



# Monitoring of vagrant seals on mid-oceanic islands of the South Atlantic Ocean

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## Abstract

Extra-limital sightings of seals breeding on the Antarctic pack- and fast ice and on sub-Antarctic and temperate islands of the South Atlantic Ocean are summarised. Particular life history events of four vagrant seal species that have turned up on Mid-Atlantic Ridge islands are presented, and the likely arrival of a further three vagrant seal species is speculated upon. The setting up and/or expansion of a recording system underpinned by an appropriate sighting protocol for vagrant seals in which citizen scientists can participate is advanced. Determination of whether range contractions/expansions of seals in the South Atlantic are taking place reflects on the status of the source population(s). Seal vagrancy may conceivably also be involved in the spread of viral diseases such as highly pathogenic avian influenza and rabies. Insights gained through extra-limital sightings of seals may assist with the establishment of conservation strategies.

**Keywords** Otariids · Phocids · Saint Helena dependencies · Ranging behaviour · Viral disease

## Introduction

The Mid-Atlantic Ridge (MAR) is a mid-ocean ridge located along the floor of the South Atlantic Ocean (SAO), equidistant to Africa and South America, portions of which extend above sea level to form Ascension Island (07°59'S, 14°25'W), St Helena Island (15°57'S, 5°41'W), the Tristan da Cunha Islands (37°05'S, 12°17'W) which includes Gough Island (40°20'S, 10°00'W), and Bouvetøya (54°24'S, 03°21'E). These islands are variously inhabited and/or visited by pinnipeds for which the population states are uncertain (Bester 2021a).

The Southern Ocean (SO) is undergoing substantial alteration from resource exploitation and climate change

(Chown and Brooks 2019). The health and productivity of many Large Marine Ecosystems (LMEs), such as those on the western seaboard of Africa off St Helena Island (Fig. 1), have been in decline (Kirkman et al. 2020). Largely attributable to the intensity of anthropogenic stressors within the boundaries of LMEs, these impacts have been exacerbated by climate change. Climate change is likely to impact all trophic levels in seabirds and marine mammals, which may result in, amongst others, changes in their distribution (Forcada and Trathan 2009). Tracking the ranging behaviour of marine predators may, therefore, provide information to assist with (a) the protection of SO ecosystems (Hindell et al. 2020; Requena et al. 2020), (b) establishing conservation strategies (Prado et al. 2016), and (c) risk assessment with regard to spreading of disease (Bester 2014).

A vagrant is an individual organism found outside the region that is known for that particular species (Bester 2021a,b). Such extra-limital sightings of marine mammals likely result from one of the most fundamental functions of animal movement, i.e., to find food (Stern and Friedlaender 2018). Errors in navigation acting independently or in concert with other factors (Carpenter-Kling et al. 2017) may also play a role. We are unaware of official recording systems in place for detecting seals on oceanic islands in the SAO.

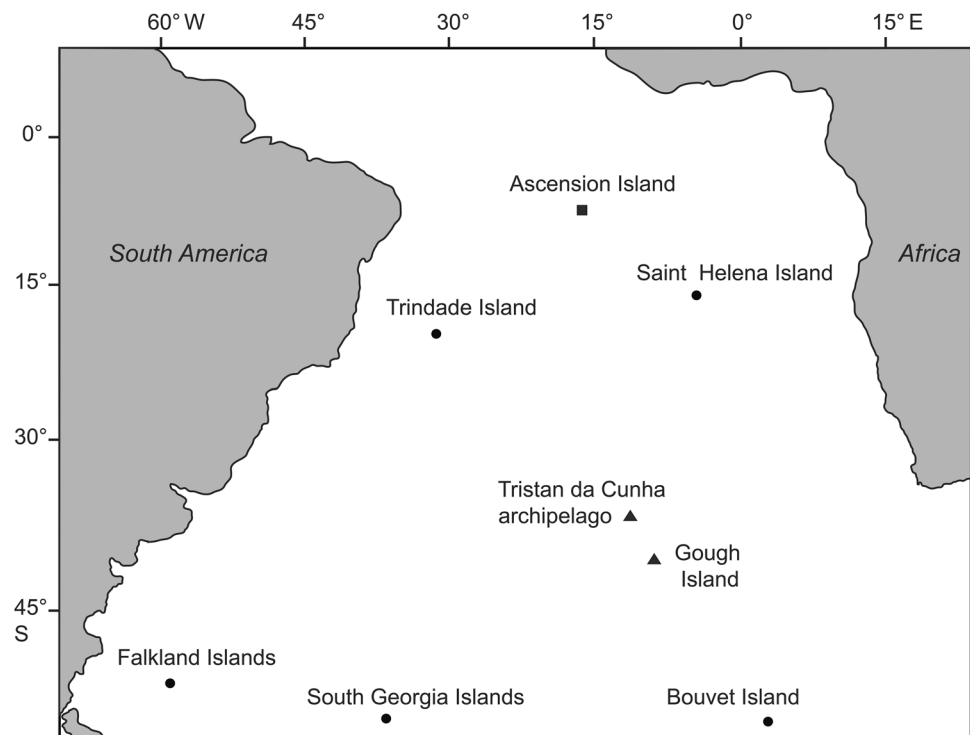
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**Fig. 1** Map (taken from Bester 2021b) showing locations of oceanic islands in the SAO in relation to South America and Africa. These include the northernmost Ascension Island (black square), the Tristan da Cunha Islands (black triangles) and the southernmost Bouvetøya (black dot) on the Mid-Atlantic Ridge



Irrespective of how vagrant seals might arrive on islands outside their usual range, the recent detection of the world's first outbreak of rabies (*Rabies lyssavirus*) in marine mammals, i.e., in Cape fur seals (CFS) along the southwestern African coast (van Helden 2024), raises the alarm for MAR islands. Considered to be endemic in the CFS population, numerous cases have been reported of bites to humans and dogs (Maja 2024). As carriers of the zoonotic rabies virus, vagrant CFS may be arriving at any of the MAR islands, where it conceivably may infect humans and their pets on the inhabited ones (i.e., Tristan da Cunha and St Helena). In addition, the risk assessment of the Highly Pathogenic Avian Influenza (HPAI) in the SO shows that both seals and seabirds are infected and that the spreading of HPAI continues to be catastrophic (Dewar et al. 2023; Leguia et al. 2023). If not already in place, authorities should take extra precautions to prepare for the possible arrival of such viruses (Anon. 2023; Dewar et al. 2023).

Here, we provide preliminary data on vagrant seals in the SAO as a precursor to our ultimate aims of (a) providing guidelines and detailed information (in documents, brochures and weblinks) to create awareness of candidate vagrant seals with its likely observers, (b) suggest a sighting protocol to enhance the ability of expeditioners, scientists and members of the public to correctly record, identify and report any seal sighted, and (c) to mitigate issues that may arise in terms of human safety and animal welfare (e.g., Boren et al. 2002; Kirkwood et al. 2003; Mertz and Bester 2011).

## Methods

We investigated recent scientific literature on extra-limital sightings of seals breeding on islands and the Antarctic pack- and fast ice of the South Atlantic Ocean (following Bester 2021a). Appropriate details of the life history of candidate vagrants were taken from Kirkman et al. (2016), Hofmeyr et al. (2016) and Bester et al. (2017). We scoured the literature for a published sighting protocol which would allow the maximum detail to be recorded at each sighting by the public without advanced skills being required.

## Results and discussion

### Candidate vagrant seals

Based on their extra-limital sightings in the SAO on one or more of the MAR islands (Table 1), candidate vagrants are the eared (Otariid) Antarctic fur seal (AFS) and sub-Antarctic fur seal (SAFS), together with the earless (Phocid) leopard seal (LS) and southern elephant seal (SES). As the most likely seals to turn up at MAR islands, their details are as follows:

Antarctic fur seal *Arctocephalus gazella*

**Table 1** Year, locality, location, identity, age class and sex, number and condition of vagrant seals recorded on MAR Islands

Year	Species	Locality	Location	Age/Sex Class	<i>n</i>	Condition	References
1656	<i>M. leonina</i>	St Helena	Chapel Valley, beach	? Female	1	Weak, injured, killed	Fraser (1935), Temple and Anstey (1936)
1690	<i>M. leonina</i>	St Helena	?	?	1		Fraser (1935)
1739	<i>M. leonina</i>	St Helena	?	?	1	Killed	Fraser (1935)
1817	<i>M. leonina</i>	St Helena	?	?	> = 1	?	Barnes (1817), Fraser (1935)
< 05.09.1910	<i>H. leptonyx</i>	Tristan	?	?	2	?	Barrow (1910)
05.09.1910	<i>H. leptonyx</i>	Tristan	?	? Immature?	1	?	Barrow (1910)
1942	<i>H. leptonyx</i>	Tristan	?	?	> 1	?	Booy (1957)
< 10.1974	<i>H. leptonyx</i>	Gough	?	?	?	?	Bester (1987)
19.01.1997	<i>A. tropicalis</i>	Bouvetøya	Nyrøysa	Subadult M	1	Good	Hofmeyr et al. (2006)
09.02.1997– 12.02.1997	<i>A. tropicalis</i>	Bouvetøya	Nyrøysa	Adult M	1	Good	Hofmeyr et al. (2006)
10.02.1999– 14.02.1999	<i>A. tropicalis</i>	Bouvetøya	Nyrøysa	Adult M	1	Good	Hofmeyr et al. (2006)
06.10.2005	<i>A. gazella</i>	Gough	Seal Beach	Adult M	1	Poor	Wilson et al. (2006)
06.10.2005– 27.10.2005	<i>A. gazella</i>	Gough	Seal Beach	Subadult M	2–3	Poor	Wilson et al. (2006)
06.10.2005– 27.10.2005	<i>A. gazella</i>	Gough	Seal Beach	? Females	1–3	Poor	Wilson et al. (2006)
14.10.2005	<i>H. leptonyx</i>	Gough	Seal Beach	Immature F	1	Poor	Wilson et al. (2006)
05.11.2005 +23.11.2005	<i>A. gazella</i>	Gough	The Glen	Subadult M+? Female	2 + 1	Good	Wilson et al. (2006)
23.11.2005	<i>A. gazella</i>	Gough	Wild Glen	Subadult M+? Female	6 + 2	Good	Wilson et al. (2006)
12.09.2009– 26.09.2009	<i>A. gazella</i>	Gough	Seal Beach	Subadult M	1	Lean, fair	Bester and Reisinger (2010)
25.09.2009 +26.09.2009	<i>A. gazella</i>	Gough	Seal Beach	Adult M	1	Lean, fair	Bester and Reisinger (2010)
18.09.2009	<i>A. gazella</i>	Gough	Cave Beach	Subadult M	1	Lean, lethargic, abrasions on nose	Bester and Reisinger (2010)
26.09.2009	<i>A. gazella</i>	Gough	Seal Beach	Subadult?	1	Poor, lethargic	Bester and Reisinger (2010)
28.09.2009	<i>A. gazella</i>	Gough	Wild Glen	Adult M	1	Lean, fair	Bester and Reisinger (2010)
29.09.2009	<i>A. gazella</i>	Gough	Wild Glen	Adult M + Subadult M	2	Lean, fair, lethargic	Bester and Reisinger (2010)
30.09.2009– 02.10.2009	<i>A. gazella</i>	Gough	Wild Glen	Adult M	1	Lean, fair, lethargic	Bester and Reisinger (2010)
2010	<i>A. tropicalis</i>	Ascension	George Town	Adult M	1	Unknown	Bester (2021b)
21.09.2013	<i>A. gazella</i>	Gough	Seal Beach	Subadult M	1	Lean, lethargic	Bester et al. (2014)
12.09.2016	<i>H. leptonyx</i>	Tristan	Edinburgh	Immature M	1	Poor, minor injuries	Bester et al. (2017)
2019	<i>H. leptonyx</i>	Tristan	?	?	?	?	Bester et al. (2017)

The largest and second largest breeding populations of AFS occur at South Georgia and Bouvetøya, respectively (Fig. 1). The latter population (on the MAR) is stable (Hofmeyr et al. 2005), while the South Georgia population has declined due to climate-driven fluctuations in prey availability (Forcada and Staniland 2018). Elsewhere on the southern MAR, AFS are occasional

seasonal vagrants on the Tristan da Cunha Islands (Bester et al. 2014).

#### Sub-Antarctic fur seal *A. tropicalis*

The largest population of SAFS in the world occurs at Gough Island on the MAR, but its current status is uncertain (Bester et al. 2019). The much smaller populations on the northern group of the Tristan da Cunha Islands

(Tristan da Cunha, Inaccessible and Nightingale) have increased over the last 40 years (Bester et al. 2019). Vagrant SAFS appear at Bouvetøya (Hofmeyr et al. 2006). A vagrant adult male SAFS was recorded in 2010 on the MAR at Ascension Island some 3,587 km to the north of Gough Island, a likely source (Bester 2021b).

#### Leopard seal *Hydrurga leptonyx*

LS that breed in the Antarctic pack ice have been sighted near Bouvetøya (Sivertsen 1954) but have never been recorded ashore there (Bester 2021a). However, they are likely to turn up as seasonal transients during winter and spring (April to October), as observed at South Georgia (Jessopp et al. 2004). Further north on the MAR, only two LS were seen at Gough Island (Bester 1987; Wilson et al. 2006), but there are a number of confirmed records of LS ashore at Tristan da Cunha (Barrow 1910; Booy 1957), most recently in 2016 and 2019 (Bester 2021a; Bester et al. 2017). These sightings are the northernmost for LS at the MAR islands.

#### Southern elephant seal *Mirounga leonina*

A small breeding population of SES existed at Bouvetøya in 1998 (Kirkman et al. 2001). SES were formerly abundant at the Tristan da Cunha Islands but were then decimated by sealing for oil extraction (Wace and Holdgate 1976). Only a small breeding population occurred at Gough Island, which slowly declined by 1998 (Bester et al. 2001) and became practically extinct by 2019 (Jones et al. 2020). Despite claims to the contrary, historically, SES never bred at St Helena Island (Bester 2021a) but ‘sometimes visits the shores’ (Barnes 1817), and at least one SES has been killed there (Fraser 1935).

The vast north–south distances between MAR islands and the low frequency of vagrant seal stranding events complicate inferences based on extra-limital sightings about range contractions/expansions of seals in the South Atlantic (Bester 2021a). By contrast, extra-limital sightings of hundreds of seals of various species (Procksch et al. 2020) are recorded on the South American coast which allowed the calculation of a changing frequency of occurrences of temperate/polar marine mammals to that of subtropical/tropical species (Prado et al. 2016). This changing frequency of sightings may be linked to environmental changes consequent on climate change (Prado et al. 2016). Sightings of vagrant seals may also inform about the source population(s), as vagrants are considered to be the expanding fringe of growing populations (Veit 2000).

The Marine and Conservation section of the St Helena Government website provides for a recording system which allows members of the public to report sightings of marine species (<https://www.sainthelena.gov.sh/directorates/environment-natural-resources-planning/environmental-management/marine-division/>). However, a link exists only for a

sub-section of marine mammals, the whales and dolphins (Whales-and-dolphins-around-St-Helena.pdf (sainthelena.gov.sh)). Such recording systems do not exist for the Tristan da Cunha Islands (cf. Tristan da Cunha Government), where the Governor of St Helena exercises executive authority. Alerting the Tristan da Cunha Department of Conservation and Tristan da Cunha residents to record and report seal sightings (e.g., Bester 2017, 2021c) met with partial success (see Bester et al. 2014, 2017). Given the new threats recording systems require decisive action (this study).

## Conclusions

To enable the interpretation of the presence of vagrant seals at the MAR Islands, there is a need to create or locate and enhance existing databases on vagrant seal sightings. Ideally, a sighting database should include St Helena Island, the Tristan da Cunha Islands and Ascension Island, inhabited islands that fall within the jurisdiction of the Government of St Helena. The most likely vagrant seals found on those MAR islands where they do not breed are CFS originating from the Southern African coast (Kirkman et al. 2016; Thibault 1999), although none has yet been unequivocally identified ashore on MAR Islands, AFS, SAFS and SES. Although the probability of the other four Antarctic phocid seal species turning up at the islands is very low, that eventuality cannot be ruled out (Bester et al. 2017; Frainer et al. 2017). For the Conservation Departments involved at the various islands, it will be useful to include descriptions of all seven species accompanied by colour illustrations of these seals in documents/brochures/weblinks to create awareness of vagrant seals with their likely observers. Encouraging citizens to report potential sightings of seals would improve the database on extra-limital vagrants, our ability to investigate any possible range shifts of seals that breed and/or visit MAR islands in the SAO in the long term, and awareness about the condition and possible diseased state of such vagrants. Ultimately, the public should be encouraged to become involved as citizen scientists in recording seal sightings in a meaningful way (Hofmeyr et al. 2016).

We suggest that the sighting protocol should include the following: source of the record (e.g., the name of the publication/organisation/person who submitted the record), sighting number, date, location (including region and latitude and longitude), type of record (sighting, specimen or bycatch), status (alive or dead), age class (pup, non-adult or adult), sex (male or female), body condition (severe, poor, good or excellent), presence of injuries (present or not-present), presence and detail (number, colour code, site of attachment) of identifying tags and availability of photographs (available or unavailable) after Hupman et al. (2020).

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**Data availability** No datasets were generated or analysed during the current study.

## Declarations

**Conflict of interests** The authors declare no competing interests.

**Ethical approval** Past field procedures on which this paper is based were cleared by the University of Pretoria Animal Ethics Committee (Project Number EC077-15), executed under an Environmental Research Permit, including the Wildlife and Protected Areas Research Permit, of the Tristan da Cunha Government.

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