

1989

Fellowship Research Report

研究紀要



**MATSUMAE
INTERNATIONAL FOUNDATION**

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Preliminary report for the Matsumae International Foundation and the Ecology Laboratory, Kyushu University.

RED FOX, *Vulpes vulpes* (L.) TRACKING IN YABE-MACHI, KUMAMOTO-KEN: FIRST RESULTS, METHODOLOGICAL PROBLEMS AND MANAGEMENT INDICATIONS

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TRAPPING

Leg-hold steel traps were used. The system proved efficient (3 foxes captured in the first 5 days of trapping) but the traps often injured the foxes. I advise against their further use. In one case the injuries possibly caused the death of a fox about one month after release; the relevant data were excluded from following analyses.

TRACKING TIMES

Since 8 tracking days (from 8:00 to 17:00) revealed no activity, subsequent tracking was done almost exclusively by night (18:00 to 6:15; mostly between 19:30 and 5:30).

SAMPLE SIZES

A total of 7 foxes (3 adult males; 3 adult females; 1 juvenile female captured in June) were radio-tracked from May to September. Animal locations ("fixes") were recorded every 15 min during all-night tracking sessions (one animal per night). One female lost her collar in June 14th and could therefore be tracked for 60:15 hours (241 fixes), of which only 24:15 hours (97 fixes) by night. Nighttime tracking for the other 5 animals (one was excluded, see "Trapping") averaged 84:30 hours (338 fixes; range 177-521). 25 scats could be positively attributed to foxes.

MOVEMENTS & ACTIVITY

Activity was recorded on the basis of the signal intensity fluctuations. Minimum movement per 15 min was calculated as the straight distance between consecutive fixes; this measure obviously underestimates the total distance moved by foxes, who often wander instead of travelling in a straight line (pers. obs.). The foxes were active for the largest part of the night (average 83.1%; range 75.5-91.8%). Adult animals moved an average of 186 m per 15 min (range of the individual averages 166-236 m), while the juvenile female moved consistently less (86 m \pm 86 S.D.). Average maximum distance moved per 15 min was 1245 m (range 952-1581 m) for adult animals, 515 m for the juvenile fox.

HABITAT USE

The accuracy of the tracking system was reduced by reflections along electric cables and by the poor performance of the dipole antenna when compared to the classic 3-elements yagi (too cumbersome on the 50Mhz to be used in the field). This resulted in an error radius of about 50 m in most condition. Due to that measurement error, and to the high habitat interspersion, I considered doubtful the attribution of any location to a particular habitat. Both quick animal movements and darkness contributed to increase this problem. Therefore habitats were simply classified as "near the houses" (within 50 m) and "other". That because: (i)the houses were probably important as a source of food for the foxes (see "Food") (ii)the extensive road network around the houses made it possible to record more accurate fixes (error radius mostly within 25 m) (iii)the percentage of time spent around the houses is an important variable when considering different management options (see "Conclusions"). The radio-tracked foxes spent a large part of the night near the houses, with considerable variations between animals (average 40%; range 18 to 49%).

FOOD

The low number of scats collected can be attributed to the following factors:

- (1)the presumably low density of foxes in the area (preliminary estimates suggest values around 1 to 2 foxes/Km²), and the consequently low numbers of scats
- (2)the heavy rains, common during the study period, washed away most of the scats (pers. obs.). It should be noted that in the study period the rainfall amounted to 1358 mm
- (3)the detection range was usually very limited due to high grass
- (4)populations of free-ranging cats and dogs roamed around the villages (habitat much frequented by foxes also); thus, many of the scats collected there has to be discarded as of dubious origin.

Most of the scats were therefore collected near the dens occupied by the study animals. The diet was analyzed following the method of Kruuk & Parish (1981; J.Anim.Ecol. 50:773-788).The figures shown represent the percentage of total volume. The most important category in the diet appeared to be "domestic animals"(31%), either resulting from garbage dumps or actively predated. Amorphous material constituted 19.5% in volume of the faeces examined; although a small number of earthworm chetae was found, three factors suggest its origin mainly from garbage: (i)its association with newspaper, seeds of domestic fruits not cultivated in the area, human hair etc. (ii)its association with domestic animals (62.5% of the samples containing amorphous matter contain also domestic animals); and (iii)its high average volume when present (60.8%), that indicate an abundant resource the animals gorged upon.

Together with cultivated fruits, the man-related food amounted to more than 50% of the diet. Furthermore, radio-collared foxes were

occasionally observed eating sweet corn, cultivated in the area. Small mammals (20.1%) and beetles (11.8%) were also important. Minor items were grass (7.6%), berries (6.6%), small birds (2.5%), other insects (0.2%). Little can be inferred from such a small sample. It suggests, however, that human activities were an important source of food for foxes in this season. Furthermore in winter, while insects and small mammals are probably less available, food derived from human activities might become even more important.

MANAGEMENT IMPLICATIONS

One of the aims of this study (see the Research Project) was to give indications on the management of this Carnivore in Japan, especially in relation to human health.

At this stage, the following considerations have to be made:

- (1)due to their close proximity to human residences, a potentially dangerous situation can be envisaged. In fact, the breakout of a vulpine disease (especially rabies) would put the human population at a great risk, because of the probability of both direct and indirect (through free-ranging cats and dogs) contact with infected animals
- (2)on the other hand, a large-scale vaccination campaign would be made much easier by the same proximity man-fox.

I therefore consider that, to reduce the potential risks for the human population, the following steps should be undertaken:

- (1)to eliminate the garbage dumps, so diffusely distributed on the Japanese countryside
- (2)to control the population of free-ranging pet animals
- (3)to expand studies on foxes and other possible vectors of dangerous diseases (e.g. raccoon dog, masked palm civet), both in Japan and in neighboring countries, with special attention to ranging behaviour and dispersal
- (4)to identify the possible routes of ingress of epizootic diseases, possibly focusing on migrating bats and rodents (inadvertently introduced by the ships), both demonstrated to be rabies vectors.

FURTHER ANALYSES (to be done)

Further analyses will focus on size and patterns of utilization of the home range. The use of the extended data base from the Maremma Natural Park (Italy) will allow in particular to investigate on:

- (1)how the fox ranging behaviour varies in different social and trophic environments
- (2)what sampling strategies and elaboration techniques are the most efficient and reliable to determine range size and activity centres.