



Photo by Jeff Wilson

Earthwatch 2016 Annual Field Report

WALKING WITH AFRICAN WILDLIFE

DR. DAVE J. DRUCE JULY 2016 TO SEPTEMBER 2016



Dear Volunteers,

The 2016 fielding season was a great success as a result of you volunteering your time, legs, eyes and expertise in order to complete a large number of transects throughout Hluhluwe-iMfolozi Park (HiP). All the transects that you walked were repeated between 13 and 17 times during the season, with 4735 different sightings of various herbivore species being recorded! Without you coming to HiP, we would not have been able to repeat the transects as many times as was achieved with you here. We need enough repetition of these transects to have a large enough sample size to produce accurate estimates. As well as for various research projects that are undertaken within HiP, one of the main reasons for conducting the census is to monitor long-term trends in the large herbivore population and to use the information in more effectively managing these species within a "small" (960 km²), enclosed protected area.

During November 2016, we held the annual Animal Population Removals meeting. The aim of this meeting is to debate population estimates, assess population trends and determine offtakes of each species for the following year. As you can imagine, this is a very important meeting and requires excellent information. The park management team was very impressed with the amount of data collected during the census this year. Unfortunately, many of the species are decreasing in number. As a result, only black rhinos will be removed from the park next year, as part of the ongoing provincial and national strategy to increase the distribution of this species. In 2008, many of the large herbivore species had reached 10 year high figures, but most have now dropped to lower levels. We are not sure exactly what has caused this decrease; some of the suggestions include a natural downward fluctuation after a peak, a decrease caused by a prolonged period of below average annual rainfall, incorrect fire burning practices, a result of high numbers of predators such as wild dog and lion or perhaps a result of the stabilization of predator numbers after various introductions over the last few decades. These trends have resulted in us initiating various research projects focusing on lion, wild dog, cheetah and leopard movement, demographics and prey selection. Other projects are looking at "landscapes of fear" within the park to determine if it is more "scary" for herbivores in certain areas of the park, which results in lower population growth rates in these areas.

An additional monitoring project that we have initiated is a biannual road based survey of the herbivore demographics in order to determine recruitment of young into the herbivore population and to determine if any of the species display a skewed sex ratio. Hopefully these projects, in conjunction with the other ongoing monitoring in the park, will assist in determining why many of the herbivore species are in decline. On a positive note, species such as impala and kudu are showing an increase in numbers, while the rate of decline of nyala has slowed considerably and is now only showing a very slight decrease over the last three censuses. Estimates for red duiker and grey duiker could also be produced for the third census in a row and show fairly stable numbers of both species over the six-year period. The data that you, and previous volunteers, collected will also continue to be used in various external research projects and scientific papers which are planned for the next few years!

Thanks again to all for your assistance with this project, the results of which are used directly by the management team as well as other researchers. Thanks also for entering the data immediately after you had completed the transects. It made Geoff's job of analysing the data very easy after you had left. The entire job was done successfully and extremely well!

Regards,

Dave



Summary:

- All game count transects in Hluhluwe-iMfolozi Park were completed between three and 17 times, with the transects that were walked by volunteers being completed between 13 and 17 times each.
- In total 3480 km of transects were walked with 4735 sightings being recorded (an increase from the 3532 sightings in 2014).
- All species, with the exception of impala, kudu, red duiker and grey duiker continued the downward trend in estimates as has been observed since 2008.

Goals, Objectives, and Results:

Objective 1: Count the large herbivore component of game in Hluhluwe-iMfolozi Park (HiP).

This was successfully achieved, despite the lower number of volunteers during this fielding season which resulted in less repetition of each of the transects. At least 60 sightings of each species are required for accurate estimates to be derived. Although this was possible for all species being counted, the estimate for waterbuck *(Kobus ellipsiprymnus)* is not considered very accurate (see Note below).



Objective 2: Use the data to determine a biennial estimate for the ungulate population of Hluhluwe-iMfolozi Park (HiP) which can be used to inform management decisions and highlight further research requirements.

This was successfully achieved. The same methods have been used since 1996 which has produced reliable estimates and allowed scientific services to determine trends in the herbivore population numbers in the park. Over the past few years, there have been significant declines in many of the herbivores being counted which has triggered numerous research projects and a review of the park's predator management plan. These research projects aim to determine the prey selection of wild dogs (*Lycaon pictus*) and lions (*Panthera leo*), to determine the population demographics (rather than just an estimate) of the herbivore population in various areas of the park, to determine whether there are top down or bottom up effects on the herbivores, and to determine what effect various parameters associated with wild dogs and lions have had on the herbivore population over the years. Because the game count data has been collected using the same methods since 1996 and there are other estimates prior to this, it is possible to look into these effects.



Population trends of large herbivores in Hluhluwe-iMfolozi Park between 2000-2016 based on surveys conducted by Earthwatch Institute teams. White rhino counts are not included due to increased threats from poaching.



















Note: Although 67 sightings of waterbuck were recorded, a large number of these sightings were on Transect 4 where it appears a group of waterbuck took up residence. The Coefficient of Variance (CV) for this estimate is high, indicating low confidence in the estimate.







Objective 3: Use the data to establish long term trends in herbivore populations and ensure this data is accessible to research projects.

As mentioned above, various research projects have been initiated which are using the data collected over the years by the Earthwatch-supported game census program. In addition, Conserving Africa's mega-diversity in the Anthropocene: The Hluhluwe-iMfolozi Park story, edited by Joris P.G.M. Cromsigt, Sally Archibald & Norman Owen-Smith" was published by Cambridge University Press in April 2017 and contains a chapter (4) which deals specifically with the trends in herbivore numbers and densities within HiP over the years. Chapter 11 covers aspects of white and black rhino conservation, management and research, which was also informed by the census data collected by Earthwatch volunteers.

Project Impacts

- 1. Increasing Scientific Knowledge
 - a. Total citizen science research hours: Approximately 1872 hrs contributed.
 - b. Peer-reviewed publications:

van der Plas, F., Howison, R.A., Mpanza, N. Cromsigt, J., and H. Olff. 2016. Different-sized grazers have distinctive effects on plant functional composition of an African savannah. *J of Ecology*. 104(3). 864-875.

c. Non-peer reviewed publications:

Results of the 2016 game census were displayed on the notice boards in the two tourist camps in HluhluweiMfolozi Park and were sent to the tour operators that work inside the park.

An annual game census report was produced, in April 2017, for the park management team outlining the methods of the 2016 census, the estimate of each species (including confidence limits) and showing the trends in estimates for every two years since 2000. These estimates were used to inform removals for the 2017/2018 and 2018/2019 financial years.

A white rhino count report was produced, in January 2017, for the park management team which included the white rhino population estimate as derived from the game count census.

d. Non-peer reviewed publications:

Elizabeth le Roux, Geoff Clinning, Dave J. Druce, Norman Owen-Smith, Jan A. Graf & Joris P.G.M. Cromsigt. 2017. Chapter 4. Temporal changes in the large herbivore fauna of Hluhluwe-iMfolozi Park. In *Conserving Africa's mega-diversity in the Anthropocene: The Hluhluwe-iMfolozi Park story*. Edited by Joris P.G.M. Cromsigt, Sally Archibald & Norman Owen-Smith. Cambridge University Press.

Norman Owen-Smith, Joris P.G.M. Cromsigt & Randal Arsenault. 2017. Chapter 5. Megaherbivores, competition and coexistence within the large herbivore guild. In *Conserving Africa's mega-diversity in the Anthropocene: The Hluhluwe-iMfolozi Park story*. Edited by Joris P.G.M. Cromsigt, Sally Archibald & Norman Owen-Smith. Cambridge University Press.

Wayne Linklater & Adrian Shrader. 2017. Chapter 11. Rhino challenges: spatial and social ecology for habitat and population management. In Conserving Africa's mega-diversity in the Anthropocene: The HluhluweiMfolozi Park story. Edited by Joris P.G.M. Cromsigt, Sally Archibald & Norman Owen-Smith. Cambridge University Press.



e. Presentations:

2016 – <u>Marneweck, D.G.</u>, Druce, D.J., Marnewick, K. & Somers, M.J. The effect of wild dogs and rainfall on herbivores in Hluhluwe-iMfolozi Park, South Africa. *14th Annual Savanna Science Network Meeting, Skukuza, Kruger National Park, South Africa; 13-18 March.* ORAL PRESENTATION.

2016 – <u>Druce, D.J.</u> Conserving Africa's mega-diversity in the Anthropocene: The Hluhluwe-iMfolozi Park Story. *Symposium of Contemporary Conservation Practice, Fern Hill, South Africa; 31 October - 4 November.* ORAL PRESENTATION.

2. Mentoring

a. Graduate students:

Student Name	Graduate Degree	Project Title	Anticipated Year of Completion
Elizabeth le Roux	PhD	The role of apex predators in ecosystem function. Fear triggered cascades regulated by differential prey vulnerability	2016
David Marneweck	PhD	Long term behavioral ecology of an enclosed population of African wild dogs	2017

3. Partnerships:

Partner	Support Type(s) ¹	Years of Association (e.g. 2006-present)
Wildlife ACT Fund	Funding, technical support, collaboration	2011 to present
Wildlife ACT	Technical support	2011 to present
Endangered Wildlife Trust	Funding, technical support, collaboration	2008 to present





4. Contributions to management plans or policies:

Plan/Policy Name	Type ²	Level of Impact ³	New or Existing?	Primary goal of plan/policy ⁴	Stage of plan/policy⁵	Description of Contribution
Hluhluwe-iMfolozi Park Management Plan	Management plan	Regional	Existing	Outline management objectives, selected options and goals for a 5 year period	In progress	Herbivore population trends over time
Hluhluwe-iMfolozi Park predator management plan	Management plan	Local	New	Outline herbivore and carnivore management objectives and goals for a 5 year period	In progress	Herbivore population trends over time

5. Conserving natural and sociocultural capital

a. Conservation of taxa -

Species	IUCN Red	Local/regional	Local/regional	Description of	Resulting effect ⁶
	List	conservation	conservation	contribution	
	category	status	status source		
White rhinoceros	Near	Increasing		Removal of	Maintained/enhanced
	threatened			individuals for	genetic diversity,
				supplementation	range increased,
				of other	improved population
				populations,	structure
				increased	
				knowledge of	
				highly important	
				population	



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b. Conservation of ecosystems:

Habitat type	Habitat significance ⁷	Description of contribution	Resulting effect ⁸
Savanna	Breeding ground,	Scarp forest is conserved	Extent maintained
	feeding site, refuge	within the park and no-	
		where else in the province.	
		Provides habitat for various	
		specialist invertebrates.	
		Woodland savanna provides	
		habitat for African wild	
		dogs, cheetah, black rhino	

c. Ecosystem services:

\Box Food and water	\Box Flood and disease control
\Box Spiritual, recreational, and cultural benefits	\Box Nutrient cycling
Details:	

There are a large number of ecosystem services that are maintained as a result of the HluhluweiMfolozi Park. In order to ensure the park maintains and/or enhances all of the possible ecosystem services, it needs to be managed well. This includes ensuring the correct fire regime and a balance between the predators and herbivores in the park. The game census program provides almost all the data required on the trends in the herbivore numbers which can then be compared to rainfall, fire regimes and the distribution and abundance of predators. A detailed ecosystem service assessment was undertaken in the park approximately 7 years ago which showed that the park was very important in contributing the many different ecosystem service functions within the local area.

Research Plan Updates

1.	Have you added a new research site or has your research site location changed?	\Box Yes	⊠No
2.	Has the protected area status of your research site changed?	\Box Yes	⊠No
3.	Has the conservation status of a species you study changed?	□Yes	⊠No

4. Have there been any changes in project scientists or field crew? \square Yes \square No

Details - provide more information for any 'yes' answers

Siphesihle Mbongwa joined the Hluhluwe Research Centre at the beginning of 2016 as a Scientific Technician. He has a BSc (Hons) degree and is currently studying towards his MSc degree.

Acknowledgements

Additional funding is provided by Ezemvelo KZN Wildlife in the form of salaries of long term staff who are dedicated to the project for the 3 months that it is in progress. These include field rangers and Scientific Services staff. Ezemvelo also provides the vehicles and approximately 10 to 20% of the running costs of the vehicles.