

The Study of Small Nocturnal Mammals Population, to Determine their Biodiversity around Namib Desert Environmental Education Trust (NaDEET) Centre, In the Southern Namib Desert

Research Report

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Introduction

Generally small mammals are perceived to be less important or even as pests in ecosystems (Sieg, 1987), and therefore less attention is paid to them. Even though only a few nocturnal mammals are recorded to be observed in this area, I assumed there could be more. In a field guide "It's time to Identify" (Ehrenbold & Keding, n.d) only three of the nocturnal small mammals are documented, namely *Gerbillurus paeba*, *G tytonis*, and *Rhabdomys pumilio*. Field guides have shown many other small mammals to be occurring in this area (Smithers 1992), and at least two more small mammals were trapped and identified recently, namely the garble mouse *Malacotharix typica* (NaDEET's news letter) and short tailed gerbil *Desmodillus auricularis* last year and this year respectively. This research followed on a similar study done previously in this area "Determining the biodiversity and the population size of nocturnal small mammals" (Mamili, 2006) which concluded that there was only two species of small mammals occurring in this area, because distinctions were not drawn between the two of the gerbil species commonly observed in this area. The two gerbil species are very challenging to tell apart and often mis-identified, but they can be distinguished by the following characteristics, most obviously the tail of *G tytonis* is 40 mm longer than its body and head, while *G. paeba*'s is just 20 mm long longer than its body , The hind toes of *G. tytonis* are broader than those of *G. paeba*, and lastly *G. tytonis* have fringes of hair on each hind toe which is absent in other gerbil species (Micheal, Perrin, Edith, Dempster, Collen & David, 1999). Often NaDEET centre participants do not pick up these differences, as it is not easy to handle and measure the specimens.

G. paeba is abundant, distributed almost all over Namibia but north eastern parts and some parts of the central coast line (Micheal, Perrin, Edith, Dampster, Collen, David, 1999). *G. tytonis*'s is endemic to the Namib sand sea, where NaDEET Centre is situated within the boundaries of the Namib Rand Natural Reserve. The area is very hot and dry, the mean annual temperature is > 18° and mean annual rainfall is less than 125ml (Micheal, Perrin, Edith, Dempster, Collen & David, 1999). Average gerbil's home range is about 3.41 hectares (Micheal, Perrin, Edith, Dampster, Collen, David, 1999). Besides the previous project that have been done on small mammal population in this area, other similar studies have been done in Namibia including Etosha National Park. This study would determine the current species richness and and determine whether the Centre is attracting small mammals.

Objectives

- (a) To determine if the Centre is an attractant to small nocturnal small mammals.
- (b) To determine biodiversity of nocturnal small mammals in the area.
- (c) Explore a simple ways to distinguish *G. paeba* and *G. tytonis*.

Hypothesis

Is there a difference in small nocturnal mammal abundance on the two sites?

H₀ there is no difference in the abundance of small mammals between the two sites

H_A there is a difference in the abundance of small nocturnal mammals between the two sites.

Methods and Materials

Materials

- 20 Sherman traps
- A GPS
- A 30 M tape meter
- Bait (Peanut butter & oats)
- Scale
- Scissors to mark the specimen
- Clear plastic bag for handling the specimen
- Guide (mammal)
- Digital camera
- Data sheet

Methods

Firstly two sites were chosen, one closer to the Centre (A) and one at least a kilometre from the Centre (B). A GPS was used to mark the areas and ensure that area B is a Km from the Centre. Site B has to be a km from the Centre because some small mammals such as gerbils have an average home range of about 3.41 hectares (Micheal, Perrin, Edith, Dampster, Collen, 1999) and to reduce chances of overlapping populations. Only 20 Sherman traps were available, 10 for each site. Systematic sampling was used, 100 × 100 m transect with 10 quadrants was chosen, and while making sure all habitats (dune and dune valley) are covered. Each quadrant was allocated one Sherman trap.

Trapping and marking of specimens

Trapping started from 1st of March up to the 1st of June. 2 trapping sessions were done every week, where traps were set up at least after 18h00 and checked before 09h00 the next morning, to prevent traps from heating up. Each specimen trapped was marked, by clipping a bit of its hair. A pair of scissors was used for this. Distinctions were made between marks of species from the two different

sites. Species from site A were marked by clipping a bit of hair from the back of their head, and species from site B were marked by clipping of hair from their backs, just at the base of their tails just in case there is overlap in study populations. Specimens marked could then be recognized in the next trapping session to avoid counting the same animal twice. All specimens trapped in a trapping session that were not marked were marked before being released.

Identification

For handling, specimens were placed in a clear plastic bag which was punched with holes for ventilation. More than one diagnostic features were used to ensure accurate identification of specimens. Total body length of specimens was measured followed by tail length, this was done using a ruler. A small mammal scale was used to measure weight of specimen while still in plastic bag, and then plastic bag weight was subtracted. Photos of specimens were then be taken for further identification and exploration of better distinguishing characteristics for *G. tytonis* and *G. paeba*. A digital camera was used.

Method

Originally a Jolly-Serber mark recapture method was going to be used. This method could not work because there was no distinction, in marks of animal trapped in different sessions. Diversity was determined simply by, comparing the abundance of the different species on each site.

Difference in abundance of nocturnal small mammals on the two sites was determined. This was to determine whether the Centre and human activities are playing a role on species distribution. If Centre's (site A) small mammal abundance is higher than site B, than chances are that activities at the Centre is attracting small mammals. To determine the significance of the difference between the two populations, a T test for independence variable was performed. **Formula:** $t = \frac{\bar{x}_1 - \bar{x}_2}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$ this formula was used to calculate the T value, which was compared to a critical value. This was be done to prove that the difference is significant, and it's not by chance. If the T tests result is more than the critical value from the probability table, than there is a significant difference

Results

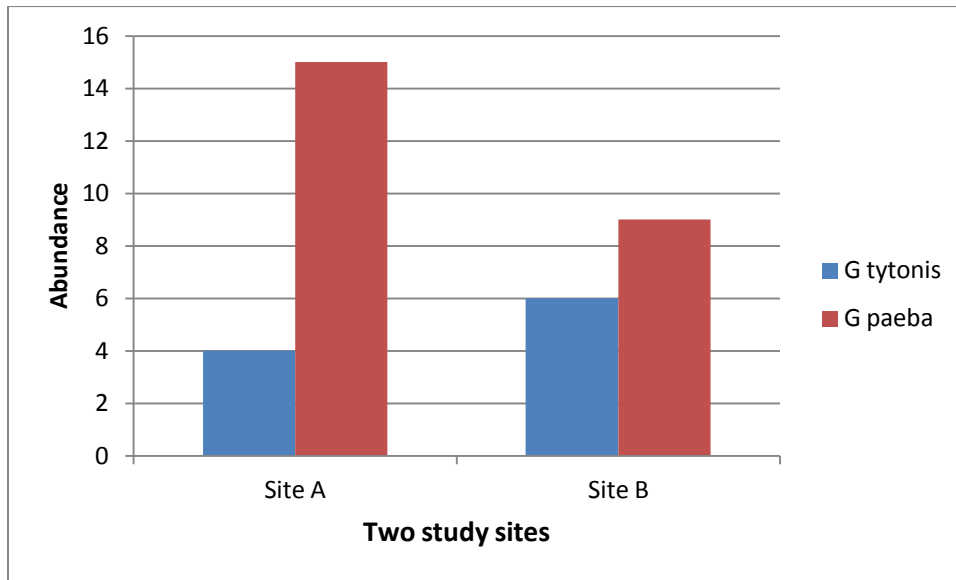


Fig 1: Species abundance of small mammals on the two sites, area A (area next to Centre) and area B (area away from centre).

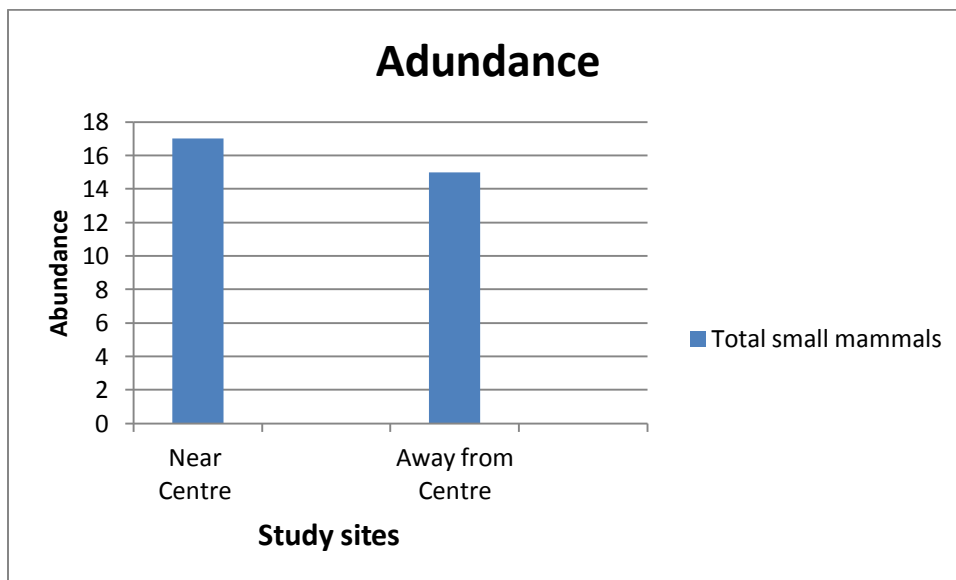


Fig 2: Overall small mammal abundance on two sites, near the centre and away from the centre.

Trapping session	# sp Captured A	# sp recapture A	Abundance A	# sp captured B	# sp recapture B	Abundance B
session 1	3	0	3	1	0	1
session 2	3	2	1	1	0	1
session 3	3	2	1	4	0	4
session 4	6	2	4	3	1	2
session 5	7	4	3	5	2	3
session 6	4	2	2	2	0	2
session 7	4	3	1	1	0	1
session 8	6	4	2	1	0	1
Sum	36	19	17	18	3	15
Trap success	4.5			2.25		
Total abundance			17			15
SD			1.125991626			1.125991626

Figure: 3 Calculation of standard deviation trap success and abundance.

T test for independent variables

$$T = (x_1 - x_2) / \sqrt{(s_1^2/n_1 + s_2^2/n_2)}$$

$$= (2.125 - 1.875) / \sqrt{(0.15848214 + 0.15848214)}$$

$$= (0.25) / \sqrt{0.31696428}$$

$$= 0.25 / 0.56299581$$

$$= 0.444$$

$$df = n - 1$$

$$= 8 - 1$$

$$P(0.05) \text{ 7df} = 2.365$$

$$t = 0.444 < 2.365$$

This proves that there is thus no significant difference in abundance of small nocturnal mammals on the two sites, thus the H_0 hypothesis is true.



Fig: 3 G. paeba



Fig: 4 G. Tytonis

Discussions

Despite high odds that the centre would attract small mammals, results of the study show different Results. The results show that there is no big difference in abundance of the small mammals on both two sites. A T test for independent variables proves that there is no significant difference in abundance between the two areas. The study's results show a very low species richness, even though literature shows a lot more small mammals to be occurring in this area, only two species were trapped during the study *G. paeba* and *G. Tytonis*. Regardless of the results, during separate sessions that were unrelated to the research, other species such as *Rhabdomys pumilio* and *Desmodillus auricularis* were trapped. There could be a few justifications why only two mammal species were trapped. The number of traps available was very low to give efficient results, secondly only peanut butter and oats was used as bait, and not all nocturnal mammals are herbivores. Using peanut butter as bait could mainly only attract herbivores. Besides that trap success was fairly high on site A than site B regardless of abundance. It could be that animals from site A are trap happy, because there are often trapped during the activity called "nocturnal trapping". It's clear it that the same animal was coming back to the trap more than ones. Figure tree and four compares the two very similar gerbil species *G. paeba* and *G. tytonis*, to spot the anatomical differences. Only measurement of total body length and tail length were used to tell the two gerbils apart.

Conclusion and recommendation

The T test proves that there is no deference in abundance of sample on the two sites, which means that small mammals are evenly distributed in the area, and not concentrated to areas surrounding the Centre. According to the study, species reaches is only two, therefore the bio diversity of small nocturnal mammals is low on both sites. It is no mistake that literature fail to describe any physical characteristics that distinguish the two gerble, like the two pictures only measurements could tell this two gerbils apart. No clear physical distinctions were observed. My recommendations to anyone who wishes to follow on this study are, they should use bait that could also attract carnivorous small mammals. Also do a small survey to ensure that the trapping sites are identical in terms of vegetation and micro climate. Use more traps if possible to acquire sufficient data.

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Appendix 2

Site B

Date	Total body	Tail length	Body leng	Deffernce	Weight	Mark	Recapture	Sex	Photograp	Species	Comments
1/3/2015	20	11	9	2	24	M		F	IMG 6207	G.t	1
			0	0							
5/3/2015	20	11	9	2	23	M		M	DSCN 086	G.p	1
			0	0							
8/3/2015	19	10	9	1	22	M		F	IMG 6219	G.p	1
	18	10	8	2	21	M		M		G.p	1
	20	11	9	2	20	M		M	IMG 6229	G.p	1
	20	11	9	2	21	M		M	IMG 6271	G.p	1
			0	0							
12/3/2015	18	10	8	2	20		R in 4th se	M	DSCN 097	G.P	1
	18	10	8	2	22	M		F		G.p	1
	19	10	9	1	20	M		F	DSCN 099	G.p	1
			0	0							
16/3/2015	18	10	8	2	20	M		M		G.p	1
	20	11	9	2	22	M		M	IMG 6384	G.p	1
	18	10	8	2	23		R in 5th se	M		G.p	1
	21	12	9	3	26	M		F		G.t	1
	18	10	8	2	23		R in 5th se	M		G.p	1
			0	0							
19/4/2015	18	10	8	2	25	M		F		G.t	1
	20	12	8	4	26	M		F		G.t	1
22/4/2015	19	11	8	3	24	M		F		G.t	1
			0	0							
26/4/2015	18	10	8	2	22	M		F		G.p	1
Total G.t											6
total G.p											9

G. p = Gerbillurus paeba

G. t =Gerbillurus tytonis