In collaboration with

Progress Report

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Population estimation of African elephants using photographic encounter data and capture-recapture analysis

The goal of our study was to use photographic encounter data from Elephants Alive to develop analysis methods to estimate abundance and density of elephants at the Associated Private Nature Reserve. When working toward an estimate, we begin from the realization that we can never see all the elephants in an area of interest. On any particular day, there is a true number of elephants on the landscape, but survey methods miss some elephants because they are hidden by vegetation or occupy parts of the reserve where people might not be looking for them. To have a reliable number of elephants to work with for management, biologist have to ask two "big questions": (1) what is our best estimate of the number of elephants in area at a particular time, and (2) how close is that estimate to the true number?

Ideally, we want the discrepancy to be as small as possible, but because we never see all the animals and funding for surveys is limited, there is always some discrepancy. Knowing the factors that affects how good our estimates are ultimately helps us to do a better job of getting numbers of animals when planning for management and conservation. To try to tackle the two big questions, we divided our larger goal into three more specific objectives:

(1) Because elephants occur in herds, that herding tendency can affect our ability to get good estimates. For example, herd size and composition can affect how easily they are seen during a survey, and lone animals can be more easily missed. How do we include information about herds into analysis methods when trying to get good estimates of abundance?

(2) Elephants are observed where people go to look for them, but there are parts of a reserve where people might not go where elephants nonetheless occur. How does the searching behaviour by people affect data collection and analysis methods?

(3) The time of day or year can affect how easily elephants are seen by people. How does the time of day or year that surveys occur affect data collection and our ability to estimate abundance?

At the moment we are busy with the first objective, and it is turning out to be fairly challenging. Although much more work needs to be done, one of our initial findings is that grouping behaviour can affect the discrepancy between the true number of elephants and an estimated number. Much of this work has been done so far by using simulated populations on a computer. Analyses with simulated data allow us to know the true abundance and to comparing to estimates from different analysis methods. This is never possible with real populations, so it gives us an idea how good the methods are for coming up with estimates, and how we might change them to improve estimates. Once we are confident that an analysis method works well (that is, the true number and the estimated number are close to each other), we will try it on real data from APNR elephants.

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