



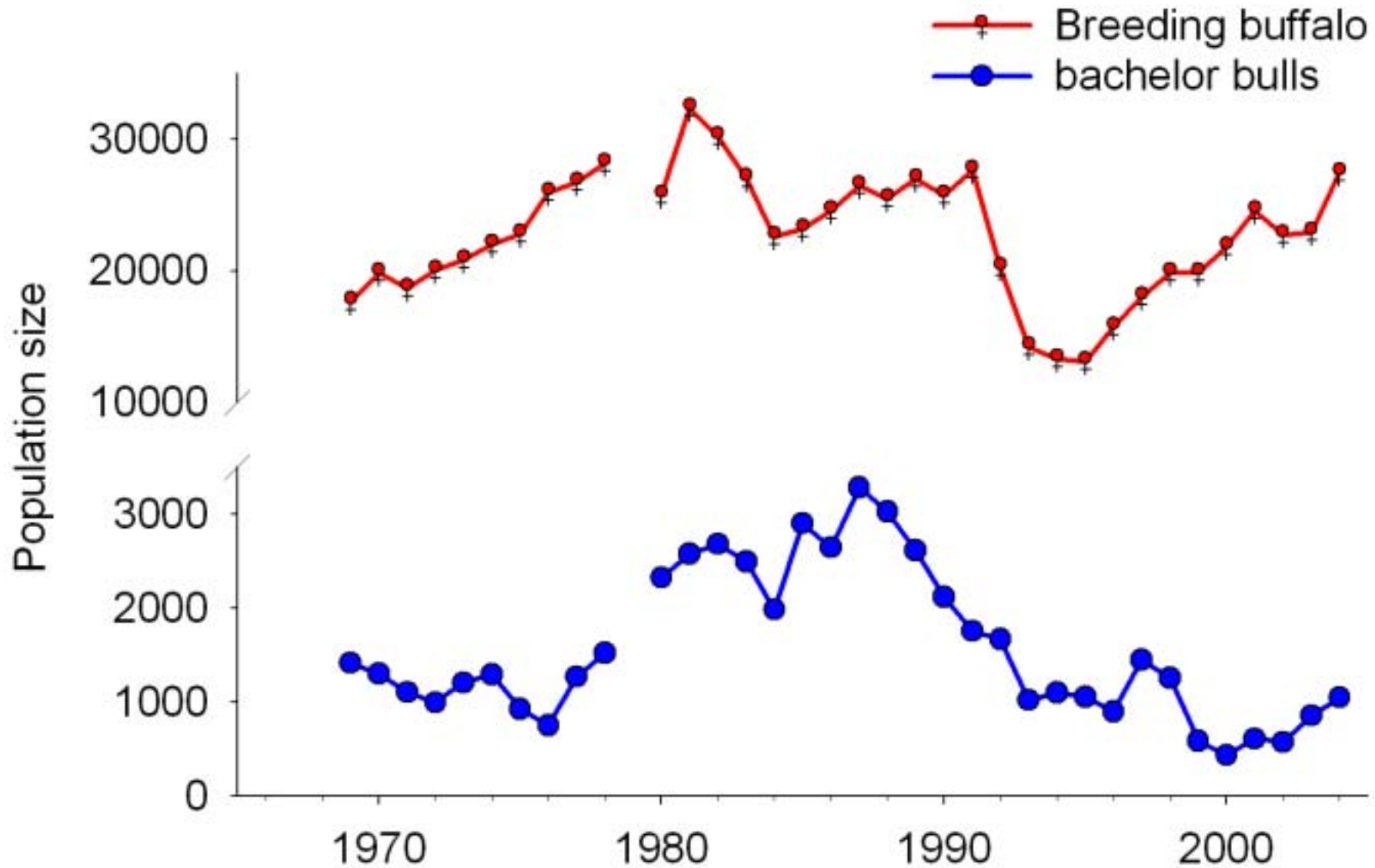
Population dynamics of African buffalo

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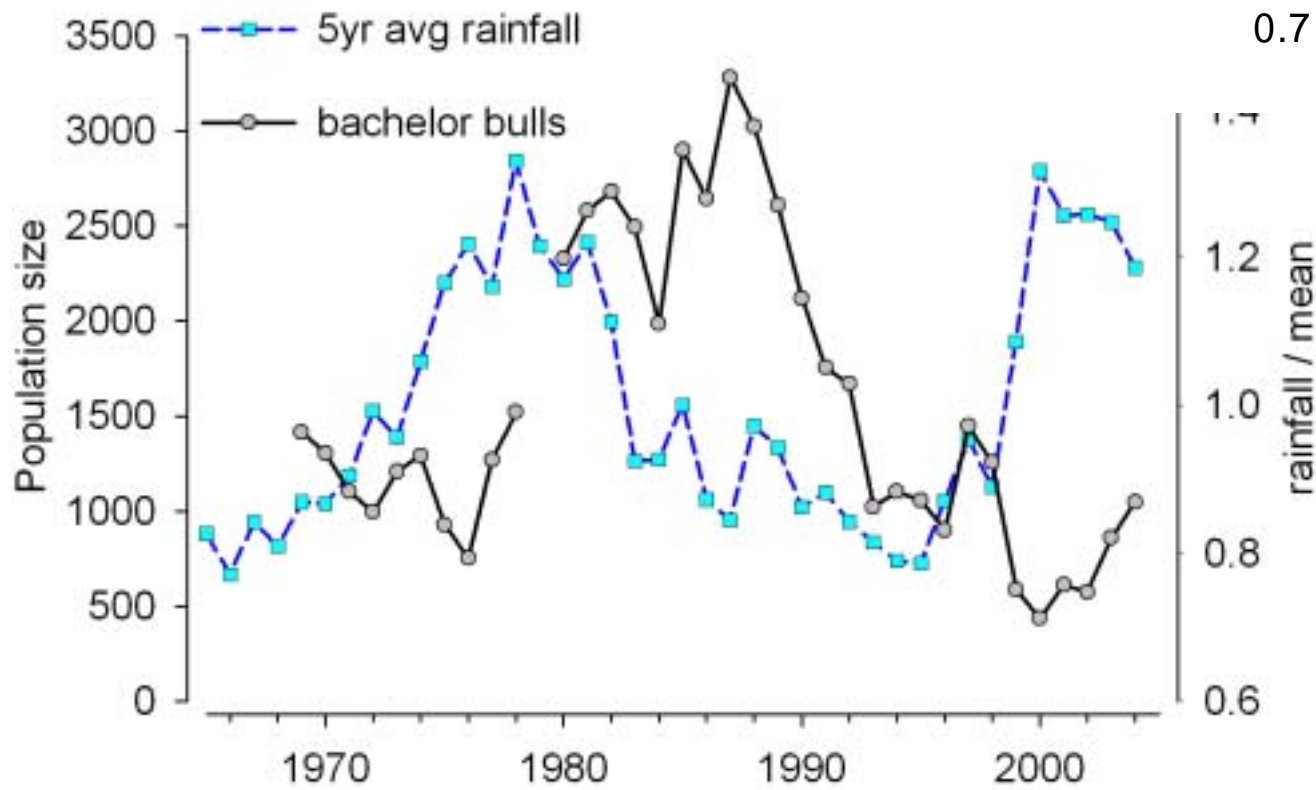
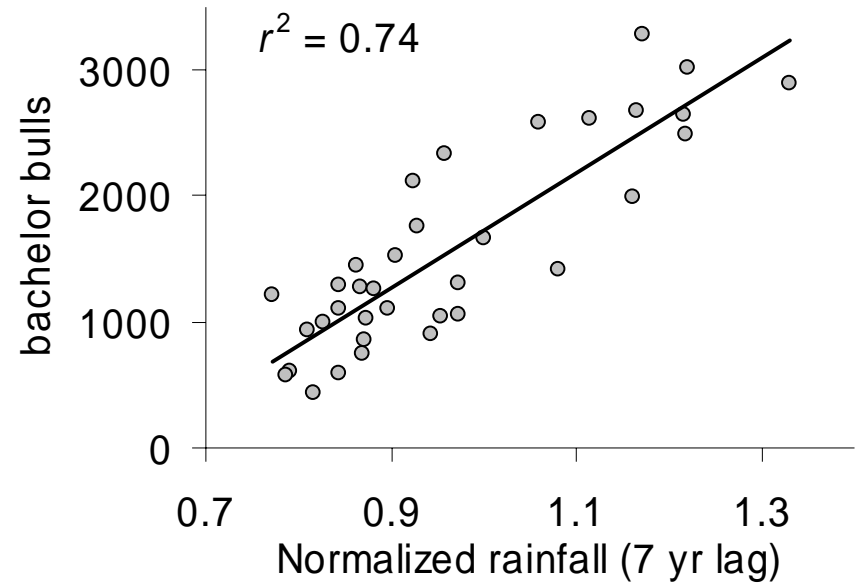
**Collaborators: Ian Whyte, Craig Hay, Julie Wolhuter
Norman Owen-Smith, Wayne Getz**

Strange signals



Why are bulls so different than the rest of the population?

Strange signals



Hypotheses:

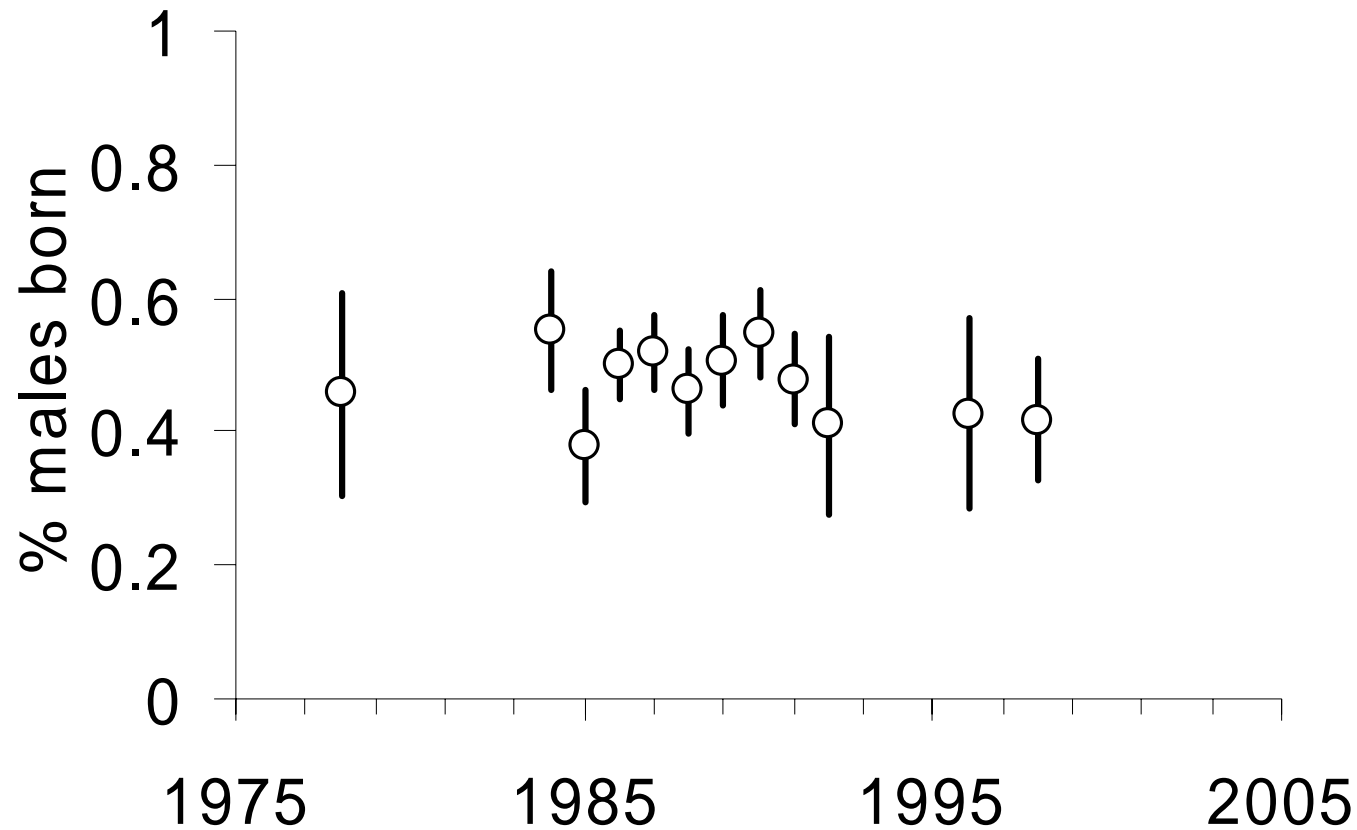
- movement
- reproduction
- survival
- detection
- culling



Methods & Data

- Census data (1969-present)
- Photo recounts of % adult bulls & cows (1985-2004)
- Radio-tracking survival and reproduction data (2000-2005)
- Culling data (1978-1998)

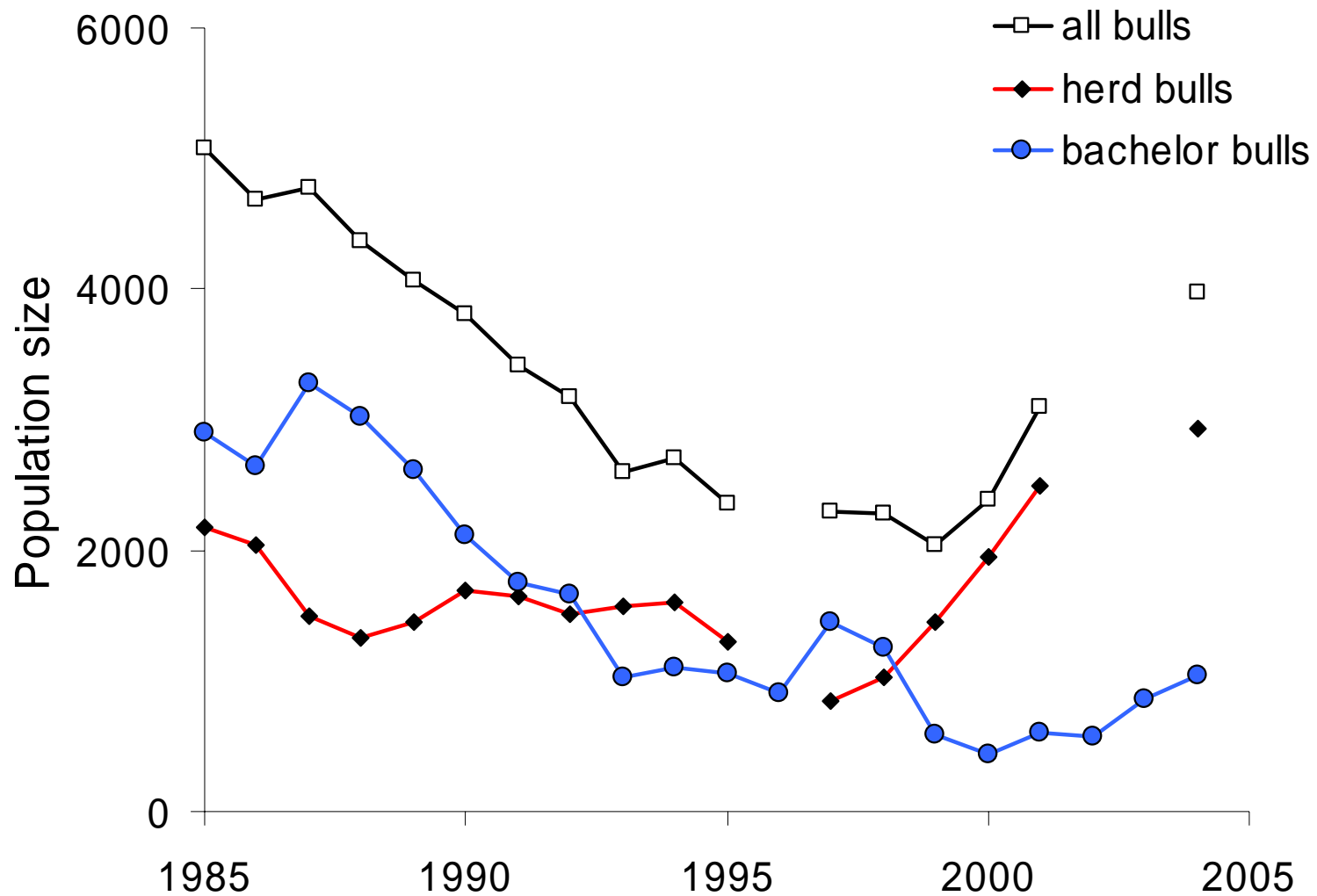
Differential reproduction



No evidence from culling data ($p = .35$).

Modeling analyses also argue against this hypothesis.

Movement between bachelor and mixed herds?



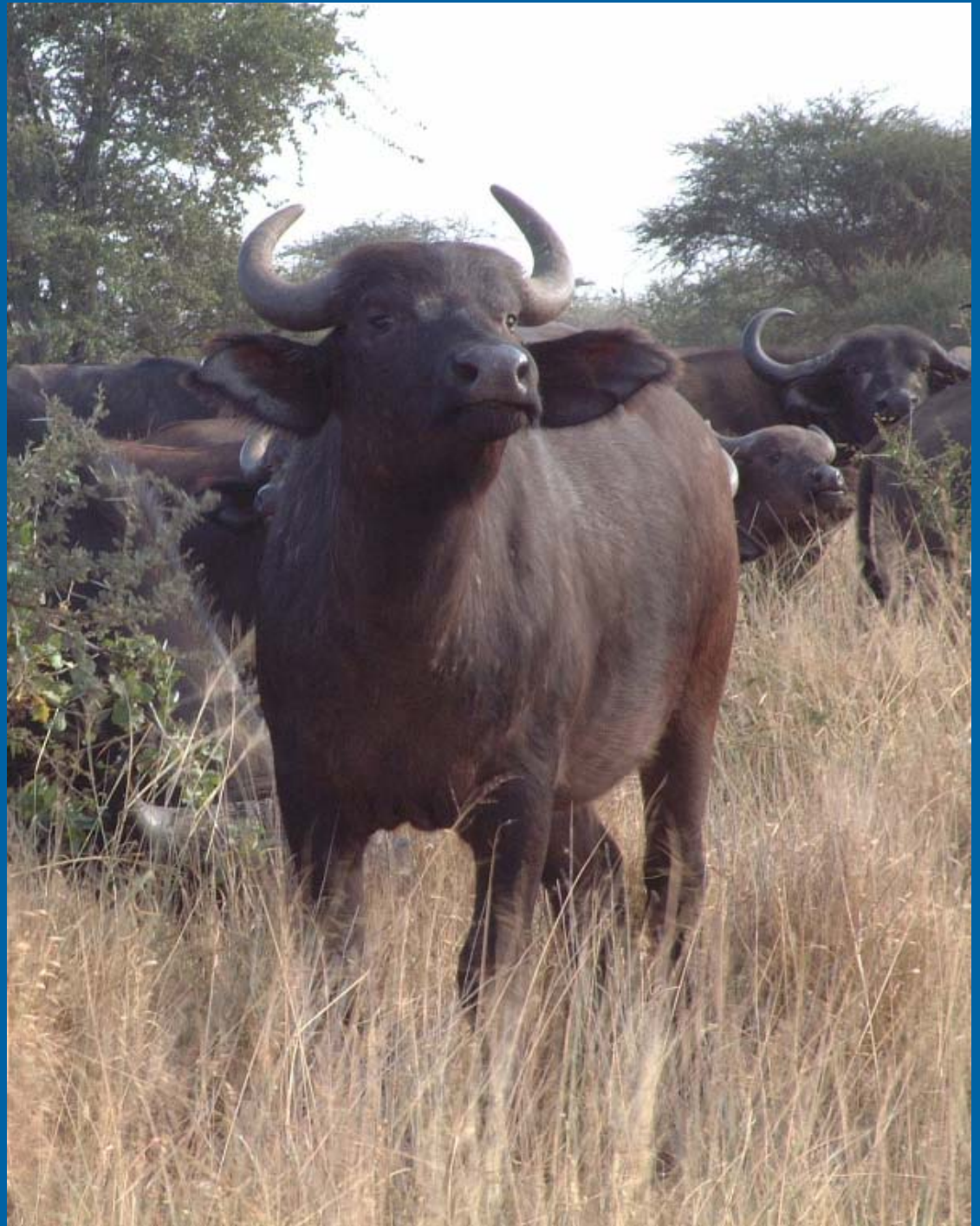
Yes, but doesn't affect overall signal of buffalo bulls.

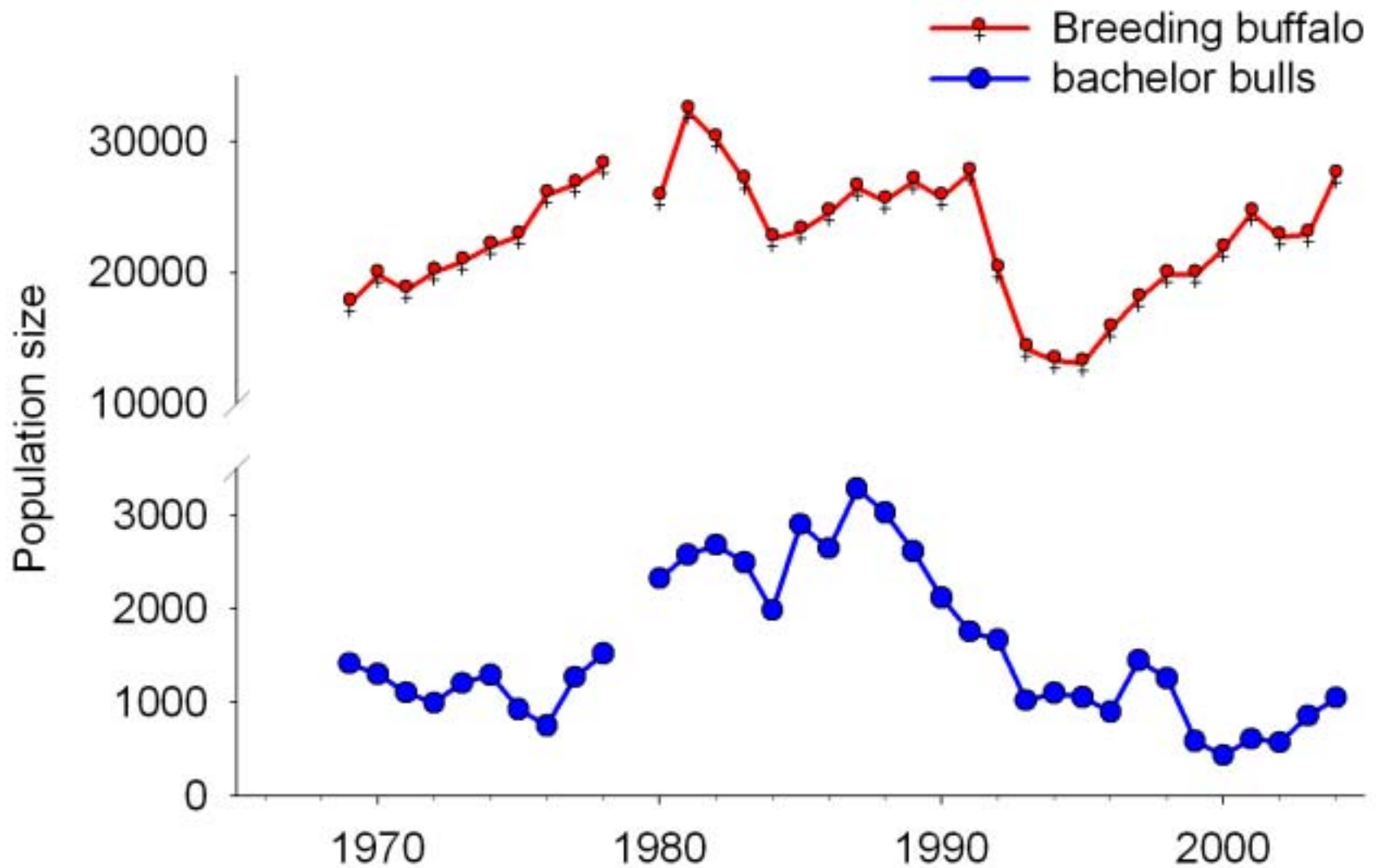
Hypotheses:

movement
reproduction

survival?

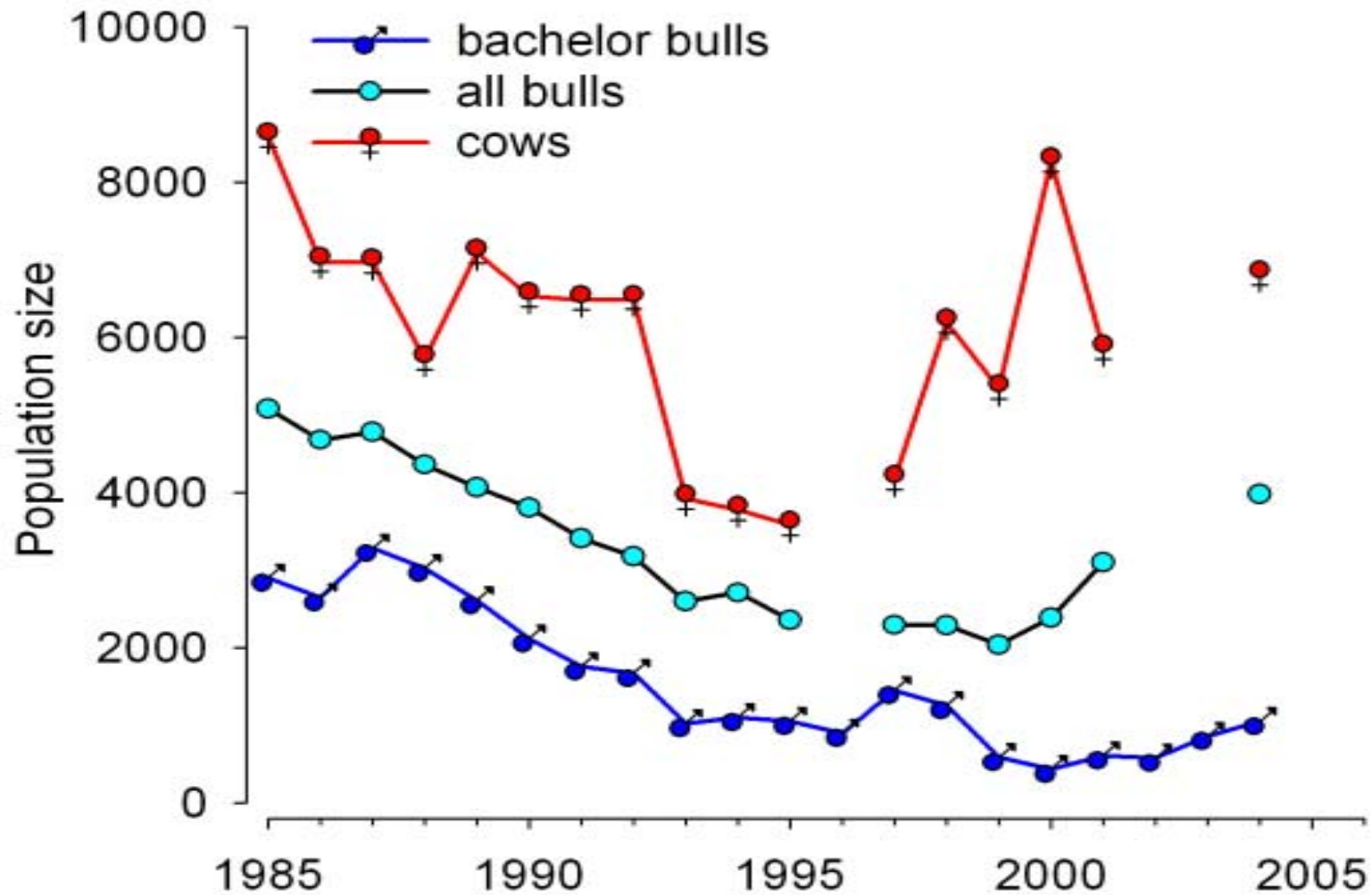
detection
culling





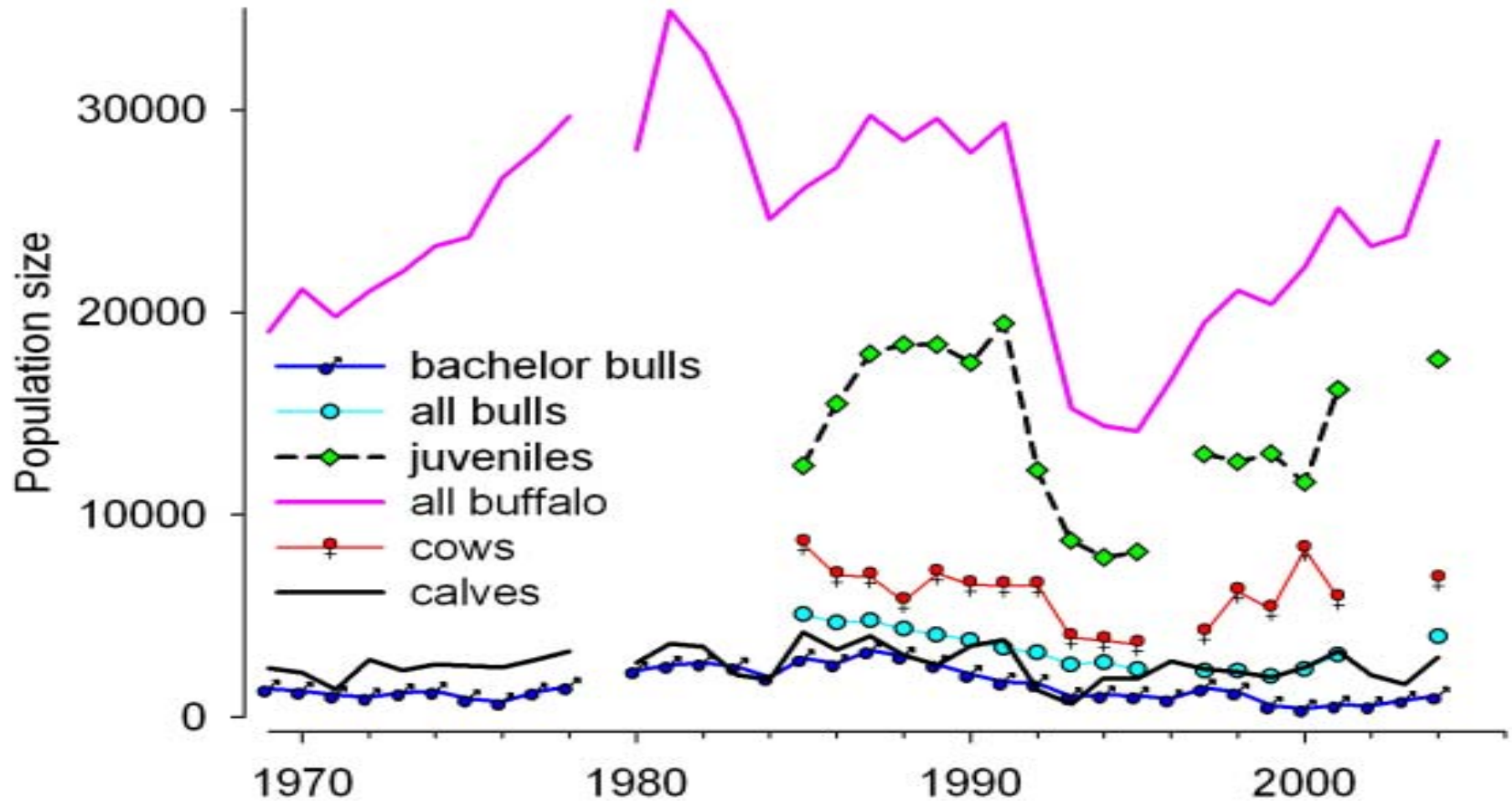
**Is this about males vs. females
or juveniles vs. adults?**

Photo analyses



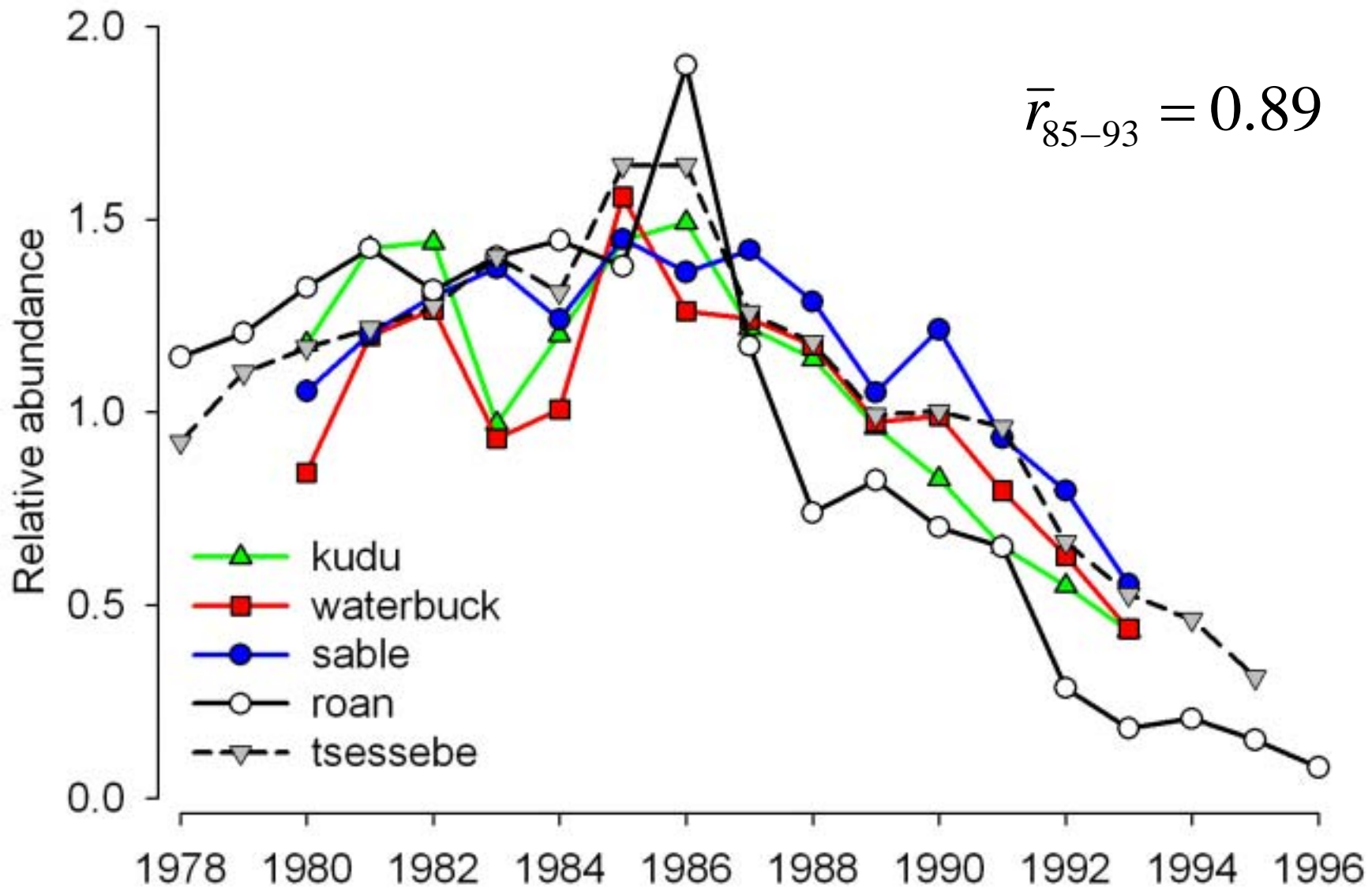
Adult females and adult males roughly correlated ($r^2 = .37$)

Results from photo analyses



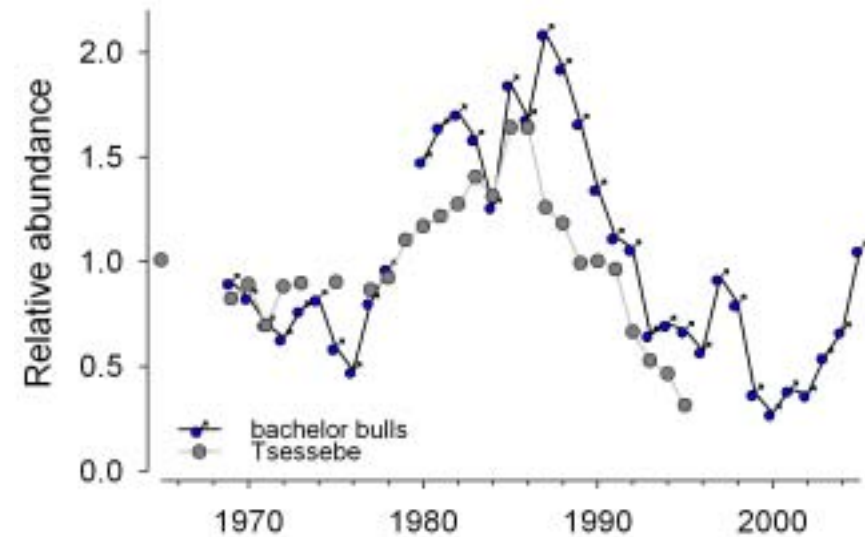
Population crashes mostly related to the juvenile segment.

Declining ungulate species



	Wildebeest	Zebra	Impala	Giraffe	Kudu	Waterbuck	Sable	Roan	Tsessebe	Eland	Bach bulls	Herd buf	Calves	Total buf	All bulls	Juvenile buf	Cow buf
Wildebeest	1																
Zebra	0.59	1															
Impala	-0.07	0.26	1														
Giraffe	-0.36	0.08	0.71	1													
Kudu	-0.01	0.24	0.95	0.82	1												
Waterbuck	0.02	0.18	0.96	0.65	0.95	1											
Sable	0.25	0.33	0.91	0.58	0.92	0.97	1										
Roan	-0.05	0.47	0.90	0.85	0.93	0.84	0.82	1									
Tsessebe	-0.07	0.31	0.97	0.79	0.97	0.95	0.91	0.95	1								
Eland	0.21	0.18	0.73	0.63	0.86	0.84	0.90	0.75	0.78	1							
Bach bulls	0.35	0.25	0.81	0.49	0.87	0.89	0.92	0.70	0.79	0.86	1						
Herd buf	0.62	0.69	0.58	0.00	0.47	0.56	0.66	0.46	0.51	0.36	0.66	1					
Calves	0.27	0.49	0.79	0.27	0.70	0.82	0.85	0.68	0.78	0.60	0.72	0.81	1				
Total buf	0.61	0.66	0.64	0.08	0.56	0.64	0.73	0.52	0.58	0.46	0.75	0.99	0.83	1			
All bulls	0.11	0.25	0.94	0.66	0.97	0.98	0.97	0.86	0.94	0.89	0.94	0.59	0.79	0.67	1		
Juvenile buf	0.75	0.68	0.35	-0.15	0.27	0.34	0.48	0.25	0.29	0.21	0.54	0.95	0.65	0.92	0.38	1	
Cow buf	0.03	0.34	0.79	0.31	0.68	0.78	0.73	0.66	0.74	0.54	0.65	0.61	0.73	0.64	0.77	0.32	1

Adult bull counts highly correlated with other declining species.



Conclusions

- Adult buffalo highly correlated with other declining ungulate species, but not with juvenile component.
- No obvious density dependence, but non-linear pop. growth and calving rates w.r.t. rainfall.
- Not yet clear whether cyclic dynamics of adult males and females are due to recruitment or survival.

Recommendations

- Relative importance of long-term data.
- Waterholes and fire as opportunities for adaptive management.

Acknowledgements

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Stable ungulate species

