A Note on the Feral House Cat and House Mouse on Marion Island

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Introduction

A preliminary survey of the feral populations of the house cat *Felis domesticus* and the house mouse *Mus musculus* was conducted on Marion Island between August 1973 and March 1974. This survey formed part of the research programme of the Mammal Research Institute of the University of Pretoria.

The cats and mice are the only introduced mammals which inhabit the island. The mice were probably introduced through shipwrecks and sealers' expeditions. The cats were introduced to exterminate the mice. In 1949 there were five cats at the Meteorological Station on the island. The only other mammals recorded on the island are three species of seals.

Study area

Marion and Prince Edward Islands (46° 52′ S, 37° 51′ E) are situated in the southern Indian Ocean and are entirely volcanic in origin. The flora is typical of Sub-Antarctic islands with low stands of herb-bryophyte communities. Marion Island, the larger of the two, is approximately 19 km by 14 km, with an area of about 300 km². The Meteorological Station and biological laboratory are situated on the east-north-east coast of the island (Fig. 1).

The climate is cold (mean temperature of 5°C), humid, cloudy, windy (westerlies, often of gale force, predominate), and rainy (mean annual precipitation as rain, snow and soft hail totals 260 cm). It rains throughout the year, and there is little diurnal or seasonal variation in temperature *(Schulze,* 1971).

The principal topographic regions are the central mountainous area and the coastal plains. The latter are generally less than 150 m above sea level and vary in width, with an average of 1-2 km. These coastal plains are not continuous, but are interrupted in four places by ridges 200-300 m high. Maximum altitude is 1 230 m above sea level. Numerous lakes and streams occur on the island, but in spite of the high precipitation certain parts have very little surface water.

The cat population

Distribution

All cats seen by the authors were recorded and the distribution pattern is shown in Fig. 1. The total number of sightings was 231, 39 of which were resightings, giving a total of 192 individual cats seen. Locality, habitat type, relative size and coat colour were noted so that new sightings could be distinguished. In areas traversed frequently, individual cats inhabiting particular areas could be recognized.

Most field trips were made in the vicinity of the Meteorological Station, in the coastal plains within 3 km of it, and in the lower parts of the central mountainous region. Cats were recorded up to the 400 m contour level but they may occur above this level. Large areas of the central region were not visited, and the coastal plains were not traversed completely. Evidence of cats, in the form of dung piles, was seen in most parts of the coastal plains, even when cats were not sighted.

Habitat

The majority of the cats were sighted in two types of habitat *(Huntley,* 1971, p. 102), *viz* black lava humps, and tussock grassland and mires. The former consists of a series of well drained mounds with the main plant species *(Blechnum penna-marina, Acaena adscendens* and the cushion plant *Azorella selago)* forming a closed herbfield. In the coastal plains below the 150 m contour these mounds alternate with poorly drained depressions of a bryophyte-grass mat. Most of the cats (48%) are recorded in this habitat type. Well defined cat trails are evident, which traverse the drier slopes and lead from one rock outcrop to another where most of the cat lairs were found.

The second habitat type includes the areas of well drained tussock grassland slopes and the flat, poorly drained bogs and mires. Both types occur on the coastal plains; the tussock grassland is characterized by *Poa cookii,* and the swamp complex consists of bogs and *Agrostis magellanica* mires *(Huntley,* 1971). These grassland and mire areas usually occur in small pockets close to coastal cliffs or broken terrain of grey or black lava. However, fairly extensive swampland extending up to one kilometre inland is found on the west coast and on Goney Plain on the north-east coast. Approximately 20

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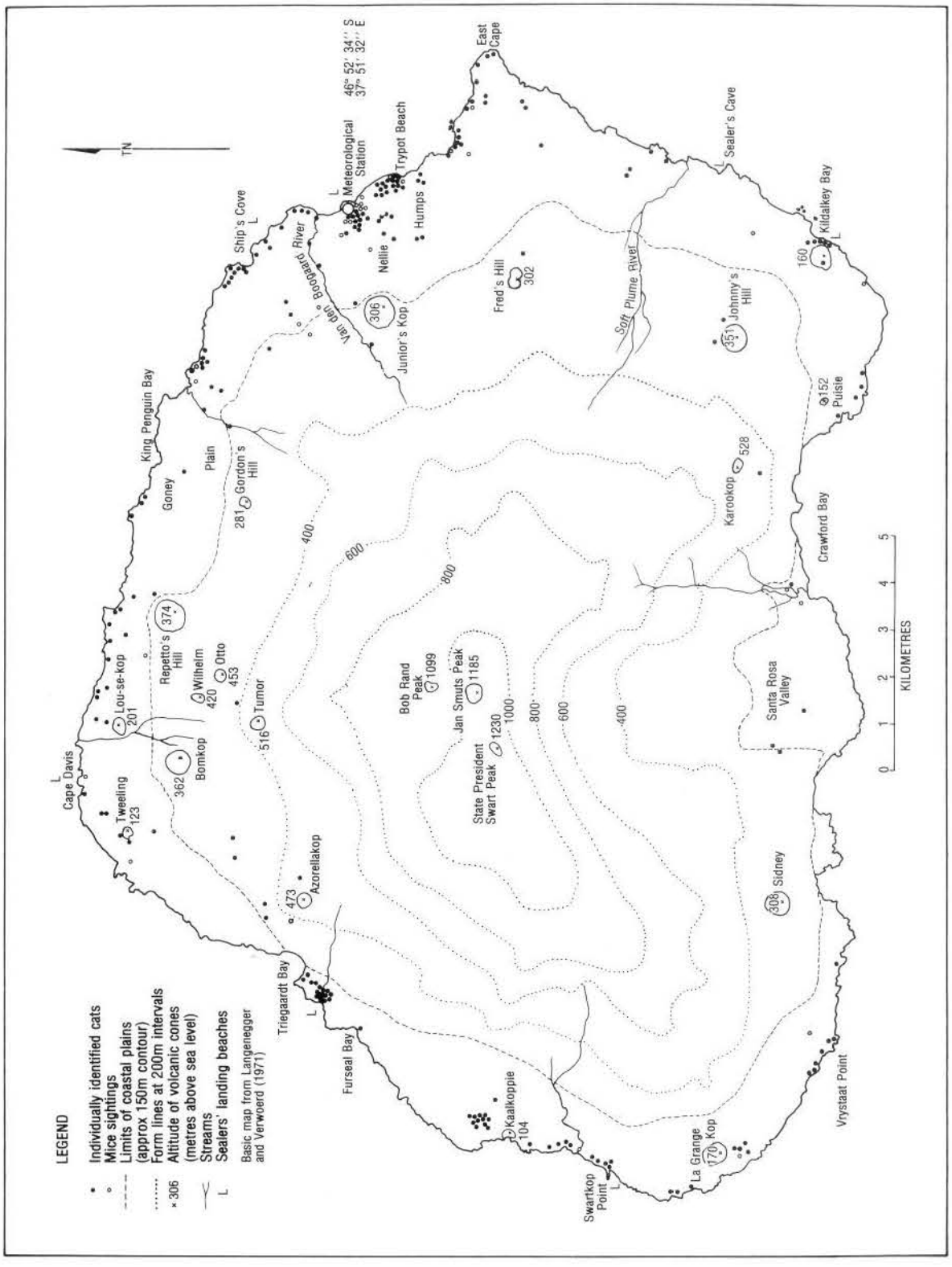

Fig. 1. Sightings of cats (*Felis domesticus*) and mice (*Mus musculus*) on Marion Island.

per cent of the cats seen were in this habitat type, mostly in the drier tussock grassland areas. The few lairs found here were always on the better drained slopes, and most of the cats disturbed in these areas ran for cover into nearby black lava humps or towards cliff edges.

The remaining observations were made along the coastal cliffs of black and grey lava (12%), on or near beaches (12%), on the bleak fjaeldmark parts of the grey lava ridges (4%) and in areas of very rugged and barren black lava flows (4%). However, no account has been taken of the relative areas of each habitat type, or of the distance walked through each type.

Feeding habits

Preliminary data indicate that burrowing petrels (Procellariidae) form the principal component of the cats' diet. Two petrel species, the Salvin's prion *Pachyptila salvini* and the soft-plumaged petrel *Pterodroma mollis* have been identified as cat prey, but others may be taken as well. The Salvin's prion is the most numerous petrel on

the island, and together with the other common species of petrel, occurs chiefly in the black lava humps *(Van Zinderen Bakker*, 1971).

On one occasion a cat was seen killing a fully grown macaroni penguin *Eudyptes chrysolophus* (V.R. Smith, personal communication), and on another two cats were seen feeding on the carcass of a rockhopper penguin *Eudyptes crestatus* outside their lair, some 100 m from the nearest penguin colony. Although penguins probably do not form a large part of their diet, cats scavenge from carcasses of penguins (and petrels) killed by skuas *Stercorarius skua* and giant petrels *Macronectes spp.*, especially during summer.

Seal carcasses on the beaches and young chicks of the various albatross species also provide a source of food for the cats. Cats have been observed stalking and catching mice on three occasions. The large numbers of mice on the island may be an important food source, especially during the winter when the seals and many of the birds leave the island.

Coat colour

Of the five cats at the Meteorological Station in 1949, four were black with white markings (one tom and three of unspecified sex) and the fifth was a marmalade tabby tom (D.O. Triegaardt, personal communication).

The coat colours seen most frequently were black, black with various white markings, and tabby. Cats with dark red-brown or ginger coats were included in the black category, as coat colour could not always be determined accurately on account of poor light conditions and the timidity of the cats. The tabby category includes variations from darkly striped tabbies to tabbies with white patches or an overall grey colour. The proportions of the different colour variations are shown in Table 1.

Table 1

Colour	Number of cats seen	% of total number of cats seen
Black	95	50
Black with white markings	36	19
Tabby	53	27
Unidentified colours	8	4
	192	100

Body size

Age structure of the cat population could be estimated only very broadly, since only two classes of body size were easily distinguishable, *viz* large adult or sub-adult cats, and small cats that were kittens born during the summer of 1973-74. Of the 192 individuals recorded, 76 per cent were large cats, the remaining 24 per cent being kittens. With more experience it may be possible to distinguish between adult and sub-adult cats in the field. The large cats were usually seen singly or in pairs. Kittens were often seen in groups of two to five (probably siblings of one litter).

The mouse population

Distribution

All sightings of mice were recorded and the distribution is shown in Fig. 1. Mice are abundant around the Meteorological Station where many were trapped. Including trapped animals, 29 mice were seen in the field excluding the immediate vicinity of the Meteorological Station. From evidence of nests and runways it is apparent that mice occur all over the coastal plains and up to 300 m above sea level. Mice have also been recorded in the higher mountains at over 1 000 m, near Jan Smuts Peak (V.R. Smith, personal communication).

Habitat preference

The majority of mice and mice nests seen were on the rocky beaches and in exposed peat in the vicinity of elephant seal wallows, penguin rookeries and nightbird burrows. However, this may be because visibility is better in these areas than in more heavily vegetated parts. Several mice were seen in *Poa cookii* grassland, in black lava humps and also in the more barren black and grey lava areas.

Feeding habits

Seeds of *Poa cookii*, *Acaena adscendens* and *Agrostis magellanica* were found stored in mice nests, and seeds of the former species were found in the stomach contents of some trapped animals. A mouse was seen feeding on the carcass of a juvenile black-backed gull *Larus dominicus*. For the mice living in the vicinity of the coastal cliffs and beaches, bird and seal carcasses are probably an important food source. The mice inhabiting the inland areas would have a predominantly vegetable diet.

Discussion

Both cats and mice have successfully colonized most parts of the island, particularly the regions below the 150 m contour. Beaches frequented by sealers (Fig. 1) were probably the points of introduction of mice. Only the south coast of the island has a notable lack of such beaches.

The success of these two introduced species of mammals may be attributed to the availability of suitable lairs and nest sites, offering protection from the elements, and to an abundant food supply. For the cats the black lava humps appear to be the preferred habitat; they provide both lair sites and food, as a large proportion of the burrowing petrels nest in these areas.

The French Sub-Antarctic islands of the Kerguelen and Crozet groups and New Amsterdam Island are also inhabited by house mice and feral cats. There the cats have made a noticeable impact on the bird populations, and certain species of petrels have been greatly reduced in number *(Prévost & Mougin*, 1970). In certain parts of the Kerguelen islands they estimated a density of five adult cats per hectare.

While such a figure may apply to small areas of Marion Island, a figure for overall density would be considerably less. From the observations presented here, which do not represent a complete survey of the island, the minimum size of the cat population is estimated to be 500, with a

maximum of between 1 000 and 2 000 animals. As in the case of the mice, a systematic trapping or transect census programme will be required to obtain a reliable estimate of population size. A detailed study of the predator-prey relationships of the cats on Marion Island is required before their impact on the birds can be assessed.

It appears that the mice are one of the major herbivores on the island, and further investigation into this aspect as well as their general ecology would be of great value.

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