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Sengis (Elephant-shrews) in North-eastern Namibia

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Abstract

Based on live-trapping, interviews, and qualitative habitat assessments, the distribution of the Short-snouted sengi (*Elephantulus brachyrhynchus*) was extended deeper into the panhandle (Caprivi Strip) of Namibia. No evidence was found that the four-toed sengi (*Petrodromus tetradactylus*) occurs in the Panhandle.

The 19 extant sengi (or elephant-shrew) species (Dumbacher, Carlen & Rathbun 2016) are found only in Africa from the north-western Mediterranean coast south to Cape Agulhas (~Cape of Good Hope), and from the Indian Ocean coast to the eastern bank of the Congo and Ubangi rivers; they are absent from the Sahara Desert and far western Africa (Corbet & Hanks 1968, Rathbun 2009). The four-toed sengi, *Petrodromus tetradactylus*, is monospecific and one of the most widespread sengis, occurring in central, eastern and southern Africa in closed-canopy habitats that include coral rag, woodland, and riparian thickets, as well as dense lowland and montane forests (Jennings & Rathbun 2001).

Petrodromus occurs in woodland thickets in Zambia, on the north-west side of the Zambezi River, adjacent to Namibia (Shortridge 1934, Fig. 1), but we are not aware of any records in Namibia, even though the long north-eastern panhandle (“Caprivi Strip”)

that extends ~450 km to the east supports woodland and riparian thicket habitats. The closed-canopy habitats in Namibia that might be suitable for *Petrodromus* are mostly associated with higher rainfall zones in the north-east, and the Okavango, Kwando, and Zambezi rivers (Mendelsohn, et al. 2002). Most habitats in Namibia to the south-east of the panhandle and south into South Africa, are too xeric to support *Petrodromus*. However, rock engravings in the Northern Cape Province of South Africa suggest *Petrodromus* either occurred there in the distant past, or the long-vanished artists were familiar with this species further to the north-east (Rathbun 2008). In contrast, sengis in the genera *Elephantulus* and *Macroscelides* are widespread in arid habitats in Namibia, where sufficient rock or plant cover occurs (Rathbun 2009). *Elephantulus brachyrhynchus* is known from the Western end of the panhandle (Fig. 1; www.sengis.org/distribution).

We trapped small mammals during an expedition to Namibia, hoping to capture *Petrodromus* in the Kavango-East and Zambezi Regions (panhandle), and targeting *Elephantulus* and *Macroscelides* in more arid areas to the south-west of the panhandle. We visually searched for suitable *Petrodromus* habitat and spore (Jennings & Rathbun 2001), interviewed local residents and officials while showing them sengi photographs, and set live traps (H.B. Sherman Live Traps, Tallahassee, Florida, USA, model LFA; Tomahawk Live Traps, Hazelhurst, Wisconsin, USA, model 203) in habitats that looked promising, including in national parks.

We accumulated 744 Sherman and 27 Tomahawk trap-nights in sengi habitats, and found no evidence that *Petrodromus* occurs in Namibia, although absence is more difficult to document than presence. We caught nine species of other small mammals, including eight *Elephantulus brachyrhynchus* (Tables 1 and 2; because we caught nothing in the Tomahawk traps, which were only set at “Camp 2”; the traps-nights are not included in the tables). Our most Eastern trap location (“Camp 2” in Table 2; Figure 1) of *E. brachyrhynchus* represents a ~170 km Eastern range extension for this species in Namibia.

We found that people clearing much of the vegetation, often to bare soil, had largely destroyed much of the potential sengi habitats in riparian areas, outside national parks, that we visited. In national parks with few human residents, riparian habitats we visited were highly impacted by elephants, with virtually all closed-canopy thickets near rivers eaten or trampled to nearly bare soil in areas we visited. More distant from riparian areas, large areas of potential closed-canopy thicket were burned by people, with little or no suitable habitats remaining for *Petrodromus*. The only locations where we captured *E. brachyrhynchus* were in relatively small areas where human and elephant damage had not occurred or was minimal (Table 1, Fig. 1). Our searches were only close to roads, so it is possible that habitat alteration may not have been as severe in more remote areas (with fewer people?). However, this is not supported by an examination of satellite images (Google Earth 2016), nor the fact that the panhandle is only ~30-100 km wide with relatively good roads or tracks, which allows people access to nearly all areas (Mendelsohn, et al. 2002). Indeed, the only area where we successfully trapped *E. brachyrhynchus* were small unburned thickets on the rarely travelled and unpopulated section of the bush track

along the Zambia-Namibia border, and in small and isolated protected habitats, such as RiverDance Lodge (Tables 1 & 2; Figure 1).

All sengis are terrestrial, with no ability or propensity to swim or climb. In addition, only some use shallow and short burrows in the soil (Rathbun 2009). These behaviours suggest that it is unlikely that *Petrodromus* occurs in Namibia because of the effectiveness of the Okavango and Zambezi rivers, including their seasonal flood plains, as dispersal barriers. Additionally, suitable mesic habitats for *Petrodromus* in most of arid Namibia have likely been limited in recent centuries (Mendelsohn, et al. 2002). Although we found relatively few areas that might support *Petrodromus*, one of the most widespread sengis in Africa along with *E. brachyrhynchus* (Rathbun 2009), neither is globally in danger of extinction in the foreseeable future.

We thank the Namibia Ministry of Environment and Tourism for our permit to trap small mammals in Namibia, including in several national parks (Table 2). We also thank Laura Wilkinson for assistance with specimen identifications, and Laurel Osborne for her participation in the fieldwork.

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Table 1: Total individual small mammals (N = 111) captured by species (N = 9), date (2016), and location (N = 10) during 13 days of trapping (Sherman trap-nights = 744) in Namibia. See Table 2 for location details, and number and species of voucher specimens collected at each site. Species (column) abbreviations: Elephantulus = *Elephantulus brachyrhynchus*, Sacco = *Saccostomus campestris*, Dendro = *Dendromus mesomelas*, Desmodil = *Desmodillus auricularis*, Gerbil = *Gerbilliscus (Tatera) leucogaster*, Micaelamys = *Micaelamys (Aethomys) namaquensis*, Mus = *Mus (Nannomys) indutus*, Masto = *Mastomys* sp., Petro = *Petromyscus collinus*.

Date	Location	Traps	Elephantulus	Sacco	Dendro	Desmodil	Gerbil	Micaelamys	Mus	Masto	Petro
20 Sep	Roy's	30	0	0	0	0	1	1	0	0	0
21 Sep	Buffalo	60	0	0	0	0	3	0	2	0	0
22 Sep	Nambwa	48	0	2	1	0	0	?1 (escaped)	0	0	0
23 Sep	Camp #1	90	1	0	0	0	9	3	0	9	0
24 Sep	Camp #2	80	2	2	0	0	15	0	0	0	0
26 Sep	Nkasa L	30	0	0	0	0	0	1	1	0	0
27 Sep	Nkasa L	45	0	1	0	0	0	2	0	0	0
28 Sep	Camp #2	98	3 (released 1)	0	0	0	18	0	0	0	0
29 Sep	Camp #2	98	1 (+1 recap)	0	0	0	13	2	0	0	0
30 Sep	River Dance	20	1	0	0	0	8	2	0	0	0
3 Oct	Windpoort	47	0	1	0	1	1	0	0	2	0
6 Oct	Messum	49	0	0	0	0	0	0	0	0	1
7 Oct	Dorob	49	0	0	0	0	0	0	0	0	0
TOTAL	10 sites	744	8	6	1	1	68	12	3	11	1

Table 2: Small mammal trapping locations (N = 10) in Namibia during September and October 2016, and number of voucher specimens (N = 34) collected at each site (NP = National Park). Map site refers to the numbers on the map in Figure 1. Specimens are catalogued into the collection at the California Academy of Sciences, San Francisco, except one each of *Gerbilliscus* and *Mastomys* in row “Camp 2” that are in the collection of the Biology Department, Trinity University, San Antonio, Texas.

Location	Latitude	Longitude	Map Site (Fig. 1)	Vouchers
Roy's Camp (N. Grootfontein)	-19.2325	18.4978	1	0
Buffalo Camp, Kavango R, Bwabwata NP	-18.14423	21.71053	2	1 <i>Mus</i>
Nambwa Camp, Kwando R, Bwabwata NP	-17.8774	23.30401	3	1 <i>Dendromus</i> , 1 <i>Saccostomus</i>
Camp 1, Namibia-Zambia border track	-17.62381	23.51137	4	5 <i>Mastomys</i> , 2 <i>Gerbilliscus</i> , 3 <i>Micaelamys</i> , 1 <i>Elephantulus</i>
Camp 2, Namibia-Zambia border track	-17.5950	23.64824	5	5 <i>Elephantulus</i> , 2 <i>Saccostomus</i> , 2 <i>Mus</i> , 2 <i>Mastomys</i> , 1 <i>Gerbilliscus</i>
Community Camp, Nkasa Lupala NP	-18.31794	23.66223	6	1 <i>Mus</i> , 1 <i>Micaelamys</i> , 1 <i>Saccostomus</i>
River Dance Lodge, Kavango R, W of Divundu	-17.98628	21.35622	7	0
Windpoort Farm, SW of Etosha NP	-19.36631	15.48108	8	1 <i>Desmodillus</i> , 1 <i>Gerbilliscus</i>
Messum River, east of Messum Crater	-21.32466	14.32431	9	0
Dorob National Park, W side Goboboseb Mts	-21.24722	14.06624	10	0

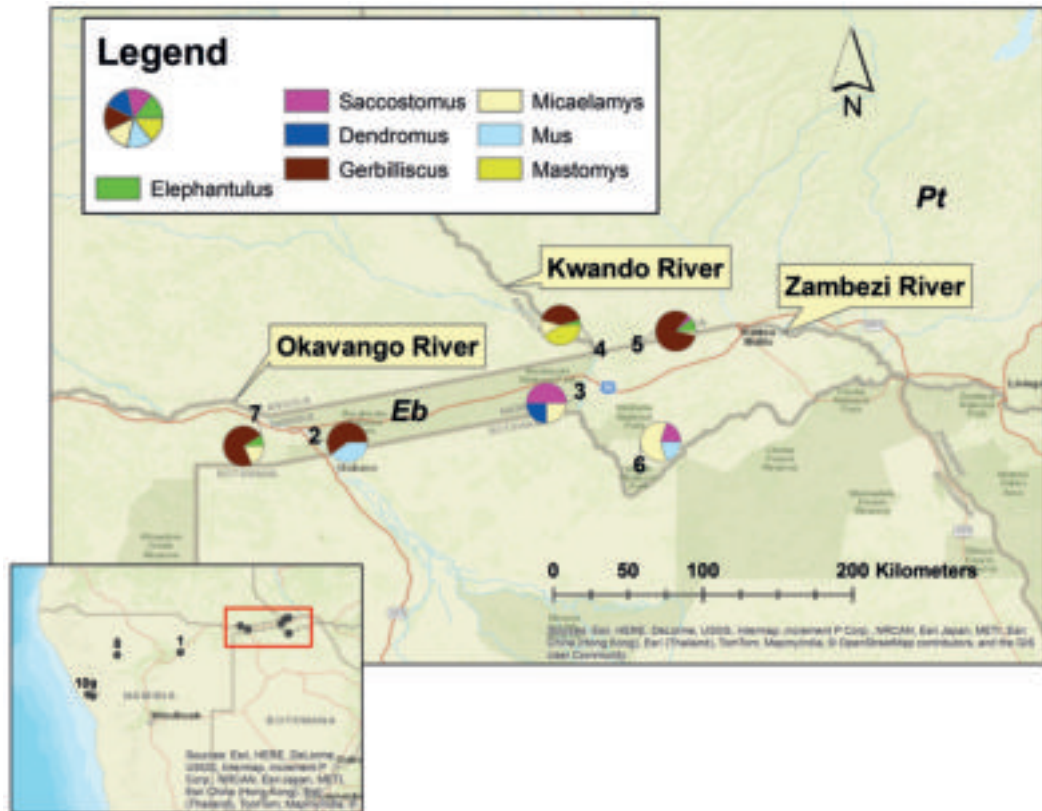


Figure 1. Location of trapping stations in the panhandle of Namibia (see inset) during September and October 2016. The numbers in the overall and inset maps are positioned at the trapping locations and correspond to the site numbers in Table 2. The pie diagrams represent the relative number of each species captured, as indicated in the legend and in Table 1. **Pt** is the location of the nearest known site of *Petrodromus tetradactylus* to Namibia, and **Eb** is the location of the only previously documented *Elephantulus brachyrhynchus* in the panhandle (see text).

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Galen Rathbun is a Fellow and Research Associate of the California Academy of Sciences, and has spent much of his career studying the behavioural ecology of small mammals, including sengis, in eastern and southern Africa.



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