

# Wind Farms Threaten Southern Africa's Critically Endangered Bearded Vulture

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Wind energy is commonly understood to be clean and environmentally friendly and many African countries are planning, or have already constructed, wind farms. In southern Africa, South Africa is investigating the large-scale exploitation of wind power for electricity generation and Lesotho is proposing to develop two wind farms in the Maluti Mountains. The proposed developments are within the breeding and foraging range of the Endangered Bearded Vulture *Gypaetus barbatus meridionalis* (Figure 1).

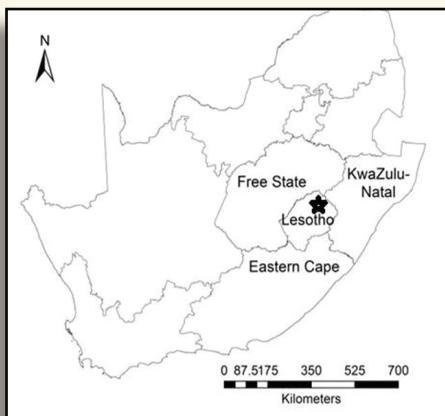


Figure 1. The range of the Bearded Vulture in southern Africa covering the Maluti-Drakensberg mountains of Southern Africa, including the Kingdom of Lesotho and the Free State, KwaZulu-Natal and the Eastern Cape provinces of the republic of South Africa. The proposed wind farms are located in north-eastern Lesotho(\*).

A number of recent studies have confirmed that wind farms negatively impact birds, causing avoidance behavior and disturbance or fatality through collisions with rotor blades and the associated power line infrastructure. Since wind farms are often placed in areas heavily used by raptors, there is real potential for interaction between vultures and wind turbines in southern Africa, posing an additional threat to a population that only has about 109 breeding pairs left. There is no quantitative data on the extent of the impact of wind farms on vultures in Africa. We therefore used a Population Viability Analysis model to predict the population level impacts of the anticipated establishment of wind energy developments on Bearded Vultures in southern Africa, with existing information on their distribution and ranging behavior from long-term monitoring of the population.

We used data from 10 Bearded Vultures fitted with 70g solar-powered Argos GPS transmitters between 2007 and 2012 to determine the size and location of the core foraging range of the species as well as the speed of travel and height above ground at which they forage. The ranging data comprised 5.8 juvenile years, 4.8 immature years, 1 sub-adult year and 2 adult years. Only data points representing foraging behaviour (those with a speed of 11-77 km/h) were used in the analyses. A total of 10640 flying records in Lesotho was used for the analysis.

Adult Bearded Vultures foraged predominantly within a 15 km radius of their nest site while non-adult birds foraged extensively over the highlands. Bearded Vultures spent 92% of their flying time at foraging speeds (11-77 km/h) and more than half (53.5%, n=9791) of this was spent  $\leq 100$  m AGL (i.e., within the blade swept height and hence at risk of collision). All age classes selected upper slopes, mountain tops, and high ridges (RSI=1.491) where they spent 44% of their time, and used valleys (RSI=0.744) and plains (RSI=0.255) less than expected (n=10201). The Population Viability Analysis predicted the impacts of mortalities caused by wind farms to be extreme with the population rate further declining from the current -1.4% per annum (baseline model) to -3.7% per annum (Figure 2). The predicted time to extinction of the species was reduced from 260 years to 110 years.

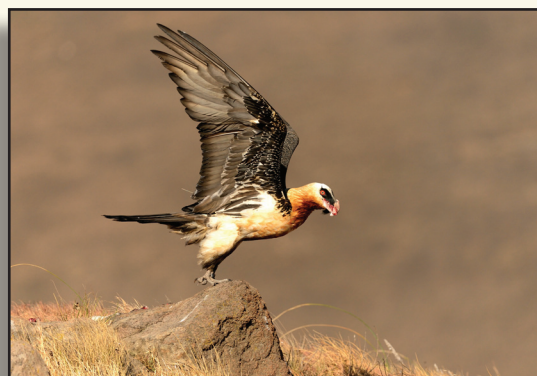


Photo by Shane Elliott

Adult Bearded Vulture with transmitter.

The fact that Bearded Vultures actively select ridge tops and upper slopes and spend at least half their foraging time less than 100 m above ground level, puts them at risk both in terms of the areas they select and the height at which they fly. This coupled with a small, isolated and declining population means that wind farm developments in the Lesotho highlands, even at a modest scale, will have a catastrophic impact on this species. Because of their low reproductive rate and long life span, this population will be unable to recover from a cumulative loss of individuals. The model's predictions are conservative because it does not take into account an increase in the number of wind farms to meet the energy demand or ever-increasing mortalities from other anthropogenic factors such as power line collisions and poisoning. The Bearded Vulture is the iconic symbol of the Maloti Drakensberg Park World Heritage Site, and the focus species of the Maloti Drakensberg Transfrontier Programme. The extinction of this iconic species will be a public failure of transfrontier conservation efforts and efforts to conserve our natural heritage for future generations.

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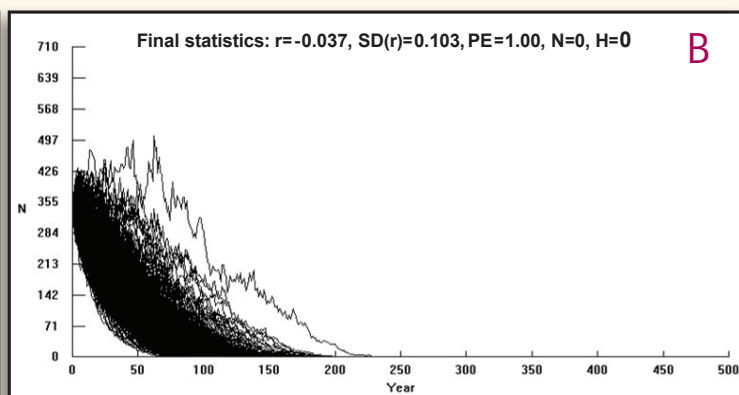
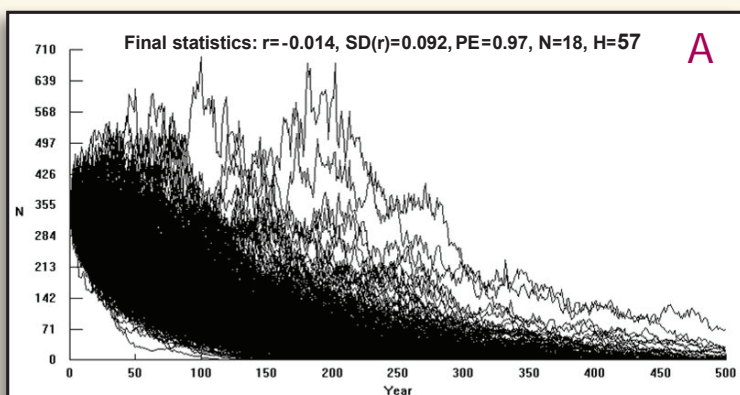


Figure 2. Population trajectories for the Bearded and Cape Vultures in the Maluti-Drakensberg: A) pre-wind farm and B) post-wind farm