

1. COVER PAGE

Award Period: Fall 2019

Principle Investigator(s) Kevin Wilcox

Department: Ecosystem Science and Management

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Project Title from Application: Identifying plant traits to maximize grassland resilience after extreme drought

Amount spent: \$6,471

Non-technical summary (max 1500 characters plus spaces):

In 2016 and 2017, an exceptional drought swept much of Southern Africa, causing widespread mortality of plants and animals in Kruger National Park. This also caused plant communities to shift drastically, and our aim was to assess how these shifts altered the grazing/browsing potential of these ecosystems.

In January and March 2020, we traveled to Kruger National Park, and collaborated with the South African Environmental Observation Network (SAEON) to assess which species were present in Kruger National Park savanna grasslands, measure plant species characteristics related to forage quality, and measure forage quantity. Two University of Wyoming graduate students, Sheila Cloud and Ashley Dupuis, and PI Wilcox worked with local SAEON scientists, Dave Thompson, Mighty Mashele, and Tsumbedzo Ramalevha to collect these data. Forage quality data were generated from vegetation samples by KZN Agricultural and Rural Development.

Although the COVID-19 pandemic caused our March trip to be cut short, Wilcox and Thompson worked on Savanna Rangelands lecture for the Range Ecosystems and Plants course in the College of Agriculture and Natural Resources.

Preliminary data from this funding were used by PI Wilcox to submit an NSF grant which was funded for \$1.4M.

2. REPORT: Maximum of two pages of text; in addition, please also include photos. Must be written in a style understandable by a general audience.

Main results of planned activities:

In 2016 and 2017, an exceptional drought swept much of Southern Africa, causing widespread mortality of plants and animals in Kruger National Park. This also caused plant communities to shift drastically, and our aim was to assess how these shifts altered the grazing/browsing potential of these ecosystems.

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Although the COVID-19 pandemic caused our March trip to be cut short, Wilcox and Thompson are working on a Savanna Rangelands lecture for the Range Ecosystems and Plants course in the College of Agriculture and Natural Resources.

Future plans:

These preliminary data were used by PI Wilcox to submit a National Science Foundation (NSF) grant for \$1.4M to study the effects of extreme fire, grazing, and drought on plant communities, which was funded in full. PI Wilcox's lab will continue to go back to these plots, and provide training and support for US and South African students, technicians, and scientists. Additionally, this will provide critical information for land managers in Kruger National Park.

Impacts to (a) the College of Agriculture and Natural Resources, (b) the University of Wyoming, and (c) the State of Wyoming:

- (a) These data were important pieces of a large NSF grant which will support graduate students in CANR. Additionally, I am leveraging expertise and knowledge of SAEON scientists to broaden the scope of a CANR course – REWM 2400 – Range Ecosystems and Plants – which now includes savanna grasslands. If the NSF proposal is funded, it will partially fund a field-based international J term course which will take students to Kruger National Park to undertake hands-on learning about savanna ecosystems from local scientists.
- (b) The University of Wyoming will benefit from many of the activities listed in (a). This research is attractive to a wide audience and will bring in top-notch graduate students from around the US and internationally. Additionally, if funded, the NSF grant would directly benefit the university by bringing in research funds.
- (c) The State of Wyoming benefits from this research by learning from the two-year drought in Kruger National Park. This information is invaluable to support the sustainability of rangeland services (e.g., forage quality/quantity) under future climate scenarios of more extreme and frequent drought. Understanding the long-term impacts on savanna grasslands will provide insight into how Wyoming grasslands may respond in the future, and what steps may be taken to maximize services during and after these climatic events.

Photos:

Ashley Dupuis (left) and Sheila Cloud (right) CANR master's students sampling vegetation within a long-term grazing experiment in Kruger National Park



SAEON scientists Mighty Mashele (left) and Tsumbedzo Ramalevha (right) measuring forage biomass:



Kevin Wilcox (center) and Tsumbedzo Ramalevha (right) taking plant species composition measurements within a rhino-battered grazing enclosure while game guard Desmond Mabaso (left) looks on:



Tsumbedzo Ramalevha and Mighty Mashele clipping an individual *Heliotropium nelsonii* for trait processing:



Two teenage cheetahs (mom was lying down a little ways off) spotted amidst a swath of Black Speargrass on our morning drive into work:



Late again to the site because of an elephant-related traffic jam:



Rare wild dog sitting on our drive out of Kruger National Park!

