

PRIVATE GAME

ISSUE 1 | JULY 2020

Bigger Picture
TAKE STOCK!

Corona pandemic
and future ecotourism

Mate choice!
WHITE RHINO

Game meat
phased approach

Diversifying

CONSERVATION FUNDING

will increase resilience to future shocks



R65.00 (VAT EXCL)

OPINION! The meaning of custodianship in environmental law

Private Rhino Conservation

DIVERSE STRATEGIES
ADOPTED IN RESPONSE
TO THE
POACHING CRISIS

by Hayley S. Clements, Mike Knight,
Pelham Jones, and Dave Balfour
Photos © Quintus Strauss

White rhinoceros or
square-lipped rhinoceros
(*Ceratotherium simum*).

Towards the end of 2018 private landowners in South Africa conserved roughly 40% of white rhinos globally and that figure may be closer to 50% in mid-2020. For the past decade these rhino owners, together with their counterparts in formal state conservation, have battled a ten- to twenty-fold increase in poaching activity. The levels of poaching have been such that scientists have warned of the risks of extinction within decades if current trends are continued.

Despite these concerns, and until recently, there has not been a nationwide assessment of trends in how private rhino owners are responding to the poaching crisis and whether the financial benefits from rhino ecotourism, trophy hunting and live sales remain sufficient to offset increased security costs and financial risks arising from keeping rhino.



Understanding that private landowner involvement in conservation in South Africa has different motivations, and in an attempt to better understand how many rhinos there are in private hands in the country as well as to understand the responses and attitudes of their owners, a countrywide survey of around 300 properties was undertaken in 2015, and repeated in 2018, under the banner of the Private Rhino Owners Association (PROA). This work has provided us with useful insights, some of which have now been published in scientific literature.



Dr Hayley S. Clements is an interdisciplinary conservation scientist who is interested in applying social-ecological systems thinking to identify resilient and equitable conservation opportunities in a changing world. Her PhD at the University of Cape Town (South Africa) assessed the social-ecological drivers of private land conservation in South Africa.

@ clementshayley@gmail.com



Dr Mike Knight trained as a wildlife ecologist and has spent most of his career within South African National Parks. Involved in rhino conservation for the past 20 years, Mike has been chairman of the SADC Rhino Management Group (RMG) before and is now chairman of the IUCN SSC African Rhino Specialist Group (AfrSG) since 2011.

@ M.Knight@nmmu.ac.za



Chairman of the Private Rhino Owners Association (PROA), Pelham Jones has over 30 years' conservation experience and is a private reserve and rhino owner. He is a member of the IUCN SSC AfrSG and the SADC RMG. In September 2009, PROA was established under his guidance and today it is recognised as a national body to lobby for and co-ordinate assistance to private reserves faced with poaching pressure.

@ pelham@vibe.co.za



Dr Dave Balfour is an ecologist with 25 years' experience researching, planning, and managing protected areas in South Africa. He is a member of the IUCN SSC AfrSG and the IUCN African Elephant Specialist Group. He is the Chair of the SADC Rhino Management Group (RMG) and a member of the team conducting the current Red List assessment of the African Elephant.

@ environi@mweb.co.za

Scan the QR code or visit dx.doi.org/10.1111/conl.12741 to access the full report, 'Private rhino conservation: Diverse strategies adopted in response to the poaching crisis', Hayley S. Clements, Mike Knight, Pelham Jones, Dave Balfour. First published: 15 June 2020.





Here we share some of what we have learnt.

Rhino numbers

On the question of how many white rhinos there are in private hands in South Africa and how that compares to the total number in the country, the pattern is clearly illustrated in Figure 1.



Owner responses

The analyses of the survey results showed there are three distinct groups of responses of private rhino owners to the poaching pandemic. Based on the responses we labelled these owners as follows:

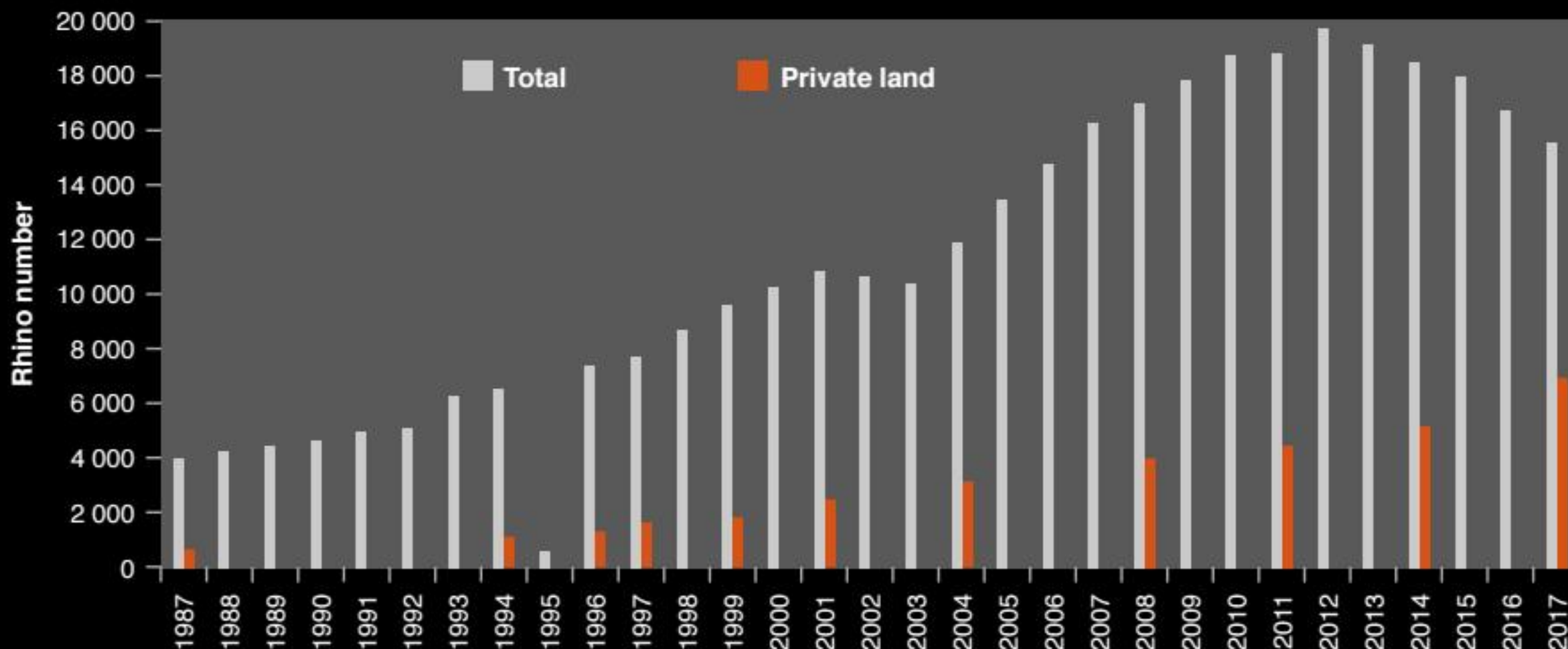
- 1** **'dis-investors'** who are selling their rhino to reduce their risk exposure,
- 2** **'business-as-usual'** group who are seeking to continue operating pretty much as they have been doing,
- 3** **'investors'** who are actively buying rhino and increasing their populations.

The survey shows the largest group is those engaging in business-as-usual, who represent 57% of the total and interestingly they are also largely those pursuing ecotourism. The dis-investors is the second largest group representing 28% of rhino owners and 15% are investing in more rhinos.



All groups had responded by increasing security costs (>ZAR1.5 million/property on average in 2017).

Figure 1



Source: Emslie 2018 and PROA



Dehorning as a costly security measure. Regardless of whether private rhino owners are already opting out, investing or continuing as usual, many are experiencing rising costs. The majority support legalising international horn trade to equilibrate the cost-benefit ratio.

Group attitudes

Most rhino owners support the legalisation of horn trade as well as the intensification of rhino management and many would participate in both these activities (see Table below).

Characteristic	Dis-investors	BAU*	Investors
Average security costs (in 2014 in ZAR1 000)	598	143	366
In support of legal trophy hunting (%)	85	49	93
In support of legal horn trade (%)	93	77	93
In support of intensification (%)	75	69	79
Participate in legal trophy hunting (%)	30	13	33
Would participate in legal horn trade (%)	86	70	100
Would participate in intensification (%)	46	29	60

* BAU – Business-as-Usual

Policy implications

Enabling private rhino ownership has diversified rhino conservation options in South Africa, and Figure 1 suggests a growing reliance on private land for white rhino conservation. However, regardless of whether private rhino owners are already opting out, investing or continuing as usual, many are experiencing rising costs, and there is uncertainty around the resilience of rhino conservation on private land into the future.

The findings of the survey highlight a global need for policies on wildlife to keep pace with dynamic socio-economic changes (e.g. increased illegal trade, changing market dynamics, an increasing anti-hunting lobby, local institutional contexts, global economic shocks such as that caused by the SARS-CoV-2 pandemic), amidst criticism that international policies such as CITES are misaligned with national-level strategies for conserving wildlife.

From this work, we have identified two key policy considerations.

Firstly

Firstly, theory suggests there is a generally positive relationship between the diversity of elements in a system and system resilience. For example, in more diverse ecosystems, it is less likely that disturbance that causes species losses will cause the loss of entire ecosystem functions, due to diversity in species' responses to the disturbance. It can be hypothesised that the involvement of private landowners in rhino conservation increases South Africa's resilience to the poaching crisis (i.e. the country's capacity to conserve rhinos in the face of poaching), and that this increased resilience is achieved by increasing the extent of rhino habitat, doubling the number of rhinos, and through the diverse responses of individual rhino owners to a crisis (in this case poaching),

which may increase the likelihood of at least one response strategy (in this case dis-invest, business-as-usual, invest) contributing to conserving rhinos.

It will however be important to track these insights and to understand how the situation changes over time and with changing circumstances. This means that effective monitoring should be put in place so that decision-makers are in a position to understand these changes.

Secondly

Secondly, with the levels of support for legal trade in rhino horn, there is clearly a need to continuously adapt and align international and national policies to incentivise rhino management in a manner that advances the conservation of the species. Equally it is necessary to seek to avoid introducing perverse policy incentives that lead to forms of rhino management that are detrimental to their conservation, including the complete disinvestment in rhino.

Conclusion

The information received from the survey among private rhino reserves in **2015** and **2018** illustrate the challenges and expectations of private owners. This data in turn is essential when discussing policy both within South Africa and the CITES community. The past assistance by private rhino reserves in supplying this sensitive and confidential data must be recognised. ■

ACKNOWLEDGEMENTS AND DATA

The collection and collation of the PROA members' data was undertaken by Dave Balfour and supported by the Department of Environmental Affairs, South Africa (2015) and the IUCN (2018). Hayley S. Clements was funded by a Claude Leon Postdoctoral Fellowship and a Jennifer Ward Oppenheimer Research Grant. Data can be requested from PROA (not open-access due to data sensitivity). Research was approved by Stellenbosch University Human Research Ethics Committee, reference 11333.

PROA thanks all members that participated in the survey and strongly encourages all owners to participate in future surveys.



@ info@rhinoalive.com
www.rhinoalive.com



White rhinoceros
or square-lipped
rhinoceros
(*Ceratotherium
simum*).



MATE CHOICE!

**Mate choice, reproductive success and
inbreeding in white rhinoceros: New insights
for conservation management**

By Dr Petra Kretzschmar
Photos courtesy Thaba Tholo Game Farm



years ago, William Conway, a pioneer in conservation breeding, noted that breeding farms and ranches will be needed to provide sufficient land for conservation of species (De Wildt et al, 2019). Today, we are in a period of mass extinction. The survival of many species, especially that of large herbivores in Africa, is threatened by poaching, habitat loss and resource competition with livestock. As a consequence, the available land for conservation is scarce and many species are isolated in islands of protected areas, which are only fractions of their historical range (Ripple et al, 2015).

Game farms, which are large enough to sustain herbivore populations such as African rhinos, are therefore becoming more important for the protection of these highly endangered species. Currently they hold nearly half of the South African rhino population and have higher budgets for their protection than state-owned conservation areas. In the near future they may even become the last refuges for the species.

However, **the conservation of isolated rhino populations is challenging.** Currently the poaching crisis is the main threat for the survival of the African rhinos. Every year hundreds of individuals are slaughtered for their horn and the protection against poachers costs a fortune. Yet, there is another threat to the survival of the rhinos that has so far been neglected – the low genetic diversity of the species and the risk of a further reduction in diversity due to inbreeding.

“There is a threat to the survival of the rhinos that has so far been neglected.”



Dr Petra Kretzschmar

Research fields and interests

I am working with free-ranging and captive African and Asian rhinos on private game farms in South Africa as well as in a national wildlife reserve in Asia. My work involves research as well as dialogues with politicians, NGOs and the industry. My research interests include mate choice, territorial behaviour, habitat use, conservation of endangered species, habitat restoration and captive breeding.

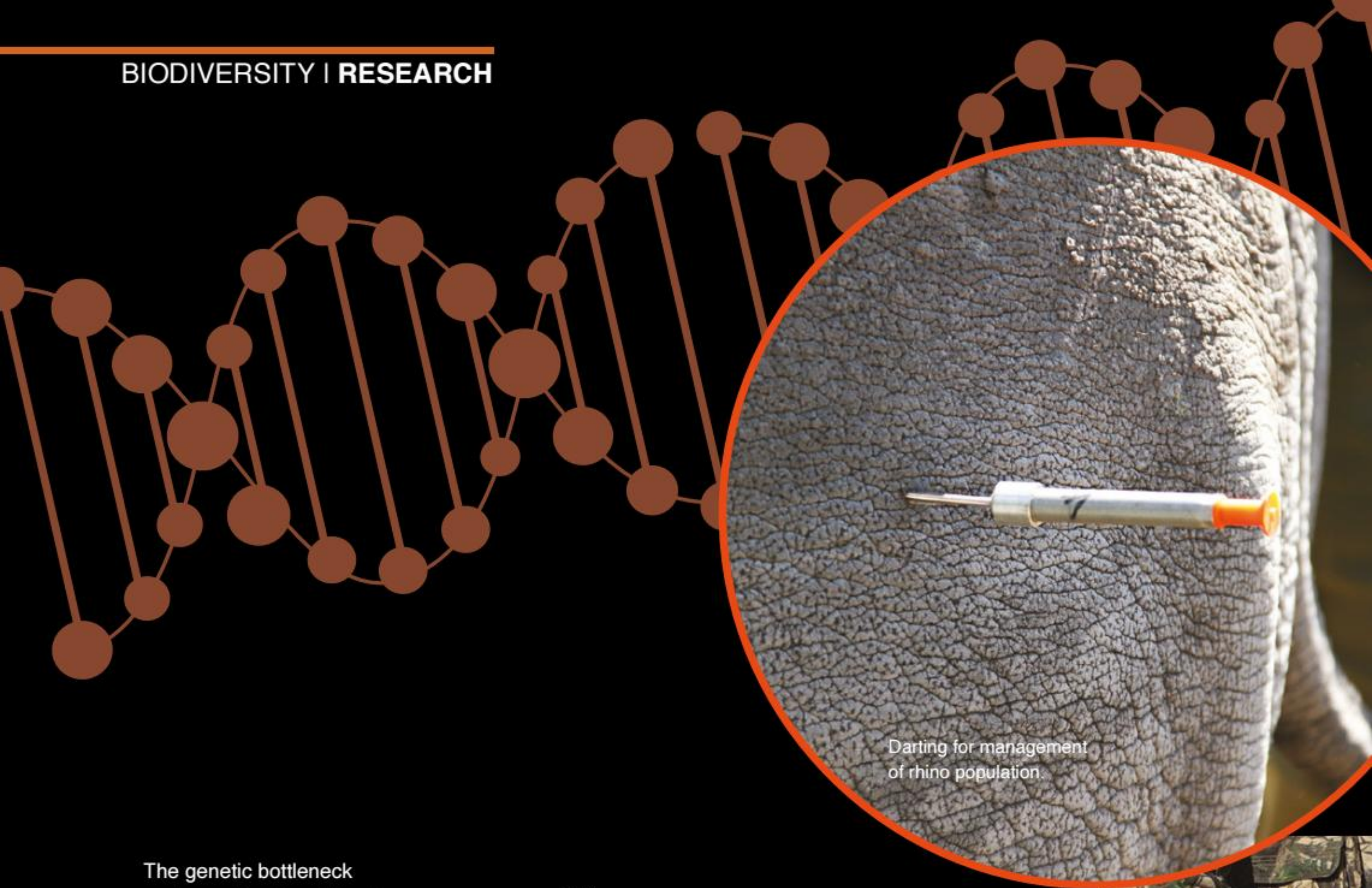
Dr Petra Kretzschmar Scientist at the Leibniz Institute for Zoo and Wildlife Research in the Department of Evolutionary Ecology

Director of the Rhino & Forest Fund

Member of the IUCN Asian Rhino Specialist Group

Sabah Rhino Project Coordinator

@ kretzschmar@izw-berlin.de



The genetic bottleneck experienced by the white rhinoceros during the colonial period and several population crashes in prehistoric times (Moodley *et al*, 2018) lead to the fact that the white rhinoceros has a much lower genetic variability than any other rhinoceros species (Guerier *et al*, 2012). Inbreeding depression, such as juvenile mortality and abortions, have not been described in white rhinos yet. However, it is likely that a further reduction in the genetic variability of the species will result in reproductive problems, which are known from many other species, including various ungulates (Ralls *et al*, 2008).

In addition to these rather short-term problems, the rhino may also lose its adaptive flexibility (Ralls *et al* 1979; Frankham *et al*, 2002; Giglio *et al*, 2016)

“One of the major challenges for the preservation of the white rhino is therefore to identify the risks that individual rhino populations are facing and to minimise these risks by managing interventions.”

and may thus not be able to adapt to changing environmental variables, such as climate change or new emerging diseases.

This leads me to my study on the mating behaviour of the white rhinoceros at the Thaba Tholo Game Reserve in South Africa.





The aim of this study was to assess the degree of inbreeding in white rhinos. In particular, I wanted to find out whether females are able to choose unrelated males as mating partners, which would enable them to actively avoid inbreeding. Additionally, I wanted to establish whether females mate equally with all territorial males in a population or whether they prefer a territorial owner that is characterised by certain male and habitat characteristics.

"The aim of this study was to assess the degree of inbreeding in white rhinos."

At that stage we only knew that white rhinoceros have a territorial-based mating system, where adult males that are old and strong enough to defend their own territory, dominate all mating activities. It was also known that young sexually mature males between seven and nine years of age do not defend a territory and do not to participate in breeding (Owen-Smith, 1975; Rachlow *et al*, 1998).

The territorial-based mating system reduces the number of breeding males within a white rhino population to a few individuals. A further preference of individual territorial males as mating partners would lead to an even stronger bias in the breeding sex ratio and could result in a high degree of inbreeding.

To answer these questions, I combined 13 years of field observations with genetic paternity assignments of 104 offspring with known mothers. My study thus represents the largest paternity analysis ever performed for any species of rhinoceros. I collected various data of individual animals, such as the body and horn size of territorial males, the food quality in the male territories and the hormone concentration in their faeces.

Additionally, I assessed the degree of relatedness between males and females to identify whether females avoid close related males as mating partners.

I was lucky that I could compare the influence of the different traits on two different groups of territorial males, which were introduced sequentially – with removal of the first set of males – into the same population of females. This was due to the fact that the white rhino population on Thaba Tholo was managed in such a way that all territorial males were exchanged on a ten-year basis in order to prevent inbreeding.

"The white rhino population on Thaba Tholo was managed in such a way that all territorial males were exchanged on a ten-year basis in order to prevent inbreeding."



Rhino ear-notching, implanting an identification tag and collection of DNA assist owners to monitor and manage their rhino population.



Photo © Robynne Prinsloo



Scan the QR code or visit
youtu.be/SPZoO3powOk
 to watch the video, 'Mating
 Behaviour of White Rhino'.

The **results of the study** clearly indicate that the mating behaviour of the white rhinoceros leads to a reduction in the genetic diversity:



- 1** There was a strong skew in the reproductive success among territorial males,
- 2** There was a lack of inbreeding avoidance during mate choice, and
- 3** Half of all females that produced multiple offspring were monogamous and thus mated during consecutive breeding seasons with the same male.

In a natural situation where rhinos can roam freely, this characteristic mating behaviour would not be a problem. Yet, in the current situation where fences and other barriers prevent dispersal and immigration between different rhino populations, it leads to inbreeding and the loss of genetic variability. White rhino therefore need careful management in order to best preserve their already low genetic diversity.

“White rhino need careful management in order to best preserve their already low genetic diversity.”



There are a number of strategies that can be used to increase the genetic variation in isolated rhino populations.

When pedigree information is available, a management option could be to aim to selectively remove monogamous females or males that have sired many offspring. Another option could be to retain individuals with specific rare alleles in the population.

When genetic data is not available, the introduction of individuals from outside of the population is advisable. As mentioned, in the Thaba Tholo population, all territorial males were exchanged every ten years to avoid inbreeding. Nevertheless, I still observed a case of incest, which indicates that the ten-year time period was already too long and should be shortened to six years, the time period when young females reach sexual maturity (Owen-Smith, 1975).

I was not able to identify any environmental factor that clearly influenced the reproductive success in the white rhinoceros.

Nevertheless, knowledge about such traits would help to influence mate preference. For example, the supplement of water or food in certain areas can change the habitat quality (Cinková *et al*, 2017) and thus potentially the reproductive success of individual males.



Calling all private rhino owners! Get involved!

As a follow up of my study, I plan to compare the genetic diversity of several white rhino populations that are kept under different management regimes, such as in intensive breeding camps or in national parks. The idea is to identify the best management measure that helps to prevent the loss of genetic diversity in the species. *For this study I am still looking for samples as well as funding and I highly welcome any kind of support.*

To participate in the follow-up study contact Dr Petra Kretzschmar:
@ kretzschmar@izw-berlin.de

Access the full paper:

🌐 onlinelibrary.wiley.com/doi/full/10.1111/eva.12894



ENDORSEMENT



Dr Michelle Otto



'Spartacus' was rhino calf number 1 000 born at Buffalo Dream Ranch in 2017.

Photos © Quintus Strauss

Dr Michelle Otto, resident veterinarian for John Hume, the largest private rhino farm breeder in the world, Buffalo Dream Ranch.

It is a well-known fact that the southern white rhino have already undergone a genetic bottle neck. Having had their wild number reduced to less than 50 at the onset of the 1900s in a single location, the ability of the southern white rhino to have recovered genetically to several viable populations today is remarkable. Of course, this could not have been accomplished if not for the sustainable conservation programmes that led to the translocation of rhino from this small, isolated population to several other locations such as the Kruger National Park in the 1960s, as well as allowing private land owners to establish their own southern white rhino breeding populations.

This spatial distribution definitely helped relieve pressure on the high degree of inbreeding that must have occurred due to the limited number of individuals left in the wild population in the 1900s. That being said, with the ongoing losses of rhino being poached, as well as loss of present day breeding populations due to disinvestment by rhino custodians as a result of the rising costs of security and the risk involved in taking care of rhino under the current circumstances, proper biological management of the remaining breeding populations is now more vital than ever.

It is our responsibility as rhino custodians to ensure that proper

genetic management is done whenever possible.

Knowing there is already low genetic diversity in our southern white rhino today, doing more research such as this is important and will become a key component to help rhino custodians make informed decisions and help guide them in the management of their breeding populations. Knowing that rhinos don't have an inbreeding avoidance in mating choice, for example, should motivate us to ensure that we remove progeny timeously from their parents to reduce the risk of further inbreeding if possible. If we as rhino custodians are willing to help one another and share or exchange rhino (or genes) amongst our different breeding herds, we can try and promote genetic variance as well.

We have the ability and knowledge to help this iconic species survive. It falls on us to give them the best chance of recovering from this onslaught and threat of extinction. By working together and making more informed decisions, we can.

Dr Michelle Otto

© otto.michelle84@gmail.com

ENDORSEMENT



Rubin Els

Rubin Els, former CEO of Thaba Tholo Game Farm.

– stamping her footprint on the African soil. She was relatively inexperienced regarding African bush conditions, and particularly, rhino in the wild. However, when she was thrown into the deep end, it was a sink or swim situation for her, with limited assistance from the Thaba Tholo personnel.

Petra rose to the occasion and did not just manage to survive her first few years in the bush, but continued her research and in so doing, managed to document extremely valuable data.

She collected and processed tons of rhino dung – a seemingly futile exercise at the time, but one that ultimately yielded fantastic results. Many aspects discovered during her research will be of immense practical value to rhino owners, game reserves and the wildlife industry as a whole.

“I am privileged to know Petra as a friend but also as a scientist advisor on all rhino matters at Thaba Tholo. Her research, I believe, will become an invaluable source of information to all rhino owners and keepers.”

Rubin Els

✉ info@rhinoalive.com

🌐 www.thabatholo.co.za



I have known Dr Petra Kretzschmar since her student days in March 1997. She was awarded an opportunity to do her doctoral thesis on white rhino at the Thaba Tholo Game Ranch by the visionary businessman and conservationist Tilman Ludin.

At that stage, Petra was enthusiastically focused on – and had a dogged determination towards

