

Notes on staging bar-tailed godwits (*Limosa lapponica baueri*) at Ouvéa (Loyalty Islands, New Caledonia) during southward migration in 2007

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Abstract: During southward migration from Alaska in 2006, a satellite-tracked female bar-tailed godwit (*Limosa lapponica baueri*) encountered adverse weather and stayed between 19 September and about 28 September 2006 at Ouvéa (Loyalty Islands, New Caledonia), where she apparently died. Ouvéa was visited between 27 September and 7 October 2007 to look for godwits. A total of eight godwits was recorded of which one, thought to be an adult female, may have been a dropout migrant. The remaining birds appeared to be immatures.

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INTRODUCTION

Bar-tailed godwit (*Limosa lapponica baueri*) breeds in coastal Alaska (McCaffery & Gill 2001) and spends the non-breeding season mainly on the east coast of Australia and in New Zealand (Higgins & Davies 1996). Northward migration takes place from late February to late March with birds staging in the Yellow Sea followed by migration to Alaska in late April (Conklin *et al.* 2013). Most birds return to the non-breeding areas between September and October (Conklin *et al.* 2013). This southward migration is the longest single non-stop flight ever recorded for a species, 11,690 km from southwest Alaska to northern New Zealand (Gill *et al.* 2009; Battley *et al.* 2012).

Between 2006 and 2010, ten birds were satellite-tracked during southward migration between 30 August to 17 October (Gill *et al.* 2014). One of which

(H4), did not reach the non-breeding grounds. H4, a female, tagged on 9 June 2006 at Old Chevak, Alaska (61.5279°N, 165.5786°W) departed on southward migration on 10 September 2006. During her trip, she encountered a rapidly developing cyclone in the North Pacific (~35°N, 158°W) which caused her progress to slow through an uncharacteristically long fetch of headwinds (Gill *et al.* 2014). Her last 'in-flight' report came on 18 September 2006, 1,500 km east of Ouvéa, Loyalty Islands, New Caledonia (20.6522°S, 166.5619°E). Between 18 and 19 September 2006, H4 turned west and flew to Ouvéa, from where the transmitter reported on 19 September from the Mouli Bridge area (20.7006°S, 166.4708°E). To reach Ouvéa, she travelled 10,940 km over 9.2 days (Fig. 1) (Gill *et al.* 2009). After her landfall, she stayed at Mouli Bridge for less than two hours and then moved to the middle of the island near Hwaadrila (Fig. 2); the last report from H4 while she was still alive came from this area on 21 September 2006.

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Based on changes in body temperature recorded by satellite transmitter, the bird probably died between 21 and 28 September 2006 near Hwaadrila; however, the transmitter (and/or carcass) was near Lekiny (Fig. 2) for at least another three weeks before the transmitter stopped working. It is unknown how H4 ended up at Lekiny.

To get a better understanding of the environment where H4 occurred, and to investigate if godwits use Ouvéa as a stop-over site, Schuckard visited the island during the southward migration period between 27 September and 7 October 2007.



Figure 1. Southward migration route of bar-tailed godwit H4 between 10 September 2006 and 18 September 2006. Journey track ends at Ouvéa (see Fig. 2).



Figure 2. Map of Ouvéa showing locations mentioned in the text. Bar-tailed godwit H4 made landfall at Mouli Bridge on 19 September 2006; moved to area near Hwaadrila, reported 19–21 September 2006; last report near Lekiny, apparently dead.

STUDY SITE

The west-facing beach, largely of coral sand, along the lagoon side of Ouvéa island was explored from various access points. The northern area could be accessed up to a channel dividing Unyee Island, part of the rim of atoll, from the main island (Fig. 2). The environment around this channel is dominated by sandy tidal flats and mangrove. Most of the eastern, oceanic shores are dominated by hard rocky outcrops of old coral. The only area where shorebirds were recorded was near Mouli Bridge. This connects the main island of Ouvéa to Mouli Island, crossing a ~130 m channel at the northern end of Lekiny Bay (Fig. 2). The Mouli Bridge area was visited daily and the western beach near Hwaadrila (coral sand beach) and Lekiny (inlet bordered with old coral edges) infrequently.

Ouvéa has a tidal range of about 1.3 m, and at low tide, an area of about 3,500m² of coarse, white, coraline sand is exposed north of Mouli Bridge. Superficial observations indicated that one third of the tidal area had a dense infaunal community of at least two species of worms. One polychaete had agglutinated tubes, the other (*c.f.* Sipuncula) created casts on the surface (estimated at about 69 casts per square metre). In Lekiny Bay there is coarse hard coral and coral sand with no obvious evidence of infauna that might be available as prey for shorebirds. The beach near Hwaadrila is coral sand with no evidence of infauna.

All individual godwits were photographed and flight feather moult (Ginn & Melville 1983) and abdominal profiles (Wiersma & Piersma 1995) were recorded. Bar-tailed godwits are strongly sexually dimorphic with males usually being noticeably smaller than females of the same population, however there may be some overlap between populations which may complicate sex determination in the field (Conklin *et al.* 2011). Nonetheless it was possible to assign a gender to all birds observed. Weather data for Ouvéa were recorded during the stay on the island.

RESULTS

Numbers of bar-tailed godwits and other shorebirds (whimbrel *Numenius phaeopus*, Pacific golden plover *Pluvialis fulva*, wandering tattler *Tringa incana*, and crested tern *Sterna bergii*) recorded on each visit are given in Table 1, together with information on tide and weather conditions.

A total of eight godwits were recorded between 27 September and 7 October 2007: six of them north of Mouli Bridge (Table 1). A male and female were recorded on 4 October in Lekiny Bay, south east of Mouli Bridge. No birds were recorded at Hwaadrila. No other potential roosting and foraging sites for bar-tailed godwits were identified on either Mouli

Table 1. Bird and weather records from Ouvéa 27 September – 7 October 2007. Moderate Breeze, wind speeds 11–16 knots, Fresh Breeze, wind speeds 17–21 knots, Strong Breeze, wind speeds 22–27 knots (R. Schuckard pers. obs.). Black border box; front passing through. “nfr” indicates “no further records”.

	27 Sep 07	28 Sep 07	29 Sep 07	30 Sep 07	1 Oct 07	2 Oct 07	3 Oct 07	4 Oct 07	5 Oct 07	6 Oct 07	7 Oct 07									
Time	12:00–12:37	12:00–12:35	11:00–11:30	12:00	17:15–17:40	10:55–11:34	17:00–17:15	11:00–12:00	16:30–16:40	10:45–11:00	17:45–18:00	8:50–9:10	10:30–10:40	17:40–17:51	6:00–6:15	17:00–17:15	9:30–10:39	18:00–18:15	6:00–6:45	
Wind direction	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	Easterly	
Wind	Moderate Breeze	Moderate Breeze	Moderate Breeze	–	Strong Breeze	Strong Breeze	Strong Breeze	Moderate Breeze	Fresh Breeze	Moderate Breeze	Moderate Breeze	Fresh Breeze	Strong Breeze	Moderate Breeze	Fresh Breeze	Fresh Breeze	Fresh Breeze	Moderate Breeze	Moderate Breeze	
Rain	Dry	Dry	Dry	Dry	Big Rain Showers	Rain Showers	Rain Showers	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	
Cloud	0/8	3/8	1/8	–	8/8	8/8	8/8	2/8	3/8	3/8	1/8	2/8	–	4/8	4/8	4/8	7/8	5/8	2/8	
Tide	Falling	Falling	High Tide	High Tide	Low Tide	High Tide	High Tide	High Tide	Low Tide	Incoming	Falling	Low Tide	Incoming	Falling	Falling	High Tide	Falling	High Tide	High Tide	
Disturbance	–	–	–	–	–	–	–	–	–	–	–	–	–	Dog	–	–	–	–	–	
BfG 1 σ	–	–	–	–	1	nfr	–	–	–	–	–	–	–	–	–	–	–	–	–	
BfG 2 σ	–	–	–	–	–	1	nfr	–	–	–	–	–	–	–	–	–	–	–	–	
BfG 3 σ	–	–	–	–	–	1	nfr	–	–	–	–	–	–	–	–	–	–	–	–	
BfG 4 σ	–	–	–	–	–	1	nfr	–	–	–	–	–	–	–	–	–	–	–	–	
BfG 5 σ (Fig.3)	–	–	–	–	–	–	–	–	–	–	–	–	1	nfr	–	–	–	–	–	
BfG 6 (Fig.3)	–	–	–	–	–	–	–	–	–	–	–	–	1	nfr	–	–	–	–	–	
BfG 7 σ (Fig.4)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	nfr	–	
BfG 8 σ	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Whimbrel	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pacific golden plover	7	3	0	0	4	4	4	0	0	0	0	0	0	0	0	0	5	3	1	2
Crested tern	120	135	15	0	0	120	21	40	15	0	0	163	0	0	70	0	0	120	160	80
Wandering Tattler	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0

Table 2. Primary moult and abdominal profile of individual bar-tailed godwits recorded at Ouvéa. (*It is possible that BtG 2 dropped P3 from left and right wing and is same individual as BtG1.

Bird ID	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	Abdominal profile	Bill probing	Outer primary wear	Outer primaries faded	Interrupted moult	Wing covert wear
BtG 1 ♂	1	1	0	0	0	0	0	0	0	0	2.5	-	Slight	Slight	-	-
BtG 2' ♂	1	1	1	0	0	0	0	0	0	0	2.5	Yes	Slight	Slight	-	-
BtG 3 ♂	0	0	0	0	0	0	0	0	0	0	2.5	Yes	-	-	-	-
BtG 4 ♂	0	0	0	0	0	0	0	0	0	0	2.5	Yes	-	-	-	-
BtG 5 ♂	5	5	0	0	0	0	0	0	0	0	2.0	Yes	Moderate to very	Strong	Yes	Slight
BtG 6 ♀	0	0	0	0	0	0	0	0	0	0	1.0	Yes	-	-	-	Very
BtG 7 ♂	5	5	0	0	0	0	0	0	0	0	4.5	Yes	Moderate to very	Strong	Yes	Sight
BtG 8 ♂	5	5	0	0	0	0	0	0	0	0	4.0	-	Moderate to very	Strong	Yes	Slight

or Ouvéa islands. Godwits were seen probing on exposed tidal sand flats/in shallow water over tidal sand flats (Table 2) at Mouli Bridge, but were not seen ingesting big prey, despite the presence of apparently suitable worms (Estrella *et al.* 2011).

The presence of six of the seven godwits coincided with strong easterly winds (22–27 knots), and there was no relationship between their occurrence and the state of tide. Birds apparently departed within a day.

Two birds were in active primary moult having

dropped the inner two or three primaries with slightly worn outer primaries and faded tips. Three birds showed no primary moult. One of the latter was the only female seen; the visible upper wing coverts were very worn (Fig. 3). Three birds showed interrupted primary moult, having replaced the inner two primaries (Table 2, Fig. 4). The birds with interrupted moult had moderately-very worn outer primaries with strongly faded tips, whereas those which had just started moult showed less wear and fading.



Figure 3. Bar-tailed godwit BtG5 (left) with interrupted primary moult. BtG6, a thin female (right), with no moult; a possible drop out migrant from Alaska – Ouvéa, 4 October 2007 (Photograph: R. Schuckard).



Figure 4. Bar-tailed godwit BtG7 with interrupted primary moult, Inner two primaries replaced, fresh; outer primaries moderate-very worn and faded – Ouvéa, 6 October 2007 (Photograph: R. Schuckard).

DISCUSSION

It is uncertain which subspecies of bar-tailed godwits occurs in New Caledonia – H4 was *baueri*, as were all the birds that were recorded in 2007. However, Barré and Dutson (2000) give ‘Sib[erial]’ as the origin, suggesting that the birds are *menzbieri*. It is possible that both forms may occur. Neither *baueri* nor *menzbieri* undertake any primary moult before departing the breeding grounds but initiate primary moult shortly after arriving on the non-breeding grounds in Australia and New Zealand (Higgins & Davies 1996; McCaffery & Gill 2001); *baueri* initiate primary moult 3–29 d (mean 15.7 d) after arrival in New Zealand (Conklin & Battley 2012). Moult of the flight feathers of long-distance migrants is usually delayed until they reach the non-breeding grounds in the southern hemisphere (Remisiewicz 2011), and thus the two birds seen which had just started primary moult (BtG1 and BtG2) are likely to have remained in New Caledonia for some time, if not the entire non-breeding season.

Interrupted moult has not been recorded in godwits in either Australia or New Zealand. The worn and faded feathers of the birds in interrupted moult suggest that either the feathers are older than those of birds that are not in interrupted moult and/or that the birds may have spent time in the tropics where bright UV light would result in increased fading/wear. It appears that some bar-tailed godwits remain in New Caledonia over the Austral winter with records from June (Macmillan 1938) and July (Reid 2017). Such birds are most likely immatures and would be expected to start moult before returning adults, but such moult would be most unlikely to be interrupted. Some bar-tailed godwits staging on southward migration along the Jiangsu coast, East China, undertake at least some

moult of the primaries (Li *et al.* 2015); an adult male bird that appeared to be *baueri* was recorded with interrupted moult, having replaced the inner three primaries, in October 2019 (DSM *unpubl. data*). It is not known where these birds spend the non-breeding season.

Of the birds that were not in active moult, abdominal profiles (Table 2) suggest that all were carrying some fat and thus were unlikely to be recent arrivals from Alaska, apart from BtG6 (Fig. 3) which was very thin; potentially it was a recent arrival, and possibly a drop out migrant from Alaska.

Age of first breeding in *baueri* is unconfirmed, but McCaffery & Gill (2001) noted that birds spent their ‘first, second and probably their third boreal summers after fledging on the non-breeding grounds’ and that ‘subadults [are] not known to have partial northward migration’. Subsequently, however, Battley (2007) reported several instances of birds in their second year migrating at least as far as East Asia, and one returned to Alaska. It is possible that some birds in the southwest Pacific may be immatures from Australasia that have undertaken a partial northward migration.

Bar-tailed godwits are widespread throughout much of the Pacific during southward migration (Gill *et al.* 2005), and during the non-breeding season are recorded throughout Micronesia and Fiji, but becoming uncommon east of Samoa, Niue, and the Hawaiian Islands (Pratt *et al.* 1989). In New Caledonia, bar-tailed godwit is the third commonest shorebird (after Pacific golden plover and tattlers *Tringa incana/brevipes*), being ‘fairly common’ between October and April, with the highest individual count being 26 birds (Barré & Dutson 2000). Layard & Layard (1880) noted that local people reported that ‘Uvéa [read: ‘Ouvéa’] swarms with waders and waterfowl’; the first record of bar-tailed godwit from the island was one on 14 February 1938 (Macmillan 1938). The 2007 records are similar to ten earlier records (max 4) from Ouvéa in October 2001 and two from Lifou, also in the Loyalty Islands, between November 1999 to September 2000 (Barré *et al.* 2006). Godwits are not always occurring on the Loyalty Islands during the migration period. No godwits were recorded from Lifou (14–17 October) and Ouvéa (17–21 October) over the 2019 season (Steve Wood *pers. comm.*).

While the occurrence of bar-tailed godwits in New Caledonia is well established, much remains to be learned about their ecology and to which population(s) they belong.

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