

Winter 2011



## An update from the Botswana Lion Conservation Genetics Research

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### Current aims of the Project

- Assess levels of inbreeding within northern Botswana's lion population
- Understand patterns of lion movement across the region and the influence of human development and artificial barriers.
- Assess the cause and potential implications of female lions developing male secondary sexual characteristics, in the form of large manes.
- Determine the degree to which the genetic diversity, and thus population, has changed over time using ancient DNA techniques on historic trophy specimens.
- To assess the status of the lion population in northern Botswana.

### An introduction to the project

Like the global population, the lions of Botswana have, over the past century, undergone dramatic contraction in range due to human encroachment, as well as considerable population reduction from conflict with humans. This contraction in range is likely to have driven down the size of both the overall lion meta-population in Botswana and any individual isolated populations. The consequence of such changes in a population results in smaller population sizes and decreased connectivity of population fragments. These changes are well known to significantly reduce the genetic diversity of a population, increasing their susceptibility to the effects of inbreeding and disease, and in turn leading to an increased risk of localised extinction.

Initial observations by local safari guides, concession managers and field researchers suggest that a rare genetic mutation may be increasing in frequency within some of the lion populations. For example at least two female lions on Chiefs Island, within the Okavango Delta, have been observed to have developed male secondary sexual characteristics (developing large manes



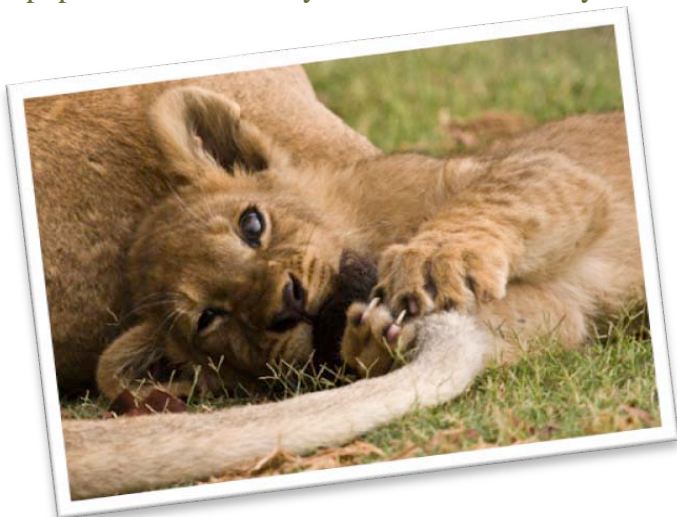
“The results of this project hope to infer the true conservation status of lions within northern Botswana”

– see page 4). Within all likelihood these females are likely to be infertile and even if they are not, they are unlikely to be attractive to breeding males, thus reducing the possible breeding population size.

This project hopes to address these issues by quantifying current levels of genetic variation within the lion populations of Botswana, and to test for patterns of genetic structure across these populations. Primarily we wish to identify if there

populations due to do their residence on islands or isolation due to human barriers. From this we hope to be able to identify the primary drivers of any population or genetic decline and use this information to advise long-term conservation planning and management options that will mitigate and ultimately reduce the extinction risk of this charismatic felid species.

Importantly, the results of this project hope to infer the true conservation status of lions within northern Botswana; their risk from habitat fragmentation and encroachment, any requirements for genetic supplementation and the impact trophy hunting is likely to have on the population. ■



has been a significant decline in levels of genetic diversity within the population. We will also be using this information to assess the risk posed to the population by current unknown levels of inbreeding.

On top of this, we wish to use the naturally fragmented nature of the Okavango delta to develop an approach to assessing the implications of a fragmented landscape on the genetics of the population. To do this we will attempt to determine relatedness patterns of the lion populations within the Okavango Delta, each sub-population having differing degrees of isolation from neighboring

## Hitting the bull’s-eye

In order to obtain the genetic information needed to make this research possible we have chosen to use a dart gun equipped with a special ‘biopsy’ dart that cuts a small piece of skin from the animal before dropping to the ground to be collected. There are other options, such as searching for and gathering scat, but these do not provide as high quality genetic material nor can we be certain of gathering samples from all the lions we encounter in a feasible amount of time.



# Where are we working?

Since its inception the project has focused on the lions in and around Chief's Island, the traditional hunting grounds of Chief Moremi, now forming the centre of the Moremi Game reserve. However, as the concept has evolved a wider conservation need has been recognized and its scale and scope expanded.

To equip us with the facilities to carry out this biopsy darting 'Pneu-Dart' of Pennsylvania, USA, have sponsored us the darting rifle we require in the form of one of their X-caliber CO<sub>2</sub> powered rifles. This fantastic piece of equipment has the accuracy, ruggedness and ease of use to perform just as we need for this research and we are very grateful for their support of the work.

In addition Dr. Dane Hawk has very kindly donated his time to give training and advice on the proper procedures and the do's and don'ts of biopsy darting.

So far we have successfully managed to collect biopsy samples from four individuals and they are sitting in storage until the time comes to head into the lab.

The study currently encompasses a large percentage of the Okavango Delta as well as parts of the Linyanti. However, as interest in the project has spread we are looking to expand further afield in an attempt to analyse just how dramatically human presence and fragmentation of the landscape in Northern Botswana has disrupted the flow of genes through the lion population and in turn risked the health and chances of survival of the population. For now, until we have made more headway into the initial sampling session of this research, we will be focusing on the Okavango Delta and Linyanti areas.

The Okavango Delta is a wondrous place to work. The patchwork landscape of the Delta provides a fascinating but challenging place to study. It is diverse in so many ways; from the landscape and vegetation, to the wildlife and even the seasonality of the floods. It is this latter element that has crafted the environment into such unique place.

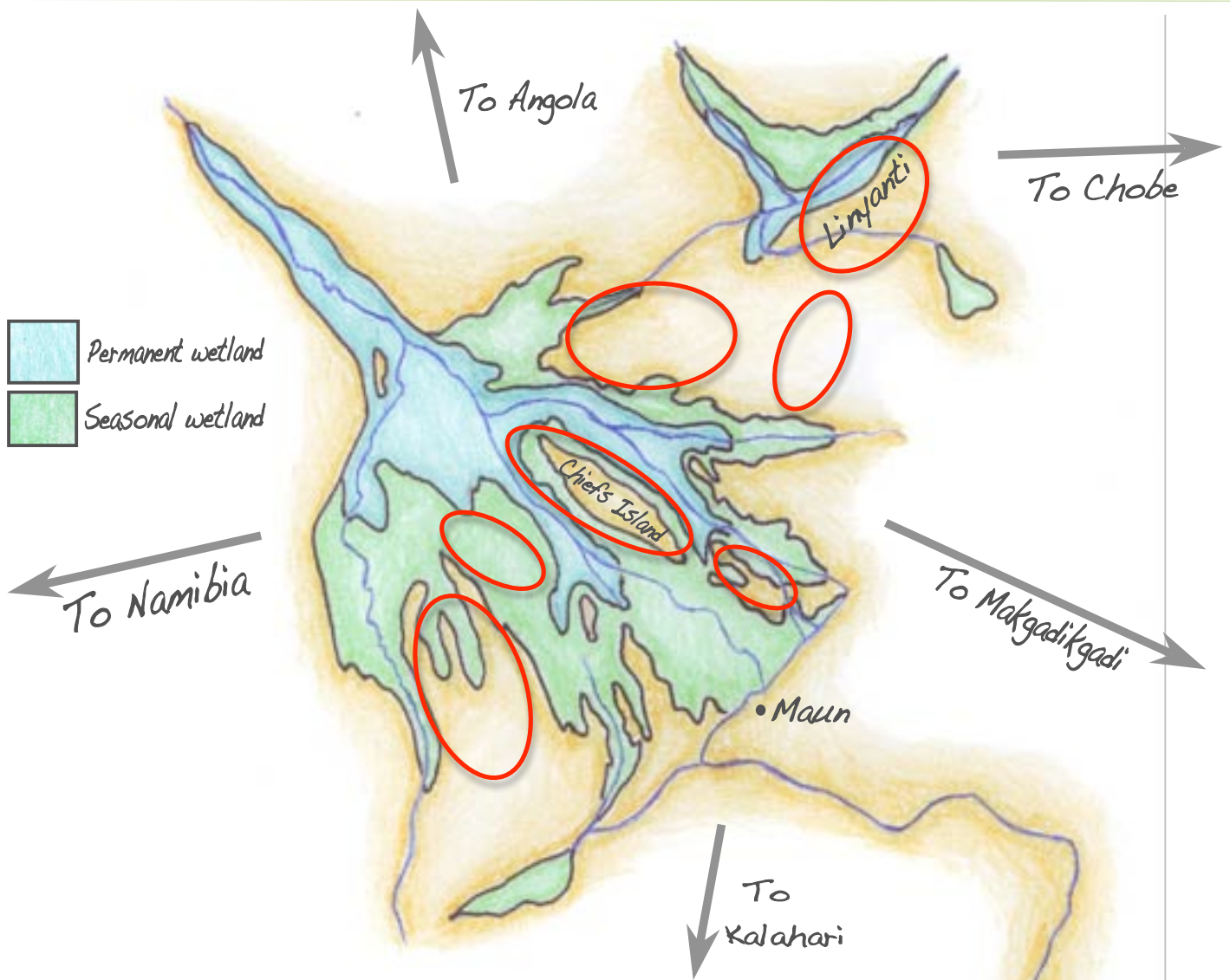
On the map on the following page I highlight some of the areas in which we will be working, as well as some of the pathways to areas that we hope will in time become part of the research. For anyone who wishes me to incorporate their own area of the delta into this research program please feel free to contact me. The more areas we can sample the greater the power of this research will become. Everyone involved will of course be acknowledged.

Hopefully by understanding how lions are influenced by the structure and changes in this landscape we will be able to understand how other species and elements of the ecosystem are affected and how our conservation actions can help preserve all elements of this wondrous environment.



"The patchwork landscape of the Delta provides a fascinating but challenging place to study"





*Map of Study sites showing possible movement corridors. Kalahari, Makgadikgadi & Chobe are potential future sample areas.*

## Meet our inspiration...

When I first arrived at Mombo, the Wilderness Safari's camp on the northern tip of Chief's Island I was treated to a large lion pride slowly and arrogantly strolling across a grassy floodplain. Amongst them was the impressive lion seen in this photo (© Kai Collins).

As I sat there my guide told me to take a close inspection of its genitals – a strange request under the best of circumstances. It took me a few seconds to register but

when I did the significance was not lost on me. He was a she, not a he!

This lioness is the second to be seen in the area showing full male secondary sexual characteristics. Little more than this is known. We do not yet know if this is a genetic mutation caused by inbreeding or something entirely different. Nor do we know if there are many others like this, although I have heard accounts from

other areas of the delta.

Whatever the case, it did inspire this project and hopefully we will in time learn what is causing this dramatic change and what implications it might have.



## Would you like to help? Here is how...

As with everything in life, research takes considerable resources. If you are interested in donating to the project please contact Simon. If required, details can be provided for donations to be made through a tax deductible organisation.

Do you have or lease land on which you would like this research to be expanded into?

Are you a hunter or taxidermist? Do you have access to old lion specimens and are willing to provide a small piece from which DNA can be extracted?

Please contact Simon  
([simond@wilderness.co.bw](mailto:simond@wilderness.co.bw)) regarding any of the above, or any other project related queries.

### Every Little Helps!

## Photos for Donations

If any of the photos in this newsletter take your fancy they can be purchased for a donation to the project.



**Dr. Dane Hawk**



We would like to thank all sponsors and contributors to the project, with special thanks to the Botswana Department of Wildlife & National Parks for allowing this research to happen.

**THANK YOU!**



**CHITABE**  
BOTSWANA