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 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
This is to certify that the under mentioned society is registered as a Registering Authority in terms of Section 8(7)(a)(i) 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

6 Jun 2016
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
PROTOCOL:

FREE STATE Farmers
1 Feb 2013

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 Birss

Scientific Services, CapeNature

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Biased - to the detriment of the survival of the species.

Private Bontebok farming &

Producing surplus trophy game to

The detriment of the species.

16 May 2016

16 Mar 2016

1 Feb 2013
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>
<thead>
<tr>
<th>Year</th>
<th>Inside Historic Range</th>
<th>Outside Historic Range</th>
<th>Total Population (excluding animals in Zoos and in Namibia)</th>
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<td>2016</td>
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<td>1,400 *</td>
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</table>

* Numbers that are extrapolated

TABLE 1: Bontebok numbers in past history
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+
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).
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. Progressively increased human pressure attributed to the further down fall of the already pertaining down trend of the Bontebok subspecies.
Coastline change from 18,000 years ago

Outeniqua Basin
120 m lower coastline
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)
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)
Vegetative Bioregions
TABLE 1: Bontebok numbers in past history

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* Numbers that are extrapolated

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

Data from: WRSA Bontebok Breeders Association (2016)

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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)

n (number) - animals as per farm
1575 Bontebok in 76 herds DNA tested
0116 Bontebok in 7 herds not DNA tested
0024 in 1 herd DNA tested as hybrids with blesbok
n (number) of farms = 84

Farm sizes range from 100 ha to 5800 ha
Approved bontebok land = 83493 ha

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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.
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).
Private Bontebok Farm size Free State
Exported Bontebok
Namibia
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
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........
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.
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.
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.
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).
SMALL GAME (Bushbuck)
Bushbuck Diversification

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

Yohan Modley*, 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
Subspecies
(Giant Sable
Niger varianii)

Subspecies
(Sable
Niger niger)

Phenotypes

(Zambian Sable)

(Matetsi Sable)

(Malawian Sable)

BOTTLENECK

Phenotypes = Colour morphs / hybrids

ISOLATION = Inbreeding ➔ EXTINCTION
Genetic Heterozygosity

<table>
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<tr>
<th>Haplogroup</th>
<th>Geographic Range</th>
<th># Core Ecoregions</th>
<th>% sampled in Core habitat</th>
<th>Index of Specialisation (tB)</th>
<th>Divergence (tyr)</th>
<th>Ecological Affinity</th>
<th>Core Bionome</th>
<th>Key Biogeographic Region</th>
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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)
Bontebok Report

74 pages

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Thank You