Recent translocation of elephant family units from Sweetwaters Rhino Sanctuary to Meru National Park, Kenya

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Abstract

As part of its strategy to conserve and manage Kenya's elephant population, the Kenya Wildlife Service has pursued translocation as one of the management options to address human–elephant conflict by moving identified problem elephants, thus restocking certain elephant ranges and reducing pressure on vegetation as a result of high densities in confined habitats. A total of eight translocations have been undertaken in various elephant ranges in Kenya since 1996 involving 141 individuals with 9.2% mortality recorded. This paper reports on the recent relocation that involved 56 elephants, among them family units.

Résumé

Dans le cadre de sa stratégie pour conserver et gérer la population d'éléphants du Kenya, le Kenya Wildlife Service poursuit les translocations, celles-ci étant une des options de gestion destinées à répondre aux conflits hommes–éléphants en déplaçant les éléphants identifiés comme fauteurs de troubles tout en repeuplant certaines aires de répartition et en réduisant la pression que subit la végétation lorsque de densités fortes d'animaux sont confinées sur des habitats restreints. Au total, huit translocations ont eu lieu dans différentes aires du Kenya depuis 1996, impliquant 141 individus, et pour lesquelles on a rapporté un taux de mortalité de 9,2 %. Cet article fait le rapport de la récente translocation qui a impliqué 56 éléphants, y compris des unités familiales.

Introduction

Elephant numbers in most range states in Africa have continued to show an upward trend since the international ban on ivory trade (CITES 2000). Alongside increasing elephant numbers is the increasing human population that brings with it high demand for land for settlement and economic activities. Consequently elephant habitats are being fragmented, and this has ultimately led to compression of elephant ranges and emergence of isolated habitats, leading in turn to increasingly frequent human–elephant interactions, which in many places have led to serious human–elephant conflicts. This scenario poses two major problems: the need to protect the elephant on one hand and the need to protect human life and property on the other.

To mitigate the conflicts and conserve the elephant, Kenya Wildlife Service (KWS) has initiated a number of conflict-management strategies. Constructing electric fencing and moats, and creating elephant sanctuaries and elephant drives have all been tried to ensure harmonious coexistence between people and wildlife. KWS has adopted translocation as another conflict-management method, preferable to shooting problem animals.

In Sweetwaters, habitat destruction has been caused largely by overconcentration of confined elephants. This situation has been exacerbated by elephants, giraffes, rhinos and other browsers competing for the same forage. Drought in most parts of the country has intensified the competition, forcing wildlife to move out of parks and reserves in search of water and forage. Elephants have moved into adjacent areas, increasing the likelihood of human–elephant conflict. In April 2000, seven problem elephants were moved out to lessen the conflicts.

Sweetwaters Rhino Sanctuary, located on Ol Pejeta Ranch 25 km west of Nanyuki town in northern Kenya, covers an area of 95 km^2. An electric fence completed in 1989 completely encloses it and restricts animals from moving into or out of the reserve. In addition to protecting the black rhino, the fence also enclosed over 100 elephants, causing considerable competition among large mammals for available forage. Habitat quality and quantity, particularly in relation to *Acacia xanthophlea,* have declined over the past decade (Birkett et al. 2000). It was in the face of this habitat degradation that translocation of half the elephants in the sanctuary emerged as a management option. Meru was chosen as a release site because in the 1970s and early 1980s the ecosystem was home to over 2400 elephants (Douglas-Hamilton and Hillman 1976), but rampant poaching during the same period had reduced the population to a mere 306 (Kahumbu et al. 1999).

Historical background of elephant translocations

In early elephant translocations young animals were captured and transported mainly to safari parks, circuses and zoos in Europe and the United States. Although the use of drug immobilization in the 1960s made it possible to capture adult elephants, transportation of such large animals was thought at the time to be fraught with too many problems to be attempted (Pienaar 1967). Because it was difficult to capture breeding herds on foot, initially among the adults only bull elephants were drug immobilized. Using a helicopter in capturing breeding herds was first attempted in September 1966 in Kruger National Park in South Africa, when 27 young elephants below the age of 5 years were captured (Pienaar 1967). In 1976 the management of Kruger National Park began to capture juvenile elephants routinely for translocation to other areas. By 1992, 25 discrete populations of elephants within South Africa, one in Namibia and two in Swaziland had been built up by translocations of 761 juveniles. These translocations provided a useful body of data on the best ways to carry out such movements (Hall-Martin 1992).

However, it was not until 1993 that the first translocation of entire family units was attempted when 670 elephants were saved from starvation in Gonarezhou National Park in Zimbabwe and transported over distances greater than 1000 km, some to other conservation areas in Zimbabwe and others as far as to South Africa. The operation proved that elephant family units could be captured and successfully transported over large distances, providing an alternative to culling as a mode of population management (Dobb 1993; Coetsee 1996). Since then a great number of elephant family units have been translocated for various reasons, ranging from saving populations from collapse (as in Gonarezhou), to building up populations in areas where they had gone extinct (as in areas in South Africa) (Du Toit 1994; Savory 1996), to easing human–wildlife conflict (as in Kenya) (Njumbi et al. 1996).

A history of previous translocations undertaken in Kenya is given in table 1.

The objectives

The translocation from the Sweetwaters Rhino Sanctuary to Meru National Park had four major objectives:

- to resolve human–elephant conflict
- to reduce competition for food with other herbivores
- to reduce habitat destruction resulting from confinement
- to restock Meru National Park

Capture site

The capture site was Sweetwaters Rhino Sanctuary, in an area of low rolling hills, rising gently from an elevation of 1760 to 1820 m above sea level. A permanent river, the Ewaso Nyiro, which flows in a south–northerly direction, bisects the reserve. Other drainage lines in the reserve are only seasonal and run in an east–westerly direction.

The high-altitude sanctuary lies in the rain shadow of Mount Kenya. Rainfall is erratic, generally falling in localized showers produced by the build-up of convective clouds. The mean annual rainfall is about 800 mm, falling in two seasons, the ‘long rains’ from mid-March to June and the ‘short rains’ from November to December. There are also cold, dry spells.

The sanctuary was set up as a protected area for breeding black rhino, a species highly endangered in Kenya. The number of elephants enclosed was found to exceed the carrying capacity and the animals were

Table 1. Previous translocations undertaken, their objectives and results

Translocation	Stated objective	Pre-translocation monitoring	Mov'd (no.)	Mor-tality (no.)	Post-trans-location monitoring	Measure of success
Mwea Nature Reserve to Tsavo East National Park, 1996	• reduce human–elephant conflict by reducing population by 50% • reduce numbers before entire fencing of the reserve	distribution, numbers, age, sex and family structure of the population done	21	5	radio-tracking for one year	no reports of conflict since translocation
Lewa Downs Conservancy to Kora NP, 1997	• reduce habitat destruction/human–elephant conflict • restock Kora National Park	well-known bulls identified by conservancy managers	10	0	ground and aerial monitoring	reduction in *Acacia xanthophlea* destruction; reduced no. of conflict incidents
Mwaluganje to Tsavo East, 1999	• reduce habitat destruction • reduce conflict	individual identification done	29	2	individual identification and ground monitoring	minimized number of conflict inci-dents
Shimba Hills to Tsavo West NP, 2000	• reduce conflict	rogue bulls identified by park managers	4	0	ground monitoring	minimized number of conflict incidents
Laikipia to Meru National Park, 2000	• reduce habitat destruction • reduce conflict	individual identification of problem bulls done	10	0	ground and aerial monitoring	reduced number of human–elephant conflicts
Ongata Rongai to Amboseli NP, 2001	• move stray elephant	not available	1	0	ground monitoring	monitoring con-tinuing by the Amboseli ele-phant research project
Nakuru to Aberdares NP, 2001	• move stray elephants	not available	2	1	ground monitoring	not available
Sweetwaters to Meru National Park, 2001	• reduce habitat destruction • reduce conflict • restock Meru Park	4 months of monitoring, 120 identified, 16 family units and 20 lone bulls; 9 families, 9 bulls totalling 56 elephants selected for translocation	51	5	ground and aerial tracking ongoing	reduced habitat destruction; no conflict inci-dents reported so far
Totals			128	13		

competing with rhinos and giraffes for the available browse. They were also breaking through the electric fence to look for browse outside the sanctuary. This led to human–wildlife conflict. To revert to the optimum carrying capacity some elephants had to be moved out.

Release site

The release site was Meru National Park, located in Meru North District in Eastern Province of Kenya and about 208 km from the capture site. The park covers about 884 km^2 with a further dispersal area that increases animal range to 5500 km^2. The habitat of Meru National Park varies from woodland to open grasslands intersected by permanent rivers fringed with riverine vegetation. It was chosen as the release site because of its large size and because in the 1980s poaching almost wiped the elephants out. Increased security and intelligence surveillance have once again made this range safe for elephants.

Methods

Pre-translocation elephant monitoring

The elephants were monitored daily for four months to identify animals to be moved. They were selected using two criteria: 1) habitual fence breakers and 2) discrete family groups with preference given to small units because they could be relocated all at once.

Individual recognition techniques based on elephant fingerprints (Douglas-Hamilton 1972; Moss and Poole 1983) were used. The unique ear markings of each elephant with other features on the tusks and body helped distinguish one elephant from another. Fence-breaking animals were identified in night patrols along the fence, and any animal near any breakage point, in or out, was identified, with photographs and sketches of ear markings made of all. From the photographs and sketches shown to wardens and rangers the sanctuary authorities were able to identify the notorious fence breakers. Elephants associated with them were also marked for relocation.

When determining which family unit was ideal for translocation, it was necessary to know the entire population. Matriarchs and all other adults were first identified and then catalogued. These identifications were later used to recognize and distinguish family units. The age and sex of all members of each family unit were established. Associations existing among family units in the population were also recorded. Finally, small families and groups were selected for relocation.

During the monitoring exercise, 140 elephants were individually identified in the reserve. They made up 16 family units and groups of 20 lone bulls. Thirty of these elephants were seen only once in the reserve. Identified as ideal for relocation were 56 animals comprising 9 family units and 9 bulls. Among the bulls, 4 problem elephants and 5 others that associated closely with them were identified for relocation. Only one family unit of 5 animals was identified as being a problem.

The pre-translocation monitoring exercise also revealed that during the

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Darted elephants fleeing before they fall.

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A veterinarian takes details of two members of a family awaiting loading.

dry season, the group sizes were small, but as soon as the rains began, many family units merged to form large herds. One time a herd of 56 elephants was recorded. Two family units of 7 each that had been marked for relocation during the dry season showed very close association with each other after the rains. Apart from these changes, all the others continued to maintain their group sizes: three groups of 4 each, three groups of 5 each, and one group of 6.

Darting and monitoring anaesthesia

The translocation operation was carried out in July 2001. A Husky fixed-wing aircraft was used to locate the target elephants, assisted by the ground monitoring team. The Husky crew included the pilot and a spotter, who was a member of the pre-translocation monitoring team and familiar with the area. The helicopter pilot and two veterinarians (the darter and the loader) remained at camp while the rest of the team was directed by the aircraft to a suitable position where they would stand ready. This position, close to the area where the elephants were to be darted, allowed the team to respond quickly after the darting. Quick response is crucial to avert prolonged sternal recumbency or obstruction of the elephant's trunk, which can lead to death.

The elephants were herded to ground that would be suitable for recovery, allowing the helicopter to approach them closely, thus ensuring good dart placement and speedy ground follow-up. Family members were herded together so they would fall as close to one another as possible to facilitate loading.

Adult bulls and cows were immobilized using 18 mg of M99 (etorphine hydrochloride) mixed with 5000 IU of hyaluronidase, the latter to quicken absorption of the drug from the site of deposition. Subadults were darted with 15 mg of M99 mixed with 2500 IU of hyaluronidase and juveniles with 5 mg. One calf that was less than one metre in height was captured manually and immediately tranquillized with 30 mg of azaperone tartarate. Cap-Chur darts with 3-ml barrels and NCL1-3 needles were used to deliver the drugs using the Cap-Chur long-range rifle (Palmer Chemical Co., Atlanta, USA) with .22 green loads.

Bulls were darted and recovered individually. Each immobilized bull was recovered before darting the next one. Members of a family group were darted in

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The capture team turns a bull to lie in better position while he is awaiting loading,

quick succession starting with the matriarch, so that the rest stayed close to her. The other older females were darted next. Small calves were darted last, either from the helicopter or from the ground. Each immobilized elephant was assigned a veterinarian, a technician and a few rangers to monitor it.

Once the animals were down, the ground teams, directed by the helicopter, moved in quickly to ensure each animal was in a suitable lateral position and was in a stable anaesthetic state. Animals lying on their sternum were pushed over onto their side. The trunk was straightened to ensure good breathing.

Darts were removed and the wounds treated by infusing an antibiotic cream into them. A general physical examination was done and any ailment was treated appropriately. All injuries were treated conventionally.

An antibiotic cover of 20,000 mg of a long-acting oxytetracycline preparation was injected intramuscularly at five sites in all adult elephants. Juveniles were given the same antibiotic at reduced dosages.

Biological materials were collected for assessing animal health and for future studies. The sex and age of all animals was determined.

Doxapram (400 mg) was administered intravenously to animals that showed signs of depressed respiration. Membrane stabilizers such as corticosteroids and Flunixin Meglumine were given to animals frothing from the trunk. In recumbent elephants, this frothing, called pink foam syndrome, is a result of lung oedema, caused by high mean arterial pressure in immobilized animals. The high pressure leads to fluid and sometimes blood being forced out of the capillaries into the alveoli of the lungs. The fluid accumulating in the alveoli is pushed out through the trunk as the animal exhales.

Loading, transportation and release

The area around the elephant was cleared using a hand-held power saw. If an elephant fell deep in the bush, a passageway was made using a bulldozer to allow the recovery tractor and trailer to move to the site. Various recovery methods were used depending on the size of the elephant. Older calves that had been darted were lifted with a cargo net or ropes onto the recovery vehicle while the smaller ones that had been physically restrained were walked into the crates. The subadults and adults were roped and rolled over manually onto a conveyor belt on which they were firmly secured. The recovery trailer was tipped backwards towards the elephant, which was then conveyed onto the trailer using a winch system and transported to a suitable loading site.

The older calves, lying on their sides, were transferred manually from the recovery vehicle into small crates. Once inside, the calves were given the reversal agent. The crates were closed and raised manually and gently to an upright position so that the calf was supported on its feet. The crate was then loaded onto the low-loader or Canter truck ready for transportation.

Subadults were directly transferred from the recovery trailer into family crates on low-loader trucks by being pulled from the recovery trailer onto the low-loader and then into the family crate using ropes. Once in the crate, the animal was revived using the appropriate antidote.

Adults were loaded into individual animal recovery crates as follows: The recovery crate was offloaded from the Volvo Hannibal truck and placed on its side by hydraulic lift; its rear and front doors were opened. The recovery trailer carrying the elephant was reversed and tipped backwards towards the open front of the crate. The elephant was manually pulled down the trailer into the crate, the doors of the crate were closed and the animal given the reversal agent. The crate was raised hydraulically to an upright position so that the conscious elephant was supported on its feet. The Volvo Hannibal truck then loaded the crated elephant either onto the truck itself or onto a low-loader truck ready for transportation to the release site. Elephants loaded onto the Hannibal truck were either transported by the truck to the release site or transferred to family crates on the low-loaders.

The elephants were revived using M5050 (diprenorphine) at three or four times the dose of M99 used. It was administered through the middle ear vein. The elephants were also given an intramuscular injection with azaperone tartarate at 120 mg for adults, 80 mg for subadults and 40 mg for juveniles. This drug was administered just before the animals were revived to calm them during transportation.

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A bull is lifted into position for loading.

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The capture team loads an elephant onto a recovery crate.

Five crates were used to transport the elephants: two family crates on the Kenya Army low-loaders, two individual animal crates on the KWS low-loader and Hannibal trucks, and a small crate for calves on the KWS Canter. To minimize stress on the animals, they were transported as soon as possible after crating, and stops were avoided wherever possible.

A veterinarian and a team of rangers escorted the elephants to the release site in case an emergency arose. The problem encountered most commonly was that when the effects of the azaperone wore off, the elephant became violent, banging and shaking the crate. This behaviour could have led to self-inflicted injuries and vehicle instability. To calm such animals again, a low dose of azaperone tartarate was given intramuscularly through an opening in the crate.

At the release site, the trucks were reversed onto an off-loading ramp. For family groups, the doors of the crates were opened at the same time to allow the animals to move out together and join up. Bulls were released one at a time. Once the doors were opened, the elephants were given time to walk out voluntarily.

Results

A total of 56 elephants (9 individual bulls and 9 family groups) were translocated in 12 capture operations conducted over a period of 22 days. Table 2 summarizes the number of elephants captured per day. Five animals died. Four died during transportation: two from lung oedema as manifested by the pink foam syndrome; one of suffocation when it fell in the family crate and its tusks locked into the sliding partition, obstructing its trunk; and the fourth from a pyloric obstruction that was present before immobilization and was exacerbated by capture stress. The fifth, a small calf, lay on its trunk and suffocated before the veterinary team arrived. A calf that lost its mother during release was airlifted to the David Sheldrick Trust for foster motherhood.

Post-release monitoring

Both aerial and ground monitoring are ongoing. Six of the elephants were fitted with conventional radio collars to assist in the aerial monitoring. An initial post-release monitoring report indicates that most of

Table 2. Number of elephants captured at specific dates (2001)

Date	No. in family	No. of bulls	Total
2 July	—	1	1
4 July	—	3	3
6 July	4	—	4
8 July	5	1	6
10 July	5	—	5
12 July	5	1	6
14 July	4	—	4
16 July	6	1	7
18 July	4	—	4
20 July	7	—	7
22 July	5	—	5
24 July	2	2	4
Total	47	9	56

the elephants have settled close to the point of release at park headquarters and range within the Meru ecosystem.

Discussion and conclusion

The small number of recovery crates available was a major problem. Only two were available and therefore no more than two elephants could be recovered at a time. When dealing with the larger family groups, some elephants had to be kept down for a very long time while those already recovered were being transferred to transport crates. The speed of transfer was sometimes slow because some elephants refused to move out of the recovery crate into the transport crate despite being prodded. Some of the elephants that were kept down a long time developed lung oedema, manifested by frothing from the trunk. One of those that died passed the blood-tinged froth of pink foam syndrome. If there had been enough recovery crates so that all the animals could have revived in the shortest time possible, mortality would have been reduced significantly.

The family crates that were available were small, and each could take only two subadults or three juveniles. At least three more recovery crates and three bigger family crates are needed. The system of transferring the elephants into family crates also needs improvement.

We were short of vehicles to transport the veterinary teams to immobilized elephants when family units were darted. The teams had to rely on borrowed vehicles and those of volunteers. The capture team currently has only one serviceable field car. At least two more vehicles are needed for future operations.

The Hannibal truck burst a major hydraulic pipe just after the last three elephants in the operation were immobilized. The vehicle could not move. The pipe had to be dismantled and flown to a workshop in Nanyuki for repair and then brought back to fix the truck. Meanwhile the elephants were kept down for about three hours until the truck was repaired. One of these developed the pink foam syndrome a few minutes before being recovered. Another Hannibal truck is necessary if we are to carry out translocations at the present scale. This would also quicken the recovery of family groups and reduce mortality.

The amount of immobilization drug used during the exercise exceeded the amount anticipated by far. This problem arose because when dealing with family groups, many animals had to be kept immobilized for longer periods than anticipated. Top-up dosages of about a quarter of the immobilizing dosage had to be administered at intervals of about 30 to 40 minutes. In future, a better contingency arrangement should be made for the top-up drug when dealing with family groups.

All the objectives of the translocation were, however, achieved. The population of elephants in the sanctuary was reduced by half. The elephants removed were taken to Meru National Park, a more extensive and suitable habitat. The quality of habitat in the sanctuary is expected to improve drastically over the next decade because of reduced competition among elephants, rhinos and other large mammals. Elephant–human conflict in the surrounding community is expected to be reduced drastically since most of the elephants that broke out of the sanctuary and entered farms were taken away to a habitat where they are less likely to interact with human communities. This will safeguard human life as well as protect the elephants. KWS has a programme of restocking Meru National Park with various species of wildlife, including about 500 elephants, within the next five years. This translocation was a great contribution to the planned restocking.

Because this was the first time that KWS moved elephants in family units, the translocation team faced problems that were new to it but from which it learned valuable lessons. The mortality of 8.9% was attributable to various hazards, as discussed above. The mor tality rate will definitely be reduced significantly with the acquisition of more and better equipment.

The success of the operation is attributable to many factors, among which donor support, good and timely planning, good background research, pre-translocation monitoring, and teamwork stand out.

The importance of translocation for managing wildlife in Kenya is increasing rapidly. Those who have a heart for conservation are urgently requested to give any support that can help equip KWS for present and future translocations. The organization does not have enough money to address all the country's conservation requirements and therefore donor support is greatly needed.

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