Disturbance bias when tracking Kalahari leopards *Panthera pardus* by spoor

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The possible habituation of leopards to spoor trackers or increased disturbance by trackers affecting leopards in the Kalahari was examined. The median flight distance class interval was 0,6–1,0 km and there was no evidence of either habituation or increased disturbance.

Key words: tracking, leopard, *Panthera pardus*, disturbance bias, Kalahari.

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Visual tracking of large predators by spoor has been used successfully in the Kalahari to study various predators (e.g. Eloff 1972, 1984; Mills 1981; Bothma & Le Riche 1984). The technique of using expert trackers to follow and interpret the activities of large predators in the sandy substrate of the Kalahari has been recognised as a resourceful and ingenious adaptation of age-old techniques in modern wildlife studies (Teer 1982).

One factor that needs evaluation in using the technique, however, is the potential disturbance of the tracker and the research vehicle to the predator concerned, as contact with the predator is made daily, usually when it is resting. This facet is evaluated here for studies using this technique for Kalahari leopards (Bothma & Le Riche 1984, 1986, 1989, 1990).

During the above studies, a given leopard's tracks were followed by day, for a period of up to 14 days, to study its activities. At the end of each day's tracking the leopard was usually seen where it was resting under some convenient cover (Bothma & Le Riche 1984). All leopards were left alone immediately when it became evident that they were in the vicinity. Before study of the normal activities of the leopard resumed the next day, the distances fled and the activities during this disturbance were recorded by tracking.

The hypothesis evaluated was that continual daily disturbance during a prolonged period (7-14 days) of study would either habituate the leopards to the presence of the tracker and vehicle or that it would cause increasing flight distances. These effects would then manifest themselves either as an indirect or a direct relationship between days tracked and distances fled. An underlying assumption was that disturbed leopards will not indulge in restful activities while fleeing, and therefore that evidence of activities such as sitting or lying down indicated absence of undue disturbance.

To exclude possible sex-related and ambient temperature biases on flight distances, only data collected for male leopards in summer were analysed. These were distance (km) fled and day of tracking a specific leopard. Flight distances on 42 days of tracking, involving 37,4 km of flight were analysed. Flight distances and responses were determined from step by step tracking of leopards as was done for other movements (Bothma & Le Riche

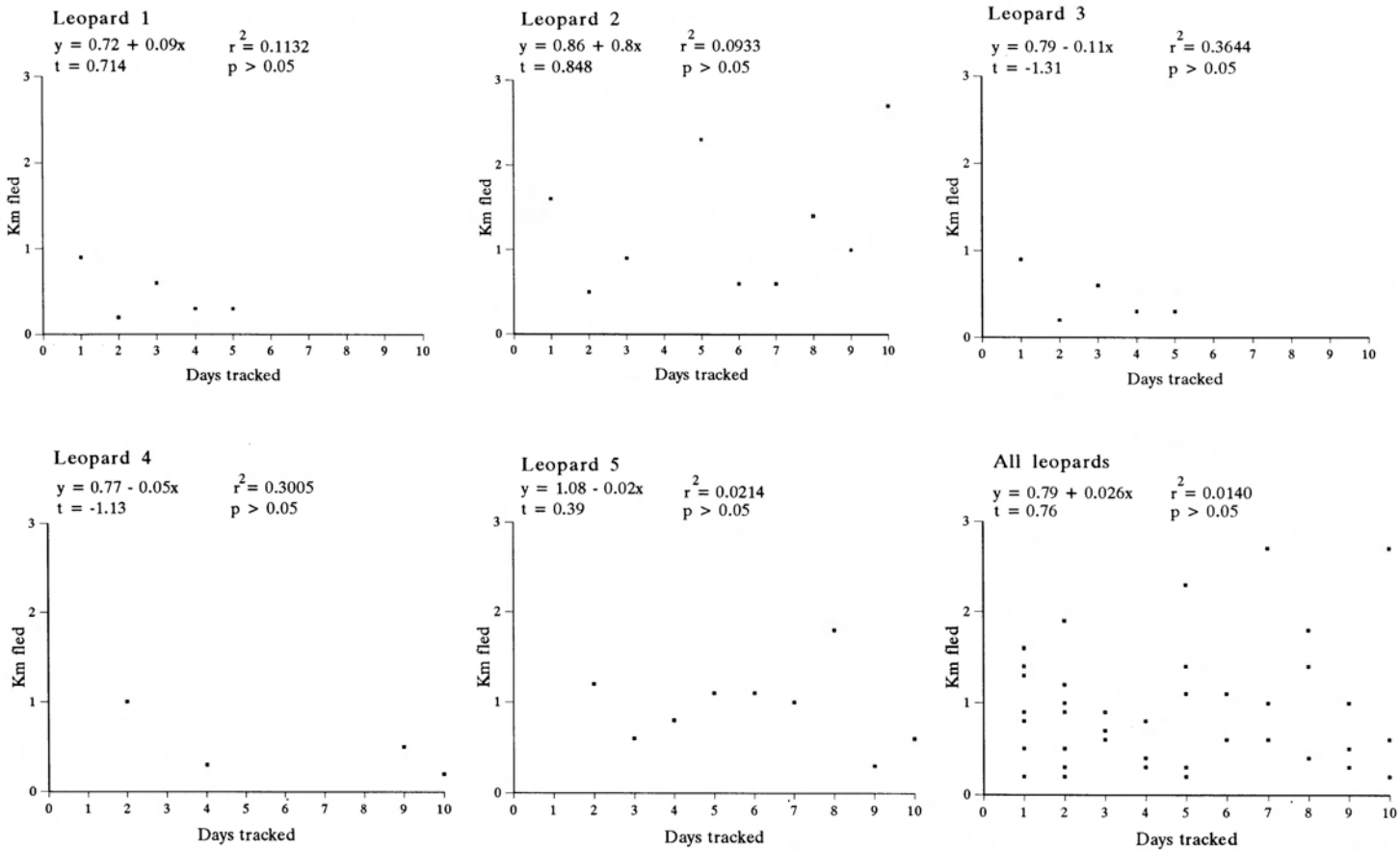

Fig. 1. The absence of linear relationships between the number of days tracked and the distances (km) fled for five individual leopards and for the combined data of nine leopards in the southern Kalahari.

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1984). No data for leopards resting at a kill were used. The data resulted from tracking nine leopards during different research visits. The study area in the northern interior part of the Kalahari Gemsbok National Park was approximately 1000 km^2 in extent.

The mean and standard deviation of the 42 flight distances measured were 0,91 ± 0,7 km (CV = 72 percent). As the mean is influenced by extreme values, the median class interval of 0,6 – 1,0 km is probably a more useful indicator of the true flight distance (Table 1). The maximum flight distance recorded was 2,7 km and the minimum 150 metres. Using the General Linear Models Procedure of the SAS System, no significant linear relationship was found between flight distances and day of tracking in five individual leopards yielding sufficient data for individual analysis, or on the combined data for nine leopards (Fig. 1). A polynomial curve yielded no better fit.

Table 1
Frequency distribution of 42 leopard flight distance class intervals (km) when tracked by spoor in the southern Kalahari

Flight distance class interval	Frequency
0,1 – 0,5	12
0,6 – 1,0	17
1,1 – 1,5	7
1,6 – 2,0	3
2,1 – 2,5	1
2,6 – 3,0	2

During the 37,4 km of flight, the leopards involved lay down to rest 37 times, sat down 16 times, crawled in and out of porcupine burrows eight times and once clawed an *Acacia luederitzii* tree.

If one accepts the assumption that resting leopards are not disturbed, then the animals studied do not appear to have been perturbed by the tracking and contact with humans.

Of the 23 leopards observed at various kills, only two did not return to their prey after being disturbed. In both these cases the prey was relatively small (a bat-eared fox and a porcupine) and almost totally consumed when the leopard was disturbed.

No similar data exist in the literature for comparison. The absence of any significant correlation between flight distances and day(s) of tracking allows the rejection of the null hypothesis that tracking disturbances will either lead to habituation to human presence or to increasing flight distances. However, our data only provide absence of evidence of tracking influences on leopard flight distances and not clear evidence of absence of this phenomenon. More detailed studies of this relationship are obviously needed.

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References

BOTHMA, J. DU P. AND E.A.N. LE RICHE. 1984. Aspects of the ecology and the behaviour of the leopard *Panthera pardus* in the Kalahari Desert. *Koedoe* 27 (Supplement): 259-279.

BOTHMA, J. DU P. AND E.A.N. LE RICHE. 1986. Prey preference and hunting efficiency of the Kalahari Desert leopard. Pp. 389-413. *In*: MILLER, S.D. AND D.D. EVERETT (eds). *Cats of the world: biology, conservation and management*. Washington D.C.: National Wildlife Federation.

BOTHMA, J. DU P. AND E.A.N. LE RICHE. 1989. Evidence of a flexible hunting technique in Kalahari leopards. *South African Journal of Wildlife Research* 19(2): 57-60.

BOTHMA, J. DU P. AND E.A.N. LE RICHE. 1990. The influence of increasing hunger on the hunting behaviour of southern Kalahari leopards. *Journal of Arid Environments* 18: 79-84.

ELOFF, F.C. 1972. Ecology and behaviour of the Kalahari lion. Pp. 90-126. *In*: EATON, R.L. (ed.). *The world's cats*, Vol. 1. Winston, Oregon: World Wildlife Safari.

ELOFF, F.C. 1984. Food ecology of the Kalahari lion *Panthera leo vernayi*. *Koedoe* 27 (Supplement): 249-258.

MILLS, M.G.L. 1981. *The socio-ecology and social behaviour of the brown hyaena* Hyaena brunnea *Thunberg, 1820, in the southern Kalahari*. DSc dissertation, University of Pretoria, Pretoria.

TEER, J.G. 1982. Advances in wildlife management techniques. *Transactions of the International Congress of Game Biologists* 14: 397-407.