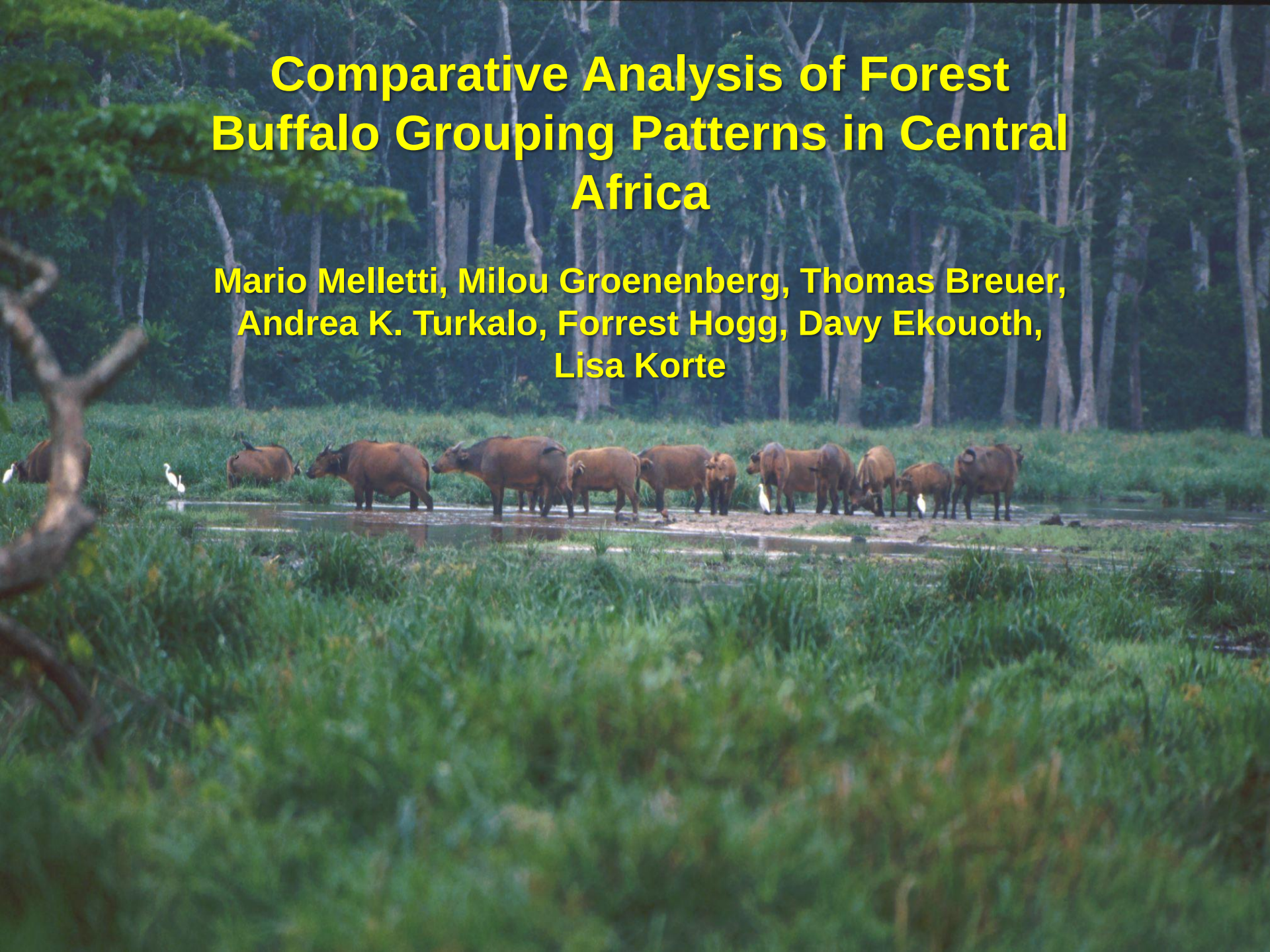


Comparative Analysis of Forest Buffalo Grouping Patterns in Central Africa

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Andrea K. Turkalo, Forrest Hogg, Davy Ekouoth,
Lisa Korte



Study Sites

– Forest clearings (bais)

– Dzanga-Ndoki National Park, Central African Republic

- Bai-Hokou
- Dzanga Bai



– Noubalé-Ndoki National Park, Republic of Congo

- Mbeli Bai
- Bonye Bai



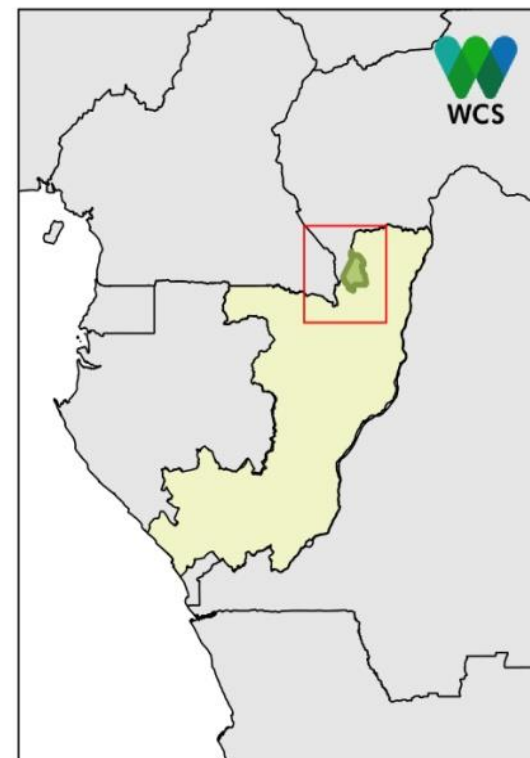
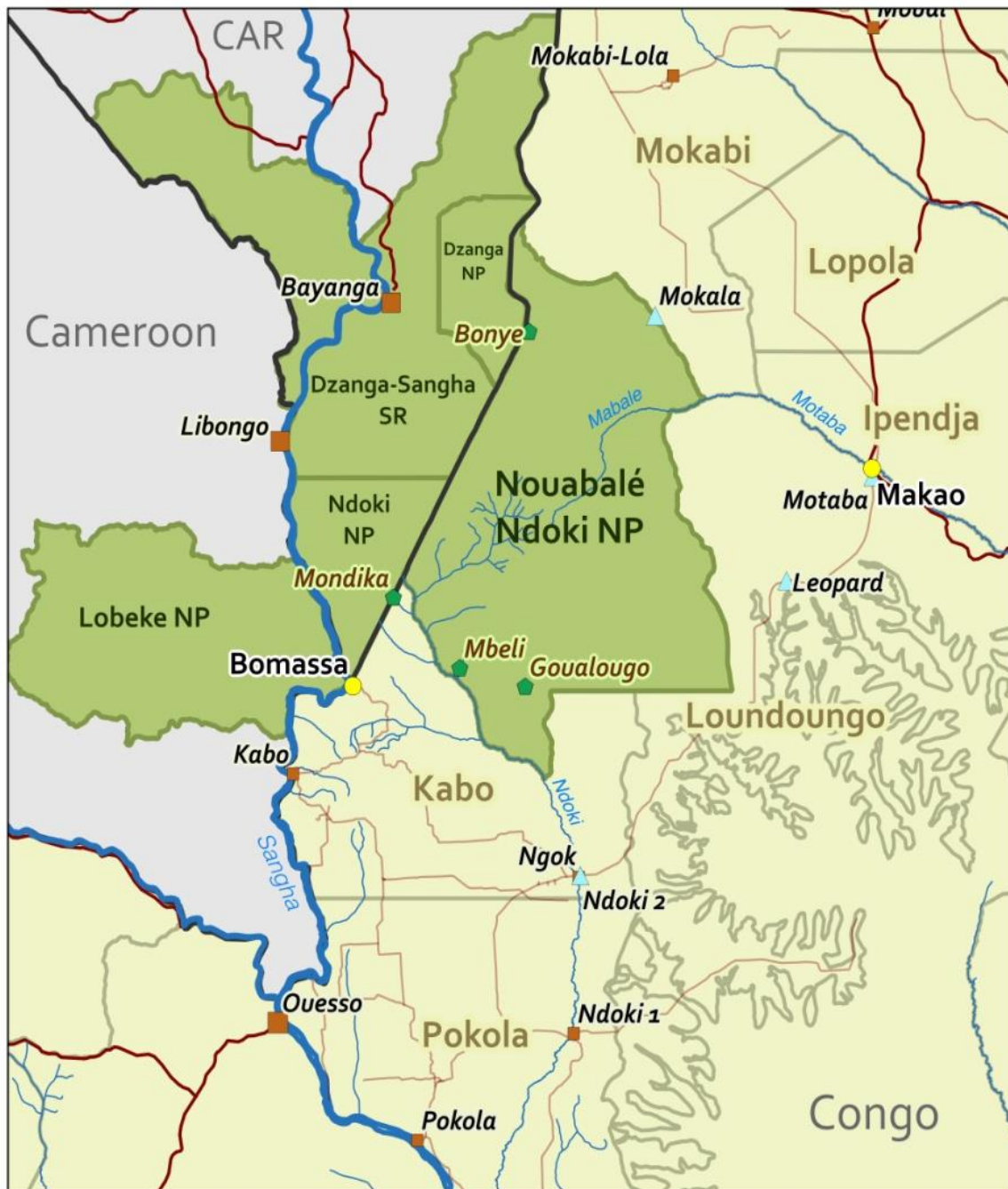
– Rainforest with logging roads

- Campo Ma'an National Park, Cameroon

– Savanna/forest edge

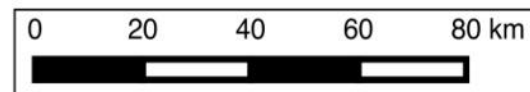
- Lopé National Park, Gabon



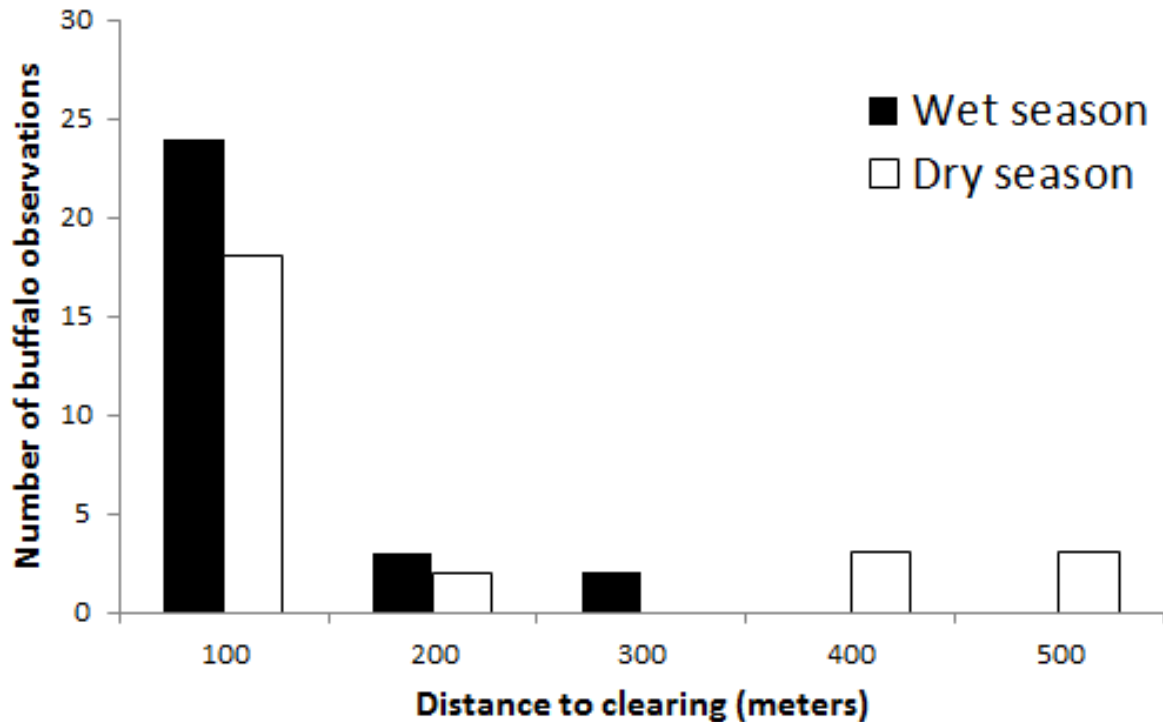


Nouabalé Ndoki National Park

- NNNP Bases
- ◆ Research Camps
- ▲ Ecoguard Posts
- Towns & Villages
- Rivers
- Roads
- Protected Areas
- Logging Concessions



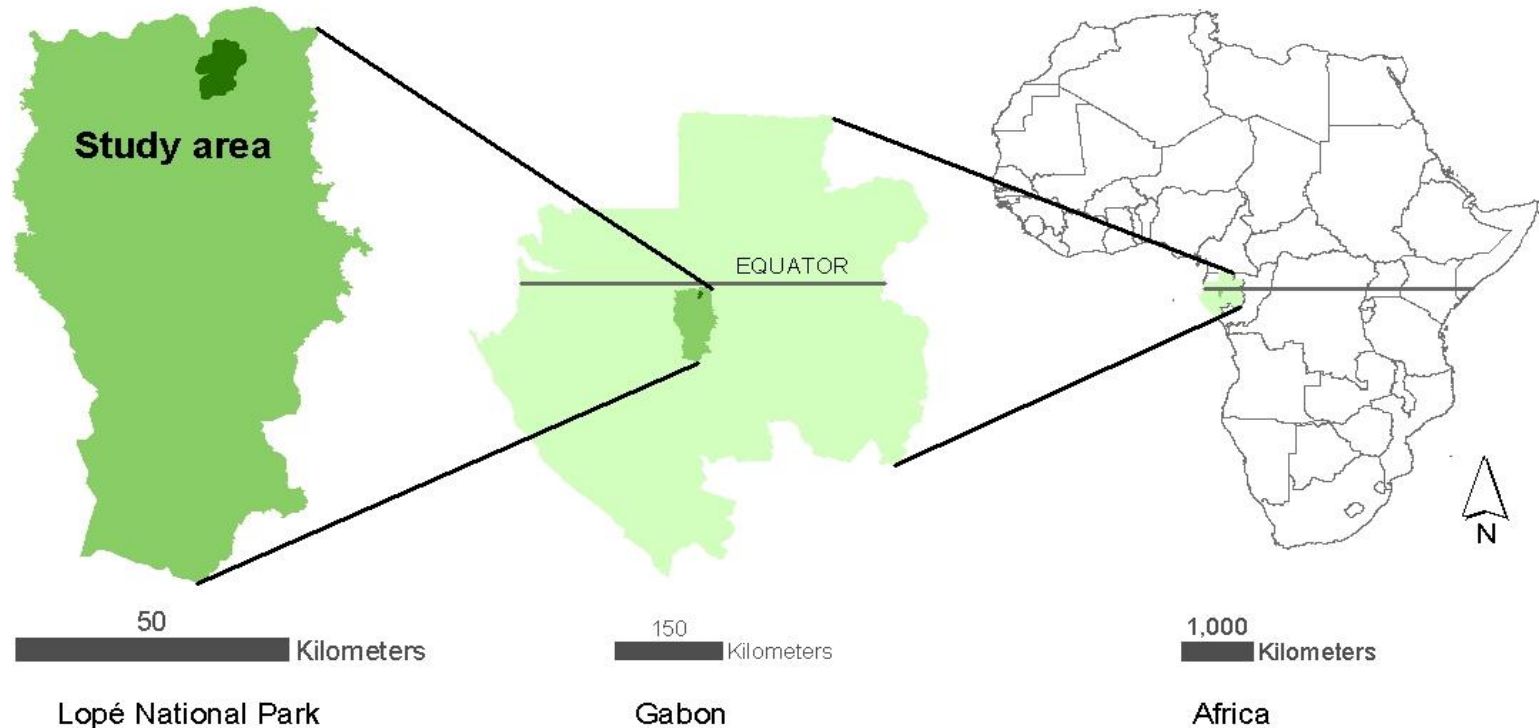
Bai-Hokou (Dzanga-Ndoki N. P.- C. A. R.)



- Rainforest (19 forest clearings range 2-5 ha; study area 25 km²)
- Herd size increased from 16 to 24 ind. (2001-2004)
- Home range size 2-8 km²

(Melletti *et al.* 2007)

Lopé N. P. (Gabon)

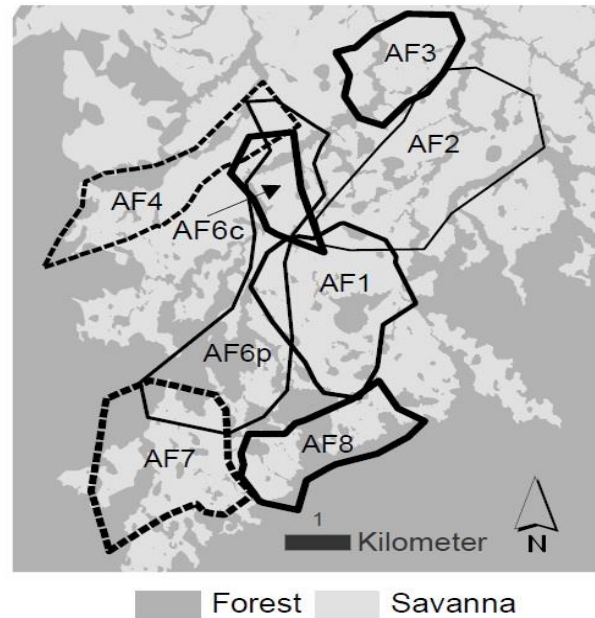


- Forest-savanna mosaic (72 km²)
 - Herd size from 3 to 24 ind. (2002-2004)
 - Mean group size (12 ind.) for 18 herds
 - Home range size 2-8 km²
- (Korte 2008)

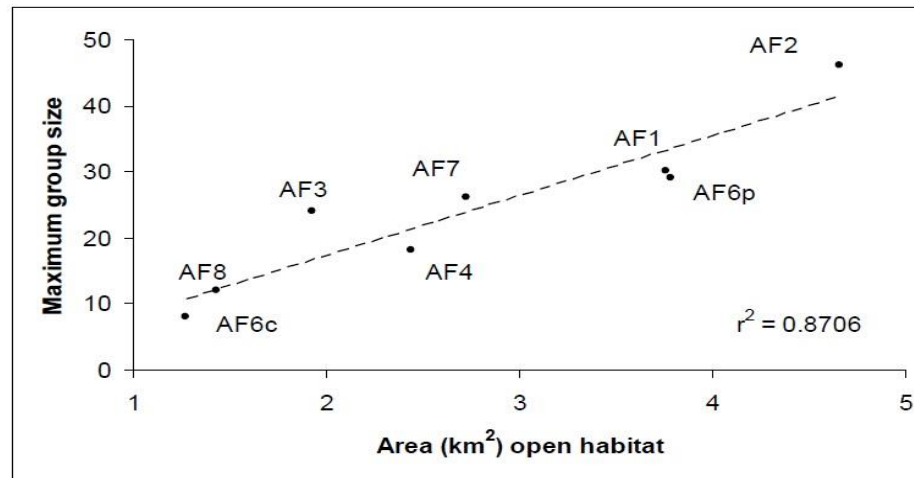
Lopé N. P. (Gabon)

Korte 2008

a)



b)



Home range size in different African buffalo populations

Study area	Home range size (km ²)	Reference
Okavango Delta (Botswana)	359-1537 ¹ ; 159-818 ²	Bennitt, 2012
Caprivi strip (Namibia)	50-448	Naidoo <i>et al.</i> 2012
W Regional Park (Niger, Burkina Faso, Benin)	172-620	Cornélis <i>et al.</i> 2011
Lopé N. P. (Gabon)	2-8	Korte 2008
Dzanga-Ndoki N. P. (C. A. R.)	2-8	Melletti <i>et al.</i> 2007
Klaserie Private Nature Reserve (South Africa)	170-327	Ryan <i>et al.</i> 2006
Botswana	920-1455	Hunter, 1996
Lake Manyara N. P., Tanzania	50	Prins, 1996
Sabi Sand Game Reserve (South Africa)	40-120	Funston <i>et al.</i> 1994
Benoue N. P. (Cameroon)	46-61	Stark 1986
Matusadona N. P., Lake Kariba (Zimbabwe)	60-110	Taylor, 1989,1985
Kenya, Zambia (Busanga swamp), Zimbabwe	126-1075	Mloszewski, 1983
Sengwa Wildlife Research Area (Zimbabwe)	207-286	Conybeare, 1980
Hwange N. P. (Zimbabwe)	286	Conybeare, 1980
Akagera N. P. (Rwanda)	35-60	Monfort, 1980
Serengeti, Tanzania	222	Sinclair, 1977
Momella Lakes, Arusha N. P. (Tanzania)	11	Vesey-Fitzgerald, 1974
Ruwenzori N. P. (Uganda)	9.5	Eltrigham & Woodford, 1973
Tsavo N. P. (Kenya)	85-350	Leuthold, 1972
¹ Migratory population; ² Resident population		

Main differences between the four African buffalo subspecies

African buffalo subspecies	<i>Syncerus caffer caffer</i>	<i>Syncerus caffer brachyceros</i>	<i>Syncerus caffer nanus</i>	<i>Syncerus caffer aequinoctialis</i>
Main Habitat	Different types of woodland and open-arid savannas, montane grassland	Different types of woodland and open savannas	Rainforest, natural forest clearings, equatorial savanna, forest logging roads, costal forest	Different types of woodland and open savannas
Herd size	10-1654 2000-4000	19-150	3-27	2-800
Density (ind./km²)	0.7-20	0.8-1.19	0.01-7.4	2.55; 1.75
Daily movement (km)	1-15	5-15	1-4	
References	Prins & Sinclair, 2013; Bennitt, 2012; Naidoo <i>et al.</i> 2012; Chase, 2011; Ryan <i>et al.</i> 2007; Hunter, 1996; Prins, 1996; Funston <i>et al.</i> 1994	Cornélis <i>et al.</i> 2011; Sinsin <i>et al.</i> 2008; Stark, 1986	Korte, 2008; Melletti, 2008; Bekhuis <i>et al.</i> 2008; Melletti <i>et al.</i> 2007; Morgan, 2007; Van Der Hoeven, De Boer & Prins, 2004; Tutin <i>et al.</i> 1997	

Mbeli Bai (Nouabalé-Ndoki National Park, Republic of Congo)

- 13 ha marshy clearing
- 2 herds (8 and 7 individuals)



Bonye Bai (Nouabalé-Ndoki National Park, Republic of Congo)

- 2.7 ha sandy clearing
- 1 herd (5 individuals)



Dzanga Bai (Dzanga-Ndoki National Park, C. A. R.)

- 10 ha sandy clearing
- 1 herd (27 individuals)





Mbeli Bai (Nouabalé-Ndoki N. P.; Republic of Congo)

- 13 ha marshy clearing
- 2 herds (8 and 7 ind.)



Bonye Bai (Nouabalé-Ndoki N. P.; Republic of Congo)

- 2.7 ha sandy clearing
- 1 herd (5 ind.)

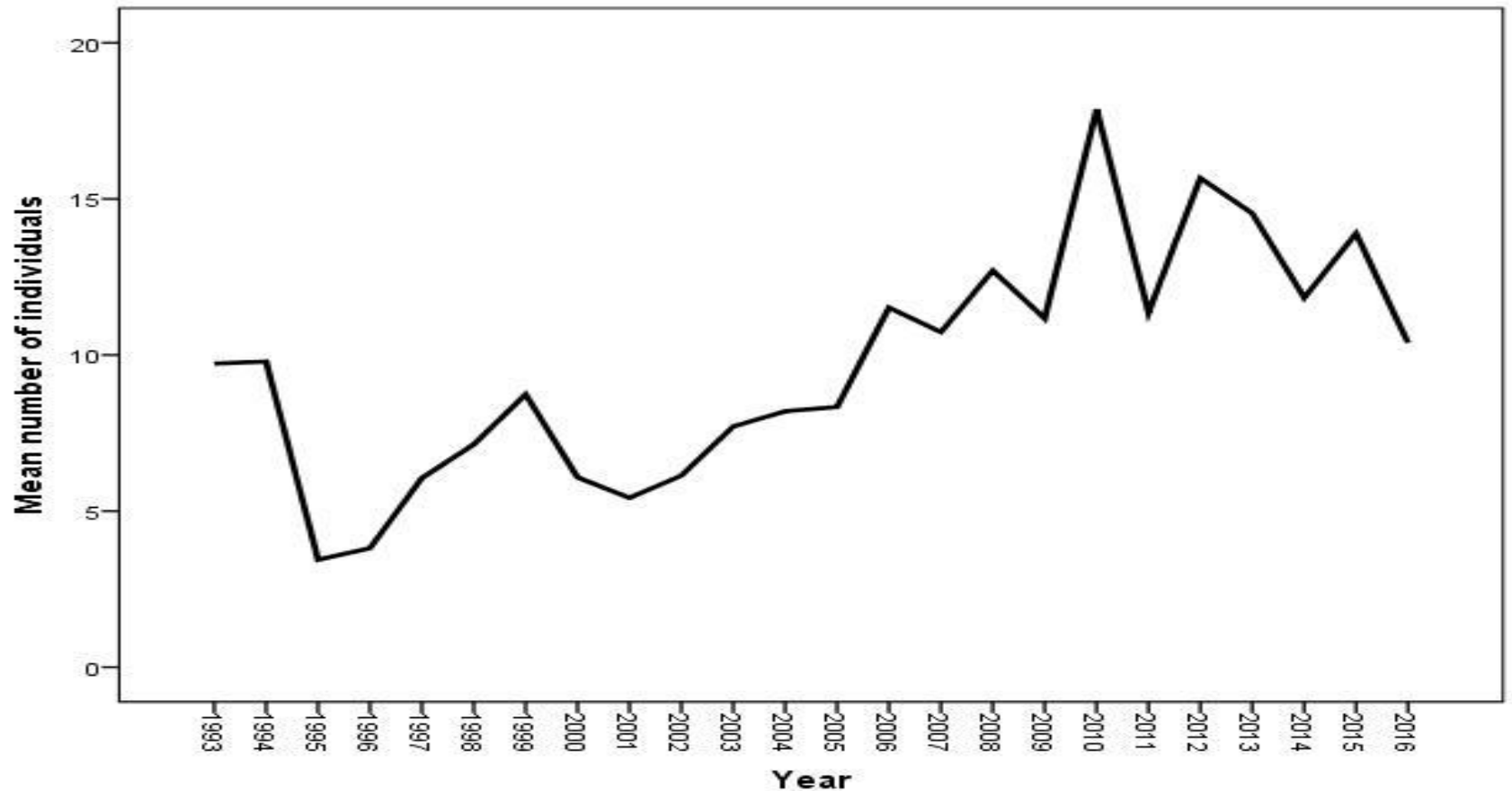


Dzanga Bai (Dzanga-Ndoki N. P.; C. A. R.)

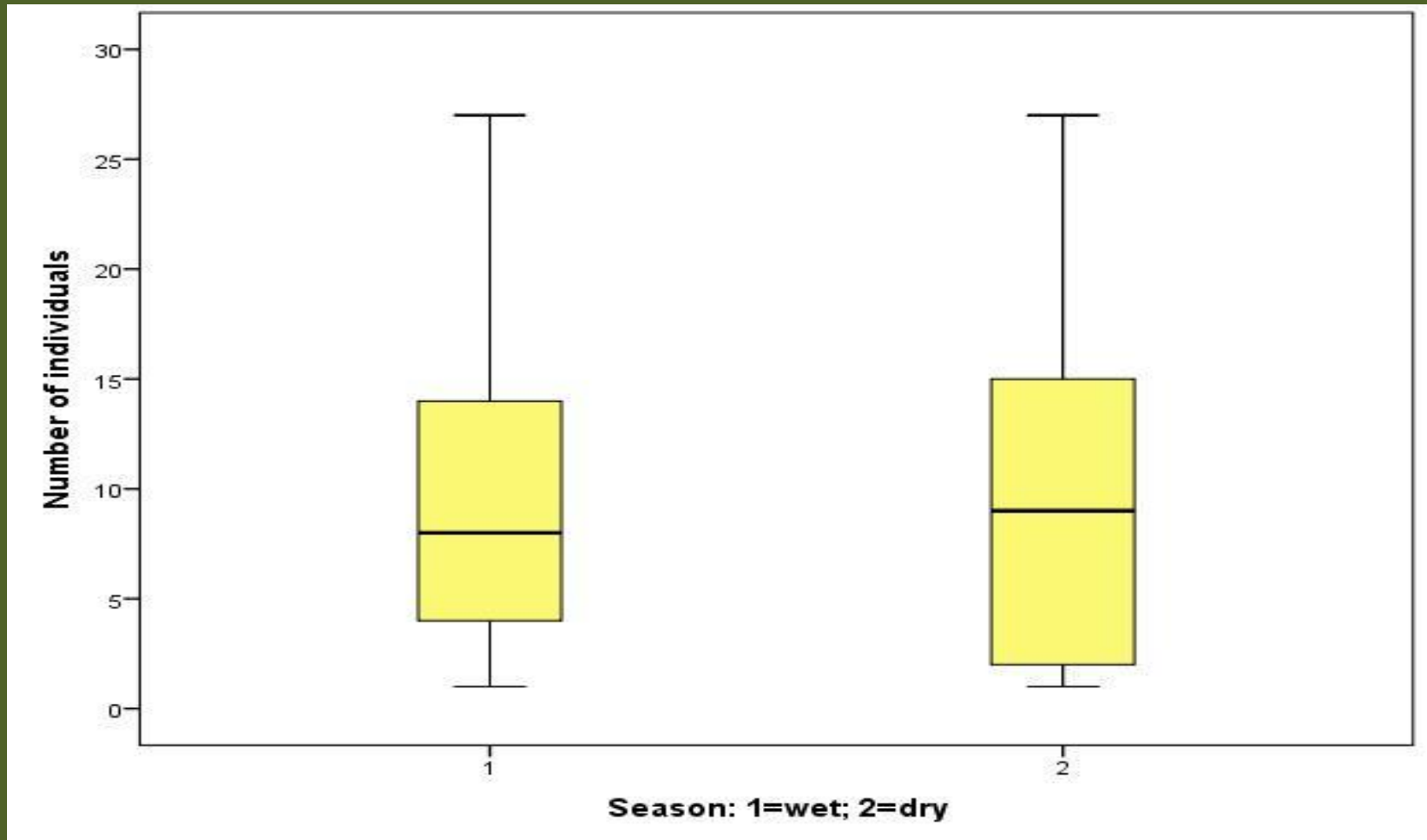
- 10 ha sandy clearing
- 1 herd (27 ind.)

Dzanga Bai

(Dzanga-Ndoki N. P.-C. A. R.)

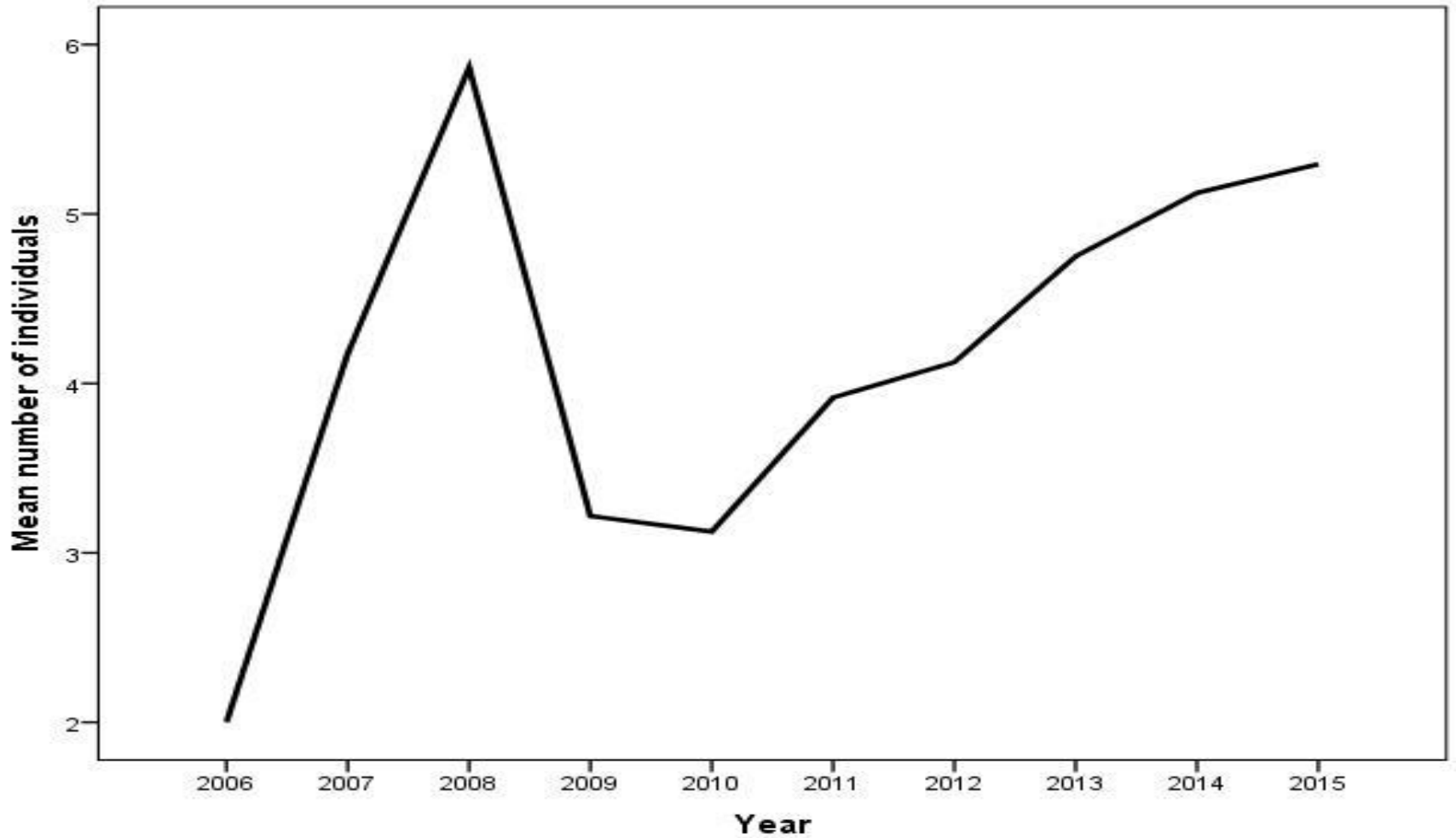


Dzanga Bai (C. A. R.)

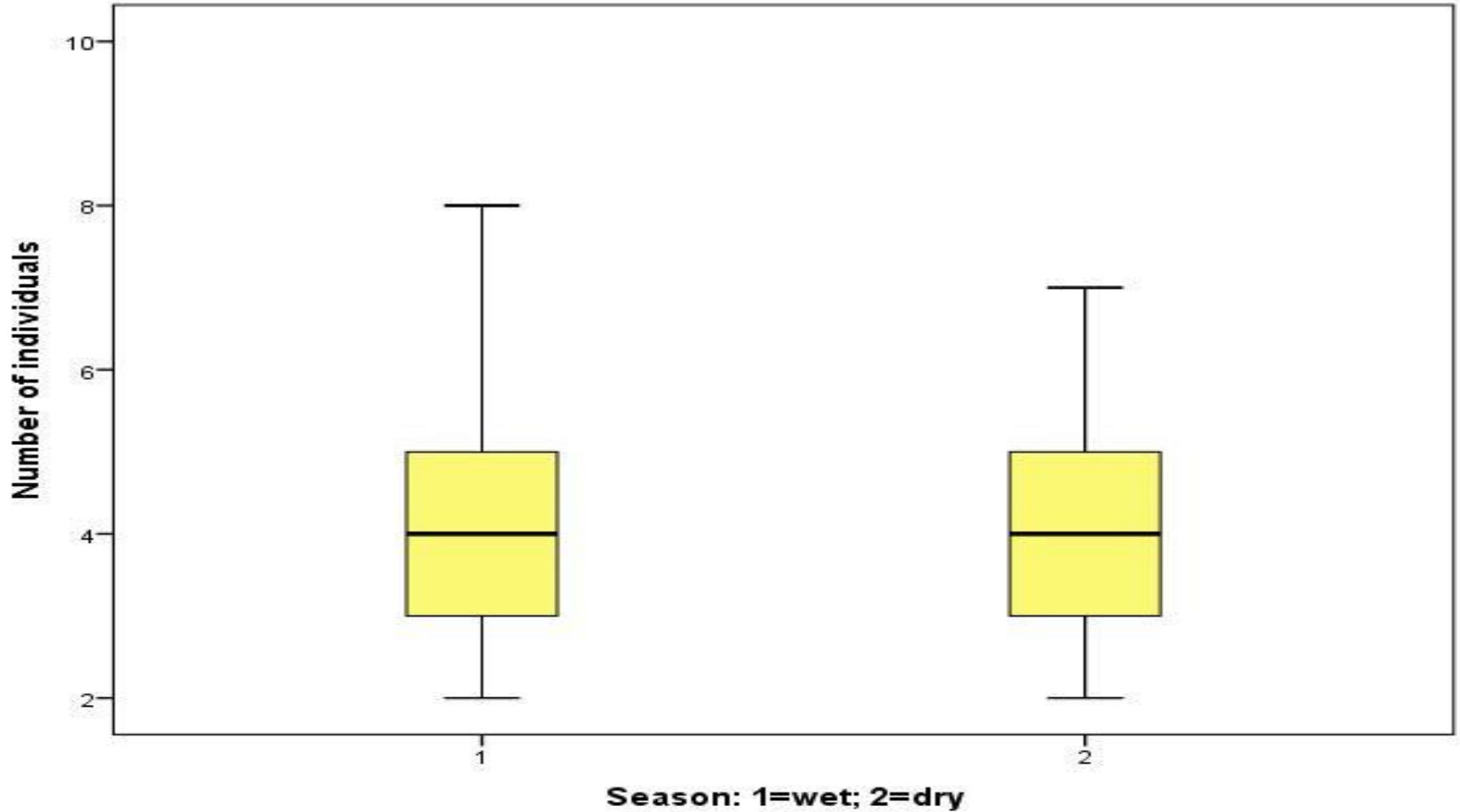


- Mean herd size 9 ind. (wet and dry season)

Mbeli Bai (Noubalé-Ndoki N. P. Republic of Congo)



Mbeli Bai (Republic of Congo)



- Mean herd size 4 ind. (wet and dry season)

Comparison Bonye vs Dzanga Bai (Wet Season)

Mann-Whitney test

Number of individuals: $U = 94.0$, $Z = -3.49$, $P = 0.0001$

Bonye Bai



Dzanga Bai



Comparison Mbeli vs Dzanga Bai (2007-2015)

GLMM (2007-2015)

Response variable:

Number of individuals

Factors:

- Herds (2 herds from Mbeli, 1 herd from Dzanga)
- Season (wet and dry)

Result:

- Number of individuals in 2007-2015 (Mbeli and Dzanga herds) show significant differences as function of the herd $F = 53.4$, $p = 0.0001$
- Seasons have not a significant effect in both Mbeli and Dzanga
- The number of individuals within the herds also showed small variation over the years



Conclusions

- Herd size is smaller than savanna buffalo
- Herd size is less than 50
- Herds are stable units
- Home range size is much smaller (2-8 km²) than savanna buffalo
- Large areas, forest clearings and equatorial savanna, seem to support larger groups of buffalo
- High fidelity of herds for the same forest clearings during many years as supported by long term observations
- No significant differences in the number of individuals in wet and dry seasons
- Results seem to be consistent throughout forested Central Africa

Thank you!

