ASSESSING THE ETHICAL AND WELFARE IMPLICATIONS OF GAME CAPTURE IN NAMIBIA

BVA OVERSEAS TRAVEL GRANT 2008 REPORT

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INTRODUCTION: GAME CAPTURE IN NAMIBIA

The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) provides the basis for international cooperation in preventing the unsustainable exploitation of wildlife through international trade. Namibia became a party to CITES in 1991. The Ministry of Environment and Tourism (MET) is the agency responsible for the implementation of CITES in Namibia. In the summer of 2008 I spent 6 weeks working in Namibia for the MET game capture team as part of my extra-mural studies.

Wildlife is an important renewable and exploitable natural resource in Namibia (Nuding 2002). Commercial farmers in Namibia have the right to use and benefit from the wildlife on their farms, so long as they comply with conditions imposed by the state (such as the maintenance of game fencing and provision of a permanent water source). Farmers realised that they could benefit from improving conservation of wildlife on their land, and this led to the development of thriving game-farming, tourism and hunting industries. Game-farming contributes to the national economy and the financial viability of individual farms, but requires little financial support from the state. MET also supports wildlife utilisation on communal land through the conservancy system. A conservancy consists of a contiguous group of commercial farms or communal land, managed by a committee with the shared aim of conservation and wildlife utilisation in a sustainable manner. Participating landowners practise both normal farming activities and utilisation of wildlife resources. People living on communal land benefit from the conservancy system because it grants them the right to profit from the wildlife on their land in the same way as commercial farmers. This provides them with an economic incentive to conserve wildlife, and supports sustainable development in rural areas.

Wildlife management may be approached from the point of view of people, or from that of the animal. A people-centred approach focuses on maximising profits, which can result in over-utilisation of wildlife resources. On the other hand, the animal-centred approach demands rights for each individual animal, which clearly is not practicable in the context of species and ecosystem conservation. This apparently dichotomous view is well illustrated with the example of trophy-hunting. Trophy-hunting makes efficient use of the few individuals in the population that are of trophy quality, and generates many times more income for the landowner than other wildlife tourism activities; however, the unlucky animals that are of trophy quality must be sacrificed. It should also be taken into consideration that trophy animals (generally those with the largest horns) are often elderly males, which may be too old to breed and unlikely to survive through the next winter; the removal of such individuals is unlikely to make any significant impact on the viability of the source population, and therefore on conservation. I will not attempt to cover the complex ethical issues surrounding trophy hunting in this report; it is sufficient to say that hunting is ubiquitous in many southern African countries and this situation is unlikely to change in the foreseeable future.

Utilitarian principles suggest that, while the welfare of the individual animal is important, it is less important than the overall conservation of species, populations and ecosystems, and the self-interest of the human participants in conservation. Some degree of animal suffering and even loss of life during a game capture operation may therefore be justified if the overall gain to the human and animal participants from game capture is judged to be great enough. Any reasonable measures which can be taken to reduce the animal welfare costs of game capture should be taken if they can be justified in a cost-benefit analysis. For example, mortality can be markedly reduced during capture of black and white rhino if a dedicated team member (such as a veterinary student) constantly monitors the animal's respiration (Morkel and Kennedy-Benson 2007).

RHINO CAPTURE

Of the five extant species of the family Rhinocerotidae, two species occur in Namibia. The southern white rhino (*Ceratotherium simum*) is now the most numerous of the rhino taxa, but is listed by the IUCN as 'near threatened' because of poaching and the high illegal demand for horn. Black rhino (*Diceros bicornis*) are listed as 'critically endangered' due to large-scale poaching and land clearance for settlement and agriculture. In December 2007 it was estimated that there were 17,480 white rhino and 4,180 black rhino remaining in the wild (IUCN 2008).

During the time I spent with the MET game capture team we captured 16 black rhino and two white rhino. Of the black rhino, eight were transported and held in bomas for auction, five were immobilised for ear-notching and immediately released, two were transported a short distance and released ('field to field' translocation), and one was released because it did not adapt well to the transport crate. The two white rhino were immobilised for ear-notching and immediately released. My report will focus on translocation of black rhino.

MET protocol for black rhino immobilisation and translocation

Capture operations were only conducted when the ambient temperature was lower than 25°C to reduce the risk of hyperthermia and associated physiological stress. A fixed-wing aircraft was used to search for suitable individuals for capture. Animals were darted from a helicopter with 4-5mg etorphine depending on size, 80mg azaperone and 1500 IU hyaluronidase. Induction time varied from 3.5 to 5 minutes for full recumbency. One animal was still standing at 10 minutes and had to be roped down by the ground crew; this was thought to be due to poor dart placement. Total anaesthetic time was between 20 and 30 minutes. A prioritised checklist was prepared (adapted from Morkel and Kennedy-Benson 2007):

- Cover eyes
- Block ears
- Lateral recumbency
- Put ropes on the head and hind leg
- Monitor breathing: respirations per minute and pulse oximetry
- Give nalorphine if necessary (5mg intravenously)
- Take temperature and douse with water if necessary
- Check age by examining teeth
- Remove dart and treat wound
- Examine thoroughly for wounds and treat with antibiotic spray
- Give long-acting tranquillisers

- Give long-acting antibiotics
- Draw blood
- Tip horn
- Implant microchip
- Take body measurements
- Apply acaricide
- Collect parasites and faecal sample
- Check that everything is done and data recorded
- Wake up and walk into crate with diprenorphine and nalorphine

The vet always travelled with the rhino and administered additional sedatives and narcotics (by hand injection through the open top of the crate) as required.

My job was primarily to monitor the anaesthetic and report any changes in respiratory rate and depth or quality of breathing. Nasal oxygen was administered to every animal, using a lubricated hosepipe (attached to a control valve and flow meter on a bottle of oxygen) inserted almost to the level of the larynx. I used a pulse oximeter to record blood oxygenation and pulse rate, and found that a rectal probe pressed against the nasal mucosa gave the most reliable readings. I also monitored the body temperature using a rectal thermometer. Hyperthermic animals (body temperature > 39°C) were doused with water.

Ellie using the pulse oximeter on a white rhino

Rhino Custodianship Scheme

MET policy focuses on establishing new rhino populations in existing parks and reserves as well as on suitable communal land, transferring individual animals to private land for safe keeping by 'rhino custodians', the sale of breeding nuclei to approved buyers, expanding anti-poaching efforts, and generating sustainable revenue for rhino conservation. Under the Rhino Custodianship Scheme, black rhino from suitable donor populations are translocated by MET's game capture team onto approved private farmland and communal conservancies. Rhinos on custodianship farms are individually identified by ear notches and constantly monitored.

I was involved in the translocation of one black rhino under the custodianship scheme: a six year old male rhino had broken through the fence of its custodianship farm (a privately owned tourism and hunting lodge) and escaped onto neighbouring farmland. MET was notified quickly of its escape because the rhino was fitted with a radio transmitter and the landowners tracked it daily. We were concerned about the risk from poachers while the rhino was at large on the neighbouring farm, so the game capture team responded immediately. With the help of the spotter plane and the radio transmitter the rhino was located next to a fence line, and was darted from the helicopter with 4mg etorphine, 80mg azaperone, and 2500 IU hyaluronidase. Induction time was 3.5 minutes. The rhino was examined for wounds and was found to be in good condition. The antidote of 60mg nalorphine and 1.5mg diprenorphine was given intravenously into the ear vein, and the rhino was loaded into a crate with the aid of an electric prodder. Total anaesthetic time was 23 minutes. After a short journey the rhino was offloaded uneventfully next to a waterhole in the custodianship farm. I met the landowners at a game auction several weeks later, and heard that they were tracking the rhino daily and that he had made no further attempts to break through the fence.

Sale of black rhino to South Africa

MET holds a high-value species game auction every two years to raise funds for conservation and community development. In 2008, MET decided to sell eight black rhino to foreign buyers; these were taken from two donor populations, one on a custodianship farm, and one in Etosha National Park. The rhino were transported to specially-constructed bomas in Waterberg Plateau National Park, where they were boma-trained by Alison Kennedy-Benson. The rhino included three males aged 6 years, 6.5 years and 15 years, and 5 females aged 4.5 years, 5 years, 5.5 years, 6 years and 8 years. All of the black rhino were sold to a South African farmer for N$500,000 each.

A three year old male was captured and loaded into a crate, but was found to be 'dog-sitting' (hind legs in a rigid, squatting position, which must be resolved quickly to avoid irreversible muscle damage) and not settling well, so it was decided to release him rather than risk further problems during transport. It is very likely that significant welfare problems would have developed if the capture team had decided to persevere with transporting this rhino (Radcliffe and Morkel 2007).

Risk factors for morbidity and mortality in black rhino capture

Capture related stress is reported to be a significant factor in field immobilisation of black rhino, resulting in morbidity and mortality in the post-capture period. The most critical factor in reducing stress during rhino capture is rapid immobilisation using high doses of opioids in combination with hyaluronidase (Radcliffe and Morkel 2007). Unfortunately, severe respiratory compromise with hypoxaemia, hypercapnia and acidosis are more likely to occur in field conditions where high doses of opioids are used to shorted induction times. Respiratory depression is the most significant life-threatening complication encountered during routine rhino anaesthesia (Bush 2005). This is because of the ventilation-perfusion mismatch and cardiopulmonary depression that occur when the heavy abdominal contents press on the diaphragm during recumbency.

There is some debate over whether it is best to maintain rhino in sternal or lateral recumbency during anaesthesia. For many years it was standard practice to move animals into sternal recumbency because of improved respiratory function in this position. However, it has been found that sternal recumbency is a significant risk factor for myopathy as a result of the occlusion of blood supply to the limbs, although this is uncommon. Consequently, it is now recommended that rhino be maintained in lateral recumbency and that the legs should be physically 'pumped' up and down every twenty minutes to improve blood flow to the limbs. It is thought that any slight disadvantages in terms of reduced gaseous exchange in the lungs are far outweighed by the reduced risk of muscle damage (Morkel and Kennedy-Benson 2007).

I encountered no significant welfare issues during rhino capture with MET, and saw no immediate post-capture morbidity or mortality amongst captured rhino. In my opinion this was because of a very well-organised and experienced capture team, rather than any particular piece of equipment or drug used during the capture efforts.

BUFFALO CAPTURE

42 African buffalo (*Syncerus caffer*) were captured from Waterberg Plateau National Park to be auctioned for export. These were darted using a combination of etorphine, azaperone and hyaluronidase, loaded into crates and given diprenorphine as an antidote, then transported and offloaded into bomas. The first group of buffalo were chased with the helicopter into a temporary boma and darted over the top of the sails. The remaining animals were darted from the helicopter. The animals were approached by the ground crew as soon as the situation was judged to be safe (the spotter plane continually circled overhead to monitor the position of the rest of the herd). Each buffalo was immediately moved into sternal recumbency, blindfolded, and two people held up the head to reduce the risk of regurgitation of rumen contents.

I monitored respiration and rectal temperature, helped to collect blood samples and wrote down skin thicknesses for tuberculin testing. Animals with rectal temperature >39°C were doused with water. Every animal was fitted with a numbered ear tag and microchipped for identification. Age was estimated by dental examination. All were given long-acting antibiotics. Older animals were given the long-acting tranquilliser perphenazine enanthate to facilitate adaptation to the bomas. Animals which had been chased for a long way by the helicopter before going down were given the anti-inflammatory finadyne megalumine.

Blood samples were collected from the jugular vein and sent to a laboratory for testing for corridor disease (*Theileria parva lawrencei*), brucellosis and foot and mouth disease. Tuberculin skin testing was also carried out; we darted all the animals again in the boma 72 hours later so that the tests could be read. All animals were negative for all diseases.

Despite capturing so many animals over a short time period, I saw no morbidity or mortality amongst the buffalo. This was in marked contrast to previous capture efforts carried out several years ago in Waterberg Plateau National Park, where mortality during buffalo capture exceeded 10% (Pierre du Preez, personal communication).

Ellie and Mark Jago measuring skin thickness for TB testing of African buffalo

SABLE ANTELOPE CAPTURE

12 sable antelope (*Hippotragus niger*) were captured for auction. These were darted individually from a helicopter using etorphine, azaperone and hyaluronidase, loaded into crates and given naltrexone as an antidote before being transported to the bomas. All animals were blindfolded, microchipped, fitted with a numbered ear tag, treated with a pour-on anthelmintic, and given long-acting antibiotics and the long-acting tranquilliser zuclopenthixol acetate. Two further animals were caught and released, one because it was found to be too old to be sold as a breeding animal, and the other because its rectal temperature exceeded 41°C.

Sable antelope in the boma

BLACK-FACED IMPALA CAPTURE

111 black-faced impala (*Aepyceros melampus petersi*) were captured for auction. Black-faced impala are an endangered subspecies of the common impala (*A. m. melampus*), differing in body size, colouration, facial markings and habitat. They are endemic to a small region in north-western Namibia and south-western Angola.

The animals were herded into a large temporary boma by helicopter, and then directed up a ramp and into a lorry. Impala have been known to panic at this point and leap straight up, ~~at this point,~~ breaking their necks on the roof of the lorry, but this did not happen on this occasion (M. Jago, personal communication). However, we began to encounter problems when we came to unload the animals into the boma. The impala were captured from Etosha National Park, which marks the southern boundary of a foot and mouth disease surveillance zone ~~(see fig. 1)~~; in order to auction the animals for sale anywhere in Namibia they needed to be certified free from foot and mouth disease, which required that a blood sample be taken.

Animals were unloaded from the truck in groups of 10 and trapped in a narrow corridor. Several members of the game capture team then entered the corridor and physically restrained the animals so that the vet and I could take blood samples, fit ear tags and microchips, and treat them with a pour-on anthelmintic.

Physical restraint of a black-faced impala

Capture and handling is one of the most stressful events that happen to wild ungulates and is sometimes associated with considerable mortality (Montané *et al.* 2003). When attempts were made to handle the impala trapped in the corridor, the animals panicked and injured themselves by trying to escape. This process was repeated for all 111 animals over two days, and was very distressing to be involved in; unfortunately every animal had to be physically restrained to obtain a blood sample, and there seems to be no welfare-friendly way of doing this. We considered releasing them into the boma and then darting them individually, but this would have been inefficient and uneconomical in terms of time and the cost of drugs.

One animal was found to have an old open fracture of the carpus which undoubtably occurred several days before capture. This animal was euthanased immediately. Unfortunately, after the impala were released into the boma it quickly became clear that several animals were severely lame in a hind limb, (probably due to rupture of the gastrocnemius muscle during handling) and eventually 10 animals were euthanased on welfare grounds.

This was the only part of the MET game capture operation where I encountered significant welfare issues. In total, 11 animals (10% of total) were euthanased in the immediate post-capture period.

CONCLUSION

Is it necessary for UK vet students to pay large sums of money to participate in 'game capture' courses based in South African private game reserves?[1] Conversations with students at Cambridge who have attended such courses reveal that practical experience of darting and anaesthetic monitoring generally involves darting individual wild animals for medical treatment (for example, a female bushbuck with conjunctivitis), or simply selecting a random individual to capture in order to demonstrate the technique. There are clear ethical problems with such practices: in my opinion, the welfare costs paid by the selected animal that is darted are not outweighed by the benefits of the experience to the students. But how else can we gain experience with charismatic wildlife species outside of a zoo setting? My personal opinion after taking part in 'real life' game capture with the Namibian Ministry of Environment and Tourism (MET) Game Capture Team is that such 'game capture' courses are justified neither on welfare nor on ethical grounds, but that there is a viable alternative.

Vet students on extra-mural studies can play an important role in 'real life' game capture if they are prepared to work as part of the capture team and the vet is willing to teach them. Students in their clinical years can be trusted to monitor a recumbent animal's respiration and temperature consistently throughout the immobilisation period, providing regular verbal reports and immediately alerting the vet to potential anaesthetic problems or changes in the animal's condition. This is especially important during rhino capture, because of the relatively high incidence of respiratory compromise in these species (Morkel and Kennedy-Benson 2007). Just as in the UK, students can help the vet by collecting data such as skin thicknesses for TB testing, and we can also collate and analyse anaesthetic data which may influence future capture operations.

Unfortunately, the number of vet students willing to make the effort to find a placement with a government agency or private game capture operation (and indeed the number of game capture vets willing to take on and teach such students, and the intrinsic limitations of any wildlife management programme) will always fall far short of the demand for 'game capture' courses as an addition to EMS for clinical students. However, for the small number of students who are keen to make a career of wildlife management and game capture, vets like Mark Jago with MET and the game capture externships offered by the South African National Parks Board offer unparalleled opportunities for us to contribute to 'real life' *in situ* conservation and management efforts. In conclusion, I believe that vet students can be a valuable part of the 'real life' capture team and hence play a vital role in the conservation of threatened wildlife.

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[1] In this report I have emphasised the distinction between 'game capture' courses as opposed to 'real life' game capture. In the first case I am referring to commercial operations aimed at vet students in which capture is generally of individual animals for demonstration purposes, and is rarely of any great benefit to conservation. I contrast this with 'real life' game capture, which is a fundamental part of wildlife management programmes and endangered species conservation, carried out by government agencies or private teams. 'Real life' game capture happens regardless of any vet students who might be present, and is certainly not carried out for their benefit.

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