CHAPTER 3

MATERIAL AND METHODS

In order to assess the size of the various reptile and amphibian populations, different methods of marking and capture were attempted. In a study such as this, where the species are so diverse and inhabit different strata within a community, a variety of methods must be applied in order to be able to assess the populations. Also, in most populations of mixed species, there are those which are common and could possibly be considered as density dependent, while on the other hand, there are many more which are rare and, therefore, density independent. It is these that are difficult to sample adequately, particularly when it comes to mark - recapture techniques.

This diversity coupled with the pronounced seasonality of the climate results in large scale fluctuations in animal visibility, particularly reptiles and amphibians, and made this study a difficult one.

Trapping and census techniques

The main method of capturing snakes and terrestrial lizards, was by continuous trapping for a period of ten days each month, using funnel traps and drift fences, Dargan & Stickel (1949). The drift fences were constructed out of tempered masonite strips, which together were nine metres long and 30 cm high. This barrier was supported by eight gauge galvanised wire stakes placed at the ends and to which the strips were attached. Other supporting stakes were placed at intervals along the fence as the masonite tended to warp and buckle, particularly when on uneven ground. These strips were placed on either side of the funnel trap, the funnels of which were divided in two by a wedge-shaped piece of masonite, so that the animals could not go around the end of the drift fence, but had to move into the trap.

Each trap consisted of a rectangular cage, constructed from welded wire mesh 50 mm x 50 mm, covered over with gauze screening. The trap is 1,2 m long, 60 cm wide and 30 cm high, (Figure 9). A door placed in the roof facilitated the removal of trapped animals. Some difficulty was experienced with small species as they had a habit of squeezing in under the funnel and were difficult to extract. Large poisonous snakes also presented a problem until one is able to take hold of the tail and extract them slowly,

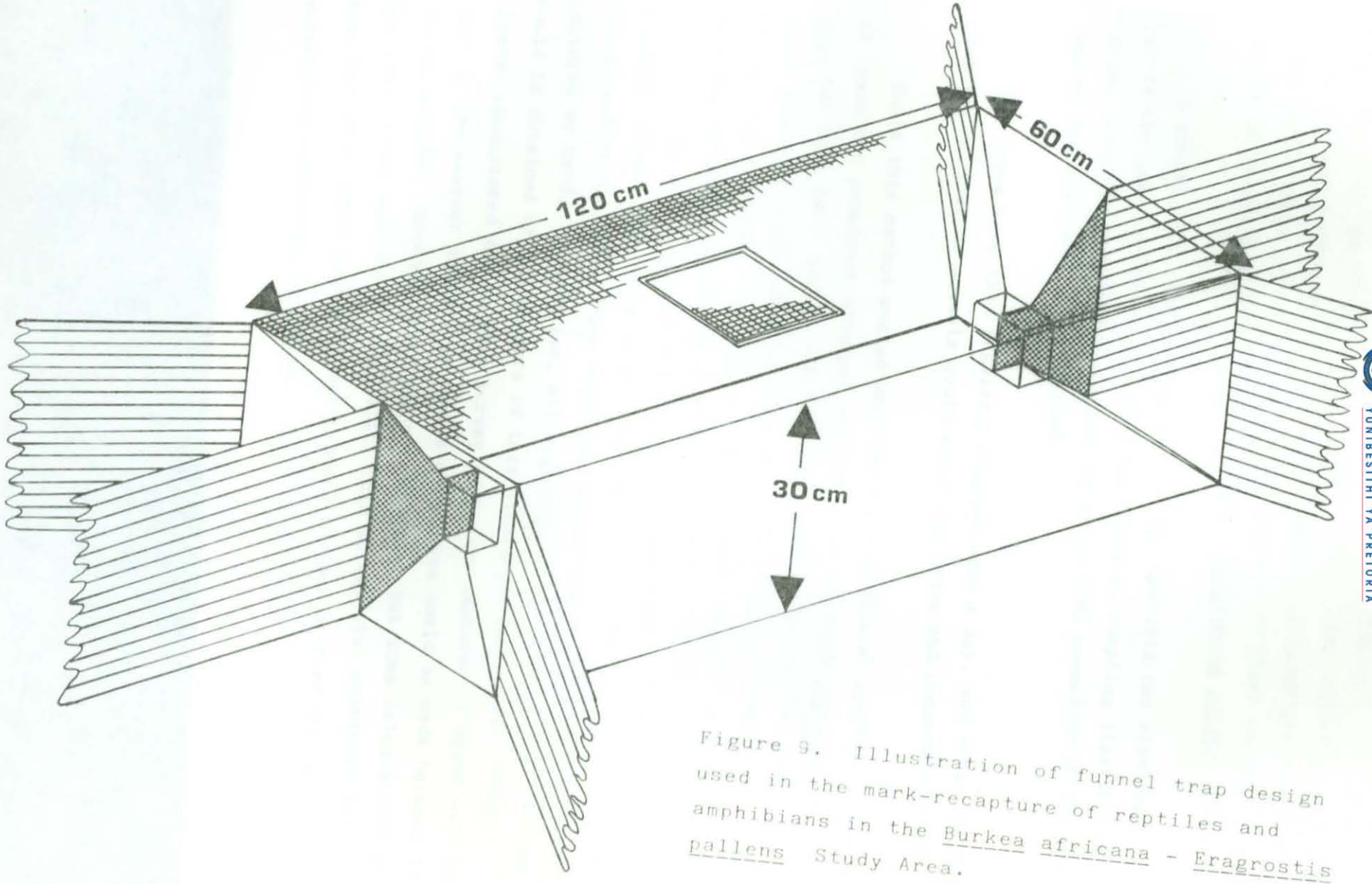


Figure 9. Illustration of funnel trap design used in the mark-recapture of reptiles and amphibians in the Burkea africana - Eragrostis pallens Study Area.

although they tended to twist in and out of the welded wire mesh and could only be removed gradually. The traps were then covered over with grass or sacking on the tops and on one side, to prevent the animals dying from dehydration and sunstroke, particularly in summer.

These traps were then spaced 100 m apart in a grid of 7 traps by 7 traps in order to obtain a representative random sample. They are located over an area of 49 ha, although their influence possibly extended over an area of 64 ha. This plot was located in Paddock 1 (Figure 3), along grid lines laid out over the whole Ecosystem study area. They therefore occupied the area between grid points B_3 to B_9 inclusive, and along grid lines B to H inclusive. This area encompassed the majority of plant community variations to be found in the Burkea africana - Eragrostis pallens savanna.

A second, but smaller, area of 0,36 ha was laid out with smaller traps, but of the same construction. This was aimed at sampling lizards (terrestrial), but the area and the number of traps (36) proved to be too small and no results could be calculated.

The traps were then regularly checked once a day, and after 10 days upended, so that no animals could enter the traps and consequently die.

While this method worked well for the terrestrial species, there were at least two prominent arboreal reptiles, one of which Lygodactylus capensis, the Cape dwarf gecko, had to be surveyed differently as they rarely cross extensive areas of ground and were not likely to be fully represented in the trap captures. In order to census these reptiles, a one hectare area was delimited between grid points F_3 and F_4 (Figure 2). All of the trees, shrubs and logs were marked with a galvanised iron disc stamped with a number (Figure 10). The object then was to systematically walk through the area from one side to the other and search for geckos which were then captured by hand. In addition, all sightings were noted, so that an idea could be obtained of the numbers of this lizard per unit area. Other lizards encountered during this survey were also captured or noted with respect to the nearest number, so that a comparison could be made between the various methods. However, this was not possible, but some calculations of home range sizes were made. Initially, this survey also continued for 10 days, but after three months it was reduced to four or five days as the disturbance was considered excessive.

Figure 10. Diagram of the Lygodactylus capensis intensive study area.

In order to establish terrestrial species, an area of one hectare was demarcated and iron fencing droppers were used to mark a grid of 10 points x 10 points. These droppers were numbered and at each point a square metre of soil was dug up, to a depth of approximately 30 cm and sifted for the presence of these animals. This method was repeated twice during the year to broadly include the seasons. Nothing was accomplished, so this method was only used during the first year. This plot was set up in Paddock 4 of the Ecosystem Study Area in the site set aside for destructive sampling.

As an aid to assess the movement of snakes into and out of the Study Area, spoor counts of these reptiles crossing the roads surrounding this area were made. This was done by two assistants perched on the bonnet or bumper of the vehicle who look for spoor, while the driver maintains a speed of approximately 10 km/h. At the same time, a bunch of branches tied behind the vehicle wiped out old spoor which had already been recorded. Snake crossings were noted as ingoing or outgoing and on occasions even the species of snake responsible for the track could be ascertained.

The distance around the area amounted to 4,44 km. At each 100 m, a numbered iron fencing dropper was located in order to determine whether there were any particular crossings more favoured than others. This spoor recording also took place during the 10 day recording period.

During visits to the area by myself and two assistants and other workers, the presence of snakes were noted and snakes were captured, if possible, so as to add to existing captures. These were also marked and released at the site of capture. This later extended to irregular counts by the team walking in a line through the area back and forth, searching the trees and shrubs. This was particularly successful for locating vine snakes, Thelotornis capensis.

In order to link the reptile and amphibian population study to the other components of the Ecosystem, it was necessary to ascertain what food was eaten by the various species. This involved collecting specimens of the more abundant lizards and frogs. They were obtained by shooting them with strips of rubber tube, or else with a .22 revolver loaded with dust shot. The specimens were then opened mid-ventrally and placed in a solution of 70% alcohol or formal saline, until such time as they could be examined. Collecting of specimens was done on farms adjoining the study area, but far enough so as not to influence the population under observation. Some re-

productive data was also obtained from these specimens.

It was not possible to collect snakes for analysis so that feeding records were restricted to those occasions where snakes were found which had recently fed. These snakes were then palpated and forced to regurgitate their prey so that identification was possible. Road kills, round and about Nylsvley, were also collected and dissected to identify stomach contents. Apart from this, specimens killed on farms in the area were also collected, particularly on the adjoining farm.

Amphibians were mostly collected at random, but mainly derived from the population in the study area which had died from dehydration in the traps, or killed by carabid beetles and formicid ants (Camponotus sp), as well as those that died from shock and heat stroke.

Marking, measuring and sexing.

All reptiles and amphibians were weighed, measured, sexed if possible, marked and released the following morning. Measurements taken were standard and included snout to vent and tail where applicable, as well as mass. Problems arose in the sexing of small snakes and lizards, as the normal method of everting the hemipenes did not work, except of dead specimens which were relaxed. In was, therefore, necessary to resort to probing with a liquid paraffin moistened probe, behind the vent. A deep pocket indicated the presence of inverted hemipenes following Szidat (1968). This method, however, does have its drawbacks, in that it is not always easy to insert a probe, as the hemipene may be constricted by muscles which block the entrance of the probe. In addition, the probing must be done very gently in order to avoid piercing the soft skin of the socket. Probes of various sizes were made to suit all reptiles likely to be captured.

Some lizards showed sexual di-chromatism, especially during the reproductive period while also at the same time exhibiting swollen hemipenes, so that sexing was relatively simple and provided a back check on the sexing done by the method described above.

The amphibians on the other hand, were difficult to sex when immature. Differences between the sexes when adult include dark coloured gular regions, as well as pads on the thumb in males, both of which characters were not, or only partially, developed in females. These then were the basic characters

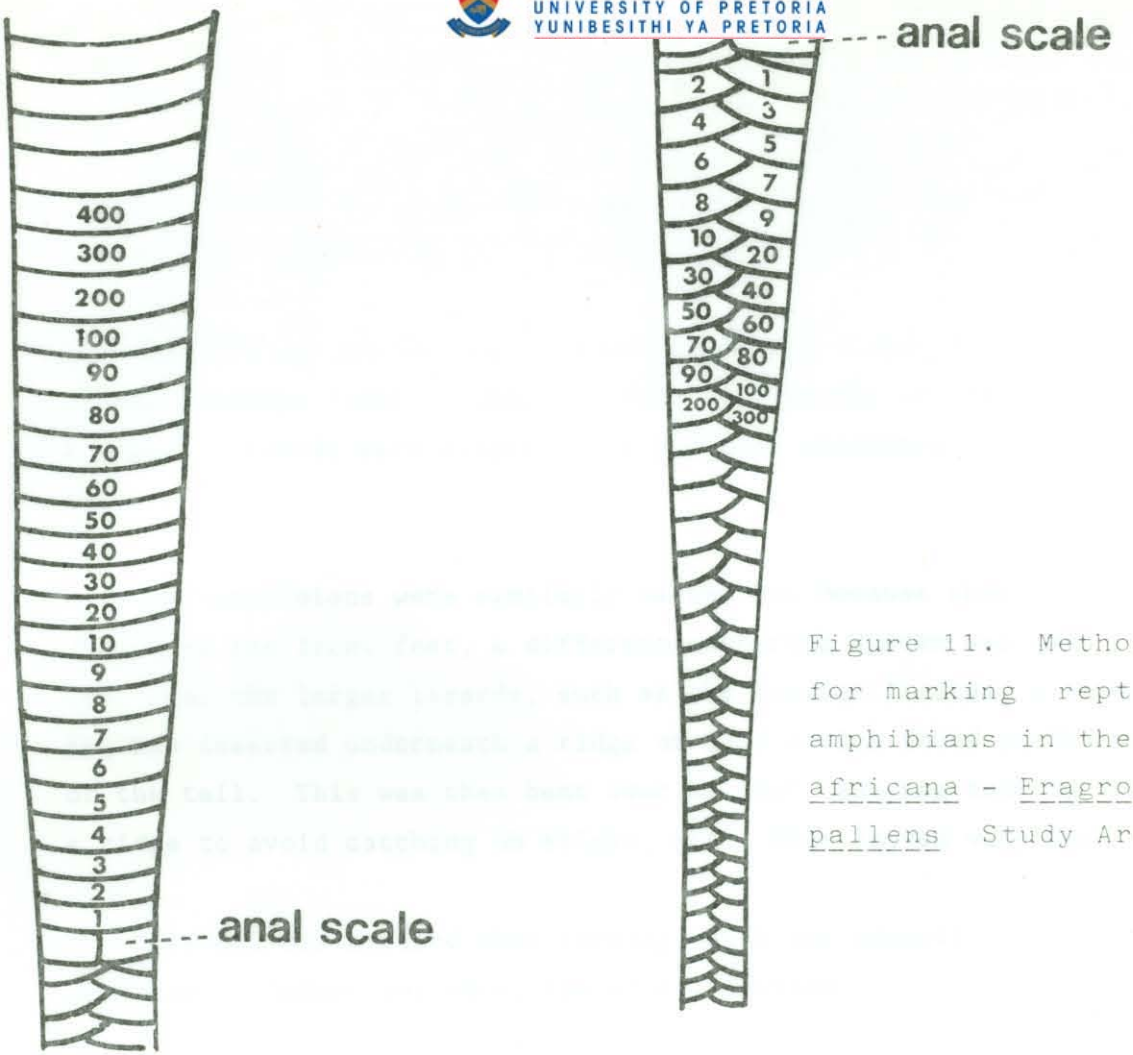
relied on.

Initially, all snakes were marked by a standard scale clip method, Blanchard & Finster (1933). This involved clipping the belly scales so that a permanent mark is made, which upon recapture can be endorsed again. In this method, the anal scale covering the vent is considered as No. 0. Moving anteriorly, the next scale is No. 1 and so forth to the 10th. The eleventh scale is No. 20, while the twentieth is No. 100 and so forth. This method allows for an indefinite number of combinations. Clipping the scales of juveniles was difficult and required a very narrow, sharp-pointed scissors, (Figure 11).

At the same time, another method of marking was also attempted, using a tattooing machine and a twelve volt battery as described by Woodbury (1948). The snakes were either marked caudally or else the ventral skin was twisted around to be against the ribs in the neck region and a number tattooed. This method was not of use on species with a dark ventral skin, as the mark is not visible. Another drawback experienced, was that the machine was too coarse for small snakes and on the other hand, not adequate enough to pierce the heavy ventral scales of the larger snakes.

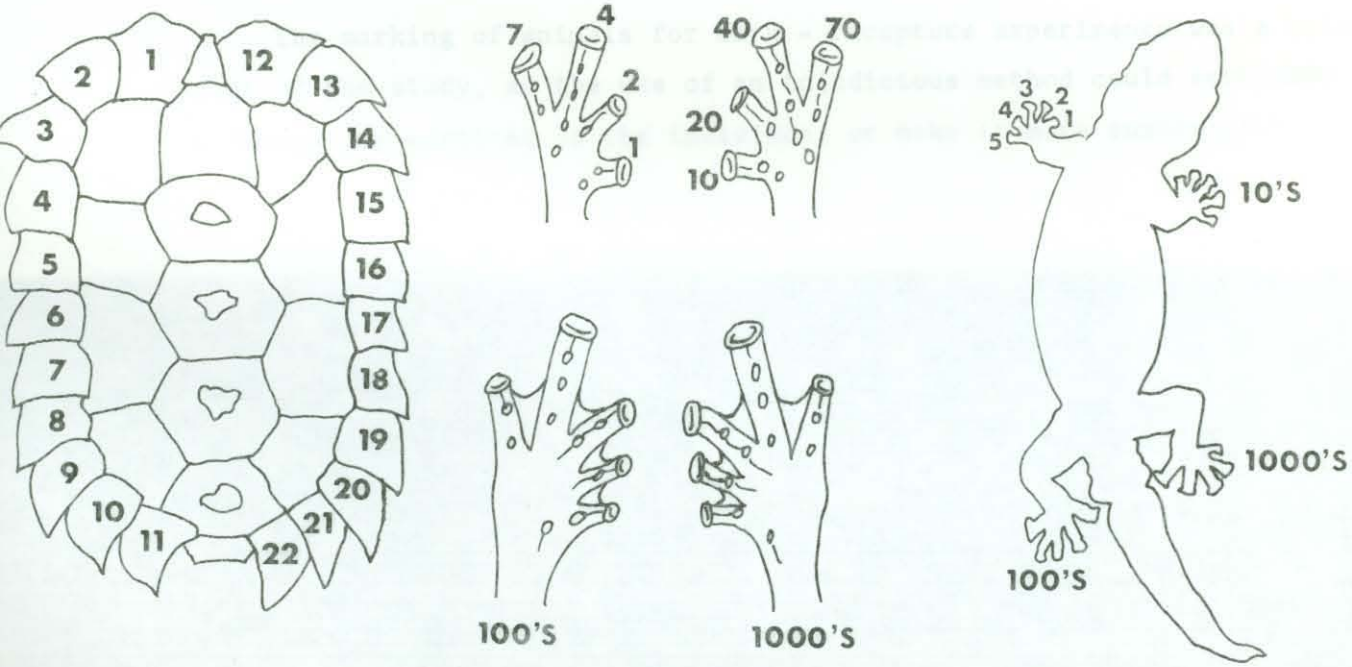
However, both the above methods proved to be too laborious, and in the first mentioned method, some regrowth was seen to take place. Therefore another method, Weary (1969), was attempted. This involved the use of a fine-tipped soldering iron. The subcaudal scales are paired in most snakes and are numbered starting from the first large subcaudal on the left-hand side posterior to the vent (Figure 11). Again, a system of numbering from one to 10, 20 - 100, 200 - 1000, is used which enables an infinite number of combinations. This method proved to be particularly successful and no regrowth occurred, the marks being clearly visible four years after the animal was marked.

As all these methods involved subsequent recapturing in order to determine whether they were marked, another method of marking, namely cryo-branding, was attempted, so that the mark could be seen without resorting to the capture of the animal. Two different methods were tested, one using a can of "Dust Off", produced by Falcon Safety Products, Inc., commonly used by photographic agencies. This contains freon (Dichlorodifluoromethane), which is a liquid gas which by inverting the container, is squirted onto the skin of the reptile for a few seconds. The skin is frozen in that area and



Snakes

Figure 11. Methods used for marking reptiles and amphibians in the Burkea africana - Eragrostis pallens Study Area.



Tortoises Amphibians Lizards

the pigment cells are killed so that after subsequently shedding the skin, the area is white. In this instance, a burst of five seconds proved to be too long, and although showing white initially after the first ecdysis, scar tissue formed and virtually obliterated the marks. A less lengthy exposure would possibly obtain good results.

The other method involved brass branding irons in the shape of symbols, immersed in a mixture of dry ice and methanol. The irons cool down to approximately -70°C, usually discernable when the mixture stops boiling. At this stage, the irons are removed and held firmly against the skin of the reptiles. The skin froze onto the underlying tissue and on subsequent sloughings the marks became clearly discernible. All the marks, however, only lasted one year and became less visible after each successive sloughing. With some species, such as pythons, distinctive markings on the head and tail were photographed for later recognition. This, however, is only applicable to those species having such distinctive colour variations.

Lizards and amphibians were marked in the standard toe clipping technique, Woodbury (1948). This involved the removal of the first section of a digit. Lizards were clipped on all digits according to numbers, (Figure 11).

The amphibians were similarly marked but because they only have four digits on the front feet, a different numbering system was used (Figure 11). For the larger lizards, such as the Monitor lizards, a numbered metal tag was inserted underneath a ridge of hard scales found on the dorsal side of the tail. This was then bent over so that the tag took on the shape of a ridge to avoid catching on sticks, etc. This proved very successful.

Alcohol was applied when marking, with the exception of snakes and tortoises. Infections were, therefore, avoided.

Although an attempt was made to assess the tortoise population, and animals were marked by filing a notch in the marginal scutes, no recaptures were made as the animals were infrequently seen.

The marking of animals for mark - recapture experiments was a critical part of the study, as the use of an injudicious method could seriously have affected the survival of the individual or make it more susceptible to

to predation. The trauma of capture coupled with the pain of marking may also affect its subsequent catchability. With this background, a method of establishing the presence of a marked animal by means of a suitable dye should be thoroughly investigated. Although several methods were tested, none proved to last for more than the ten-day period, and had to be repeated at each visit.