

COVER NOTE

New Zealand Storm-petrel sighted off Ulladulla, NSW, 29th March 2010

On the final day of the Southern Ocean Seabird Study Association's pelagic trip run from Ulladulla on the south coast of New South Wales (27-29 March, 2010) a 'white-bellied' storm-petrel was seen amongst a large group of Wilson's Storm-petrels that were feeding on the oily slick behind the vessel MV Banks. We considered this bird to be a moulting New Zealand Storm-petrel and are submitting it to the Birds Australia Rarities Committee as such.

The attached photographs are low quality to keep the size of the document as small as possible. Higher quality images of the better photos are available on Raja Stephenson's website (click on the New Zealand Storm-Petrel link on www.adarman.com/Birds/Stormpetrels). Also see Raja's images of New Zealand Storm-petrel from Hauraki Gulf in Dec 2010 (under the pelagics tab). One of these images shows a bird with a similarly small-headed appearance and other images show distinctly grey underwing primary coverts.

BARC SUBMISSION

Species: New Zealand Storm-petrel *Pealeornis maoriana* Mathews 1932

Observers: Dan Mantle, Rob Hynson, Nikolas Haass, Raja Stephenson, Stuart Pickering, David Mitford, Pete Milburn, Lindsay Smith, and other observers on board whom have not seen this submission include John Berggy, Anne Zerneck, Helen & Al Young, and Mark Jenkin.

Time and date: 10am, 29th March 2010

Location: 40km due east of Ulladulla

Water Depth: Continental slope waters (approx. 1000-1200 fathoms)

Sea conditions: Moderate swell (1.5-2m), low waves.

Weather conditions: Slightly overcast with a moderate breeze. Excellent conditions for observation and photography with limited or no glare.

Length and distance of sighting: The New Zealand Storm-petrel made 4 or 5 approaches to the aft of the vessel over the course of 10 minutes. It came as close as 20 metres to the boat allowing a large number of good photographs to be obtained, although it often remained over 100m from the stern. The bird then disappeared for 15-20 minutes before making another 3 or 4 approaches along the slick. It was not seen thereafter.

Other birds observed: A large number of Wilson's Storm-petrels (up to 70 birds) were observed feeding over the slick thus allowing close comparisons in size and jizz with the New Zealand Storm-petrel. Low numbers of Wedge-tailed Shearwaters (20), Great-winged Petrels (5-10), Providence Petrels (1-2), Pomarine Jaegers (2-3) and a lone Long-tailed Jaeger were also seen at this time. An interesting mix of tropical to subtropical species were seen over the course of the two days at sea, including White-tailed Tropicbird (1), White Terns (3), Red-footed Booby (1), Common Noddies (3), Gould's Petrels (10) and Kermadec Petrels (3).

Other species observed on the 28th and 29th March included a Black Petrel, low numbers of Albatrosses (Black-browed, Bullers, Campbells, Indian Yellow-nosed, Shy and various Wandering-type) Arctic and Long-tailed Jaegers, White-faced Storm-petrels, Fluttering, Hutton's, Short-tailed and Sooty Shearwaters, Crested Terns and Australasian Gannets.

DESCRIPTION

Summary description: A small-medium, long-winged storm-petrel with a dark head and upper breast and white belly. There was obvious dark streaking on the flanks, belly, and lower breast. The undertail coverts were somewhat mottled black and white and hard to clearly define – some paler feathers seem to extend further towards the tail along a central line. The dark upperwings showed an inconspicuous thin brownish carpal bar whilst a short, narrow white underwing panel did not extend onto the primary coverts. The bird displayed a large white rump that wrapped around to the white underparts. Dark thigh patches are also evident on the photographs. The bird had very long black legs and the fully black feet protruded well beyond the tail tip.

Size: The bird appeared slightly larger than the accompanying Wilson's Storm-petrels but was still hard to pick out amongst them. This apparent difference in size may have been influenced by the broader spread of the primaries and thus larger wing area as the bird 'pattered' over the slick.

Structure, jizz and flight: The bird had quite a 'lanky' appearance with very long legs, a long slim body, and long wings. The wing shape differs quite dramatically during more determined, faster flight than whilst pattering and gliding over the slick. During direct flight the wings appeared long and relatively narrow with a straight-ish trailing edge and variably pointed wing-tips (images 1a, 2a, 3-6). However, as the bird pattered over the slick the wings appeared significantly broader with a more rounded 'hand' (images 7a, 8a, 9, 14). This difference in apparent wing-shape is also clearly illustrated in Shirihai (2007; pages 216-217).

Structurally the bird appeared rather long-bodied and thin necked without the obvious thick neck and chest that impart such a 'stout' feel to *Fregetta* storm-petrels. Another feature not immediately obvious at sea but commented on by some observers from the digital images was the apparently small-headed appearance of the bird. Interestingly, the figure on page 216 in Shirihai (2007) shows a New Zealand Storm-petrel with a relatively small-headed appearance.

At first the bird was hard to pick from the accompanying Wilson's Storm-petrels but during direct flight to the stern of the boat it would glide for significantly longer distances than the Wilson's Storm-petrels. It typically flew low to the waves and would disappear into the troughs of the 1.5-2m swell. Whilst pattering over the slick, its wings appeared broader than those of the accompanying Wilson's Storm-petrels but this may well have been accentuated by moult (discussed below). Comments made at the time of observation varied from how similar the flight was to Wilson's Storm-petrels to those noting the bird was not as typically erratic as most *Fregetta* storm-petrels. Furthermore, the bird often engaged in pattering on the sea-surface, much in the same manner as the Wilson's Storm-petrels but was not seen to 'chest-off' the waves as *Fregetta* storm-petrels commonly do.

Plumage: The head, upper breast and upperparts were wholly dark other than the broad clean white rump and a very thin, brownish carpal bar, although the latter feature was not easy to see in the field. The broad white rump ($\sim\frac{1}{2}$ to $\frac{2}{3}$ the tail length) wrapped around to the white underparts. The median secondary underwing coverts were white forming a narrow white underwing panel that did not extend onto the primary coverts. The inner primary coverts were dark greyish merging to black outer primary coverts.

The lower breast and belly were white with obvious dark streaking. This streaking varied from quite broad streaks on the flanks that merge somewhat to form ragged lines to much finer streaking on the mid-belly. The border between the dark upper breast and white lower breast and belly is somewhat curved (white extends further towards the head along the mid-line of the breast/belly) and not sharply demarcated, rather it is a ragged edge as the dark streaking 'bleeds' down from the upper breast.

The undertail coverts are rather mottled and appear to grade from mostly white to fully dark towards the tail and from the centre outwards. These darker peripheral undertail coverts merge with the dark thigh patches.

Moult: Although the bird appeared quite long-winged during direct flight, this appearance altered as the bird slowed to feed over the slick and the wings appeared broader than typical for New Zealand Storm-petrel. This apparently atypical wing shape may be due to moult as the bird has clearly moulted several tail feathers and the secondaries may not yet be fully grown (perhaps 4/5 their full length). Thus, the bird may also be 'overspreading' the primaries to compensate for the short secondaries. Compounding this, the outermost primaries may also not be fully grown, further leading to the broader spread and blunter than normal wing-tips in some images. However, there is no obvious difference in colour of the outer primaries to support this, but whether this would ever be obvious in the field or photographs is unsure.

This ongoing moult probably also contributes to the small-headed appearance of the bird as it moults body and head feathers. There is also a small whitish patch on the bird's throat that would appear to be the pale feather bases exposed due to feather wear or moult.

The timing of this moult should also be considered. It would appear that very few New Zealand Storm-petrels in active moult have been observed off New Zealand since the birds were rediscovered in 2003. Is the Ulladulla bird an example of post-breeding moult or are we looking at a pre-breeding age bird perhaps in its 3rd or 4th year?

Bare part colour and structure: The bill was all dark with prominent raised nostrils and a slender hooked tip. The bill length is hard to estimate but is approximately half the width of the head. The legs and feet (including webbing) were all black (see image 16).

The legs were extremely long, almost recalling White-faced Storm-petrel, something that was particularly evident as the legs trailed below the bird or as it pattered on the water surface. With the legs held flat to the tail during longer glides and direct flight the feet protruded well beyond the tail. Generally $\frac{2}{3}$ to the whole of the foot appeared to extend beyond the tail (e.g. images 2a, 7a, 13).

Structural measurements from photographs: There are few structural measurements that can be reliably made from still images due to unmeasured distances and angles. One possible although admittedly crude method that may act as a rough guide to Storm-petrel identification is the foot length:bill length ratio (as suggested by Jeff Davies during email discussions). We have tried to replicate Jeff's initial attempts and recorded an average ratio of 2.29 for the foot:bill length (see table 1). These measurements are very similar to those from measured New Zealand Storm-petrel specimens and considerably greater than for either species of *Fregetta* storm-petrel.

We must stress that we attach a very low confidence to the accuracy of our foot and bill length measurements from the images of the Ulladulla bird and that these measurements do not represent absolute values hence the enormous discrepancy between these values and the ‘absolute values’ listed in Table 2. Locating the base of the bill was particularly problematic. However, the results were surprisingly consistent and seem to fit very well with the identification of this bird as a New Zealand Storm-petrel.

Table 1	foot length*	bill length*	foot:bill length
Ulladulla Storm-petrel	<i>*very low confidence in these measurements</i>		
Photo i	12.2	5.5	2.22
Photo ii	18	8	2.25
Photo iii	21	9	2.33
Photo iv	16.8	7.5	2.24
Photo v	15	6.5	2.31
Photo vi	19	8	2.38
Average			2.29

Table 2 (specimens of known identity)	mid-toe + claw length	bill length	(mid-toe + claw):bill length
NEW ZEALAND STORM-PETREL	28	12.7	2.20
BLACK-BELLIED STORM-PETREL	29.2	15.2	1.92
WBSP	23.6	14.5	1.63
<i>T. lineata</i> (single specimen)	28.6	14.6	1.96

Precise measurements and references are included in Stephenson et al. (2008). These numbers represent the rough averages from various populations that have been measured and cited in the above paper.

CONFUSION SPECIES

Wilson's Storm-petrel *Oceanites oceanicus*

The nominate subspecies of Wilson's Storm-petrel can largely be ruled out by the white belly and prominent dark streaking on the white underparts of the Ulladulla bird. There were large numbers of nominate Wilson's Storm-petrels present with the Ulladulla Storm-petrel and although the behaviour and size were similar, upon closer views the Ulladulla Storm-petrel appeared marginally longer-winged (sometimes appearing broader-winged as the birds fed over the slick). There are occasionally reports of nominate Wilson's Storm-petrels with white belly patches and the Chilean subspecies, *O. o. chilensis*, has a pale underwing panel and a lightly mottled lower belly. However, the combination of white belly and upper breast, dark streaking, very long black legs and feet (including black webbing) easily distinguish the Ulladulla Storm-petrel from all subspecies of Wilson's Storm-petrel.

Recent photos of unidentified Storm-petrels from Puerto Montt, Chile (Dowdall et al., 2009) bear many structural and plumage similarities to *O. o. chilensis* but differ primarily in having a white vent and lower belly and prominent white upperwing and underwing panels. The broad whitish diagonal carpal bars on the upperwing, the white underparts only extending to the lower belly and vent and the lack of dark streaking on these white underparts immediately distinguish these birds from the Ulladulla Storm-petrel.

Elliot's Storm-petrel *Oceanites gracilis*

Elliot's Storm-petrel can be ruled out for many of the same reasons as Wilson's Storm-petrel. The small size, smudgy rather than streaked underparts, more pronounced dark thigh patches, yellowish patches on the foot webbing, and often better defined pale crescent on the upperwing median-secondary coverts all help to distinguish Elliot's Storm-petrel from the Ulladulla bird.

White-bellied Storm-petrel *Fregetta grallaria*

The shorter legs, bulkier body, thicker neck and sharp demarcation between the black upper breast and throat and white lower breast all immediately distinguish White-bellied Storm-petrel from the Ulladulla bird. The deeper chest, larger head, steep forehead and shorter broader wings further distinguish this species from the Ulladulla bird without even considering plumage. White-bellied Storm-petrel can exhibit rather variable plumages, ranging from typical pale forms through variably streaked individuals to full dark morph birds. The intermediate 'streaked' birds would come closest to the Ulladulla bird in terms of plumage but this streaking is generally broader or 'smudgier' than observed on New Zealand Storm-petrel. Stephenson et al. (2008) considered that the intermediate and dark morph individuals of *F. g. grallaria* (Lord Howe and Kermadec Islands) are "not streaked but show gradual darkening of the plumage in the axillaries and flanks" thus the smudgier rather than streaked plumage.

Furthermore, many White-bellied Storm-petrel in fresh plumage also show pale, silvery edges to the scapulars and upperwing coverts; a feature that is not known for New Zealand Storm-petrel and not seen on the Ulladulla bird. The pale bases to some of the throat feathers of the Ulladulla bird is considered to be further persuasive evidence ruling out White-bellied Storm-petrel.

Black-bellied Storm-petrel *Fregetta tropica*

As for White-bellied Storm-petrel, the relatively long narrow appearance of the wings during direct flight, lack of bulk through the body, neck, and head and extremely long foot projection together rule out Black-bellied Storm-petrel on structural grounds alone. The flight style being similar to Wilson's Storm-petrel including much foot pattering on the sea surface but with some longer glides is further tentative evidence against this bird being identified as a Black-bellied Storm-petrel. The Ulladulla bird was also never observed hitting the sea surface with its chest as both species of *Fregetta* are often seen to do.

Relying solely on plumage this bird is very different to any Black-bellied Storm-petrel images or illustrations that we can find in published literature or on the web. Indeed, Stephenson et al. (2008) studied Black-bellied Storm-petrel skins in several museum collections and stated that 'no bird showed patterning remotely similar to the streaking seen in New Zealand Storm-petrel'. However, as for White-bellied Storm-petrel, Black-bellied Storm-petrel is clearly a very variable species. The width or even presence of a black line down the centre of the belly is very variable and some Black-bellied Storm-petrel may show some streaking on the flanks but this is likely coarser/smudgier as for White-bellied Storm-petrels. Dark streaking also appears to be commonest on Black-bellied Storm-petrel with the broadest black ventral lines. The mottled white to dark undertail coverts and dark thigh patches of the Ulladulla bird are also more typical for New Zealand Storm-petrel than Black-bellied Storm-petrel.

Although an admittedly crude method and based on very few images, the bill:foot length ratio of the Ulladulla bird (2.29) is also typical for New Zealand Storm-petrel (2.2) and significantly larger than expected for Black-bellied Storm-petrel (1.92).

'Striped' Storm-petrel *Thalassidroma lineata*

See Stephenson et al. (2008) for a fuller discussion on the taxonomic uncertainties that have confused the identity of five museum specimens that have been variably labelled as *Thalassidroma lineata* or *Fregetta lineata* or *Pealea lineata*. In summary, three of these specimens would appear to represent the type specimens of New Zealand Storm-petrel whilst the remaining two birds are a streaked White-bellied Storm-petrel collected off Huapu I. (Marquesas Is.) in 1922 and a streaked Black-bellied Storm-petrel collected from Upolu, Samoa in 1839. However, there is still considerable debate as to the true identify of the latter specimen but hopefully DNA analyses will help to solve this taxonomic riddle.

It is very difficult to make comparisons between the Ulladulla and Upolu birds; comparing digital images of live birds to old museum specimens is never easy. However, there are certain apparent differences between these birds, namely the streaking is much coarser and smudgier on the Upolu bird and appears to be evenly distributed across the pale underparts and the bill looks to be considerably larger too.

One curious similarity between the Upolu and Ulladulla birds is the apparent small head but what this has to do with moult (Ulladulla bird) and shrinkage of museum specimens (Upolu bird) is difficult to judge.

Intriguingly, Murphy & Snyder (1952) note in their discussion of the 'Pealea phenomenon' (the development of variably streaked individuals in certain storm-petrel populations) is that Peale (1848) recorded *T. lineata* frequently in the torrid zone during the trip to Upolu and that natives on the island 'represented' that the bird bred high up in the mountains. However, there must be some doubt as to the identification

of the birds Peale observed at sea and the gestured identifications made by the islanders due to the lack of quality binoculars or any cameras and problems in communication, respectively. Murphy and Snyder (1952) said as much by noting that 'both statements fit well with the distribution and habits of another petrel with which "Pealea" might readily be confused in the field, namely, *Nesofregetta albigularis*'.

Polynesian Storm-petrel (PSP) *Nesofregetta fuliginosa*
(some authors retain *albigularis* as the specific epithet)

Polynesian Storm-petrel is another polymorphic species that may show dark streaking on a white lower belly and breast. However, Polynesian Storm-petrel is the largest species of Storm-petrel and would differ from the Ulladulla bird in being very obviously larger than Wilson's Storm-petrels. Furthermore, it has a moderately forked tail and all but some dark morph birds show an obvious pale carpal bar formed by white greater coverts on the upperwing (Onley and Schofield, 2007). The intermediate 'streaked' morph birds typically still show a white throat and dark breast band and the rump becomes increasingly dark from the centre outwards (Onley and Schofield, 2007) thus further distinguishing it from New Zealand Storm-petrel.

DISCUSSION

The 'white-bellied' Storm-petrel observed east of Ulladulla on the 29th March, 2010 represents a considerable identification challenge. Of the currently accepted Storm-petrel species, it fits best with the recently rediscovered and relatively poorly known New Zealand Storm-petrel *Pealeornis maoriana*. Excellent descriptions of New Zealand Storm-petrel have been published in the last few years (Flood, 2003; Onley & Schofield, 2007, Shirihai, 2007; and Stephenson et al. 2008) but this data is largely based on birds present in the Hauraki Gulf on New Zealand's north-east coast during the austral spring-autumn period. Little is known about the timing or sequence of moult and how this effects the appearance of the bird or where and when the New Zealand Storm-petrel breeds.

As a group of observers, we are all confident that the structure (small rounded head, thin neck and long body), wing shape, leg length, and various plumage attributes easily rule out either of the *Fregetta* storm-petrels – the two most obvious confusion species. However, the Ulladulla bird differs significantly from most of the New Zealand Storm-petrels observed in the Hauraki Gulf by having darker underwing primary coverts, more rounded and apparently broader wings and a rather small headed-appearance. These latter two features could both be due to the bird being in heavy moult; it is clearly missing several tail feathers and the secondaries may not yet be fully grown. It is also possible that the outer primaries are also not yet fully grown, thus adding to the rounder wing-shape and that head and body moult are contributing to the small-headed appearance. None of these differences represent features that favour identification as another species and may represent a reasonable wing-shape for a moulting New Zealand Storm-petrel. The darker underwing primary coverts are atypical for New Zealand Storm-petrel and thus the Ulladulla bird may represent a darker morph bird of this variable species. Indeed, it would almost be unusual for a Storm-petrel species with white underparts not to have some darker morph birds. Onley and Schofield (2007) do mention that on some more comprehensively streaked birds that the underwing is 'duskier with darker secondary coverts'. The dark underwing primary coverts may also simply be a feature of moult.

The Ulladulla bird appeared slightly larger and longer-winged than the accompanying Wilson's Storm-petrels. The wing-span measurements published in Onley & Schofield (2007) show some overlap between New Zealand Storm-petrel (WS 37.4-38.0cm) and Wilson's Storm-petrel (38-42cm) but also state in the text that New Zealand Storm-petrel is "probably larger than many Wilson's". Stephenson et al. (2008) compiled a large volume of Storm-petrel morphometric data that included measurements of New Zealand Storm-petrels (7 captured and museum specimens) and compared this to Wilson's Storm-petrel data from 6 locations and of several subspecies. This data shows that New Zealand Storm-petrels are shorter winged than some populations of Wilson's Storm-petrel but longer-winged than others. Thus, the slightly larger size of the Ulladulla bird compared to the accompanying Wilson's Storm-petrels may not be remarkable.

There is also strong circumstantial evidence to support the identification of the Ulladulla bird as a New Zealand Storm-petrel. No records of New Zealand Storm-petrel have previously been claimed from Australian waters prior to autumn 2010. However, a remarkable series of observations were made during this period – a New

Zealand Storm-petrel was noted on a pelagic from Port Stephens on the 28th March, 2010, the Ulladulla observation was the following day and a third New Zealand Storm-petrel was sighted from a Wollongong pelagic on the 24th April. These two additional NSW sightings are both considered to be fairly classic New Zealand Storm-petrels with more pointed wings, the white-underwing panel extending onto the underwing primary coverts and variably streaked flanks and bellies. The bird sighted off Wollongong was particularly sparsely and finely streaked but well within the variability of birds observed in the Hauraki Gulf. To our knowledge, neither record has yet been assessed by BARC.

A massive body of warm water moving from the western Pacific Ocean, north of New Zealand, towards the east Australian coast was recorded prior to the Ulladulla and Port Stephens observations and may have played a significant role in bringing these storm-petrels into Australian waters. New Zealand Storm-petrels presumably disperse north from the Hauraki Gulf area during the autumn-winter months and might be expected to be within the region of this unusually prominent east-to-west warm current at this time. These current patterns were probably also responsible for the observations of more tropical, warm water species such as White Tern, Common Noddy, White-tailed Tropicbird, Red-footed Booby, and Gould's and Kermadec Petrels during the course of the Ulladulla pelagic.

Adding to the complication in confidently identifying the Ulladulla bird as a New Zealand Storm-petrel are the sightings of 'white-bellied' storm-petrels with streaked underparts off New Caledonia in 2008 and 2010. The first of these sightings was south of Noumea, New Caledonia on the 7th April, 2008 and was published as a possible New Zealand Storm-petrel by Howell and Collins (2008). Their article included several photographs of the bird or birds they observed. These images show a remarkably similar bird to that observed off Ulladulla; it too had darker underwing primary coverts and a rather small-headed appearance. They also recorded that the bird was slightly larger than the accompanying Wilson's Storm-petrels, a feature they noted was at odds with the measurements published in Onley & Schofield (2007). On the 5th April 2010, a further sighting of a 'white-bellied' storm-petrel with dark streaking on the underparts was made 20nm south of Noumea (Collins 2010). This bird was considered to be too large to be a New Zealand Storm-petrel and the observers postulated that it may represent a potential new species. This bird appeared to differ from the 2008 bird in appearing obviously much larger than the accompanying Wilson's Storm-petrels and in not displaying the same very prominent foot projection.

To conclude, we feel the majority of plumage features, structure, and jizz of the bird observed off Ulladulla on the 29th March, 2010 all point to it being a New Zealand Storm-petrel. Stephenson et al. (2008) state that 'to date, there has been no record of any population of storm petrel that shows similar prominent streaking to that found in New Zealand Storm-petrel'.

ATTACHED PHOTOS

The majority of attached images were provided by Raja Stephenson and Rob Hynson and a few from Daniel Mantle.

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