STATUS OF THE MOUNTAIN GAZELLE POPULATION IN THE ARABIAN ORYX SANCTUARY OF OMAN

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Introduction

The mountain gazelle, *Gazella gazella*, is an Arabian endemic, which inhabits an area stretching from the coastal plains to the mountains around the western and southern periphery of the peninsula (Vesey-Fitzgerald 1952). In Oman, as elsewhere in the peninsula, mountain gazelles are under threat due to the rapid development of the country since c. 1970. The mountain gazelle population in the Arabian Oryx Sanctuary and the coastal areas to the east is the largest in Oman, and until recently this population was thought to number around 10,000 individuals (Insall 2001). We undertook the first comprehensive population survey of mountain gazelle in the Arabian Oryx Sanctuary to generate a more recent population estimate and to determine whether distance sampling could be used to monitor population trends.

Methods

Following a pilot survey we randomly selected placement of our first transect, where after an additional 14 transects of variable length were systematically placed at 5 km intervals in a north south pattern. Surveys were carried out between sunrise and 13:30 by 2-man teams, a driver-observer and an observer-recorder, in 4x4 vehicles driving at 40km/h or less. Perpendicular distances to gazelle groups were measured to the nearest 1 m on the animal in the centre of the group, using rangefinders. Population density was calculated using the software "DISTANCE" Version 3, and the general guidelines of Buckland *et al*. (1993) were followed in data preparation and analysis.

Results

The total transect length surveyed was 1,882 km and our survey area amounted to 12,420 km2. Each transect was surveyed only once and 78 different mountain gazelle groups were observed. The mean observed group size for all observations was 2.3 ± 1.1 gazelle. The half-normal cosine model fitted the distance data well ($x^2 = 1.9693$, d.f = 6, P = 0.92250). The density of gazelle in the survey area was estimated at 0.224 gazelles/km2 (CV = 18.00), the equivalent of a population estimated at 2,787 mountain gazelle.

Discussion

We have shown that the mountain gazelle population in the Arabian Oryx Sanctuary is more than three times smaller than the 10,000 previously reported by Insall (2001). It is believed, however, that this previous estimate was inflated. There are two main reasons for this. Firstly, inspection of the survey routes previously used indicated a high probability of double counting of animals, and sampling was concentrated in those areas where gazelles would be found. This resulted in the size of the gazelle population being over-estimated. Our use of a more robust survey design, making use of non-overlapping, randomly placed, straight-line transects as well as an analysis technique where the potential recounting of animals does not pose serious problems (see Buckland et al. 1993) have resolved these problems. Also, during the period 1992-1997 the Arabian Oryx Sanctuary frequently recorded above average rainfall (Fig. 1). Consequently, the survey in the late 1990's on which the previous population estimate was based, was initiated at a time of near optimal conditions. Nevertheless, we do believe that there has been a substantial and real decrease in mountain gazelle numbers in the Arabian Oryx Sanctuary. While environmental variability has contributed to the decrease in mountain gazelle numbers - as illustrated by the more recent climatic conditions in the study area (1999 onwards) – poaching of gazelle is believed to have been the main contributory factor. Lastly, our survey resulted in a Coefficient of Variation of 18%. This is lower than the required 20% that is needed for monitoring purposes (Buckland *et al.* 1993), indicating that Distance sampling can be reliably used for monitoring the mountain gazelle population in the Arabian Oryx Sanctuary.

Across their range the mountain gazelle population is believed to total less than 15,000, and the overall decline in numbers has been estimated at more than 30% over the last 18 years (IUCN 2008). It is therefore essential that reliable population estimates are generated in all range states, so that appropriate conservation measures can be initiated and/or maintained.

References

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Insall, D.H. (2001) Oman. In *Global Survey and Regional Action Plans – Antelopes, Part 4: North Africa, the Middle East, and Asia* (compilers D.P. Mallon & S.C. Kingswood), pp. 69-73. IUCN, Gland, Switzerland.

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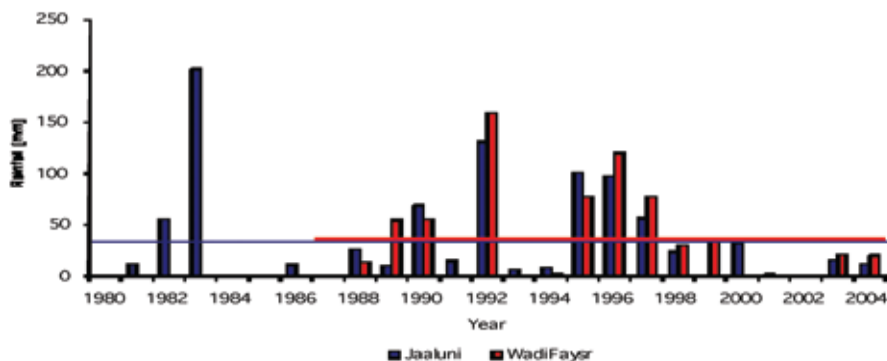Vesey-Fitzgerald, L.D.E.F. (1952) Wild life in Arabia. *Oryx* 1(5):232-235.

Fig1. Long-term rainfall patterns and the mean annual rainfall (solid lines) at two weather stations within the Arabian Oryx Sanctuary, central Oman. Note that, at Wadi Faysr, records have only been kept from 1987 onwards.

Fig2. Mountain gazelle (©Tom Bailey).