Gulf of Oman: analysis of seabird records of boat trips from the east coast of the United Arab Emirates 2010–2016

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Seabird distribution off the east coast of the United Arab Emirates was studied 2010–2016. Data was acquired from 107 boat trips, totalling *c*450 h of which 76% were undertaken May–September. The majority of trips reached 50 km, and in some cases over 60 km, offshore. Almost 100 000 individual birds of 42 species were recorded. Records of 31 of the most numerous or significant species are analysed, with occurrence of a further 11 (predominately terrestrial) species noted briefly. Two species (Swinhoe's Storm Petrel and Cory's Shearwater) not previously reported in the UAE were recorded, both on multiple occasions, and the known status of a further five species, hitherto very rarely observed (Wilson's Storm Petrel, Flesh-footed Shearwater, Jouanin's Petrel, Masked Booby and Sooty Tern) has been greatly clarified. Four further species (Wedge-tailed Shearwater, Lesser Noddy, Arctic Tern and Long-tailed Skua), previously believed to be extremely rare, were recorded multiple times. The data collected has been compared against available literature for the northern Indian ocean, in particular that from Oman and southwest India.

INTRODUCTION

Historically, pelagic seabirds utilizing the gulf of Oman have been little studied, especially in the northernmost sector off the east coast of the United Arab Emirates. Most of the early records were summarised by Tuck (1974) whilst Richardson (1990) added details on the occurrence of all species recorded up to 1989, based mainly on chance observations from vessels surveying or passing offshore. Other published works are limited to short one-off trips (*eg* Richardson 1999) or feature observations made over relatively short periods, mainly in Omani waters (*eg* Strickland 1973, Bundy 1986, Hirschfeld 1994, Flood 2016). Summer sea-watching sessions undertaken from a number of terrestrial locations and occasional boat trips to mainly inshore waters from the cities of Fujairah (Fujairah emirate) and Khor Fakkan (Sharjah emirate) and summarized by Pedersen & Aspinall (2010), were unable to add significantly to Richardson's (1990) data. Recently, however, the databases of the Royal Naval Birdwatching Society (Anon 2016) and eBird (http://ebird.org/) have become accessible and provide useful supplementary sources of data *eg* much recent data on seabird observations in India are available on eBird (Karuthedathu & Praveen 2016).

With shallow inshore waters, no promontories or headlands and no significant breeding colonies within 150–200 km (Jennings 2010), the topography of the UAE's east coast does not lend itself to seabird observation. There are, however, many interesting and notable seabird records from Oman (above references and summarized in Eriksen & Victor 2013), of which many were collected by non-systematic observations from land. This led to the belief amongst resident birdwatchers in the UAE that at least some species common in Omani waters were likely to be occasional, perhaps regular visitors to UAE waters. To investigate this, regular boat trips were initiated from Kalba harbour (Sharjah emirate) from June 2010 and the data obtained from these trips is presented herein. It summarizes the occurrence of 42 species June 2010–October 2016, seven of which were not recorded by Richardson (1990), and provides a more detailed analysis on the numbers and phenology of 31 of these species. Results are compared with summarized Omani data (Eriksen & Victor 2013) and with data currently being compiled from the Kerala coast of India. The latter waters, and those around the Malaysian peninsula, have recently witnessed a surge of interest in seabird distribution (*eg* Karuthedathu *et al* 2012, Poole *et al* 2011).

Table 1. Number of boat trips undertaken by month, June 2010–October 2016 (total trips = 107).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010						3	1	3	1	1	1	
2011				4	8	7	2	4	4	1		1
2012	1		2	2	4	6	2	1	4		4	1
2013		1			2	5	2	2	2			
2014				2	1	4	2	1	3	1		
2015							2			2	1	
2016					1	1		1	2	1		
total	1	1	2	8	16	26	11	12	16	6	6	2

METHODOLOGY AND STUDY SITE

From June 2010–October 2016, 107 boat trips were conducted, each lasting *c*4–4.5 h. These are summarized by month in Table 1. The majority (76%) were undertaken May–September, co-incident with the southwest monsoon and consequent cold-water upwelling off southern Oman and also the expected presence of southern hemisphere breeding species that utilize the northern Indian ocean in their non-breeding season (Bailey 1966, Bundy 1986). In addition, most seabirds breeding in Arabian waters (with the exception of Socotra Cormorant) are present at their breeding stations during this period (Jennings 2010). Scientific names of species are given in Tables 2 and 3 and the systematic list. Taxonomy and species order follow OSME (2016). The majority of boat trips departed from Kalba harbour, Sharjah emirate (Figures 1 and 2; 25.02° N, 56.36° E) and they were captained by Abdulla al Zaabi using a fast 40 foot boat with twin engines. When the regular Kalba boat was not available, eight trips departed from Fujairah harbour, Fujairah emirate (Figures 1 and 2; 25.09° N, 56.36° E). All trips departed early afternoon, returning at or shortly after sunset. Most trips followed the same basic route, essentially heading due east (directly offshore) from Kalba for 40–60 km, then turning approximately north or northwest for up to 10 km before returning inshore and passing south parallel to the coast between Fujairah and Kalba (Figure 2). The precise route varied depending on time available and sightings made, with sometimes long stops for flocks found feeding over schooling fish. Several trips deviated marginally into Omani waters. Birds were located, in some cases at ranges as great as 1–2 km, through binoculars and the boat diverted for a closer look. All species identified were recorded and counted, with estimates sometimes necessary for large flocks or fast-moving groups. Up to ten observers (average 6) were present each trip. Weather conditions on the vast majority of trips varied little, with little or no wind or swell and invariably excellent visibility. With regard to bathymetry, the 10 fathom line is *c*10 km offshore due east of Kalba. From there, depth increases steadily, reaching 100 fathoms (183 m) at 50 km and then more rapidly reaching 200 fathoms at *c*65 km. Waters rapidly become much deeper to the southeast (700 fathoms).

All data used in the following analysis are stored in the UAE Bird Database. Records of all rarities discussed below have been examined and accepted by the Emirates Bird Records Committee, and details archived. Data from 23 additional trips, where a full species list and counts were not recorded (many of these were fishing trips, where bird recording was an incidental activity) have been excluded from the analysis. However, a few particularly significant records from such trips are discussed in the systematic list. Data from three trips carried out April–May 2017 have not been included in the analysis but several significant records have been noted in the systematic list.

Figure 1. Location map showing main departure port (Kalba) in relation to gulf of Oman and international borders. Second departure port (Fujairah) used occasionally.

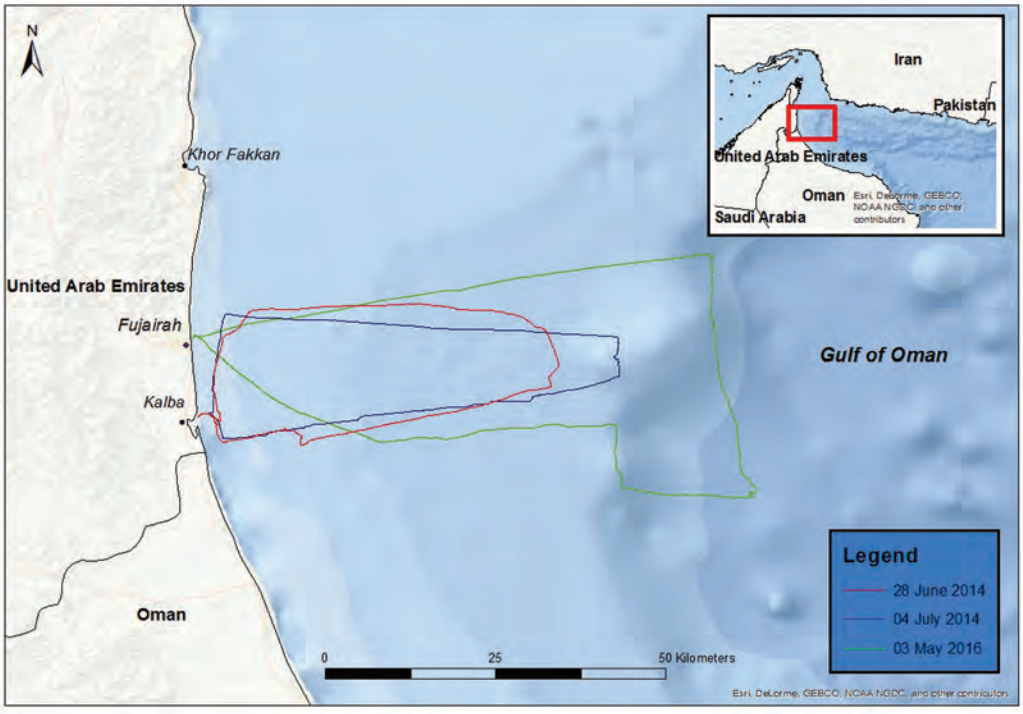


Figure 2. Location map showing approximate extent of study area in relation to Kalba and Fujairah. Tracks for three trips, on the dates indicated including one departing from Fujairah, are illustrated.

Table 2. Seabird species recorded on boat trips June 2010–October 2016 (further details in systematic list). The value for bird-days was obtained by summing number of individuals recorded on each trip.

	Bird-days	% trips recorded (total trips = 107)	Max individuals/trip (months max recorded)
Wilson's Storm Petrel *Oceanites oceanicus*	1010	52	120 (Jun)
Swinhoe's Storm Petrel *Oceanodroma monorhis*	23	11	5 (Aug)
Cory's Shearwater *Calonectris borealis*	5	5	1 (May, Jun, Jul)
Wedge-tailed Shearwater *Ardenna pacifica*	27	8	8 (Jun)
Sooty Shearwater *Ardenna grisea*	52	15	12 (May)
Flesh-footed Shearwater *Ardenna carneipes*	150	33	35 (Jun)
Persian Shearwater *Puffinus persicus*	31 792	94	2000 (Jun)
Jouanin's Petrel *Bulweria fallax*	1381	21	609 (Dec)
Red-billed Tropicbird *Phaethon aethereus*	1	1	1 (Jun)
Masked Booby *Sula dactylatra*	9	7	2 (Nov)
Red-footed Booby *Sula sula*	1	1	1 (May)
Socotra Cormorant *Phalacrocorax nigrogularis*	4116	43	1200 (Feb)
Red-necked Phalarope *Phalaropus lobatus*	6578	57	2080 (Sep)
Brown Noddy *Anous stolidus*	146	35	19 (Aug)
Lesser Noddy *Anous tenuirostris*	11	7	3 (Sep)
Slender-billed Gull *Chroicocephalus genei*	517	9	100 (Mar)
Black-headed Gull *Chroicocephalus ridibundus*	1930	6	1200 (Jan)
Sooty Gull *Ichthyaetus hemprichii*	1361	36	250 (Mar)
Large gull sp *Larus sp*	568	27	160 (Jan)
Greater Crested Tern *Thalasseus bergii*	58	24	7 (Apr)
Lesser Crested Tern *Thalasseus bengalensis*	661	49	150 (Sep)
Sandwich Tern *Thalasseus sandvicensis*	130	21	40 (Mar)
Little/Saunders's Tern *Sternula albifrons/saundersi*	1019	48	300 (Sep)
Bridled Tern *Onychoprion anaethetus*	36 712	94	5311 (Jul)
Sooty Tern *Onychoprion fuscatus*	22	12	7 (Jun)
Arctic Tern *Sterna paradisaea*	4	2	3 (Jun)
Common Tern *Sterna hirundo*	10 574	78	1000 (Sep)
White-cheeked Tern *Sterna repressa*	546	53	60 (Apr)
Pomarine Skua *Stercorarius pomarinus*	15	11	2 (May, Jun)
Arctic Skua *Stercorarius parasiticus*	197	54	21 (Apr)
Long-tailed Skua *Stercorarius longicaudus*	12	9	2 (Jul, Nov)

Note that in Tables 2 and 3 and the systematic list, bird-days is used to indicate the total number of birds recorded as it is likely that, with trips on successive weekends on a number of occasions, a small (but not negligible) number of individuals will have been seen on multiple trips. For example, mid-summer flocks of Persian Shearwaters regularly remain in the same area for periods of many days and it is very likely that repeated

Table 3: Additional species, mainly terrestrial or inshore, recorded on boat trips June 2010–October 2016.

	Bird-days	% trips recorded (total trips = 107)	Month(s) of occurrence
Great Cormorant *Phalacrocorax carbo*	2	1	Dec
Whimbrel *Numenius phaeopus*	2	2	Aug
Terek Sandpiper *Xenus cinereus*	8	1	Apr
Dunlin *Calidris alpina*	1	1	Sept
Great Black-headed Gull *Ichthyaetus ichthyaetus*	4	4	Dec–Feb
Whiskered Tern *Chlidonias hybrida*	3	2	Dec, Feb
White-winged Tern *Chlidonias leucopterus*	2	2	June, Dec
Black Tern *Chlidonias niger*	1	1	Apr
European Nightjar *Caprimulgus europaeus*	3	3	Sept
Common Kestrel *Falco tinnuculus*	1	1	May
Sand Martin *Riparia riparia*	1	1	Sept

records of Wedge-tailed Shearwaters in 2011 involved the same individuals seen on successive trips.

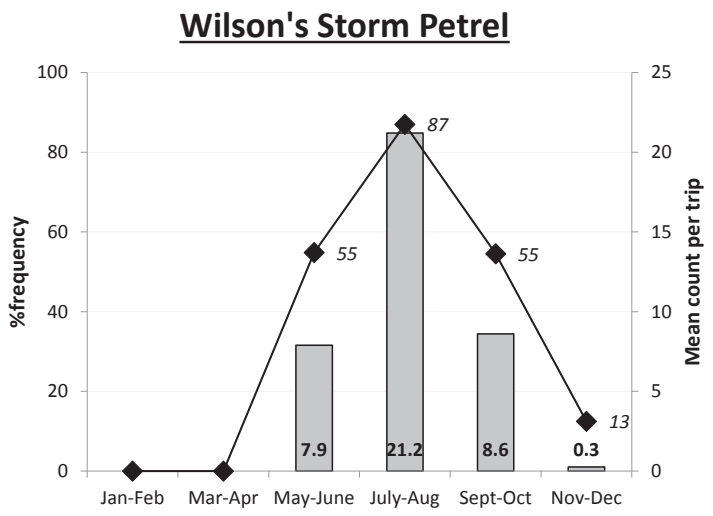
Limitations to the dataset

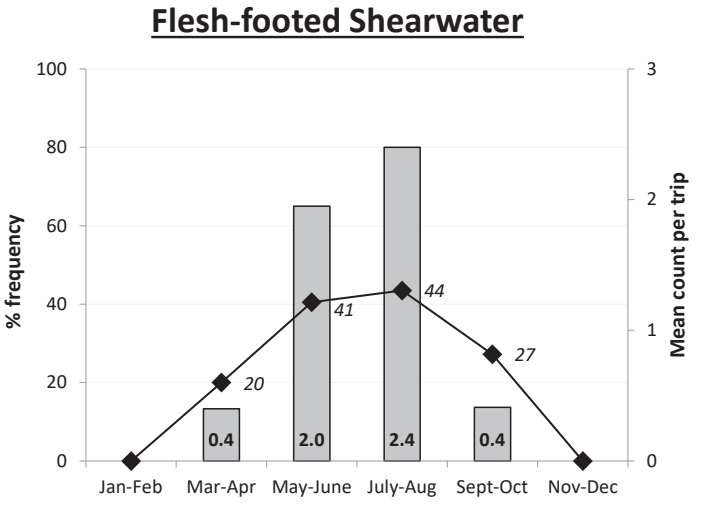
Boat trips were not undertaken at regular intervals throughout the year (Table 1) due to restrictions caused by the availability of observers, plus the supposition that the summer months were likely to be much richer in species. This contention is borne out by histograms for a number of species presented in Eriksen & Victor (2013) and A al Zaabi's opinion (pers comm to OC). The latter carries out regular fishing trips year-round from Kalba harbour and confirmed the general absence of many species December–March/April. Hence, only two trips were completed January–February, compared to 42 in May–June. However, as discussed below, the paucity of trips January–March may inhibit our understanding of the occurrence and phenology of certain species (in particular Jouanin's Petrel, Swinhoe's Storm Petrel and possibly Red-billed Tropicbird) in the UAE sector of the gulf of Oman.

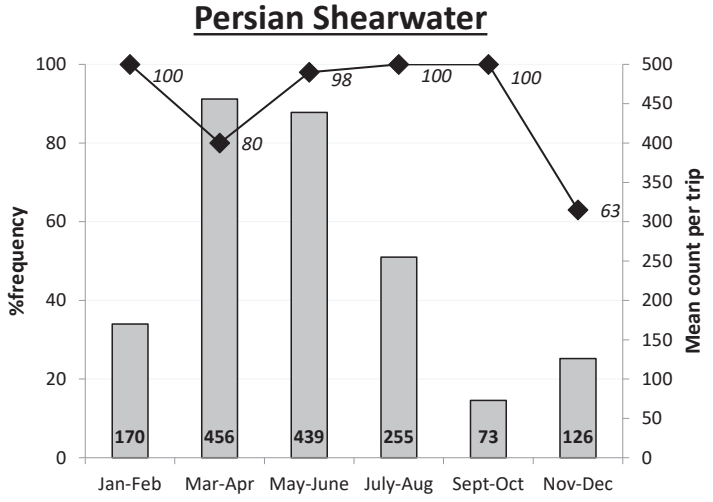
RESULTS AND DISCUSSION

A list of all species, total numbers recorded and overall percentage of trips recording that species are provided in Table 2. The systematic list discusses the 31 species listed in Table 2 in more detail. Additional species recorded, mainly terrestrial or inshore species, are listed in Table 3 and are not discussed further. Exact dates and numbers for all records of rarities are provided in Pedersen *et al* (2016).

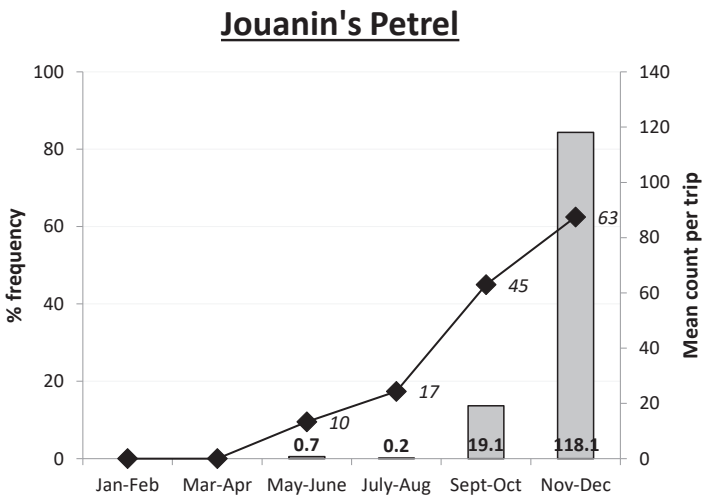
In the systematic list that follows, all references to observations in Oman (unless otherwise stated) are from Eriksen & Victor (2013), hereafter cited as EV (2013).The accounts for 14 of the species below should be read in conjunction with the accompanying graphs (Figures 3–16). In these graphs, % frequency (% of trips recording the species, out of the total number of trips in the two-month period) and mean count per trip for the two-month period is illustrated. Some species lacking a graph were recorded in numbers insufficient to merit such analysis. Others are cases where the infrequent nature of mid-winter trips (December–February) is likely to have significantly skewed the data.

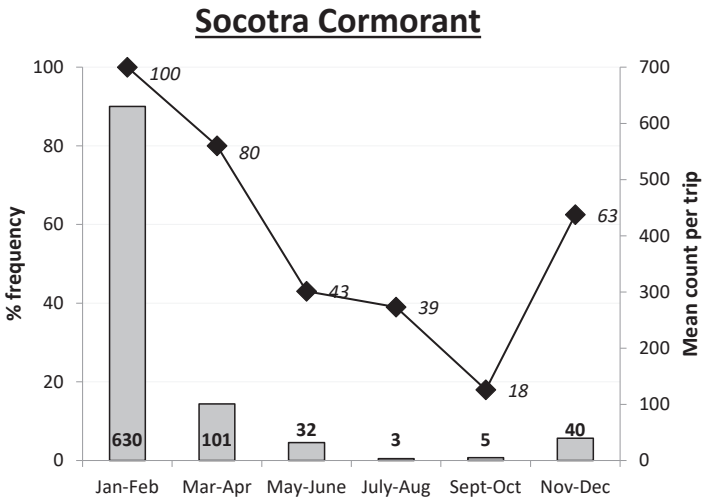


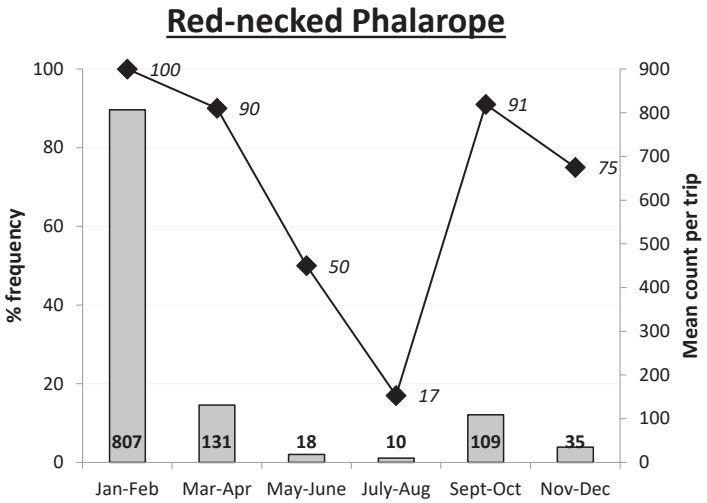




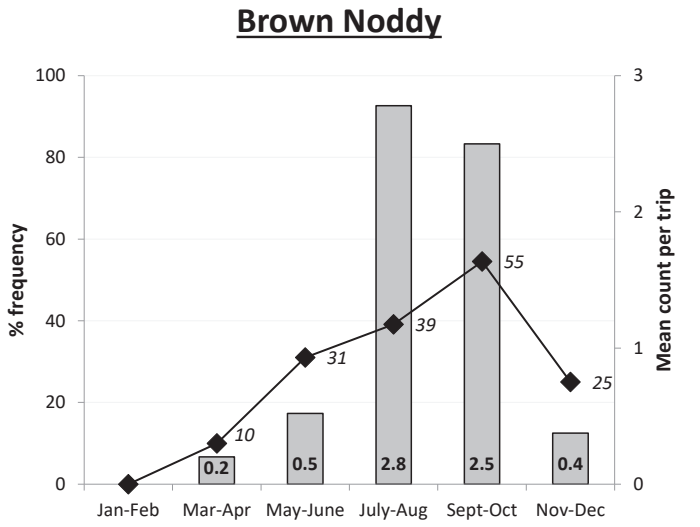
Figures 3–5. Frequency of encounter —— and mean count per trip ▭, in two-month periods June 2010–October 2016, for Wilson's Storm Petrel, Flesh-footed Shearwater and Persian Shearwater.

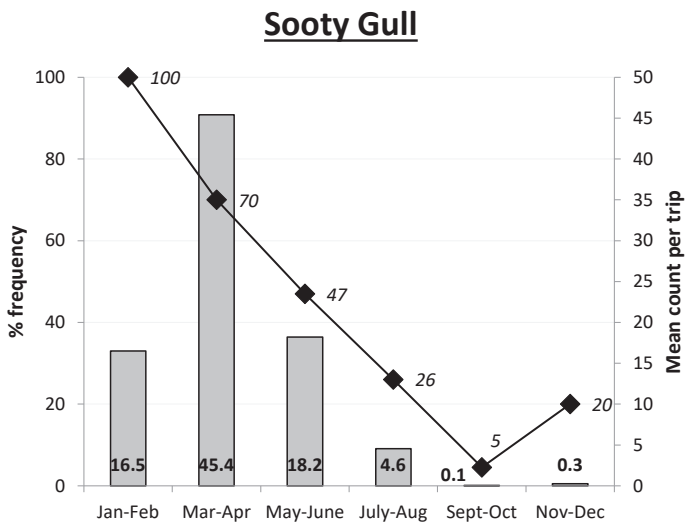


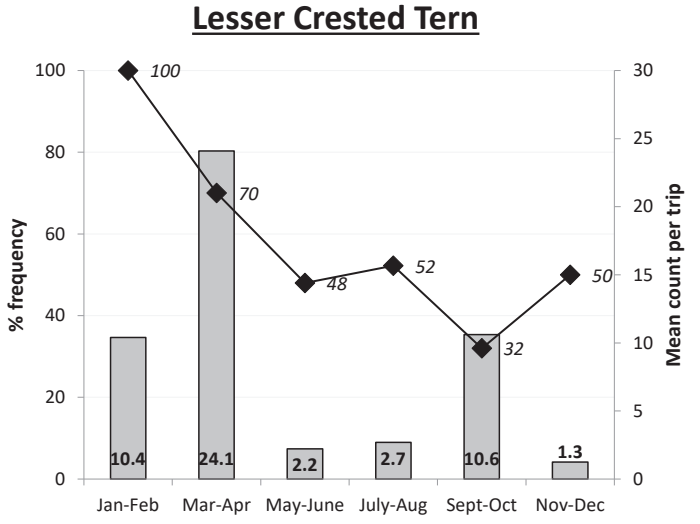




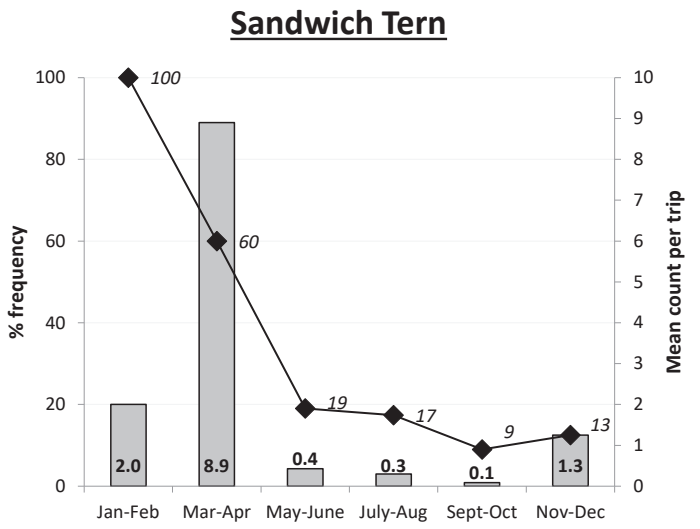
Figures 6–8. Frequency of encounter — and mean count per trip ▭, in two-month periods June 2010–October 2016, for Jouanin's Petrel, Socotra Cormorant and Red-necked Phalarope.

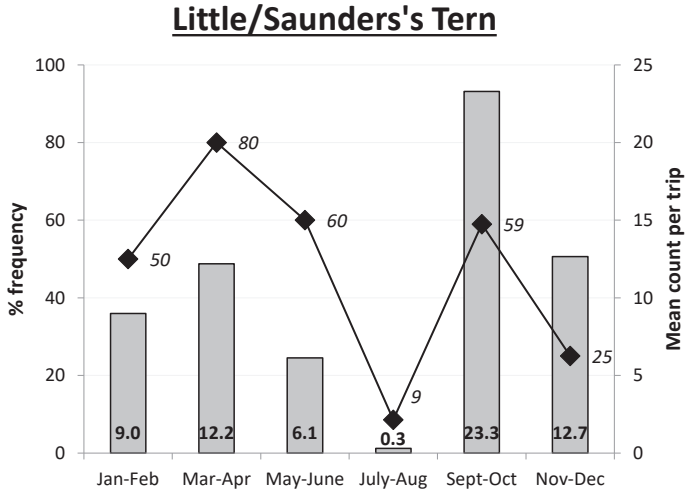


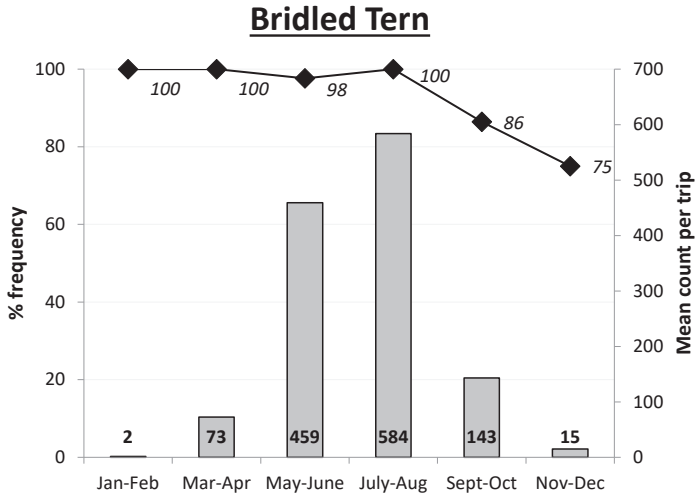




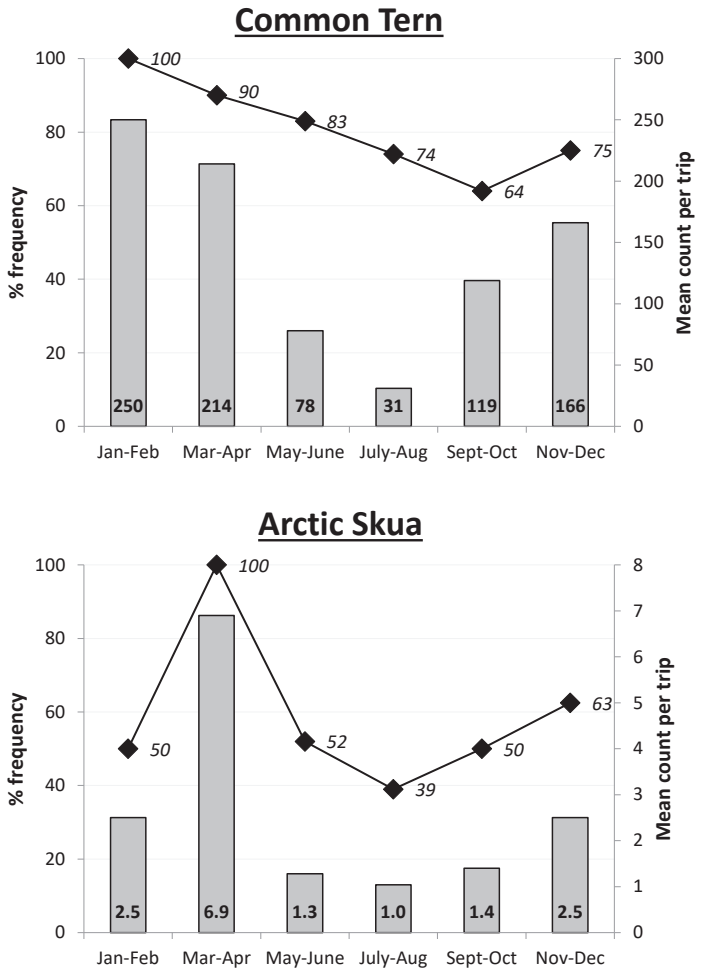
Figures 9–11. Frequency of encounter — and mean count per trip ▭, in two-month periods June 2010–October 2016, for Brown Noddy, Sooty Gull and Lesser Crested Tern.







Figures 12–14. Frequency of encounter —— and mean count per trip ▭, in two-month periods June 2010–October 2016, for Sandwich Tern, Little/Saunders's Tern and Bridled Tern.



Figures 15 & 16. Frequency of encounter —— and mean count per trip ▭, in two-month periods June 2010–October 2016, for Common Tern and Arctic Skua.

Wilson's Storm Petrel *Oceanites oceanicus* (Plates 1 and 2). Common; present May–November but much more numerous July–September (Figure 3). Presence of this species in UAE waters had been established from land-based observations, but its true abundance is only evident from boat-based trips, with a maximum of 120 per trip. Most common beyond

Plate 1. Wilson's Storm Petrels *Oceanites oceanicus* 24 June 2016, offshore Kalba, UAE. © *Oscar Campbell*

Plate 2. Wilson's Storm Petrel *Oceanites oceanicus* 2 September 2011, offshore Kalba, UAE. © *Huw Roberts*

Plate 3. Swinhoe's Storm Petrel *Oceanodroma monorhis* 24 June 2016, offshore Kalba, UAE. © *Khalifa al Dhaheri*

20 km from shore; many birds observed were in active primary moult and therefore adults. Its phenology in UAE waters matches that in Omani and southwest Indian waters (EV 2013, Karuthedathu *et al* 2012) but it appears to depart UAE waters much earlier than those in Oman where the species remains common until December (Tuck 1974).

Swinhoe's Storm Petrel *Oceanodroma monorhis* (Plate 3). Very uncommon (total 17 bird-days) mid August–mid September with three further records (totalling 5 bird-days) in June and one in October, plus one record May 2017. Most records at ranges exceeding 30 km from shore. Prior to this study, this species had not been recorded in the UAE. In addition, nine birds on four trips were logged as 'dark-rumped petrels' as they could not be definitively attributed to species (June–September). Following the acceptance of Matsudaira's Storm Petrel *O. matsudairae* from Oman (Harrison 2015), EBRC now assess claims of Swinhoe's Storm Petrel very critically and several previously accepted records have been recently reassigned as unspecified. Swinhoe's Storm Petrel breeds April–August in the northwest Pacific (Carboneras *et al* 2016a) and there is a very strong passage through the Singapore strait (westbound in September, eastbound in May, Poole *et al* 2014). Hence, Swinhoe's Storm Petrel might be expected to be much commoner in the gulf of Oman in winter rather than summer. However, most Omani records are also late May–October (discounting an exceptional, weather-influenced influx in November 1999, EV 2013). Further, the species has also been found to be reasonably common September–October off the southwest Indian coast (Karuthedathu *et al* 2012) with a small number of records January–August (eBird 2017) and records from the Maldives are from February and April (Anderson & Baldock 2001). One possible explanation may be that wintering birds frequent other areas of the Indian ocean and over-summering non-breeders move into Arabian waters in response to food availability. Data on the ages of birds using gulf of Oman waters in summer would provide insight into this hypothesis.

Cory's Shearwater *Calonectris* [*diomedea*] *borealis* (Plate 4). Very rare (five records of singles); mid May–early July; recorded on three trips in 2011 and two in 2014. In addition, birds identified only as Cory's/Scopoli's Shearwaters *C.* [*diomedea*] were recorded in September 2014, and August–September 2015. Records have ranged from quite close inshore amongst rafts of feeding Persian Shearwaters to lone birds beyond 50 km. This species had not previously been recorded in UAE waters and the individual in July 2011 flew into Omani waters, thereby also becoming the first confirmed record for that country (Campbell *et al* 2013). Up to 2013, there are nine Omani records of birds assumed to be Scopoli's

Plate 4. Cory's Shearwater *Calonectris* [*diomedea*] *borealis* 31 May 2014, offshore Kalba, UAE. © *Huw Roberts*

Shearwater *C. diomedea* (EV 2013), mainly June–July, although this assumption may now be questionable. A moribund specimen, confirmed as Cory's Shearwater, was found in Kerala, southwest India, in September 2013 (Praveen *et al* 2013c) and another individual was found in waters between Eritrea and Yemen in April 2015 (Flood 2016). Tracking data (total 40 datasets) suggests this species regularly reaches the Mozambique channel, but is rare north and east of Madagascar whereas no tracked Scopoli's Shearwaters (total 29 datasets) have yet reached the Indian ocean (BirdLife International 2016c).

Wedge-tailed Shearwater *Ardenna pacifica* (Plate 5). Very rare; less than annual visitor almost exclusively May–June. There was only one documented record in the UAE prior to this study, although Richardson (1990) regarded it as an occasional vagrant far offshore. An influx in 2013 accounts for the majority of records, with up to eight individuals per trip over several dates. Almost all records are of birds amongst rafts of Persian Shearwaters, generally quite close inshore. All birds were dark morph; pale morphs are unknown in the Indian ocean away from western Australia (Rasmussen & Anderton 2012). Although Tuck (1974) stated it to be common (presumably well offshore), this species is rather rare inshore in Omani waters, where there are 62 records (EV 2013) whilst only two have been reliably recorded in India, in May 2011 and April 2014 (Karuthedathu *et al* 2012, Praveen *et al* 2015). The species might be more regular in UAE waters than our study implies as tracking data of birds breeding on the Seychelles and Reunion indicates that, out of 8 datasets, five

Plate 5. Wedge-tailed Shearwater *Ardenna pacifica* 31 May 2013, offshore Kalba, UAE. © *Huw Roberts*

reached the gulf of Oman with three even penetrating the (Arabian/Persian) Gulf (BirdLife International 2016c).

Sooty Shearwater *Ardenna grisea* (Plate 6). Annual in very small numbers April–June, mainly late April–May. Virtually all records are from amongst rafts of Persian Shearwaters within 5 km of land; in addition there have been more than 20 shore-based observations since the first record in 1995 (Aspinall 2003, Pedersen *et al* 2016). The near annual occurrence of this species in UAE inshore waters of the gulf of Oman is initially surprising as there are only eight Omani records (mainly April–May, EV 2013). The species is largely absent from the Indian ocean (Carboneras *et al* 2016b) with no verified Indian records (Praveen *et al* 2013a) although there are three records from the Maldives (2003 and two in 2016) all from mid April (Anderson *et al* 2017). However, there are many spring records from the gulf of Eilat, Israel, from a similar time period as the UAE records and co-incident with the species' arrival in very large numbers in the northwest Atlantic and Pacific oceans (Carboneras *et al* 2016b). The paucity of Oman records from the same period may simply reflect limited observer coverage, especially in spring. Birds attempting to continue north

Plate 6. Sooty Shearwater *Ardenna grisea* 14 May 2011, offshore Kalba, UAE. © *Huw Roberts*

and west presumably account for the few records from within the Gulf and Kuwait (Pope & Zogaris 2012, Anon 2016). Northwest Atlantic and Pacific birds head east in summer; birds utilizing UAE waters in spring may well do likewise and thus account for the lack of records after June. However, if so, it is surprising that the species has not been confirmed from Indian waters.

Flesh-footed Shearwater *Ardenna carneipes*. Regular in small numbers April–October but much more numerous May–August (Figure 4). Maximum counts of 35 (June) and 21 (August) were exceptional. Much commoner than the previous two species and generally occurring much further offshore; the only individual close inshore was in ill-health. Only one UAE record prior to June 2010, and this species is not reported in Richardson (1990). The species is fairly common in Oman and, although most records are rather later than those from the UAE (especially September, EV 2013), this may be a function of observer effort. However, Richardson (1999) noted 60 in early December 65 km due east of Kalba, suggesting that there may still be much to learn about the phenology of this species in the gulf of Oman. Flesh-footed Shearwater is one of the commonest seabird species recorded off the southwest Indian coast (Karuthedathu *et al* 2012) and is regularly recorded off the east coast of Africa and the Indian ocean islands (eBird 2017).

Persian Shearwater *Puffinus* [*lherminieri*] *persicus* (Plate 7). Abundant; present all year, but much more numerous March–August (Figure 5). Much commoner in shallow inshore waters when large rafts, often attracting other tubenoses, are sometimes found. Tuck (1974) reported it common in all seasons. Records from Oman also span every month but

Plate 7. Persian Shearwater *Puffinus* [*lherminieri*] *persicus* 28 October 2016, offshore Kalba, UAE. © *Huw Roberts*

numbers December–April are very low (EV 2013) and a six-day cruise Muscat–Djibouti in March–April 2015 recorded only six (Flood 2016). The location of birds prior to breeding remains unknown. However, it is unlikely to be the seas of western India, where only five confirmed records are noted by Praveen *et al* (2013a) although the species has since been recorded annually in small numbers (J Praveen *in litt*). The first record from the Maldives dates from 2013 (Anderson *et al* 2017). Jennings (2010) confirms breeding no closer than the Al-Hallaniyat islands, southern Oman, 840 km due south. However, there may be a closer breeding population given counts of 1000 or more in UAE waters annually April–August. The breeding chronology is poorly known (Jennings 2010). Breeding probably occurs spring–early autumn, with fledging significantly earlier than that exhibited by Jouanin's Petrel (Jouanin 1992). This study suggests that significant post-breeding concentrations do not utilize UAE waters of the gulf of Oman.

Jouanin's Petrel *Bulweria fallax* (Plates 8 to 10). Generally absent (which is surprising given regular occurrence off Muscat, Oman, EV 2013). However, this species is prone to periodic influxes, sometimes very large, in September–December (Figure 6). Such influxes occurred in 2012, 2014 and 2015; in 2012 a maximum count of 609 was made in December, when this species was by far the most numerous species present. In 2017, up to 80 were seen April–early May (but none on a trip on 19 May), underlining the erratic nature of this species in UAE waters. The very small number of boat trips January–February allows for the possibility that the species utilizes UAE waters in late winter as well, albeit not annually. Also recorded, rarely and not every year, May–August. Only one

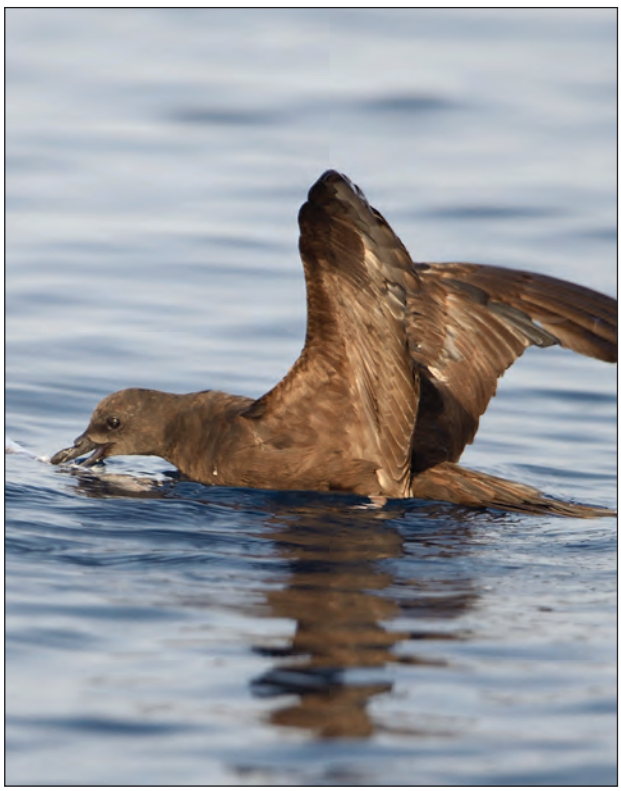


Plate 8 (above left)**.** Jouanin's Petrel *Bulweria fallax* 8 April 2017, offshore Kalba, UAE. © *Mike Barth*

Plate 9 (above right)**.** Jouanin's Petrel *Bulweria fallax* 10 October 2014, offshore Kalba, UAE. © *Huw Roberts*

documented UAE record prior to this study (Pedersen *et al* 2016) although Richardson (1990) regarded it as a scarce visitor March–November. This species appears to avoid inshore waters (contra Richardson 1990), with virtually none within 20 km of the shore and has proved most common beyond 40 km offshore. The breeding ecology and sites of the species are very poorly known, with fledging at the only confirmed colony (Socotra) estimated as October–November (Jennings 2010). Recently fledged birds have been reported in the Omani interior and from the Kenyan coast in December (Jouanin 1992). This fledging period is significantly later than the cessation of the upwelling associated with the southwest monsoon and Jouanin (1992) suggests it may indicate reliance on a food source that becomes abundant as the water temperature rises. However, little information is available on food preferences (Carboneras *et al* 2016c). Hence, an observation of a juvenile in UAE waters on 9 November (Campbell & Smiles 2013) is of particular interest and, as previously suspected, may imply breeding grounds rather closer to the UAE than Socotra. Jennings (2010) moots the Al-Hallaniyat islands, or remote cliffs along the eastern Oman coast as possible additional breeding localities. Many individuals observed in UAE waters in autumn are in heavy wing moult and thus adults. With an estimated population of up to 10 000 mature individuals (BirdLife International 2016a), a significant proportion of the world's population of this near-threatened species may utilize UAE waters at certain times. Jouanin's Petrel remains rare off southwestern India where Praveen *et al* (2013a) note only ten records but has recently been shown to wander much more widely into the eastern Indian ocean than previously believed (Ryan *et al* 2013).

Plate 10. Jouanin's Petrel *Bulweria fallax* (top) and Arctic Skua *Stercorarius parasiticus* (below) 7 April 2017, offshore Kalba, UAE. © *Howard Heaton*

Red-billed Tropicbird *Phaethon aethereus*. Very rare; just one record well offshore during this study (June), although another was seen on a fishing trip in August 2015 (A al Zaabi pers comm). The status of this species is perplexing, given that over 300 pairs are estimated to breed in the Gulf with a further 50 pairs on the Batinah and Musandam coasts of Oman, within 150 km proximity to Kalba (Jennings 2010). Furthermore, it is a

Plate 11. Masked Booby *Sula dactylatra* 11 May 2012, offshore Kalba, UAE. © *Huw Roberts*

regular visitor to the western Indian coastline (Rasmussen & Anderton 2012, J Praveen *in litt*). However, numbers have apparently declined significantly recently at one key Gulf colony (Environment Agency–Abu Dhabi unpublished data). Two breeding birds tracked by satellite in February 2007 from their breeding island in the Gulf moved rapidly through the strait of Hormuz after release, with one reaching Indian waters within two months (Javed *et al* 2008). Neither bird lingered in UAE waters or the gulf of Oman. The species appears to be peculiarly uncommon in waters around the Maldives as well; Anderson & Baldock (2001) listed only 7 records. This species' habit of flying very high likely influences detection rates, as does the fact that the main return to Gulf colonies is October–November with post-breeding dispersal complete by April (Jennings 2010) and hence outside the main period of trips. Whilst this phenology may appear to explain its rarity, there are no additional records of this distinctive species from fishing trips conducted during winter (A al Zaabi pers comm).

Masked Booby *Sula dactylatra* (Plate 11). Rare but annual. Only nine seen during organized trips specifically for this study but fishing trips have recorded this conspicuous species a further 12 times. Records widely scattered with regard to distance from shore. Prior to 2010, there were 12 earlier records, mainly observations from shore (Pedersen *et al* 2016). It is likely some records involve duplication of long-staying individuals. Recorded May–November; an apparent small peak May–June may simply reflect greater coverage during those months. Although the breeding population of the Al-Hallaniyat islands, southern Oman, is estimated to be 11 000 pairs (Jennings 2010), relatively few occur along Omani coasts to the north (EV 2013, Tuck 1974).

Red-footed Booby *Sula sula.* Very rare; just one record far offshore photo'd during a fishing trip in May 2011 (A al Zaabi pers comm). The only previous record of this species in the UAE relates to a bird resting on a ship offshore from Fujairah in August 1979 (Pedersen *et al* 2016), whilst another, a long-dead corpse, was discovered on a beach in the Gulf in October

2016. The 1979 bird was also recorded in Omani waters and there are just two additional records from that country, one March and the other June (EV 2013).

Socotra Cormorant *Phalacrocorax nigrogularis*. Present almost exclusively on or around buoys off Fujairah within 1–2 km of shore and sometimes very numerous there, with counts of up to 1200. Much more frequent November–April (Figure 7) but some present year-round. This vulnerable species has a protracted and variable breeding season in the Gulf, the presumed source of birds in UAE east coast waters and where a large proportion of the world's population breeds (BirdLife International 2016b). Given that many nest there autumn–early spring, the clear peak found at the same period during this study was unexpected.

Red-necked Phalarope *Phalaropus lobatus* (Plate 12). Present almost all year; numbers very variable and most frequent September–April, uncommon June and no July records (Figure 8). Counts of over 1000/trip obtained January, March and September, but less than 50 more typical. The majority of birds were within 20 km of shore. The origin of these

Plate 12. Red-necked Phalarope *Phalaropus lobatus* 25 April 2014 offshore Kalba, UAE. © *Huw Roberts*

birds wintering in Arabian waters has recently been established to be Scandinavia (van Bemmelen *et al* 2015), the birds entering the Indian ocean via the gulf of Oman but then spreading much further offshore to winter. Hence, large numbers in March and September are attributable to birds preparing to depart or recently arrived respectively. Records from Oman show a similar peak in March–April and no records June–July (EV 2013).

Brown Noddy *Anous stolidus* (Plate 13). Annual in variable but mainly very small numbers April–November (Figure 9); much more numerous July–October when up to 19 recorded/trip. Omani records show a comparable pattern (EV 2013). First recorded in the UAE in 1995, with 20 records by 2010 (Pedersen *et al* 2016). Most records are fairly close inshore. This species breeds in very small numbers on islets off Musandam, Oman. However, with that country unlikely to have more than 200 breeding pairs in total (Jennings 2010), it is likely that birds in UAE waters come from much further south or east. Large numbers breed in the Maldives and Lakshadweep, southwest of India (Rasmussen & Anderton 2012).

Lesser Noddy *Anous tenuirostris* (Plate 14). Very rare; less than annual visitor July–November, mainly August–September with a small influx to inshore waters in 2013 accounting for the majority of records. Five records in all, some of long-stayers seen on repeated trips, compared to three previous records 1994–2008 (Pedersen *et al* 2016). This species is much commoner in Oman, mainly in the south, with 46 records up to 2013 (including a count of 94) and a clear peak in July (EV 2013).

Slender-billed Gull *Chroicocephalus genei*. Common winter visitor, mainly December–March; virtually absent remainder of year. This species is invariably seen close inshore and usually much less numerous than the next species. Phenology in Oman is very similar to that along the east coast of the UAE (EV 2013), but small numbers regularly over-summer on the east coast of the UAE (OC pers obs).

Common Black-headed Gull *Chroicocephalus ridibundus*. As in Oman, a very common winter visitor in a narrow time period (December–March); absent for the remainder of the year. Invariably close inshore.

Sooty Gull *Ichthyaetus hemprichii*. Common and present all year, but much more numerous January–June (Figure 10), with a marked increase March–April perhaps indicative of passage birds en route to the Gulf or gathering prior to nesting off the Batinah coast, Oman. Egg-laying in the Gulf is April–May with fledging from late June, but significantly later on the Omani coast, where hatching may not occur until November (Jennings 2010). This data on breeding timing implies that post-breeding dispersal of Gulf birds in late summer or autumn does not reach the UAE east coast, whilst birds from Omani colonies may not arrive there until January. Richardson (1999) noted 50 at an offshore island in the Gulf in December, so it is possible breeders remain within the Gulf most of the year. However, if so, this will be mainly offshore as this species is very uncommon inshore in the Gulf (OC pers obs). In contrast, most records in this study came from inshore waters.

Steppe Gull *Larus* [*fuscus/heuglini*] *barabensis* and **Heuglin's Gull** *Larus* [*fuscus/heuglini*] *heuglini*. Common migrant and winter visitor, mainly September–March; absent only May–July. Mainly inshore, although groups of migrating birds seen well offshore. Due to generally poor views, mainly in flight as they migrate low over the sea, no attempt was made to assign records to taxa. On current knowledge based on observations of coastal birds in the UAE as a whole, the two taxa noted above are likely to account for the vast majority of records. Steppe Gull greatly outnumbers Heuglin's Gulls in the UAE as a

Plate 13. Brown Noddy *Anous stolidus* 30 August 2013, offshore Kalba, UAE. © *Huw Roberts*

Plate 14. Lesser Noddy *Anous tenuirostris* 16 November 2012, offshore Kalba, UAE. © *Huw Roberts*

whole, with Caspian Gull *L. cachinnans* and 'Baltic Gull' *Larus f. fuscus* very uncommon and very rare respectively (Pedersen *et al* 2016, OC & MS pers obs).

Greater Crested Tern *Thalasseus bergii*. Small numbers present all year. However, as for Sooty Gull, much less common in the second half of the year, perhaps because the large colonies on the southern Omani coast breed rather late in the year (egg-laying June–September, Jennings 2010). Consistent with this, Strickland (1973) reported largest numbers on Masirah island in late summer. Found exclusively close inshore.

Lesser Crested Tern *Thalasseus bengalensis*. Common; present all year, but most numerous during spring and autumn migration (Figure 11). This coincides with passage into and out of the Gulf, where large numbers nest; egg-laying in May–June (Jennings 2010). Regular, but in very low numbers, from May–August, a similar pattern as reported on Masirah (Strickland 1973) and elsewhere along the Omani coast where the species does not nest. Evidence from ringing recoveries suggests that birds breeding in the Gulf move east-south-east to spend the winter off the western and southern Indian coasts (most recoveries August–December) with a few reaching Indonesian waters (Kavanagh *et al* 2017). Found almost exclusively close inshore.

Sandwich Tern *Thalasseus sandvicensis*. Present in small numbers all year, but much more numerous during spring passage (March–April, Figure 12) with birds presumably en route to central Asia, from where there are two ringing recoveries on the Omani coast (Jennings 2010). Exclusively close inshore.

Little Tern *Sternula albifrons* and **Saunders's Tern** *S. saundersi*. Common September–June, with a noticeable increase during September–October and, to a much lesser extent, March–April (Figure 13). Due to identification difficulties (near-complete overlap in all plumages except full breeding adults) and the nature of views usually obtained, it is generally not possible to separate these two species. Observations indicate that in March–May (when Saunders's Terns in the Gulf are breeding) Little Terns can be quite numerous on the UAE's east coast and regular on passage at sites far inland where Saunders's is unlikely to occur (pers obs OC, HR, MS). In autumn, relative proportion of the two species is completely unknown. The vast majority of records are from inshore waters.

Bridled Tern *Onychoprion anaethetus*. (Plate 15). Abundant; the most numerous seabird and present especially May–August (Figure 14), with several counts exceeding 2000 and, once, 5311 (August). Virtually absent December–March. Large flocks may occur at any range, feeding where 'bait balls' have been forced to the surface by larger predatory fish. Birds presumably originate from the Gulf or Daimaniat islands (near Muscat) where large numbers breed mainly May–August (Jennings 2010). Phenology in UAE waters based on this study is consistent with this; Richardson (1999) found very few on a December cruise from Muscat to the Gulf. Wintering range is presumed to be the tropical Indian ocean (Gochfeld *et al* 2016a), although the only two distant recoveries of birds ringed as chicks in the Gulf were both from northwest India in September (Kavanagh *et al* 2017). Very few present in Omani waters November–mid April (EV 2013).

Sooty Tern *Onychoprion fuscatus* (Plate 15). Rare; only recorded May–August with an exceptional count of seven on one trip in June. Most other records concern singles, usually amongst small groups of Bridled Terns and mainly at ranges exceeding 30 km from shore. Thirteen records in all (totalling 22 bird-days; also one in early May 2017) compared to seven previously in the UAE (Pedersen *et al* 2016). The vast majority of records are of

Plate 15. Bridled Tern *Onychoprion anaethetus* (left) and Sooty Tern *Onychoprion fuscatus (*right) 24 June 2016, offshore Kalba, UAE. © *Oscar Campbell*

distinctively-plumaged 2nd calendar years and it is possible that adults are overlooked, particularly amongst larger flocks of Bridled Terns. Adult Sooty Terns are possibly less likely to wander to inshore waters than immatures (J Praveen *in litt*). The Arabian population may comprise as few as 30 pairs (Jennings 2010). Most are in the Musandam area of Oman, 140 km north of the study area, where up to 50 have been reported in August.

Arctic Tern *Sterna paradisaea* (Plate 16). Very rare; recorded on two trips only, June 2011 (one bird) and June 2016 (three birds). In addition, there are two recent records of birds seen from land in May, and just one other UAE record (Pedersen *et al* 2016). There are just three

Plate 16. Arctic Tern *Sterna paradisaea* 24 June 2016, offshore Kalba, UAE. © *Oscar Campbell*

Omani records, all July–August and the species is a vagrant to inland India (Rasmussen & Anderton 2012) with no records in coastal waters (J Praveen *in litt*).

Common Tern *Sterna hirundo*. Abundant and present all year, but mainly September–April (Figure 15). Unlike in Oman, where there is a heavy passage past Dhofar in the south of the country throughout May (Bundy 1986, Hirschfeld 1994), we found no obvious spring or autumn passage amongst large numbers of wintering birds. However, small groups of migrating adults were regularly recorded flying purposefully north both close inshore and further offshore throughout May. Other than such obvious migrants, the majority occur close inshore. As the vast majority of birds are in non-breeding or immature plumages, some confusion exists as to exactly which subspecies occur and in what proportions. Gochfield *et al* (2016b) recognize four subspecies, of which three (*S. h. hirundo*, *minussensis* and, perhaps, *tibetana*) are likely (based on breeding and wintering ranges). The taxon *minussensis* is not recognized by Cramp (1986), being regarded as an intergrade between nominate and easterly breeding *longipennis*. As noted at least as long ago as 1993 (Richardson 1993), characteristics of a small but significant minority of birds observed in the UAE approach *longipennis*; all-blackish bills and a rather dark, deep greyish wash to most of the underparts (but many have reddish, not black legs and feet). Such birds are presumably referable to *minussensis* or intergrades. Based on geographical distribution, regular occurrence of true *longipennis* is unlikely.

White-cheeked Tern *Sterna repressa*. Common and present all year, especially March–April, presumably as birds pass en route to breeding grounds in the Gulf where the species is much more numerous as a breeder than it is on the Omani coast (Jennings 2010). This species returns to the Gulf by mid March and is common from April, but virtually all depart by September (OC pers obs). Passage on the UAE east coast in August–September

is surprisingly light given the abundance of breeding birds in the Gulf. Almost all records are close inshore.

Pomarine Skua *Stercorarius pomarinus* (Plate 17). Rare and not recorded annually; 12 records totalling 15 individuals May–October with most May–June. Adults amongst the latter are consistent with spring migrants bound for a high-latitude breeding range, where breeding begins in June (Furness 2016). Most records are within 20 km of the shore. The rarity of this species is peculiar, given that Cramp & Simmons (1983) and Furness (2016) regard it as wintering at low latitudes in the northern Indian ocean. Anderson & Baldock (2001) only listed four records from the Maldives and Karuthedathu *et al* (2012) recorded only one on surveys off the west Indian coast (although the species may be commoner there during winter when survey effort is low, J Praveen *in litt*, Prince 2011). Phenology in the UAE appears rather different to that in Oman where, although reported all year, most records are July–November (EV 2013).

Plate 17. Pomarine Skua *Stercorarius pomarinus* 14 May 2011, offshore Kalba, UAE. © *Ahmed Al Ali*

Arctic Skua *Stercorarius parasiticus* (Plates 10 and 18). Present in small numbers all year, though much commoner March–April (Figure 16), a peak doubtless due to spring migrants. This species normally occurs close inshore. It was formerly regarded as much less frequent than Pomarine Skua in the gulf of Oman (*eg* Tuck 1974) but outnumbered that species by a ratio of 13:1 during this study. In Oman, Arctic Skua records outnumber those of Pomarine, although not to nearly such a large extent (EV 2013). In an interesting series of records totalling 75 individuals on passage in April past Dubai, Bannon (1993) identified 63% as Arctic compared to 23% as Pomarine. However, it was surmised these birds had just completed overland passage across eastern Arabia. Relative proportions of the species doing so may not necessarily match those opting for a sea route off the UAE's east coast. Arkhipov & Blair (2007) summarized records of skuas extracted from the UAE Bird Database for the period 1987–2002 and although the data of the species concerned (predominately Arctic and Pomarine) was combined, it too showed a clear peak in March–April. This is a similar situation to that now recognized

Plate 18. Arctic Skua *Stercorarius parasiticus* 6 November 2015, offshore Kalba, UAE. © *Huw Roberts*

in western Indian waters (Karuthedathu *et al* 2012; Praveen 2014) and, to a lesser extent, Oman (EV 2013). Data from Oman shows clear peaks during passage periods of April and September–November (the latter not noted in this study) with apparently only a small proportion over-wintering.

Long-tailed Skua *Stercorarius longicaudus* (Plate 19). Very rare and not annual; 9 records May–August (mainly June) and one record of two birds in November. Ten UAE records 1989–2008 prior to this study. Most records within 20 km of shore. Possibly overlooked; many birds are 2nd-calendar years, and prone to confusion with Arctic Skua unless views are close and prolonged. Birds in near-adult plumage in early June were observed purposefully migrating northwards but records later in summer presumably refer to birds that will not reach the breeding grounds. This species appears to be rare throughout the northwestern Indian ocean, as there are only six Omani records (EV 2013) and Praveen *et al* (2013a) were unable to confirm it during studies from the west coast of India (although the species has now been identified off Mangalore—Karuthedathu 2014). Interestingly however, further east, Poole *et al* (2011) noted a significant passage (exceeding that of Pomarine and Arctic Skuas) through the waters of northern peninsula Malaysia, mainly April–May, *ie* much earlier than the majority of records in UAE waters.

Plate 19. Long-tailed Skua *Stercorarius longicaudus* 20 June 2014, offshore Kalba, UAE. © *Tommy Pedersen*

This study has greatly improved our knowledge of seabirds utilizing the waters off the UAE east coast. The abundance and phenology of a number of common species (*eg* Persian Shearwater and various terns) has been quantified for the first time. Two species not previously recorded in the country (Swinhoe's Storm Petrel and Cory's Shearwater) were recorded on multiple occasions and at the least the former is likely to be a regular, albeit probably very scarce, visitor. The status of five other species has been accurately assessed for the first time, with some indication of abundance and phenology. Of these, Wilson's Storm Petrel was long known to be a regular visitor, whilst the status of the other four species (Flesh-footed Shearwater, Jouanin's Petrel, Masked Booby and Sooty Tern) was speculative and largely unknown prior to this study. Finally, whilst records of four further species (Wedge-tailed Shearwater, Lesser Noddy, Arctic Tern and Long-tailed Skua) were obtained, their apparent rarity in UAE waters has been confirmed. However, there is some evidence that Wedge-tailed Shearwaters may appear in some numbers during erratic influxes whilst Long-tailed Skua is likely to be annual in very small numbers.

Whilst most of the expected species have now been accounted for, several significant absences remain. Most striking of these are the two *Catharacta* skuas, Brown *C. lonnbergi*

and South Polar *C. maccormicki*. There are now 27 records of these taxa combined in Omani waters (EV 2013), with some close inshore and as far north as Muscat (Harrison 2016). There are 32 records for southwest India (Praveen *et al* 2013b). Given this, it is reasonable to expect a second record in UAE waters (one, of unspecified taxon, was recorded in January 2000 from shore—Pedersen *et al* 2016). Streaked Shearwater *Calonectris leucomelas* may also occur given records from Israel and Oman (Shirihai 1996, EV 2013). Further, there are seven records from Indian waters, all June–December (summarized by Praveen *et al* 2013a, Praveen 2014) and one from the Maldives (Anderson & Baldock 2001) in February. Tropical Shearwater *Puffinus bailloni*, a taxon with a complex taxonomic history, breeds in the Maldives (ssp *nicolae*, del Hoyo *et al* 2017) and is another possible candidate for vagrancy to UAE waters. However, Praveen *et al* (2013a) were unable to confirm it on the Indian checklist (although one Indian record has subsequently come to light, Bhatt 2016), implying that birds do not move far from breeding locations. No less likely, although as challenging to identify, is Short-tailed Shearwater *Ardenna tenuirostris*, of which specimens and photo'd birds include one as far west as southeastern Pakistan (Praveen *et al* 2013a). Further, a small eastward passage has recently been detected through the Singapore strait in May (Poole *et al* 2014).

Future trips will continue to refine our understanding of seabird occurrence in the gulf of Oman. There still remains much to learn about many of the seabirds encountered and their regional phenology. In the case of Wedge-tailed Shearwater, the apparent mismatch between data generated by satellite-tracking and our observations is yet to be resolved. Whilst movements and distribution of certain other species *eg* Red-billed Tropicbird may prove less amenable to analysis from studies such as this, it is hoped that more still can be elucidated about the occurrence of species such as Jouanin's Petrel and Swinhoe's Storm Petrel in UAE waters.

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