

KENYA'S BLACK RHINOS

BRINGING BACK ENDANGERED RHINOS



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Rhinos are secretive, often solitary, and avoid humans. Although they have poor eyesight, they have excellent hearing and a keen sense of smell, and if they feel threatened, they will charge without warning. Although rhinos are dangerous characters, they are still pursued by **poachers**. Their horns are prized for traditional Chinese medicines and are also popular dagger handles in the Middle East. Mainly due to poaching, Kenya's rhino population has declined from 20,000 in the 1970s to less than 500 today.

Kenya's black rhinos now only live in well-protected sanctuaries. Three-quarters of the black rhinos are in national parks, and the rest are guarded in private sanctuaries such as in Sweetwaters Reserve. Sweetwaters Reserve is a 100-square-kilometer reserve that was created in 1988 primarily for the black rhino, and is now home to 38 of these formidable beasts, as well as other wildlife such as elephants, giraffes, lions, cheetah, hippopotamus, hyenas, and antelopes. Next to Sweetwaters Reserve is the Ol Pejeta Ranch. Together these two properties make up the privately-owned and managed Ol Pejeta Conservancy.

WHAT RHINOS EAT

Black rhinos are very picky eaters. They use their **prehensile** lips to **browse** the leaves of the whistling thorn tree, a type of Acacia that makes up 75 percent of the rhino's diet. As it happens, the whistling thorn tree is one of the two dominant tree species on the

Sweetwater Reserve. However, the rhinos do not have the Acacia trees all to themselves; the Acacia tree also makes up 75 percent of the diets of the local giraffe population. Giraffes use their long tongues to browse the tops of the Acacia trees. If a tree is over-browsed, it will stunt the tree's growth. Elephants also dine on the Acacia trees. During the rainy seasons, elephants prefer grass and other green vegetation, but in the dry seasons, when the grass becomes dry and brown, they eat the bark of the Acacia tree. Elephants are not delicate browsers. When they set their sights on an Acacia tree, they usually snap off the main stem, often killing the tree. With three large **herbivores** in the reserve, the reserve managers have to monitor their populations and sometimes remove the excess elephants and giraffes, no easy task.

RHINO RESEARCH

To bring Kenya's black rhino population back from the brink of extinction, Dr. Linus Gatimu (*Moi University*) and Dr. Geoffrey Wahungu (*Moi University*) are leading a research project on the Sweetwaters Reserve to gather information about these shy animals. Specifically, Gatimu and Wahungu want to determine the home ranges of each rhino, the numbers of other herbivores on the reserve, the rate of tree damage on the reserve, the amount of edible grass at different times of the year, and rhino behavior. They are also surveying the vegetation in the neighboring ranch in



Measuring tree height.

GIRAFFE GATES

A wide and shallow ditch in front of a low stone wall is a big enough obstacle to deter most rhinos from trying to cross into the ranch. However, one adventurous rhino was not discouraged by the barrier and broke out of Sweetwaters into the Ol Pejeta Ranch. Eventually, the trackers were able to capture and return the headstrong rhino to the reserve and the gate is now equipped with a single electric wire to further inhibit bold rhinos.



A "giraffe gate" usually is enough to deter rhinos from leaving the reserve.

case the reserve can someday expand into these areas. Since 1999, Gatimu and Wahungu have been gathering data on a number of issues:

Tree Growth and Damage

Gatimu and Wahungu have identified dozens of individual Acacia trees, and have been monitoring them for the last six years. Each year, they measure the tree's height, and with a telescopic measuring rod, they also measure the diameter of the main stem. If there is any damage to the tree, they note it and if possible, mark down the cause — rhinos bite the small branches below two meters at a 45 degree angle, giraffes over-browse the tops of the trees, and elephants cause major damage with their powerful trunks. Trees can also die from drought, fire, or other natural causes.

They also record the presence of ants because the ants defend the tree from over-browsing. When the tree is disturbed by a giraffe tongue, the ants rush out from hiding to bite and deter any foreign bodies that may be preying on the tree. They compare the data on each tree with that of previous years to see if the tree's growth has been stunted, reversed, or terminated by damage.

Counting and Tracking Rhinos

The Ol Pejeta Conservancy employs several highly-trained trackers to spot rhino footprints, identify rhino bedding sites, and locate rhino **middens**. These trackers can move silently through the bush, are always aware of the way the wind is

blowing, and will find a rhino before the rhino finds them. The trackers can also identify individual rhinos by their features, such as their size, horns, or maybe a notch on their ear.

Researchers use a GPS unit to identify the location of the rhino sign or sighting. When they spot a rhino in the reserve, they record the rhino's name (the researchers know them by sight) and what it is doing — such as resting, foraging, walking, showing aggression.

Through these rhino patrols, researchers keep track of the rhinos at Sweetwaters. If a particular individual has not been spotted in a few weeks, a special patrol will scour the reserve to find this rhino. The locations of rhino sightings and rhino signs are entered into a computer program that calculates **home ranges** for individual rhinos.

Game Counts

The impala is the only small herbivore that feeds on the Acacia tree. However, the populations of other animals in the reserve ultimately affect the rhino and its habitat. For example, warthogs, zebras, elands, buffalos, and hippos are all grazers. If large populations consume too much green grass, elephants will eat more Acacia bark. Lions and other carnivores are also an important part of the ecosystem. They prey on warthogs, zebras, antelopes, and occasionally dine on giraffe and buffalo. To count the wildlife, researchers simply walk along transects through the reserve and record the types and numbers of wildlife they see. By putting information on which animals they saw where and how many of them there were, they can calculate how many animals of each kind are in the reserve. They can also see where particular animals, such as zebras or giraffes, like to go, which helps researchers understand how the different animals are using the park, and which animals might be using the same areas that the rhinos like to use.

Grass Biomass

Gatimu and Wahungu want to know how much green grass is available to grazers. They do this by counting the blades of grass. They don't count every blade of grass in the 10,000-hectare reserve, however. Rather, they use a pin frame to count grass at sample locations. A square wooden frame holds twenty pins that hang down. When placed on the grass, the pins touch the grass. Researchers count the number of green and brown blades that touch each pin. From the data collected, the scientist can estimate the **biomass** of green and brown on the reserve.

Rhino Food Preferences

Rhinos do not give warnings before they charge with their massive horn thrust forward. They are too unpredictable to observe at close range. Gatimu and Wahungu want to know which other plants

and herbs supplement the rhinos' diets. From a distance, it may look like a rhino is snacking on grass, but it may actually be munching on African asparagus or another herb that grows in the grass.

To get the inside scoop on rhino dietary preferences, Gatimu and Wahungu look to a friend of theirs, Morani, for the answers. Morani, which in Swahili means "warrior," is a rhino that was orphaned at birth, was brought up by humans, and has been in close contact with humans his entire life. He lives in a special fenced-off area in Sweetwaters to protect him from other rhinos. The researchers can observe his behavior and eating habits at extremely close range. Researchers spend hours observing Morani and recording how he spends each moment. Most of his time is spent eating, and each plant or herb he nibbles on is carefully noted. Information on Morani's diet is compared with the different types of vegetation available on the reserve.

Vegetation Sampling

Although the Acacia tree and Euclea bush are dominant at Sweetwaters, there are many more trees, bushes, herbs and grasses that fill the landscape and the bellies of the herbivores at Sweetwaters. Research teams visit several locations on the reserve to take representative samples of the Sweetwaters vegetation. They travel to selected coordinates and mark out a 30-meter diameter circle. After recording specific details of the ground within the circle, they carry out a series of measurements on the ten trees and shrubs nearest to the center of the circle. The data is used to create density maps of the different plant species on the reserve.



PUTTING THE DATA TO WORK: MOVING ELEPHANTS

The scientists use Palm Pilots to record all of the data when they are in the field, and after a long day's work, they return to the research camp to upload the information onto a laptop computer. The data gathered since 1999 has been used to develop a mathematical model of the Sweetwaters ecosystem. Using this model, Gatimu and Wahungu can determine how the amount of green grass available, the size of the giraffe population or the density of *Euclea* bushes will affect the rhinos. This model is used to describe the current state of the reserve, is used to predict the future condition of the ecosystem, and is used to make decisions about the management of the reserve.

Using information from their model, Gatimu and Wahungu have suggested some major changes on the reserve. In the first couple of years of the project, the model showed that elephants were causing too much damage to the Acacia trees at Sweetwaters. If the trend continued, there would not be enough Acacia trees for the rhinos. Based on their mathematical model, the scientists made a recommendation to the reserve managers: remove 50 elephants from the reserve. This is, of course, easier said than done.

In 2001, with the help of the Kenyan Army, the Kenya Wildlife Service (KWS) moved an entire family group of 56 elephants to Meru National Park. Before the move, researchers had to make sure that they knew all the members of the family unit, and that none would be left behind. Elephants are very social animals,

and breaking up the family group was something no one wanted to do. The moving process took more than a month, and 100 people were needed to move each animal! Following the relocation of the elephants, data collected by researchers revealed a significant drop in tree mortality due to elephant damage.

The elephant relocation relieved some of the pressure on the Sweetwaters ecosystem;



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Counting grass using a pin frame.

THE RESEARCH TEAM

In 1984, Linus Gatimu obtained his bachelor of science degree with honors in botany and zoology from the University of Nairobi. That same year, Gatimu was appointed by the Teachers Service Commission of Kenya to teach chemistry and biology at a high school in Embu, Kenya. In 1986, he began working at the department of Wildlife Management of Moi University in Kenya. As a laboratory assistant, he assisted academic staff and postgraduate students in their research. In 1996, he obtained a masters of science degree in conservation biology at the University of Cape Town, South Africa. He then began lecturing and supervising undergraduate students back at Moi University. He has been working with Earthwatch volunteers since 2001, and is working on his Ph.D. dissertation. For his dissertation, he is researching elephant damage to another species of Acacia tree (*Acacia xanthophloea*, the yellow fever tree) at Sweetwaters.

Geoffrey Wahungu holds his bachelor's, master's and doctorate degrees in wildlife and ecology management and currently leads the Department of Wildlife Management at Moi University. In 1993, he was granted the Dr. Richard Leakey Conservation Award in recognition of his research contributing towards the conservation of the endangered Tana River Crested Mangabey, an endangered monkey found only in southeast Kenya.

THE OXPECKER ALARM SYSTEM

"...We slowly picked our way through the grass towards the bedding site. We were suddenly stopped dead in our tracks by a shrieking sound. The rhino has three primary early warning systems: smell, sound, and oxpeckers. The oxpecker is a bird that feeds on small ticks and other insects found on the rhino. In return for this meal, the bird adds its keen eyesight to the rhino's arsenal. An oxpecker had spotted us and refused to go silent again. The alarm finally registered, and as we waited, not moving, all three rhino leapt up without warning and bolted off to our right. After going in to examine the bedding site and take some measurements, we decided that we had enough excitement for one day and were back in our huts by 11 o'clock."

– Andrew Welch, Volunteer '99

however, the data then started showing that the giraffes were over-browsing the Acacia trees and stunting their growth. Based on the data collected from the vegetation sampling, Gatimu and Wahungu recommended a plan that would allow giraffes to leave Sweetwaters for the more lush Acacias in the neighboring ranch. Part of the fence on the west side of the reserve was taken down for construction of a giraffe gate. The "gate" is actually a stone wall that is low enough for giraffes to step over, yet too high for rhinos.

Now that the gate is open, giraffes and many other animals move freely between the Sweetwaters Reserve and the Ol Pejeta Ranch. Experienced trackers at Sweetwaters periodically check the fine sand that has been spread in front of the gate and identify the footprints of each animal that passes through. What they have found is that more giraffes have

moved into the reserve! It is unclear why the giraffes are moving in this unexpected direction, but the increased number of giraffes at Sweetwaters will not be good for the rhino population.

The management of Ol Pejeta Conservancy wants to take down all of the fencing between Sweetwaters and the ranch and replace the fence with a giraffe gate. If they do this, almost all of the wildlife, except for the rhinos, will be able to move freely throughout the whole area. While this is good for the wildlife population, it enlarges the task of the research team. They will need to expand their research areas, and sample and map out the vegetation of the entire area. Keeping track of where the different wildlife populations are will involve more tracking and transects, but could reveal interesting information and give the rhinos more habitat with less competition.

GLOSSARY

biomass: the total mass of living matter within a given unit of environmental area.

browse: to feed on leaves, young shoots and other vegetation.

herbivore: an animal that feeds chiefly on plants.

home range: the area an animal uses to satisfy its normal requirements for food, water, and cover.

midden: a dunghill or refuse heap.

poachers: people who hunt or kill animals illegally.

prehensile: adapted for seizing, grasping, or holding, especially by wrapping around an object.

transect: a line along which researchers gather ecological data.

Intensive studies of all the variables in the mathematical model will have to continue on the Sweetwaters Reserve.

Gatimu and Wahungu's research can help other national parks and private reserves understand and manage their rhino populations. By understanding how much space a rhino needs, what its food preferences are, and what kind of habitat they prefer, these researchers and others can help bring these animals back to Kenya, as well as to other parts of Africa.

FIND OUT MORE

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Web Sites

Five Year Study of Habitat Change at Sweetwaters

<http://www.laikipia.org/sweetwaters-research-project.htm>

Key Words

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Volunteers have joined this project through Earthwatch Institute. Read more about this study and other scientific field research at www.earthwatch.org.



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