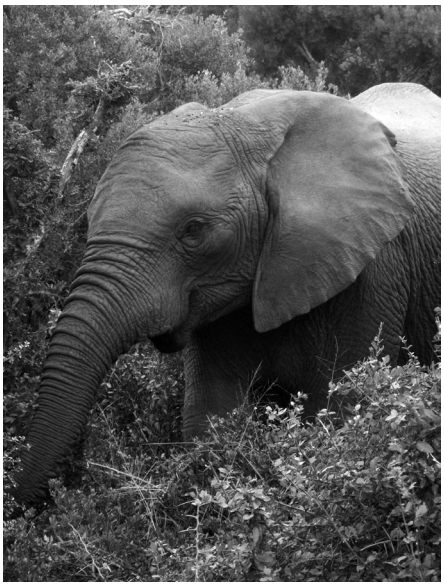
Impacts of a Growing Elephant Population in Southern Africa

TIM FULLMAN

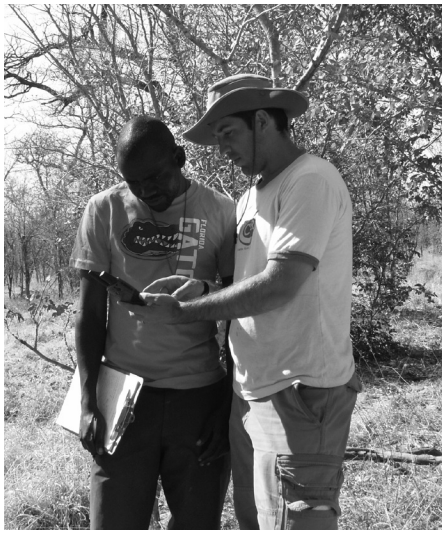
My research investigates the impacts of African elephants (Loxodonta africana) on vegetation and large herbivores of southern Africa. Elephants are one of the main drivers of landscape change in southern Africa and there is increasing concern about the possibility of negative effects on biodiversity caused by increasing elephant populations. I am investigating this topic by considering spatial patterns of elephant habitat use and impacts. In previous field seasons, my work has concentrated on collecting animal location data to create species distribution models for elephants and other large herbivores in protected areas of Botswana and Namibia. By evaluating how habitat use changes for different species across a gradient of elephant densities I hope to improve understanding of how increases in elephant numbers will influence other wildlife.

In the 2012 field season, I had the opportunity to initiate two new projects, one in Chobe National Park, Botswana, where much of my previous work has focused, and the other in Addo Elephant National Park, South Africa. The Botswana project uses satellite imagery to detect vegetation modified by elephants. Being able to assess elephant impacts on trees is an important step in promoting effective management strategies. The Moving Standard Deviation Index (MSDI) uses the standard deviation of satellite image values to assess degradation of vegetation. Used predominantly for assessing impacts of livestock on rangelands, it has been suggested as an effective means of identifying elephant-modified landscapes. Working with a local research assistant, I evaluated the status of vegetation at 270 sites within the Chobe riverfont, a heavily elephant-impacted landscape. By linking these data with MSDI values, we will be able to use other satellite images to investigate how elephant modification of vegetation compares between Chobe and other parks with lower densities of elephants. We



can also look back in time using older imagery to see how modification of vegetation has changed as the elephant population has increased in Chobe. Furthermore, we will be able to create maps of modified versus unmodified habitat, which will allow us to assess how other large herbivore species utilize or avoid elephant-impacted areas, informing the distribution modeling conducted in past field seasons. In addition to the plots in the park, we conducted 17 plots in the nearby Chobe Enclave, a collection of five villages that border the park. We will use these to assess whether the MSDI may also be useful for highlighting areas heavily modified by people, providing an exciting opportunity to compare patterns of vegetation degradation between areas dominated by human versus wildlife drivers.

In Addo, I am working with Greg Kiker (UF Department of Agricultural and Biological Engineering), and Jessica Steele (PhD student in the UF Geography Department) to investigate how elephant movement patterns relate to vegetation change. Using GPS collar data from seven elephants, we will examine how elephant movement both influences and is influenced by seasonal and long-term shifts in vegetation. This information will help managers better understand elephant habitat preferences to predict future impacts on vegetation as well as the effects of management efforts such as artificial waterhole provision and park expansion. This is extremely important as the Addo ecosystem is home to a number of rare and endemic plant and animal species. We met with park managers, a local university research team, and members of the South African National Parks research division to discuss our plans and seek out avenues of collaboration. I look forward to continuing to work with these groups to promote management efforts that balance the needs of a growing elephant population with those of the diverse flora and fauna of South African succulent thicket.



Tim Fullman is a PhD candidate in the Department of Geography and a former FLAS fellow (Swahili, 2007-09). *Funding was provided by the Cleveland Metroparks Zoo and Zoological Society, the QSE3 IGERT program at UF, and IDEA WILD.*