imagery, range quality assessment, eco-physiological data and population demography data (Treydte et al., 2001). The model predicts that the maximal carrying capacity for the protected area would be 800-850 oryx. Above this threshold the population is likely to undergo significant density-dependent mortality during periods of under-average forage conditions. The model also evaluates the probability of extinction (frequency with which 100 initial populations fall to zero within 100 years) of the Mahazat as-Sayd oryx population under various management strategies. The probability of extinction was high when no management was applied to the population (probability of extinction varied between 0.3 and 0.92 according to combination of assumptions) whereas removing every year all oryx above 70% of carrying capacity provided the lowest probability of extinction, and the lowest population size variation whatever was the combination of assumptions. A more readily applicable management option; removing annually 15% of the current population, would also provide a low probability of extinction, despite wide fluctuations in population size.

Management decisions are simple in their principles but relatively complex to implement on the ground. The method of “removal” of oryx must be discussed (either physically through culling or capture and emigration or virtually through sterilization procedures) and funding appended according to management methods required. Whatever the management option applied, human intervention seems ineluctable to maintain the long-term viability of the Arabian oryx population re-introduced in Mahazat as-Sayd. Rehabilitation of the Arabian oryx in Mahazat as-Sayd Protected Area has been completed in a decade, however nowadays the new challenge concerns its long-term survival.

References

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Arabian oryx monitoring at ‘Uruq Bani Ma’arid protected area, Saudi Arabia: population size estimate

The ‘Uruq Bani Ma’arid protected area occupies 12,500 km² of the western edge of the Rub’ al-Khali desert, the largest sand sea in the world, located in the south of the Arabian Peninsula. The protected area extends from the southern extremity of the Jurassic escarpment of Tuwayq in the west, through a limestone plateau incised with vegetated wadis and gullies and towards large longitudinal dune areas in the east. From March 1995 to July 2002, a total of 149 Arabian oryx (Oryx leucoryx) were re-introduced into the ‘Uruq Bani Ma’arid protected area (Mésochina et al., 2003). Some were wild-born animals from the Mahazat as-Sayd protected area, Saudi Arabia (see update on page 29), but most were captive-born from the National Wildlife Research Center, Taif, Saudi Arabia. Monitoring of oryx range use in the protected area have shown a seasonal pattern of movement, animals retrieving to the western escarpment plateau in the hot season and returning eastwards into the sands in cooler months (Wacher, 1998). Since 2001 we have been using the fact that during summer the oryx population ranges over a relatively small area (i.e. 2,500 km²) where trees and overhanging rocks offer presumably enough shelter they require to survive the hot season, to carry out population size estimates. We employ a mark/re-sighting method using the Lincoln-Petersen index calculation technique. This technique has proved efficient in estimating oryx population sizes in the Mahazat as-Sayd protected area (Saddon et al., 2003).

The “total count” was carried out on 20th, 21st and 22nd August 2003. The protected area was divided into 13 sectors of approximately equal size, based on topography and limited by major tracks, hills, dunes, all readily observed permanent features. We counted during three consecutive mornings and one afternoon. Each count session was dedicated to a separate area. No set routes were defined and there was no time limits set for the census in each area. Surveying teams were composed of two to three observers equipped with binoculars and a GPS unit programmed to record the track followed, in order to quantitatively assess the area covered. Observations were made during the week prior to the count showed that the oryx rarely migrated between sectors, suggesting that the probability to re-count the same individuals between days was low. In August 2003 we estimated the Arabian oryx population in the western edge of ‘Uruq Bani Ma’arid at 203 individuals with a 95% Confidence Interval (CI) of 169–237. When excluding immature individuals (<18-24 month-old), the adult population was estimated at 157 oryx, 95% CI = 133–181.

The Lincoln-Petersen index estimations suffer a major flaw
when the number of marked individuals in the population is inaccurately known. For this reason, up-dating the number of marked oryx (collared) present in the protected area and increasing the proportion of marked animals in the population have been two important management / monitoring activities during the previous months. The population estimate we provide is derived from a number of marked animals recorded for the 12 months prior to the count, a reasonably accurate estimation of the total number of marked oryx present in the surveyed area during the census. Although 149 oryx have been re-introduced into the protected area, a number of them have died due to inefficient adjustment to the new environment, starvation during the 1999-2000 drought period, poaching, and intra-specific fights. We estimate that 75 (50%) of them have survived. The oryx population at 'Uruq Bani Ma'arid is therefore composed of 60% wild-born individuals, a great asset to the population if one assumes that wild-born individuals are better adjusted to the environment than captive-bred oryx and that their capacity to survive harsh conditions is presumably optimized. Population estimates were consistent with results of routine monitoring carried out throughout 2003. When comparing with previous population estimates carried out respectively in July 2001 and August 2002, the present estimate was slightly higher than in 2002 and similar to results of 2001. However, the relatively large 95%CI (i.e. 169 - 237) observed in 2003 compared to 2001 (i.e. 182 - 216) and 2002 (i.e. 164 - 202) limits our prededions of population trends.

To the best of our knowledge the population has not suffered a significant decrease or increase since August 2002. The reasons for a lack of increase of the population could be several, ranging from an underestimation of death rate (undetected poaching or environmental stress deaths), the existence of an emigration trend, the presence of wild-born oryx in non surveyed areas, a population that has already reached a demographic equilibrium with the environment, a positive but slow growth rate difficult to demonstrate on the short term. Many more years of monitoring might be necessary to clarify this demographic issue.

References

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