CHAPTER 1

INTRODUCTION

> "Further research, or rather re-search, is needed for more understanding not only of the canids but also of man's place in nature, the two being intimately related. We must strive to preserve and foster this relationship, this unity and interrelatedness of all things and at the same time reduce man's alienation from nature as well as from his fellow beings. The dynamically balanced intrinsic complexity of life, of ecosystems, of species, of individuals, and of the cells of the body must be appreciated; for man, it must also be understood. Why? In order to predict, control, modify, or manipulate and exploit? I hope simply for the sake of awareness and also for the possible necessity of intervention in times of an ecocatastrophe, as well as to avert such an eventuality."
>
> (Fox 1975:460)

As a group of animals, the Canidae display a remarkable adaptability to environmental extremes. Representatives of this family occur from the Artic tundra to sub-tropical deserts. They subsist on animal and vegetable matter, the former ranging in size from insects weighing less than one gram to large ungulates weighing over 800 kilograms. Canids may lead a solitary existence, or may form part of large cohesive packs of up to 36 individuals. Some depend for their existence on a certain social structure, while others, such as the jackal and coyote, can adapt their social system to suit prevailing conditions. The symbiotic relationship between man and the earliest domestic dogs may be seen as an example of the flexibility and adaptability of this highly successful group of carnivores (Eaton 1969). And the ability of certain species to flourish and take advantage of man's ineptitude despite heavy persecution - again the coyote and the jackal serve as excellent examples - indicates that in some way or another the canids will continue to adapt despite the accelerating rate of global change induced by man.

This study of the predatory habits of the black-backed jackal *Canis mesomelas* has a rather fortuitous origin. During my early acquaintance with the Northern Tuli Game Reserve (NTGR) in Botswana, the then manager of Mashatu Game Reserve, part of the NTGR, mentioned to me that the jackals in the region were responsible for killing adult impala *Aepyceros melampus*. This intrigued me - an adult impala weighs between 32 and 66 kg, while an adult jackal weighs only between 6 and 10 kg (Smithers 1983). The killing of such large prey by jackals would thus constitute a spectacular feat. In addition, the jackal is often accused of killing domestic stock, and the possibility that this reputation could be based on a predatory role in natural areas is an intriguing one. The study was thus launched, not without some scepticism, to determine whether or not the local folklore had some foundation in fact.

Jackals have sporadically been reported to hunt and kill medium-sized antelope (van Lawick Goodall 1970a, Kruuk 1972, Schaller 1972, Sleicher 1973, Lamprecht 1978a, Moehlman 1983, Goss 1986). All of these reports merely served to fuel speculation as to whether this was an integral part of jackal biology, or whether these were freak incidents of curiosity value only. Most studies on the diet of jackals have utilized the indirect techniques of stomach-content or faecal-content analysis (Grafton 1965, Bothma 1971, Smithers 1971, Rowe-Rowe 1976, Stuart 1976, Hall-Martin & Botha 1980, Rowe-Rowe 1983). This is hardly surprising, as the jackal is a small, largely nocturnal carnivore - traits which make direct observation of feeding habits a difficult and time-consuming task. Furthermore, much of the motivation for earlier studies was the perceived impact of jackal predation on stock farming enterprises (van der Merwe 1953, Rowe-Rowe 1975). Surviving jackals in farming areas are even less likely to allow close observation after years of relentless persecution. The outcome of these practical difficulties was that the source of individual prey items could rarely be unequivocally determined - i.e. was it hunted or was it scavenged. This most important question was therefore not answered by such early investigations. Even the extensive study of the black-backed jackal by Ferguson (1980) did not yield a large amount of direct observational data.

Some other aspects of jackal (hereinafter used to refer to the black backed jackal *C.mesomelas*) biology have been well studied, although much basic work remains to be done. Black-backed jackals occur sympatrically with the two other jackal species - the golden jackal *C. aureus* and the side-striped jackal *C.adustus* - in parts of Africa. In southern Africa *C.mesomelas* and *C.adustus* occur, the latter occurring only in the moister eastern and northern extremities of the subregion while the former occurs throughout the subregion with the exception of these extremities. There is only a small area of overlap in the north-eastern sector (Smithers 1983).

Jackals are monogamous and exhibit a long-term pair bond (Moehlman 1983). Between one and six young are born between June and September in southern Africa (Smithers 1971, Rowe-Rowe 1974 in Rowe-Rowe 1975). Some of the young jackals may remain with the parent pair for more than a year, and may assist in raising the next litter of young (Moehlman 1979, 1983). Dispersing young jackals move over larger areas than adults or younger jackals (Ferguson, Nel &

de Wet 1983). Adult jackals may display territorial behaviour (Moehlman 1983) or may have an overlapping home-range system (Rowe-Rowe 1982, Ferguson *et al.* 1983, Hiscocks & Perrin 1988). Home-range size is highly variable between geographical areas (Ferguson *et al.* 1983).

Jackals may become strictly nocturnal when persecuted, but otherwise are most active at dawn and dusk (Ferguson, Galpin & de Wet 1988). Activity consists largely of foraging and hunting, with social interactions, marking of territories with faeces and urine, and maintenance behaviour of lower frequency (van Lawick Goodall 1970a, Lamprecht 1978a, Ferguson 1980, Moehlman 1983). Jackals prey on anything from termites to adult antelope (Lamprecht 1978a). Predation on larger prey is more successful if undertaken by more than one individual (Wyman 1967, Lamprecht 1978a, Ferguson 1980). Jackals are most renowned as scavengers. This reflects the opportunistic nature of the species - individuals will move far from their normal home-range and will form large aggregations when large scavengeable resources are available (Ferguson *et al.* 1983).

Jackals emit a wailing call which can be heard over a considerable distance. Frequency of calling is greatest during the breeding season (Skead 1973).

The answer to the question posed by the present study lay in direct observation. The fact that many, many hours of frustration, exasperation and boredom would accompany this mission was evident from the paucity of comparable information. Even studies on coyotes *C. latrans* (White 1973, Bowen 1981, Bekoff & Wells 1985) and wolves *C. lupus* (Mech 1966, Peterson 1977, Allen 1979, Gasaway, Stephenson, Davis, Shepherd & Burris 1983, Carbyn &

Trottier 1987, Peterson, Woodlington & Bailey 1984) have yielded frustratingly few direct observations of predation after many hundreds of cumulative man-hours of study. The need to make-do with available equipment together with a complete lack of experience in dealing with the wiles of the jackal also yielded a unique set of frustrated ambitions. The fact that the study was successful is due to a considerable amount of good fortune, coupled with a degree of dogged determination.

The outcome of the present study has a far broader scope than is indicated either by the title of this thesis or by the original question. As a highly adaptable, opportunistic carnivore, the habits of the jackal are likely to reflect the underlying processes at work within the particular system in which it is being studied. The broad scope of the present study is, therefore, a reflection of the fact that in studying the predators within a system the system itself is being studied - the predator merely provides the window through which to view the intricate workings of its environment.

As in the system itself, each part of the present study stands on its own as an entity with its own peculiar characteristics. Yet each part supports, is supported by, and interacts with, all the other parts. An appreciation of the interactive nature of the various parts can only follow the detailed description of the parts themselves. This thesis is, therefore, divided up as follows:

Chapter 2 describes the context of the present study - the history and geography of the study area;

Chapter 3 describes the study of jackal predation;

Chapter 4 describes the study of the impala population in the study area;

Chapter 5 describes attributes of other large carnivores - wild dogs *Lycaon pictus* and spotted hyaenas *Crocuta crocuta*- which are of relevance to the study;

Chapter 6 describes the pathology of a syndrome of hairlessness in impala - autogenous alopecia - discovered during the study, and

Chapter 7 describes the relationships between the different parts of the study and places these in context.

The many cross-references used in the text are a reflection of the holistic nature of the study. It is strongly recommended that the summary at the end of this thesis be read first to obtain a synthetic overview before reading the individual chapters.

Ockham's Razor is the mantra of science which states that "One should choose the simplest hypothesis fitting the facts" (Brynum, Browne & Porter 1983). The study of ecosystems is a complex task indeed, and the application of Ockham's Razor can simplify the conclusions to a few short sentences. Yet the emergent mathematical formulation of natural systems is showing what ecologists have known all along - that ecosystems, and other natural systems, are governed by chaotic forces (May 1989). And what is the simplest description of chaos? Chaos!

Study of an ecosystem yields a pattern. Can any conclusions be drawn from a pattern? The pattern is merely a reflection of the temporal and spatial matrix of processes at work within the system, many combinations of which could potentially yield the identical pattern (Cale, Henebry, & Yeakley 1989). I believe that it is the task of the ecologist to employ all the faculties at his disposal to identify the processes responsible for the patterns he observes - it is the ecologist who, after all, will be charged with caring for ecosystem health and "In ecosystems as in organisms, what constitutes health is not (despite the popular view) based on objective scientific criteria, but rather involves judgement" (Rapport, Regier & Hutchinson 1985). The true sequence of events is unlikely to follow the simplest route, and the ecologist must, of necessity, trample on Ockham's toes, limited only by his own caveat that he is merely doing his best. At least, by using his judgement, something of substance is generated which can be compared to future patterns to determine if indeed the true processes have been identified. The present study is thus a record of my attempts to identify the processes that gave rise to the patterns that I observed in the ecosystem of the Northern Tuli Game Reserve. I believe that it is only the identification of these processes which has led to a meaningful outcome to this study. Yet the conclusions I have reached must always be viewed in the context of my inability to ever fully understand a system far older and more complex than myself.