Fence effectiveness & Maintenances

A comparison study of maintenance methods and the effectiveness of a boundary fence in two habitats.

First In-service Training Project Report

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The End

Introduction

Fences are not new to Namibia. The methodologies, approaches and setting of a fence have however moved on with time and continue to change with the evolving needs of the animals and values of the people. Fences play a very important part in the world of conservation, by keeping out unwanted animals and keeping out two “legged jackals” (people/ poachers). Fences can also be of great danger when not well looked after by creating conflict between two neighbours especially when one is a nature reserve and the other is a livestock farmer. The erection of an effective game fence is determined by the type of game kept, the nature of the terrain, the type of material used and the availability of materials (Bothma, 1996).

The jackal proof fence situated near NaDEET Centre in the southern part of NamibRand Nature Reserve (NRNR) divides the reserve from a livestock farmer, farming with sheep and cattle. Sheep are animals that are not wanted in the reserve and **Canis mesomelas** are not wanted on the farmer’s land. How does one keep the unwanted animals (sheep & cattle) out of the reserve and the wanted animals in the reserve? How does one keep the problem animal (**C. mesomelas**) out of the farmer’s land and inside the reserve? It is by **fence maintenance** that one can achieve the above to avoid conflict and keep good neighbourly relations. But through maintenance one can also limit unnecessary game lost. Through maintenance we can also avoid the unnecessary killing of animals (if fences are maintained and jackals are not able to escape, it won’t be necessary for the farmer to use poison to kill jackals and accidentally also kill other innocent animals like vultures).

Objectives

Project objectives

- To determine the most effective method for repairing holes in the game-proof fence. (Find out which of the three methods that they use to repair holes is most effective. The methods are:
    1. Filling the hole with sand.
    2. Closing the hole with rocks.
    3. Closing the hole with small iron poles hammered into the soil.)
- To find out how effective is the fence by looking at mortality rate close to the fence (2m away from the fence) on both sides.
- To find out which animals enter and leave the reserve through the holes by identifying their spoors.
- To compare the fence maintenance methods in the dune area with that of the plain area.

Personal objective

- To gain more experience in identifying the spoors of animals. This will help me to educate learners at NaDEET centre.
- To know which maintenance methods I should apply on the fence in my home village.
- To gain more experience on how often to maintain our fence in my home village.
- To gain more experience in using a computer and how to enter data on a computer.
- To gain experience in data collection and fence maintenance.

Methods

The project included two sections of the border fence. The first section was the fence situated in the dunes from the NaDEET/ Tok-Tokkie entrance gate towards the Northeast. The second section was in the plains, running from west to east in front of NaDEET's office. The project covers an area of 1 km on the dunes fence and another 1 km on the fence situated on the plains. When working with these methods mention below it was very important for one to take in consideration the quantity of the meterials that was used, whether they were all equal for each method. This helped the project be fully scientific. When a method period came to the end, the materials were not removed, as this gave me the chance to tell after how long NRNR should maintain each method. These methods were put up in a way that it dose not create visual pollution as this area is also used by tourist operations. The methods that were used are namely:

- Filling the hole with sand as shown above.

Figure 1. Shows the first method used to close holes Photo: J. Amutenya

For this method it was very important that all the holes found should be filled with the same amount of sand to avoid animals from only opening some holes

(filled with small amount of sand) and not the other holes (filled with large amounts of sand) . When one was carrying out this experiment each hole was filled with three spades full, this made sure that all holes had the same amount of sand.

- covering the hole with rocks as shown above

Figure 2. Shows the second method used to close holes **Photo: J. Amutenya**

For this method the size and the type of rocks used played a very important part in the accuracy of this method and the project. If the sizes of the rocks vary the animals will tend to open the holes that had smaller rocks. If other rocks like sedimentary rocks were used, which are not as strong, they will change due to heat and pressure. All rocks used must be the same and of the same weight, in this project igneous rock (granite) measured at the size of 4-5 kg was used.

- **Closing the hole with iron poles hammered into the soil as shown below.**

Figure 3. Shows the third method used to close holes Photo: J. Amutenya

It was very important that all the iron posts set up to close a hole were the same depth and had the same spacing between then. When carrying out this method all iron poles were marked at the length of 70 cm before being put up and they were also put up at a depth of 70 cm on both the plains and the dunes. The iron post was set up at a distance of 2 cm from each other (taking into consideration the smallest animal using the holes).

Every Sunday there was a fence check and the fence check was to:

- Check and record holes.
- Check and record spoor at holes.
- Repair holes using the different methods.

Each method was tested for six weeks and data was collected once a week. Before a hole is to be closed, all the spoor found was first identified and was inspected if the animal had come in the reserve or had left the reserve. When

trying to find out the effectiveness of the fence the following two factors were looked at:

- Mortality rate from the fence 2m away, on both sides of the fence.
- The number of holes.

In order to make sure that holes and dead animals were not counted twice signs had been put up every after 100 m as shown below.

Figure 4. Shows an example of the signs that was put up **Photo: J. Amutenya**

The distance markers ensured the accurate recording of distances. All the collection of data was carried out on foot. After the collection of all data one was able to compare the fence in the dunes with the one on the plains.

Results

Number of holes re-opened in percentage: 63/71*100 = 89% re-opened.

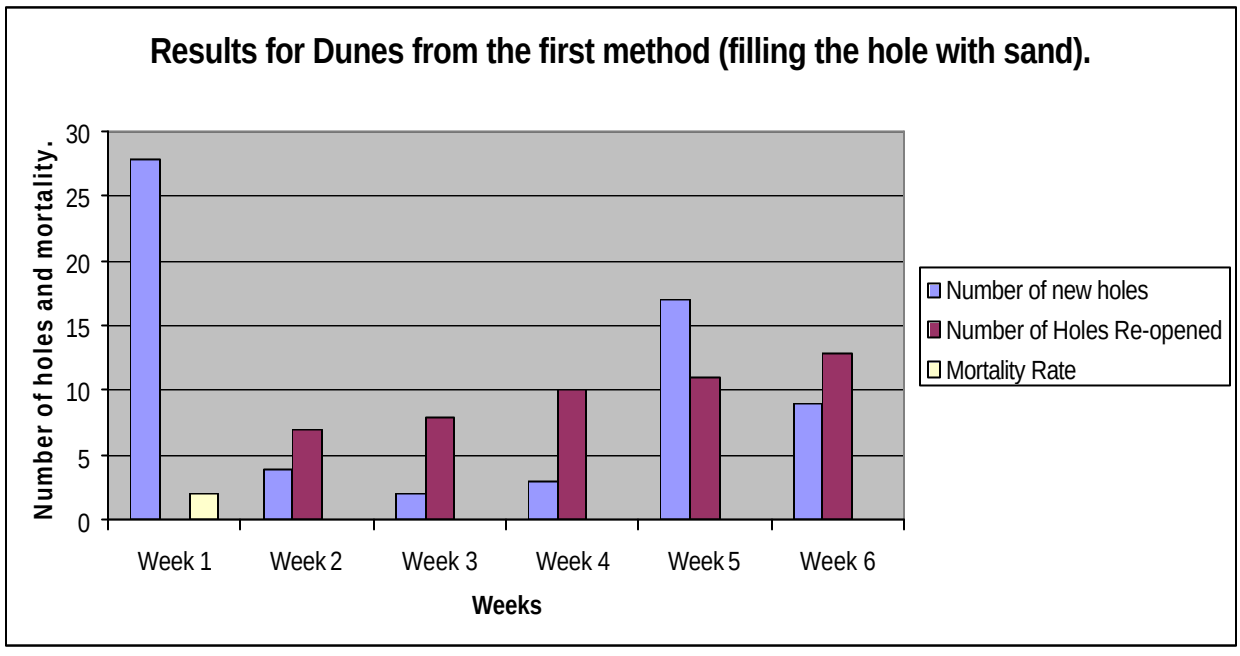

Figure 5. Shows the results for the method filling the hole with sand in the dunes and the results for the effectiveness (number of new holes and mortality rate) of a game fence.

Number of holes re-opened in percentage: 23/29*100 = 79% re-opened.

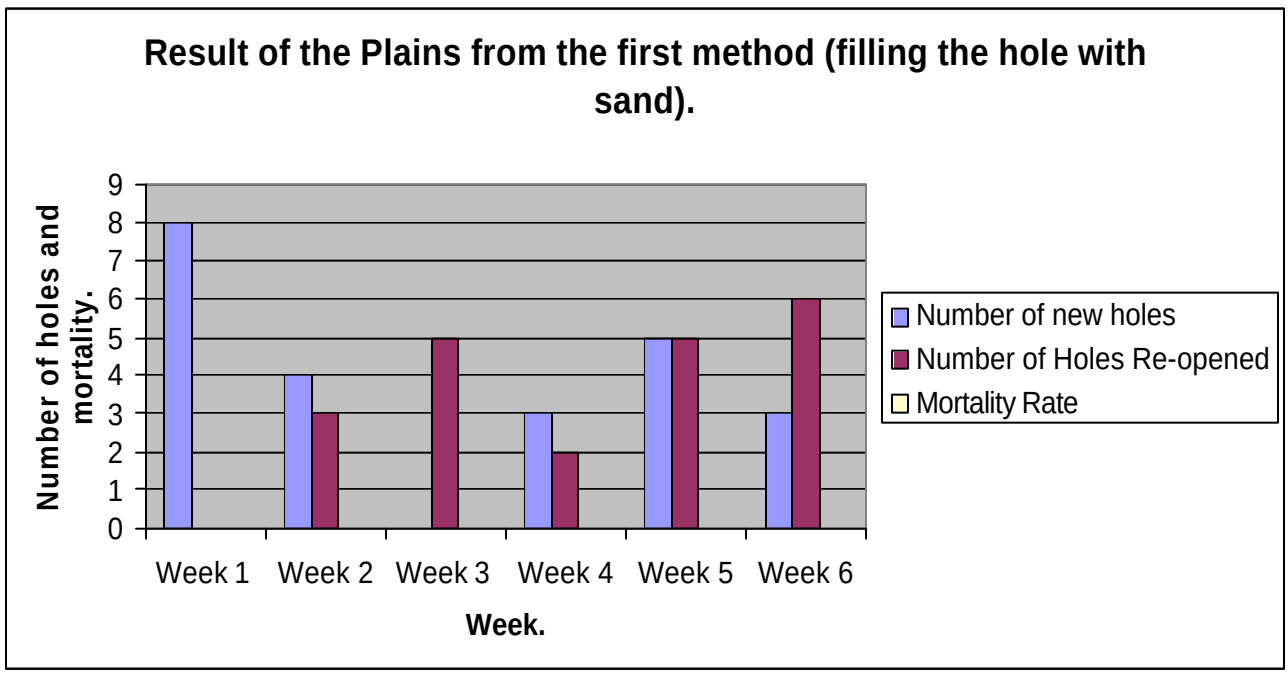

Figure 6. Shows the result for the method filling the hole with sand in the plains and the results for the effectiveness (number of new holes and mortality rate) of a game fence.

Number of holes re-opened in percentage: 5/24*100 = 21% re-opened.

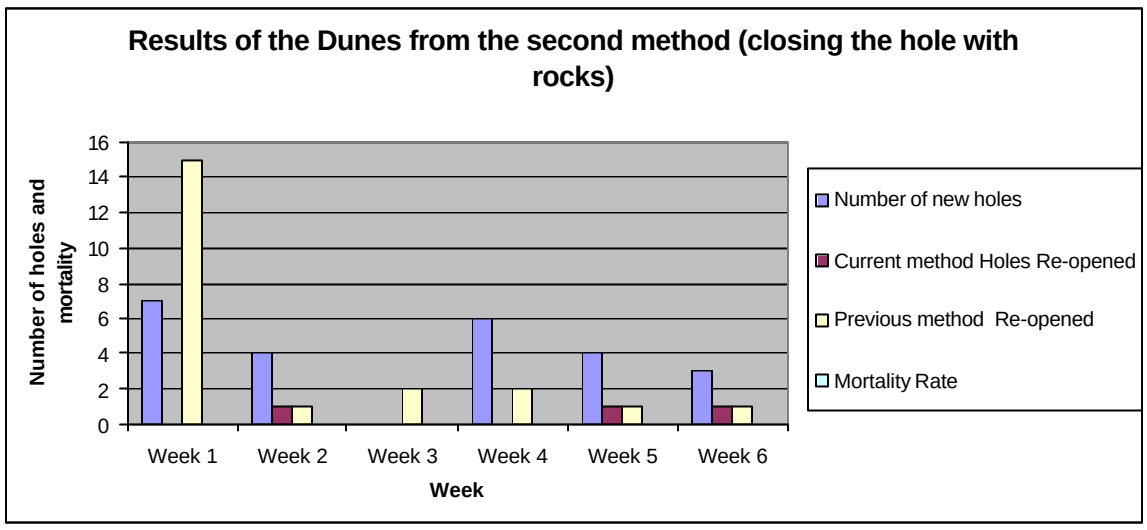

Figure 7. Shows the result for the method closing the hole with rocks in the dunes and the results for the effectiveness (number of new holes and mortality rate) of a game fence.

Number of holes re-opened in percentage: 6/24*100 = 25% re-opened.

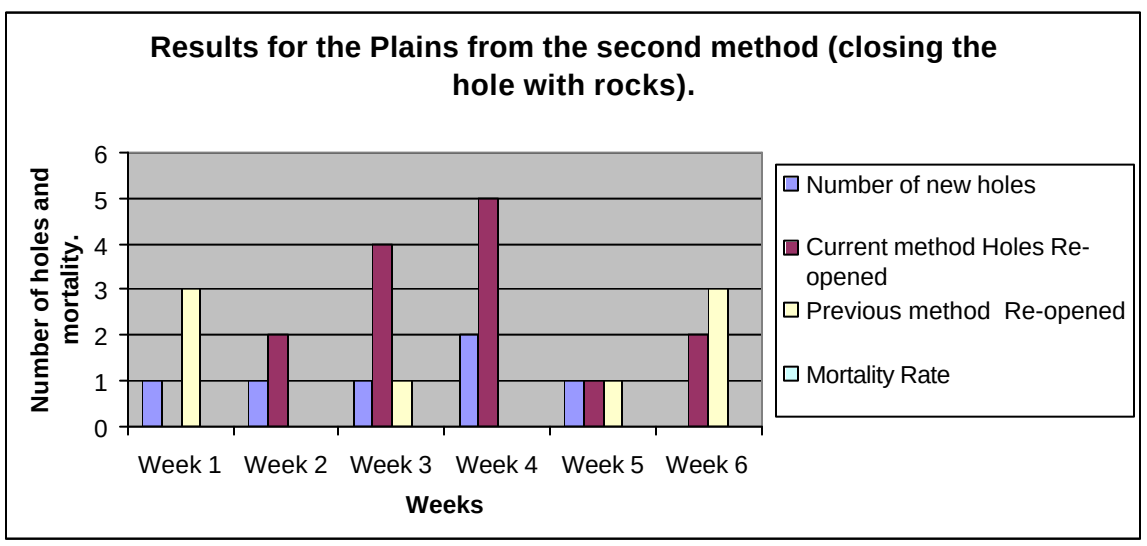

Figure 8. Shows the result for the method closing the hole with rocks in the plains and the results for the effectiveness (number of new holes and mortality rate) of a game fence.

Number of holes re-opened in percentage: 29/33*100=88% re-opened.

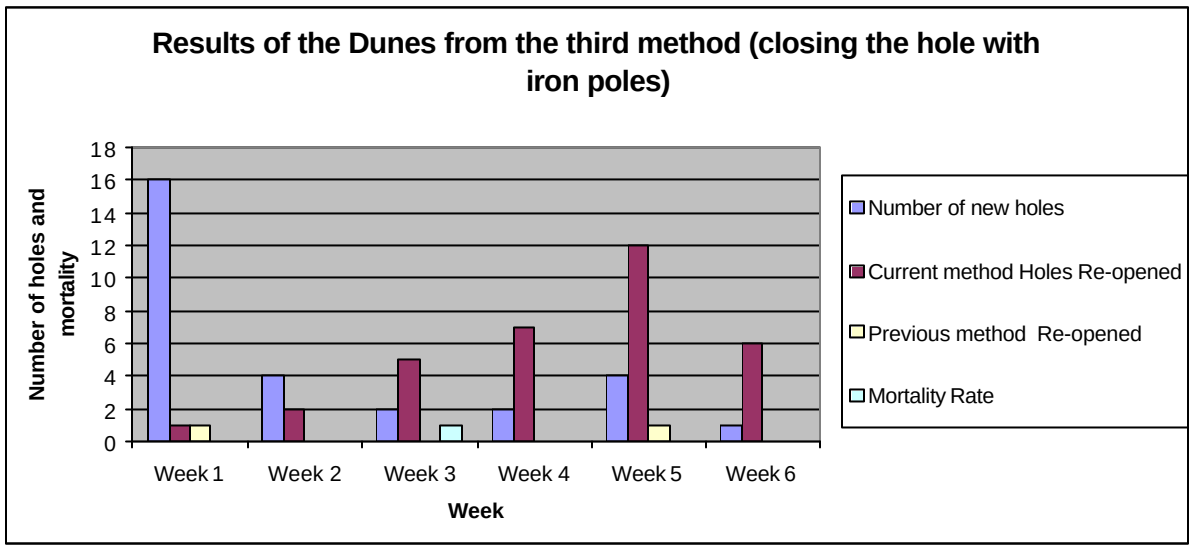

Figure 9. Shows the result for the method closing the hole with iron poles in the dunes and the results for the effectiveness (number of new holes and mortality rate) of a game fence.

Number of holes re-opened in percentage: 1/9*100=11% re-opened

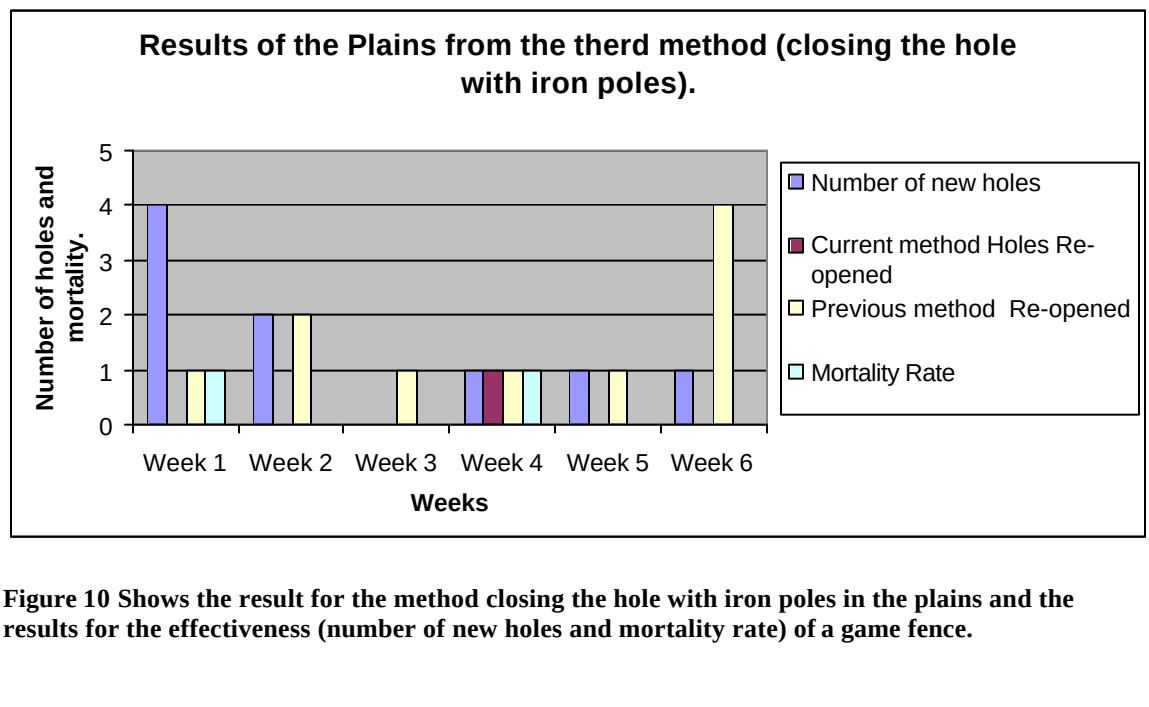

Figure 10 Shows the result for the method closing the hole with iron poles in the plains and the results for the effectiveness (number of new holes and mortality rate) of a game fence.

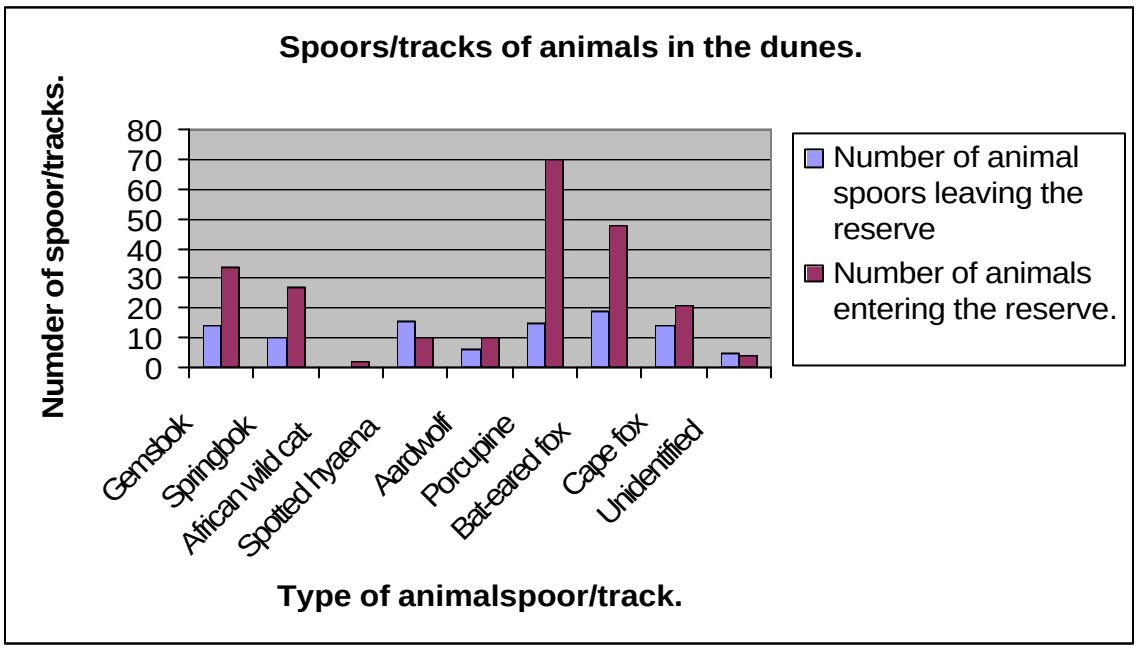

Figure 11 Shows the result of the different animals using the holes in the dunes.

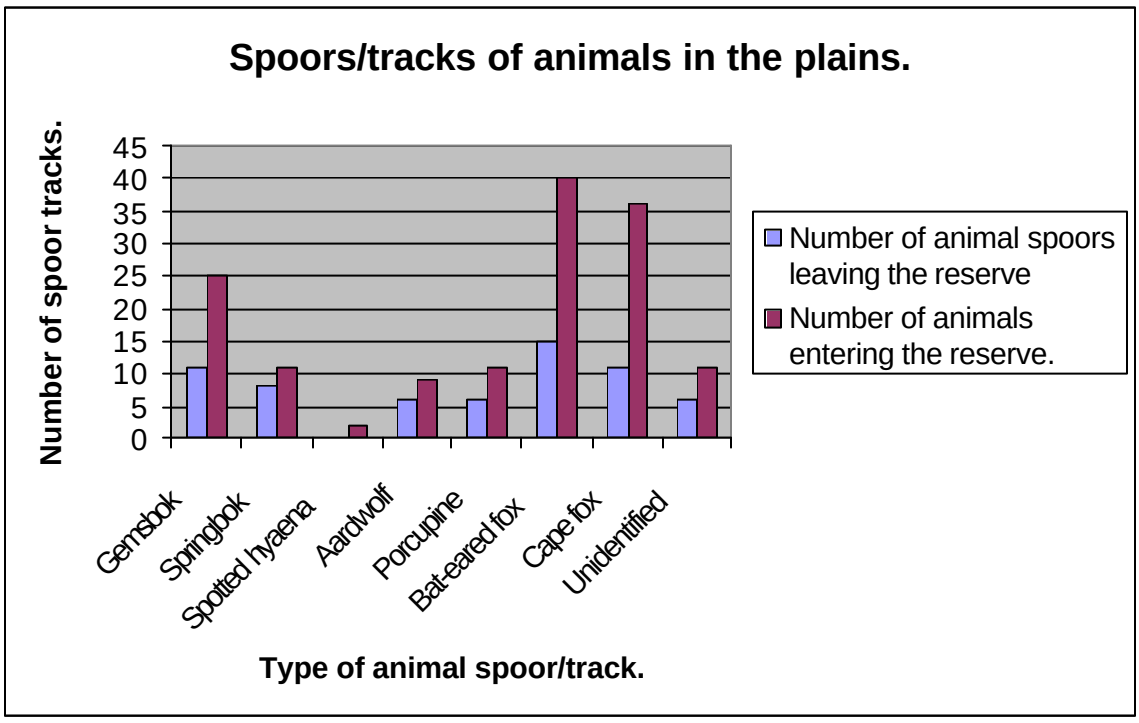

Figure 12 Shows the result of the different animals using the holes in the Plains.

Discussion

One of the objectives was to determine the **effectiveness of a game fence** by looking at the number of holes and morality rate along the fence. This method was not appropriate simply because by looking at the number of holes that does not really tell whether the hole was made by the animals or not. Investigations were done to find out what other things besides animals can also contribute to the holes. The most likely thing that has contributed to the number of holes, especially in the dunes, was iron oxidation which has also been sped up this year by the high rainfall (Keding, Pers comm). We all know that the dune sand is rich in iron and with water made up of one molecule of oxygen and two molecules of hydrogen; the oxygen is needed for the oxidation. In order to prove that some of the holes were caused by iron oxidation a separate investigation was done. In this investigation ten pieces of diamond mesh fence was measured and cut at 10 by 10 cm. Five pieces were put up in the plains and five in the dunes. Each piece was laid flat into the ground approximately 20 cm under the surface. The result was as follows:

Table 1. Shows the influence of iron oxidation on dune sand

Dunes.	***Plains.***
With the rain involved it took 2 weeks to rust and another 3 weeks to be vulnerable to become a hole.	This fence did not rust at all in both two experiments.
Without rain it took 3 months for the fence to rust and it never become vulnerable to become a hole.	

This experiment clearly shows that some of the holes were not made by the animals, but were a result of iron oxidation and the animals only use these holes.

Figure 11 & 12 shows an example of a piece of wire that was iron oxidized and a hole as a result of iron oxidation Photo: J Amutenya.

By looking at the mortality 2m away from the fence, it also does not really tell whether the animal died because of the fence. This method was also carried out during the rainy season and animals had a lot of food. If only this method was also carried out during the dry seasons when anials might be desperate for migration it would have been more accurate. But according to (Bothma, 1996) the effectiveness of a game fence may be questioned, since no fence is fully game proof. That is simply because animal such as Springbok will jump over the fence, the Gemsbok and Jackal will creep underneath the fence and Vultures will fly over unhindered. But indeed the function of a game fence is to control movement of animals which the fence is not carrying out.

According to figure 5 and 6 the first method (filling the hole with sand) for the **maintenance method** was not effective in both the plains and the dunes. In the dunes 89% of holes re-opened in the dunes and 79% of holes re-opened in the plains. This was because some of the sand was always blown away and did not serve its role of preventing the animals from moving through. The high rainfall in the area that we received, when this method was carried out led to the sand being washed away, making it easier for the animals to move and to re-open the hole both in the dunes and the plains. The other reason that was associated with the dunes only was when sand was applied to the hole, the rate of iron oxidation was increased because the sand of the Namib Desert contained iron and with oxygen in the air and water (rain) iron oxidation took place.

According to figure 7 and 8 the second method (covering the hole with rocks) was very effective in the dune area having only 21% re-opened holes and not effective in the plains were it had 25% re-opened holes. But what has been observed during the experiment in the dunes is that the animals tend not to open the hole but they only start digging next to the hole.

Figure 12 shows an example of how animals dig next to the covered hole Photo: J Amutenya

Comparatively on the plains the rocks were totally removed from the holes. The reason why this method was more successful in the dunes can simply be because with the wind blowing away some sand particles some were deposited between the rocks making it more firm and difficult to remove. The reason why this method was not successful on the plains could be that there is no loose sand that the rock can get stuck in when it is pushed. The vegetation cover can also be another reason as they prevent the wind from picking up sand particles and depositing them (between the rocks).

According to figure 9 and 10 the last method (closing the hole with iron poles hammered into the soil) was very successful in the plains were it had only 11% re-opened holes then in the dunes were 88% of the holes was re-opened. This is because the iron pole had more stability and no soil was removed. This method

was not was not successful in the dunes because sand was always removed by the wind. When one was visiting the holes one could see that the 60 mark was getting more exposed by the wind. The main animals that were using and making the holes were gemsbok, bat-eared fox and porcupines as shown in figure 11 and 12 both in both the plains and dunes.

Conclusion

The first method (filling the hole with sand) was not successful in both study areas and should not be used to close holes as it might contribute to the number of holes in a fence. The second method (filling the hole with rocks) was successful in the dune area because the wind was blowing sand particles and some of the particles are deposited between the rocks making it more firm and difficult to remove. The last method (closing the hole with iron poles hammered into the soil) was very successful in the plains then in the dunes. This is because the iron pole had more stability and no soil was removed. The animals that was using the holes more often was mainly the Bat-eared fox and Porcupine. It is also believed that those animals are the ones that make the holes in the fence. The strange thing is the fact that one did not see any track of a jackal. Is that a sign that all of them are dead in the South-east part of NRNR due to poisoning done by the livestock farmer next door?

Project Limitation

The area of studies especially in the plain area were covered in thick dense tall grasses making it difficult to spot the holes making one vulnerable to snake and snake bites. Lack of time was the other limitation that made the project to be carried out only in the wet season and not in the dry season.

Recommendations

According to the research and result it is recommended to the NamibRand Nature Reserve that they should never use the sand method. They should use the method of rocks when they are fixing holes situated in the dunes and the iron method when they are fixing holes situated in the plains. NRNR should check the fence every after three to four month if iron poles are used in the plains and rocks are used in the plains.

Acknowledgements

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