



THE BIG SNIP

In 2011 a team of vets from South Africa and the US carried out pioneering keyhole surgery to vasectomise 14 wild elephant bulls on a private game reserve in South Africa's Limpopo province. The surgeons, from the NGO The Elephant Population Management Program, performed the ground-breaking procedures to help curb the reserve's escalating elephant numbers. Wildlife photographers **Steve and Ann Toon** witnessed three of the operations. ▶



LEFT Sedated, a wild elephant bull is suspended from a crane and manoeuvred into position for a laparoscopic vasectomy. The operation was one of 14 carried out in 2011 by surgeons from the Elephant Population Management Program.

BELOW Working in teams on either side of the elephant, veterinary surgeons from South Africa and the US perform the 'keyhole' procedure.

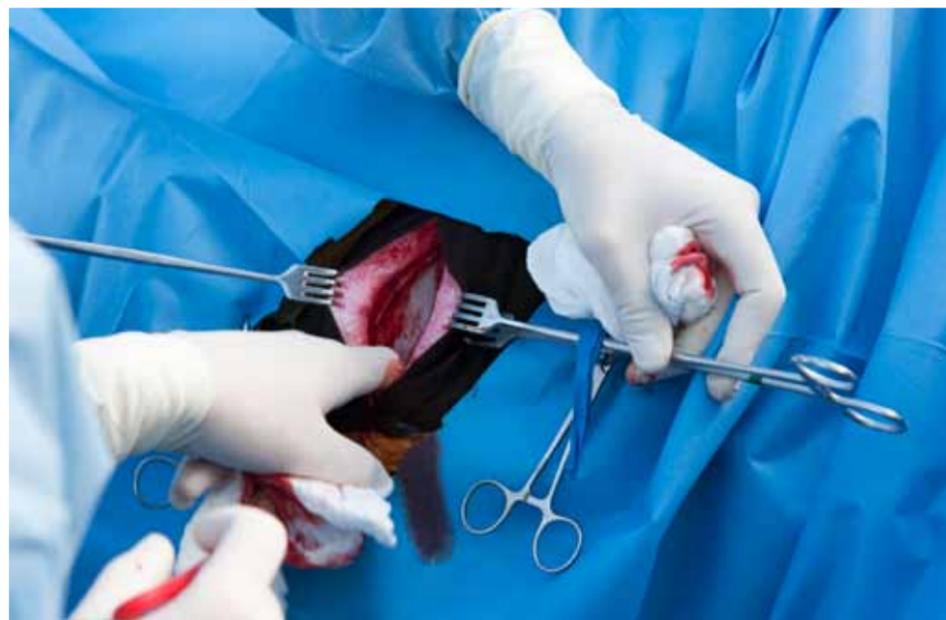
BOTTOM After cutting through 40 centimetres of skin, fat and muscle, the vets have an opening through which the vasectomy can be performed.



ABOVE The bull remains under anaesthetic during the procedure, and is carefully monitored throughout.

LEFT The elephant, sporting stitches on his sides, is brought out of anaesthetic. All 14 bulls survived the operation, an encouraging success rate.

BELOW Exit one *vas deferens*. The use of vasectomies to manage elephant populations is not embraced by all elephant conservationists, as comments overleaf show.



Setting up a complete mobile operating theatre to work on the world's largest land mammal in the middle of the bush is no mean feat. Unlike most other mammals, an elephant's testes are inside its body, so performing a vasectomy on a huge bull requires complex, invasive surgery. Each elephant first had to be darted from a helicopter by an expert game capture team, then suspended from a huge crane and manoeuvred to the 'operating table'.

The surgical team, dressed in scrubs and operating gowns, used specially developed 1.4-metre-long fiberoptic laparoscopes to cut through the five centimetres of skin, 10 centimetres of fat and 25 centimetres of muscle that covered each of their oversized patients. Images from inside the elephant were then relayed to the surgeons working on either side of the animal's body, via wraparound goggles and a computer screen. All 14 operations were successful – the elephants regained consciousness immediately after the 90-minute procedure and walked off into the bush. Although no longer able to impregnate females, they should still be able to go into musth and mate.

The US veterinarians who pioneered the specialist anaesthetic and surgical techniques used these operations to train a team of South African vets, headed by Dr Johan Marais from the University of Pretoria, who are now able to perform the procedure where required.



WHAT THE EXPERTS SAY

The sterilisation of elephant bulls is heralded in some quarters as a possible solution to the growing problem of overpopulation in a number of southern African reserves. Although scientific solutions, including vasectomies and immunocontraception, are controversial, they are seen by many conservationists as a preferable alternative to culling. We asked some of the world's leading elephant experts: 'Can elephant vasectomies play a meaningful role in elephant conservation and management?'

Dr Mark Stetter, Director of Animal Operations, Disney's Animal Kingdom.

Stetter, who helped to pioneer the wild elephant vasectomy technique, is president of the Elephant Population Management Program, the NGO that carried out the recent vasectomies in South Africa.



'Absolutely! There are many public and private reserves that are struggling with elephant population management. Many wildlife managers feel that they must choose between removing elephants or facing habitat destruction and the associated loss of biodiversity. Culling and translocations have been used traditionally in South Africa, but many managers would prefer not to cull these wonderful animals. However, there are really very few places left to move elephants. The Elephant Population Management Program has successfully used this procedure to manage populations of the animals in eight reserves and parks in southern Africa.

'Only a small percentage of the elephant population needs to be handled (just the dominant bulls) and it is a one-time relatively quick procedure. Most importantly, it does not change the natural social and breeding behaviours of the bulls, which are merely unable to impregnate a female. After several years of development, elephant vasectomies can efficiently be carried out on multiple animals in a single day. A group of South African veterinarians is now fully trained to do these procedures with equipment and supplies housed at the University of Pretoria's Faculty of Veterinary Science in Onderstepoort. This programme is a realistic management tool in reserves that contain elephant populations of fewer than 1 000 individuals.'

Dr Johan Marais, Faculty of Veterinary Science, Onderstepoort, University of Pretoria.

Marais is one of the South African vets trained to perform an elephant vasectomy. 'While I believe the elephant vasectomy programme is highly suited to many smaller South African reserves, larger reserves can also benefit if a reduced elephant population growth rate is needed. This once-off invasive procedure targets a small percentage of the population, as opposed to the PzP vaccine, which requires yearly management of the herds, with obvious costs involved.



'The vasectomy technique has been used very successfully in the past few years and minimal side effects have been observed. While it is just one of the methods currently being employed in elephant population management, it is very effective and can dramatically reduce the need to control numbers by culling and/or translocation.'

Professor Rudi van Aarde, Professor of Zoology and chairman of the Conservation Ecology Research Unit, University of Pretoria.



'The answer is simple: no.

Vasectomies do not and cannot make a contribution to the conservation and management of free-ranging elephants. The method may be of use in captive elephants, but other less invasive and more cost-effective approaches can be employed to reduce breeding rates. There is no scientific foundation for vasectomy as a tool in conservation management because the breeding rate is not a function of individual bull fertility.'

Dr George Wittemyer, Assistant Professor, Department of Fish, Wildlife, and Conservation Biology, Colorado State University.



'Vasectomies can be used effectively to limit growth in very small populations on lands (typically private) where someone has a lot of money to spend, so the procedure has management relevance in a limited context. However, these populations are typically of little conservation importance in terms of the species. Vasectomies are not useful for larger elephant populations that are of conservation relevance, so the procedure is of little if any importance to conservation for elephants.'

Dr Heinz Kohrs, founding trustee, Space for Elephants Foundation.



'No. However, in confined spaces and especially where the perception exists that elephants cause irreversible habitat destruction and loss of biodiversity, vasectomies may buy time for better understanding and solutions to come about.'

Dr Iain Douglas-Hamilton, elephant conservation guru and founder of Save the Elephants.



'Vasectomies could be useful in very small populations where there are a small number of known males and it is desired to sterilise them. However, I personally like to see this sort of interference in elephants' lives kept to an absolute minimum and used only when no other alternatives are possible.'

Dr Henk Bertschinger, elephant reproductive specialist, University of Pretoria.



'For practical purposes, an elephant vasectomy is not reversible. What will the reserve management do after 10 years or so when they want some cows to bear calves? Will they introduce another bull at great cost (bearing in mind that all the cows are likely to fall pregnant if that is done, and that's hardly controlled fertility)? Also, are they going to vasectomise the younger bulls that are entering puberty and leaving their natal herd? If they do not, inbreeding is very likely to follow.

'If one wants to target elephant bulls rather than cows there is probably a simpler approach – that of immunocastration. Since 2003, we have been using a GnRH vaccine in elephant bulls to suppress testosterone secretion and thus sex-related behaviours such as aggression and musth. Used correctly, the vaccine has proved successful in over 35 captive and free-ranging bulls. We are now researching its effect on the fertility of treated bulls. If successful, this will offer a cheap (roughly R100 per treatment) method of treating bulls for contraception which, like immunocontraception of cows, can be delivered remotely.'

Dr Markus Hofmeyr, Head, Veterinary Wildlife Services, SANParks.



'As field veterinarians, the project has given us significant insights into keeping elephants anaesthetised and the parameters that surround this procedure – lessons we can apply directly to capture and translocation, or to other procedures involving free-ranging elephants. The fact that vasectomies can now be performed in the field adds to the toolbox that is available to managers when they want to influence elephant population growth or breeding rates.

'It must, however, be stressed that elephant vasectomy is suitable only for smaller, fenced populations where 2–10 bulls are present. The verdict is still out as to whether it will have any impact in places where only some bulls (even the dominant ones) are vasectomised, and if breeding will indeed be stopped by the procedure. Experiments need to run over a number of years due to the long inter-calving periods experienced by elephants. For populations other than the small confined ones with only a few bulls, vasectomy may not be a viable tool and therefore it has limited value for management in such areas.'

Dr Jay Kirkpatrick, Director, The Science and Conservation Center, ZooMontana, and pioneer of elephant immunocontraception.



'Perhaps, but marginally. In general, fertility control of males, in any form, does not lend itself to effective wildlife fertility control. The idea of the vasectomy is based on the supposition that virtually all the breeding is done by a limited number of males and, if you choose the right individuals, you can reduce the reproductive rate. With elephants, it might be viable in fenced game parks where there is some assurance that every male is vasectomised, but in large free-ranging populations I fear there are too many males out there. In fact, if one male is doing all the breeding, the genetic consequences of male sterilisation are significant. Female contraception provides more genetic flexibility for the manager.

'One last reservation is the stress and expense of capturing animals. It is now recognised that one of the most important characteristics of a truly successful fertility control approach in wildlife is remote delivery, with no capturing of animals. The role of fertility control, in any form, has a serious role in conservation if culling is the looming alternative. Sterilisation, as opposed to contraception, has a lesser role in conservation, because of the resultant permanent loss of genes in the population.'

Audrey Delsink, Behavioural Ecologist and Head of Research, Humane Society International, working on elephant immunocontraception at Makalali Private Game Reserve, South Africa.



'Elephant management is a complex issue where there's no "one size fits all" policy. Due to its invasive nature, large ground crew and skilled surgery team, vasectomies performed for the purposes of slowing down growth are only suited to small- to medium-sized parks with a handful of bulls.

'Although dominant bulls are believed to sire approximately 90 per cent of offspring, there are possibilities for "sneak breedings" from younger males. The theory behind this practice is that dominant bulls retain their dominant behaviour (going into musth, for example) because their testes have not been removed; they are simply unable to impregnate a female. But there is a gap in our knowledge – we don't actually know if retaining the dominant behaviours will be sufficient to prevent breeding by other males.

'If all bulls capable of breeding are treated, then the population is basically rendered demographically and genetically extinct – dangerous if disaster, such as disease, should strike and wipe out the population. I disagree with vasectomising every breeding capable bull, as I believe that reproductive fertility control should be flexible and allow for flux within the population and ecosystem. Ecosystems are not static, and we should not be trying to revert to some theoretical "benchmark" of the ideal.'