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ARTICLE

Offshore surprises: new at-sea bird records for Suriname (2013–2015)

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ABSTRACT: Bird observations were collected from various types of survey vessels in Suriname's territorial waters between 2013 and 2015. Dedicated, effort-related surveys were carried out from geophysical seismic survey vessels within an area located 80–110 km offshore (in 2013) and 165–290 km (in 2015). Opportunistic observations were recorded during fisheries surveys on a shrimp trawler operating along the 30 m depth contour, approximately 40–60 km offshore (in 2014). In total, 10 bird (sub-)species were observed during these surveys that previously were not recorded for Suriname, including Manx Shearwater *Puffinus puffinus*, Ruff *Calidris pugnax*, South Polar Skua *Stercorarius maccormicki*, Long-tailed Jaeger *Stercorarius longicaudus*, Sandwich Tern *Thalasseus sandvicensis* (ssp. *acuflavidus*), Roseate Tern *Sterna dougallii*, Bridled Tern *Onychoprion anaethetus*, Black Noddy *Anous minutus*, Scarlet Tanager *Piranga olivacea* and Black-and-white Warbler *Mniotilta varia*. In addition, Lesser Black-backed Gull *Larus fuscus* and Bulwer's Petrel *Bulweria bulwerii* were photographed for the first time in Suriname. A Sooty Shearwater *Ardenna grisea* was recorded just outside the Exclusive Economic Zone (EEZ), and therefore does not count as a new country record. This paper contributes to a better understanding of the avifauna frequenting the waters off Suriname, which historically has been poorly studied. Most of the species reported here are migratory. The timing of our sightings therefore also helps in a better understanding of their at-sea distribution and migration patterns.

KEY-WORDS: at-sea distribution, avifauna, EEZ, Guianan Ecoregion, migration patterns.

INTRODUCTION

Suriname is home to a great diversity of tropical flora and fauna (Latawiec *et al.* 2014). Whereas the avifauna of Suriname's terrestrial and intertidal habitats is relatively well documented (Ottema & Spaans 2008, Ottema *et al.* 2009, Spaans *et al.* 2015), little is known of the birds inhabiting the country's coastal and offshore marine waters. A study between May and July 2012 (de Boer *et al.* 2014) was the first dedicated bird survey conducted offshore Suriname within the last forty years, with previous knowledge relying only on sporadic observations (Ottema *et al.* 2009, A.L. Spaans pers. comm.).

In 2013 and 2015, dedicated marine fauna observations were made from survey vessels operating off Suriname, related to offshore seismic explorations. Furthermore, birds were opportunistically recorded during fisheries surveys on a shrimp trawler in 2014. This paper reports on some remarkable bird observations during these surveys, representing species or subspecies that were not yet (adequately) recorded for Suriname. By discussing each observation, we aim to increase the documented information on the bird species frequenting Suriname's marine waters, and to contribute to a better understanding of their distribution.

METHODS

Study area

Suriname is situated along the northern coast of South America, it meets the Atlantic Ocean in the north and borders Brazil in the south. Together with its neighboring countries Guyana, to the west, and French Guiana, to the east, the region is referred to as the Guianas. Suriname's territorial waters (Exclusive Economic Zone; EEZ) stretch 370 km (200 nautical miles) offshore from the 386 km long coastline. The inner part of the EEZ is characterized by a wide and smoothly sloping continental shelf, which is part of the Guianan Ecoregion of the North Brazil Shelf Province (Spalding *et al.* 2007). Beyond the 100 m depth contour, water depth rapidly increases to 4600 m as the shelf plunges into the depths of the Western Central

Atlantic Basin (Fig. 1). The Suriname EEZ is profoundly influenced by the turbid freshwater discharge from the Amazon River (Heileman 2008), which is carried north-west by the North Brazil Current and the Guiana Current (*e.g.* Hellweger & Gordon 2002). As a consequence, shelf waters in the region can be characterised by three major zones parallel to the coast (*e.g.* Lowe-McConnell 1962, Willems *et al.* 2015). The *brown* nearshore waters have a high turbidity and low salinity due to suspension of the muddy deposits and freshwater input of both the Amazon and local rivers. Between 20 and 50 km offshore, the combination of riverine nutrient input and decreased turbidity creates a productive zone with high chlorophyll concentrations, termed the *green water zone*. Offshore from this zone irradiance further increases, while nutrients become limited for primary production, resulting in *blue waters*. Blue waters cover most of the EEZ and receive nutrients from upwelling along the continental slope (Artigas *et al.* 2003). Sea surface temperatures are around 27–29ºC throughout the year, and wind and wave patterns in the area are dominated by north-eastern trade winds (Miloslavich *et al.* 2011). Most rainfall and peak river discharge occur between December and July (Amatali 1993). From August to November, the Guiana Current weakens and the weather is drier and calmer, causing warmer sea surface waters (*e.g.* Augustinus 2004).

Dedicated marine fauna surveys

Dedicated, effort-related marine fauna observations were carried out in the offshore waters of Suriname during geophysical seismic surveys in 2013 and 2015. The 2013 surveys (12 June to 5 July and 6 August to 18 September) took place onboard the *Polarcus Naila* (length 90 m) which operated 80–110 km off the Suriname coast in water depths ranging from 40 to 60 m. The 2015 survey (2 May to 17 September) took place onboard *Ramform Sterling* (length 102 m), which mainly operated between 150 and 300 km offshore, in water depths ranging 100–2000 m, although deeper waters (*c.* 5000 m) well outside the EEZ were also visited in late May and June.

Both vessels operated with a speed over ground of *c.* 4 knots. Observations were carried out during all daylight hours (06:10–19:00 h, local time). One observer would carry out a 2 h observation watch whilst the other observer was on break. Observational effort was conducted from the bridge wings and foredeck (both at 20 m height on *Polarcus Naila*, and 18.5 and 14 m height on *Ramform Sterling*). The observers scanned the sea predominately with the naked eye, but also used binoculars (8 × 43 and 10 × 42). Environmental observations collected included Beaufort wind speed (Bft) and direction, swell height (low <2 m, medium 2–4 m and large >4 m) and visibility (estimated by eye: poor <1 km, moderate 1–5 km and good >5 km), glare intensity (strong, weak, variable or no glare) and Beaufort Sea Scale (BSS). A GPSMAP76CSx (Garmin GPS) was used to log the ship›s position every minute. The presence of floating mats of brown macroalgae of the genus *Sargassum* was logged on an hourly basis.

A daily presence/absence log was kept for the seabird species observed during the surveys. Further,

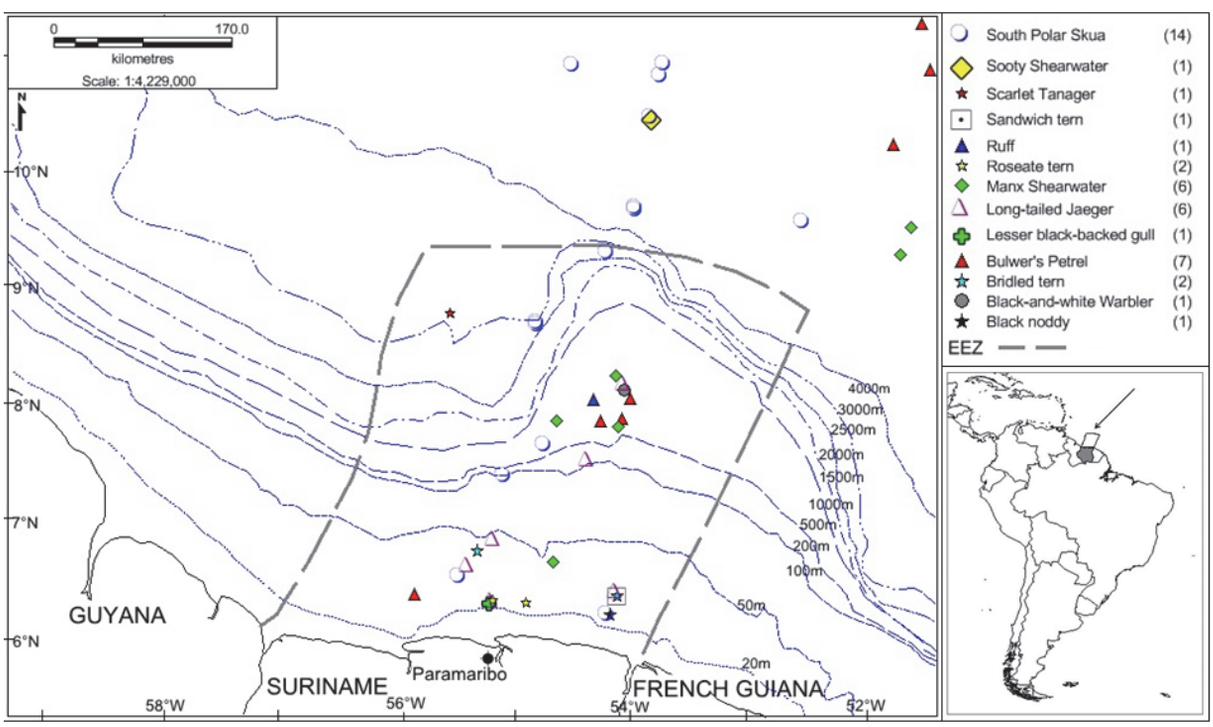

Figure 1. Map of the Suriname Exclusive Economic Zone (EEZ). The location of observation of 13 remarkable bird species is indicated with symbols.

systematic transect seabird surveys were carried out in 2015 for periods of 12 weeks (2 May–22 July) and 3 weeks (27 August–17 September). This involved standard observational periods of 60 min duration, carried out by one observer operating a 500 m wide transect on one side and ahead of the vessel, but without specifying band transect subdivisions (Webb & Durinck 1992). All birds, both resting on the water and flying were recorded within visual range (*c.* 1000 m) and an index of abundance was computed (birds.km^{-1}; de Boer *et al.* 2014).

Digital cameras with zoom lenses (Canon 7D with a 200 mm, f2.8 lens, Canon EOS550D with a 100–400 mm, f4.5–5.6 lens and a Nikon D7000 with 80–300 mm, f4.5–5.6 lens) were used to take photographs of seabirds when feasible. This allowed for subsequent identification checks of difficult or distant birds and provided reference material. Regular observation was also undertaken to check for species known to follow ships. All seabird identifications were confirmed by at least two observers or by photographs to alleviate any "single observer" issues.

Opportunistic records

Between March and November 2014, birds were observed, and opportunistically recorded, during six fisheries surveys (five to seven days each) onboard FV *Neptune-6,* a 25 m–long outrigger shrimp trawler. The vessel mostly operated along the 30 m depth contour, between 40 and 60 km off the coast, fishing for Atlantic Seabob Shrimp *Xiphopenaeus kroyeri* with otter bottom trawls. Whenever time and workload permitted, birds resting on or circling around the vessel were observed using binoculars (10 × 42), and photographed with a DSLR camera (Nikon D7000, 80–200 mm, f2.8 lens with 1.7× teleconverter). Potentially interesting sightings were recorded with date, time and position from the vessel's GPS. No information on weather or sea state was recorded.

RESULTS AND DISCUSSION

General survey results

Dedicated marine fauna surveys: in 2013 and 2015, dedicated marine fauna surveys took place during 70 and 140 days, respectively. During these surveys a total of 25 seabird species were recorded and identified to species level. Some birds could only be identified to a higher taxonomic level (Table 1).

The 2013 survey took place relatively close to the coast. Magnificent Frigatebird *Fregata magnificens* was the most frequently recorded species during this survey (in 47% of the days), followed by Laughing Gull *Leucophaeus atricilla* (27%), Masked Booby *Sula dactylatra* (10%), Great Shearwater *Ardenna gravis* (10%) and Brown Booby *Sula leucogaster* (9%). Unidentified tern sp. (16%) and storm-petrel sp. (11%) were also recorded regularly (Table 1). In 2015, Sooty Tern *Onychoprion fuscatus* was recorded most frequently (26%), followed by Great Shearwater (20%), Pomarine Skua *Stercorarius pomarinus* (14%), Red-billed Tropicbird *Phaethon aethereus* (13%), Masked Booby (10%) and Audubon's Shearwater *Puffinus lherminieri* (9%). Unidentified shearwater and large skuas were recorded in 15% and 11% of the days, respectively (Table 1). During the systematic transect survey in 2015, a total of 3615 seabirds were recorded during all weather conditions. When adjusting for "good viewing conditions" (BSS 0–4, good visibility and swell <4 m), a total of 3598 seabirds were recorded over 6644 km of transect. From this survey, the relative abundance of seabirds was computed within the 1000 m strip-width as 0.36 birds.km^{-1}. During June the abundance was the highest (0.60 birds.km^{-1}), with Great Shearwater (0.20 birds.km^{-1}) and Sooty Tern (0.32 birds.km^{-1}) being the most frequently recorded species. Skuas and jaegers peaked in May (0.03 birds.km^{-1}) and terns were most abundant in June (0.34 birds.km^{-1}), late August (0.60 birds.km^{-1}) and September (0.28 birds.km^{-1}). These observations are in agreement with the previous dedicated marine fauna survey off Suriname in June–July 2012 (de Boer *et al.* 2014), when Great Shearwater was also most abundant in June. However, in 2012 shearwaters were dominant, whereas terns were the most frequently recorded in 2015.

During the dedicated marine fauna surveys, several species were observed and photographed that are relatively little known or were previously unreported for Suriname. As outlined below, these include Manx Shearwater *Puffinus puffinus*, Sooty Shearwater *Ardenna grisea*, Bulwer's Petrel ***Bulweria bulwerii***, Ruff *Calidris pugnax*, South Polar Skua *Stercorarius maccormicki*, Long-tailed Jaeger *Stercorarius longicaudus* and Bridled Tern *Onychoprion anaethetus*, but also two passerines: Scarlet Tanager *Piranga olivacea* and Black-and-white Warbler *Mniotilta varia* (Table 2).

In addition, terrestrial birds were observed on their northbound migration (in 2015) and southbound migration (in 2013 and 2015), but non-migratory terrestrial birds were also occasionally observed. The terrestrial birds recorded included Cattle Egret *Bubulcus ibis* (Status in Suriname: breeding resident), Semipalmated Plover *Charadrius semipalmatus* (northern migrant & present year-round), Short-billed Dowitcher *Limnodromus griseus* (northern migrant & present year-round), Whimbrel *Numenius phaeopus* (northern migrant & present year-round), Spotted Sandpiper *Actitis macularius* (northern migrant & present year-round), Lesser Yellowlegs *Tringa flavipes* (northern migrant & present year-round), Willet *Tringa semipalmata* (northern

Table 1. Results of the dedicated marine fauna surveys off Suriname coast. Overview of the total number of days during which different seabird species were recorded during the absence/presence seabird census carried out in 2013 (total number of survey days *n* = 70) and 2015 (*n* = 140).

Common name	Scientific name	2013		2015	
		No. of days	% of total days	No. of days	% of total days
Sooty Shearwater	*Ardenna grisea*	0	0	1	0.7
Manx Shearwater	*Puffinus puffinus*	0	0	4	2.9
Cory's Shearwater	*Calonectris diomedea*	0	0	11	7.9
Great Shearwater	*Ardenna gravis*	7	10	28	20
Audubon's Shearwater	*Puffinus lherminieri*	1	1.4	13	9.3
Shearwater sp.	*Puffinus* sp.	2	2.9	21	15
Bulwer's Petrel	*Bulweria bulwerii*	0	0	5	3.6
Petrel sp.		1	1.4	3	2.1
Wilson's Stormpetrel	*Oceanites oceanicus*	1	1.4	2	1.4
Leach's Stormpetrel	*Oceanodroma leucorhoa*	2	2.9	7	5
Stormpetrel sp.	*Oceanites/Oceanodroma* sp.	8	11.4	4	2.9
Red-billed Tropicbird	*Phaethon aethereus*	1	1.4	18	12.9
Large Skua	*Stercorarius* sp.	1	1.4	16	11.4
South Polar Skua	*Stercorarius maccormicki*	0	0	7	5
Pomarine Skua	*Stercorarius pomarinus*	3	4.3	19	13.6
Parasitic Jaeger	*Stercorarius parasiticus*	1	1.4	1	0.7
Long-tailed Jaeger	*Stercorarius longicaudus*	0	0	5	3.6
Jaeger sp.	*Stercorarius* sp.	5	7.1	11	7.9
Laughing Gull	*Leucophaeus atricilla*	19	27.1	7	5
Magnificent Frigatebird	*Fregata magnificens*	33	47.1	5	3.6
Masked Booby	*Sula dactylatra*	7	10	14	10
Brown Booby	*Sula leucogaster*	6	8.6	6	4.3
Red-footed Booby	*Sula sula*	1	1.4	7	5
Brown Noddy	*Anous stolidus*	0	0	1	0.7
Sooty Tern	*Onychoprion fuscatus*	5	7.1	36	25.7
Bridled Tern	*Onychoprion anaethetus*	1	1.4	0	0
Least Tern	*Sternula antillarum*	3	4.3	3	2.1
Cayenne/Sandwich Tern	*Sterna sandvicensis*	1	1.4	2	1.4
Common Tern	*Sterna hirundo*	2	2.9	5	3.6
Royal Tern	*Thalasseus maximus*	1	1.4	0	0
Tern sp.	*Sterna* sp.	11	15.7	4	2.9

migrant & present year-round), Ruddy Turnstone *Arenaria interpres* (northern migrant & present year-round), Red Knot *Calidris canutus* (northern migrant & present year-round), Sanderling *Calidris alba* (northern migrant & present year-round), Semipalmated Sandpiper *Calidris pusilla* (northern migrant & present year-round), Least Sandpiper *Calidris minutilla* (northern migrant & present year-round), Short-tailed Swift *Chaetura brachyura* (breeding resident), Small-billed Elaenia *Elaenia parvirostris* (southern migrant & present from July to August), Fork-tailed Flycatcher *Tyrannus savanna* (breeding resident), Caribbean Martin *Progne dominicensis* (northern migrant & present year-round), Grey-breasted Martin *Progne chalybea* (breeding resident) and Barn Swallow *Hirundo rustica* (northern migrant & present year-round) (status in Suriname all according to Spaans *et al.* 2015).

Opportunistic records: in 2014, six fisheries surveys took place on the shrimp trawler, totaling 37 days spent at sea. When discarding fish (from bycatch), this attracted

Table 2. Details on the observations of 13 bird species offshore Suriname in 2013–2015. DS = dedicated marine fauna surveys; OR = opportunistic records, EEZ = Exclusive Economic Zone.

Common name	Scientific name	Number	Date	Decimal Latitude	Decimal Longitude	EEZ	Method	Behaviour	Note
Manx Shearwater	*Puffinus puffinus*	2	12 May 2015	7.8775	-54.6123	IN	DS	Travel W	First record for Suriname
		1	7 Jun 2015	9.3366	-51.6577	OUT	DS	Travel E	
		1	07 Jun 2015	9.5652	-51.5585	OUT	DS	Travel NW	
		1	4 Jul 2015	7.8316	-54.0895	IN	DS	Travel NE	
		1	18 Jul 2015	8.2690	-54.0979	IN	DS	Travel NE	
		1	17 Sep 2015	6.6522	-54.6491	IN	DS	Travel NW	
Sooty Shearwater	*Ardenna grisea*	1	9 May 2015	10.5119	-53.7821	OUT	DS	Travel N	
Bulwer's Petrel	*Bulweria bulwerii*	1	4 Jun 2015	11.3458	-51.4595	OUT	DS	Travel NW	First photograph for Suriname
		1	5 Jun 2015	10.9464	-51.3892	OUT	DS	Travel SE	
		1	5 Jun 2015	10.2902	-51.7117	OUT	DS	Travel E	
		1	29 Jun 2015	8.0719	-53.9851	IN	DS	Travel NW	
		1	01 Jul 2015	7.9058	-54.0491	IN	DS	Travel NW	
		2	16 Jul 2015	7.8788	-54.2402	IN	DS	Travel E	
Ruff	*Philomachus pugnax*	1	18 Aug 2015	8.0704	-54.2977	IN	DS	Resting on water	First record for Suriname
South Polar Skua	*Stercorarius maccormicki*	1	25 May 2014	6.1833	-54.1833	IN	OR	Travel	First record for Suriname
		1	3 May 2015	7.3909	-55.0654	IN	DS	Travel NW	
		1	7 May 2015	10.9682	-54.4549	OUT	DS	Travel NW	
		1	9 May 2015	10.9804	-53.6731	OUT	DS	Travel N	
		1	9 May 2015	10.8799	-53.6988	OUT	DS	Travel N	
		1	9 May 2015	10.5119	-53.7821	OUT	DS	Travel N	
		2	10 May 2015	9.7256	-53.9231	OUT	DS	Travel N	
		1	10 May 2015	9.7040	-53.9231	OUT	DS	Travel N	
		1	10 May 2015	9.3357	-54.1720	IN	DS	Travel N	
		1	11 May 2015	8.7274	-54.7720	IN	DS	Travel N	

Common name	Scientific name	Number	Date	Decimal Latitude	Decimal Longitude	EEZ	Method	Behaviour	Note
		1	11 May 2015	8.7044	-54.7744	IN	DS	Travel S	
		2	13 May 2015	7.6665	-54.7182	IN	DS	Travel N	
		1	17 May 2015	9.6135	-52.4838	OUT	DS	Travel NE	
		1	17Jun 2015	6.5188	-55.4521	IN	DS	Travel NE	
Long-tailed Jaeger	*Stercorarius longicaudus*	1	4 Apr 2014	6.3833	-54.1167	IN	OR	Feeding on discards	First record for Suriname
		1	18 Nov 2014	6.3000	-55.1833	IN	OR	Feeding on discards	
		1	18 May 2015	6.8347	-55.1550	IN	DS	Travel N	
		1	17 Jun 2015	6.6044	-55.3880	IN	DS	Travel NE	
		1	15 Jul 2015	8.1930	-54.0332	IN	DS	Travel S	
		1	16 Jul 2015	7.5328	-54.3541	IN	DS	Travel N	
Lesser Black-backed Gull	*Larus fuscus graesslii*	1	8 Oct 2014	6.3000	-55.2000	IN	OR	Resting on ship	First photograph for Suriname
Sandwich Tern	*Thalasseus sandvicensis acuflavidus*	1	4 Apr 2014	6.3500	-54.1000	IN	OR	Resting on ship	First record for Suriname
Roseate Tern	*Sterna dougallii*	4	15 Jul 2014	6.3000	-54.8833	IN	OR	Resting on ship	First record for Suriname
		1	7 Oct 2014	6.3167	-55.1667	IN	OR	Resting on ship	
Bridled Tern	*Onychoprion anaethetus*	1	20 Jun 2013	6.7482	-55.2957	IN	DS	Resting on floating log	First record for Suriname
		1	3 Apr 2014	6.3667	-54.1000	IN	OR	Travel	
Black Noddy	*Anous minutus*	1	23 May 2014	6.2000	-54.1667	IN	OR	Resting on ship	First record for Suriname
Scarlet Tanager	*Piranga olivacea*	1	27 May 2015	8.8159	-55.5189	IN	DS	Travel NW	First record for Suriname
Black-and-white Warbler	*Mniotilta varia*	1	16 Jul 2015	8.1481	-54.0366	IN	DS	Resting on ship	First record for Suriname

many birds to the shrimp trawler. The species composition of these accompanying birds consisted of hundreds of terns, mainly Common Terns *Sterna hirundo* and Cayenne Terns *Thalasseus sandvicensis (*ssp. *eurygnathus*). Further, up to 60 Magnificent Frigatebirds were counted circling around and resting on the boat. Occasionally, flocks of skuas were also attracted to the vessel.

From this shrimp trawler, several species were observed and photographed in 2014 that are relatively little known or were previously unreported for Suriname. As discussed below, these species include South Polar Skua, Long-tailed Jaeger, Lesser Black-backed Gull *Larus fuscus*, Sandwich Tern *Thalasseus sandvicensis* (ssp. *acuflavidus*), Roseate Tern *Sterna dougallii*, Bridled Tern and Black Noddy *Anous minutus* (Table 2).

Species accounts

Manx Shearwater Puffinus puffinus: on 12 May 2015, two small shearwaters *Puffinus* sp. were observed 213 km

off the Suriname coast (Fig. 1). The weather was choppy with a strong northeasterly breeze (6 Bft). There was no cloud cover and there was a moderate swell (3 m). The two shearwaters were synchronically flying with a typical series of strong, shallow beats of straight wings and long glides on slightly arched wings, and were flying over a string of *Sargassum* algae (Fig. 2A). The photographs, together with the observed flight pattern, identified the birds as Manx Shearwaters *Puffinus puffinus*. More Manx Shearwaters were recorded on 7 June, 4 and 18 July and 17 September 2015. The shearwaters were either flying WNW (n = 3) or in the opposite direction ENE (n = 3) (Table 2). The 17 September bird was observed relatively close to the coast (70 km), while the records in June were located outside the EEZ (Fig. 1).

Manx Shearwaters breed in the North Atlantic from Newfoundland in the north to the Azores and Canary Islands in the south (Hamer 2003). Manx Shearwaters are rarely encountered in the West Indies, with records primarily made from November through March (Raffaele *et al.* 1998). Since 2001, a notable "spring passage" of Manx Shearwaters has been described off Guadeloupe in the Lesser Antilles (eastern Caribbean; Levesque & Yésou 2005a). Studies using geolocators show that the species follows a westward curved route through the eastern Caribbean (Guilford *et al.* 2009). Using various data loggers, Freeman *et al.* (2013) also revealed a major westward shift in distribution of Manx Shearwaters during their northward migration from their winter grounds in the South Atlantic to their breeding grounds in the North Atlantic. This westward shift coincides with an increase in sea surface temperatures recorded at locations where Manx Shearwaters were stopping-over to forage, indicating their capacity to rapidly respond to changing oceanic conditions (Freeman *et al.* 2013). Our records either involved birds that were passing the region during their spring migration (May and early June) or involved non-breeding sub-adults which summer (May–Sep) off the mid-Atlantic coast and SE United States (Post 1967, Lee 1995, Howell *et al.* 2012, Wingate pers. comm.). Manx Shearwaters have also been sighted off French Guiana, with recent records for the months of July, November, December and March (Bordin *et al.* 2012, Claessens 2015). Manx Shearwaters have yet to be observed off Guyana (Braun *et al.* 2007, BirdLife International 2015). Our records are the first for Suriname (Spaans *et al.* 2015), and it does not seem unlikely that these birds make regular stopovers for foraging in Suriname waters.

Sooty Shearwater Ardenna grisea: the offshore seabird community in Suriname has previously been described as one dominated by foraging plunge-diving shearwaters (May-July; de Boer *et al.* 2014). Other shearwaters recorded during the current study include Great Shearwater (number of records n = 1017 between 8 May and 8 August 2015), Cory's Shearwater (*Calonectris diomedea*; n = 36 between 5 May and 29 June 2015), Audubon's Shearwater (n = 35 between 1 May and 12 September 2015) and Sooty Shearwater (n = 1 on 9 May 2015) (Table 1). The first three have previously been described for Suriname (Ottema *et al.* 2009, de Boer *et al.* 2014). The Sooty Shearwater (Fig. 2B) was observed just outside the Suriname EEZ (Fig. 1) and therefore does not constitute a new country record. Although Sooty Shearwater was recently recorded in French Guiana (Réserve Naturelle Nationale de l'Ile du Grand-Connétable 2016) its occurrence off Suriname (Spaans *et al.* 2015) and Guyana (Braun *et al.* 2007) remains unconfirmed.

Bulwer's Petrel Bulweria bulwerii: during the dedicated marine fauna surveys, six observations of Bulwer's Petrel were made, of which three were recorded within the EEZ of Suriname (Fig. 1, Table 2). These petrels appeared slender-winged with a long wedge-shaped tail and a broad pale "carpal bar" on the upperwing, and were notably larger than any storm-petrels encountered during the surveys. Photographs were taken of all six encounters, which confirmed the identification of Bulwer's Petrel. At least one of these birds was clearly in wing molt, having replaced P1 and P2 (Fig. 2C). Howell (2012) states that adult Bulwer's Petrel wing molt occurs away from breeding grounds, with earlier onset of molt - as here - suggesting a 2nd calendar year (CY) bird.

Bulwer's Petrel has previously been recorded off Suriname (17 May 2012), but was not verified by photographs (de Boer *et al.* 2014). The species has also been recorded off French Guiana, but not since 1992 (Claessens 2015). No records exist for Guyana (Braun *et al.* 2007). Sightings of Bulwer's Petrels are rare in this part of the Atlantic (Flood & Fisher 2013). Undocumented sightings were made in the nutrient-rich upwelling areas off northeast Brazil in December–January (*e.g.* van Oordt & Kruijt 1953), but the first official Brazilian record occurred off Rio de Janeiro state in December 2011 (Klein *et al.* 2012). There are a handful of records known for the eastern seaboard of North America (North Carolina, LeGrand *et al.* 1999) and few unconfirmed records are known for the Lesser Antilles (Guadeloupe) in June and July 2003 (Levesque & Yésou 2005b). Further, Bulwer's Petrel has been recorded off Curaçao (May; Voous 1983), off Dominica (April; Norton *et al.* 2003), on Soldado Rock off Trinidad (January, Ffrench 1991), and several unconfirmed records were made off Barbados (Raffaele *et al.* 1998). The records made in the present study occurred in June (n = 4) and July (n = 2; Table 2). There are not enough sightings records of this species in the western central Atlantic to indicate any pattern of occurrence. However, the timings of our records together with the unconfirmed record made off Suriname in 2012

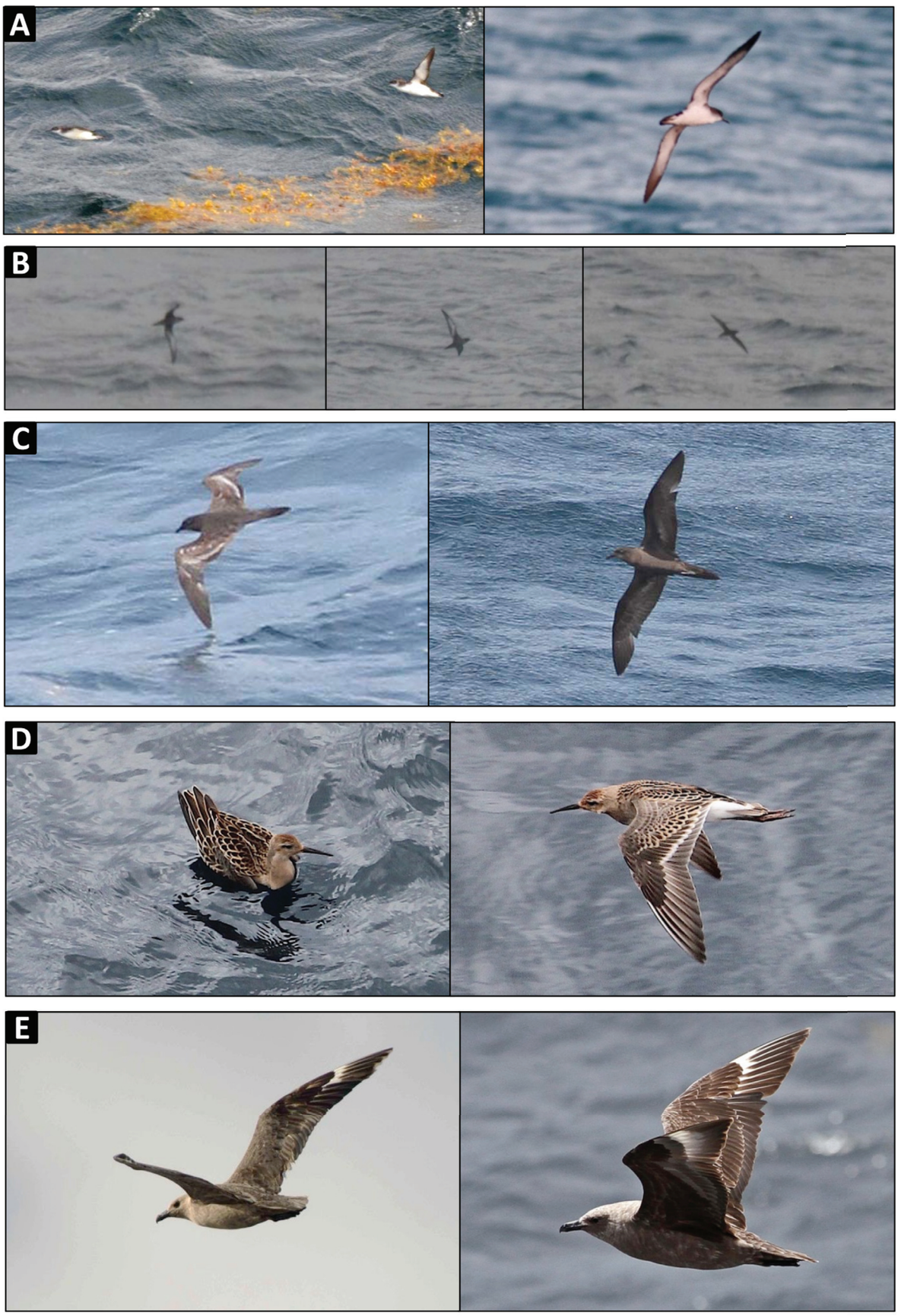

Figure 2. Pictures of remarkable bird species observed offshore Suriname in 2013–2015. (**A**) Manx Shearwater *Puffinus puffinus*, (**B**) Sooty Shearwater *Ardenna grisea*, (**C**) Bulwer's Petrel *Bulweria bulwerii*, (**D**) Ruff *Calidris pugnax*, (**E**) South Polar Skua *Stercorarius maccormicki* (left: May 2014; right: May 2015). Photo authors: M de Boer (C, E-right photo), J. Saulino (A, B), T. Willems (E-left photo) and A. Williams (**D**).

(de Boer *et al.* 2014), match those records made in the Lesser Antilles (Guadeloupe and Curaçao) indicating that Bulwer's Petrels show some trans-Atlantic movements during the months of June and July.

Ruff Calidris pugnax: on 18 August 2015, a medium-sized wader briefly landed on the water alongside the vessel 236 km from the Suriname coast (Fig. 1). The weather was fine with some cloud cover, a light northeasterly wind (3 Bft) and a gentle swell (<2 m). The bird had a distinctive small head, medium-length bill, rather long neck, and a pot-bellied body. In flight, it had long legs with prominent feet projecting beyond the tail, and displayed a thin, indistinct white wingbar and white ovals on the sides of the tail. Its upperparts had a neat, scale-like appearance with a dark center to the feathers. These characteristics identified the sandpiper as a juvenile Ruff most likely a male as suggested by the relatively long bill (Fig. 2D).

Ruff is a fully migratory sandpiper with the bulk of the population wintering in sub-Saharan Africa, although small numbers winter in northwestern and central Europe (Hagemeijer & Blair 1997). Ruff is very rare in South America, with only four published records from Brazil (Lees *et al.* 2014) and two records from French Guiana (in September and October; Pereira *et al.* 2014, Claessens 2015). It is a more regular visitor, however, to North America (O'Brien *et al.* 2006). Our record is the first for Suriname (Spaans *et al.* 2015).

South Polar Skua Stercorarius maccormicki: on 23 May 2014, a large skua was noted briefly in the vicinity of the shrimp trawler, and subsequently photographed. The bird had a heavy flight, short tail, wings with wide bases and prominent white patches on the upper wings. While these characteristics eliminated all smaller skuas (Praveen *et al.* 2013), the identification of large *Stercorarius* spp. is often problematic, notably birds sighted at low latitudes (de Boer & Saulino 2015). Nevertheless, based on the light cream-colored body, the bird was identified as an intermediate color-morph South Polar Skua. The other large skuas (*S. skua*, *S. antarctica* and *S. chilensis*) are not known to show such a cold-toned plumage at any stage (Olsen & Larsson 1997). Further, the state of primary molt (primaries replaced to P4) suggested a bird of at least 3rd CY, as molt in a 2nd CY would be more advanced in May (Fig. 2E). In 2013 one large skua was observed, and in 2015 a total of 10 large skuas were recorded within the EEZ waters. Seven of these large skuas were positively identified as South Polar Skua with an additional seven identified just outside the EEZ. In 2015, the species was mainly observed in May, with the earliest record made on 3 May and only one record was made in mid-June (17 June 2015; Table 2).

South Polar Skua breeds in coastal Antarctica and on adjacent islands. The species winters at sea, both in the North Atlantic and North Pacific (Olsen & Larsson 1997). Using geolocators, Kopp *et al.* (2011) found that individuals breeding on King George Island migrated both to the Atlantic and the Pacific to overwinter. Those that spent the austral winter in the North Atlantic used a flyway along the east coast of South America during their northbound migration, with several records in the Suriname EEZ in early May. The timing of our observations, which present the first field sightings of South Polar Skua for Suriname (Spaans *et al.* 2015), confirms the passage of this species along the north-eastern coast of South America in (boreal) spring. Similarly, most observations of South Polar Skua in French Guiana are made in May (Claessens *et al*. 2014). The species is yet to be confirmed off Guyana (Braun *et al.* 2007).

Long-tailed Jaeger Stercorarius longicaudus: on 4 April 2014, a smaller and more slender jaeger was noted among tens of Pomarine and Parasitic Jaegers *S. parasiticus* circling around the shrimp trawler. From photographs, the bird was identified as an immature Long-tailed Jaeger, based on the following characteristics. The body was rather narrow and elongate with long, tern-like wings and a small head and bill, the rump and undertail had neat and regular barring, and both wings had white shafts on the two outer primaries. Further, the barred underwing coverts, in combination with the very worn, brown outer primaries indicated the bird was probably in its 2nd CY (Fig. 3A). Later in the year (November 2014), a second immature Long-tailed Jaeger was observed from the shrimp trawler. In addition, three individuals were recorded during the dedicated surveys (June–July 2015), all involving immature birds (2nd or 3rd CY) (Table 2).

Long-tailed Jaeger is a northern circumpolar breeder, and during the non-breeding season the species is normally found far out at sea, being the most pelagic of all jaegers (Furness 1987, Olsen & Larsson 1997). Although Long-tailed Jaegers are known to winter at sea in the south Atlantic (Lambert 1980, Ryan 1989), it was only recently that the exact wintering areas and migration routes became better understood. Using satellite transmitters and geolocators, it was revealed that Long-tailed Jaegers breeding in northeast Greenland and Svalbard migrate to the west coast of north Africa after the breeding season, and continue south to spend the winter off Namibia and South Africa (Sittler *et al.* 2011, Gilg *et al.* 2013). However, during the northbound spring migration (April–June), a more western migration route may be used, along the north coast of South America, including Suriname (Gilg *et al.* 2013). Our results represent the first records of Long-tailed Jaeger for Suriname (Spaans *et al.* 2015). It may be quite possible that the species may be a frequent visitor in the area, as non-breeding immatures (at least from April through November; this study) or as adults migrating north (Gilg

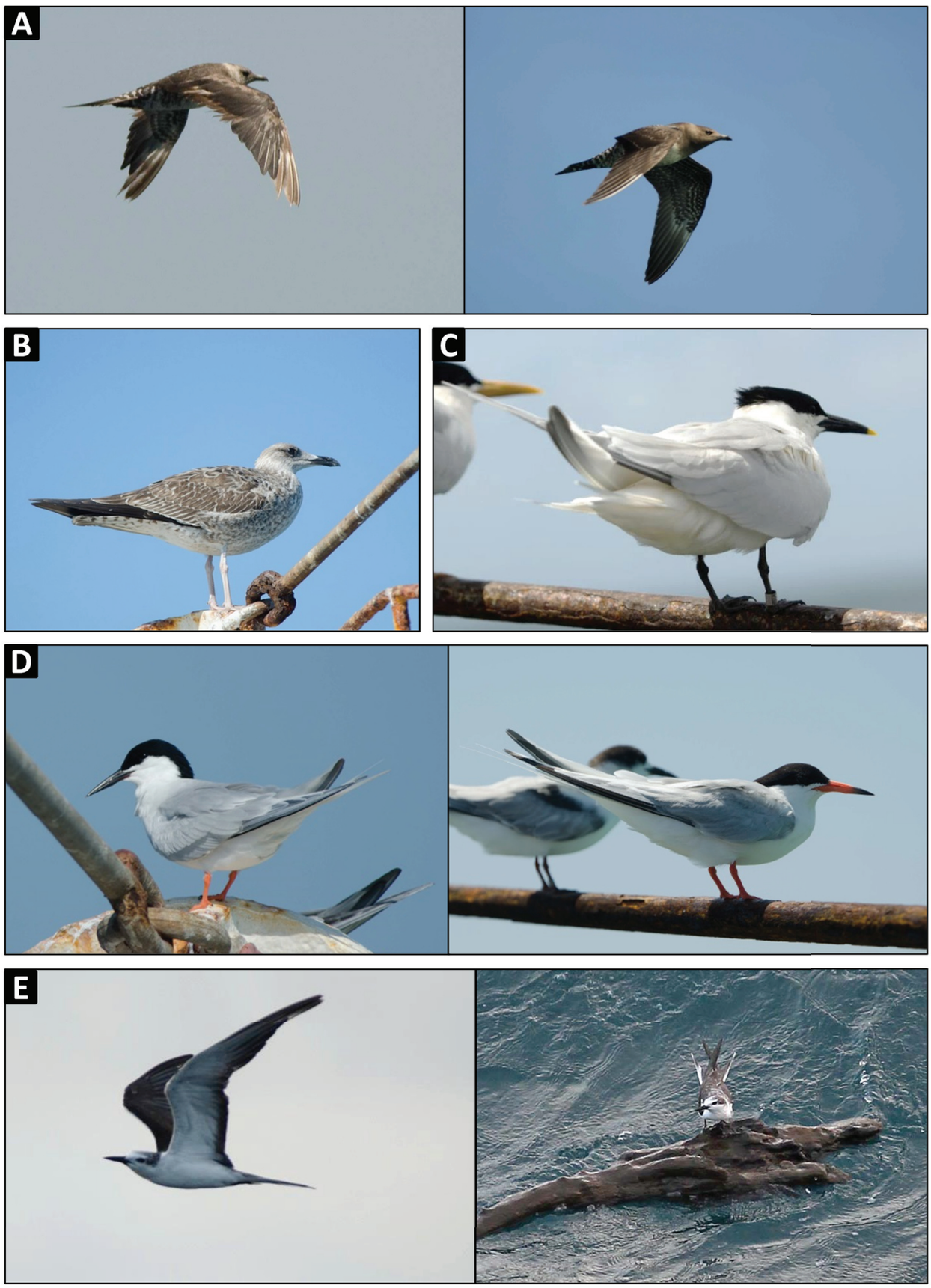

Figure 3. Pictures of remarkable bird species observed offshore Suriname in 2013–2015. (**A**) Long-tailed Jaeger *Stercorarius longicaudus* (left: April 2014; right: November 2014), (**B**) Lesser Black-backed Gull *Larus fuscus graellsii*, (**C**) Sandwich Tern *Thalasseus sandvicensis acuflavidus*, (**D**) Roseate Tern *Sterna dougallii* (left: North-American population; right: Caribbean population, with Common Tern), (**E**) Bridled Tern *Onychoprion anaethetus melanopterus*. Photo authors: M de Boer (E-right photo) and T. Willems (A–D, E-left photo).

et al. 2013). Off French Guiana, Long-tailed Jaegers have been observed from March through November, including an adult bird in April (Bordin *et al.* 2012, Claessens *et al.* 2014). The species has not yet been reported off Guyana (Braun *et al.* 2007).

Lesser Black-backed Gull Larus fuscus: on 8 October 2014, an immature large gull (*Larus* sp.) was observed resting on the shrimp trawler. From photographs it was identified as a juvenile Lesser Black-backed Gull *Larus fuscus* (ssp. *graellsii*), molting into first winter plumage (Fig. 3B). The bird displayed pale markings on the inner greater coverts and anchor-markings on the fresh scapulars. These characteristics, in combination with the overall slender appearance of the body, and the rather slim bill distinguished the bird from both Great Black-backed Gull *L. marinus* and Kelp Gull *L. dominicanus* (Olsen & Larsson 2003). Moreover, Kelp Gulls breed in the Southern Hemisphere, and individuals in this molting stage are therefore only to be expected later in the year (P. Adriaens pers. comm.).

Lesser Black-backed Gull mainly breeds in northwestern Europe, and winters from central and southern Europe south to West Africa (Olsen & Larsson 2003). Of the three recognized subspecies (*fuscus*, *intermedius* and *graellsii*), populations of *L. f. graellsii* have increased in Western Europe since the early 20th Century with subsequent changes in migratory behavior (Baker 1980). The increase has accelerated in Iceland, Britain and Ireland, and the species has subsequently colonized Greenland (Boertmann 2008), coinciding with an increase of Lesser Black-backed Gulls wintering along the Atlantic coasts of North America (Post & Lewis 1995). This change in status in the USA and Canada has been followed by a steady trickle of vagrants to Central and South America (Almeida *et al.* 2013). Most sightings come from Atlantic-facing coastlines of Colombia (Salaman *et al.* 2008), Venezuela (Fairbank 1999), Trinidad and Tobago (Ffrench & White 1999), Guyana (Braun *et al.* 2007), French Guiana (Claessens *et al.* 2014) and Brazil (Almeida *et al.* 2013). Our record represents the fifth sighting of Lesser Black-backed Gull for Suriname (Spaans *et al.* 2015), but the first one confirmed by photographs.

Sandwich Tern Thalasseus sandvicensis *(ssp.* acuflavidus*)*: on 3 April 2014, many Sandwich Terns *Thalasseus sandvicensis* ssp. *eurygnathus* ("Cayenne Tern") were observed resting on the shrimp trawler when an atypical individual with an entirely black bill with a well-defined yellow tip was noted (Fig. 3C). It was identified as Sandwich Tern ssp. *acuflavidu*s, from North America. In contrast to the highly variable bill coloration pattern in ssp. *eurygnathus,* the bill in ssp. *acuflavidus* is virtually always black with a yellow tip (Hayes 2004). The bird was in adult summer plumage, and was banded on the right leg. Although it was not possible to read the complete band inscription from the photographs, the first four digits (1483) revealed that the bird was originally banded in either North Carolina or Virginia, USA (J.A. Lutmerding - USGS Bird Banding Program pers. comm.), confirming the identification of the bird as the North American ssp. *acuflavidus*.

This observation marks the first record of ssp. a*cuflavidus* for Suriname (Spaans *et al.* 2015). Wintering as far southeast as Suriname seems exceptional for ssp. *acuflavidus*, which generally winters on the Pacific Coast, and the western Caribbean (Buckley & Buckley 1984). Further south along the Atlantic Coast, Sandwich Tern is replaced by ssp. *eurygnathus*, which breeds from the Caribbean to Argentina (Efe *et al.* 2009). Interbreeding between ssp. *eurygnathus* and ssp. *acuflavidus* has been observed in the Caribbean, where the ranges of both subspecies overlap (Hayes 2004). Efe *et al.* (2009) argue that based on mtDNA analyses, they comprise a single species in the Americas (proposed as *T. acuflavidus*), versus the European Sandwich Tern *T. sandvicensis*. The North American Sandwich Tern *T. s. acuflavidus*, whether a subspecies or morph/race, is probably an uncommon visitor to the coast of Suriname, and along the Atlantic coast of northern South America in general. An extensive offshore bird and marine mammal survey off French Guiana reported one ssp. *acuflavidus*, versus a total of 100 ssp. *eurygnathus* (Bordin *et al*. 2012). Sightings are also known from the north-eastern coast of Brazil (WikiAves 2017).

Roseate Tern Sterna dougallii: among many Common Terns *Sterna hirundo* resting on the shrimp trawler, Roseate Terns were identified on 15 July (n = 4) and 7 October (n = 1) 2014 (Fig. 3D). The birds were initially discovered based on their distinctive call, and identified by their overall whitish appearance, with pale inner primaries with a broad white inner edge, and very pale upper parts. The July birds were in breeding plumage, with an entirely black cap, long tail streamers projecting beyond the wing-tips when perched, and the absence of a dark carpal bar on the wing (Svensson *et al.* 2009).

Roseate Terns mainly breed in tropical and subtropical areas of the North Atlantic and Indian Ocean, with smaller breeding populations in the temperate zone of North America, Europe, South Africa, and western Australia (Gochfeld & Burger 2016). At any stage in the breeding cycle, the bill of Roseate Terns breeding in the Caribbean is much redder than the corresponding stage in birds from eastern North America, with virtually no overlap (Nisbet *et al.* 2014). In July, at least one bird with an entirely black bill was observed, while the bill was half-red in others, suggesting the presence of birds from both populations (I.C.T. Nisbet pers. comm.). These observations mark the first field records of Roseate

Tern for Suriname (Spaans *et al*. 2015). Due to their similarity to Common Terns, the species might have been overlooked in the past. Indeed, through geolocator tracking studies, the coastal waters off the Guianas were identified as stopover and wintering areas for Roseate Terns outside the breeding season (Mostello *et al.* 2014), and the species has been observed off Guyana (Braun *et al.* 2007), French Guiana (Bordin *et al.* 2012) and north-eastern Brazil (Lees *et al.* 2014). While the tracked birds originated from North American populations, our observations indicate that Suriname waters might act as a wintering area for Caribbean birds as well. Due to declining population trends, Roseate Tern is listed as "Endangered" in the USA (Mostello *et al.* 2014). Whereas the species has been intensively studied at North American nesting colonies, it is poorly known outside the breeding season, when most mortality probably occurs (Nisbet *et al.* 2014). It seems likely that the waters off the Guianas are important stopover and wintering sites for Roseate Tern, where discarded fish from shrimp trawlers might constitute an important food source.

Bridled Tern Onychoprion anaethetus: terns of the Sooty/Bridled type were observed resting on a floating log in June 2013, and flying by the shrimp trawler in April 2014 (Table 2). From photographs, they were identified as Bridled Terns based on the shape of the white forehead patch, extending back over the eye like a supercilium (Fig. 3E). In the very similar Sooty Tern the forehead patch extends to the eye. The underwing pattern was also distinctive, with the bases of the primaries white rather than dark (as in Sooty Tern), so that the wing tips appeared white edged with black (Marantz & Kratter 1998). Both birds were non-breeding adults with white mottling on the crown typical for winter plumage, and lacking pale feather edging to the upperparts as in juveniles (Southey 2013).

These observations mark the first confirmed records of Bridled Tern for Suriname (Spaans *et al.* 2015). Both observations were made far from the closest breeding colony on the Caribbean island of Tobago some 900 km away (Chardine *et al.* 2000b). During the non-breeding season, *i.e.* July–April for the Caribbean population, Bridled Terns migrate away from nesting areas and are found far offshore over deep waters. They are mostly solitary, foraging along oceanic fronts, and typically associate with *Sargassum* rafts that accumulate along current edges (Gochfeld *et al.* 2013). Although the 2013 observation occurred at the end of the breeding season (20 June), the winter plumages suggested both birds were non-breeding wanderers. Whereas the 2013 bird was seen further offshore (85 km off the coast in waters <50 m in depth), the 2014 individual was observed 50 km from the nearest coast in shallow waters (<40 m depth). During the 2013 sighting, significant amounts of floating debris (tree trunks, branches) were observed, whilst during the 2014 sighting *Sargassum* was noticed in the area. This might suggest that Bridled Terns follow floating debris and *Sargassum* rafts, even if these drift inshore in shallow seas. The massive arrival of *Sargassum* in the Guianan Ecoregion was also suggested as explanation for the first observation of Bridled Tern off French Guiana in 2011 (Claessens *et al.* 2014). The species has been recorded off Guyana as well, but its status is unclear due to paucity of data (Braun *et al.* 2007). While detailed migratory movements of Bridled Tern remain largely unknown (Gochfeld *et al.* 2013), our results suggest its presence off the Guianas is linked to large *Sargassum* influx events, caused by oceanographic features.

Black Noddy Anous minutus: on 23 May 2014, a noddy *Anous* sp. was noted resting on the shrimp trawler. From photographs, the bird could be identified as Black Noddy, based on the long and slightly thin bill, and the extensive amount of white on the crown and forehead (Fig. 4A). The other Atlantic noddy, Brown Noddy *Anous stolidus*, looks very similar, but is somewhat larger, with a heavier bill and less white on the head (Contreras-González *et al.* 2010). The plumage of the bird showed substantial wear on the wing coverts, primaries, and tail, and seemed in an early phase of post-breeding molt (Bridge *et al.* 2007).

Similar heavily worn individuals were observed in May–June in the Caribbean (Aruba; R. van Halewyn pers. comm.). With only one unconfirmed record for Suriname (07 October 1968; Spaans *et al.* 2015), this is the first documented observation of Black Noddy for Suriname. No records of this species are known from either Guyana or French Guiana (Braun *et al.* 2007, Claessens 2015), but the species was recently recorded off northern Brazil (França *et al.* 2016). Identification of flying noddies at sea is challenging (*e.g.* Camacho & Torres 2011), therefore, Black Noddies may previously have been overlooked and misidentified as Brown Noddy, which is regularly observed in the Guianas (Braun *et al.* 2007, Bordin *et al.* 2012, Spaans *et al.* 2015) and breeds off French Guiana (Tostain *et al.* 1992). Nevertheless, the closest nesting sites of Black Noddy are in the eastern Caribbean, some 1000 km away, where it is a rare breeder. According to Chardine *et al.* (2000a), Black Noddy (ssp. *americanus*) is the rarest (100–150 pairs) of all seabirds breeding in the Caribbean area, while Brown Noddy is one of the most abundant species (43,000–48,000 pairs). East of Suriname, the closest nesting sites of Black Noddy (ssp. *atlanticus*) are the archipelagos off the state of Rio Grande do Norte, Brazil, more than 2500 km away (Gochfeld *et al.* 2015). The population of origin, and hence the subspecies, of the observed bird remains unknown. Given the large distances to both breeding areas, and the fact that Black Noddies are mostly found close to the nesting

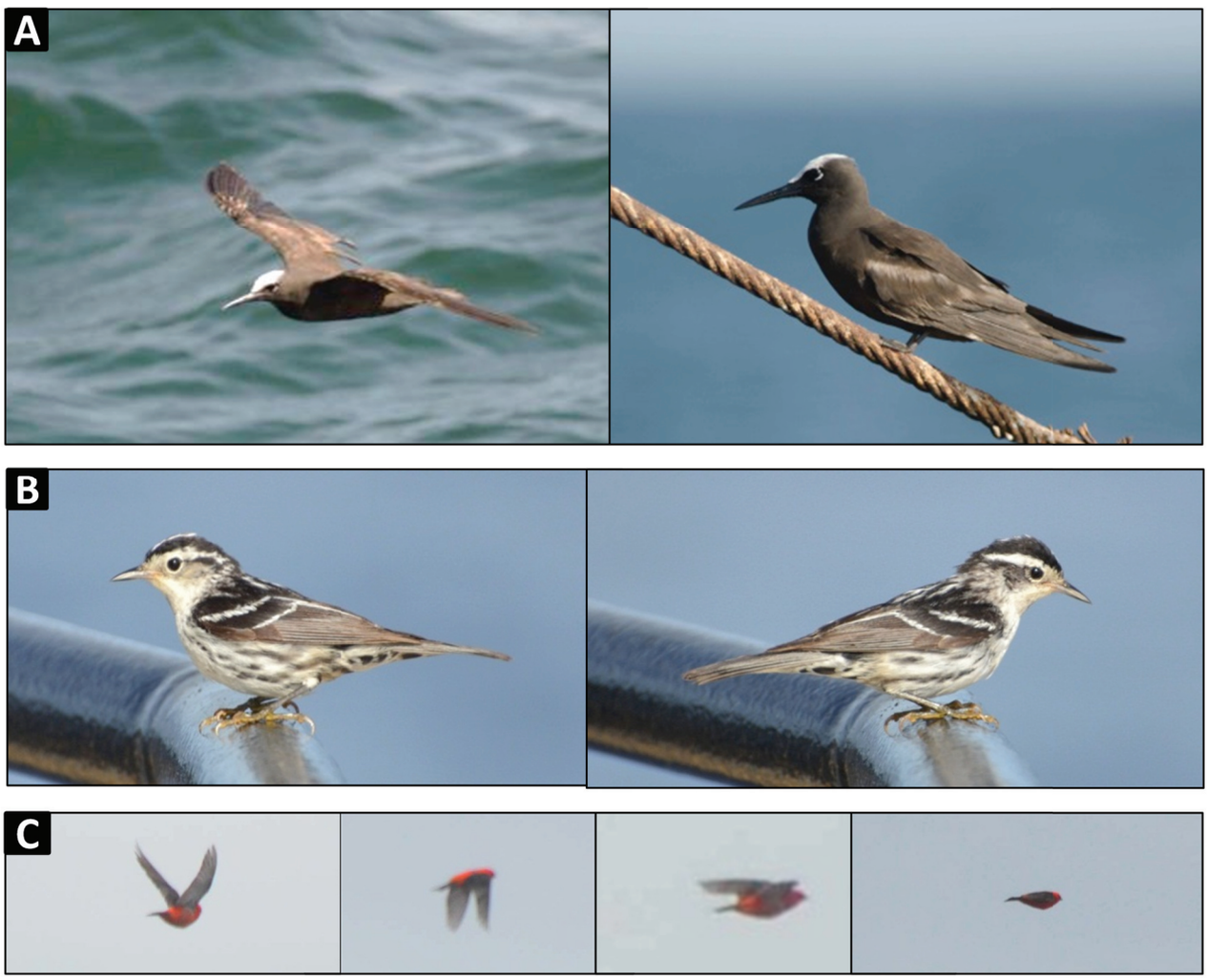

Figure 4. Pictures of remarkable bird species observed offshore Suriname in 2013–2015. (**A**) Black Noddy *Anous minutus*, (**B**) Black-and-white Warbler *Mniotilta varia*, (**C**) Scarlet Tanager *Piranga olivacea*. Photo authors: J. Saulino (B, C) and T. Willems (A).

sites year-round (Chardine *et al*. 2000a), the species is probably a rare vagrant to the waters off the Guianas.

Black-and-white Warbler Mniotilta varia: on 16 July 2015, a boldly streaked warbler was observed 135 km off the coast. The weather was fine with some cloud cover, a light easterly wind (3 Bft) and a gentle swell (<2 m). The small warbler briefly rested on the ship's railings close to the bow and the observer (Fig. 4B). Several photographs were made before the warbler took off to continue flying in a southerly direction. The photographs confirmed a clear unique black-and-white streaked pattern, identifying the bird as a Black-and-white Warbler. Adult males have obvious black streaking, particularly on the underparts and the cheek and are sometimes referred to as a flying "humbug". Females and especially immatures are paler and have less streaking on the cheeks than adult males. The molt limit between greater coverts and greater primary coverts show that our warbler was a 1st CY bird.

Black-and-white Warblers breed in northern and eastern North America and typically migrate towards Mexico, the Caribbean, Central America, including Venezuela and Columbia (Curson *et al.* 1994, BirdLife International 2013). Black-and-white Warblers have not previously been recorded in Suriname or its neighboring countries French Guiana or Guyana (Braun *et al.* 2007, BirdLife International 2013, Claessens 2015, Spaans *et al.* 2015). Our observation therefore presents a new record for the Guianas, and also the most eastern record of the species in South America.

Scarlet Tanager Piranga olivacea: on 27 May 2015, a bright red passerine with black wings was observed approximately 312 km off the coast. The weather was fine with slight cloud cover and a weak northeasterly wind (Fig. 4C). The bird approached from the stern and was flying fast, low, and right over the vessel. It was then observed from the front deck as it sped by the bow, heading in a NW direction. The black wings were contrasting with an overall bright red body and the photographs supplemented by the features noted at sea, identified the bird as Scarlet Tanager (Fig. 4C).

Scarlet Tanager breeds in eastern and central North America and mainly migrates through the

Caribbean lowlands of Central America and in smaller numbers through the West Indies to winter in western South America (Isler & Isler 1999). On migration, it is uncommon in the Dutch Antilles of Aruba, Bonaire, and Curaçao, rare in western Venezuela, and only a vagrant to Trinidad and Tobago (Restall *et al.* 2006). Males in breeding plumage have been recorded once in French Guyana (15 April 2007; Dechelle & Ingels 2007) and once in Guyana (10 June 1959; Braun *et al.* 2007), the species has not been recorded in Suriname before (Spaans *et al.* 2015).

Conclusions

This study reports on the observation of 13 remarkable bird species in the waters offshore Suriname between 2013 and 2015. Although very little information is available on the avifauna frequenting Suriname's territorial waters, some of these sightings came nevertheless as "offshore surprises". Unexpected sightings included those of the passerines (Black-and-white Warbler and Scarlet Tanager), but also Ruff and Black Noddy. These species most likely deflected from their normal migration routes, and they probably remain vagrants to Suriname waters. While the observations of Bridled Tern were also unforeseen, their presence might relate to influx events of *Sargassum* seaweed in the western central Atlantic (including Suriname territorial waters) in 2013 and 2014 (Doyle & Franks 2015). In contrast, the occurrence of South Polar Skua, Long-tailed Jaeger and Roseate Tern off Suriname was previously reported through tracking studies. Their presence is now supported by field observations and confirmed by photographs. The status of Manx Shearwater, Bulwer's Petrel, Sooty Shearwater, Sandwich Tern and Lesser-Black Backed Gull in the waters off Suriname remains unclear, but all except Manx Shearwater are probably rather rare visitors to the area. In a reaction to changing oceanic conditions, the latter might use these waters for stopover and foraging. Active foraging on discarded fish bycatch was observed for most birds which were accompanying (resting and/or following) the shrimp trawler. As seen in other areas (*e.g.* Brazil; Traversi & Vooren 2010), the shrimp trawling fleet operating off Suriname might provide an important food source for seabirds. The importance of this fishery in terms of food provision for seabirds frequenting Suriname's marine waters should further be assessed, notably for endangered Roseate Terns.

The observations reported here contribute to a better understanding of the birds frequenting the poorly-studied waters off the Guianas. Furthermore, this study increases the knowledge about their overall at-sea distribution and migration routes, as well as highlighting the potential importance of this area for foraging stopovers.

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