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Abstract: After four years of fieldwork, the authors find 200 cheetahs in the plains and 300 or more in the rest of the Serengeti National Park. In the dry season cheetahs concentrate along the woodland edge, and around Seronera, where the density increases to about one cheetah per square mile. The population appeared to be increasing, because of it contains a large proportion of young. Further information about the cheetah's social organization and ecological aspects is given as well.

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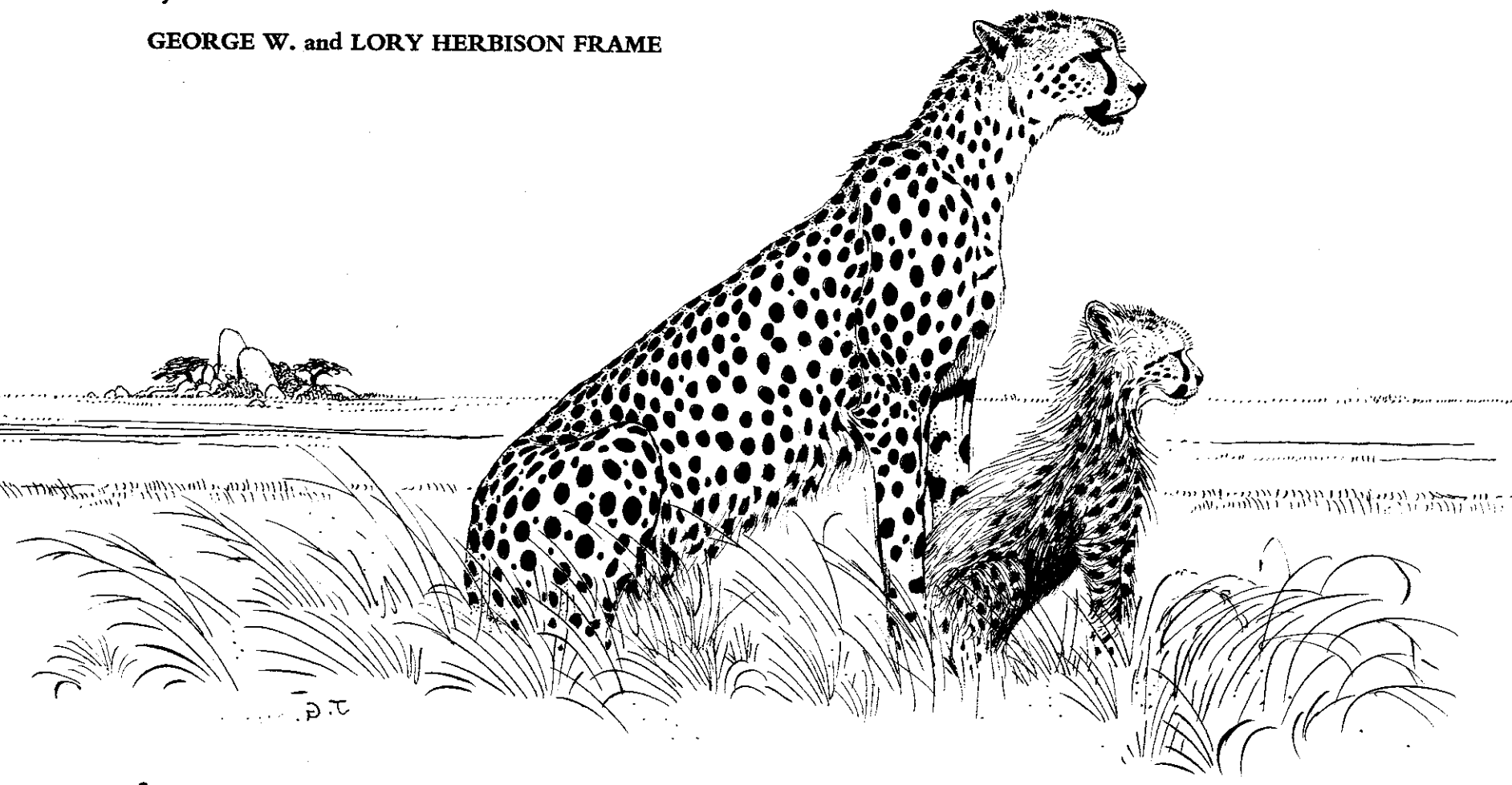
serengeti CHEETAH

by

GEORGE W. and LORY HERBISON FRAME



In the Winter, 1977 issue of the Wildlife News *(Vol. 11, No. 3) George and Lory Frame wrote about their study of the wild dogs in the Serengeti. In this issue they have written about their research on the Serengeti cheetahs.*

Of all of Africa's big cats the cheetah is the one most endangered. No one is exactly sure why. Compared with lions and leopards, cheetahs have large litters, relatively low cub mortality and the young mature early. As hunters they are more successful than most of the other large predators, and they range over large areas and so they are not restricted by the seasonal movements of prey. Despite these apparent advantages their numbers are diminishing rapidly. In 1972, when Norman Myers carried out a survey of the status of cheetahs for the IUCN/World Wildlife Fund (See News, *Vol. 9, No. 2) he predicted that by 1980 there would be less than 7500 cheetahs in Africa south of the Sahara, and possibly as few as 5000. There are no indications that their status has improved since that survey.*

In view of these facts it seems surprising that there has been so little research done on cheetahs in Africa. Until the Frames started their four-year study in 1974 there had only been one other full-time, long-term study carried out in East Africa, which was Ronald McLaughlin's excellent work on the cheetahs in the Nairobi National Park. The Frames results from the Serengeti have added greatly to our knowledge of the cheetah especially in their data on the ranging patterns of the males and females.

As a team George and Lory Frame have been working in Africa for nearly six years now. Prior to their study in the Serengeti they carried out an ecological survey of the Empakaai Crater, near the more famous Ngorongoro Crater in Tanzania. In their present study George is concentrating on the cheetahs and Lory on the wild dogs. They will finish their field work in January and go to Utah State University where they will write up their results; George for a Ph.D. and Lory for a M.Sc.

Their work on wild dogs and cheetahs has been sponsored in part by **AWLF** *with grants from the Shikar Safari Club, and also by the East African Wild Life Society, the Max Planck Institute, Sigma XI: the Scientific Research Society of North America, the Fauna Preservation Society the Explorer's Club, the Zoological Society of Philadelphia and the Fund for Animals, Inc.*

GEOGE W. FRAME **LORY HERBISON FRAME**

We watched two tiny black cheetah cubs as they hurried along behind their mother. The cubs pushed and stumbled through the grass and herbs, as if these plants were the greatest of obstacles, while their mother softly yelped and churred for the cubs to follow. Then when the going became easier, one cub sometimes ran ahead exhuberently, and sat waiting for its mother and sibling to catch up.

The late-morning sun was becoming hot, but the cheetah family continued onward. We slowly drove closer in our Land Cruiser, so we could carefully study the mother's face spots with our binoculars. With the aid of our reference file of nearly 200 cheetah identification photos, we soon recognized this cheetah as Amber. She was five years old, and this was her third litter.

After several miles of traveling, the cheetahs passed 200 yards upwind of a kopje where a pride of lions was resting, but the sleepy lions hardly bothered to look. Amber then approached a mixed herd of Grant's and Thomson's gazelles. She stopped and sat, carefully studying the prey, as her tired cubs crawled between her forelegs and belly, seeking whatever shade they could find.

The minutes ticked by slowly until Amber suddenly arose, tumbling the cubs aside. She intently began stalking toward the herd. As her cubs bounded along behind her, some of the gazelles saw the cheetahs and trotted further away. Apparently realizing that the hunt was already a failure, Amber sat and looked around. But after nearly half an hour, a lone adult male Tommy appeared about 200 meters away. It seemed unaware of the cheetahs. Amber immediately trotted toward the prey, leaving her cubs behind. She kept low and hid behind clumps of grass as much as possible. Twice she froze with forepaw held in midair when the Tommy raised its head to look around. Then when the gazelle lowered its head again, a brief chase of about 80 yards was all Amber needed to catch the prey.

Suffocating the gazelle took nearly two minutes. Amber held firmly onto the underside of its throat, her eyes closed in apparent concentration. Then she dragged the limp carcass a short distance to a clump of herbs, which offered only sparse cover. There she sat panting heavily, and looking around for scavengers.

Soon Amber ate a little, beginning where the skin is thin on the inner side of a hind leg. Then she sat up, called twice to her cubs, and resumed eating. Several times more she called, until the cubs finally heard her and came running. The mother cheetah then sat watching as her two tiny six-week-old cubs devoured the meat.

Two vultures now circled overhead. It wasn't long before a lioness saw the tell-tale scavengers. She appeared at a slow trot through the heat-shimmer of the plains. As the lioness approached, Amber sat, head low, growling repeatedly. Both cubs, unaware of the lioness as a source of danger, suddenly fled blindly toward her.

Without heasitation Amber sprang between the lioness and her cubs, pffft'-ing and swatting at the lioness with her forepaw. The surprised lioness retrated first at a run and then in a dignified walk. In the confusion both cubs went different directions and hid in the grass.

Amber found one of her cubs immediately, and sat with it some distance from the gazelle carcass. They were no longer in a mood for eating. She then led her cub away. Twice she looked back for the second cub, but continued without it.

Several hours later, when her one cub finished suckling, Amber sat up and began calling in the direction of the lost cub. Amber's calls sounded very bird-like. Her cub sometimes called too, with high-pitched chirps. Slowly they walked further away, both calling as they went. They traveled several miles by evening, and then spent the night sleeping hidden in a clump of taller grass. We began to wonder if Amber could be so stupid as to lose her cub so easily.

In the morning Amber and the one cub retraced their steps, calling as they went. By midmorning they reached the site of the previous day's kill, and nearby they found the lost cub. With all the family together again, we felt reassured about Amber's competence as a mother. Now that they were reunited, it was possible for us to sample the social interactions and play behavior of these tiny cubs.

The primary reason for our study of cheetahs on the Serengeti Plains is to evaluate their status. Even under the seemingly ideal ecological conditions of the national park, cheetahs have always seemed rare. Our goal was to find out if they really are so few, and if so, why.

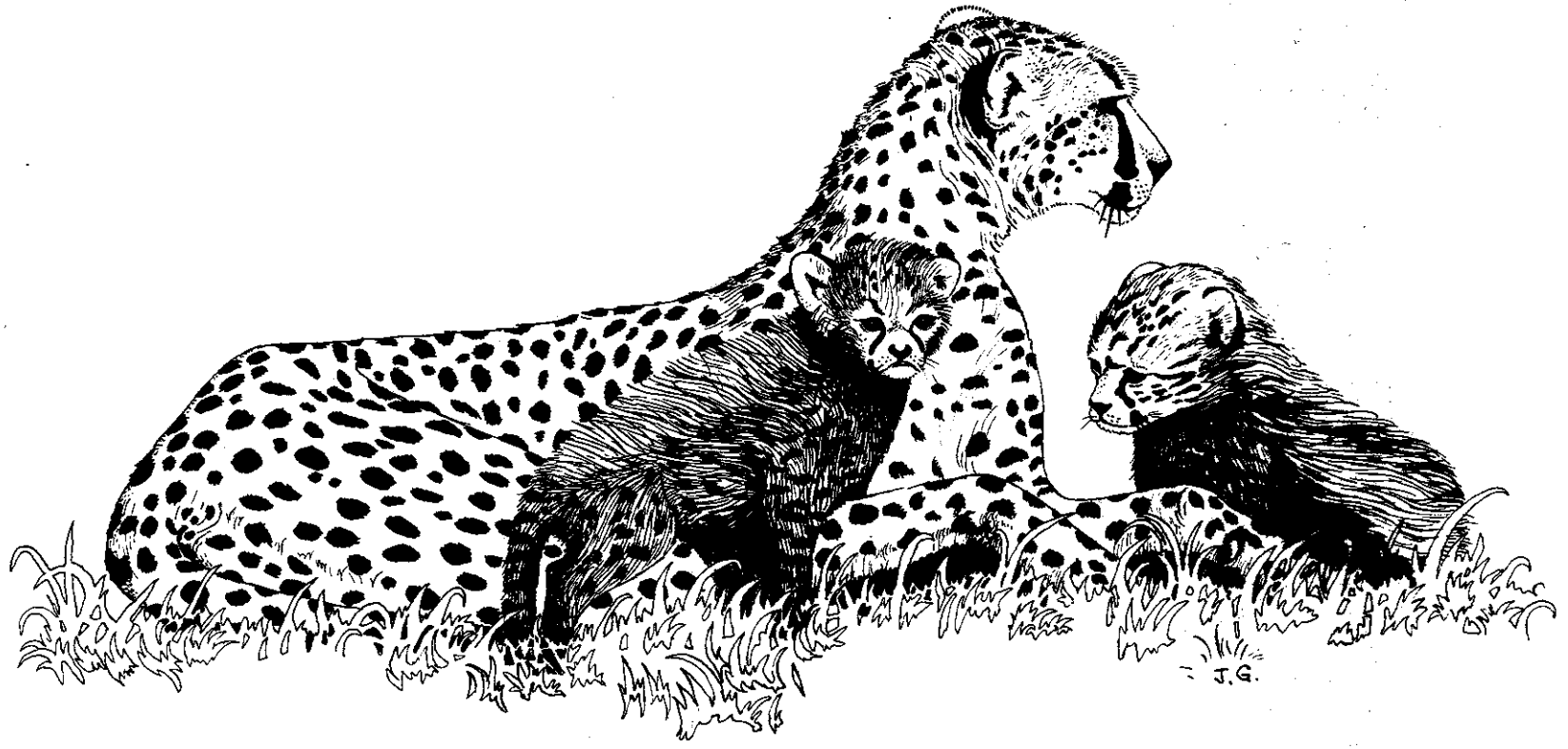
After nearly four years of fieldwork, we now know that more than 200 cheetahs use the plains, and probably 300 or more live in the rest of the Park. This is more than we had expected, although it is less than a quarter of the number of lions or spotted hyenas in the same area. In the dry season cheetahs concentrate

along the woodland edge, and around Seronera, where the density increases to about one cheetah per square mile—the highest known density of wild cheetahs anywhere in Africa. We believe that the secrecy of cheetahs accounts for their apparent scarcity.

The Serengeti cheetah population contains a large proportion of young individuals. This suggests that the population is increasing. Improved ecological conditions could certainly be responsible for more cheetahs now: More rain in the dry season has created a more even distribution of prey throughout the year. Also, the reduction of dry-season burning on the plains has resulted in more cover for stalking prey and for hiding from danger. The lack of intense fires may also mean that fewer small cubs perish in the flames.

We have been particularly interested in cheetah social organization, because of the occasional sightings of cheetah groups. We find that cheetahs are mainly solitary. Adult females nearly always are alone, except during courtship or when they have cubs. Adult males are more sociable though, with nearly half of our male sightings consisting of groups. The largest group that we ever saw was nine cheetahs, which consisted of two adult females each with a litter of cubs. We believe that these two females must have been closely related to have been so tolerant of each other.

It has been possible to follow many litters from shortly after birth until adulthood. We find that cubs stay with their mother until they are about 14 to 18 months old. Then gradually over a several days period the litter separates from the mother. However the young stay together as a sibling group for several months more. Thereafter, the young adult females leave, one by one, presumably as they come into estrus. Brothers usually stay together for a longer time.



Young adult female cheetahs, after leaving their mother, continue residing in their mother's home range. Initially, at least, the mother and daughters sometimes approach each other, but avoid actually meeting. Usually the mother moves away if she sees a daughter approaching her.

We have found that young adult male cheetahs emigrate from their mother's home range. We have resighted these emigrating males in entirely new areas, and they never returned to their mother's home range. Possibly the resident breeding males chase these younger males away into marginal areas. A selection for brothers remaining together may have evolved, because lone males have a smaller chance of establishing themselves in new areas already held by breeding males.

Mother cheetahs with newborn cubs are by necessity limited in their movements. One example is Malaika, who gave birth to a litter near Seronera in September. During their first month of life the cubs were occasionally moved to new lairs, but all were within a range of less than half a square mile. In the same time period, because gazelles were present in moderate density, Malaika hunted over an area of about four square miles. If Malaika is typical, she will eventually take her cubs over a range of 500 square miles or more during the coming year.

We find that cheetah births in the Serengeti occur throughout the year. The largest litter that we have ever seen was six cubs, but in captivity cheetahs are known to have produced as many as eight cubs in one litter. The average litter size for Serengeti cheetahs is about four, when the cubs are tiny. But at 5 to 12 weeks old, when they are still very small and black, they must sometimes follow their mother many miles per day. During this time they are very vulnerable, as we have seen with Amber's cubs, and some cubs perish. By three months old the litters average between only 2 to 3 cubs.

The sex ratio between cheetah cubs appears to be unity. However, twice as many adult females as males live on the Serengeti Plains. This is what we would expect, considering that young adult males emigrate from their mother's home range. Presumably they are subject to greater mortality in their wandering, or they disperse into less favorable areas outside of our study area.

Early in our study we were surprised to learn how unsuited cheetahs are for living and hunting in short grasslands. They are very much dependent on cover for stalking their prey, for hiding from other predators such as spotted hyenas and lions, and for shade during the heat of the afternoon. Most of the Serengeti Plains are, however, suitable for cheetahs because of the cover of medium-height grasses and herbs. Also important for cover are the drainages, erosion terraces, and kopjes. Although we have searched the short grass plains intensively, we have seldom seen cheetahs out there, except where there is some cover.

We have been looking at cheetah hunting in great detail for the purpose of evaluating their success rate in various ecological conditions. Cheetahs are primarily diurnal hunters, with decreased hunting activity during the heat of mid-afternoon. Of nearly 300 hunts that we have watched, about two-thirds of these involved stalking for a period of anywhere from a few minutes to an hour or more. The selected prey individual was usually alone, or else in a small group, which presumably reduced the chance of the stalking cheetah being seen. Apparently the prey were seldom selected with regard to physical condition. Stalking enabled the cheetahs to approach to within 10 to 50 yards of the prey, which greatly increased the chances that the chase would be successful. For tiny prey such as hares, stalking was rarely used; the cheetahs merely flushed them when walking and immediately gave chase.

Nearly ten percent of the cheetahs' captured prey was stolen by spotted hyenas and lions. Half of these were before the cheetah began eating. One gazelle was abandoned uneaten by a group of shy cheetahs, because of the combined presence of a large number of aggressive vultures surrounding the kill and a vehicle 300 yards away.

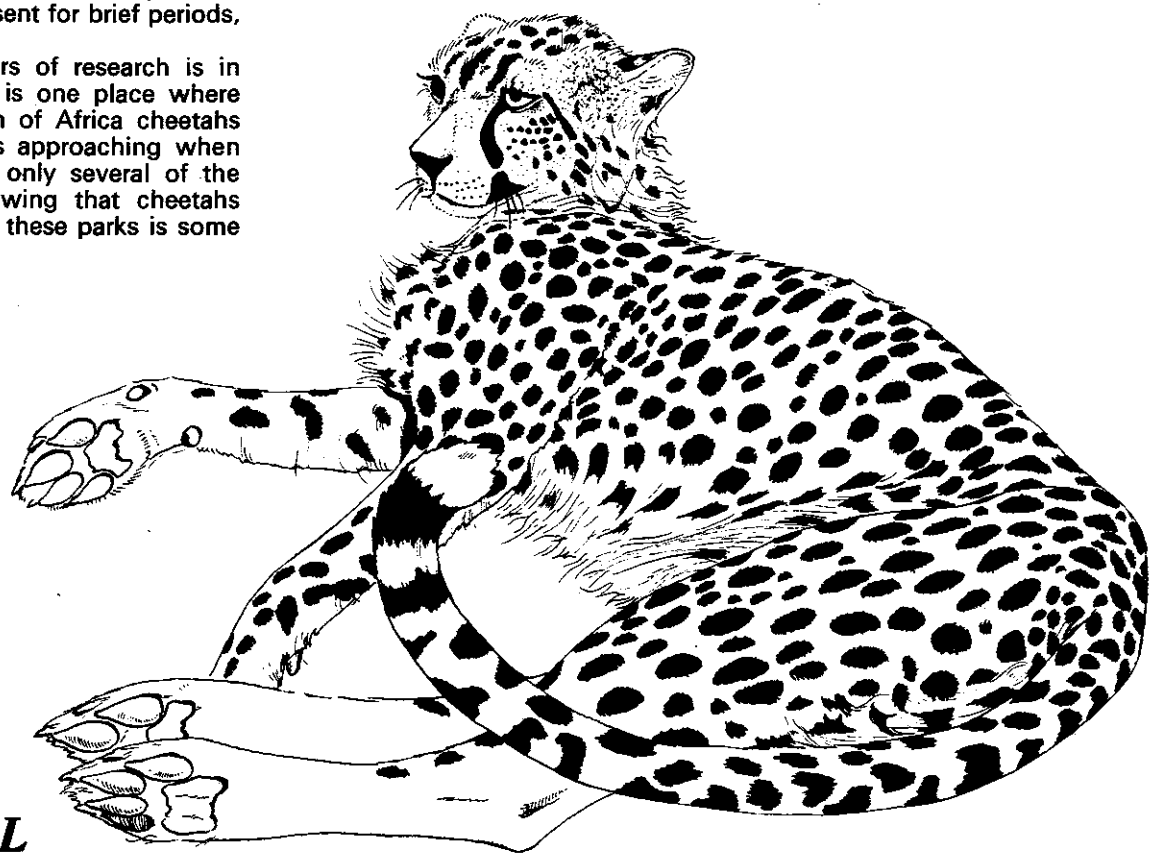
The most frequently killed prey of cheetahs in our study area are Thomson's gazelles. Hares were the second most frequent. Although the hares are small in size, they are an extremely important food resource because they serve as a buffer food supply in times when the migratory prey are absent from an area. Other prey killed were wildebeest, Grant's gazelle, and impala. Topi, kongoni, waterbuck, and zebra were selected only as half-grown or younger. The importance of various prey species certainly must vary with the locality.

Aside from studying cheetahs, we have spent some time watching the tourists who were watching the cheetahs. About 70 percent of the tourist vehicles that we sampled spent less than 9 minutes watching cheetahs. Usually they stop only long enough to snap several pictures, and then hurry along to get

pictures of something else.

We will soon finish our fieldwork. It appears that under the present ecological conditions, the Serengeti cheetah population is doing well. Considering movements, spacing, and available habitat, the Serengeti ecosystem population is estimated at 500 cheetahs. We feel that the best insurance for conserving cheetahs in the Serengeti ecosystem is to maintain diversity in the environment. The mosaic of woodlands, bushlands, and grasslands, and the availability of waterholes, help to ensure a fairly even distribution of cheetah prey throughout the year. On parts of the plains where all ungulates are locally absent for brief periods, hares are especially important as prey.

Our greatest satisfaction from these years of research is in knowing that the Serengeti National Park is one place where cheetahs are doing well. Throughout much of Africa cheetahs are being rapidly exterminated. The time is approaching when viable cheetah populations will survive in only several of the continent's larger national parks. But knowing that cheetahs like Amber and Malaika do have a future in these parks is some consolation.



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