

The influence of increasing population size and vegetation productivity on elephant distribution in the Kruger National Park

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KEYWORDS

density dependence • habitat utilization • large herbivore • *Loxodonta africana* • NDVI • vegetation productivity

ABSTRACT

Decisions to reduce the impacts of large herbivores on biodiversity in protected areas are often based on controlling their numbers. However, numbers per se may not be the foremost consideration when managing impacts. This is because density-related changes in distribution can also affect habitat utilization and hence, impact. In this study we tested whether changes in the distribution of African elephants are associated with increasing population size. We used spatially explicit count data collected during the dry seasons from 1998 to 2004 in South Africa's Kruger National Park. We did this at five spatial scales and in landscapes defined by vegetation, geology, climate and soils. We then investigated whether observed distributions and grid-cell-specific densities were associated with the remotely sensed Normalized Difference Vegetation Index (NDVI) as a measure of productivity and therefore food resource availability at the landscape scale. Consistent with density mediated changes, we found that elephant grid-cell occupancy increased with population size, while grid-cell-specific density became less variable. In addition, the combined distribution of bull groups and breeding herds became less clumped with increasing population size. We further found that within landscapes elephants were present on grid-cells with higher NDVI values, but that the influence of NDVI during the dry season on densities among landscapes may be weak. These results suggest that NDVI was more indicative of structural habitat choices such as woody vegetation than food availability per se. Our study highlights the need to consider factors other than population size alone when formulating management decisions to reduce large herbivore impacts on biodiversity in protected areas.

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