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Observations of black and white storm petrels in the Hauraki Gulf, November 2003 - June 2005: Were they of New Zealand storm petrels?

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Abstract We observed black and white-plumaged storm petrels on 27 seabird-watching trips to the outer Hauraki Gulf, New Zealand, November 2003 - June 2005. We studied their plumage characteristics, behaviour and seasonal occurrence: the birds had common plumage characteristics and sightings of them were concentrated in the outer Hauraki Gulf from October to March and further offshore in April-May. Their presence in the Hauraki Gulf coincided with summer breeding of other seabirds, in particular white-faced storm petrels (*Pelagodroma marina*). Their pattern of occurrence off northern New Zealand suggests the birds may be breeding in the Hauraki Gulf; the Mokohinau Islands, rid of rats (*Rattus exulans*) 15 years ago, is a potential breeding site In our view these black and white storm petrels do not conform to descriptions of any extant species known from New Zealand waters, and, consequently, we speculate that our observations may have been of New Zealand storm petrels (*Pealeornis maoriana* Mathews 1932), a species known from only three specimens collected in the 19th century.

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INTRODUCTION

The near-shore waters of the Hauraki Gulf and eastern Northland contain, especially during summer, an abundance of small oceanic seabirds. The many large and small islands in this region are nesting sites of Cook's (*Pterodroma cookii*), Pycroft's (*P. pycrofti*), and black (*Procellaria parkinsoni*) petrels, fluttering (*Puffinus gavia*), sooty (*P. griseus*), Buller's (*P. bulleri*), flesh-footed (*P. carneipes*) and little (*P. assimilis haurakiensis*) shearwaters, fairy prion (*Pachyptila turtur*), common diving petrel (*Pelecanoides u. urinatrix*), and white-faced storm petrel (*Pelagodroma marina maoriana*) (Turbott *et al*. 1990). A plethora of other coastal species (e.g. gulls, terns, gannet, shags) add further diversity to the marine waters, thus making the area a rewarding location for seabird viewing.

The presence in Hauraki Gulf waters of a black and white storm petrel, readily distinguishable from white-faced storm petrels, was first highlighted following a sighting on 25 January 2003 off Coromandel Peninsula. Although initially identified as a black-bellied storm petrel (*Fregetta tropica*), the observers (Saville *et al.* 2003) subsequently suggested it might be a New Zealand storm petrel (*Pealeornis maoriana* Mathews 1932).

On 17 November 2003, two British birdwatching enthusiasts, B. Flood and B. Thomas,observed, photographed and video-taped at least 10 similar black and white storm petrels north of Little Barrier Island (see Fig 3). They, too, claimed these to be New Zealand storm petrels (Flood 2003), a claim considered unproven by the Ornithological Society of New Zealand's Rare Birds Committee (Rare Birds Committee 2005). Their sighting followed a tantalising glimpse in rough weather of a small, black and white storm petrel two weeks previously in much the same area (C. Gaskin pers. obs.), during a pelagic bird-watching trip.

Many sightings of black and white storm petrels have since followed and we present here details of our observations of these birds between November 2003 and June 2005.

METHODS

Timing and location of observations

From November 2002 to June 2005, we conducted 55 commercial and private pelagic seabird-viewing trips in northern New Zealand waters, mostly within the Hauraki Gulf during summer (October

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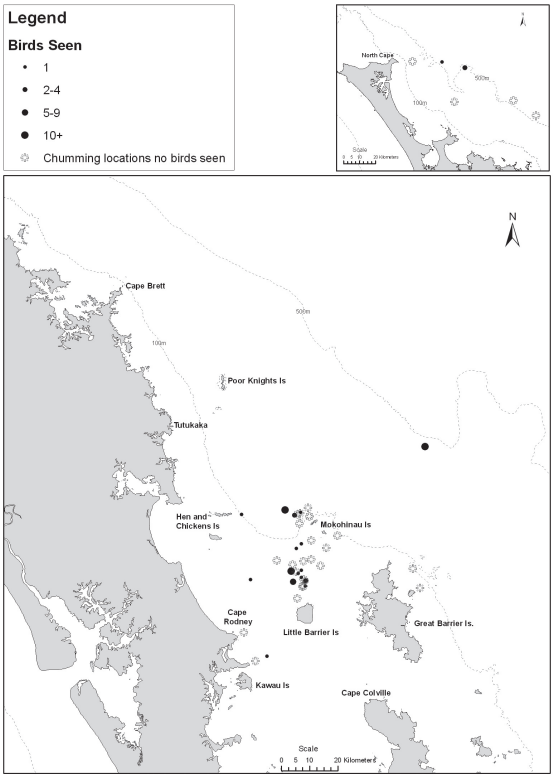

Figure 1 Locations of sightings of black and white storm petrels in the Hauraki Gulf, November 2003-October 2004. Legend: ● Sightings; + Chumming locations, no storm petrels seen. Scale (km). Inset: Far North

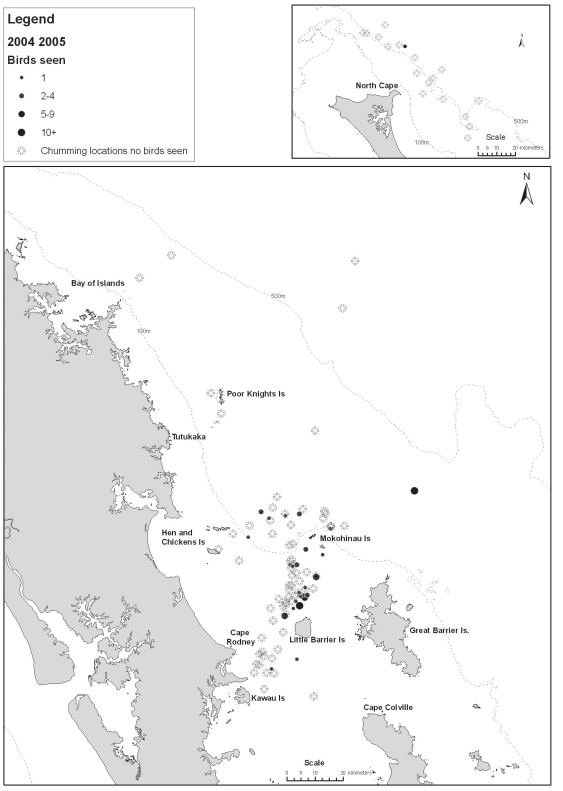

Figure 2 Locations of sightings of black and white storm petrels in the Hauraki Gulf, October 2004-June 2005. Legend: ● Sightings; + Chumming locations, no storm petrels seen. Scale (km). Inset: Far North

to March). Prior to November 2003, we generally followed set routes, noting what we saw as we cruised along but slowing down or stopping to view birds, bird activity and marine life.

In November 2003, following Flood and Thomas's observations (Flood 2003) and trips with us, we began incorporating "chumming sessions" into our trips. "Chumming" is a technique used to attract seabirds close to a relatively stationary boat; a mix of fish scraps and oil is used to create a slick around the boat, with the scent being carried downwind. We did this where, based on previous experience, as well as conditions and bird activity on the day, e.g., the presence of white-faced storm petrels and/or fairy prions, we thought conditions might be suitable for attracting these black and white storm petrels as well.

Chumming drew birds towards the boat from the surrounding area, most commonly from downwind. These black and white storm petrels arrived between 1 min and 2 h after the chum was initially released, an indication of how far away the birds were attracted by the chum's scent. Time spent chumming ranged from 0.5 h to 3 h.

The presence of a lot of natural food (e.g. plankton slicks), and calm days considerably reduced the effectiveness of chumming. On calm days the scent would not disperse far enough to attract distant birds, though chances improved of spotting small birds while cruising, and they were more likely to be seen resting in groups and so could be approached for identification. While adopting chumming during trips meant more time stationary and less distance travelled, some birds e.g., small *Pterodroma*, prions and storm petrels, were easier to see and identify when they came close to the boat. Chumming sessions where these black and white storm petrels were not seen were an important factor in determining areas of most likely occurrence. Had they been in the vicinity there was a high probability they would have been seen by observers on board.

We maintained a full record of all birds seen by us and our observers throughout each trip. Data collected included identification of seabird and marine mammal species seen, their activity when viewed, sea surface temperatures (SST), and sea and wind conditions.

The region in which most of our observations were confined, the outer Hauraki Gulf, is defined as Whangaparaoa Peninsula to Great Barrier Island (Port Fitzroy and north to Needles Point) to Bream Head and to Cape Rodney with the outer limit being a line just beyond the Mokohinau Islands (from Great Barrier Island to just north of the Hen & Chickens Islands (Fig 1).

We undertook three trips to deeper waters adjacent to the Hauraki Gulf (10 April 2004, 19 March and 19 June 2005) times when the black and white storm petrels were not being seen in the Hauraki Gulf itself (Figure 1, 2; Appendix 1). We have also included data from a further five trips, from a line 40 km northeast from Whangaroa Harbour to 40 km northwest of North Cape (Figure 1 insert, Appendix 2), undertaken in May and July 2004, and January, March and May 2005.

Characteristics of the black and white storm petrels

The birds that are the subject of this paper had consistent plumage characteristics which we were able to view as birds flew by and from close scrutiny of photographs of them. They were small storm petrels, with scimitar-shaped wings, a slender-looking body, a black/dark brown head, neck and upper parts with a paler but not prominent diagonal band across the upper wing coverts. The white rump was prominent, the tail black and slightly rounded, and the outer tail feathers showed white bases on the underside (visible in some photographs). Feet extended well beyond the tail in flight. Underparts comprised a white belly and flanks, with dark variable streaking a constant diagnostic feature, the degree of streaking varying from minimal streaking on the belly and flanks to an overall dusky appearance; on some birds the streaking was in a pronounced longitudinal band on each side running along the flanks and through the thighs. Feathers on the row of lateral undertail coverts had dark tips. The underwing was mainly white centrally (central coverts), bordered by broad black leading edge, dark-grey tip (primaries) and dark-grey trailing edge (secondaries). Their long legs and feet were black with no sign of paler webs. Bill was black with relatively short nasal tube pressed on to the bill for its entire length. These characteristics are illustrated in Figures 3-8.

Based on personal observations and photographs, and descriptions in Murphy & Snyder (1952), Harper & Kinsky (1978), Harrison (1987), Marchant & Higgins (1990), Enticott & Tipling (1997), and Shirihai (2002.), we have identified the following characteristics as being those which appear to separate the storm petrels we have observed from other dark storm petrels with white-rumps:

Wilson's storm petrel (*Oceanites oceanicus*) appears to have different body/wing proportions although it appears similar in length (Fig 9), has dark underparts, dark underwing (with faint pale centre) and yellow webs on the feet;

Elliot's storm petrel (*O. gracilis*) appears to be smaller, with dark underparts and white patch on central belly only, mostly dark underwing with pale-grey central area and yellow webs on feet;

Black-bellied storm petrel appears larger, has different body/wing proportions (Fig. 10) and distinctive nostril/bill structure; and

White-bellied storm petrel (*Fregetta grallaria*) appears to be larger, has different body/wing proportions, a distinctive nostril/bill structure, and lack of foot projection.

The flight of these "black and white"[1] storm petrels was typically direct, swift and agile (swallow-like) with frequent rapid changes in direction. They typically flew low across the sea surface with rapid wing beats, interspersed with glides at times. When braking suddenly (to change direction or to drop quickly to the sea surface) primaries sometimes flared to give the wings a fleetingly rounded appearance (Fig. 5). They pattered and danced but often only briefly (Fig. 6), sometimes 'belly-flopping' onto the surface of the water. They ran, skipped and, occasionally, while flying at speed pushed off the side of waves to glide and even 'water-ski', alternating between one foot and the other (Fig. 7).

When responding to chumming, these storm petrels generally approached the boat upwind, flying low and directly towards the slick, sometimes passing close to the boat. If birds stopped to linger over the slick they would flutter and patter, dipping to feed. Some continued flying, showing little apparent interest in the slick; others, after investigating the slick, circled around the boat/slick, flying downwind then back upwind to the slick. This pattern might be repeated several times, with additional birds flying in. By contrast, white-faced storm petrels attracted generally stayed with the slick displaying their characteristic pattering feeding behaviour, and at times building to considerable numbers.

We have observed these storm petrels resting on the water with Cook's petrels and Buller's, fleshfooted and fluttering shearwaters in very calm conditions. For the most part they were solitary when observed while cruising. They sometimes fed in the vicinity of, or amongst, white-faced storm petrels, particularly along plankton slicks, or were found in areas where fairy prions were observed. At no time have we heard them vocalise.

[1] Hereinafter we use the term "black and white storm petrel" as the simple descriptor of the birds described above. No formal species identity is implied.

Figure 3 Black and white storm petrel, north of Little Barrier Island, 16 November 2003. Photo: Bryan Thomas

Figure 4 Black and white storm petrel, north of Maori Rocks, Mokohinau Islands, 17 January 2005, showing heavily streaked 'dusky' underparts. Photo: David Stewart

Figure 5 Black and white storm petrel braking sharply, showing how primaries can flare to give the wings a momentary rounded appearance, 17 January 2005. Photo: David Stewart

Figure 6 Black and white storm petrel feeding, north of Maori Rocks, Mokohinau Islands, 17 January 2005. Photo: David Stewart.

Figure 7 Black and white storm petrel photographed 'water-skiing' north-east of Burgess Island, Mokohinau Islands, 4 January 2005. Photo: Hadoram Shirihai

Figure 8 Black and white storm petrel photographed north-east of Burgess Island, Mokohinau Islands, 4 January 2005. Photo: Hadoram Shirihai

Figure 9 Wilson's storm petrel, north-east of North Cape, 27 March 2005. Photo: © Steve Wood.

Figure 10 Black-bellied storm petrel, Port MacDonnell, South Australia, 27 March 2005. Photo: Grant Penryhn.

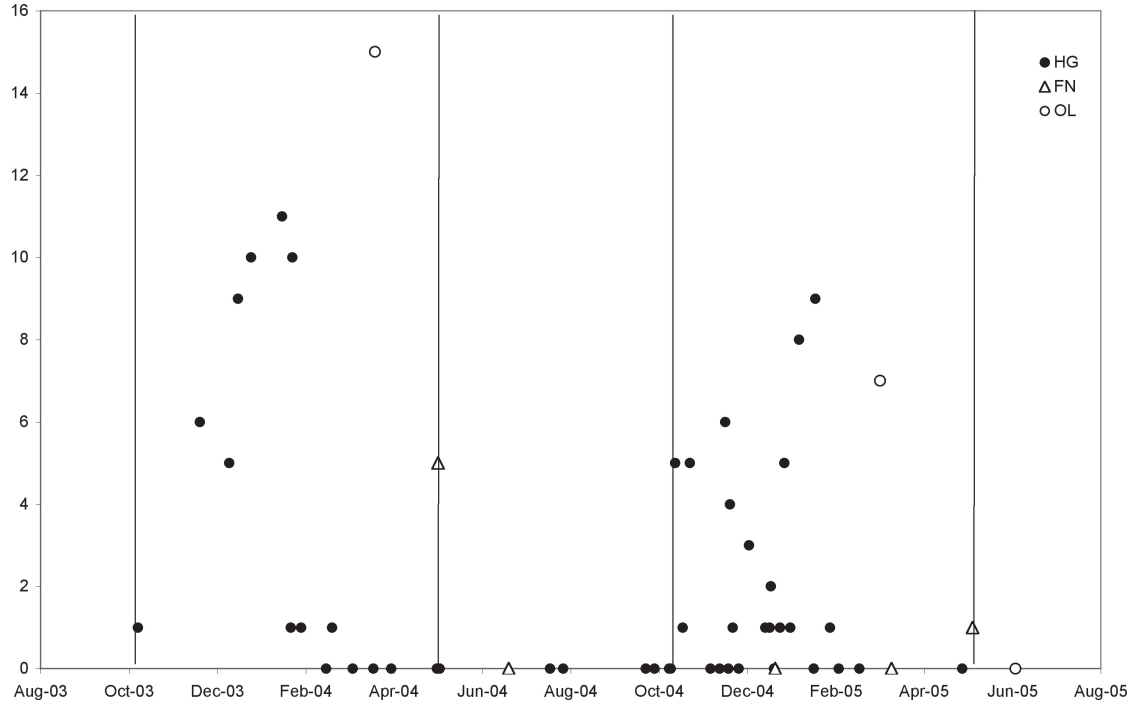

Figure 11 Seasonality and numbers (i.e. individuals seen per day) of black and white storm petrels observed in the Hauraki Gulf and northern New Zealand waters, November 2003-June 2005. Legend: HG – Hauraki Gulf; OL – Outer limits of Hauraki Gulf; FN – Far North.

RESULTS

Sightings

We have divided our sightings of these storm petrels (Appendix 1, 2) into two periods: Period 1, from 1 November 2003 to 24 May 2004 (Fig. 1); and period 2, from 31 October 2004 to 14 May 2005 (Fig. 2).

Period 1

From 1 November 2003 to 26 March 2004 we conducted 12 one-day pelagic seabird- viewing trips in the Hauraki Gulf, seeing the black and white storm petrels on 10 (83%) of them, and made multiple sightings (more than one bird seen during a chumming session, several birds seen at one time, or birds seen at different locations on the same day) on 6 (60%) of them. We encountered calm/light conditions (wind below 10 km/h throughout the day) on five days. Thirteen of 34 (38%) chumming sessions resulted in sightings.

The storm petrels appeared to have left the Hauraki Gulf inside the Mokohinau Islands by mid-March, because they were not seen on three consecutive trips in late March and April 2004 (Appendix 1). However, on 10 April 2004 we saw between 10 and 30 of them well outside the Hauraki Gulf (chumming for 2.5 h), over water of 400m depth, 55 km NNE of Needles Point, Great Barrier Island. By contrast we did not see any on a trip to the vicinity of the Mokohinau Islands on 21 April. On 23 May four black and white storm petrels were observed 37 km E of North Cape, *c.*170 km NW of Mokohinau Islands (Appendix 2). After these sightings, no more were seen during winter 2004 on six seabird-viewing trips (one near North Cape in July; two Hauraki Gulf trips in August and three in October).

Period 2

The black and white storm petrels were observed again on 31 October 2004 in the Hauraki Gulf. Between then and 14 May 2005, we conducted 22 seabird-viewing trips in the Hauraki Gulf and saw these birds on 17 (68%) days, with multiple sightings on 10 (59%) days. Sixteen of 69 (23%) chumming sessions resulted in sightings, perhaps indicating that birds were harder to find this way than in the previous summer. On 13 days there were calm/light conditions thereby diminishing the effectiveness of chumming but contributing to increased sightings while cruising.

On 19 March 2005, we also made one trip to deeper waters adjacent to the Hauraki Gulf when we saw between five and 10 of the storm petrels; they had not been seen on two consecutive trips in the Hauraki

Gulf immediately prior to that date and we did not see any inside the Hauraki Gulf on the way out.

On 18 June we made one trip between Bay of Islands and the Hauraki Gulf and ventured into deep water outside the Poor Knights Islands; no black and white storm petrels were seen. We also made three trips near North Cape (5-7 January, 27 March and 20-22 May, 2005) where, on 21 May we saw one bird fleetingly.

The black and white storm petrels were also found further out in the Hauraki Gulf during summer 2004-2005 (Appendix 1), which may reflect the unusual sea conditions then prevailing within the Hauraki Gulf. Sea-surface temperatures (SST) in December 2004 at Leigh, near Cape Rodney were the coldest in 38 years (J. Evans pers. comm.), averaging 2.7 ºC below the long-term average (18.3 ºC) and more than a degree below the previous lowest. However, SST recovered dramatically through January and was near average throughout February, while March temperatures were average or above average.

Seasonality

We observed the black and white storm petrels in the Hauraki Gulf only during summer (Fig. 11).

DISCUSSION

Sightings

We observed the black and white storm petrels in the Hauraki Gulf west, but mainly north of Little Barrier Island and particularly in the area between it and the Mokohinau Islands, in the vicinity of the Mokohinau Islands, and to the immediate north of this group (Figs. 1, 2). A few sightings were made outside of this general area: SW of Little Barrier; towards the Hen & Chicken Islands; north of Great Barrier Island over deep water during late March and April; and off North Cape in May (Fig. 1). They were observed only during summer.

Both the black and white storm petrels and white-faced storm petrels feed within the Hauraki Gulf, and all sightings of the former were made within 52 km of the Mokohinau Islands. White-faced storm petrels were consistently observed in large numbers within a 10 km radius of the Mokohinau Islands where there is a major breeding colony, and in sizeable but loose groups or scattered individuals between those islands and a line east of Kawau Island. These sightings imply an abundance of food available to storm petrels in the outer Hauraki Gulf during summer. Breeding colonies of white-faced storm petrels within the Hauraki Gulf are at the Mokohinau Islands, 90 km to the south on Noises Islands, and on two islets inside the Coromandel Peninsula (Taylor 2000a,b).

There are potential feeding grounds for storm petrels beyond the Mokohinau Islands between 120-500 m depth but we did not observe in this area to any significant extent. On two occasions when we ventured into deep water (10 April 2004, 19 March 2005) we obtained multiple sightings of black and white storm petrels at the continental shelf slope in areas of warmer water associated with the east Auckland current (Fig. 1). It is possible that they fed in this area throughout the summer as well.

No storm petrels with form, plumage and behavioural characteristics resembling the birds we are reporting on here have been reported on seabird-viewing trips elsewhere around New Zealand e.g., Bay of Plenty, East Cape, Kaikoura, Bank's Peninsula, Otago Coast, Stewart Island, and South Island West Coast (pers. obs.; D. Buurman pers. comm.; *http://groups.yahoo.com/group/BIRDING-NZ*). Nor have there been any reports of such storm petrels from seabird observers on fisheries vessels within New Zealand's territorial waters (S. Bartle pers. comm.). The sighting of a black and white storm petrel off Coromandel Peninsula on 25 January 2003 (Saville *et al*. 2003) was in an area that can be regarded as at the eastern margin of the Hauraki Gulf. The observers, I. Saville and B. Stephenson, did not see these birds east of Coromandel in either September or November 2003 (*http://groups.yahoo.com/group/BIRDING-NZ*, 8 September and 7 November 2003). Although we are aware of few birdwatching trips in northern New Zealand waters outside the Hauraki Gulf, the present absence of black and white storm petrel sightings elsewhere suggests the birds are concentrated in the Hauraki Gulf during summer, and are, therefore, most likely to breed there. The sightings off North Cape in late-May 2004, after a period when they had not been seen in the Hauraki Gulf, could be interpreted as birds dispersing northwards after breeding.

Other storm petrels in the Hauraki Gulf

We have located a number of past records of storm petrels, other than white-faced storm petrels, in Hauraki Gulf waters.

Sandager's (1890) record of a storm petrel he called *Thalassidroma melanogaster* (= *F. tropica*), which flew against the light of the lighthouse atop Burgess Island, Mokohinau Islands in 1886, is intriguing, but without a specimen it remains conjectural.

Jenkins & Croxall (1970) reported two storm petrels with black and white plumage, and with white bellies but some dark marks on the flanks, between Tutukaka and Poor Knights Islands in December 1969, which they identified as white-bellied storm petrels.

On 18 December 1971, a black and white storm petrel was collected on Ngunguru Bay beach from Pataua, east of Whangarei. The specimen lacked feathers on the underparts (W. Campbell,

D. Crockett pers. comm.), and was identified as Wilson's storm petrel and deposited in Museum of New Zealand, where only the bones were preserved (MNZ 17199). However, following analysis of this specimen, Worthy (2000 and pers. comm.) has caste doubt on the specimen's identification.

Several Wilson's storm petrels were reported in the Hauraki Gulf on four separate occasions in April 1990 (Taylor & Parrish 1991). Wilson's storm petrels have been observed regularly east of the North Island during March to May, including North Cape (Petyt 2001). In March and May 2005 we observed Wilson's storm petrels off North Cape, also two *Fregetta* storm petrels (21 May 2005), one most probably a black-bellied storm petrel, the other too distant to identify specifically.

In November 1990, a black and white storm petrel was seen and photographed amongst a group of white-faced storm petrels a few kilometres west of Little Barrier Island (H. Spencer pers. comm.). It was later identified as a grey-backed storm petrel (*Oceanites nereis*). We have not viewed this photograph and a recent search for it has been unsuccessful.

During the period of our study, however, we observed only white-faced storm petrels and the black and white storm petrels in the Hauraki Gulf.

Breeding season and location

We speculate that the black and white storm petrels we have observed in the Hauraki Gulf are summer breeders there. One of the main attractions of the Hauraki Gulf for pelagic seabirds is its islands where many species, including local endemics such as Pycroft's petrel, Buller's shearwater, North Island little shearwater and black (Parkinson's) petrel have important breeding colonies (Taylor 2000a,b). All of these species migrate out of the Hauraki Gulf after breeding (Heather & Robertson 1996; Taylor 2000a,b). Pelagic seabirds, other than those breeding locally, do not frequent or congregate in the Hauraki Gulf during summer months and visit infrequently.

Our observations show that: (1) the black and white storm petrels were present in the Hauraki Gulf throughout two consecutive summers (October/November to March; (2) they appeared to depart from waters inside Mokohinau Islands sometime in March; (3) they persisted in northern New Zealand waters from October to the end of May; and (4) they appeared to use the Hauraki Gulf (and probably adjacent offshore waters) exclusively through summer months in preference to other feeding areas around the New Zealand coast.

This pattern fits well with a breeding season similar to that of white-faced storm petrels in the Hauraki Gulf, but to avoid direct competition for food sources they could breed one - two months later (M.J. Imber pers. comm.). While it is possible the black and white storm petrels remain in New Zealand waters throughout the year, they were not detected on six winter trips off northern New Zealand, including five in the Hauraki Gulf, suggesting it is more likely they are summer breeders and that they move offshore after breeding.

The susceptibility of storm petrels and other small seabirds to rat-predation is well documented for Hauraki Gulf islands (Cunningham & Moors 1985; Taylor 2000b; Pierce 2002) and elsewhere. Therefore, it is most likely that the storm petrels we have observed breed on rat-free islands. While several islands or islets would be suitable as breeding sites by virtue of their being free of rats, one group of islands stands out. The Mokohinau Islands, comprising four islands and 12 islets/stacks, are at the heart of the sightings distribution, they are attractive to small breeding seabirds because of their generally shallow soils and their proximity to the edge of the continental shelf, they include a few stacks and islets that have always been rat-free, and they have all been rat-free since about 1990 (Greene & McFadden 1994).

In April, October, and December 2004, one or both of us took part in visits to the Mokohinau Islands group. Although no storm petrel breeding sites or remains were found, nor birds captured, these searches were concentrated on the more accessible Burgess Island, with visits to some of the smaller western isles being in April only. However, the discovery, in December 2004, of a new breeding colony of white-faced storm petrels spread across the northern peninsula of Burgess Island, the confirmation of breeding of common diving petrels, North Island little shearwaters and fluttering shearwaters, and the finding of prospecting black-winged petrels (*Pterodroma nigripennis*) on Burgess Island highlights its significance to small procellariiforms following rat-eradication, and shows that detailed seabird surveys of all islands in the group are needed. Today the Mokohinau Islands offer excellent, rat-free breeding habitat for a small storm petrel, whether burrowing, amongst dense vegetation or in rock crevices. The spread of white-faced storm petrels to Burgess Island (formerly heavily-grazed, rat-infested and inhabited) from Lizard Islet (where they remain), and perhaps elsewhere, within 15 years illustrates this dramatically.

Are the black and white storm petrels a tropical species?

The possibility that the birds we have observed may represent a tropical species brought into New Zealand waters by 'unique weather or current conditions' was raised during review. A major increase in sea-surface temperatures in the Tasman

Sea and New Zealand waters commenced in 1996, peaked in 2001, and declined towards pre-1996 temperatures by 2002 (P. Sutton pers. comm.). Our study, and the January 2003 sighting (Saville *et al.* 2003), coincided with a period of cool waters in the Hauraki Gulf, including December 2004 when sea-surface temperatures were the coldest in 38 years at Leigh (J. Evans pers. comm.). Significantly, birds similar to our black and white storm petrels have not been observed on monthly seabird-viewing trips off Queensland and New South Wales in Australia (*http://www.sossa-international.org*, 6 June 2005), where a wider range and higher frequency of tropical species are encountered over summer months than in the New Zealand region (Heather & Robertson 1996; Pizzey & Knight 1997). As we have shown, the black and white storm petrels may be absent from coastal New Zealand waters from early June to late October, a period of up to five months.

If the storm petrels we have observed are of a tropical species, then several questions spring to mind: (1) Are four to five months sufficient time for them to return to their tropical colony (colonies), breed, and return to New Zealand waters? (2) Where is a rat-free haven for a small storm petrel in the tropical Pacific? (3) Why have these birds only been detected in north Auckland waters, the Hauraki Gulf in particular? (4) Why would they occur in the Hauraki Gulf, a relative backwater for pelagic seabirds, over two consecutive summers and at a time when the seabirds congregating there are only those that breed there? and, (5) Why would a tropical species favour the Hauraki Gulf during a period of cooler conditions? In our view the most likely scenario is that the black and white storm petrels we have observed breed in the Hauraki Gulf during summer.

The converse suggestion, that these storm petrels breed on subantarctic islands, is also unlikely, because: (1) all sightings have been concentrated in the Hauraki Gulf and adjacent waters during the months when all subantarctic storm petrels are breeding (Heather & Robertson 1996; Shirihai 2002), and (2) no sightings have been reported elsewhere in the New Zealand or Australian region. By contrast, the diminutive grey-backed storm petrels breeding on the Chatham Islands and New Zealand's subantarctic islands (also within Indian and Atlantic Oceans) from August to March (Heather & Robertson 1996; Shirihai 2002) have been seen during 2003 to 2005 at, for example, Kaikoura (in April 2003; *http://www.oceanwings.co.nz*, 6 June 2005), South Island's West Coast (in January 2004; I. Southey pers. comm.) and off Stewart Island (in February 2005; C. Gaskin pers. obs.). Further afield, they are the most abundant storm petrel seen in south-eastern Australian waters and most commonly seen there in the non-breeding months of April to August (Reid *et al.* 2002).

Have we been observing New Zealand storm petrels?

The white-rumped, black and white storm petrels we have observed in the Hauraki Gulf during two summers do not, in our opinion, conform to descriptions of any extant species known from New Zealand waters (Turbott 1990). From their consistent presence and location during summer we have speculated these birds are breeding in the outer Hauraki Gulf from October to March/April, and most likely on the Mokohinau Islands. But what are they? In the absence of any convincing alternative, we speculate these birds may be New Zealand storm petrels, a species known from only three specimens collected in New Zealand waters in the 19th century (Bourne & Jouanin 2004; Medway 2004).

We are aware that the Rare Birds Committee of the Ornithological Society of New Zealand has declined to accept that reports and photographs of black and white storm petrels off Coromandel Peninsula (Saville *et al.* 2003) and in the Hauraki Gulf (near Little Barrier Island) in 2003 (Flood 2003) are of birds identical to the only three known specimens of *Pealeornis maoriana* (UBR 87/03, UBR 87A/03; Rare Birds Committee 2005). The Committee has specifically requested information on foot structure and measurements, details which cannot conclusively be determined from photographs. Consequently, we support the need to capture, measure, band and track these birds to locate their breeding site(s), and to collect tissue for DNA analyses.

If these birds subsequently prove to be New Zealand storm petrels, then our observations will have provided valuable details of their distribution and ecology. If, on the other hand, these birds prove not to be identical to the only three known specimens of *Pealeornis maoriana*, then we have provided a set of observations that deserve further evaluation and explanation.

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Appendix 1

All seabird-viewing days conducted between November 2003 and June 2005 and locations of all sightings. Legend: Date; Latitude/Longitude coordinates of sightings (degrees, minutes, seconds); number (N) of black and white storm petrels seen at chumming locations (CH), or while steaming (ST); weather conditions-wind direction and wind speed (knots) at each chumming location and/or locations where black and white storm petrels were seen.

Date	Latitude °S	Longitude °E	N	Method	Weather
1 Nov 2003	36, 6, 48	175, 4, 48	1	ST	NW 20
13 Dec 2003	36, 6, 2.4	175, 1, 54.6	6	CH	NE 5
2 Jan 2004	36, 5, 48	175, 4, 48	1 + 2	ST, CH	SE 5
	36, 5, 12	175, 3, 48	1	ST	Calm
	35, 53, 24	175, 5, 24	0	CH	Calm
	36, 3, 48	175, 3, 48	1	ST	Calm
8 Jan 2004	36, 5, 48	175, 4, 48	c.6	CH	Calm
	35, 53, 15	175, 1, 52.8	3	CH	NW 5
17 Jan 2004	36, 5, 48	175, 4, 48	5	CH	NE 10
	35, 53, 24	175, 5, 24	0	CH	NE 15
	36, 4, 24	175, 3, 0	1	CH	NE 15
	36, 5, 48	175, 4, 48	4	CH	NE 15
	35, 9, 12	175, 3, 0	0	CH	NE 15
7 Feb 2004	36, 6, 49.8	175, 4, 19.8	0	CH	SW 5
	35, 51, 46.8	175, 5, 2.4	0	CH	SW 2
	35, 53, 18.6	174, 47, 22.8	1	ST	Calm
	36, 4, 0	175, 1, 22.2	c.10	CH	SW 15
13 Feb 2004	36, 4, 5.4	175, 2, 30.6	0	CH	SW 5
	36, 2, 48	175, 8, 19.8	0	CH	SW 2
	35, 56, 57.6	175, 12, 4.8	0	CH	Calm
	35, 58, 44.4	175, 3, 35.4	1	CH	SW 2-5
14 Feb 2004	35, 53, 3	175, 2, 38.4	1	CH	NW 20
	35, 58, 0	175, 6, 0	0	CH	NW 20
	35, 53, 13.8	174, 59, 37.8	6-12	CH	NW 20
	36, 05, 48.0	174, 51, 48.6	1	ST	NW 15
20 Feb 2004	36, 20, 24.6	174, 56, 7.8	1	CH	W 25
	36, 15, 55.2	174, 50, 33.6	0	CH	W 25
	36, 21, 22.8	174, 53, 24	0	CH	W 25
8 Mar 2004	36, 6, 53.4	175, 4, 5.4	0	CH	E 5
	36, 1, 35.4	175, 6, 3.6	0	CH	NE 5
	35, 52, 48	175, 3, 13.2	0	CH	NE 5-10
	36, 2, 0	174 ,58, 0	0	CH	NE 5-10
12 Mar 2004	36, 5, 28.2	175, 4, 25.8	0	CH	SW 5-10
	35, 59, 36	175, 2, 28.8	1	CH	SW 5-10
	35, 59, 19.8	175, 9, 34.2	0	CH	SW 10-15
26 Mar 2004	36, 2, 43.8	175, 1, 42.6	0	CH	SW 5
	35, 52, 40.2	175, 3, 17.4	0	CH	SW 2-5
	35, 54, 50.4	175, 4, 33.6	0	CH	SW 2-5
	36, 2, 0	175, 4, 15	0	CH	SW 0-2
9 Apr 2004	36, 2, 53.4	175, 30, 9.6	0	CH	SW 15
	36, 6, 35.4	175, 32, 0	0	CH	SW 10
10 Apr 2004 (Outer limits)	35, 39, 24.6	175, 32, 9	10 (30)	CH	SW 15-30

Date	Latitude °S	Longitude °E	N	Method	Weather
21 Apr 2004	35, 54, 26	175, 4, 57	0	CH	SW 20
7 Aug 2004	36, 53, 35	175, 5, 8	0	CH	NW 25
	35, 53, 35	175, 2, 34	0	CH	NW 25
16 Aug 2004	36, 26, 46	174, 58, 28	0	CH	S 30
	36, 5, 45	174, 53, 30	0	CH	S 40
11 Oct 2004	36, 02, 13	175, 12, 47	0	CH	SW 5
17 Oct 2004	35, 56, 56	175, 4, 47	0	CH	W 30
	35, 56, 14	175, 2, 44	0	CH	W 35
27 Oct 2004	36, 14, 13	174, 1, 53	0	CH	S 5
	35, 54, 17	175, 1, 53	0	CH	S 5
28 Oct 2004	36, 00, 25	175, 7, 00	0	CH	SW 5
	36, 03, 37	175, 4, 57	0	CH	SW 5
	36, 04, 53	175, 0, 0	0	CH	Calm
	36, 9, 12	174, 57, 6	0	CH	Calm
31 Oct 2004	36, 9, 54.6	175, 0, 26.4	c.5	CH	SW 15
5 Nov 2004	36, 5, 58.8	175, 4, 10.2	1	CH	NW 5
10 Nov 2004	36, 1, 21.6	175, 5, 23.4	0	CH	Calm
	36, 2, 16.2	175, 7, 37.2	4 (6)	CH	Calm
	36, 25, 6	175, 7, 48	0	CH	Calm
24 Nov 2004	36, 19, 12	174, 53, 57	0	CH	SW 5
	36, 17, 40.8	174, 55, 39.6	0	CH	SW 5
	36, 3, 57	175, 1, 55.2	0	CH	SW 5
	36, 16, 52.8	174, 55, 21	0	CH	Calm
	36, 17, 14.4	174, 54, 40.8	0	CH	Calm
30 Nov 2004	36, 20, 55.8	174, 58, 18	0	CH	SW 20-25
	36, 14, 9	174, 55, 9.6	0	CH	SW 20
4 Dec 2004	36, 20, 50.4	174, 53, 30.6	0	ST	Calm
	36, 4, 0	175, 1, 20.4	0	CH	SW 5
	36, 2, 8.4	175, 7, 37.2	0	CH	SE 5
	35, 52, 20.4	175, 14, 1.8	0	CH	E 2
	35, 49, 19.2	175, 4, 7.8	0	CH	Calm
	36, 4, 38.4	175, 5, 5.4	0	CH	Calm
	36, 6, 19.2	175, 5, 5.4	4 (7)	CH	SE 5
6 Dec 2004	36, 6, 13.2	175 1 16.2	0	CH	SW 15-20
	35, 59, 1.8	175 1 46.8	0	CH	SW 10
	35, 52, 21.6	175 1 25.8	0	CH	SW 5
7 Dec 2004	35, 51, 13.8	174, 56, 13.2	1	ST	SW 5-10
	35, 50, 0	174, 54, 18	3	CH	SW 5
	35, 52, 42	174, 51, 39.6	0	CH	W 5
	36, 8, 25.8	174, 57, 3	0	CH	Calm
9 Dec 2004	36, 5, 48	175, 4, 48	1	CH	SW 25-30
	36, 24, 0	174, 56, 0	0	CH	SW 30
13 Dec 2004	36, 6, 36	174, 59, 0	0	CH	Var 0-5
	36, 2, 0	175, 2, 0	0	CH	Var 0-5
	35, 51, 0	175, 9, 0	0	CH	S 0-5
	36, 7, 12	175, 0, 36	0	CH	S 0-5
20 Dec 2004	36, 4, 48	175, 1, 24	0	CH	NW 25-30
	35, 50, 16.8	175, 3, 21	1(3)	CH	NW 5-10
	36, 0, 1.8	175, 1, 24	1	CH	NW 5

Date	Latitude °S	Longitude °E	N	Method	Weather
31 Dec 2004	36, 19, 19.2	174, 54, 42	0	CH	N 5
	36, 9, 28.2	175, 0, 38.4	0	CH	N 0-5
	36, 0, 37.8	175, 1, 39	0	CH	N 0-5
	35, 50, 40.2	175, 0, 3.6	1	CH	N 5
	35, 47, 4.2	174, 57, 58.8	0	CH	N 5
	35, 54, 10.8	174, 57, 8.4	0	CH	N 5
3 Jan 2005	36, 7, 40.2	175, 0, 44.4	0	ST	SW 0-5
	35, 59, 22.2	175, 1, 30	0	CH	Calm
	35, 49, 33.6	175, 9, 11.4	0	CH	Calm
	35, 49, 9.6	174, 57, 5.4	0	CH	Calm
	35, 56, 18	175, 1, 11.4	0	CH	NE 0-5
	36, 0, 0	175, 2, 0	1	ST	NE 5
4 Jan 2005	36, 5, 21	175, 3, 39	0	CH	Calm
	35, 50, 32.4	174, 59, 55.2	0	CH	NW 0-5
	35, 52, 54	175, 10, 52.2	1	CH	Calm
	35, 52, 55.8	175, 10, 40.8	1	ST	NE 2
	35, 52, 54	175, 10, 52.2	0	CH	NE 5
10 Jan 2005	36, 20, 51	174, 56, 27	0	ST	Var 0-5
	36, 18, 0.6	174, 57, 40.2	0	ST	
	36, 3, 7.8	175, 3, 45	1	ST	Calm
13 Jan 2005	36, 7, 0	175, 3, 0	2	ST	Calm
	35, 57, 0	175, 5, 0	2	CH	NW 5
	36, 0, 0	175, 3, 0	1	ST	NW 5
17 Jan 2005	36, 0, 17.4	175, 1, 58.8	0	CH	NW 5-10
	35, 52, 27	175, 10, 47.4	1	CH	NW 10-15
	35, 54, 55.8	174, 51, 25.2	0	CH	NW 5
	35, 54, 18.6	174, 47, 49.8	0	CH	NW 5
	35, 57, 19.2	174, 44, 25.8	0	CH	NW 5
23 Jan 2005	36, 18, 10.2	175, 3, 34.2	1	CH	Calm
	36, 5, 48	175, 5, 40.2	2	ST	Calm
	36, 5, 48	175, 5, 40.2	2	CH	Calm
	36, 4, 21.6	175, 5, 4.2	1	ST	Calm
	36, 6, 6.6	175, 4, 6	1	ST	Calm
	36, 8, 26.4	175, 2, 27	1	ST	Calm
2 Feb 2005	35, 27, 25.2	174, 41, 56.4	0	CH	NE 25
3 Feb 2005	36, 20, 6	174, 57, 33.6	1	ST	SW 5
	36, 7, 51	175, 3, 57	6 (10)	CH	SW 5-10
	36, 10, 49.2	174, 57, 44.4	0	CH	SW 5
13 Feb 2005	36, 5, 56.4	175, 2, 48.6	0	CH	NW 5
	35, 57, 0	175, 9, 0	1	CH	NW 5
	35, 56, 0	175, 2, 0	0	CH	NW 5
	36, 1, 36	175, 3, 0	0	CH	NW 10
19 Feb 2005	36, 8, 0	175, 0, 0	0	CH	SW 5
	35, 50, 0	175, 9, 30	0	CH	N 0-5
5 Mar 2005	35, 51, 36	174, 56, 30	0	CH	Calm
19 Mar 2005	36, 5, 21.6	175, 3, 28.8	0	CH	S 5
(Outer limits)	35, 45, 15	175, 30, 3	5 (10)	CH	S 5
14 May 2005	39, 12, 58	175, 00, 10	0	CH	W 5
	36, 06, 59	175, 01, 53	0	CH	W 5
	36, 04, 28	175, 01, 00	0	CH	W 5
	36, 16, 18	174, 58, 58	0	CH	W 5

Date	Latitude °S	Longitude °E	N	Method	Weather
19 June 2005	35, 05, 35	174, 24, 48	0	ST	NW 5
(Outer limits)	35, 01, 11	174, 32, 10	0	ST	W 5
	35, 01, 27	175, 14, 58	0	CH	SW 5-10
	35, 10, 35	175, 12, 19	0	CH	SW 10
	35, 34, 10	175, 6, 34	0	CH	SW 10

ADDENDUM (added in proof)
On 9 October 2005 two sightings of a black and white storm petrel were made at 35° 59′ 58″S, 175° 00′ 59″E, approximately 12 km south-west of the Mokohinau Islands Other birds present were white-faced storm petrel; fairy prion; Cook's petrel; Buller's, fluttering and flesh-footed shearwaters, common diving petrel and blue penguin (all summer breeders in the Hauraki Gulf), and grey-faced petrel and little shearwater (both winter/spring breeders in the Hauraki Gulf).

Appendix 2

All seabird-viewing days conducted between May 2004 and May 2005 in waters off North Cape. Legend: Date; Latitude/Longitude coordinates of sightings (degrees, minutes, seconds); number (N) of black and white storm petrels seen at chumming locations (CH), or while steaming (ST); weather conditions- wind direction and wind speed (knots) at each chumming location and/or locations where black and white storm petrels were seen.

Date	Latitude °S	Longitude °E	N	Method	Weather
22 May 2004	34, 42, 38	174, 0, 1	0	CH	NW 20
	34, 37, 37	173, 50,37	0	CH	NW25
23 May 2004	34, 26, 41	173, 30, 28	4	CH	SW 15
	34, 24, 48	173, 21, 8	1	ST	SW 20
	34, 24, 35	173, 9, 3	0	CH	SW 25-30
24 May 2004	34, 38, 14	173, 26, 19	0	CH	SW 15
10 July 2004	34, 37, 19	173, 26, 28	0	CH	SE 5
	34, 31, 8	173, 25, 43	0	CH	SE 5-10
	34, 24, 32	173, 10, 50	0	CH	SE 5-10
6 Jan 2005	34, 21, 25	173, 12, 49	0	CH	NW 5
	34, 10, 34	173, 2, 33	0	CH	NW 5
	34, 11, 4	172, 58, 33	0	CH	NW 5
7 Jan 2005	34, 17, 35	173, 17, 25	0	CH	NW 5
	34, 29, 30	173, 30, 13	0	CH	NW 5
27 Mar 2005	34, 20, 5	173, 14, 15	0	CH	NW 5
	34, 21, 58	173, 18, 49	0	CH	NW 5
	34, 26, 41	173, 30, 27	0	CH	NW 5
	34, 34, 0	173, 27, 0	0	CH	NW 5
21 May 2005	34, 8, 30	172, 55, 30	0	CH	Calm
	34, 7, 11	172, 51, 87	0	CH	Calm
	34, 04, 77	172, 57, 73	0	CH	Calm
	34, 10, 56	173, 04, 32	1 pos	ST	NW 5
	34, 14, 20	173, 8, 6	0	CH	NW 5
	34, 18, 66	173, 8, 68	0	CH	NW 5