Conservation Management Plan, 2016-2017

Botswana

Contents

1. Executive Summary

Projects Abroad and partners Wild at Tuli private wildlife reserve are located in the Tuli Block, Botswana where we have undertaken a conservation project. The long term project aims are to achieve a legally binding conservancy for the central Tuli area. This will be achieved through using various ecological survey and census techniques (bird census, mammal census, flower ID, crocodile census, camera trap etc.) to prove that this area of Botswana is unique, wild and an essential area for protecting biodiversity in Southern Africa.

To date there has been very little survey and census data gathered in the area. The Projects Abroad and Wild at Tuli partnership intends to become a leading role player for the area in conservation and issues relating to biodiversity. Through census and survey data gathering we hope to show how unique and diverse the area is for both flora and fauna.

Our primary goal is to improve and secure biodiversity of flora and fauna of the area. Before 1945 Tuli Block area was mainly cattle farms. Wildlife moved away or had been killed. Fences, cattle, kraal, buildings and even crops were prevalent. Due to frequent droughts, outbreaks of foot and mouth disease and predators preying on livestock, the farmers started to sell out and move to more profitable farming areas. The wildlife has been coming back slowly since, more and more species are present in the area and the natural balance is slowly coming back. To help the wildlife to come back Wild at Tuli and their neighbors have decided to improve and secure the area for the wildlife. It is for all these reasons that fence removal, garbage removal , kraal removal, waterhole building, waterhole protection, anti-poaching and erosion control are such important projects on the properties.

The project is divided into two main aims:

1. Protect and improve the environment for the wildlife by creating waterholes, maintaining the existing waterholes, decrease the poaching and the erosion of the area, eradicating all fences and garbage found as a relic of the farming time.
2. Conduct surveys and census projects to assess the unique value of the area and create awareness for tourism potential. This includes recording predator movements and the offer of support to local livestock owners in protecting their herds, thus reducing the human / predator conflict which could result in predators being hunted. Data gathered is available to organizations and authorities in support of our goals.

2. General Information

2.1 STUDY AREA

The Republic of Botswana is located in Southern Africa bordering South Africa to the south, Zimbabwe to the east, Namibia to the west and Zambia to the north. A stable civilian government since winning independence form the British in 1966 has allowed for the economy to grow and stabilize thanks mostly to the mining and tourism industries. Conservation legislation and laws have allowed for the eco-tourism sector to grow as Botswana has allocated vast areas of land to protected areas (national parks, game reserves and wildlife management areas) and conservancies. Botswana's protected lands are one of the highest percentage in the world.

Location of the Tuli Block in Botswana
www.lahistoriaconmapas.com

Wild at Tuli is located in the Tuli Block (8,000 km^2), a narrow fringe of land at Botswana's eastern border wedged between Zimbabwe in the north and east and South Africa in the south, where the Limpopo and the Shashe rivers meet. It consists mainly of privately owned land, some offering safari tourism. It is relatively open with no fences although there are pockets of land with fences for agriculture and cattle farms.

2.2 GEOGRAPHY / GEOLOGY

Botswana is a landlocked country which is mainly flat with its lowest point found at the junction of the Limpopo and Shashe rivers at 513 m above sea level, where Tuli Block is located, and its highest point found in the Tsodilo Hills at 1489 meters. It is considered a semi-arid country with seasonal winds from the west carrying sand and dust across the country. Soils in Botswana are generally made up of thick sand layers. The eastern areas (Tuli Block) have hills and drainage depressions which feed the Limpopo River. These soils are mainly sandy loams to sandy clay loams, with shallow skeletal soils where heavy, sporadic rainfall washes newly formed soil materials into low lying areas and down drainage lines.

The geomorphology of Botswana is divided into the Okavango Delta, the Sandveld and the Hardveld hypsographic regions like Tuli area. About two thirds of Botswana falls under the Sandveld or Kgalagadi desert. These regions receive the least amount of rainfall compared to the rest of the country. There is no permanent flowing water in the Kalahari desert.

Landscape and Kopje of the study area

Wild at Tuli and the Tuli Block are referred to as the Hardveld because of the rocky outcrops and the abundance of stones, Kopje's (rock hill) and pebbles of all shape and size, a geologist paradise! Kopje are a must in the area, of all sizes and shape, it is a must in the landscape. Kopjes have been

formed millions years ago. Volcanic processes give rise to a body of rock resistant to erosion, inside a body of softer rock. When the less resistant rock is eroded away, the more resistant rock is left behind as an isolated mountain[1].

This long process gives a unique landscape to the Kopje present in Wild at Tuli and it is believed to be the oldest eroded rock on the planet.

2.3 CLIMATE

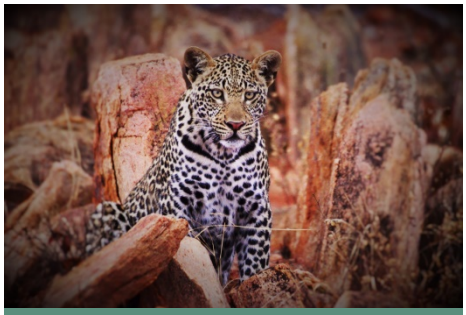
The hot summers in Botswana and Wild at Tuli are from November through to February (temperature in the shade are from 30°C to 42°C) where the increase in temperature causes storm clouds to form and the much awaited annual rains to fall (annual rain from 250 to 550ml). From May to August, temperatures drop (temperatures in the shade are from 21°C to 30°C on day) and especially during the night (can reach 0°C) with very little and in most cases no precipitation experienced. It is during these dry cold winters that much of the wildlife suffers the most from lack of water and food as the bush dries up and plants cannot produce any new foliage.

2.4 FLORA AND FAUNA

Botswana is home to a wide variety of flora and fauna. In fact the country has more than 2,500 species of plants and 650 species of trees, 593 species of birds, 164 species of mammals, 157 species of reptiles, 38 species of amphibian and over 70 species of fish[2].

Volunteers pose in front of a baobab tree

Large parts of the Tuli Block is unfenced allowing the animals to roam freely. The vegetation is spectacular, the scenery diverse, the habitats are various (riverine, grassland, scrub, woodland, aquatic and rocky outcrops etc.). The vegetation in the area, particularly during the rainy season, is simply spectacular. The trees along the Limpopo river are gigantic especially the Nyala Trees (*Xanthocercis zambeziaca*), a species that only occurs in this part of Botswana. Characteristic baobab (*Adansonia digitata)* trees are visible amongst the rock Kopjes and animals flourish in the wild terrain . Projects Abroad as at December 2015 has identified 58 species of trees and shrubs, 124 species of flowers of which 7 are invasive species and 9 species of grasses (see the Projects Abroad website for the list of the trees, flowers and grasses).



Leopards are just one of the predators found at Wild at Tuli

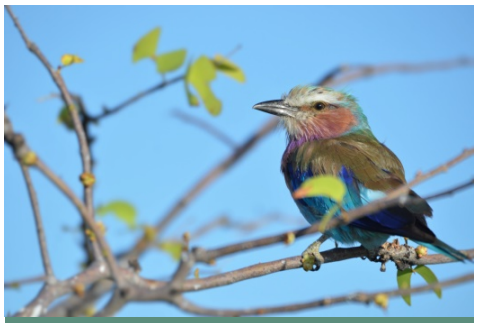
Blue wildebeest (*Connochaetes taurinus)*, greater kudu (*Tragelaphus strepsiceros)*, plain zebra (*Equus quagga)*, impala (*Aepycers melampus)*, steenbock (*Raphicerus campestris)*, common duiker (*Sylvicapra grimmia)*, giraffe (*Giraffa camelopardais)*, common eland (*Tragelaphus oryx)*, rock dassie (*Procavia capensis)*, savanna baboon *(Papio cynocephalus ursinus),* vervet monkey *Cercopithecus pygerythrus)* the elusive aardvark (*Orycteropus afer)* are living in the area with large herds of elephants (*Loxodonta Africana)*. Predators are also present in Wild at Tuli, with spotted and brown hyena (*Crocuta crocuta and Parahyaena brunnea)*, leopard (*Panthera pardus)*, African wild cat (*Felis silvestris lybica)*, black-backed jackal *(Canis mesomelas),* lion (*Panthera leo)*, African civet (*Civettictis civetta)*, small and large-spotted genet (*genetta genetta and maculate)* etc. Projects Abroad have identified 54 species of mammals in Wild at Tuli (see the Projects

[1] According to https://en.wikipedia.org/wiki/Inselberg and http://safari-ecology.blogspot.com/2012/03/how-do-kopjes-form.html
[2] source: https://en.wikipedia.org/wiki/Wildlife_of_Botswana and http://www.knowbotswana.com/fauna-and-flora.html

Abroad website for the list of mammals recorded at Wild at Tuli). Nile crocodile are abundant in the large pools of the Limpopo River, with occasional hippopotamus (*Hippopotamus amphibious)*.

Birdlife proliferates in the diverse environment. Tuli is one of the best places in southern Africa for ornithologists[3]. Over 350 species of birds have been identified in the Tuli Block and Projects Abroad as at December 2015 has recorded 251 species in Wild at Tuli (see the Projects Abroad website for the list of birds found at Wild at Tuli).

African elephant (*Loxodondat Africana)*



Lilac-breasted Roller (*Coracias caudatus)*

2.5 SOCIAL CONTEXT

Botswana has transformed itself from a least developed country (it was considered one of the 20 poorest countries in the world) when it won its independence in 1966 to a middle income country in 2012[4]. This is mainly due to a stable government and judicious management of diamond mines. It was the discovery of diamonds that increased their per capital income from USD 70 in 1966 to USD 6500 in 2012.

Botswana has a relatively small population of 2,262,000 (2015) of which 61 % live in urban areas. The capital city of Gaborone is the major economic center with a population of 196,000, making it small when compared to other capital cities in the African continent. The country's diverse landscape comprises a total size of 581,730 km^2 of which 15,000 km^2 is made up of water bodies. The population density is highest in the east of the country due to the Kalahari Desert (372,889 km^2) and the Okavango Delta (15,000 km^2) both situated in the central, west and northern areas.

Despite this impressive economic record in comparison to other African countries, Botswana is still faced with high levels of poverty, inequality and unemployment. It has a high HIV/AIDS rate with the World Bank reporting that Botswana has the second worst HIV epidemic in the world undermining its socioeconomic achievements since 1966. It is estimated that at least one quarter of the population is affected by HIV/AIDS[5].

Botswana also faces challenges in poverty and inequality issues with records contradicting its economic history. One third of the country lives below the poverty line mainly due to a large unemployment rate of 20% (2015). Inequality issues between men and women have been resolved through Botswana ratifying international agreements relating to gender equality. The Abolition of Marital Power Act (2004) was seen as one of the most powerful pieces of legislation in Botswana as it gave women equal rights to men in marriage, property holding and guardianship of minor children.

The Botswana government has recognized that utilization of its natural resources is an answer to tackling issues related to economic development. They have dedicated over 45% of the land to national parks, game reserves and wildlife management areas. It is through this dedication, the growing of the economy through eco-tourism and Botswana's close proximity to South Africa that has allowed much of

[3] according to https://en.wikipedia.org/wiki/Tuli_Block
[4] source: V. Roodt, Travel and Field Guide of Botswana 2010
[5] source: https://en.wikipedia.org/wiki/HIV/AIDS_in_Botswana

the land to remain protected and benefit both local communities and wildlife. Tourism is the 2nd largest revenue generator of the country after diamonds.

3. Major threats to the area

1. Livestock and agriculture has consistently been a threat to Botswana's wildlife and remains so to this day. As it is instilled within the culture of the people to own livestock, the nomadic grazing of goats and cattle has decimated the environment. The carrying capacity of land has been consistently and inherently ignored by farmers resulting in direct competition for water, food and space between wildlife and livestock. The human-wildlife conflict is an ever-present threat to the wildlife.
2. Hunting and poaching has always represented a threat to any eco-system with Botswana being no exception. The Botswana government is proactive in combating illegal hunting and there are strict sentences for offenders.
3. Fences hinder the movement of the wildlife and can cause injury to animals. Due to the fact that the Tuli Block has been a farming area in the past, there are many old fences still remaining.
4. According to the Global Invasive Species Database Botswana has 34 recorded species of invasive plants and animals. With the Tuli Block having very limited resources in water and fertile soils, these invasive plants/animals have the potential to outgrow naturally found species and therefore need to be carefully controlled. As at December 2015 Projects Abroad has identified and recorded 11 invasive species. The alien plants are continually being removed on this project.
5. Pollution caused by agricultural activities has caused significant harm to water systems as delicate eco-systems struggle to deal with toxins. Bio accumulation of these toxins to other species has meant that agricultural waste has become a major threat and one which needs to be closely monitored. The Limpopo river is widely used by South Africa and Botswana for agriculture. Monitoring of the crocodile population in the Limpopo river can help to gauge the condition of the aquatic environment
6. Drought and desertification within Botswana and the Tuli Block are major threats as they have direct effects on biodiversity and can cause areas to change beyond rehabilitation and recovery.
7. Lack of education, and public awareness of environmental issues have allowed a culture of lack of understanding to form amongst local populations. Without poverty reduction and education in the importance of natural resources and biodiversity for humankind, it is difficult to see local communities taking roles in protecting land and biodiversity.
8. Mining, quarrying and the development of renewable energies have resulted in the destruction of large areas of wilderness and altering of hydro systems.

4. Overall Aim

As seen previously Projects Abroad in collaboration with Wild at Tuli has 2 main aims:

- **a.** Protect and improve the environment for the wildlife by creating waterholes, maintaining the existing waterholes, decrease the poaching and the erosion of the area, eradicating all fences and garbage found as a relic of the farming time.
- **b.** Conduct surveys and census projects (mammal, bird, baobab, crocodile census, camera traps, flower and spoor identification etc.) to assess the unique value of the area (long term project) and

create a legally binding conservancy within the central Tuli Block where all landowners will abide by an agreed constitution in protecting the environment. This includes recording predator movements and the offer of support to local livestock owners in protecting their herds, thus reducing the human / predator conflict which could result in predators being hunted. Data gathered is available to organizations and authorities in support of our goals.

This 2 aims are conducted through different activities. These different activities are explained below.

5. Protect and improve the environment

5.1 WIRE AND FENCE REMOVAL

Due to the fact that the properties were cattle farms or game farms in the past we find fences and wire around the reserves. Wire and fences are a danger to wildlife and can cause injuries or death of the wildlife. It is important to remove all the fences and wire that we can find.

Aims

- Remove any cattle fence and pieces of wire found on the property or on the surrounding properties in the Tuli Block.
- Remove an old fence between the Wild at Tuli and Sukses properties which enclosed 2,500 hectares. This fenced area was used by the previous owners of the property for rearing rare antelope.
- Allow the wildlife to move freely and avoid any injury or death.

Method

- Wrap the wire neatly for easier storage in the camp
- Remove and bring back to the camp any piece of wire, garbage, etc.
- Leave iron and wood poles at the beginning of the fence
- Work in teams, one rolling, the other freeing the wire to make rolling easier

Volunteers helping to dismantle a fence

Volunteers helping to remove wire found on the

5.2 ANTI-POACHING

Poaching and snares are the biggest threat to wildlife in Wild at Tuli. Snares in this area are set by people, mainly to catch antelopes for their meat. They place the snares, or loops of wire, around waterholes or on frequently used game paths. Snares can trap any species of wild animal. As well as antelopes, they can also catch leopards, hyenas, lions, even elephants. Snaring is very cruel as animals are caught by the wire and can suffer for days as they struggle to free themselves, before death. Sometimes the snared animal is eaten alive by predators, as it cannot escape. Another problem is that snares can stay harmful for a long time as poachers may not check all the snares they set and leave some behind. Snares are dangerous until they are removed, so anti-poaching is a vital activity.

Aims

- Protect the wildlife against illegal hunting
- Check area where there is a high risk of poaching (waterhole, housing complexes, drainage lines, tar road and dirt road…)
- Remove snares and any garbage found during activity
- By being seen to frequently monitor the areas poachers may be discouraged and poaching may reduce.

Method

- Volunteers are spaced out between 2 supervisors close together and walk in a straight line through the bush to locate any snares. They sometimes follow main animal paths to look for snares.
- GPS coordinates are taken to assess any hot spot of poaching in the area
- All wire, snares and garbage are removed

A volunteer holds up a snare that was carefully hidden in the bush

Snares can cause injury or even death - pictured is a zebra that was caught

5.3 EROSION CONTROL

Erosion control is an important activity in order to maintain fertile soil in the reserve. Over the course of the summer, the much needed rain can also do a great deal of damage by washing fertile soil and seeds away. The soil is then lost down the river and can even end up in the ocean. Erosion control is necessary to take care of areas where fertile soil has been lost. Several techniques can be used, depending on the focus of the area and its soil type.

Aims

- Maintain fertile soil in the reserve
- Avoid erosion on the road
- Recreate good conditions for the plants and grasses to grow
- Slow down the speed of the rain water which will ensure that it seeps into the ground on the reserve

Method

- Lining up rows of rocks will help to slow down the speed of the water.
- Gabions (iron bags filled with rocks) can be used where there is the possibility of significant erosion that could damage property.
- Create low barriers out of mopane (*Colophospermum mopane)* branches. Depending on the size of the rill that is being protected 4-8 stakes approx. 30-25 cm long are hammered into the soil, which is easier if soil is moistened first, and then longer, thin mopane branches are woven between the stakes and pressed down to create a barrier at ground level across the flow of water which will slow the water and cause sediment, seeds and debris to drop out of the water. This will slowly form new soil behind the barrier which plants can grow in.
- Re-grass the bare land using elephant dung, grass seeds and Mopani branches on top. The elephant dung is spread out in a flat area that will create favourable conditions for the seed to grow. The second step is to spread out seed on top of the elephant dung and cover the area with mopane branches to create shade and keep the seed in place.
- Dig dams in favourable areas to slow down the flow of water and keep water in the soil. Animals will drink from these dams and holding water will increase the water table in the area.

Volunteers in the final stage of re-grassing bare land

Rocks, branches and logs are used to slow down the flow of water

5.4 WATERHOLE MAINTENANCE, PROTECTION AND CREATION

Dams and any water source play an important role in stocking up on water for the winter, which is the dry season here. Some of our dams are permanent (there is water throughout the year) and some are temporary and can dry out over the course of the winter. A good dam needs to be waterproof across the bottom and the sides and in good shape to work properly. Elephants (*Loxodonta Africana*) and other animals can affect whether the dam remains in good condition or not. Elephants are often seen walking along the edge and because of their weight (a big male can reach 6 tons), the edge can become weak and water can leak from it as a result. Water is really important for the wildlife to survive, even more so during the dry season (winter). Animals will come around permanent waterholes to drink and bath. It is for that that we need to maintain, protect and fix all the waterholes on the reserves. We also create new permanent waterholes in the reserves.

Aims

- This basically involves waiting for them to become dry, or emptying them of water and then removing the debris and mud that has accumulated in them so that when there is little water it will be standing water rather than mud. It will also make the water cleaner for the animals to drink.
- We also need to protect the dam with branches against elephants to make sure they are waterproof.
- To create new permanent or temporary waterholes around the reserve
- Protect the dam with spiky branches to stop elephants walking on the dam
- Remove the water from permanent waterholes by using buckets and clean the waterhole
- Fix any leak in the permanent waterholes with concrete

- Re-dig temporary waterholes to create a better shape and make more waterproof or to make them bigger and deeper

Spiky branches are used to protect the dams from elephants

Volunteers helping to build a new permanent waterhole

5.5 RUBBISH REMOVAL

Many people traversing through the Tuli Block are not sensible about rubbish management and can often be seen throwing rubbish out of the window of their car. Rubbish can be dangerous for wildlife and it is important to remove it. Things like glass bottles and rusted cans can cause damage to animals that may step on them and be cut or become trapped by trying to put their mouths into a can.

Aims

- Collect all types of rubbish along:
    - The tar road inside the wilderness area and along the dirt road from Lekkerpoet Junction to Limpopo River Lodge and out to Platjan (border).
    - Around the buildings, waterholes in the reserves or any place we find rubbish

Method

- Drive along the road by car, looking for rubbish. Take care when a volunteer jumps out of the car
- Search around buildings for any kind of rubbish

Rubbish removed from around a waterhole

5.6 FENCE PATROL AND REPAIR

The veterinary fence at the rear of the property which separates community land from the private wilderness land is supposed to be patrolled and maintained by the Wildlife Department. However, they are often under-resourced or deployed elsewhere so we have decided to repair small areas of damaged fence. Holes can be created by poachers coming into the property to set up snares, or by wild animals trying to cross to the other side.

Aims

- Fix any hole we find during the patrol with wire, rocks and logs to prevent animals from getting out and to stop poachers from getting in. It is also really important to patrol and show a presence to poachers who may feel uncomfortable and decide to move away.

Method

- Fix with soft wire holes in the fence
- Fix with rocks, logs holes in the ground
- Report all damage and repairs on the data sheet with GPS coordinate
- Write down any human tracks with GPS coordinate

The veterinary fence is over 300 km, so only a fraction of it can be monitored

Volunteers repairing a wire fence

5.7 ALIEN PLANT REMOVAL

There are 11 alien plant species which have been located around the property. The two biggest problems have previously been Sweet Prickly-Pear (*Optunia ficus indica)*, Smelter's Bush (*Flaveria bidentis)*, Large Thorn-Apple (*Datura ferox)* and Hairy Thorn-Apple *(Datura inoxia)*. Alien plants are species that are not from Botswana and are not supposed to grow here. Most of the alien plants are native to South America, Asia or Europe. These kinds of plants are a danger for the Wild at Tuli ecosystem because they are very competitive and grow and spread out very fast, and will overtake native species. These species are rarely eaten by the wildlife. This activity is conducted only during the rainy season (October to February) and after rains when the plants start to grow.

Aims

- Remove all alien plants found on Wild at Tuli and surroundings. Each plant has a it specific technique to be removed (some need to be burnt, some need to be removed off the property and some just need to be pulled out).
- Need to remove the plants before they seed to avoid further spreading of the species.

Method

- Go before the plants seed
- Remove all the roots and the plants
- Depending the species some need to be burned

Apple Thorns removed by hand and left to dry

The invasive species 'Queen of the Night' needs to be burned

6. Ecological surveys and census

6.1 BIRD CENSUS

The Limpopo riverine system, kopje, grassland, scrub and woodland provides a habitat for a number of unique residents and migratory bird species. Several of these feature on the IUCN red list. Their presence on the Reserve and in the area, as well as their intra-specific relationships, is of high conservational importance.

The presence of diverse bird species populations on the reserve provides an important role in ecosystems. They facilitate seed dispersal, provide shelters for other species, control insect and parasite populations and prevent the spread of disease. It is essential to monitor these as the environment is constantly under pressure of change, which may affect bird populations.

Aims

- To compile an accurate list of all bird species, including migratory species, which are found on Wild at Tuli reserve throughout the year.
- To collect information on distribution, ‘’abundance’’ and seasonal movement patterns of a variety of bird species.
- To present this information in a database (SABAP –Southern African Bird Atlas Project-; Bird Life Botswana…) that can be utilised by ornithological societies and ornithological research groups, at a point where sufficient statistical data has been collected.

Method

- Bird watch from the car, on foot or from a hide.
- With the aid of binoculars (if you have some make sure you take them with you) and bird field guides record each species once in the data sheet with the time and GPS coordinate
- Complete additional information on data sheet relating to the date, weather, staff participating in the observation, etc.

Volunteers bird watching from the vehicle

Bird watching from a hide

6.2 MAMMAL CENSUS

The Tuli area has historically been a farming area. This has caused considerable degradation to the natural balance of the ecosystem. At the return of the property to wildlife habitat, mammal populations are beginning to flourish. The information collected will provide evidence of any changes in inventory, relative abundance and population structure of species.

Information on distribution of species, seasonal distribution patterns of species and waterhole usage facilitates reserve management. It may be possible in the future to encourage species to move into certain areas on the reserve, through the use of seasonal waterholes, to increase or decrease grazing pressures on the vegetation, particularly over the harsh winter period.

Aims

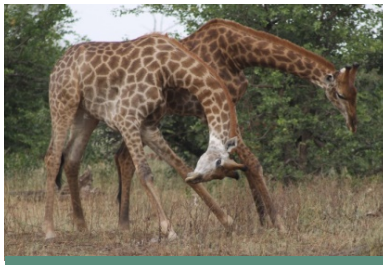
- To compile an accurate list of all mammal species, which are found on Wild at Tuli reserve throughout the year.
- To collect information on waterhole usage, population structure, distribution and seasonal movement patterns of a variety of mammal species.
- To present this information in a database that can be further utilized in reserve management and long term ecological studies.

Method

- Drive or observe mammals from a hide, a kopje or the car.
- Be quiet at any sighting. With the aid of binoculars (if you have some make sure you take them with you) and mammal identification books, for each mammal or group of mammals observed record:
    - Time of observation
    - Location using a GPS handset
    - Species of individuals/group
    - Number of individuals in group
    - Sex and age composition of individuals/group
- Complete additional information on data sheet relating to weather, date.

Mammal census in a hide

Mammal census from the car



Giraffes (Giraffa camelopardais)

Plain zebra (Equus quagga)

6.3 SPOOR IDENTIFICATION

Identification of spoor and tracks is a key component in determining which species are present in any given area. In addition it can provide information that can be used for analysis of species which are present or absent in an area, distribution of the species etc. Carnivore and rare species are the focus in this activity because they are shy and rarer species to encounter in traditional census.

Aims

- To teach volunteers how to identify spoors and tracks of different species.
- To record the presence of spoors and scats (faeces) of all carnivore and rare animals so that we can start to develop an idea of the presence and distribution of certain species.

Method

- All carnivore spoor or tracks that are recognized should be noted and its location recorded using GPS handsets
- Rare species are also recorded.
- Length and width measurements of the track are recorded.
- Complete additional information on data sheet relating to weather, date

Hyena tracks found in the reserve

Volunteers identifying tracks

6.4 CAMERA TRAPS

The creation of a complete mammal species list is important to gain official protection for the area. By discovering and recording the mammal species present in Wild at Tuli and surrounding areas we will be able to use this list as evidence to obtain further official protection for the land based on the presence of rare, unusual and/or protected species. Using camera traps is a non-invasive method which allows us to obtain data about shy and nocturnal species. It is also a good method to follow particular species like the brown hyena, their ethology and behaviour in the den. Camera traps can take pictures or video both during the day and night with date and time. They have SD memory cards and an infra-red system which keeps disturbance of the wildlife to a minimum.

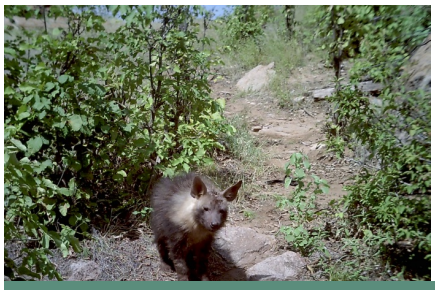
Aims

- To compile a complete list of all the mammal species present at Wild at Tuli and its surroundings.
- To focus the compilation on smaller, shy, nocturnal animals
- To follow target species (i.e. brown hyena) and learn more about their ecology, ethology and behaviour.

Method

- Take out as many camera traps as available onto the reserve.
- Find a suitable location, i.e., drainage line, game path, waterhole or potential den and set up a camera at least 1.5 from the ground (high enough to avoid hyenas' species to reach them and destroy them) and aimed at an appropriate angle. Take account of the sun, branches and rocks in the field of focus which may influence the sensor.
- Repeat this for each camera at different locations
- Check the cameras every 1 to 2 weeks to download images and check batteries and status of the camera.
- Leave the cameras in position for at least 2 weeks.
- Add few drops of chili sauce (Tabasco) on the top of the camera to deter African elephants, brown hyena and spotted hyena. These species are known to destroy camera traps.

Cameras are set up high to avoid destruction by animals



Brown hyena caught on a camera trap

Black-backed Jackal, pictured at night

A leopard photographed along the road

6.5 BAOBAB CENSUS

The Baobab (*Adansonia digitata*) is an iconic tree species of the African bushveld. They are incredibly slow growing, approximately 1m growth in circumference is equal to 100 years, and are very long lived (thousands of years). They are an integral part of the ecosystems in which they are found as they provide food, water and shelter for a large number of species ranging from host specific, epiphytic plants; wood boring insects and their larvae; colonies of Red-billed Buffalo-Weavers; and African Elephants. Due to their importance in the ecosystem it is essential to monitor them and their health to ensure that they are capable of fulfilling their roles. We use the term utilization as opposed to damage to these trees. Utilization includes stripping of bark form the tree.

Aims

- To ascertain the spatial distribution of baobabs in the Tuli Block region.
- To record the presence of elephant utilization on individual trees.
- To locate potential elephant utilization hotspots.
- To investigate whether there is a relationship between the utilization incurred and the distribution of the trees and the water sources.

Method

The following is recorded for each tree:

- Record the location using GPS
- Record the estimated height and the height of the lowest living branch using a clinometers (height meter)
- Record the girth of the tree at ground level and at 1.3m. Where there is utilization at either ground level or 1.3m, the estimated girth should also be recorded.
- Record the utilization on the tree on a scale of 0-5:
    - 0 = No utilization;
    - 1 = Light superficial utilization (10 or more tusk scars to up to 50% of the bark has been removed);
    - 2 = Heavy superficial utilization (more than 50% of the bark has been removed);
    - 3 = Light severe utilization (up to 66% of the trunk of the tree has been removed by direct elephant interaction),
    - 4 = Heavy severe utilization (more than 66% of the trunk has been removed by direct elephant interaction);
    - 5 = Dead, collapse or close to dead (the tree has fallen over due to direct elephant activity or drought).
- Record the accessibility of the tree to elephants, on a scale of 1-3:
    - 1 = easily accessible;
    - 2 = moderately inaccessible;
    - 3 = Difficult to access.
- Record the substrate type (rock, soil, kopje).
- Record the presence of any mammal, bird or reptile species utilising the tree for habitation purposes.
- Record if the tree has been protected by man, the kind of protection used (wire, wood, and circle of rocks...) and if the tree has been protected see if there is any sign of elephant utilization.

Clinometers are used to record the size of the baobab trees

Volunteers record the girth of the tree at 1.3m

Baobab with severe utilization, category 4

Baobab trees can have unique and unusual shapes

6.6 CROCODILE CENSUS

There has never been a census to determine the size of the crocodile population along the Limpopo River in Botswana. The crocodile is a protected species in Botswana because it has been persecuted as a source of meat, skins and as a threat to livestock. It is also a good indicator of a healthy river system. If there are crocodiles in a region then it is likely there are many other species of water dwelling animals.

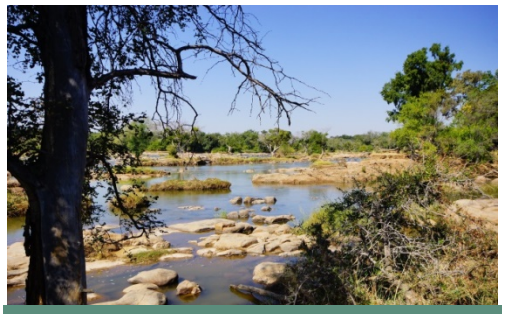
Aims

- To record the crocodile ''population'' at Wild at Tuli and its surroundings.
- To see whether the population fluctuates during the season, and what the impact of various weather systems, such as droughts has on this species.
- To know if the crocodile are mainly big, medium or small will give valuable information about the health of the population.
- To protect the crocodile along the Limpopo River. When we have collected solid numerical data about the crocodile population we can back up arguments against the building of new dams on the river, because new dams may have a negative effect on the river ecosystem.

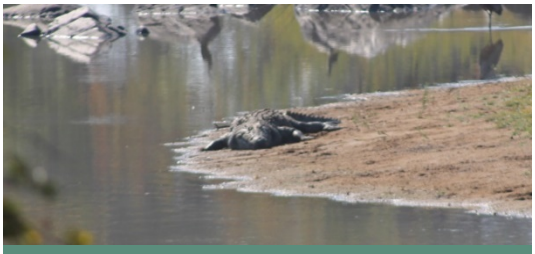
Method

- Walk along the Limpopo River and record the presence of any crocodile that is sighted.
- Record several different parameters including:
    - Date
    - Weather
    - Size of the crocodile (use an estimation)
    - Behaviour
    - Location using a GPS handset

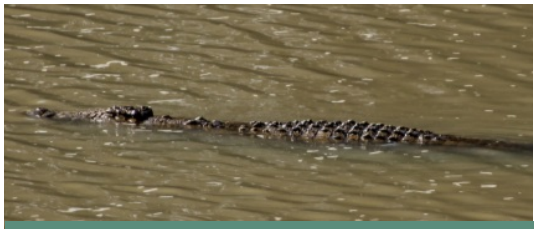
Volunteers walking along the banks of the Limpopo River, recording crocodile sightings



The project aims to get an estimate on the size of the crocodile population in the area



A crocodile sunbathing along the Limpopo River



The presence of crocodiles is a good indicator of the health of the water system

6.7 ELEPHANT IDENTIFICATION

Little information has been recorded on the ecology of the elephant population in this area. Traditionally, elephants have moved into the area from Zimbabwe and, due to fence barriers in South Africa, occur abundantly in the Tuli area. This information will provide an accurate description of the ecology of the elephant population in the area. Elephants have an impact on ecosystems and agricultural areas.

The study area is subject to very oppositional seasons, the wet (October to February) and dry (March to September) season. This plays a significant part in the availability of vegetation according to season. Elephants also consume large amounts of water (150 litres / day). In the wet season, this is partially available while they graze. In the dry season, elephants spend a huge amount of time around waterholes to drink water and cool off.

This activity is conducted only during the dry season when elephants spend long hours around the permanent waterhole and we can see them well from the hides.

Aims

- To compile an accurate identification portfolio for the elephant population (herds and males) utilising Wild at Tuli and its surroundings.
- To use this portfolio to identify distinct family groups (herds) and for each herd describe the herd size and the herd age and sex composition.
- To use this portfolio to identify the bulls, their age etc.
- To identify and record patterns in movement routes across Wild at Tuli and surrounding areas, especially direction of movement to and from waterholes (long term project).

Method

- Drive or walk from camp to an elephant observation location (example hides, kopje etc.) and use opportunistic elephant sightings.
- For each adult individual, both male and female, record:

- Identifying features (tusk absence/presence/deformity, ear markings, calves) and draw them on the data sheet
- Take identification photographs
- Cardinal direction of movement, if not interrupted by human presence
- GPS location

- On encountering an elephant herd, for each herd record:
  - Herd age composition
  - Herd sex composition
- Collect additional information relating to date, time and weather. Compile this information into an identification portfolio.
- Compare the male and herd to existing portfolio to see if they exist already.

Elephant identification and drawing

Elephants coming to drink at a waterhole

A bull elephant named "Captain"

Herd number 29 with a bull elephant

7. Other Projects

As with the management of any wild area there are several management practices that are essential to the maintenance of the reserve.

These projects include:

1. **Roads Maintenance**: As with any reserve, roads are essential but difficult to maintain. They constantly need maintenance on the surface and to keep back the encroaching bush.
2. **Road Clearing:** .After the rain, trees and branches grow fast and may stick out into the road. For all these reasons it is important to clear the road
3. **Road creation:** It is also important to create new roads to access and check the entire farm.

8. Implementing the Plan

As Projects Abroad places volunteers, interns and professionals into hundreds of projects worldwide, it is vital that these resources are deployed in a way that utilizes their strengths and coincides with the aims and objectives of the project.

To ensure all resources available to the project are being used correctly Projects Abroad employs staff on site directing the daily activities and ensuring the surveys and census is being carried out in accordance with this plan.

9. Reporting on Surveys and Census

Data collected at the project will be sent to Projects Abroad head office in the U.K. for review. Internal reports will be written using these data sets and made available to the public through a public domain.

When data sets are sufficient, reports will be made available to leading experts for review and possible use in their work.

The project will also produce an annual report outlining progress and recommendations. The project will also feature in Projects Abroad's Conservation Annual Report, made available to the public through a wide range of media.