of 120 nests at Long Beach, which dropped to 32 the following year (Hand 2014 data).

4 Discussion

This report provided information to support the Return of the Tītī project, a seabird habitat restoration initiative within the wider Beyond Orokonui project. It summarises some preliminary findings on the history of local seabird colonies along the north-eastern Otago coastline, and will be used to inform future biodiversity monitoring and management in the study area.

4.1 Cultural significance of seabirds to local iwi

Our review of the cultural significance of the nine focal species to Ngāi Tahu drew on a range of resources in the published literature. We looked for evidence that seabirds were valued as mahinga kai or symbolic, or for other reasons, using archaeological records derived from local middens as well as historical records collated by the iwi that documented the use of these seabirds as mahinga kai. We also considered evidence of embedded Māori cultural values by exploring patterns in the use of Māori bird names in local newspaper and newsletter articles. We found that shearwaters scored highly in both traditional and contemporary sources, highlighting the importance of these species. Table 6 provides an overview of our findings.

Table 6 Seabird groups used as mahinga kai (or a food resource) based on midden records and Ngāi Tahu settlement claim papers. For each group the relative use of Māori bird names (vs English ones) in newspaper articles published by early colonists and newsletters published more recently by local ornithologists and Ngāi Tahu is scored. These factors were scored on a scale of low (light grey shading) to high (black shading) significance or use

Species group	**Mahinga kai**		**Species mentions**	**Use of Māori bird names**		
	Midden records	**Treaty claims papers**	**Contemporary Ngāi Tahu newsletters**	**Early colonial newspapers**	**Contemporary ornithological newsletters**	**Contemporary Ngāi Tahu newsletters**
Shearwater						
Penguins						
Shags						
Gulls						
Terns						

All except three species (Stewart Island shag, spotted shag and red-billed gull) were listed as taonga (or treasured) species by the local iwi, Ngāi Tahu (Table 4). Although penguins and shags were often found in middens, their importance as a mahinga kai resource may have reduced over time. Ngāi Tahu presented evidence to the Waitangi Tribunal detailing the cultural significance of seabirds for the iwi (e.g. the cultural importance of the gathering of eggs and adult birds).

Exploring the use of Māori bird names in the published literature also highlights the important role of tītī, in particular, as this species' name is the one most often reported in te reo Māori by both the local iwi and other community groups. Shearwaters appeared in all time periods, emphasising their importance across cultures.

4.2 Early colonial interests in seabirds

Many of the species (or species groups) mentioned in newspaper articles were indirect references, with their names incorporated into the names of places, boats or houses. Shags were consistently the most mentioned species group in newspaper articles from 1860 to 1930, being frequently regarded as a pest or competing with Pākehā commercial fishermen for fish resources (Table 7), followed by penguins. In contrast, gulls and shearwaters were relatively rarely mentioned.

Table 7 Frequency of mentions of seabird groups or species in newspaper articles published by early colonialists and newsletters published more recently by local ornithologists. These factors were scored on a low (light grey shading) to high (black shading) frequency scale

Species group	Early colonial newspapers		Recent ornithological newsletters	
	Generic mentions	Context relevant references to species	Generic mentions	Species specific
Shearwaters				
Penguins				
Shags				
Gulls				
Terns				

Interest in the seabird species varied, with some articles focusing on the natural history of the birds (e.g. the movement and behaviour of vast flocks of shearwaters; the grace and beauty of the terns), others on resource use (e.g. harvesting penguins for sport, skin and oil), or human interactions with the birds (e.g. attempting to make penguins pets, or identifying gulls and shags as pests).

4.3 Contemporary interests of local ornithologists

Penguins (in particular yellow-eyed penguins) were the most discussed species group through the 1990s and 2000s, before and after which gulls were the most frequently mentioned group (with southern black-backed gulls discussed slightly more than red-billed ones). On the whole, shags (particularly the black shag) were mentioned less frequently than the other groups (Table 7).

4.4 Contemporary seabird colony records

Seabird colony records were collated from a detailed review extending back almost 50 years (Hand 2014). As these records only cover the recent past, they are likely to significantly underestimate the historical distribution and size of seabird colonies, given that human impacts on these colonies were already being noted in the early 20th century. In addition, very few repeated surveys have been undertaken for many of the species and colonies. Nonetheless, local knowledge and informal records can be a great source of information to create a more complete picture. Hand (2014) found that informal records identified many new locations and new colonies (for example, 29% of all colonies were identified solely in informal records).

The black shag is the only species not currently breeding in the study area. Thirty-three colonies across 14 locations were identified for the other eight focal species, with colony sizes varying from 1 breeding pair for yellow-eyed penguins to 1,000 pairs for white-fronted terns.

Taking into account all the available records (i.e. formal surveys and anecdotal data), three locations emerge as 'hotspots': Huriawa Historic Reserve, Doctor's Point and Aramoana. Southern black-backed gulls, red-billed gulls and white-fronted terns were recorded at all three locations, but spotted shags, little penguins and yellow-eyed penguins were only found at one location each.

If we consider the information derived from formal surveys within the last 6 years, colony records are only available for three species across five locations: red-billed gull (Karitāne, Doctor's Point and Heyward Point Islet), yellow-eyed penguin (Kaikai Beach and Aramoana) and white-fronted tern (Doctor's Point and Aramoana).

5 Recommendations

This summary of the cultural and ecological history of seabird colonies along the north-eastern Otago coast provides a context for community discussion about the development of the Return of the Tītī project. Discussions about why and what community members value about local seabird colonies will add a greater depth to this summary. We recommend this as the next step in the project.

Currently very few species and colonies are systematically surveyed on a regular basis, and there is no survey information at all available for large areas of the coastline. We therefore recommend that future monitoring of the seabird colonies along the north-eastern Otago coastline involve running more systematic and regular surveys tailored to support the restoration goals of the Return of the Tītī project.

Further research into understanding the historical values of the seabird colonies could be undertaken, such as a search of the archived Māori-language newspapers and an investigation of the oral information collected by James Herries Beattie in the 1920s from Otago Ngāi Tahu elders.

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Evidence

H6 Evidence of Rawiri Te Maire Tau and Henare Raikiihia Tau on mahinga kai, Tuahuriri area (1988)

H8 Evidence of Ray Hooker, Hemi Te Rakau, Kelly R. Wilson, Gordon McLaren, Albert Naihi-McLaren, Iris Climo, James M. Russell and Allan L. Russell on mahinga kai, Arahura area (1988)

H10 Evidence of Jack T. Reihana, Wiremu Torepe, Kelvin Anglem, Murray E. Bruce, Kelvyn Te Maire and Rangimarie Te Maiharoa on mahinga kai, Arowhenua area (1988)

H12 Evidence of Edward Ellison on mahinga kai, Otakou area (1988)

H13 Evidence of Robert A. Whaitiri, Harold F. Ashwell, Paddy Gilroy, Taare H. Bradshaw, Huhana Morgan, and Kevin O'Connor on mahinga kai, Murihiku area (1988)

Appendix 1: Midden records

Table A1. Seabird taxa identified from archaeological layers at Otago locations within or adjacent to the study area[40] (Smith & James-Lee 2010). Focal species are listed in bold, question marks denoted where species id was uncertain

Period	Location	Species	Minimum no. of individuals
Early	Ross's Rocks (58b)	**Little penguin**	**7**
		Spotted shag	**1**
		NZ crested penguin	1
		Fairy prion	1
		Fluttering shearwater	1
		Common diving petrel	4
		Petrel ? sp	2
Early/Middle	Ōmimi	**Little penguin**	**3**
		Spotted shag	**2**
		Common diving petrel	1
		Shag ? sp	1
	Pūrākaunui (61a and 61b)	**Spotted shag**	**8**
		Little penguin	**2**
		Wandering albatross	3
		White-capped albatross	8
		Albatross ? sp	p
		Broad-billed prion	1
		Fairy prion	1
		Fluttering shearwater	2
		Common diving petrel	1
		Shag ?sp	3
		Black-billed gull	2
	Long Beach (62b)	**Sooty shearwater**	**1**
		Little penguin	**2**
		Yellow-eyed penguin	1
		Stewart Island shag	1
		Spotted shag	2
Middle/Late	Ross Rocks (58a)	**Little penguin**	**6**
		Yellow-eyed penguin	**1**
		Spotted shag	**2**
		Southern black-backed gull	**1**
		NZ crested penguin	2
		Penguin ?sp	1
		Fairy prion	3
		Prion *Pachyptila* ?sp	1
		Common diving petrel	8

[40] All midden records reported here are from Smith & James-Lee 2010.

Period	Location	Species	Minimum no. of individuals
Middle/Late		Petrel ?sp	1
con't		Pied shag	1
		Shag *Phalacrocorax* ?sp	1
		Gull ?sp	1
	Long Beach (62a)	**Sooty shearwater**	**3**
		Little penguin	**1**
		Yellow-eyed penguin	**1**
		Stewart Island shag	**1**
		Spotted shag	**19**
		NZ crested penguin	1
		White-capped albatross	1
		Albatross/ mollymawk ?sp	1
		Fluttering shearwater	4
		Little shearwater	2
		White-faced storm petrel	1
		Common diving petrel	2
		Petrel ?sp	1
		Little shag	2
		Pied shag	1
Late	Huriawa (57a and 57b)	**Yellow-eyed penguin**	**1**
		Southern black-backed gull	**2**
		Stewart Island shag	**9**
		Spotted shag	**4**
		Wandering albatross	2
		Buller's albatross	1
		White-capped albatross	2
		Albatross/ mollymawk /sp	2
		White-faced storm petrel	1
		Common diving petrel	1
		Pied shag	2
		Gull ?sp	1
	Māpoutahi (60b and 60a)	**Yellow-eyed penguin**	**2**
		Stewart Island shag	**1**
		Spotted shag	**4**
		Southern black-backed / Kelp gull	**1**
		NZ crested penguin	1
		Wandering albatross	1
		White-capped albatross	2
		Fluttering shearwater	1
		Common diving petrel	1
		Gull ?sp	1

Appendix 2: Summary of Search Results for 1861–1930 newspaper articles

Table A2. The number of results returned for each search term with the percentage of which was relevant (i.e. about the species). For names with hyphens, searches with and without the hyphen were run.
* No new results (e.g. article included both Māori and English names).

Species group	Species	Search term	No. of articles	% relevant
Shearwaters		Shearwater	34	*
	Sooty shearwater	Sooty shearwater	7	28.6%
		Muttonbird	60	28%
		Titi	471	2.8%
Penguins	Little penguin	Little penguin	1366	2.5%
		Korora	39	2.6%
	Yellow-eyed penguin	Yellow eyed penguin	4	*
		Hoiho	27	0.0%
	?	Crested penguin	30	13.3%
Gulls	Red-billed gull	Red-billed gull	10	60.0%
		Tarapuka/Tarapunga	6	14.3%
		Akiaki	2	*
	Southern black-backed gull	Southern black-backed gull	10	50.0%
		Kelp gull	4	50.0%
		Karoro	98	*
Shags		Koau	284	0.7%
	?	Waikouaiti, shag	3,994	0.4%
	Stewart Island Shag	Stewart Island Shag	1,254	0.6%
	Spotted shag	Spotted shag	50	14.0%
	Black shag?			
Terns		White-fronted tern	6	50.0%
		Tara	1,408	0.1%

Appendix 3: Colony locations and number of breeding pairs

Table A3. Colony locations and mean minimum number of breeding pairs for each of the nine seabird species derived from Hand's review (2014).
* No data on colony size. ^ Data from personal communication rather than a formal survey.

Common name	Site	Minimum breeding pairs	Number of years surveyed	Most recent survey	Additional notes
Tītī	Māpoutahi	5.0		^	Hand (2014) lists *P. griseus* as 'Possible' at Māpoutahi. The total number of breeding colonies in the Otago coastline between Ōamaru Harbour and Tunnel Beach Dunedin declined by 54% (CI 27–67%) over the previous 50 years (Jones 2000). 'Dr. Andy Stewart has told me that until 3–4 years ago there were Tītī nesting in the cliffs behind Doctors Point' (pers. comm., Rhys Millar, 2015). And a kaitiaki report for the Purākaunui area: 'Before we moved north in 1975, there was a small colony of Tītī nesting on the upper side of the railway where the transmission line comes down over the face. They may not still be there now, because apart from the plague of pests they would have had to survive, all the previous cover was destroyed in the 1994 fire' (pers. comm., John McLachlan, 2015, via Rhys Millar, 2016).
Little penguin	Doctor's Point	5.0		^	Hand (2014) lists *E. minor* as present at Long Beach and Māpoutahi, and possibly present at Karitāne Beach, Doctor's Point, Potato Point and Aramoana Beach. The 1991/91 season survey by Dann (1994) counted 12, 22 and 2 breeding pairs at Māpoutahi, Long Beach and Aramoana Spit Beach, respectively. Hand's (2014) data set records 10 breeding pairs at Karitāne Beach, five breeding pairs at Doctor's Point and six at Māpoutahi. A nest count was carried out by locals (between the eastern side of Māpoutahi and the car park at Doctor's Point) in the 2015/16 season; they reported 16 active burrows and 11 individuals sighted (pers. comm., Rhys Millar, 2016). There was a loss of an estimated 40 *E. minor* in 2014/15 (pers. comm., Margaret McFarland, via Rhys Millar, 2016).
	Karitāne Beach	10.0		^	
	Long Beach	*		^	
	Māpoutahi	6.0		^	
	Potato Point (Pūrākaunui)	*		^	
Yellow-eyed penguin	Kaikai Beach	1.0	20	2011	Hand (2014) lists *M. antipodes* as 'Likely Present' at Kaikai Beach (Pūrākaunui area). The likely population at Kaikai Beach is recorded as one to two breeding pairs.
	Aramoana Beach	2.7	20	2011	

Common name	Site	Minimum breeding pairs	Number of years surveyed	Most recent survey	Additional notes
Spotted shag	Brinns Point	10.0		^	Hand (2014) lists *S. punctatus* as 'Confirmed Present' at Heyward Point and 'Possible' at Huriawa Reserve, Brinns Point and Potato Point. *S. punctatus* nests at Heyward Point in 1977/78 numbered 90; this rose to 300 nests in 1985/86, and by 1993/94 this had dropped to 100 nests (Hand 2014 data). At Huriawa Reserve nests numbered between 10 and 200 (Hand 2014 data).
	Heyward Point	172.5	4	1992	
	Potato Point (Pūrākaunui)	*		^	
	Huriawa Historic Reserve	6.0		^	
Stewart Island shag	Seacliff	1.0	1	1980	Hand (2014) lists this species as 'Likely Absent' from the area of interest, though it is currently on Taiaroa Head (Forest & Bird 2015)). In 1980 one nest was found at Seacliff (Lalas 1993). Colonies appear to come and go (e.g. the Taiaroa Head colony nesting population has gone from a 'large colony' in 1886, to 'attempted breeding' in 1940, to 310 nests in 1973; Watt 1975).
Black shag	Otafelo Point	35	1	2008	Lalas (1993) has records of breeding at Stoney Creek between 1978 and 1983 but the site was abandoned. Hand (2014) references Lalas's paper and lists this as a possible colony. The population was between four and six breeding pairs.
Southern black-backed gull	Doctor's Point	3.0		^	Hand (2014) lists *L. dominicanus* as possibly breeding at Hawksbury Lagoon, Merton arm, Huriawa Reserve, Blueskin Bay, Māpoutahi and Doctor's Point. Probably populations range from three nests at Doctors Point to two nests at Māpoutahi.
	Hawksbury Lagoon	5.0		^	
	Māpoutahi	2.0		^	
	Merton Arm	200.0		^	
	Aramoana Estuary	274.0	1	2008	
	Huriawa Historic Reserve	2.0		^	

Common name	Site	Minimum breeding pairs	Number of years surveyed	Most recent survey	Additional notes
Red-billed gull	Doctor's Point	5.4	9	2011	Hand (2014) lists *L. novaehollandiae* as confirmed present at Karitāne Beach Islets and Peninsula, and Doctor's Point, with possible colonies at Hawksbury Lagoon, Huriawa Reserve, Green Point and Pūrākaunui. Populations of this species appear to be very variable. Hand's (2014) data set records a minimum of 20 nests at Doctor's Point in 1992, which drops to 8 in 2011. Twenty-five nests were recorded at Hawksbury Lagoon in 2012. Karitāne Beach Islets nest numbers varied between 42 and 114 between 2001 and 2011. Nests at Karitāne Peninsula dropped from 56 to 21 between 2001 and 2011.
	Green Point	*	1	^	
	Hawksbury Lagoon	25.0		^	
	Heyward Point Islet	32.4	7	2011	
	Karitāne Beach Islets	56.1	7	2011	
	Karitāne Peninsula	32.7	7	2011	
	Potato Point (Purākaunui)	80.0	1	1963	
	Aramoana Estuary	250.0	1	2008	
	Huriawa Historic Reserve	10.0		^	
White-fronted tern	Doctor's Point	65.0	3	2011	Hand (2014) lists *S. striata* as 'Likely Present' at Long Beach and 'Possible' at Huriawa Reserve. In 2012 listed as having a large population with a predicted decline of 10–50% (Robertson et al. 2013). The population in 1995 at Long Beach was 120 nests, which dropped to 32 the following year (Hand 2014 data).
	Long Beach	76.0	2	1996	
	Aramoana Mole	1000.0	1	2012	
	Aramoana Estuary	400.0	1	2008	
	Huriawa Historic Reserve	10.0		^	

Appendix 4: Seabird species list

List of seabird species mentioned in the main text, with English and Māori names.

Scientific name	Māori name(s)	English name(s)
Chlidonias albostriatus		Black-fronted tern
Eudyptula minor	Kororā	Little penguin
Eudyptes spp.		Rock-hopper penguin
Eudyptes robustus	Penu	Snares crested penguin
Eudyptes schlegeli		Royal penguin
Larus dominicanus	Karoro	Southern black-backed gull Kelp gull
Larus novaehollandiae	Tarāpuka Akiaki	Red-billed gull
Leucocarbo chalconotus	Kōau Kawau	Stewart Island shag
Megadyptes antipodes	Hoiho	Yellow-eyed penguin
Phalacrocorax carbo	Kōau	Black shag
Puffinus griseus	Tītī	Sooty shearwater Muttonbird
Sterna striata	Tara	White-fronted tern
Stictocarbo punctatus	Kōau Kawau	Spotted shag

Appendix 5: Glossary of Māori terms

Definitions are primarily drawn from the online Māori dictionary.

Māori term	English meaning
Hapū	Section of a large kinship group
Iwi	A large group of people descended from a common ancestor and associated with a distinct territory
Kai	Food
Mahinga kai	Food resource, or food-gathering place
Mana whenua	Authority over land or territory
Māunu	Bait for fishing
Pākehā	New Zealanders of largely European descent
Patupaiarehe	Fairies or spirits
Taonga	Applied to anything considered to be of value, including socially or culturally valuable objects and resources.
Taura here	Urban kinship groups that are generally linked back to a particular iwi
Te reo	The Māori language
Umu	Earth oven
Waiata	Song
Whakataukī	Proverb or significant saying
Whānau	Extended family or family group