# CHAPTER 4

# METHODS

## Introduction

The Arabian oryxes reintroduced into the 'Uruq Bani Ma'arid Protected Area were monitored from the day of the first release (28 March 1995) until 18 February 1997. During this time 156 hours were spent on aerial surveys in and around the protected area, culminating in 1267 aerial locations of the individual reintroduced Arabian oryxes. Ground surveys during the study period resulted in 4565 observations of different groups of oryxes.

All the data that were collected during the aerial and ground surveys were entered into a database constructed in such a way as to present data for each individual animal seen during each observation. For this to be effective each individual oryx released had to be individually identifiable and data had to be collected in a structured way.

The methods discussed here apply to the study in general. More specific methods of data collection, pertaining to various other aspects investigated during this study are addressed in the relevant chapters, as are the analysis techniques used.

## Oryx identification

During the study period 66 Arabian oryxes were reintroduced into the 'Uruq Bani Ma'arid Protected Area of the Kingdom of Saudi Arabia, all of which were individually identifiable. Of these, 86% (57 oryxes) were equipped with battery-operated radio-collars from either the Telonics Company in Arizona, USA (n = 38) or the AVM company (n = 19). In addition, numbered tags were fitted onto each radio-collar to further facilitate identification and to ensure positive identification in the event of radio-collar failure. The remaining nine Arabian oryxes reintroduced were not equipped with radio-collars. Of these, seven animals were fitted with numbered tags on a collar. The remaining two oryxes were approximately 3 months old at the time of release and were considered to be too young to be fitted with collars, as this would mean recapture at some future time to adjust or fit new radio-collars. These two animals were initially identified by their different facial and leg colour patterns, and later on the shape of their horns.

Neonates born into the reintroduced population were given unique identification numbers. Initially these oryxes could only be identified through their association with their mothers. If several neonates were found in a group, identification would be postponed until an animal could be positively identified through its association with its mother (e.g., when suckling). As the calves grew older, unique features such as the colour patterns on the face, side and legs, features of their tails, or the shape of their horns identified them.

The Arabian oryxes in the 'Uruq Bani Ma'arid Protected Area were usually located by ground vehicle. In addition a Maule aircraft was available for 2 days every fortnight. This made it possible to locate all the reintroduced Arabian oryxes in a relatively short period of time. It also made the search for any "missing" oryxes easier. The procedure used for locating the Arabian oryxes on both the ground and from the air was similar. As the oryxes were free to roam around the protected area and group composition was not controlled, there was no way of determining which oryx would be located first or where it would be located during any particular day. It is therefore considered that, in general, the Arabian oryxes in the 'Uruq Bani Ma'arid Protected Area were located in a random way.

**Data collection**

***Locating the oryxes from the ground***

The radio-tracking of the Arabian oryxes from the ground was initially done with a Telonics TR2 receiver only. Later a TS1 scanner was coupled with the receiver. This allowed for each of the 57 unique radio-collar frequencies to be entered into the scanner, thereby facilitating quicker location of animals. Every time that either a given animal or herd was located on the ground through radio-tracking or visual observation, the following variables were recorded:

*Herd characteristics*

All the animals present were counted and identified individually by the tag number or other distinguishing features. The age and sex structure was also determined in this way. The sex of any new-born oryx was determined if the opportunity presented itself.

*Physical condition*

This was judged according to the method used by Riney (1960), based upon the external appearance of the individual. The physical condition of an animal is an indication of the

current state of the veld, the availability of suitable food, the quality and digestibility of the food and the general health of the animal (Ebedes 1996). A similar technique, which seems to have been based on the above-mentioned technique, was also developed for the gemsbok (Hamilton, Buskirk & Buskirk 1977) in Namibia and it was used to subjectively measure the nutritive level of an animal. Berry (1980) also used the same technique in studies on blue wildebeest *Connochaetes taurinus* (Burchell, 1823) in the Etosha National Park of Namibia.

In the present study the physical appearance of all the Arabian oryxes were judged on the degree to which the skeletal details of its body were visible externally. Points were thus awarded on the same basis as used by Berry (1980) on the blue wildebeest. They were:

1. Excellent: the hindquarters are well rounded, no ribs show, and the general appearance of the animal, its posture and coat sheen are excellent
2. Good: the hindquarters are rounded, but the ribs show slightly through the hide
3. Fair: the hindquarters are angular in appearance and the ribs are well defined externally
4. Poor: the pelvic bones are prominent and the ribs protrude
5. Degraded: all the skeletal details are clearly visible externally and the rump is concave. The general appearance, posture and coat condition of the animal are degraded

*Subhabitat*

The types of subhabitat in the 'Uruq Bani Ma'arid Protected Area were distinguished on topographical features. The type of subhabitat in which an oryx or herd of oryxes was found was coded numerically. These codes were subjectively given for each subhabitat and its subdivisions, where applicable. The numerical codes and the types of subhabitat distinguished were:

1. Dune
2. *Shiqquat* or dune street
   - 2.1.Gravel plain
   - 2.2.Sand sheet
   - 2.3. Pan at dune foot
3. Escarpment plateau
   - 3.1. Gravel plain
   - 3.2. Sand sheet
   - 3.3. Wadi

*Vegetation condition*

The condition of the vegetation at each location was assessed for three aspects. These were the overall greenness of the vegetation, the condition of the grasses and annual plants present, and the condition of the shrub and tree layer.

In terms of the overall degree of greenness, the vegetation was coded as:

1. Mostly white with a slight green tint
2. Mostly green with a white-brown tint
3. Fully green

A subjective numerical code was used to assess the grasses in the area where oryxes were observed. This assessment was made in terms of the phenology of the grass as well as the percentage of green material in the grass layer. The percentage crown cover of the grass layer was also estimated. The density of the trees and shrubs was estimated as the number of trees or shrubs per hectare, and were then entered into one of five density categories. The degree of greenness of the trees and shrubs was recorded as for the grasses and annual plants based on the percentage of green material present.

At each observation the grass layer was categorised into one of the following categories based on the growth stage observed:

0 = No grass present
1 = Sprouting
2 = Intermediate: the grass is mature but not flowering
3 = Mature, flowering grass
4 = Dormant

The following categories were recognised for the percentage ground cover of the grass layer:

0 = No cover
5 = 1 to 5% cover
20 = 6 to 20% cover
>20 = More than 20% cover

The tree and shrub densities were estimated as follows:

0 = No trees / shrubs
5 = 1 to 5 trees / shrubs per hectare (100 m²)

10 = 6 to 10 trees / shrubs per hectare
15 = 11 to 15 trees / shrubs per hectare
>15 = More than 15 trees / shrubs per hectare

The following categories were used to estimate the percentage of green material in the grass layer and in the trees and shrubs.

0= No grass / tree / shrubs
25 = 1 to 25% green material
50 = 26 to 50% green material
75 = 51 to 75% green material
100 = 76 to 100% green material

***Locating oryxes with the help of an aircraft***

Radio-tracking from the aircraft was done with the use of a Telonics TS1 scanner and TR2 receiver. An antenna was fitted to each wing of a Maule 6 aircraft. Radio signals could be monitored on both antennae simultaneously or on each one separately with the help of a cockpit-mounted left-right switch. Initially, standard transects were flown in a north-south direction across the protected area, at a height of 457 m (1 500 ft) above ground level. As the protected area became better known, however, the pilot was requested to fly to the areas known to be frequented by the oryxes first.

The reception of a radio signal indicated the presence of a specific oryx in a certain area. Therefore, once a signal was received, it was determined from which antenna, left or right, it was the loudest, whereupon the pilot was requested to turn to that side. This process was repeated until the aircraft flew over the specific animal. It was, however, still necessary to locate each oryx visually to determine the subhabitat used, the condition of the area, the density of the trees and shrubs and the percentage ground cover. The categories used for recording these variables were the same than that used during the ground surveys. The only variable recorded on the ground, and not during aerial surveys, was the phenology of the grass layer. An added advantage of visually locating the animal being radio-tracked was the plotting of accurate GPS locations.