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Brown hyena denning behaviour

1. Introduction

Brown hyenas are social animals that live in clans. Usually only one female per clan has a litter of one to four cubs at a time. These cubs are fully weaned with 15 months of age. All adult clan members take part in raising the cubs as they carry food items back to the den.

The Brown Hyena Research Project fitted four lactating females with GPS telemetry collars to monitor their movement and behaviour in detail. The collars had different programming schedules:

- Tosca 2006-2007 20 minutes GPS interval
- Tosca 2009-2010, Obelixa 2009-2011, Obelixa 2011, Alaika 2011 1 hour GPS interval
- Minerva 2007 10 minutes GPS interval

Two different female brown hyenas (Tosca and Obelixa) were each fitted with GPS telemetry collars before giving birth. The other two females (Alaika and Minerva) and in one case also Tosca had already had a litter of cubs when they were fitted with GPS telemetry collars.

2. Results

a) Time spend at den

Both hyenas that gave birth during the time that they were fitted with collars spend a major proportion of their time inside the birth den or hidden at nearby resting sites before, during and after giving birth (Table 1). Tosca spent up to 88% of the time inside the den on 12 consecutive days and Obelixa spent up to 52% of the time inside the den on 43 and 22 consecutive days.

Table 1: Time spend inside the den or at resting site around the time of birth

Hyena	Days	%	
		Inside	Outside
Tosca 2009-2010	12	88.08	11.92
Obelixa 2009-2011	43	46.61	53.39
Obelixa 2011	22	51.51	48.49

The time that the lactating females spent at the den decreased with increasing age of the cubs (Figure 1). Tosca spent significantly less time at the den than Obelixa (Repeated-measures ANOVA, $p < 0.0001$).

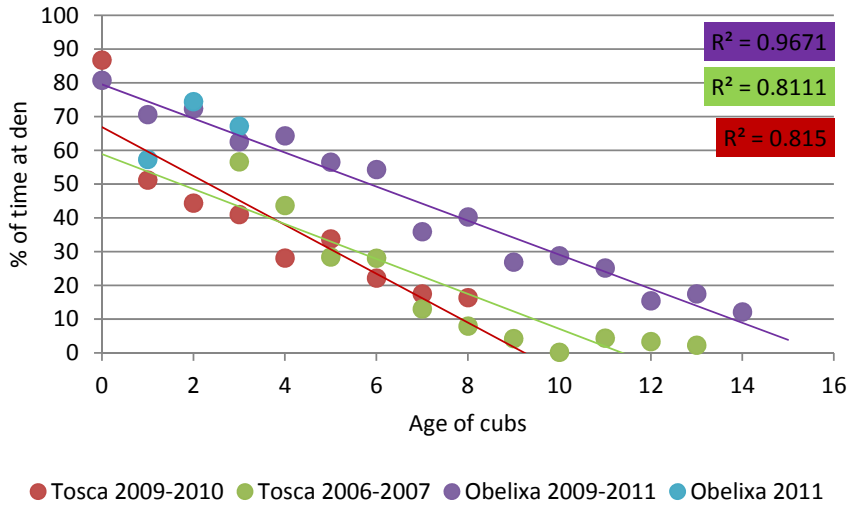


Figure 1: Percentage of time spent at the den of two lactating females with cubs of known age for two denning periods.

When comparing the pattern from the other two females shown in Figure 2 to the results shown in Figure 1, one could assume that Minerva’s cubs were still very young, possibly between one and two months old. Alaika’s cubs however, already seemed to be older, possibly around five to nine months old.

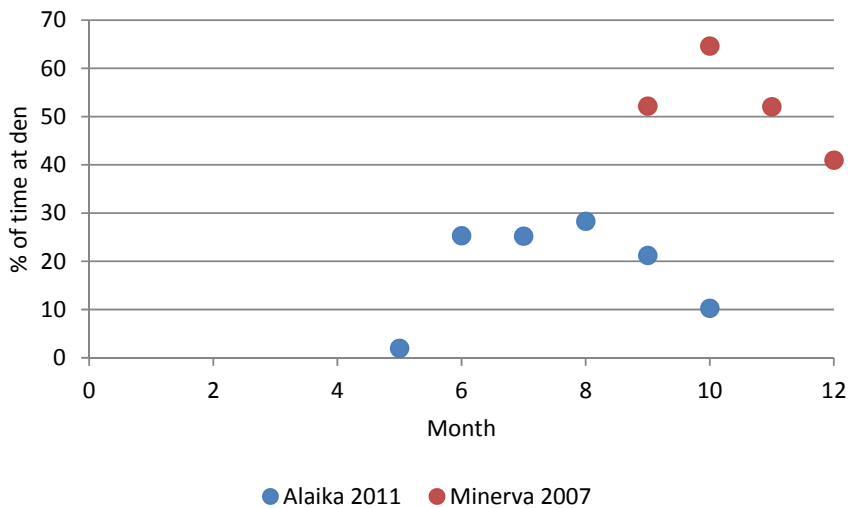


Figure 2: Percentage of time spent at the den of two lactating females of cubs with unknown age.

b) Foraging activity of lactating females

Foraging activity was significantly lower during the month that each hyena gave birth (Figure 3: Tosca 2006-2007: One-way ANOVA $p < 0.05$; Tosca 2009-2010 and Obelixa 2009-2011: Kruskal-Wallis-Test, $p < 0.05$). Activity peaked when the cubs were seven to eight months old.

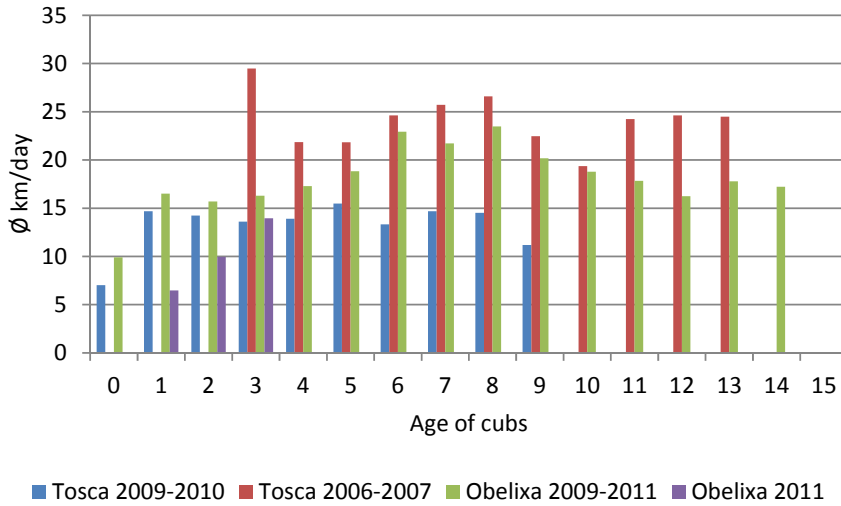


Figure 3: Average daily distance moved by lactating females with cubs of known age.

Judging from the activity of Alaika and Minerva as seen in Figure 4, Alaika’s cubs seemed to be approximately four to six months old and Minerva’s cubs seemed to be between one and three months old.

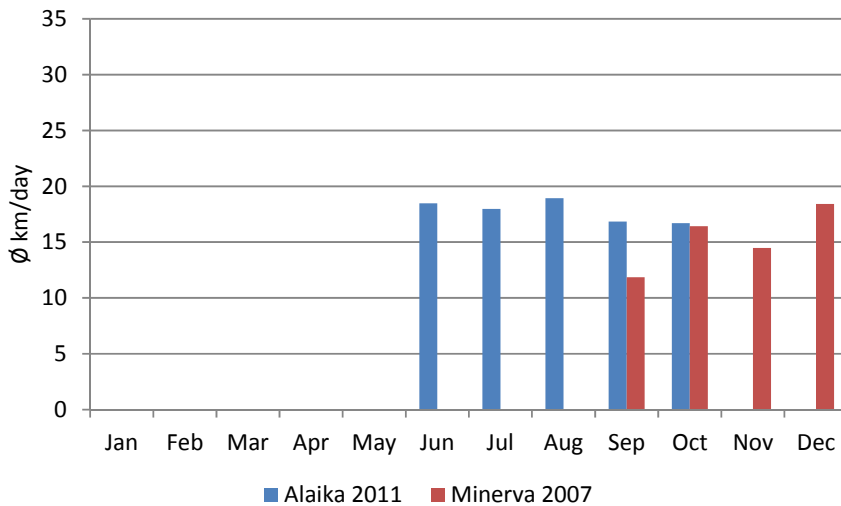


Figure 4: Average daily distance moved by lactating females with cubs of unknown age.

c) Activity at den site

Most lactating females showed two activity peaks at the den site (Figure 5). Tosca and Minerva predominately spent time at the den at dusk and dawn, whereas Alaika’s peaks of activity lay around midnight. Obelixa, however, showed a completely different activity pattern to the other hyenas. She



was resting at the den site during the day, too which is reflected in the pattern shown in Figure 5. She started foraging after sunset, but returned to the den before sunrise to spend the day there.

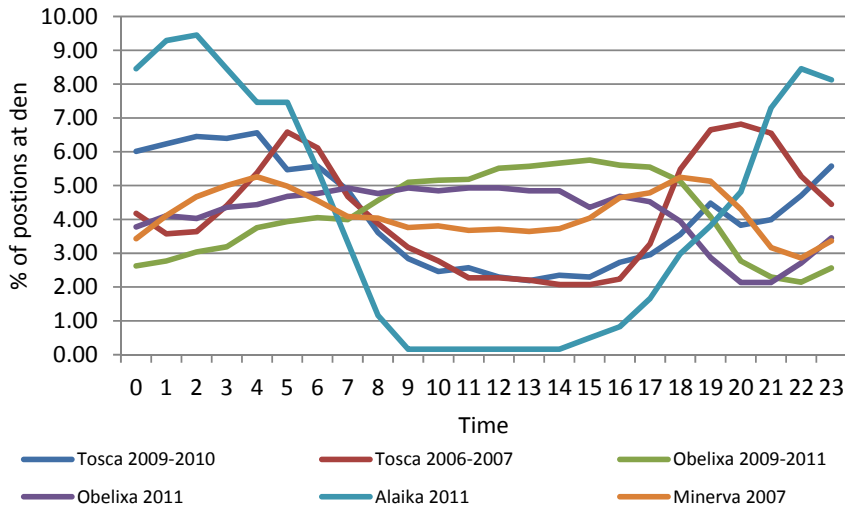


Figure 5: Activity pattern of lactating females at the den site

Lactating females spent nearly the entire day at the den when the cubs were young (Figure 6). With increasing age of the cubs, less time was spent at the den.

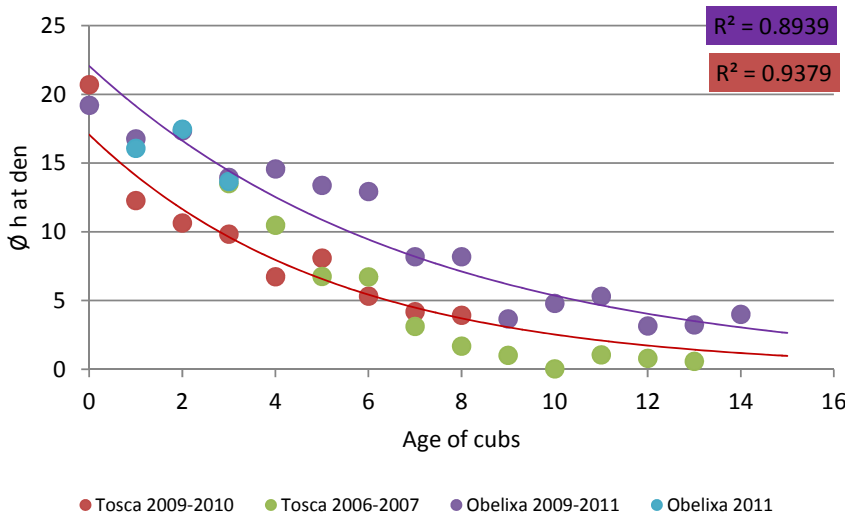


Figure 6: Average daily number of hours spent at the den by lactating females

The daily number of visits to the den decreased with increasing age of the cubs (Figure 7). The mother visited her cubs once every day for the first six months of the cubs' live. By the time the cubs were 10 to 15 months old, they were only visited by their mother once every week.

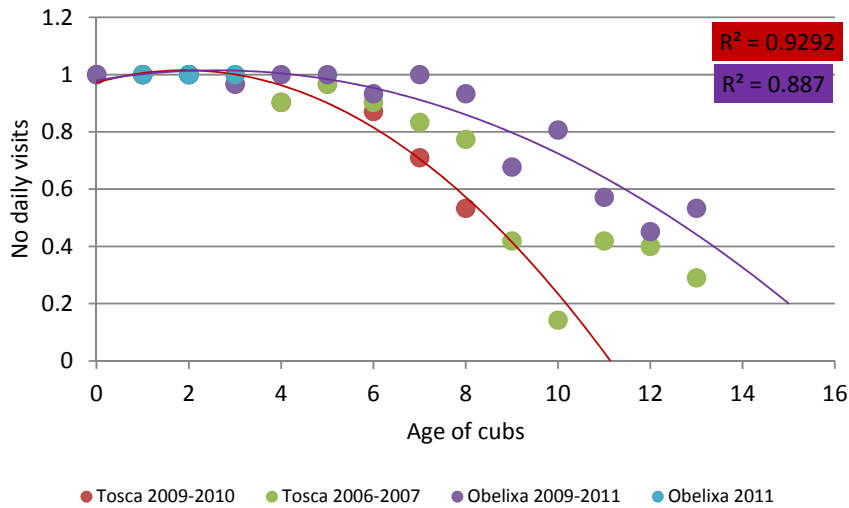


Figure 7: Daily number of visits to the den

Habitat use of brown hyenas in coastal areas of the Sperrgebiet National Park

1. Introduction

A critical factor for wildlife management is to know about the habitat use of species. The brown hyena is one of the flagship species of the Sperrgebiet National Park and will be monitored in future. The BHRP already determined sensitive areas for inland areas of the National Park in 2009. This study aims to determine sensitive areas along the coastal area of the Park by determining the

- preference for specific habitat types, and
- importance of each habitat type.

2. Material and Methods

Hyenas of two different coastal clans were fitted with GPS telemetry collars. Helene, Alaika and Tosca belong to the Wolf Bay Clan. This Clan has a mainland Cape fur seal colony in their home range. Obelixa belongs to the E-Bay Clan. There are some south-west facing beaches in her home range where marine carrion is regularly washed up. A ghost town and active mine are also part of her home range.

In order to determine habitat preferences the expected number of GPS positions in a specific habitat type was compared to the observed number of GPS positions (Chi² Statistics). The Bonferroni confidence interval was then calculated. If the observed proportion of GPS positions fell within the confidence



interval, the use of the habitat was regarded as neutral, if it was below the interval it was regarded as avoided and if it was above the interval it was regarded as preferred.

To determine the importance of each habitat type, habitats were ranked by using a compositional analysis. This analysis compares the use of one habitat type, expressed as the proportion of GPS positions taken, to all other available habitat types. The more frequently a habitat type is preferred to any of the others, the higher it ranks.

3. Results

a) Habitat preferences

Brown hyenas of the Wolf Bay Clan preferred coastal hills and the seal colony, whereas Obelixa of the E-Bay Clan preferred the ghost town, rocky shore, beaches and hummocks (Table 2). Coastal plains and coastal dunes were avoided.

Table1: Habitat preferences of four brown hyenas

Habitat type	Total				
	Helene 2011	Alaika 2009	Alaika 2011	Tosca 2009-2010	Obelixa 2011
coastal hills	Preference	Preference	Preference	Preference	Neutral
coastal plains	Avoidance	Avoidance	Avoidance	Avoidance	Neutral
coastal dunes					Avoidance
saltpan	Neutral	Neutral	Neutral	Neutral	Neutral
ghost town					Preference
mine					Neutral
rocky shore	Neutral	Neutral	Neutral	Avoidance	Preference
beach	Neutral	Neutral	Neutral	Neutral	Preference
hummocks	Neutral	Preference	Neutral	Neutral	Preference
seal colony	Preference	Preference	Preference	Preference	

However, habitat preferences also depend on the behavioural needs of animals and therefore data was analysed separately for GPS positions that were taken when the hyenas were moving (foraging, territory boundary maintenance, denning) and when they were not moving (resting, feeding).

When moving, brown hyenas of the Wolf Bay Clan preferred to forage at the seal colony. All other foraging habitats were used in proportion to their occurrence (Table 3). Wide, open coastal plains were



avoided. Obelixa preferred the ghost town, where her den was located and areas close to the shore when foraging.

Table 3: Habitat preferences of brown hyenas when moving

Moving					
Habitat type	Helene 2011	Alaika 2009	Alaika 2011	Tosca 2009-2010	Obelixa 2011
coastal hills	Neutral	Neutral	Neutral	Preference	Avoidance
coastal plains	Avoidance	Avoidance	Avoidance	Avoidance	Avoidance
coastal dunes					Avoidance
saltpan	Neutral	Neutral	Neutral	Neutral	Neutral
ghost town					Preference
mine					Neutral
rocky shore	Neutral	Neutral	Neutral	Neutral	Preference
beach	Neutral	Neutral	Neutral	Neutral	Preference
hummocks	Neutral	Preference	Neutral	Neutral	Preference
seal colony	Preference	Preference	Preference	Preference	

Brown hyenas of the Wolf Bay Clan preferred coastal hills as resting habitat, whereas Obelixa preferred to rest close to the den in the ghost town and close to the sea, either at the rocky shore or behind the beaches in the hummocks (Table 4).

Table 4: Habitat preferences of brown hyenas when not moving

Non-moving					
Habitat type	Helene 2011	Alaika 2009	Alaika 2011	Tosca 2009-2010	Obelixa 2011
coastal hills	Preference	Preference	Preference	Preference	Neutral
coastal plains	Avoidance	Avoidance	Avoidance	Avoidance	Neutral
coastal dunes					Avoidance
saltpan	Avoidance	Avoidance	Avoidance	Avoidance	Avoidance
ghost town					Preference
mine					Neutral
rocky shore	Avoidance	Avoidance	Neutral	Avoidance	Preference
beach	Avoidance	Neutral	Avoidance	Avoidance	Neutral
hummocks	Neutral	Neutral	Avoidance	Avoidance	Preference
seal colony	Neutral	Neutral	Avoidance	Avoidance	



These results highlight the importance of considering brown hyena behaviour when analysing and determining habitat use for habitat sensitivity studies.

b) Sensitivity ranks of habitats

Chi² Statistics only give information about preference and avoidance, but don't give any indication about the relative importance of preferred habitats. With the compositional analysis habitats can be ranked in order of their importance.

The highest ranking habitats for brown hyenas of the Wolf Bay clan were the seal colony and beaches, whereas the coastal plains ranked significantly lower (Kruskal-Wallis-Test, $p < 0.05$) (Figure 8). The ghost town ranked highest for Obelixa, followed by rocky shore and hummocks, whereas the coastal dunes ranked the lowest.

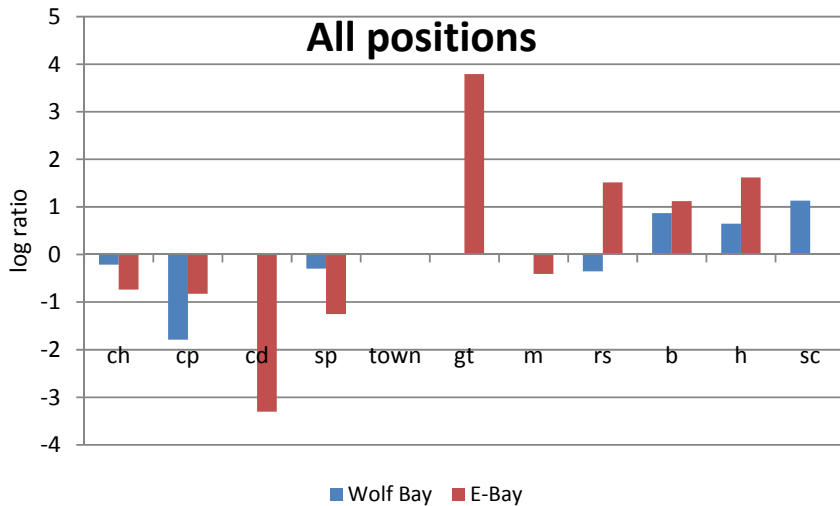


Figure 8: Rank of different habitats

When Wolf Bay Clan members were moving, the seal colony and beaches ranked significantly higher (Figure 9) than coastal plains and coastal hills (Kruskal-Wallis-Test, $p < 0.05$). Wolf Bay Clan members find most of their food at the seal colony and spend most of their time close to the shore to find food. Rocky shore and the ghost town had the highest rank followed by beaches for Obelixa and the coastal dunes ranked lowest. Obelixa finds most of her food along the rocky shore, where carrion gets trapped between the rocks. Her den was located in the ghost town, which explains the preference for this habitat type when she was active.

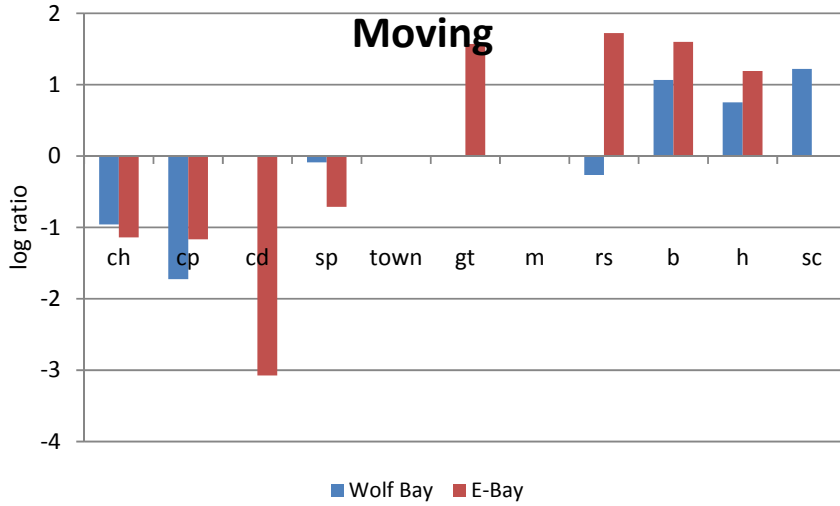


Figure 9: Rank of habitat types when moving

The highest ranking resting habitat for Wolf Bay Clan members were coastal hills (Kruskal-Wallis-Test, $p < 0.05$) followed by hummocks (Figure 10). Coastal hills provide shelter under rocks and in gullies and most dens are also located there. The lowest ranking resting habitat were coastal plains, a habitat where little shelter is found.

Obelixa’s highest ranking resting habitat was the ghost town, where her den was located and hummock vegetation close to beaches. Both areas provide good shelter. The lowest ranking resting habitats were coastal dunes followed by the mine. These areas either have no shelter (dunes) or are heavily disturbed (mine).

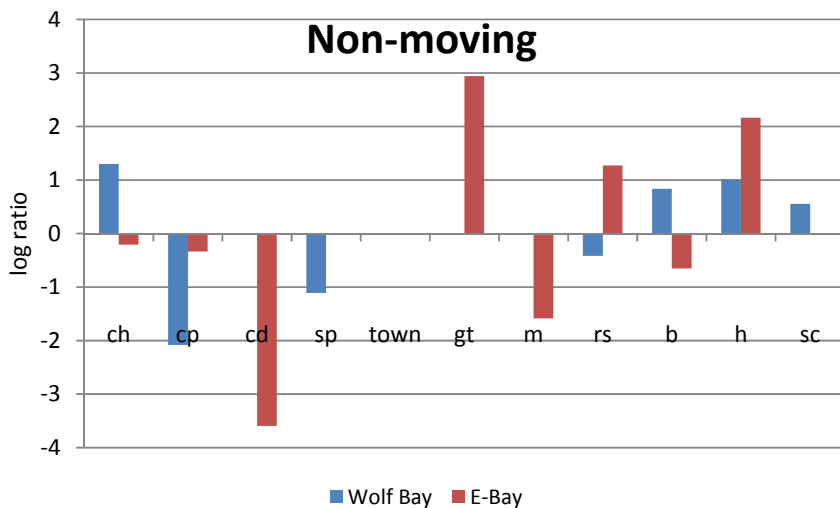


Figure 10: Ranks of habitats when not moving



Brown hyena health survey

1. Introduction

Hardly anything is known about the health status of brown hyenas in their distribution range. The BHRP has been surveying and sampling brown hyenas in Namibia since 1995. Brown hyenas that were captured for collaring were examined for external parasites or signs of disease. Blood samples were taken for further analysis in the laboratory.

2. Results

a) Blood chemistry

Table 5 gives a summary of the blood chemistry results of blood samples from 21 brown hyenas. No comparative data is available yet. However, the Mean \pm SD could be used as normal values for future comparisons.

Table 5: Descriptive statistics of blood chemistry results of 21 brown hyena serum samples taken between 1997 and 2010

	Minimum	Median	Maximum	Mean	SD	SE
Sodium mEq/l	76.0	147.0	154.0	144.8	13.6	2.5
Potassium mEq/L	2.5	4.7	5.3	4.5	0.6	0.1
Chloride mEq/L	53.0	112.0	124.0	110.1	12.0	2.2
Bicarbonate mEq/L	3.0	7.0	18.0	7.8	3.2	0.6
Anion Gap mEq/L	21.0	31.5	39.0	31.5	4.6	0.8
NaK Ratio	27.0	32.0	40.0	32.4	3.5	0.6
Urea mg/dL	18.0	34.5	66.0	35.3	11.4	2.1
Creatinine mg/dL	0.4	1.0	1.4	1.0	0.2	0.0
Calcium mg/dL	5.1	9.9	11.0	9.3	1.6	0.3
Phosphate mg/dL	2.1	5.4	7.8	5.3	1.2	0.2
Magnesium mEq/L	1.0	1.7	1.9	1.7	0.2	0.0
Total Protein g/dL	3.5	5.9	7.0	5.8	0.6	0.1
Albumin g/dl	1.5	2.7	3.3	2.6	0.5	0.1
Globulin g/dL	1.7	3.3	4.4	3.3	0.6	0.1
A/G Ratio	0.3	0.8	1.3	0.8	0.2	0.0
Glucose mg/dL	3.0	82.5	172.0	87.0	43.5	7.9
ALT U/L	8.0	23.0	103.0	29.3	21.8	4.0
AST U/L	10.0	31.0	145.0	43.7	33.7	6.2
Alk Phos U/L	22.0	85.0	245.0	95.8	56.4	10.3
GGT U/L	2.0	2.5	11.0	3.3	2.1	0.4
Total Bili mg/dL	0.0	0.0	0.4	0.1	0.1	0.0



Direct Bili mg/dL	0.0	0.0	0.2	0.0	0.1	0.0
Indirect Bili mg/dL	0.0	0.0	0.3	0.0	0.1	0.0
Amylase U/L	239.0	547.5	814.0	538.1	131.1	23.9
Cholesterol mg/dL	73.0	186.0	386.0	206.7	90.8	16.6
Creatinine Kinase U/L	35.0	215.5	4588.0	597.7	987.6	180.3
Iron ug/dL	36.0	99.0	270.0	102.3	53.8	9.8
Total Iron Binding Capacity ug/dL	91.0	189.5	270.0	182.2	49.7	9.1
Saturation %	19.0	55.0	100.0	56.8	23.7	4.3
Lipemia	12.0	118.0	552.0	169.6	156.9	28.7
Hemolysis	0.0	0.0	101.0	6.7	19.1	3.5

b) Diseases

Brown hyena serum samples were tested for eight different kind of diseases (Table 6). Thirteen brown hyenas tested positive for distemper and one of five brown hyenas tested positive for Babesia canis and Babesia gibsoni.

So far no statistical significant relationship between distemper status and sex, capture site, capture date related to disease outbreak in 2002, human interaction, dog interaction, season or rainfall could be detected. There is an indication, however, that age may have an influence on distemper status. More adult animals tested positive than subadults or cubs.

Table 6: Disease survey of brown hyenas

Hyena ID	Babesia canis Screen	Babesia gibsoni Screen	Feline Coronavirus (k-EILISA)	Feline Immunodef Virus (ELISA)	Ehrlichia Canis Status	N. risticii (Status)	Distemper Status	Parvovirus Status
GHB 2F			negative	negative	negative	negative	negative	negative
KHB 1F					negative	negative	negative	negative
LHB 10							positive	negative
LHB 21F							positive	negative
LHB 22F							positive	negative
LHB 24F			negative	negative			negative	negative
LHB 275 RC					negative	negative	positive	negative
LHB 27F							positive	negative
LHB 28F			negative	negative			negative	negative
LHB 30F	negative	negative			negative	negative	positive	negative
LHB 2					negative	negative	negative	negative
LHB 4					negative	negative	negative	negative
LHB 5							negative	negative
LHB 6			negative	negative	negative	negative	negative	negative
LHB 7					negative	negative	positive	negative



BBHB 12			negative	negative	negative	negative	positive	negative
BBHB 9	negative	negative			negative	negative	negative	negative
DHB 1M			negative	negative			positive	negative
VRB 2M	positive 32	positive 16	negative	negative	negative	negative	negative	negative
KHB 2M					negative	negative	negative	negative
LHB 20M					negative	negative	positive	negative
LHB 23M							negative	negative
LHB 26M			negative	negative			positive	negative
LHB 29M	negative	negative			negative	negative	negative	negative
LHB 300			negative	negative	negative	negative	positive	negative
LHB 34M	negative	negative			negative	negative	negative	negative
LHB 1					negative	negative	negative	negative
VRB HB 1							positive	negative
SHB 1	positive		negative	negative	negative	negative	negative	negative
UHB 1					negative	negative	negative	negative

When taking capture location of the sampled brown hyenas into account and combining this locational data with 10 random GPS locations taken from the VHF or GPS telemetry collar, a cluster analysis could be performed with CrimeStat software. Two clusters were identified, one around the town of Luderitz and a second one near the Bogenfels diamond mine, approximately 90 km south of Luderitz (Figure 11). This indicates that interaction with humans may play a role regarding brown hyenas distemper status.

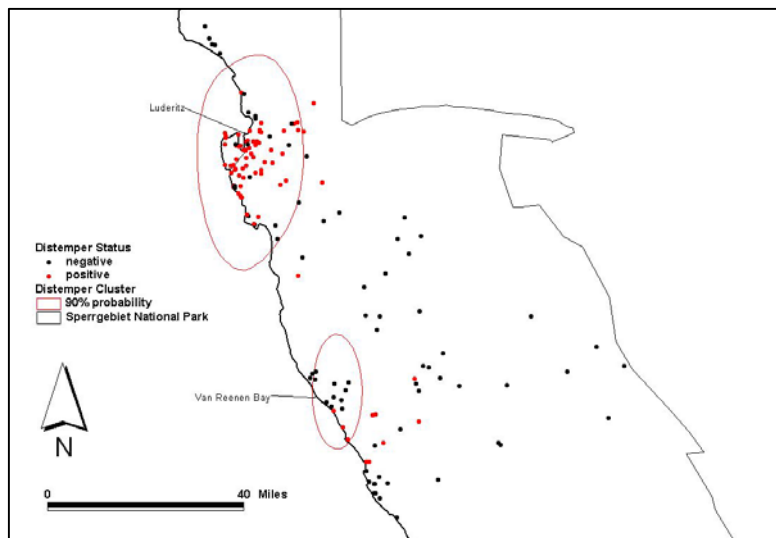


Figure 11: Clusters with a 90% probability of finding hyenas with a positive distemper status

The animal that was tested positive for Babesia was a 12 year old nomadic living male. He died three weeks after being collared. His movements shortly before death did not indicate any health problems

and his Bilirubin and BUN values were not increased. He was desorientated shortly before he died (indicated by the spoor and track that we found leading to his carcass), which indicates that he was in advanced stages of Babesia and that it had become cerebral.

The external examination of brown hyenas does not usually produce any ticks, fleas or mites. However, SHb1 was covered in ticks at capture and the blood smear revealed that it was infected with Babesia canis. No other detailed information is available about this animal though.

c) Influence of stress on blood chemistry results

Brown hyenas have been captured with various methods over the years. The most frequently used method is the darting of the animal at bait, which is regarded as low stress, whereas other restraining methods, such as using box traps or foot hold traps, are regarded as stressful to the animal. Creatinine Phosphokinase values and Glucose values should increase to values above normal in stressed animals. The comparison of low versus high stress methods showed that Creatinine phosphokinase values were significantly higher when using restraining capture methods (Figure 12, Mann-Whitney U-Test, $p=0.002$).

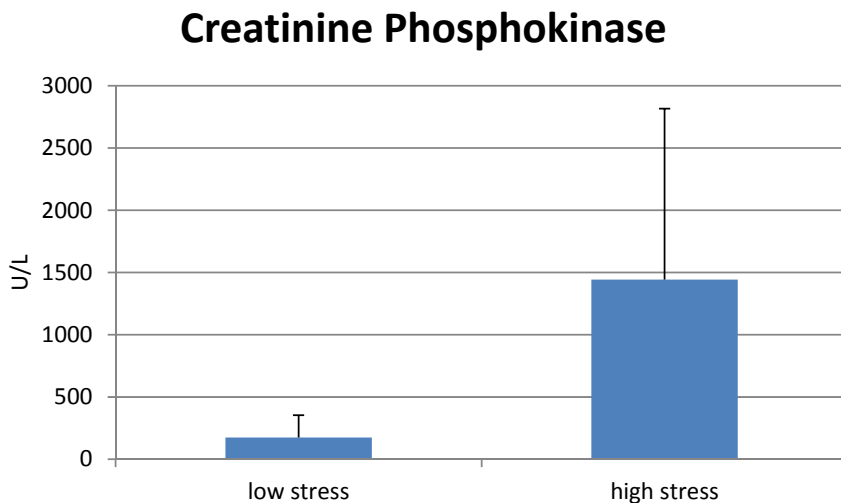


Figure 12: Creatinine Phosphokinase values in stressed and less stressed captured brown hyenas

The same pattern could be detected for Glucose levels (Figure 13). Animals that were restrained during capture had significantly higher Glucose levels than animals that were darted at bait (t-test, $p=0.001$).

Glucose

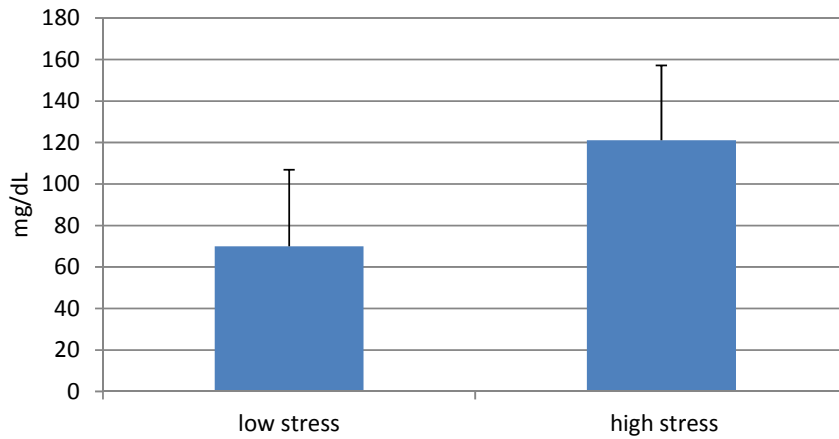


Figure 13: Glucose levels in stressed and less stressed captured brown hyenas

Therefore capture methods should be evaluated thoroughly to avoid as much stress as possible to the animals.

b) Influence of feeding habits on blood chemistry results

Brown hyenas of the Sperrgebiet National Park inhabit a variety of different landscapes. This influence to brown hyena clans living in coastal and inland areas of the Park has been described in previous reports (differences in home range size, activity, diet etc.).

Blood chemistry analysis revealed one interesting result: Lipemia levels of coastal brown hyenas were significantly higher than of inland hyenas (Figure 14: t-test, $p=0.005$), Cholesterol levels however were normal.

Lipemia

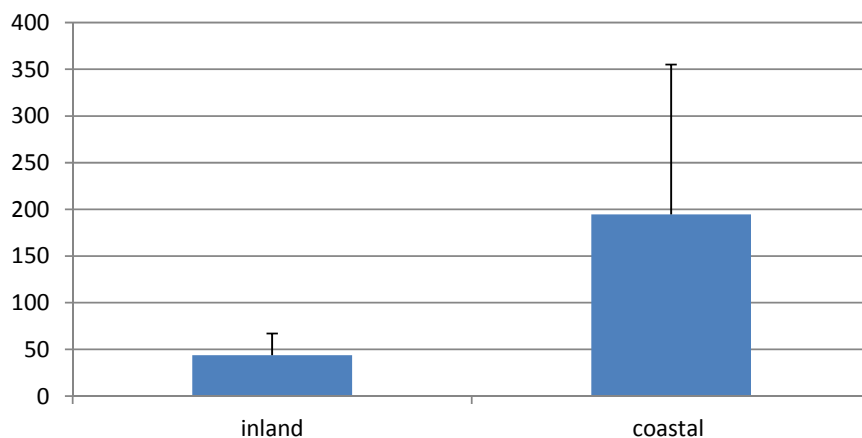


Figure 14: Lipemia levels of coastal and inland brown hyenas in the Sperrgebiet National Park



Coastal brown hyenas predominately eat seals and show a preference for brain and blubber tissue. They have a highly predictable food source that is available all year round. Coastal hyenas possibly feed every day and don't experience periods of food scarcity. Inland hyenas have less access to fatty and predictable food resources and therefore may rather show normal lipemia levels.

Road impact study: Predicting wildlife-vehicle-collision hotspots

1. Introduction

Data collection started in September 2011. Therefore only one roadside game count and animal mortality count are available for analysis. However, this report serves to give an indication about how data will be analysed in future.

2. Material and Methods

Namdeb provided the BHRP with electronic logbook copies to determine traffic volume on the gravel road between Oranjemund and Rotkop Gate for the year 2010.

Game counts were carried out by two teams of Namdeb's environmental section. The teams left each Gate at 6:00 h in the morning, met half way at Chamais and returned to the Gates. The GPS location, time, species and number of sighted mammals was recorded.

3. Results

a) Wildlife-vehicle-collision hotspots

Figure 15 shows the wildlife-vehicle-collision hotspot that was calculated for the roadside game count in September this year (CrimeStat). It was not possible to do a proper cluster analysis yet, as the sample size was too low.

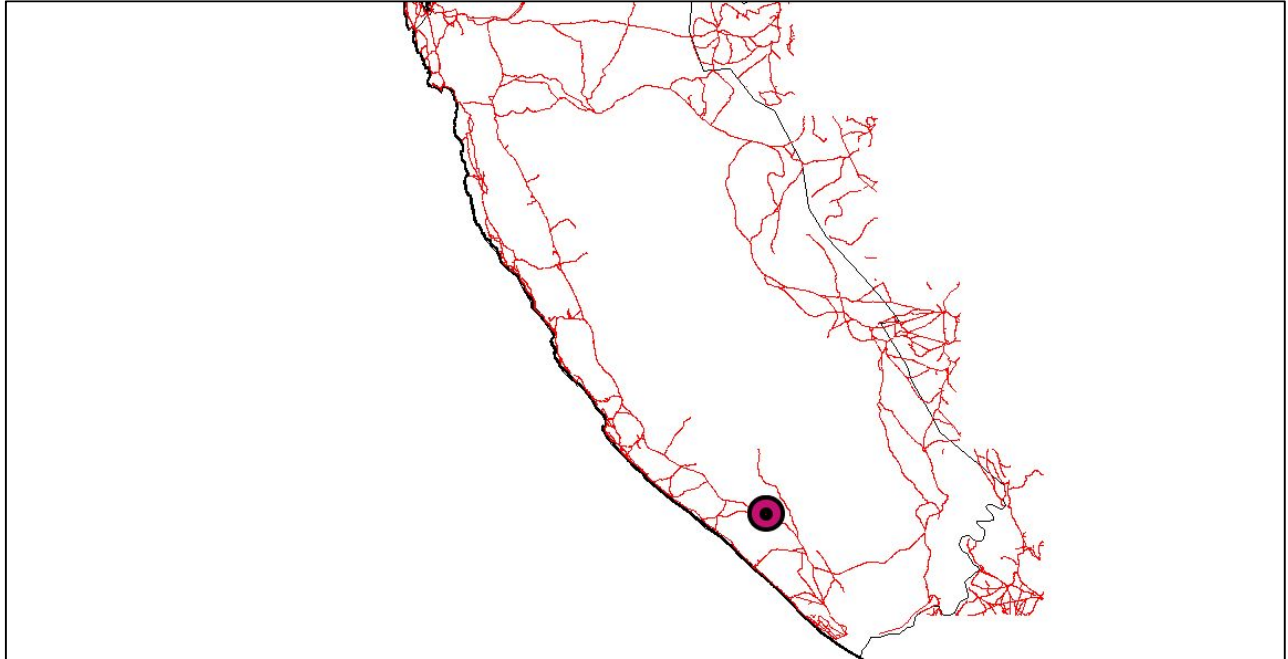


Figure 15: Vehicle wildlife collision hotspot calculated from roadside game count (15 September 2011)

The hotspot lies 50 km north of the Oranjemund Gate. For this analysis it was assumed that the vehicles drove at 90 km/h and the gate information from 2010 was used as a sample data set. A vehicle entering at Oranjemund Gate would therefore pass the hotspot after 33 minutes whereas a vehicle entering Oranjemund would have passed the hotspot 33 minutes earlier.

b) Traffic volume

The analysis showed that we have two peaks in vehicle traffic volume at the hotspot site. Outgoing traffic to Bogenfels/Luderitz peaks between 7:00 and 10:00 h (Figure 16) and incoming traffic to Oranjemund peaks between 15:00 and 18:00 h.

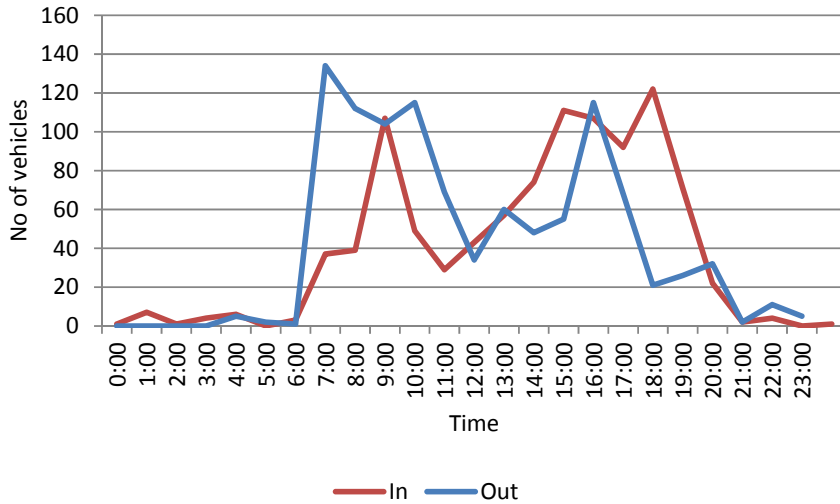


Figure 16: Traffic volume at vehicle wildlife collision hotspot during different times of the day

Speed limits and speed restrictions of different vehicle types should also be taken into account. This data was unfortunately not available yet. Seasonal differences can also be calculated and traffic at vehicle wildlife collision hotspots can be compared to traffic in other areas. Furthermore traffic at ‘mortality hotspots’ will be analysed once data is available.

c) Mortalities

Two brown hyena road mortalities were reported by Namdeb in 2011. One brown hyena was killed by a truck at Bogenfels mine in May and one in Mining Area 1 in July 2011.

Elizabeth Bay mining area impact study

1. Introduction

It was decided in 2010 that Namdeb is going to mine the southern accreted portion of Elizabeth Bay beach to extend the life of the existing diamond mine.

Brown hyenas occur in the mining area and have been monitored since 2001. Data revealed that after a decrease in brown hyena abundance in the E-Bay area between 2001 and 2003, brown hyenas were recorded again in 2009. This E-Bay hyena clan’s territory borders to the Wolf Bay clan territory to the north and to an unknown southern brown hyena clan to the south. Within the E-Bay clan hyenas’

territory, E-Bay beach is an important foraging area and there are seasonal differences in the use of the beach.

The following main potential risks were identified:

- Disturbance of brown hyenas on E-Bay beach through the mining process and seawall construction
- Effects of mining operations on territory boundary on the southern end of E-Bay beach through the mining process and seawall construction
- Loss of the beach area as a potential food source for brown hyenas through the mining process and seawall production
- Disturbance and/or mortality of brown hyenas through increased traffic (all options) due to the improvement of roads and the extension of the road network.

Therefore camera traps and the monitoring of E-Bay beach are used to monitor changes in brown hyena abundance, activity and territoriality.

2. Study area

The study area is indicated on Figure 17. The beach faces into a south-westerly direction and Possession Island, where seabirds and seals haul out and breed lies just offshore of the beach. Through the prevailing ocean current, carrion from the island is washed up regularly on the beach and serves as a food source for jackals and brown hyenas.

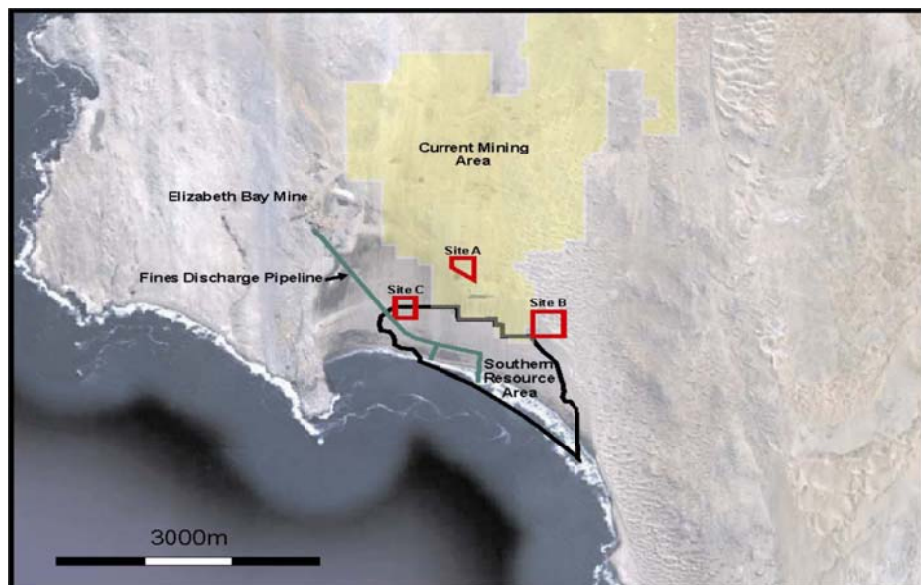


Figure 17: The Elizabeth Bay area showing the Southern Resource Area in relation to the current mining area. The three site-options for locating the WIFS plant are indicated (red polygons)(Source: Pulfrich et al 2010: EIA report)



3. Results

A total of six camera traps were set-up in the E-Bay clan's territory. Three camera traps were set-up in the ghost town, a preferred habitat of this clan's hyenas (see above), one just west of E-Bay beach and two further inside the clan's territory at Bain's Bay.

Carcass and hyena track counts were done every second week at E-Bay beach by Namdeb's environmental officer.

a) Brown hyena abundance

A total of 369 brown hyena photographs were taken by the camera trap between December 2010 and October 2011. The quality of 74 photographs was good enough for identification purposes. The two identifiable brown hyenas, Obelixa and Darwin, were recognized on 45 photographs.

The estimated population size of the E-Bay clan calculated from camera trap captures was 3.3 animals (2.6 to 4.4 animals). The E-Bay clan's territory size is estimated at 212 km², which results in an abundance estimate of 1.2 to 2.1 adult brown hyenas per 100 km². Such abundance is regarded high for brown hyenas.

b) Food availability and hyena movement at E-Bay beach

Food availability at E-Bay beach stayed constant up to the middle of June (Figure 18: January to October). However more seal carcasses were found on the beach on days following high swells. It is also expected that more seal carcasses will be found at the beach during the seal pupping season in December each year. Less seal pup carcasses were found on the beach from the middle of June onwards and at the same time brown hyena activity increased. It is possible that brown hyenas increase their foraging effort during times when little seal carrion is washed up.

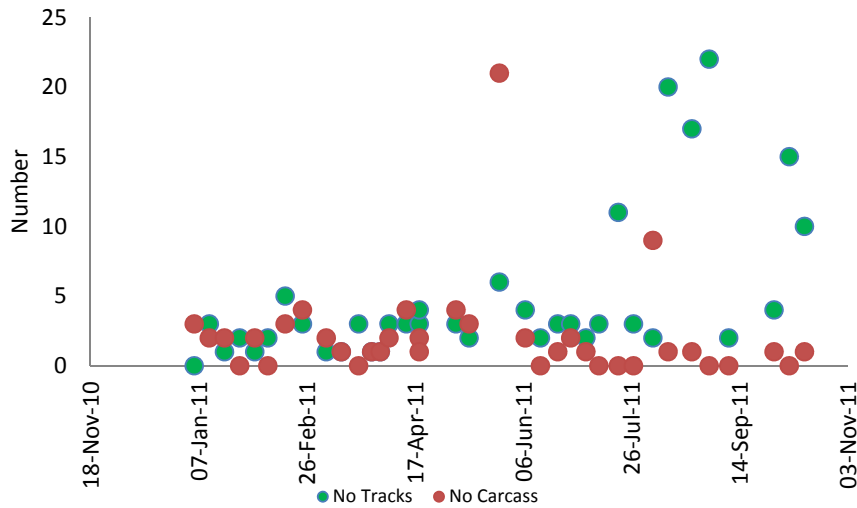


Figure 18: Seal carcass and brown hyena track count at E-Bay beach

Most carcasses were washed up between the central part and western corner of E-Bay beach with two centers of carcass accumulations (Figure 19). Most tracks were also found in this area, but concentrated only to the west. The same pattern is shown by GPS data retrieved of Obelixa’s collar. Therefore the western part of the beach seems to be the main foraging area for E-Bay clan hyenas.



Figure 19: Concentration of carcass locations (black outlines), brown hyena track locations (red lines) and Obelixa’s movements (yellow lines). A higher density of points was recorded in inner circles than in outer circles.

c) Camera trapping success

Most activity was recorded in the ghost town in January 2011 (Figure 20). It is possible that activity in coastal areas increases during the seal pupping season, but more seasonal data is necessary to analyse such data sets.

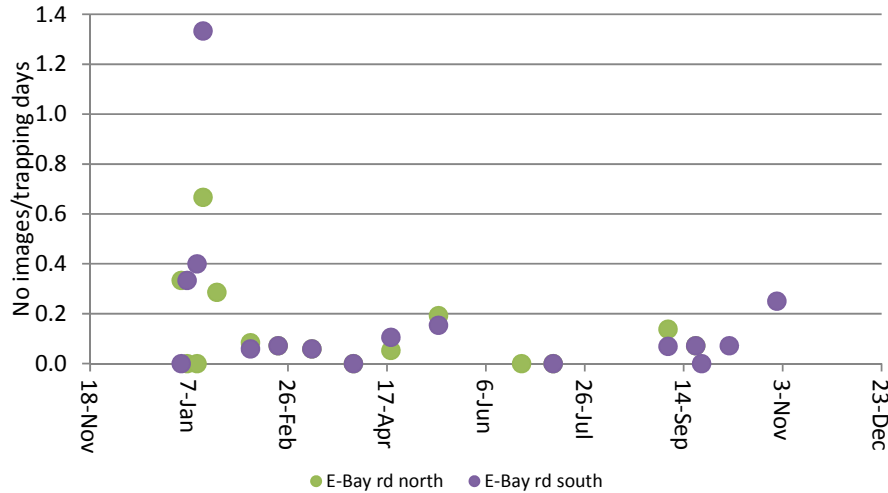


Figure 20: Camera trapping success at E-Bay road camera trap

Camera trapping success at E-Bay beach was higher than at the other camera traps throughout the year. There was no correlation between trapping success and number of carcasses at E-Bay beach. However, less activity was recorded in January (Figure 21). Again, more data is needed to discuss such patterns.

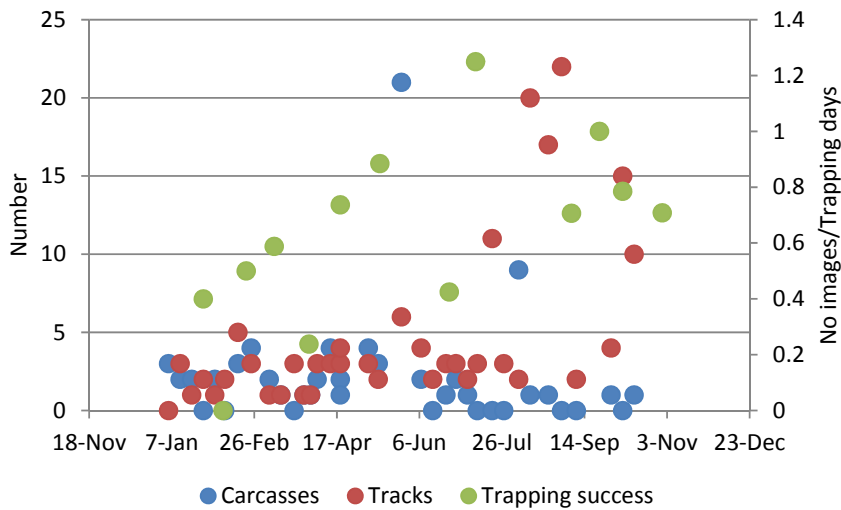


Figure 21: Trapping success, carcasses and track count at E-Bay beach



Pocket Beach Monitoring: Brown Hyena Activity and Abundance

1. Introduction

This progress report concentrates on the analysis of camera trapping data with regard to changes in brown hyena behaviour in the area mostly affected by mining disturbance at Bogenfels Pocket Beach Mine. Baseline information about brown hyena behaviour, abundance and the mitigation of mining related problems have been discussed in previous progress and annual reports.

2. Results

a) Camera trapping success

A total of 49 brown hyena images were recorded by the camera traps over 869 trapping days. As expected camera trapping success increased at the Van Reenen Bay seal colony during the seal pupping season between November and January each year (Figure 22). Trapping success is lowest outside the seal pupping season. However, trapping success at Bogenfels further decreased from last year (see annual and progress report from January 2011). The rehabilitation of the mine is going to start next year and it will be important to monitor whether activity at Bogenfels returns to pre-mining standard again.

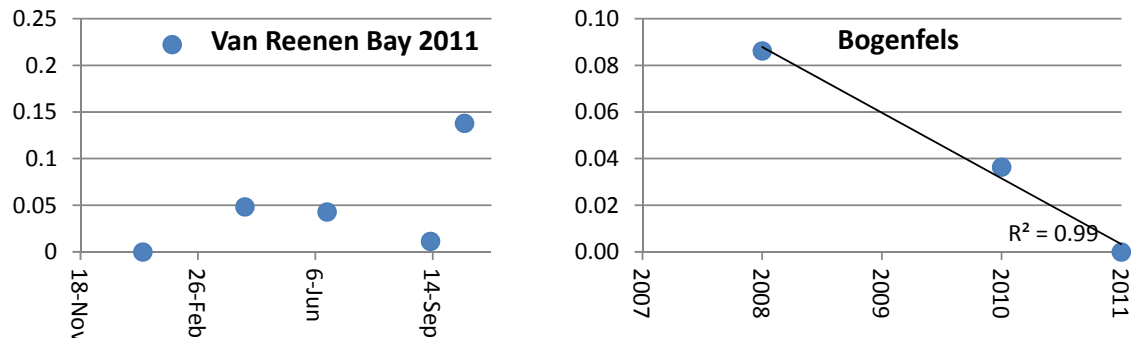


Figure 22: Camera trapping success (number images/trapping days) at the Van Reenen Bay seal colony and at Bogenfels

b) Brown hyena abundance

Brown hyena abundance decreased over the past 10 years (Table 7). It is unclear whether the decrease in population size can be attributed to mining activity. It will only be possible to determine such a negative impact once the rehabilitation of the mine is completed and data has been collected.

Table 7: Abundance estimates at Van Reenen Bay seal colony

Period	n1	n2	m2	95% min	95% max	N	Density hyenas/km ²	Method
2001-2002	7	13.46	7	12.56	14.50	13.46	2.4-2.8	Direct observation
2003-2004	6	12.00	6	11.08	13.09	12.00	2.2-2.6	Direct observation
2010-2011	1	5.00	1	3.33	10.00	5.00	0.6-2.0	Camera traps

New projects in 2012

1. Human-wildlife-conflict along the Sperrgebiet and Namib Naukluft National Parks boundaries

This project aims to investigate human-wildlife-conflict related issues on communal lands and commercial farms bordering the Sperrgebiet and Namib Naukluft National Parks. The emphasis will be on investigating conflict with carnivores. Camera trapping will be the major tool used for this study, but other indirect and direct monitoring techniques, such as hair snaring or observations at cattle posts, will also be used. Data from different habitats and seasons will be compared to gain a better understanding about the demography of carnivores in the southern Karas Region outside National Parks. It is planned to establish a carnivore inventory including their seasonal distribution to identify the actual predation risk posed by different carnivores and to give informed recommendations regarding conflict resolution.

2. Brown hyena distribution in Namibia

There has been a lot of focus on brown hyena research in recent years. Translocations and re-introductions have taken place on private game reserves (e.g. Pidwa Wilderness Reserve, South Africa), brown hyenas have been sighted in areas where they were believed to be extinct (e.g. Kruger National Park: Phiri Project) and quite a few studies have taken place to develop methods to estimate brown hyena density (Thorn et al 2010, Thorn et al 2009, Ball 2007). There are efforts underway to determine the distribution of brown hyenas across South Africa by the means of a national on-line questionnaire (www.surveymonkey.com/s/National_Brown_Hyaena_Survey). Many surveys are carried out by means of questionnaires. However, recent reviews of the use of questionnaire surveys for human-wildlife-conflict studies revealed several problems. Farmers have the tendency to exaggerate and show a lack of objectivity. Similar problems can be expected with abundance-related questionnaires.



Camera traps on the other hand are increasingly used by private landowners and scientists to monitor animals (but scientists often only publish data related to the studied species). All these data unfortunately are lost to science, as there is no central, user-friendly facility yet that motivates camera trap owners to share the collected data.

The Animal Demography Unit at the University of Cape Town has initiated a Virtual Museum for Mammals (VIMMA) in collaboration with the Cape Leopard Trust (<http://vmus.adu.org.za>). Digital photographs of wild mammals along with GPS coordinates can be submitted to this site, hence making use of a citizen scientist network. The information is used to complement existing ATLAS information in order to develop distribution maps for mammals in South Africa and other southern African countries. This has previously proved successful for birds, reptiles and butterflies in South Africa. The Brown Hyena Research Project will implement this project in Namibia.

3. Brown hyena competition with black-backed jackals at mainland Cape fur seal colonies

Coastal brown hyenas rely heavily on the availability of food at mainland Cape fur seal colonies. At the same time competition with black-backed jackals is disproportionately high due to the large population size of these carnivores. Jackals do not only scavenge but also successfully kill seal pups by forming hunting coalitions. Both carnivores hence rely on the all-year round availability of seal pups at these colonies. The BHRP has already assessed hunting efficiency and prey choice for brown hyenas during the seal pupping season when sufficient prey is available. However at small seal colonies with an annual pup production of less than 3000 pups, competition for prey may become an important factor outside the seal pupping season. Our data already suggests that brown hyenas increase their foraging efforts to inland areas of their home range outside the seal pupping season. In this study we want to assess the importance of interspecific competition at seal colonies, by observing the hunting efficiency of black-backed jackals to determine their influence on brown hyena foraging success at seal colonies and its influence on the depletion of the prey resource.



4. Development of a cost effective sign survey technique to determine sensitive brown hyena habitats to guide land use planning decisions

The BHRP is currently developing new non-invasive and cost effective methods to monitor the brown hyena as a flagship species in the Sperrgebiet National Park and to determine core activity areas that need to be protected for their survival.

The aim of this research is to compare core area activity areas determined through GPS telemetry with sign survey data (dens, latrines, resting sites and paste marks). This alternative would be less cost-intensive and time consuming than using GPS telemetry. Recommendations will be given about the suitability of the alternative method regarding its use in EIAs and monitoring guidelines will be developed to determine sensitive areas.

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