

# SERENGETI LION SURVEY

Report to TANAPA, SWRI, MWEKA and the Wildlife Division

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Since 1966, the Serengeti lion project has continuously monitored the lions of the Southeastern quarter of the Serengeti National Park. Although this long-term study has revealed numerous factors that have a significant effect on population growth and density, these results cannot be taken as representative of the Park as a whole. The North and West have fundamentally different patterns of prey availability over the course of the year and a greater diversity of habitat types. In addition, lions in these areas are undoubtedly subject to greater pressures from hunters and poachers than those on the central plains.

It has therefore been impossible to provide a reliable estimate of lion numbers over the entire Serengeti. Standard census methods (such as aerial surveys or ground counts) are useless for estimating lion numbers: lions prefer to spend daylight hours in thick vegetation and are highly clumped in their distribution. Further, lions are often very shy in areas of human encroachment and avoid approaching vehicles.

In order to provide estimates of lion densities in the rest of the Park we enlisted the services of over 120 MWEKA students to count roars over a three day period in late October 1990. Lions of both sexes frequently roar during the night, both to contact their social companions and as a territorial display. Roars can be heard from over 5 km away and it is quite easy to count the number of roaring animals. Although only a proportion of the lions in a particular area may roar during a given night, we are able to draw on our intensive behavioral studies to calibrate the number of roaring lions against lion density.

## METHODS

The MWEKA students were divided into teams that were sent to 17 different locations in the Serengeti (see Figure 1). Members of each team spent three consecutive nights listening for roars from dusk until midnight. Data were recorded on checksheets and included information on the time, number and direction of roaring lions. Similar data were collected on a separate sheet concerning the "whoops" of spotted hyenas. Information was also collected on the local habitat and weather. During each day, each MWEKA team drove six to ten 5 km ground transects to census prey abundance in the vicinity of their respective camps.

Measures of prey abundance and weather are important to assess levels of roaring. Our previous behavioral studies showed that lions roar more often on calm nights and when prey are abundant. To be able to calibrate lion densities from the roaring data, one MWEKA team was stationed in the middle of our intensive study area at SWRC. Lion numbers are known with absolute accuracy here because all lions are individually recognized and could be located during each day of the exercise. There was approximately one lion per 4 km<sup>2</sup> in this area during the month of the census.

From the roaring data, I calculated the minimum number of roaring lions that were heard by each team each night. For example, if one roaring lion was frequently heard from the east and two more occasionally roared from the south, then there were at least three lions roaring in that area during that night. After calculating these daily figures, I estimated lion densities from the maximum number heard across the three nights. For example, at Togoro, only 1 lion was heard the first night, followed by a minimum of 6 and 3 on the following two nights. Thus the maximum heard at Togoro on a single night was 6. This number represents the best estimate of the minimum number of lions in the Togoro area.

Unlike lions, which remain relatively stationary over an entire night, spotted hyenas are much more mobile and it is therefore difficult to assess accurately the number of "whooping" individuals in an area from the timing and location of calls. To give some indication of hyena numbers, I have merely reported the maximum number of whoops heard in a single night. Hyena specialists at SWRC, Heribert Hofer and Marion East, may be able to provide more accurate assessments of hyena numbers from these data at a later date.

## RESULTS

The results of the three day census are shown in Figure 1. Fortunately, there were widespread rains in the Serengeti both the week before and during the lion survey. This resulted in calm weather during most nights and in a relatively even distribution of wildebeest and zebra across the 17 census locations: prey abundance was high at all stations except near the Maswa headquarters. The number of roaring lions should therefore be equally indicative of lion density in all other censured areas.

Figure 1 shows that the number of roaring lions exceeded or equaled the number at SWRC in most areas included in the census. Lion densities, therefore, are at least comparable to those in Seronera over most of the Park. However, there are two regions where lion numbers are greatly reduced: along the western boundary of the Park from Kenyangaga to Tabora B; and in areas of the western corridor at Kirawira B, Ndabaka and possibly the northwestern Maswa.

These results are not surprising given the well known encroachments that have occurred in these areas. What is most reassuring from the census is the apparently high numbers of lions in Kogatende, Ikoma, Handajega and Mamarehe. While encroachment has had a profound effect on lion numbers near the boundary of the Park in several areas, data from the latter four posts indicate that these effects have not penetrated very far into the Park.

Results of the hyena census indicate that hyenas are common in many of the border areas where lions are absent. Hyenas are far more nomadic than lions and thus hyenas from the better protected parts of the Park often follow the migratory prey into areas where sedentary predators and prey have been extirpated.

## CONCLUSIONS AND RECOMMENDATIONS

Lions appear to be abundant over most of the North and West of the Serengeti, even though their numbers have been greatly reduced by human activities along the western boundaries. Based on the known lion density around SWRC and extrapolating over the entire area of high density outlined in Figure 1, we tentatively estimate the Serengeti lion population to number approximately 2,000 inside the Park and 2,700 in the entire ecosystem. We stress that these numbers are very crude; the principal utility of the survey was to determine where lions are abundant.

The areas where lion numbers have been drastically reduced appear to be quite narrow and the core of the Park clearly provides a large reservoir of lions that would recolonize these areas should human activities ever be effectively controlled. Poaching in these regions has a clear effect on all species and, in the long term, a fundamental change in the attitudes of the local people towards the Park and its wildlife must be encouraged. This goal is an integral part of the IUCN project, SRCS, headed by Bakari Mbanjo and Paul Simonds.

From our census it is clear that special efforts to change attitudes will be required in villages that are not separated from the Park by a real buffer zone. Park rangers informed the MWEKA team at Lemai that lions had broken into a hut in Lemai village in 1989 and killed two children. Villagers then tried to exterminate all predators in the vicinity by setting out carcasses poisoned with insecticide. Man-eating is most common in areas where the lions' usual prey have been eliminated. Restoration of a healthy resident prey population in these areas may therefore reduce conflict between humans and lions. However, the creation of a true buffer zone along the western boundary from the Kenyan border to Tabora B would be highly desirable.

Results of our census in the Park reveal two important factors associated with the Game Reserves and Game Controlled Areas that adjoin the Park. On the positive side, lion numbers were high in most areas bounded by Game reserves: Klein's Camp, Lobo, Ikoma and Mamarehe. This suggests that Game reserves do provide an effective buffer for the lions in the Park.

However, on the negative side, our studies have revealed indications of excessive trophy hunting in Ikoma and Loliondo Game Controlled Areas. We had been asked to take special care in surveying the Loliondo area by the Director of TANAPA, Mr. David Babu, and we discovered considerable evidence of abuse. During our ground counts near Lobo, we discovered a leopard bait set within a kilometer of the Park boundary due east of Lobo lodge. The MWEKA team at Klein's Camp observed that hunters brought two lions to their hunting camp in just three nights. We know of one other lion that had been shot in this block earlier this year, since it was an animal that we had fitted with a radio collar near Seronera. The hunters in this block must certainly be shooting far more than their quota of only four lions per year. Their activities are also very close to the Park

boundary: the Chief Park Warden for the Serengeti, Mr. Maragesi, has received reports of tracks leading from the hunters' camp near Klein's into the Park and such activity was also reported to us by the immigration officer at Bolagonja, Mr. Sebah. Finally, in Nov. 1989 another radio-collared male was shot by hunters well within 2 km of the Park boundary near Ikoma.

Our findings prove that hunters in Loliondo and Ikoma are not respecting the rules that prohibit hunting so close to the Park boundary. Further, hunters are shooting animals from the Park itself and hunters near Klein's Camp are exceeding the legal quotas. While the results of our roaring census indicate that lions so far remain abundant inside the Park near these hunting areas, excessive hunting of males can have profound long-term effects. When resident males are eliminated from a pride, incoming males kill all of the small cubs and evict the subadults of that pride. With frequent male replacements, successful cub recruitment becomes virtually impossible. In addition, if resident males outside of the Park are eliminated then resident males inside the Park will attempt to annex the unguarded pride. If these males are also shot, then social instability and reduced recruitment could extend well inside the Park. Leopards show a similar form of infanticide and appear to be under similar hunting pressure in these areas.

We therefore make the following recommendations concerning hunting activities in the Serengeti region:

1. All hunting of lion and leopard in the Loliondo and Ikoma Game Controlled Areas should be suspended immediately. Contracts of the current leaseholders to these blocks should not be renewed.

2. Leases to all hunting blocks around the Serengeti should only be granted to companies willing and able to invest in the long-term future of these wildlife areas.

Hunting must be carried out with the explicit goal of optimizing sustainable yields and distributing economic benefits to the local human population. Hunting activities in these areas must contribute to the development of the local infrastructure and must promote the conservation of Tanzania's wildlife resources. In the Southern Maswa, Tanzania Game Trackers have initiated two important programs that should serve as a model to any other group working in the region: first, they contribute a portion of hunting license fees to the local villages; second, they have developed a reward scheme to eradicate poaching from the hunting blocks. While TGT has initiated these programs voluntarily, I recommend that these practices become mandatory requirements for any company intending to lease hunting blocks in the Serengeti region.

In order to encourage a long-term perspective by the lessors, the lease to a particular block should be long enough to allow the firm to recover its initial investment in roads and camps, and to motivate the firm to base its economic decisions on long-term considerations. The current plan to allow for 5 year leases for responsible firms (with an assessment after 2 yrs) is a good start; but I would give preference to firms that wanted to remain in the same area for 10 yrs or more, and I encourage the Game Department to provide contractual assurances for such long leases. I would also recommend that the Game Department assess performance on an annual basis.

Finally, this census technique could be successfully applied to other regions and could provide a foundation for assessing effects of human encroachment and trophy hunting practices in all parts of the country. Repeated surveys of the same areas could be used to measure the consequences of changing policy.

# Serengeti Lion Survey

21-23 October 1990

Numbers at each post indicate:  
 first, number of lions  
 second, number of hyena calls  
 H = high prey abundance  
 L = low prey abundance

Note: No MWEKA team stayed at Moru, but estimates available from SWRC

