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Records of pinnipeds in the Mascarene Islands, 1996 - 2014

Imogen Webster^{1*}, Violaine Dulau-Drouot², Greg Hofmeyr^{3,4}, Vanessa Estrade²

¹ Mauritius Marine Conservation Society, c/o Mauritius Underwater Group, Phoenix, Mauritius

² GLOBICE Réunion, 30 ch. Parc Cabris, 97411 Saint Pierre, la Réunion, France

³ Department of Zoology, Nelson Mandela Metropolitan University, Port Elizabeth 6013, South Africa

⁴ Port Elizabeth Museum at Bayworld, Humewood 6013, Port Elizabeth, South Africa

* Corresponding author: jipperim.orca@gmail.com

Abstract

While no populations of seals are resident in the tropical Indian Ocean, vagrant animals are occasionally sighted in the region. Here we detail two new sightings of pinnipeds in the Mascarene Islands (Mauritius, Reunion and Rodrigues) since 1996 and review a further 15. These include nine records of southern elephant seals (*Mirounga leonina*) and eight of Subantarctic fur seals (*Arctocephalus tropicalis*). A possible increase in the number of vagrants over time may be partially due to changes in sighting effort. The majority of sightings for both species were in the austral winter, the period during which vagrants were most commonly recorded elsewhere. The most recent sightings were a juvenile Subantarctic fur seal on the south east coast of Mauritius in July 2013 and another on La Reunion in August 2014. These animals were underweight and in poor condition, as were most Subantarctic fur seal vagrants to the region. This contrasts with the apparently healthy condition of vagrant southern elephant seals. The origin of vagrants to the Mascarene Islands is unknown but the Îles Kerguelen is a likely source of the southern elephant seals, and Ile Amsterdam and Prince Edward Islands for the Subantarctic fur seals, due to the proximity, the size of their populations and the direction of flow of oceanic currents.

Keywords: Mauritius, Reunion, Rodrigues, southern elephant seals, Subantarctic fur seals, vagrant.

Introduction

The tropical Indian Ocean supports a diverse marine mammal fauna comprising a number of species of cetaceans and one sirenian (Jefferson *et al.*, 2008). While there are no resident populations of pinnipeds (Stoddart, 1972), vagrants have been recorded previously. These include both Subantarctic fur seals (SAFS), *Arctocephalus tropicalis* (David *et al.*, 1993; Garrigue and Ross, 1996; Hofmeyr and Amir, 2010), and southern elephant seals (SES), *Mirounga leonina* (Vinson, 1956; Johnson, 1990). Within this area, a number of vagrants were recorded at the Mascarene Islands (David and Salmon, 2003). Published records are, however, incomplete and only report on a few sightings of fur seals. Reporting the incidences and characteristics of vagrant animals is important in establishing possible distances and directions of dispersal. Here we report on a number of recent sightings of

vagrant seals and review all records of vagrant seals to the Mascarene Islands since 1996, including a number of additional unreported sightings.

Methods

The Mascarene archipelago lies at the southern end of the Mascarene plateau in the south west Indian Ocean (Fig. 1). It is made up of three islands of volcanic origin; La Reunion (21°06'S, 55°33'E), Mauritius (20°30'S, 57°30'E) and Rodrigues (19°43'S, 63°38'E). The latter is the most easterly, lying 560km from Mauritius while Reunion is the closest to mainland Africa some 700km east of Madagascar and 190km south west of Mauritius.

There is no formal database of records for vagrants in Mauritius (and Rodrigues) but unusual sightings are reported by the general public and members of the Mauritius Marine Conservation Society through their

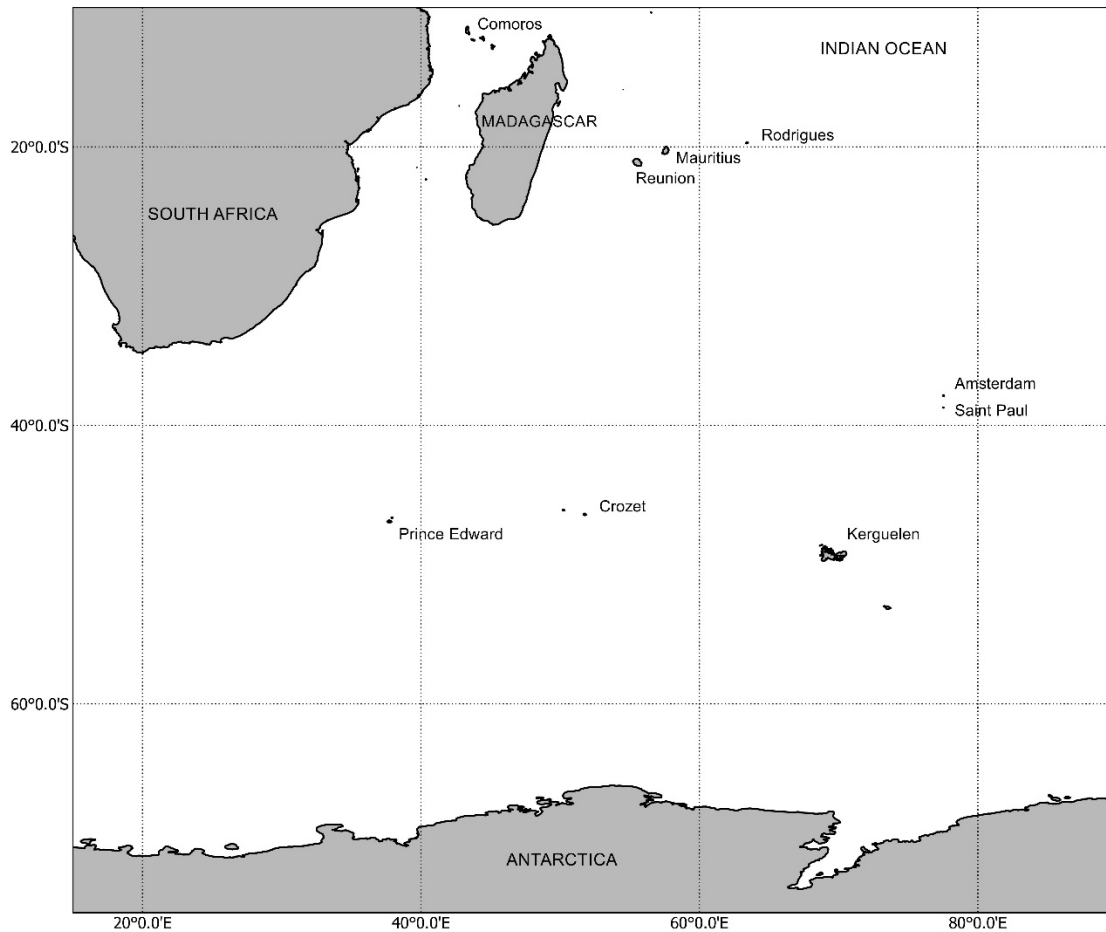


Figure 1. Map of the Mascarene region including Mauritius, Rodrigues and Reunion in relation to Subantarctic islands.

bulletin, *Diodon*. Two recent sightings of fur seals have been added to these records. In Reunion, sightings were recorded by the Marine Mammals Stranding Network, established in 2003. This Network includes 21 trained members mandated by the French National Stranding Network, under the aegis of Observatoire Pelagis, France.

Results

Description of the two most recent strandings

On 27 July, 2013 a small seal was found by fishermen in the south east of Mauritius near Mahébourg ($20^{\circ}24'21.6''S$, $57^{\circ}42'12.24''E$). It was captured and then released at sea by the National Coast Guard. Three days later, on 30 July, an animal was found at Pointe Jerome ($20^{\circ}25'23.3''S$ $57^{\circ}43'18.6''E$), (SE Mauritius) close to the original site. From the size, condition and timing it was assumed to be the same individual. The animal was weak but there were no signs of injury. On the 31 July it was transported to Albion Fisheries Research Centre and housed in the aquaculture facilities. It was examined by one of us (IW). The animal

weighed approximately 6kg and was 87cm in length. Attempts were made to feed it but it died on the 4 August. The gender was not determined. The seal was identified from photographs (Fig. 2) as a SAFS by Victor Cockcroft of the Department of Zoology, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa.

The second animal was sighted at Barachois, St Denis, in the north of Reunion Island ($20^{\circ}52'30.4''S$ $55^{\circ}26'42.7''E$) on 30 August 2014. Reports by the public indicated the presence of a second larger animal that did not come ashore. The animal was moved to a care centre and examined by a local veterinarian who is part of the stranding network (Jean-Marc Devroye). While there was no sign of injury, the animal was weak and thin. Efforts were made to feed the animal but it died on the 1 September. It was a male measuring 93 cm in length and weighed 9.3 kg after death. It was identified from photographs (Fig. 3) as a SAFS by Cédric Marteau from Terres Australes and Antarctiques Françaises (TAAF). Identification was



Figure 2. Photograph of a Subantarctic fur seal (*Arctocephalus tropicalis*) recorded at Mauritius in July 2013. Photograph: Imogen Webster.

confirmed based on a combination of characteristic colouration, head shape and size of eyes (Condy, 1978; Laws, 1993) by one of us (GH). Samples were not taken from either animal.

Other sightings

We sourced an additional 15 records of pinnipeds from the Mascarene Islands since 1996 (Table 1). Based on a combination of geographical location, timing and the sizes of the animals, we believe most of these sightings were of different individuals. Photographic evidence of scar patterns, however, indicates that two of the SES were sighted repeatedly at Reunion, over several months and between years. The first was sighted several times in late May - August 2008 on Reunion. The other individual was sighted on several occasions (>10 times) on the east coast during May - September 2009. It is likely that the latter animal returned in April 2010 (Fig. 4).

The putative species of each animal was determined from a combination of photographs and descriptions of the animals recorded at the time. In total the records comprise eight sightings of SAFS and nine of SES which were identified by local scientists with the assistance of international colleagues. A geographical comparison yields two sightings of SAFS at Reunion, five at Mauritius and one at Rodrigues, while four SES were seen at Reunion, three at Mauritius and two at Rodrigues. All records of SAFS were from the austral winter, during July, August and September (Fig. 5). While the majority of SES sightings were also during this period, two sightings were from the austral summer and two from austral autumn. An examination of inter-annual differences indicates no clear



Figure 3. Photograph of a Subantarctic fur seal (*Arctocephalus tropicalis*) recorded at Reunion in August 2014. Photograph: Jean-Marc Devroye.

trend, though sightings have possibly become more frequent over time (Fig. 6). With the exceptions of 2007 and 2012, at least one vagrant was sighted each year since 2005. Prior to this there were 2-3 year gaps between sightings. The year 2001 was exceptional for the number of SAFS sightings, and 2009 for the number of SES sightings.

Discussion

Only three of the sightings reported here, all in 2001, were previously documented in the scientific literature (David and Salmon, 2003). Here we record a further 14 sightings since 1996 of pinnipeds at the Mascarene Islands. However, this type of event is not new in the tropical Indian Ocean. Historical records mention sightings of southern elephant seals at the Seychelles and at the Chagos Islands in the 18th and 19th Centuries (Stoddart, 1972; King, 1983). More recently, stray animals, believed to be juvenile southern elephant seals, were documented in 1942 and 1954 on Rodrigues and in 1955 on Mauritius (Vinson, 1956). In Reunion, a sighting, likely of a SAFS, was recorded on the east coast (Sainte-Rose) in 1977 by the Natural History Museum (S. Ribes, pers. comm.).

The origins of the pinnipeds reported here are unknown since none of the animals recorded were marked. Other animals recorded elsewhere in the tropical Indian Ocean were also unmarked and are therefore also of unknown origin (Johnson, 1990; David *et al.*, 1993; Garrigue and Ross, 1996; Hofmeyr and Amir, 2010). The most likely sites of origin of vagrant pinnipeds are suggested to be related to the distance from regular haulout sites, the abundance of animals at those sites, and the direction of prevailing

Table 1. Sightings of Subantarctic fur seals (*Arctocephalus tropicalis*) and southern elephant seals (*Mirounga leonina*) in the Mascarene Islands between 1996 and 2014.

Date	Species	Island	Comments	Fate	Source
30 Aug 2014	<i>A. tropicalis</i>	Reunion	Standard length 92cm and mass 10.5kg	Died	This publication
27 Jul 2013	<i>A. tropicalis</i>	Mauritius	Standard length 87cm and mass 6kg	Died	This publication
9 Jan 2011	<i>M. leonina</i>	Reunion	Normal state	Returned to sea	Reunion Stranding Network
9 Apr 2010	<i>M. leonina</i>	Reunion	Normal state, the same individual sighted in 2009 in Reunion	Returned to sea	Reunion Stranding Network
2 Sept 2010	<i>A. tropicalis</i>	Reunion		Stayed at sea	Reunion Stranding Network
18-22 Aug 2009	<i>M. leonina</i>	Rodrigues	Estimated standard length 1.5m, 100kg	Released at sea	MMCS
7 Jul 2009	<i>M. leonina</i>	Reunion	Sighted approx. 10 times May to September, the same individual	Returned to sea	Reunion Stranding Network
Mid 2009	<i>M. leonina</i>	Rodrigues	Left after few hours, big male	Returned to sea	MMCS
Aug 2008	<i>M. leonina</i>	Reunion	Observed several times from late May to August	Returned to sea	Reunion Stranding Network
15 Sept 2006	<i>A. tropicalis</i>	Mauritius	Roches-Noires, NE	Returned to sea	MMCS
9 Aug 2006	<i>M. leonina</i>	Mauritius	SW, Estimated standard length <2m	Released near Îles Kerguelen	MMCS
Aug 2005	<i>A. tropicalis</i>	Mauritius	Poste Lafayette, 86cm	Released off South African coast after rehabilitation	Reef Conservation, MMCS
Jul 2001	<i>A. tropicalis</i>	Mauritius	Mass 6.5kg	Transferred to East London Aquarium	David and Salmon, 2003
Jul 2001	<i>A. tropicalis</i>	Mauritius	Mass 10kg	Died from wounds	David and Salmon, 2003
Jul 2001	<i>A. tropicalis</i>	Rodrigues	'Small'	Returned to sea	David and Salmon, 2003
May 2000	<i>M. leonina</i>	Mauritius	Ile aux Aigrette SE,		MMCS
27 Jan 1996	<i>M. leonina</i>	Mauritius	SW, estimated standard length 3.7m and mass 1.5t. Male	Returned to sea	MMCS

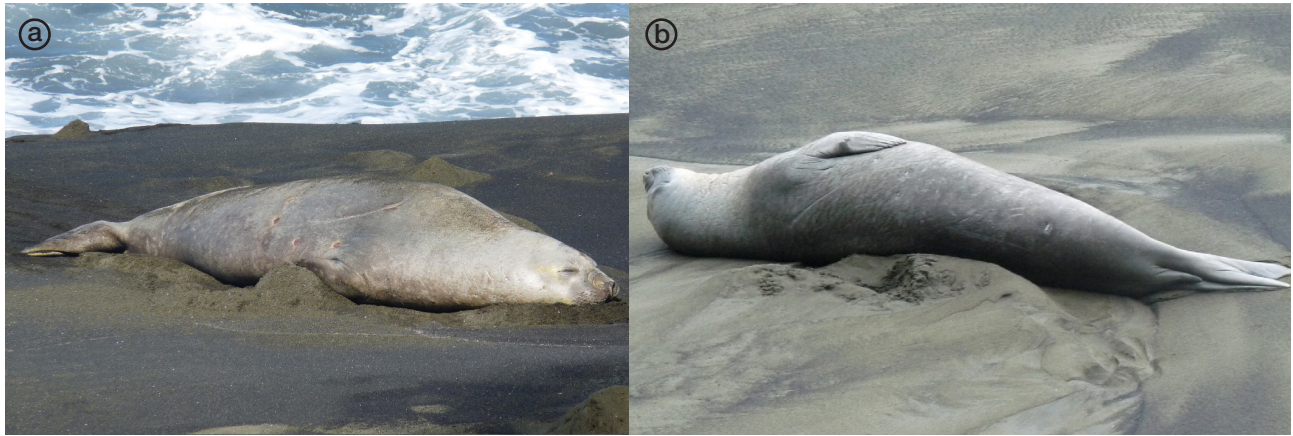


Figure 4. Photographs of the southern elephant seal (*Mirounga leonina*) seen on several occasions in (a) May-September 2009 and (b) April 2010 in Reunion. Note the characteristic scars common to the animal on both photographs. Photographs: Thomas Duval and Bernard Rota.

currents (Hofmeyr and Amir, 2010). These animals may, however, have multiple origins, as was demonstrated for vagrant SAFS to the coast of Brazil (Ferreira *et al.*, 2008).

While no pinnipeds inhabit the tropical Indian Ocean, populations of SES and SAFS are found in the adjacent Southern Ocean. SES have a circumpolar distribution, breeding on a number of Subantarctic and Antarctic islands (Laws, 1994). In the adjacent regions of the Southern Ocean, they haul out on the Îles Crozet, 2800 km distant, the Îles Kerguelen, 3400 km distant, and the Prince Edward Islands, 3400 km distant. While the populations at the Îles Crozet and the Prince Edward Islands are relatively small (Guinet *et al.*, 1999; Pistorius *et al.*, 2011), the Îles Kerguelen is home to the second largest population of this species comprising some 20 % of the global total (Authier *et al.*, 2011). Furthermore, SES from the Îles Kerguelen could use the northerly and eastward flow of both the Antarctic Circumpolar and South Indian Ocean Currents to move into the central region of the Indian Ocean before moving westward with the South Equatorial Current. These same currents could potentially assist the movement of animals from the Îles Crozet and the Prince Edward Islands, and they should not be discounted as a possible source. Although the distances between the Mascarenes and the Îles Kerguelen are large, SES are capable of these movements. Many undergo an annual double migration of several thousand km between haulout sites and foraging grounds (Campagna *et al.*, 1999; Bailleul *et al.*, 2007; Tosh *et al.*, 2009). Vagrants were recorded at a number of locations (Mills *et al.*, 1977; Oosthuizen *et al.*, 1988; Taylor and Taylor, 1989; Alava and Carvajal, 2005; De Moura *et al.*, 2010) including the 5 200 km movement of a tagged animal (Hindell and McMahon, 2000).

SAFS haul out on islands north of the Antarctic Polar Front (Laws, 1994). The most northerly populations are found at Île Amsterdam, 2 400 km distant (Guinet *et al.*, 1994), the Îles Crozet (Kingston and Gwilliam, 2007), and the Prince Edward Islands (Wege *et al.*, 2016). Of these sites, two support the second and third largest populations of this species, with 25 % of global pup production at the Prince Edward Islands (Wege *et al.*, 2016) and 10 % at Île Amsterdam (Guinet *et al.*, 1994). As with SES, SAFS from the latter island could use prevailing currents to reach the Mascarenes. Garrigue and Ross (1996) suggested that vagrants from Amsterdam Island would possibly reach Madagascar by following the northward flow of the South Indian Ocean current and the westward flow of the South Equatorial Current. SAFS are also known to move great distances and are frequently recorded as vagrants (Payne, 1979; Shaughnessy and Ross, 1980; Torres and Aguayo, 1984; Shaughnessy and Burton, 1986; Bester, 1989; Gales *et al.*, 1992; Wynen *et al.*, 2000; Aguiar-dos Santos and Haimovici, 2001; Hofmeyr *et al.*, 2006; Zanre and Bester, 2011; Shaughnessy *et al.*, 2014).

The species identification of the SES recorded is unlikely to be contentious. The large size and characteristic shape of these seals renders them unique in the region (Laws, 1993). Although Antarctic pack ice seals have been recorded on the South African coast, such sightings are rare and these species have not been recorded further north (Ross *et al.*, 1978; Vinding *et al.*, 2013). The identity of the SAFS is also unlikely to be mistaken due to the characteristic pelage colour, head shape and relatively large eyes of this species (Condy, 1978; Laws, 1993). Further, the identity of these animals was confirmed by one of us (GH) familiar with SAFS and other species of fur seals. While two further fur seal species are found in adjacent waters,

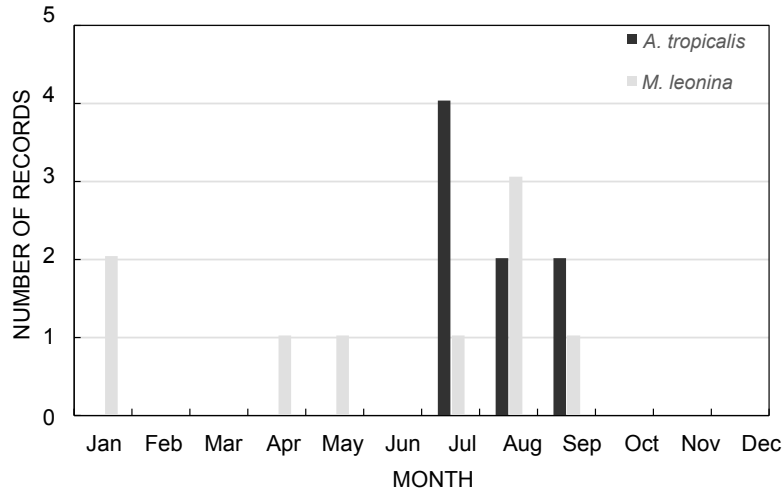


Figure 5. Monthly distribution of vagrant Subantarctic fur seals (*Arctocephalus tropicalis*) and southern elephant seals (*Mirounga leonina*) on the Mascarene islands between 1996 and 2014.

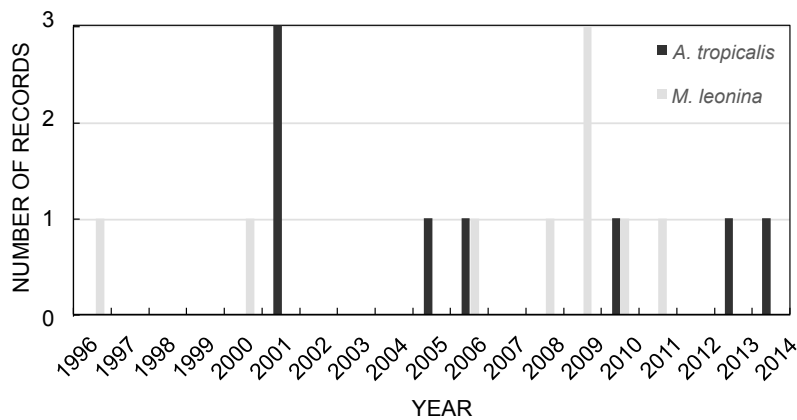


Figure 6. Annual distribution of vagrant Subantarctic fur seals (*Arctocephalus tropicalis*) and southern elephant seals (*Mirounga leonina*) sightings on the Mascarene islands between 1996 and 2014.

the most proximate colonies are small, numbering a few thousand animals only. The nearest colony of Cape fur seals (*Arctocephalus pusillus*) is in Algoa Bay, on the southern coast of South Africa, some 3 300 km distant (Kirkman *et al.*, 2007). Small colonies of Antarctic fur seals (*Arctocephalus gazella*) are found on the Prince Edward Islands, (Wege *et al.*, 2016), the Îles Crozet, (Kingston and Gwilliam, 2007) and the Îles Kerguelen (Jouventin and Weimerskirch, 1990). While vagrant Antarctic fur seals have been recorded in the Atlantic Ocean (Wilson *et al.*, 2006; Bester *et al.*, 2014; Drehmer and De Oliveira, 2000), they have yet to be recorded from the tropical Indian Ocean. Cape fur seals seldom leave the continental shelf (Shaughnessy, 1979) and have only twice been recorded as vagrants (Kerley, 1983a; Thibault 1999).

Given the dispersal capabilities of SES and SAFS, and the relatively small distance between the three islands (800km), it is quite possible for individuals to be seen at all three, or at least both Mauritius and Reunion. However, only in 2001 and 2009, were animals recorded during similar time periods. In July 2001 SAFS were sighted on both Rodrigues and Mauritius. In mid-2009, sightings of SES were recorded on Rodrigues and Reunion. However, it is not possible to confirm whether these were of the same animal. This also holds true for most inter-annual sightings. However, natural scars indicate that two SES were seen repeatedly, in one case inter-annually. Elsewhere, vagrant SES have been known to return to the same area in consecutive years (Oosthuizen *et al.*, 2011; Penry *et al.*, 2013).

The number of sightings in the Mascarenes appeared to have increased over time, especially since 2005. Shaughnessy *et al.* (2014) reported an increase in sightings of SAFS in South Australia since the 1980s which he attributed to an increase in abundance of this species. Several other older sources support this, suggesting that rapid increases in the population size at breeding colonies during certain years can lead to large numbers of vagrants in corresponding years (Bester, 1981; Viet, 2000; Torres *et al.*, 2011). However, since the records reported here are opportunistic it is possible that observer effort plays a confounding role and the earlier occurrence of vagrants on the islands is underestimated. An increase in sightings could also be due to increased interest and awareness of marine mammals as a result of the increasing activities of marine research and conservation organisations which have recently developed in the area. Furthermore, the publicity surrounding single events, may lead to a higher reporting rate of subsequent events. Individual islands appear to have recorded unrelated clusters of sightings.

The sightings show a distinct seasonal pattern. Only two SES were recorded outside of the austral autumn and winter. The January appearance of these animals coincides with the annual moult haulout between November and February (Kirkman *et al.*, 2003). The austral winter has previously been identified as the period of most strandings of pinnipeds in southern Africa (Shaughnessy and Ross, 1980; Oosthuizen *et al.*, 1988), Australia (Gales *et al.*, 1992; Shaughnessy *et al.*, 2014) and elsewhere in the tropical Indian Ocean (Garrigue and Ross, 1996; David *et al.*, 1993; Hofmeyr and Amir, 2010). During this time of the year, members of both species are primarily at sea (Carrick *et al.*, 1962, Kerley, 1983b).

The condition of the vagrants was markedly different between the species. Where recorded, all SES were in apparently good condition. Aside from one that was moved to the Îles Kerguelen, all appeared to have survived and returned to sea. In contrast, all SAFS were in poor condition and a number of these died. A comparison of the mass : length ratios of the two most recently recorded SAFS to those from the Gough Island population (Bester and Van Jaarsveld, 1994) suggested that these individuals were underweight and that starvation was a likely factor in their deaths.

*A further sighting of a Subantarctic fur seal (*A. tropicalis*) occurred on 5th August 2016 in Mauritius on the North West coast.

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