The Ecology and Conservation Biology of the Endangered African Wild Dog (*Lycaon pictus*), in the Lower Zambezi, Zambia.

by
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STATEMENT OF RESPONSIBILITY

This thesis is my own original work, except where specifically acknowledged.

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ABSTRACT

The African wild dog (*Lycaon pictus*) is one of Africa's most endangered carnivores. Previous research into this species has focussed on the largest extant populations in Africa. However, there are a large number of relatively small populations (20 to 50 dogs) distributed across Africa, which represent an important component of the diversity of the species and its remaining habitat. This study investigated the status of a small population of wild dogs in the Lower Zambezi area in Zambia. Objectives focussed on assessing population dynamics and identifying causes of decline. Research was carried out over a broad range of topics in an effort to provide comprehensive information for conservation management of the population.

The scope of the project was divided into five sections:

1) Demography and pack dynamics were assessed to identify the structure and status of the population, and the main causes of mortality.

2) An assessment of habitat types and related ecological factors was carried out to determine wild dog habitat utilisation in relation to vegetation type, prey densities and hunting success in each area.

3) The effects of interpredator competition on wild dog population dynamics was investigated, specifically, the effects of lions (*Panthera leo*) and spotted hyaenas (*Crocuta crocuta*).

4) Genetic analyses were carried out to assess the historic and contemporary genetic variability of the population, and to define patterns of geographic structuring and population differentiation.

5) Results were combined to assess the viability of the population and recommend conservation management strategies.

Snaring was identified as the most important cause of adult mortality, and a threat to wild dog population persistence. Inbreeding avoidance led to the emigration of adult males and females from the area and appeared to be a substantial contributor to population decline. Limited mate selection corresponded with neither sex displaying philopatry and large dispersal distances effectively removed adults from the

population. This result has important implications for the management of small populations, whereby lack of mate choice may increase dispersal distances and thereby increase edge effects on populations, regardless of home range sizes.

Home range sizes were related to den locations in remote areas of the Zambian Escarpment, which was used as a breeding refuge area. The Zambezi River and Zambian Escarpment appeared to be effective barriers to wild dog home range movements. The study area contained a diversity of habitats on the alluvial terraces of the river valley floor. There was a high density of impala (*Aeypceros melampus*), which formed the main prey base for the wild dog population.

Studies of other populations have found that wild dogs often avoided areas with high competing predator densities, which corresponded with high prey density areas. In contrast to those findings, the Lower Zambezi wild dog population showed a strong preference for high prey density areas. This population also showed only temporal avoidance of high lion density areas. Low lion density areas were preferred during breeding periods, while moderate to high lion density areas were preferred during non-breeding periods. Direct predation of adult wild dogs by lion and spotted hyaenas was rare. Kleptoparasitism of wild dog kills by either competing predator species was also rare. Predator competition was not considered to be an important determinant of population decline.

The Lower Zambezi population suffered from a loss of heterozygosity, low allelic richness, and there was significant evidence of a recent population bottleneck. The population did not contain any new mtDNA haplotypes, nor any unique alleles on the commonly used microsatellite loci, but was differentiated from African wild dog populations in other regions. There was evidence of historical and recent gene flow between the Lower Zambezi and the neighbouring southern African populations of Hwange and Okavango. This was the first study to show a loss of genetic variability in a free-ranging African wild dog population. Although more immediate anthropogenic and demographic factors were the critical determinants of population

decline, the loss of genetic variability has important implications for the conservation of the remaining small and fragmented wild dog populations in Africa.

Results showed that due to its small size the population is likely to have suffered from inverse density dependence and Allee effects on dispersal and reproductive success. Management recommendations focussed on mitigating anthropogenic causes of mortality, and improving connectivity with a larger, potential source population to increase the probability of successful dispersal and to restore genetic diversity. The high density prey base, small home range sizes and low levels of interpredator competition detected in this study suggest that the area has the capacity to support a large and potentially viable population of wild dogs if appropriate management strategies are implemented.

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TABLE OF CONTENTS

LIST OF FIGURES **PAGE**

LIST OF TABLES **PAGE**