SPRAINTING ACTIVITY OF CAPTIVE OTTERS: ITS RELATIONSHIP WITH BREEDING CYCLE AND NUMBER OF ANIMALS

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ABSTRACT – The marking activity of captive otters (*Lutra lutra*) was studied from April 1989 to August 1993 in an enclosure of 1.64 ***ha*** in size, located in the Ticino Valley Natural Park (Piemonte region, northern Italy). The number of otters in the enclosure varied from 1 to 6 and three litters of 1, 2 and 2 cubs were recorded in October 1990, 1991 and 1992. The sprainting activity, expressed as number of signs (spraints and anal secretions) per day was associated to the breeding cycle and increased in relation to the number of animals present in the enclosure. These data are of particular importance in order to explain the annual variation of the marking level in wild otter populations.

Key words: *Lutra lutra*, Otter, Captivity, Marking behaviour.

RIASSUNTO – *Attività di marcamento di lontre in cattività in relazione al ciclo riproduttivo e al numero degli animali* – L'attività di marcamento della lontra (*Lutra lutra*) è stata rilevata dall'aprile 1989 all'agosto 1993 in un recinto di 1,64 ha, situato nel Parco Naturale della Valle del Ticino (regione Piemonte, provincia di Novara). Il numero di animali presenti in tale recinto variava da 1 a 6, e la nascita di tre cucciolate, composte da 1, 2 e 2 piccoli, è stata registrata in ottobre negli anni 1990, 1991 e 1992. L'intensità di marcamento, espressa come numero di segni (feci e secrezioni anali) per giorno era associata al ciclo riproduttivo della specie e incrementava in relazione al numero di animali presenti nel recinto. I dati acquisiti rivestono particolare importanza per interpretare le variazioni nell'arco dell'anna del livello di marcamento di popolazioni selvatiche.

Parole chiave: *Lutra lutra*, Lontra. Cattività, Marcamento.

INTRODUCTION

The role of the marking behaviour in the European otter (*Lutra lutra*) has been discussed in some works carried out in the wild and in captivity (e.g. Chanin, 1985; Mason & Macdonald, 1986; Trowbridge, 1983). According to Mason and Macdonald (1987 and 1991), and Jefferies (1986), the number of spraints and anal secretions found in monitored sites can be considered as an approximate index to evaluate population's size, or at least, if the population is thriving or poor. However Conroy and French (1987 and 1991) suggest that the relationship between marking level and otter numbers is complex; for this reason extreme caution is needed to monitor changes in otter numbers using sprainting intensity.

In this work, conducted on captive otters housed in a large enclosure, we tried to obtain further details on this subject considering that the study area's features allowed to: i) always be sure about the number of animals present, ii) always detect the almost totality of marking signs of otters, and iii) make comparison with results obtained in field studies.

STUDY AREA AND METHODS

The study was conducted in a 1.64 ha enclosure located in the Ticino Valley Natural Park (Piemonte region, northern Italy). For a detailed description of the environmental characteristics see Fumagalli and Prigioni (in this volume). From April 1989 to August 1993 counts of otter signs (spraints and anal secretions) were carried out weekly. During this period the number of animals changed several times (Tab. I); three births of 1, 2 and 2 cubs were recorded at the end of October 1990, in middle October 1991 and at the beginning of October 1992. Weekly counts of signs were pooled as monthly values and then expressed as average number of signs and jellies per day. Direct observations on the otters were also done during the whole study period in order to get more details on the sprainting behaviour.

The relationship between the sprainting level and the number of otters was tested by Kruskall-Wallis variance analysis and by Mann-Whitney U-test to determine the significant differences ($P = 0.008$ with Bonferroni correction) between pairs of medians. These tests were applied to data collected weekly from April 1990 to August 1993. The relationship between the number of signs/day and the number of jellies/day was tested by Spearman rank (r_s) correlation coefficient (two-tailed).

To check whether the collection of signs influenced otters' sprainting activity or not, we carried out a test, which lasted two weeks, on two groups of 6 marking sites each. During the first week signs found in a group were daily counted and removed, while signs found in the other group were counted, and photographed in order to avoid re-counting in subsequent days. In the second week, after having removed the signs from all the sites, the kind of recording carried out in the two groups of sites were inverted. This test was conducted twice and the collected data, expressed as total number of signs per marking site, were analysed with the Mann-Whitney U-test. No difference in sprainting intensity was found between the sites (Fig. 1)

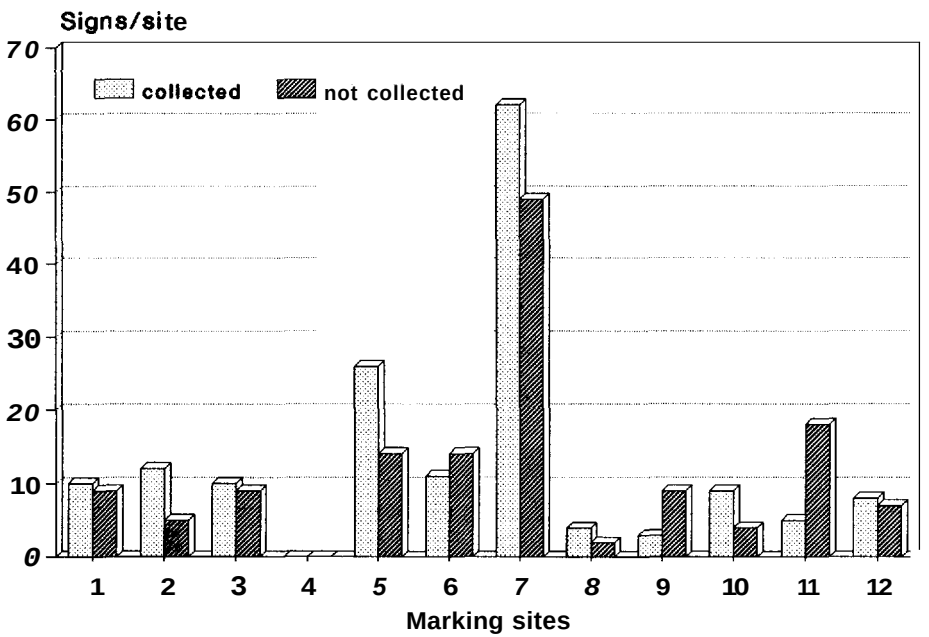

Fig. 1 – Comparison of the marking level between sites where spraints and anal secretions were collected and sites where these signs were not collected.

Tab. I – Number of otters present in the enclosure during the study period. (N° = number of individuals; M1, M2 = male number 1 and 2; F = female; J1, J2, J3, J4, J5 = Juvenile number 1, 2, 3, 4 and 5; sex in brackets, ? = undetermined sex; * M1 died in September 1989 and replaced by M2).

PERIOD	NO	STATUS
April '89-September '89	2	*M1-F
September '89-March '90	1	F
April '90-October '90	2	*M2-F
November '00-September '91	3	M2-F-J1(F)
October '91-September '92	3	M2-F-J2(M)-J3(Mj
October '92-August '93	6	M2-F-J2-J3-J4(F)-J5(?)

RESULTS AND DISCUSSION

From April 1989 to October 1990 the two marking's peaks recorded (Fig. 2) were due to M1 and M2, since their sprainting activity was high during the first months after releasing when they explored the enclosure intensively. This evidence agrees with data collected in captivity by Hillegaart et al. (1981), who observed that males sprainted about seven times per active hour, whereas females sprainted only three times

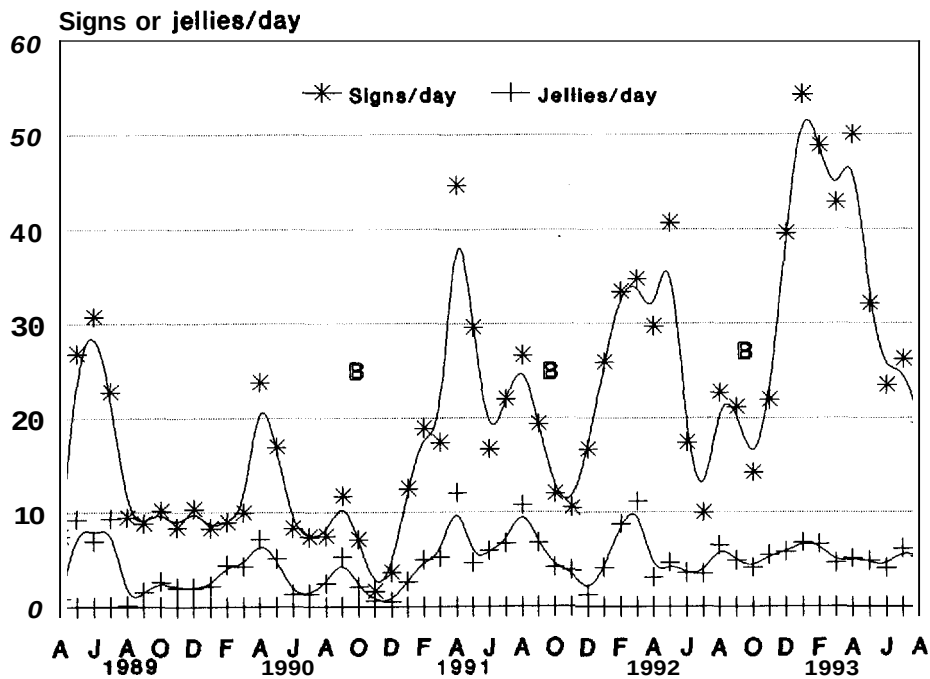

Fig. 2 – Marking activity of otters throughout the study period (B = cub birth).

From Novermber 1990 to August 1993 the marking level seemed to be related to the reproductive cycle. The lowest number of signs always coincided with cub births or their first month of life, when they remained in the holt or very close to it; on the other hand the highest marking values were recorded when cubs were 5-6 months old (Fig. 2). A similar marking pattern was observed when the number of jellies/day was considered. The only evident difference from the sign pattern occurred in November 1992-February 1993 when rainfalls were particularly intense. Even if anal secretions were lost in a greater proportion than spraints because of rain, a high significant correlation was found between the number of signs/day and the number of jellies/day ($r_s = 0.72$ $P < 0.001$ $N = 54$).

Considering the data collected from April 1990 to August 1993, the marking level varied in relation to the number of otters (Tab. 2; $x^2 = 52.5$ $P < 0.001$). Using the Mann-Whitney U-test, all possible combinations were significantly different ($P < 0.008$) from each other, except for the comparison between the marking level of 3 otters and that of 4 otters.

In the wild, the seasonal variations in sprainting intensity of the otter were recorded by several authors, who formulated different interpretations of this evidence (see Mason & Macdonald, 1985). Our data seem to confirm the hypothesis by Jenkins and Burrows (1980), who in a study carried out on Scotland lochs attributed the peaks of sprainting to the presence of family groups. In our study area, Polotti et al. (in this volume) reported that the first attempts at independent sprainting of cubs occurred when they were 6 months old and explored the enclosure regularly. At this moment we observed that their father (M2) increased heavily its marking activity in order to claim the possession of its territory.

We suggest that the annual variation in the pattern of sprainting can be considered as an indicator of breeding activity of otters in field studies and the marking level is a useful parameter for defining the status of wild otter populations.

Tab. 2 – Average marking level recorded weekly in relation to number of otters present in the enclosure (S.D. = Standard Deviation).

N. OF OTTERS	SAMPLE SIZE	AVERAGE	MIN-MAX	S.D.
2	28	75.1	5-221	59.2
3	44	146.6	4-425	97.7
4	48	167.9	4-384	78.4
6	44	256.7	64-456	106.6

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