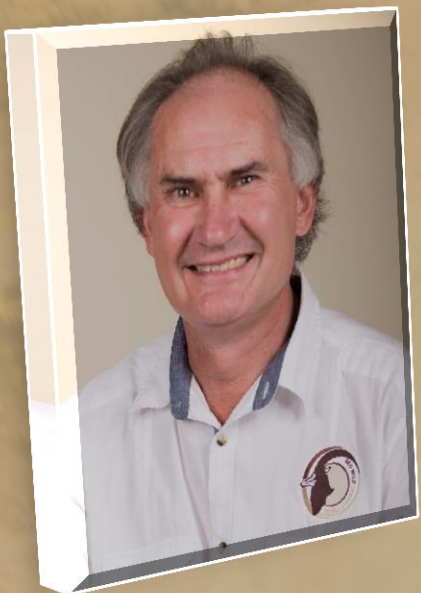


Endangered Bontebok and small game survival:

A quest of palaeontology, climate change, consumptive use and biodiversity management in S.A.



Deon Furstenburg
Pr.Sci.Nat. 115086



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Bontebok Report, 31 May 2016

74 pages



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WILDLIFE BIOLOGIST SCIENTIFIC REPORT
31 May 2016

BONTEBOK
Damaliscus pygargus pygargus (Pallas, 1766)

Prepared by:

Deon Furstenburg
Wildlife Scientist & Risk Consultant
Appointed by WRSA Bontebok Breeders SA, Mr Gerhard Heyneke, 29 February 2016.



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BONTEBOK REPORT compiled per request of the newly registered
**Bontebok Breeders Society of SA to the WILDLIFE PRODUCERS
ASSOCIATION of SA under the Animal Improvement Act of the
Department Agriculture Fisheries & Forestry**

**US Fisheries Wildlife Services (USFWS), following a trophy application
dd 23 Oct 2015 was attacked by the Humane Society – Closing of Bontebok
Import Permits (temporarily open for 2016, but closed for 2017 onwards until....)**

**Reason: Bontebok Endangered Species – US ESA – Bontebok was listed as
endangered in 1976 and never revised
– IUCN Red data listing (1,500 bontebok)**

**USFWS request an updated non-detrimental enhancement finding after 1996
Require supportive data for the reversal of the standing enhancement finding**



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WILDLIFE PRODUCERS ASSOCIATION



WILDLIFE2016
PRODUCERS ASSOCIATION

Registering Authority
Animal Improvement Act
1998 (Act No. 62)
62/98/12-8

NPO Reg. 2D12/OO4864/OB

6 Jun 2016



agriculture,
forestry & fisheries
Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA



DEPARTMENT: AGRICULTURE,
FORESTRY AND FISHERIES
REPUBLIC OF SOUTH AFRICA

This is to certify that the under mentioned society is registered
as a Registering Authority in terms of Section 8(7)(a)(ii) of the
Animal Improvement Act, 1998 (Act No. 62 of 1998)

Society Name:

WILDLIFE PRODUCERS ASSOCIATION

Registration Number:

62/98/R-8

Issued and signed under my hand this 06th day of June 2016.

REGISTRAR: ANIMAL IMPROVEMENT

**Private
Wildlife
Farming**





DEPARTMENT: AGRICULTURE,
FORESTRY AND FISHERIES
REPUBLIC OF SOUTH AFRICA

This is to certify that the under mentioned society is registered
as a Breeders Society in terms of Section 8(7)(a)(ii) of the
Animal Improvement Act, 1998 (Act No. 62 of 1998)

Society Name:

***THE BONTEBOK BREEDERS'
SOCIETY OF SOUTH AFRICA***

Registration Number:

62/98/B-73

Issued and signed under my hand this 06th day of June 2016.

REGISTRAR, ANIMAL IMPROVEMENT

6 Jun 2016

8 Sep 2016 Presidential Board Elected



**To date 12 wildlife
species registered**

14.05.2016 16:58

PROTOCOL:

FREE STATE Farmers 1 Feb 2013

Provincial
Gazette



Provinsiale
Koerant
Provinsie Vrystaat

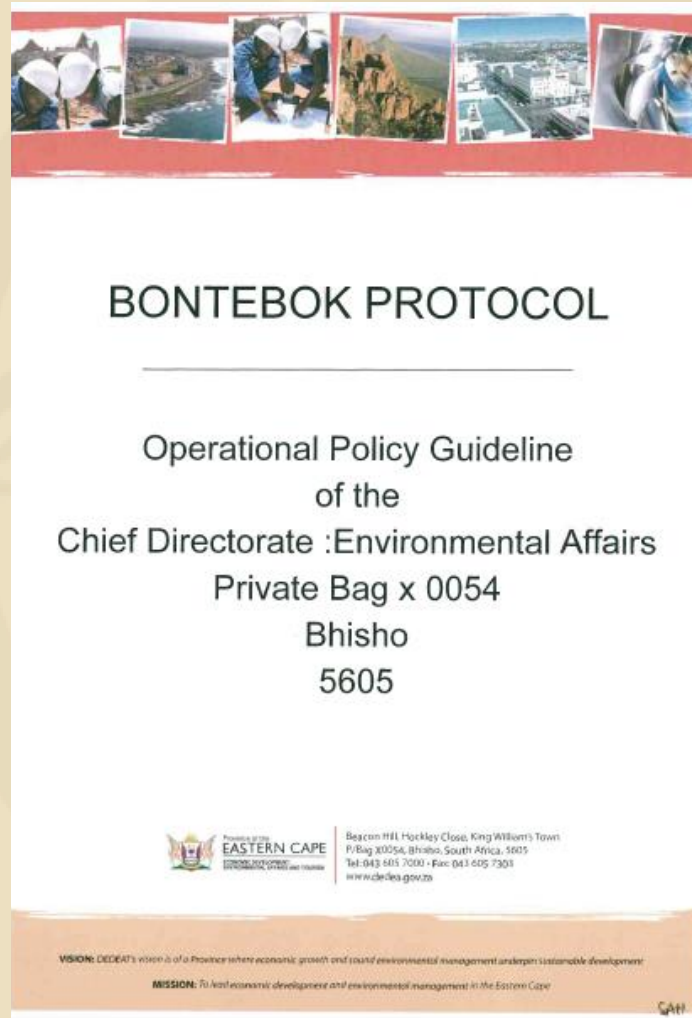
Free State Province

Published by Authority

Uitgegee op Gesag

No.	75	FRIDAY, 1 February 2013	No.	75	VRYPDAG, 1 Februarie 2013
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118		NORMS AND STANDARDS FOR THE KEEPING AND MANAGEMENT OF BONTEBOK (<i>DAMALISCUS PYGARGUS PYGARGUS</i>) IN THE FREE STATE			2
119		ACTIVITIES REGARDING LISTED LARGE PREDATORS BY LAND OWNERS, FOREIGN CLIENTS AND THE EXPORTATION OF HUNTING TROPHIES			7
120		ACTIVITIES REGARDING WHITE AND BLACK RHINOCEROS			10

EASTERN CAPE Farmers 16 Mar 2016



NATIONAL Government Sep 2016

Comments 10 Oct 2016

BIODIVERSITY MANAGEMENT PLAN FOR THE BONTEBOK (*Damaliscus Pygargus Pygargus*) IN SOUTH AFRICA



Jointly developed by SANParks and
CapeNature

Carly Cowell* and Coral Birss²

*Cape Research Centre, South African National Parks

²Scientific Services, CapeNature



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IUCN Red List

Near Threatened – NT

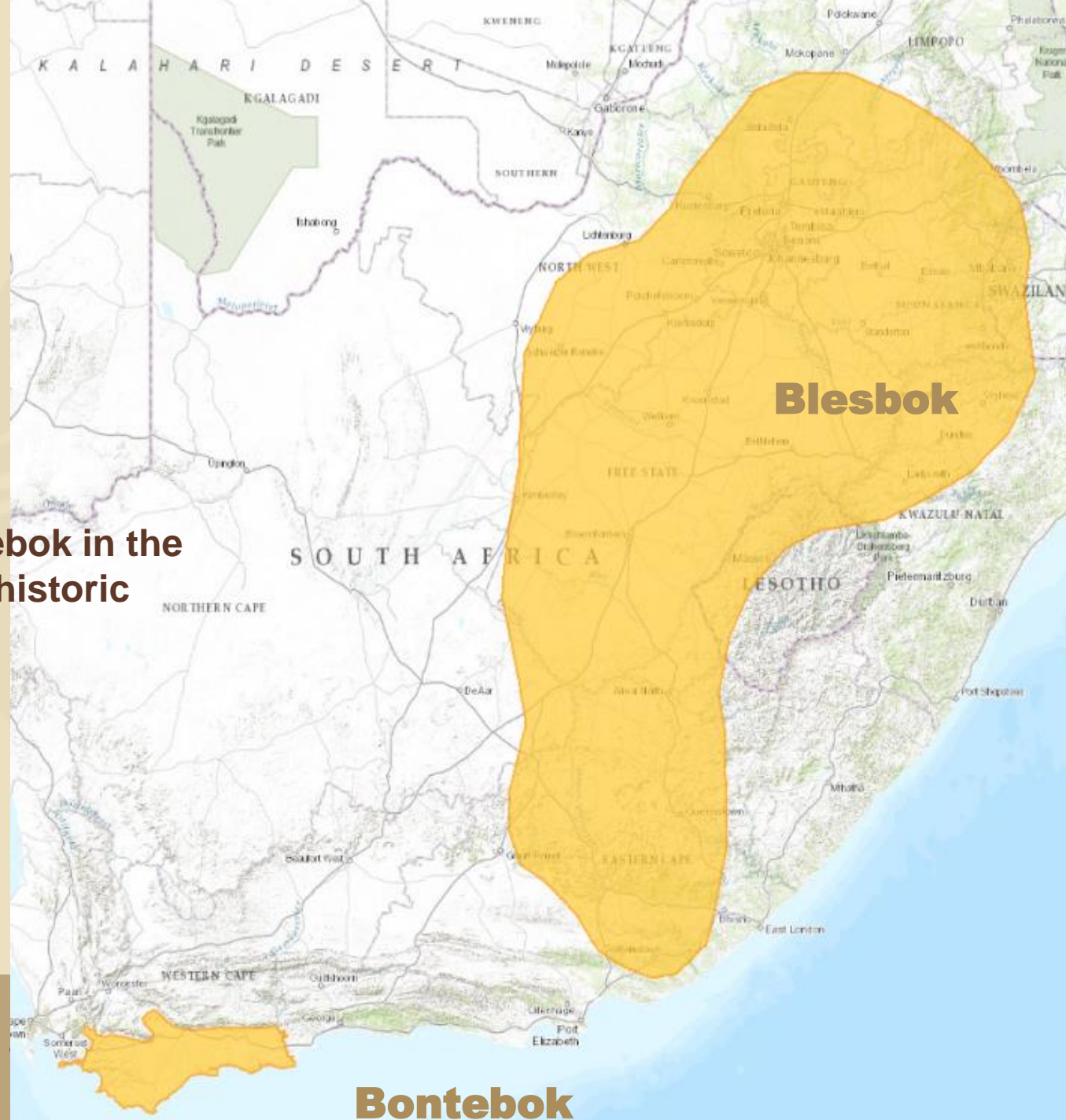
1,500 Bontebok, counted 2001
(Report: David & Lloyd, 2008)

Numbers reflect only the Bontebok in the
Western Cape, the “so called” historic
distribution range

Previous status:

Cites 2 Endangered – E

Cites 1 Critical Endangered – CE



Bontebok numbers

Bontebok National Park 1931 did not save the Bontebok / bought extra time

Bontebok saved (1944) – Senator Hochly, 5 animals moved successfully to Thornkloof (Mr Bowker) in the Eastern Cape Province

IUCN Red data listing (2008) – 1,500

SA Scientific Authority (20 May 2015)

TABLE 1: Bontebok numbers in past history

Year	Inside Historic Range		Outside Historic Range	Total Population (excluding animals in Zoos and in Namibia)
	Protected Parks	Private Land		
1837	0	87	0	87
1900	0	330	0	330
1927	0	121	0	121
1931	17	50 *	0	67 *
1939	123	100 *	5	228 *
1960	61+11	60 *	200	332 *
1978	250 *	200 *	250 *	700
1982	320	300 *	400 *	1,020 *
1999	500 *	800 *	1,000 *	2,300
2008	600 *	900 *	2,000	3,500
2015	901	1,302	4,959	7,162
2016	900 *	1,400 *	5,029	7,329 *

* Numbers that are extrapolated



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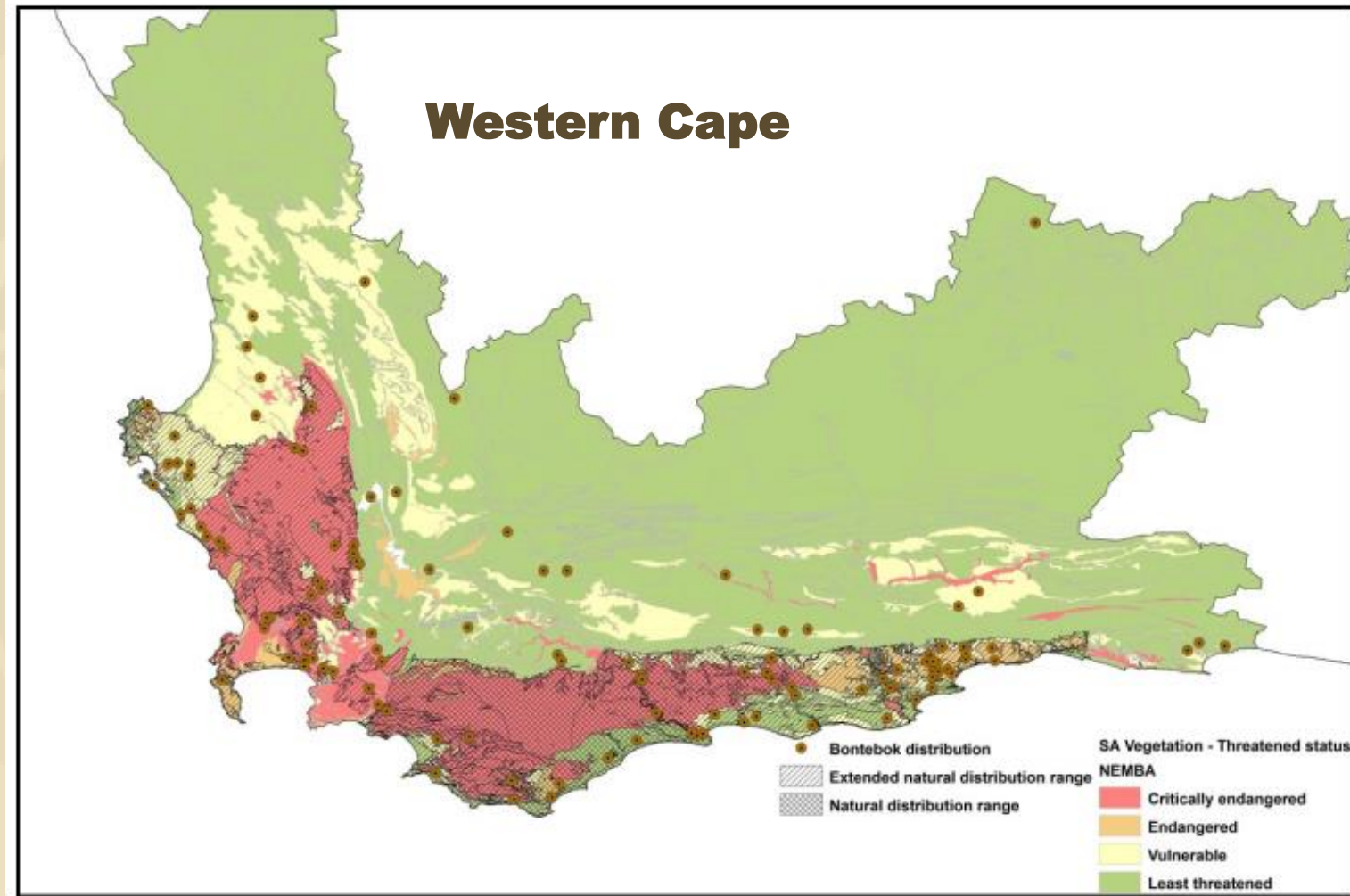
SA Scientific Authority, May 2015

Bontebok non-detrimental distribution of 2,203 bontebok noted in historical distribution range.

4,959 bontebok outside historical distribution range not recognized.

Real number being 7,162
IUCN only 1,500 listed

Recorded bontebok number
April 2016 = 7,329 with an
expected real number of 9,000+



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Origin

The natural geographic **separation** between Bontebok and Blesbok is an arid Karroid semi-desert veld, 250-320 km wide. Approximately **1,2 million years ago** a south-western group of Blesbok was cut off by a major climatological event and habitat change (*Skead 1980, Skinner & Smithers 1990, Van der Walt 2002*). They were separated from the rest of the Blesbok population by confined isolation to the south of the Cape Folded Belt (**on the historic Outeniqua Basin**), and thus the genetic DNA drift towards the origin of the later Bontebok. This isolation has allowed morphological differences such as coat colour and body markings to arise in each group (*Bigalke 1955*).



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History

With global warming and melting ice caps after the summit of the last Ice Age approximately **18 000 years ago the sea-level** around the Cape coastline **rose by 120 m** (*Le Roux, 2010; Dewar & Stewart, 2016*)

and the **Bontebok was forced to retreat** from the former optimal habitat of their origin on the **Outeniqua Basin** to the poorly and marginal suitable **foothills of the Cape Folded Belt**.

Since **6 500 years ago** the former moist climate became arid (*Stager et al, 2012*) and the **grazing converted from highly nutritious C4 grasses to poor C3 grasses** (*Ramsey, 1996*). Bush, fynbos and forest began to replace the grassland to the south of the coastal mountain range.

The Bontebok experienced **habitat, feeding and climate stress** and entered **the start of a genetic bottleneck depletion** and a gradual loss of genetic heterozygosity. Progressingly increased human pressure attributed to the further down fall of the already pertaining down trend of the Bontebok subspecies.

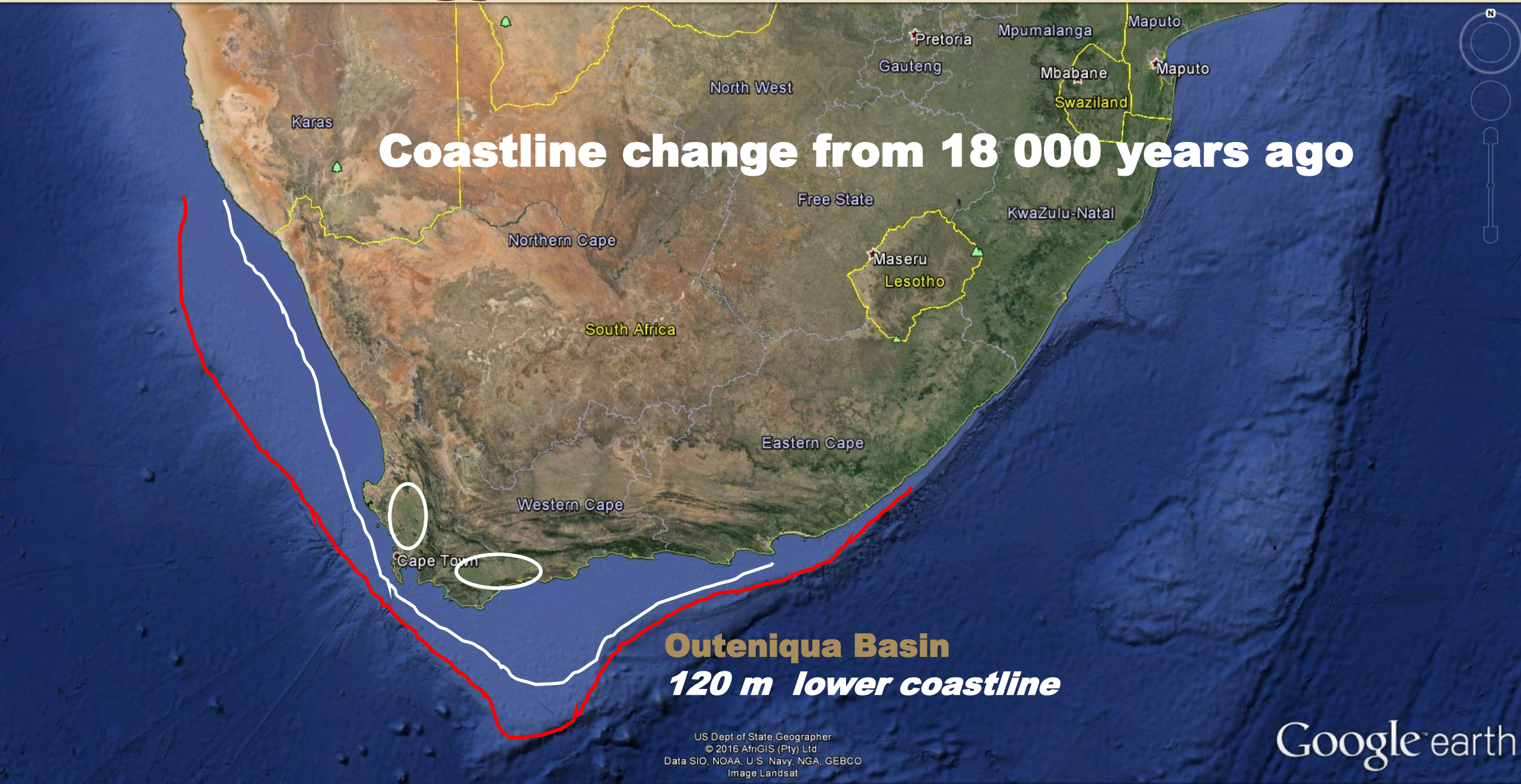


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Palaeontology



Bontebok origin

Split: 1,2 million
years ago
from blesbok

Outeniqua Basin

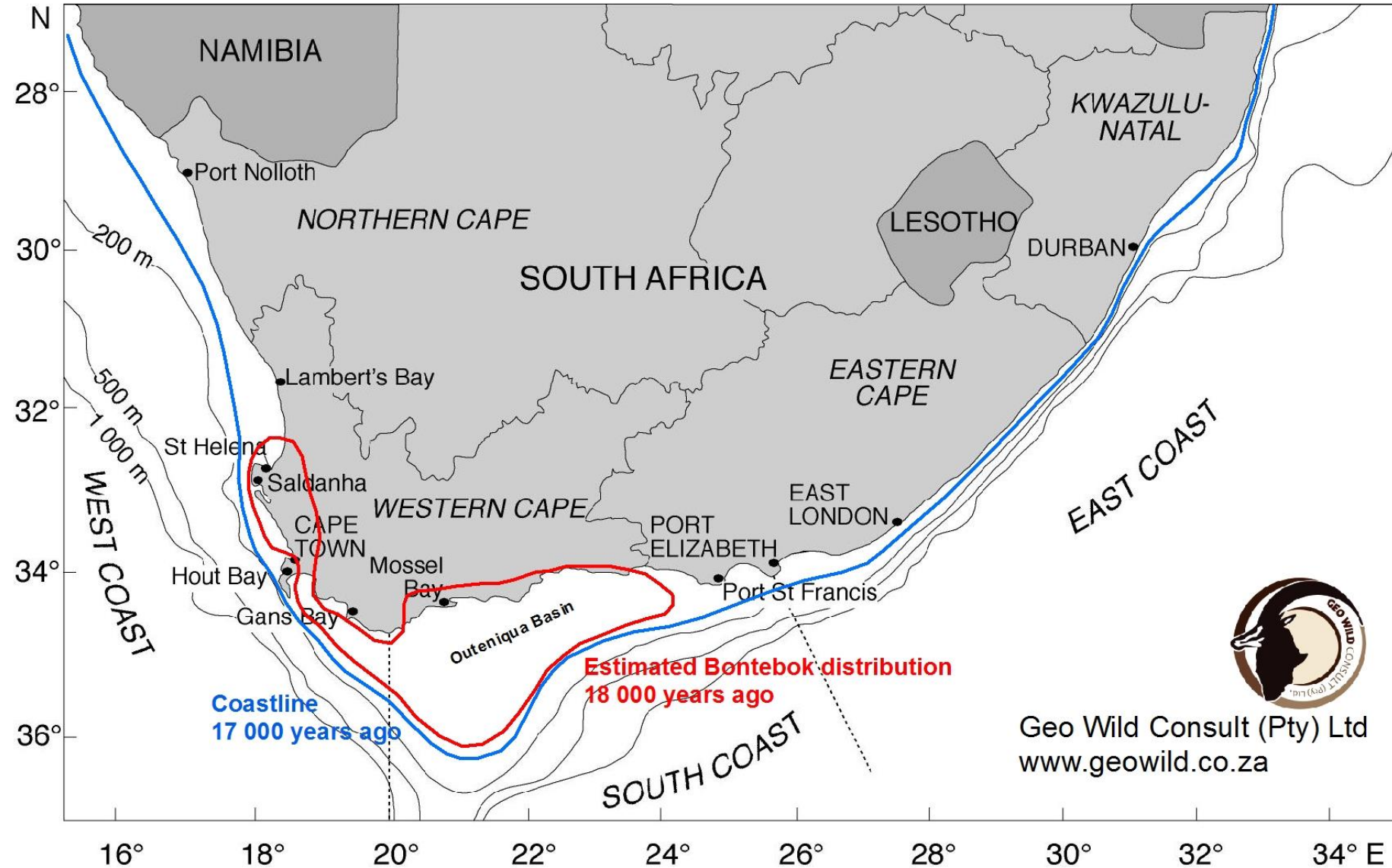
120 m lower coastline

Humid climate

C4 sweet grasslands

(Quick et al, 2015; Hare & Sealy, 2013; Stowe & Sealy, 2015; Holmgren et al, 2003; Chase et al, 2013; Carr et al, 2006)

PRESENT COASTLINE AND OFF-SHORE CONTOUR DEPTHS OF SOUTH AFRICA
(Adapted from Henderson, 2008 and Dewar & Stewart, 2016).



Habitat Change

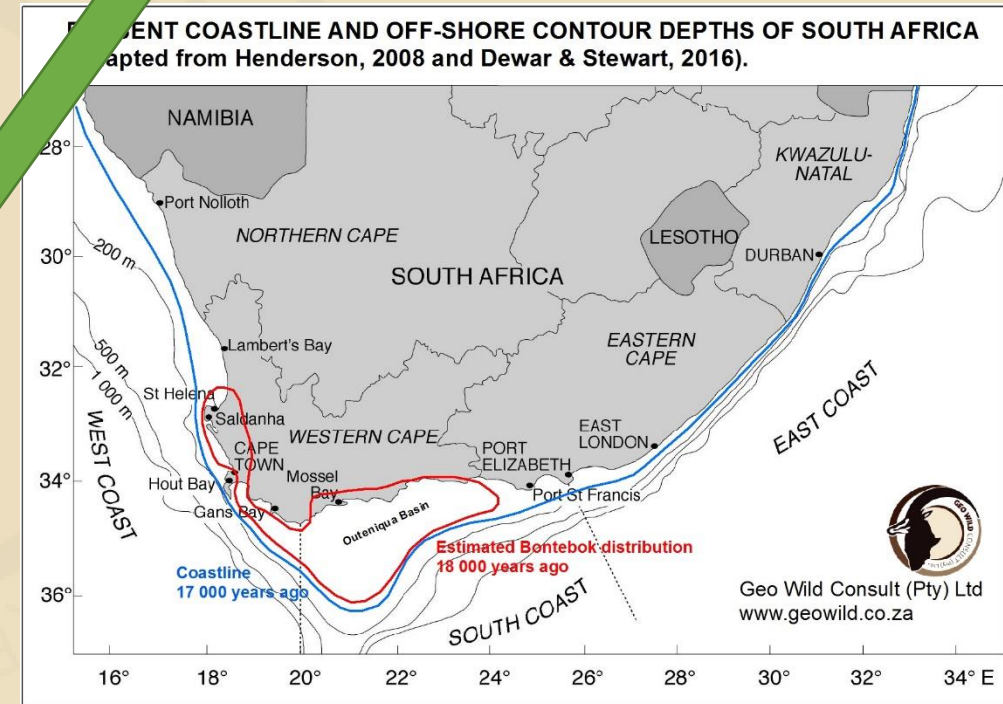
From 18 000 – 6 000 years ago the sea level rose by 120 m to the present coastline, with a maximum sea level variance of 4 m ever since (Le Roux, 2010; Dewar & Stewart, 2016)

Climate changed from humid to dry

C4 high crude-nitrogen grasses changed to low crude-nitrogen C3 grasses

Bontebok confined to poor grass and poor fynbos environment – feeding stress

Carbon isotope tooth enamel analysis from fossils and skeletons (several studies by *Codron et al 2007-2015*)



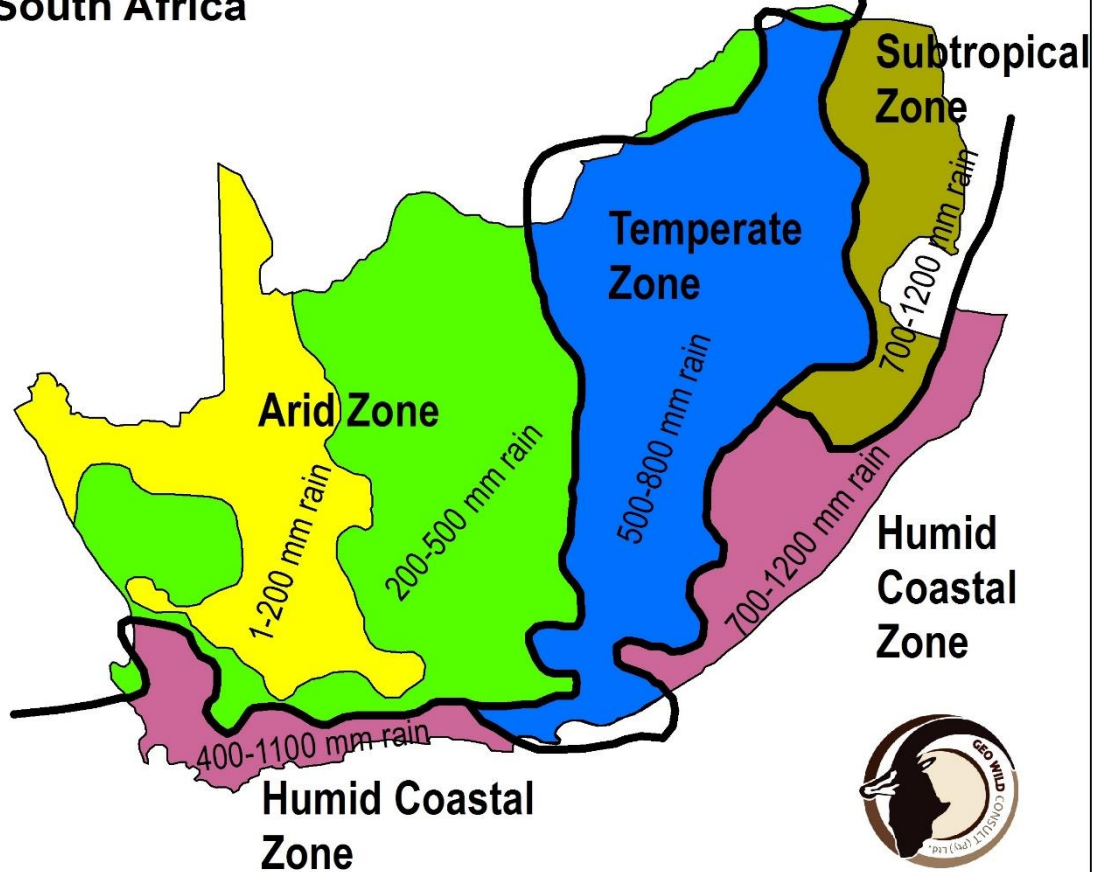
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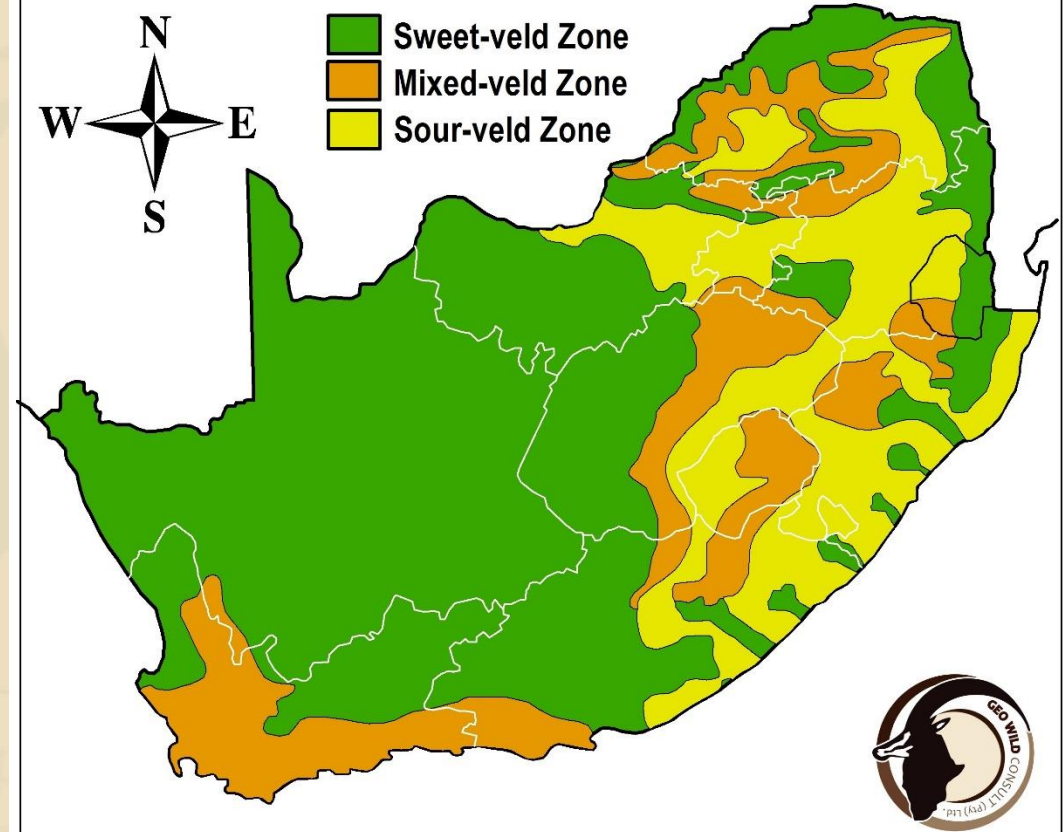
Climate:

Climate Zones affecting wildlife distribution in South Africa



D Furstenburg, 2015

Main Zones of Veld affecting wildlife distribution in South Africa



Compiled from Acocks (1988), Tainton (1999) and Mucina et al (2006)

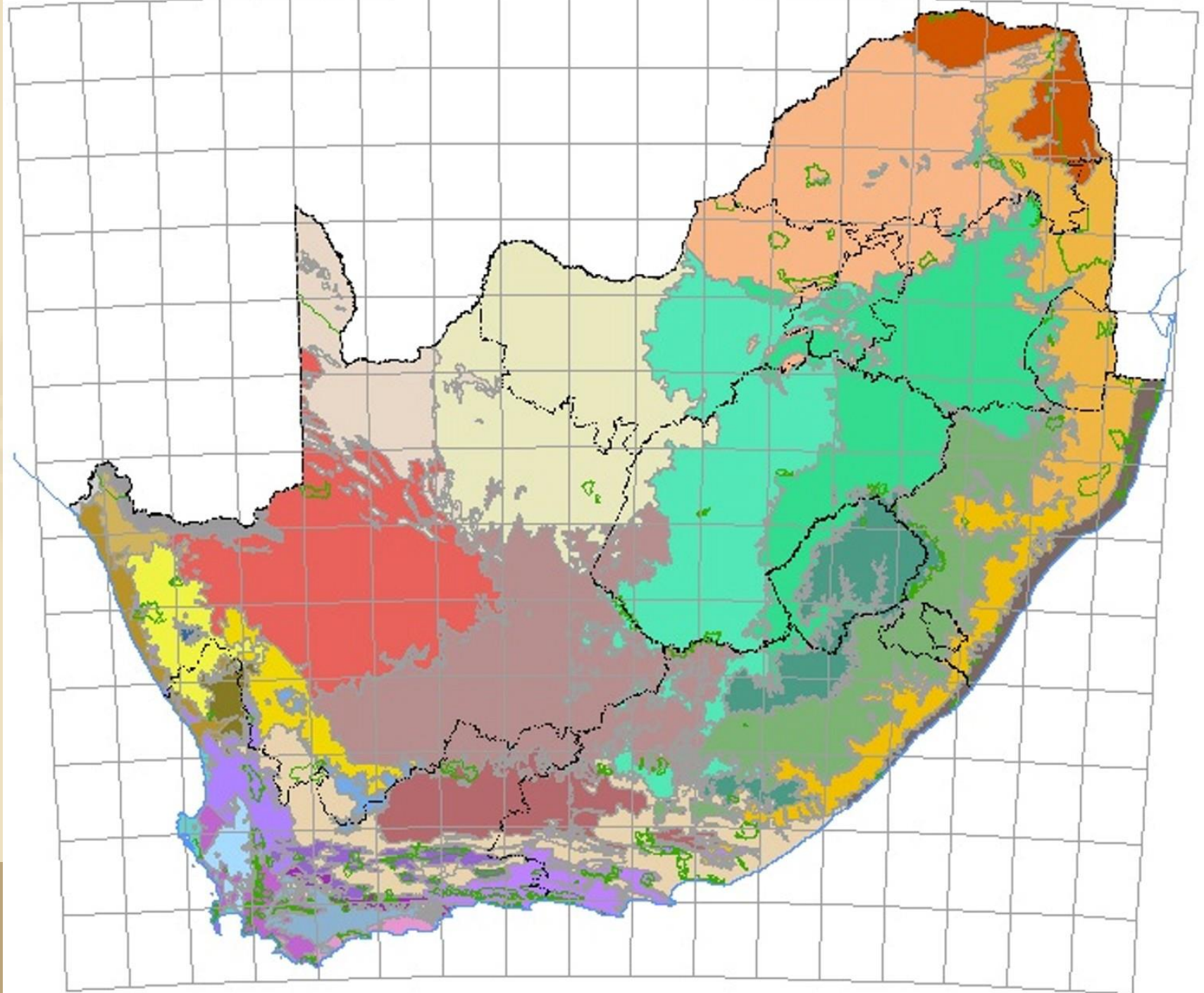


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Vegetative Bioregions



Bontebok population growth

Bontebok Park – 57% annual growth
Maximum reached 400 animals
Maintained at 250 animals

Private Farms (Western Cape)
– 42% annual growth

1950s – 50% of population died
Nutritional stress from poor grazing
Internal parasite infections

1944 – 5 animals translocated to Eastern Cape
Private Farm / 200 animals 1960 / 5,029
animals 2016 (SAVED SPECIES)
Population growth 1999-2016 = 403%

Protected Parks (Western Cape)
Population growth 1999-2016 = 219%

TABLE 1: Bontebok numbers in past history

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	Protected Parks	Private Land		
1837	0	87	0	87
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2016	900 *	1,400 *	5,029	7,329 *

* Numbers that are extrapolated



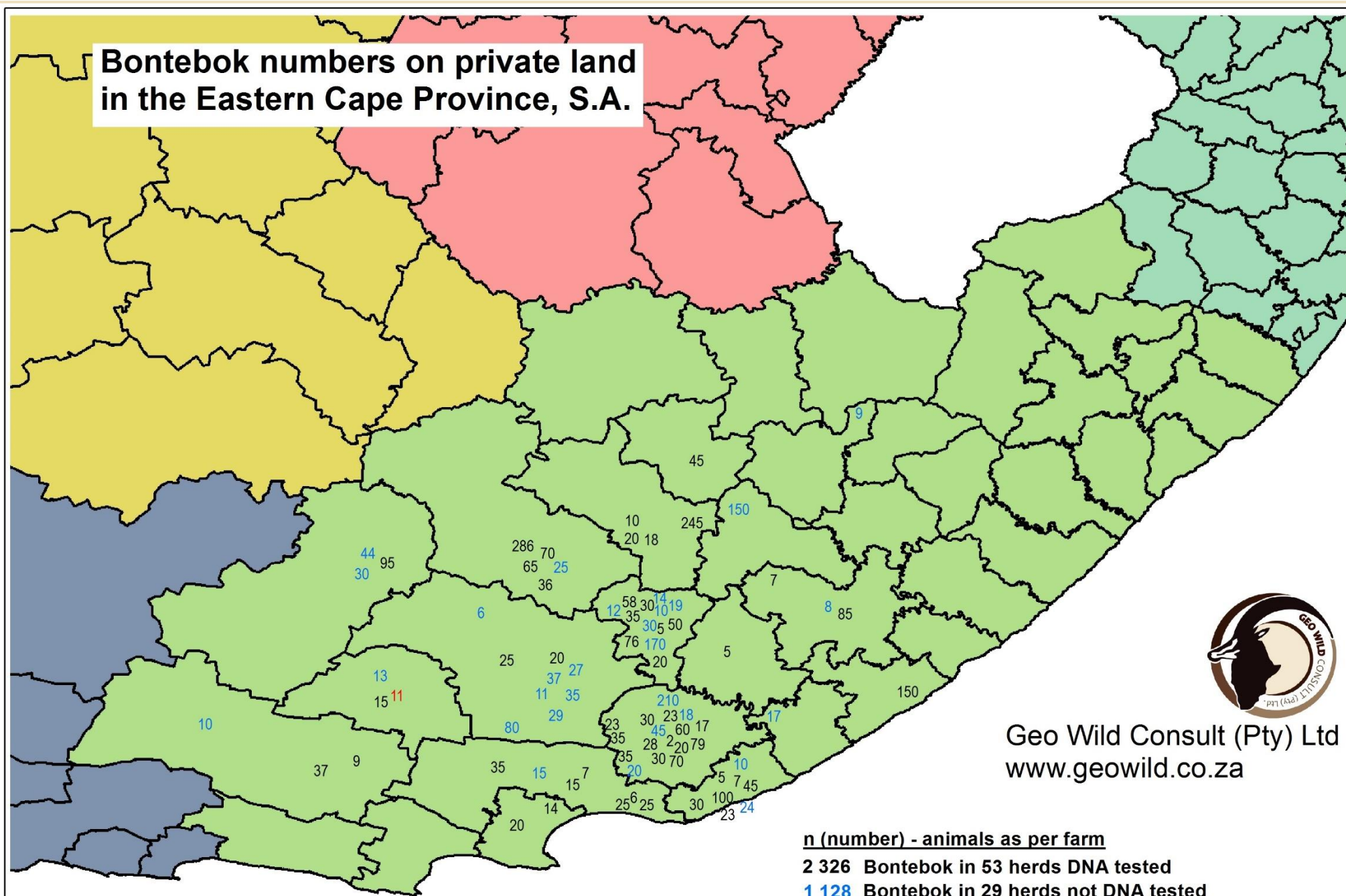
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Eastern Cape

Bontebok numbers on private land
in the Eastern Cape Province, S.A.



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Data from: WRSA Bontebok Breeders Association (2016)

n (number) - animals as per farm

2 326 Bontebok in 53 herds DNA tested

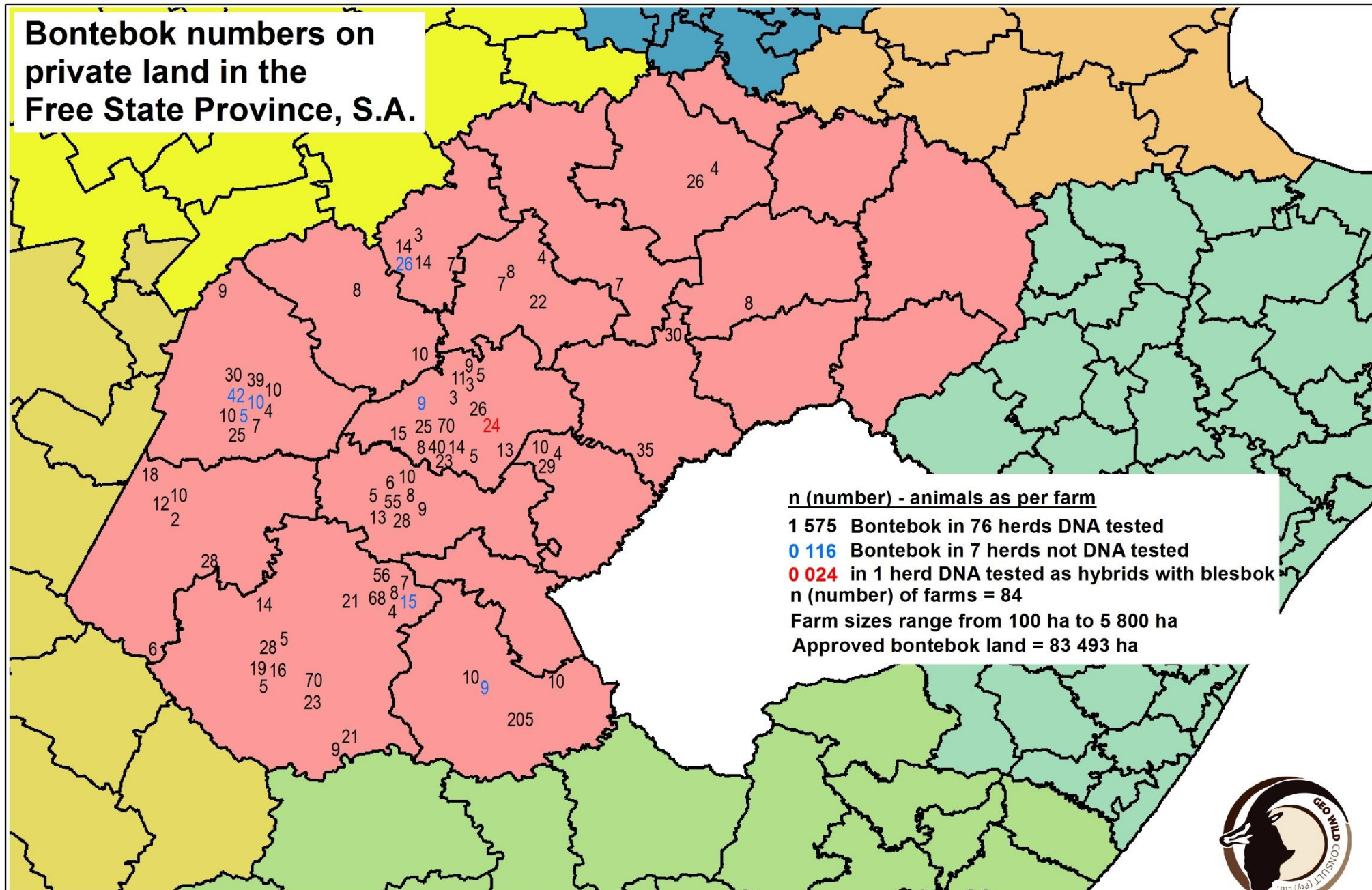
1 128 Bontebok in 29 herds not DNA tested

0 011 in 1 herd DNA tested as hybrids with blesbok

n (number) of farms = 82

Free State

Bontebok numbers on private land in the Free State Province, S.A.



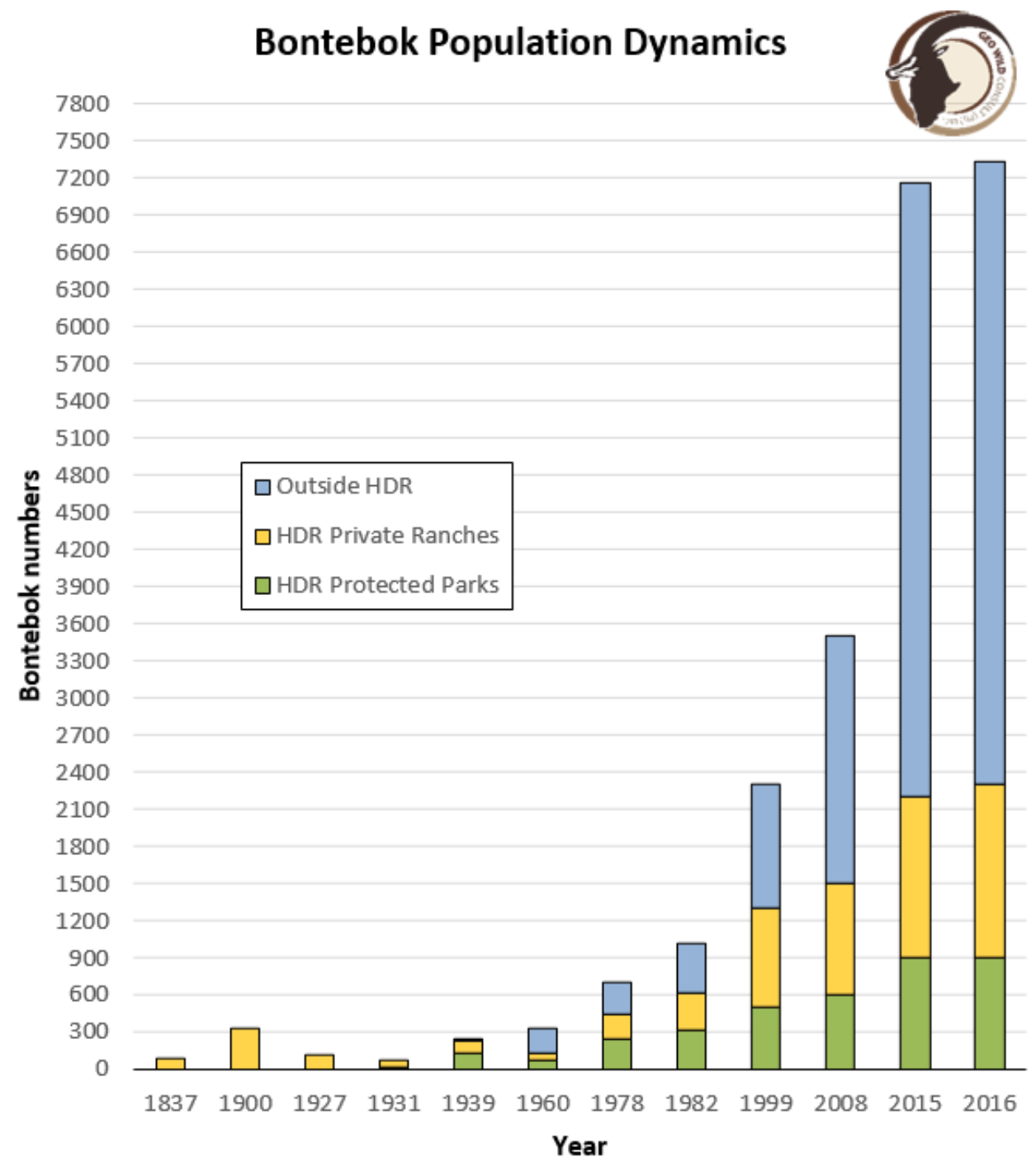
Data from: WRSA Bontebok Breeders Association (2016)



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Population

It is a self-explained fact that without economic business the enhanced Bontebok growth on private land will be virtually zero, and considering the illustrated numbers, the Bontebok would remain near extinction and most certain go extinct with progressing global climate warming (Greyling *et al.*, 2013; Furstenburg & Stoltz, 2008).



Population

National statistics on **Bontebok trophy-hunt** off-take in South Africa are **3,1%** (n = 9 years) of the global Bontebok population per annum.

The global Bontebok population has **grown by 219% since 1999**, giving an **annual enhancement** growth of **13,7%**.

Important to note is that the growth of the **privately managed** subpopulations outside the Western Cape **has grown by 403%** over the same period, giving an **annual enhancement** growth of **25,2%**.

Trophy hunting as an economic incentive had a major contribution to this enhancement success of the Bontebok.



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Genetic fitness

Genetic heterozygosity studies of translocated **Cape Buffalo** has proved advanced genetic provenance of all **privately farmed** subpopulations of **10,5%** vs **6%** in **protected parks** (*Van Hooft et al 2002; Van Hooft, 2015*).

The enhancement are due mainly to the constant **cross-trading and translocating** of breeding animals between different habitats and different subpopulations / farms (**out-breeding**).

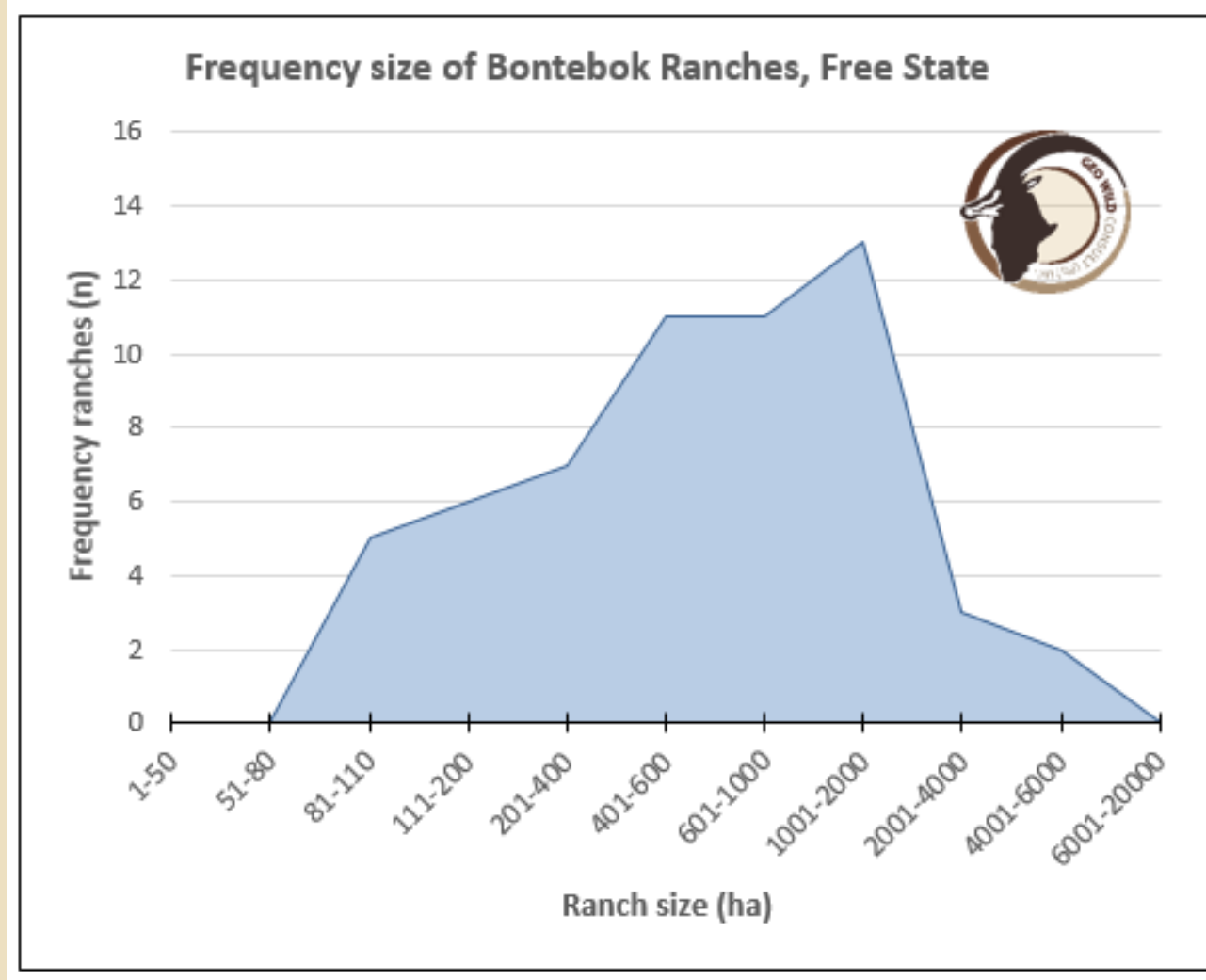


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Private Bontebok Farm size Free State



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Exported Bontebok

Namibia



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Parameters:

- 1) **Translocation of species to external environments = survival**
- 2) **Genetic heterozygosity important to survive = Bottleneck Effect**
Sable 23% genetic variation (Betine Jansen van Vuuren)
Bontebok 10% genetic variation
- 3) **DNA certificates / CAE Assessment / Permits = PROTOCOL**
- 4) **Monitoring / Recordkeeping / Registries = ESA (USFWS) requirement**
- 5) **Private game trade and translocation = enhancement of species**



Non-detrimental enhancement and survival of species



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Genetics need be exchanged for survival

Out-breeding

Between habitats

Between farms / land

Between environments

Between sub-groups

Between managements

**Bontebok Genetic Genome
and certificates / Research**

Genome banking, genetics and pathology
programmes.....



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Action Plan

Maintaining genetic diversity for the best survival and enhancement of healthy populations of especially the rarer types of animals it is **more appropriate to establish a variety of populations** of a given type of animal in **more than one locality** (Du Toit et al., 2014) e.g. the **Asiatic lion** *Panthera leo persica*.

The population consisted of only **12 animals in 1965**; it had a low genetic heterogeneity (similar to the Bontebok) and a high degree of sperm morphological abnormalities (similar to the Cheetah).

By strict conservation the population increased to 400 animals in 2013 but still low heterogeneity. The species was **only enhanced after a Court order** had been issued in 2013 to split the population and **translocate some animals to a different habitat**.



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Action Plan

Small **isolated populations** typically have **lower** levels of **genetic diversity** and become inbred easily due to **lack of translocation** (Du Toit *et al.*, 2014).

The maintenance of genetic diversity implies sufficient variation within a breeding herd / subpopulation to avoid the loss of fertility and general fitness (Du Toit *et al.*, 2014), e.g. the Malawian Sable, 23% genetic variation.



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Action Plan

The most important enhancement parameter for the sustained survival and growth of the Bontebok is the **strengthening and breeding of greater** genetic provenance or **heterozygosity** within the species (Miller *et al.*, 2014).

Population subdivision theoretically can lead to **decreased genetic variation within individual subpopulations** due to genetic drift (*Lande and Barrowclough, 1987*).

Many of the Bontebok populations within reserves and farms are offspring from the founding population at Bontebok National Park. Therefore, it is expected that there will not be significant differentiation between Bontebok populations (*Van der Walt, 2002*).

Can only be achieved with cross translocation, as happens between private game farms.



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Action Plan

Confining the Bontebok to the very few isolated and protected parks and reserves of very limited area size “**canned conservation**” within the historic distribution range is a **highway recipe to the development of a next genetic bottleneck** as clearly explained by *Van Wyk et al. (2013); Allendorf (1983) and Van der Walt (2002); Vrba (1975 & 1995); Van der Walt et al. (2001); Van Wyk et al. (2013); DeYoung and Honeycutt (2005); Van Wyk et al. (2013) and Lande & Barrowclough (1987)*



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SMALL GAME (Bushbuck)



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Bushbuck Diversification

OPEN ACCESS Freely available online



Molecular Biogeography: Towards an Integrated Framework for Conserving Pan-African Biodiversity

Yoshan Moodley*, Michael W. Bruford

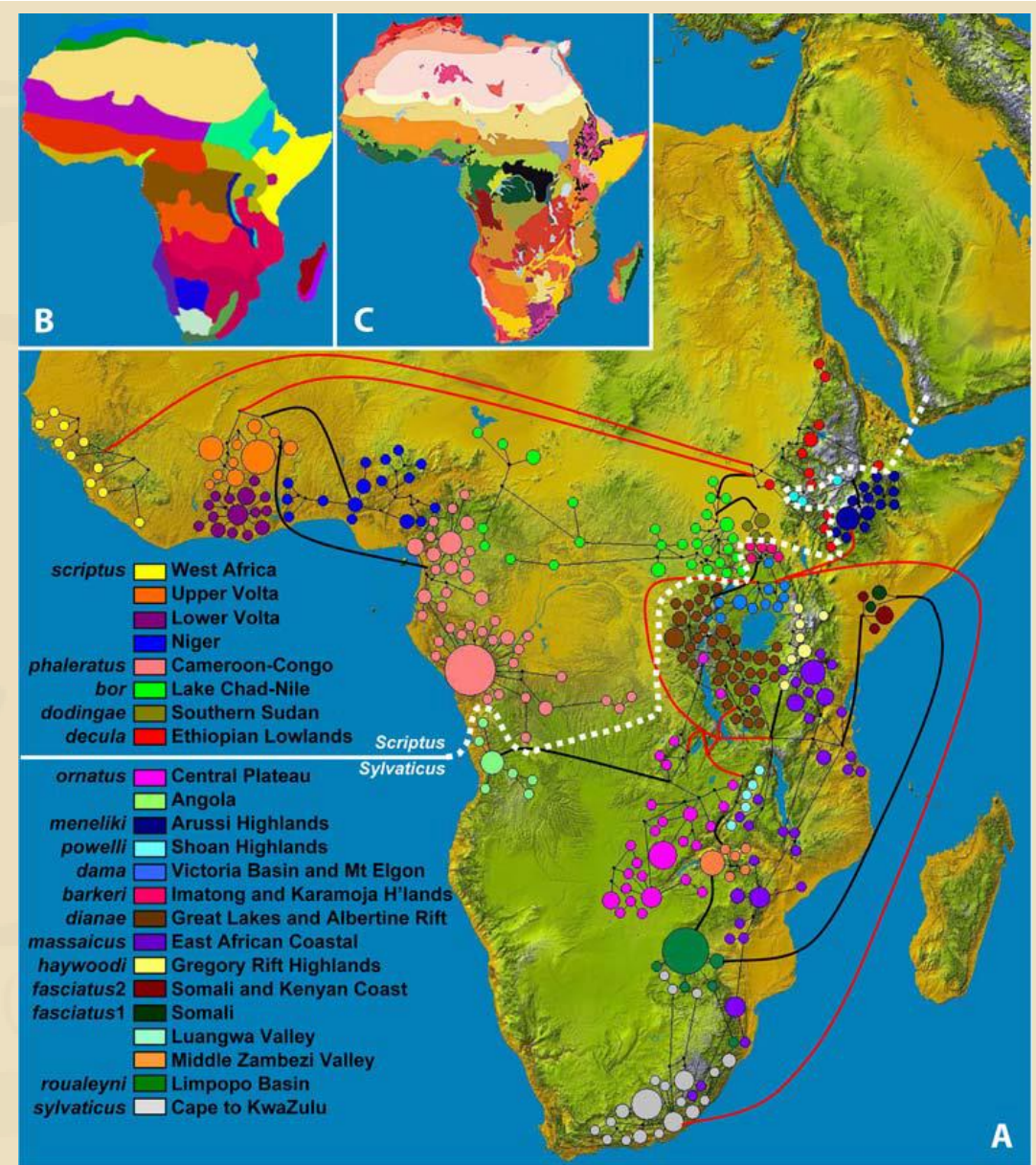
School of Biosciences, Cardiff University, Cardiff, United Kingdom

T. scriptus scriptus
T. scriptus sylvaticus

T. scriptus sylvaticus roualeyni

T. scriptus sylvaticus massaicus

T. scriptus sylvaticus sylvaticus



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Genetic Heterozygosity

Haplogroup	Geographic Range	# Core Ecoregions	% sampled in Core habitat	Index of Specialisation (IS)	Divergence (Kyr)	Ecological Affinity	Core Biome	Key Biogeographic Region
<i>scriptus</i>	West Africa	1	60	60	1710	GENERALIST	Savanna Flooded Savanna Lowland Forest Forest-Savanna Mosaic Flooded Grassland	Northern Savannas North-Eastern Savannas Western Savannas Angolan Scarp Savanna Lake Chad Flooded Savanna East African Coastal Flooded Savanna
<i>bor</i>	Lake Chad to the Nile	5	65.6	13.1	318	GENERALIST		
<i>dodingae</i>	Southern Sudan	1	80	80	207	SPECIALIST		
<i>decuss</i>	Ethiopian Lowlands	2	53.8	26.9	205	GENERALIST		
Upper Volta	Volta River north of the Ashanti Highlands	1	72.4	72.4	606	SPECIALIST		
Lower Volta	Volta River south of the Ashanti Highlands	1	95.4	95.4	233	SPECIALIST		
Niger	Lower Niger Basin	1	47.3	47.3	231	GENERALIST	Forest Grassland Mosaic Karoo Montane Forests Montane Moorlands Montane Woodlands and Grassland Coastal Forest Coastal Forest Mosaic Bushland and Thicket Bushveld Miombo Woodlands Mopane Woodlands Baikiaea Woodlands	Guinean Lowland Forests Congolian Lowland Forests Guinean Forest Savanna Mosaic Congolian Forest Savanna Mosaic Saharan Flooded Grasslands East African Forest Grassland Mosaic Nama Karoo Mount Cameroon Montane Forests Gregory Rift Montane Forests Imatong and Karamoja Montane Forests Ethiopian Highlands Atlantic Coastal Forest Eastern Coastal Forest Mosaic Southern Coastal Forest Mosaic Acacia-Commiphora Bushlands and Thickets South African Bushland and Thickets South African Bushveld Central Zambezan Miombo Woodlands Eastern Miombo Woodlands Angolan Miombo Woodlands Zambezan Mopane Woodlands Zambezan Baikiaea Woodlands
<i>phaleratus</i>	Cameroon and Congo Basin	5	89.6	17.9	72	GENERALIST		
<i>sylvaticus</i>	Cape to KwaZulu	5	44.7	8.94	732	GENERALIST		
<i>meneliki</i>	Arussi Highlands	2	100	50	315	GENERALIST		
<i>powelli</i>	Shoan Highlands	1	100	100	343	SPECIALIST		
<i>dianae</i>	Great Lakes and Albertine Rift Highlands	1	30.9	30.9	306	GENERALIST		
<i>barkeri</i>	Karamoja and Miatong Mountains	1	100	100	137	SPECIALIST		
<i>dama</i>	Victoria Basin and Mt Elgon	0	N/A	N/A	314	No inference		
<i>massaicus</i>	East African Coastal	6	44.8	7.5	211	GENERALIST		
<i>haywoodi</i>	Gregory Rift Highlands	1	87.5	87.5	69	SPECIALIST		
<i>fasciatus2</i>	Kenyan Coast and Somali	1	80	80	67	SPECIALIST		
Zambezi	Middle Zambezi Valley	1	72.7	72.7	91	SPECIALIST		
Luangwa	Laungwa Valley	1	80	80	91	SPECIALIST		
<i>roualeyni</i>	Limpopo Basin	1	80.8	80.8	No est	SPECIALIST		
<i>fasciatus1</i>	Somali	1	100	100	91	SPECIALIST		
<i>omatus</i>	Central Plateau	4	71	17.8	1584	GENERALIST		
Angola	Angola	2	100	50	1411	GENERALIST		

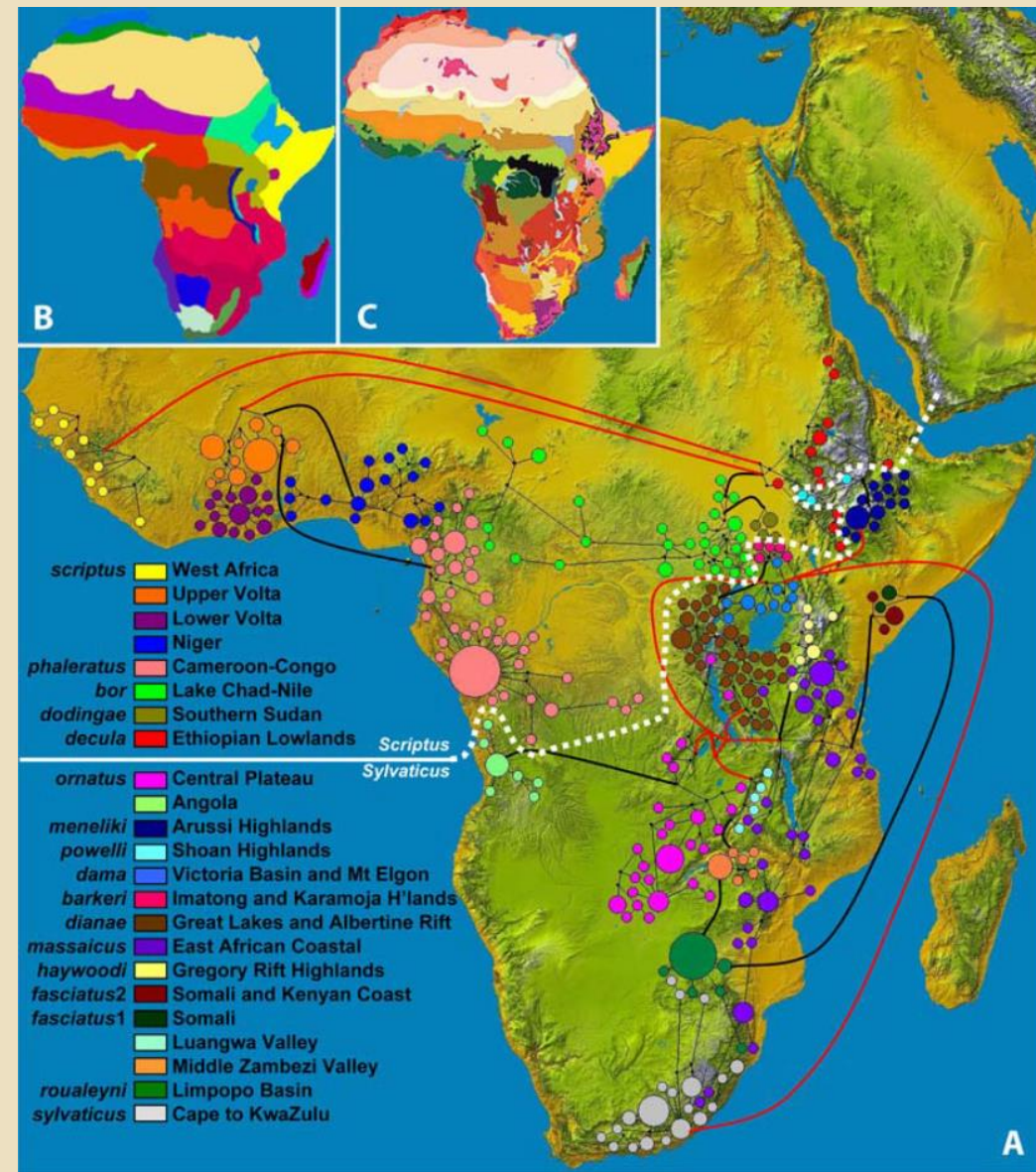


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Eastern Cape: *T. scriptus sylvaticus*



Circles = Isolation
Isolation = Extinction



Translocation Isolation:

Bontebok = Saved (Translocation to Eastern Cape + Free State)

Buschbuck = Isolation of sub-groups (No heterozygosity = Extinction)

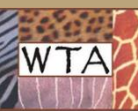
Blue duiker = Isolation of sub-groups (No heterozygosity = Extinction)

Oribi = Isolation of sub-groups (No heterozygosity = Extinction)



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Bontebok Report

74 pages

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Tab “Press Room”

deon@geowild.co.za

Thank You



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WILDLIFE BIOLOGIST SCIENTIFIC REPORT
31 May 2016

BONTEBOK
Damaliscus pygargus pygargus (Pallas, 1766)

Prepared by:

Deon Furstenburg
Wildlife Scientist & Risk Consultant
Appointed by WRSA Bontebok Breeders SA, Mr Gerhard Heyneke, 29 February 2016.



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