

DAY RESTING SITES OF THE STONE MARTEN

PIERO GENOVESI(*) AND LUIGI BOITANI

*Dipartimento di Biologia Animale e dell'Uomo - Università di Roma "La Sapienza",
Viale dell'Università 32, I - 00185 Roma, Italy*

()Present address: Istituto Nazionale Fauna Selvatica - Via Ca' Fornacetta 9 - Ozzano
Emilia (BO), Italy*

ABSTRACT - A study on the use of resting sites by the Stone marten (*Martes foina*), was carried out by means of radio-telemetry in Central Italy. From December 1990 to October 1993, 12 stone martens were intensively radiotracked and 97 resting sites were recorded. The use of resting sites during day-time appears constant for all individuals. Although types of hide vary very much, sites characterized by difficulty of access and good thermal insulation appear preferred. Association in the same resting site between adults of different sex resulted frequent.

Key words: Stone marten, *Martes foina*, Radio-telemetry, Resting site

INTRODUCTION

The Stone marten (*Martes foina*) is nocturnal, and spends diurnal hours in resting sites (Herrmann, 1994; Lachat Feller, 1993; Skirnisson, 1986). The availability, quality and dispersion of the sites very probably affect the spacing patterns of the species (Lachat Feller: 1993).

During a study on the ecology of the stone marten in Tuscany (Central Italy), conducted by means of radio-telemetry, resting sites were identified and their parameters were recorded. In the present paper, the preliminary results of use and selection of resting sites are discussed.

STUDY AREA

The study was carried out in a hilly area of Tuscany (Central Italy) (43°14'N, 11°11'E), of approximately 100 km², altitude 205-525 m a.s.l.. The habitat is mainly wooded and rural: forests cover 67.47%; meadows, including some shrubland, 8.11%; farmland 12.95%; vineyards and olive groves less than 2%; and human settlements (barns, farmhouses, villages) less than 1%. The woods are partly Mediterranean maquis with a predominance of *Quercus ilex*, *Arbutus unedo*, *Erica arborea*, and partly fresh woods

with *Q. cerris*, *Q. petraea*, *Q. pubescens*, *Acer campestre*, *Fraxinus ornus*, *Carpinus betulus* and some abandoned plantations of old growth *Castanea sativa*. The higher parts of the area are characterized by plantations of *Pinus pinaster*. The undergrowth is often dense. The area has a Mediterranean climate, with a dry season in summer (min. rainfall in July, max. in November), and average temperatures which never go below 0°C (January mean 5.2°C; August mean 23°C).

MATERIALS AND METHODS

Stone martens were captured in cages with eggs acting as bait, tranquilized with Ketamine (Ketalar Parke Davis: 0.2-0.4 cc/Kg), sexed, aged by gauging teeth wear, fitted with radio-collars (Mod 2A, Telonics Inc., Mesa Ca) and released. The animals were located with a receiver (Mod.LA 1?, Custom clcc. of Urbana Inc., Ill.) and a hand-held antenna (Telonics). From December 1990 to October 1993, 12 stone martens (3 females: 9 males) were radio-tracked for a total of 1770 radio-tracking days. Two types of observations were made: single fixes in diurnal hours: sessions continued for 24hr in which the animal was located ever) 15 minutes. During location, activity, presence in resting site, parameter of the resting site, association with other in-

Anim. id.	Habitat	observ. days in rest site	N. rest sites	days per site	Buildings		Bramble) and edge-walls		Burrows	
			n	days	n	days	n	days	n	days
M1	Forest-rural	44	4	11.00					7	21
M2	Forest-rural	64	9	7.11	1	1			2	25
F5	Forest	339	15	32.60	2	309			6	22
M7	Forest	197	7	28.13	3	151			3	36
M9	Forest-rural	61	23	2.54	1	4	3	9		
M11	Rural	111	22	5.05	13	77	1	8		
M12	Rural	35	9	3.89	3	10	4	23		
F13	Rural	14	1	14.00						
M15	Rural	77	6	3.67	5	19				
TOT.		887	97	9.14	29	571	8	41	14	114

Anim. id.	Fissures in rock cliffs		Interstices in mine residuals		Brambles		Trees (cypress)		Ground	
	n	days	n	days	n	days	n	days	n	days
M1									2	23
M2			7	32					7	6
F5	1	1							6	7
M7										
M9	1	14			1	4	2	6	16	24
M11	5	21			1	3			2	7
M12									1	1
F13	1	14								
M15							1	3		
TOT.	8	50	3	32	2	7	3	9	30	63

Table 1 - Resting sites of Stone martens: types and days of use

dividuals in the resting site, were then recorded. To avoid autocorrelation of data in statistical analysis, only one location per day per individual was considered.

RESULTS

A total of 957 sites in day time were recorded. In only 7.89% of all locations (70 days) were animals located out of covert. In the remaining 92.11% (887 days), stone martens were found in 97 resting sites (Tab.1). Of these, 29 (571 days of use) were buildings,

either inhabited or not: 8 (41 days) were edge-walls or brambles attached to buildings: 8 (50 days) were in fissures in rock cliffs: 3 were in interstices in mine residuals (32 days); 3 (9 days) were in cypress trees: 14 sites (114 days) were burrows or cavities in the ground. Finally, 70 times (32 sites) stone martens were round resting on the ground, in brambles or in other quite accessible coverts.

95.8% of the buildings used by stone martens were of 2 or more floors, and often ani-

imals were located in garrets, or in fissures in walls several meters above ground level. Also the fissures in rock cliffs used as coverts were often quite high. Within the research period, two reproduction dens were identified: one in the ruin of a tower (in a fissure at about 20 m from ground level), the second in a crack of a rock cliff.

The number of days of use per site (N. of sites/days of monitoring), calculated for the animals ($n=8$) which were monitored for more than 20 days were round to vary preatly from individual to individual ($\bar{x}=10.5$; $s.d.=10$). The highest values ($\bar{x}=25.4$; $s.d.=4$), which signify a more stable use of resting sites, were those of two individuals which inhabited a forested part of the study area, where only 5 uninhabited buildings were present. On the other hand, three animals living in the more rural part, with a higher availability of potential resting sites (barns, farmhouses, etc.), showed significantly lower values ($\bar{x}=4.2$; $s.d.=1$, T-test= 7.344 , $P=0.0012$).

The contemporary presence of individuals in the same resting site was not uncommon. A mating pair (adult male and adult female) contemporarily monitored for more than 10 months, was found together in 42.93% of all occasions (288 days). Adults of both sexes were found together with young in a successive period which was not taken into consideration in the present paper. No association was recorded between adults of the same sex.

DISCUSSION AND CONCLUSION

The results of the present research confirm that the use of resting sites in day-time is constant for all individuals and in all seasons. This is probably a typical characteristic of stone marten activity (Herrmann, 1994; Lachat Feller, 1993; Skirnisson, 1986). Every individual used several resting sites dispersed within its territory. As one can expect, in areas where potential resting sites are scarce animals use the available

ones more intensively.

The wide range of resting site types recorded in the present and in previous studies (Herrmann, 1994; Lachat Feller 1993; Muskens et al, 1989; Posillico & Lovari, this volume; Skirnisson, 1986), confirms the adaptability of the stone marten to varying habitats and ecological parameters. Despite difficulty in the evaluation of the availability of resting sites (Lachat Feller, 1993), and therefore also calculations on the site selection (Cock, 1978), the stone marten seems to show a preference for buildings, fissures in rock cliffs or burrows. These types of sites are characterized by good insulation and difficulty of access for which the stone marten uses its excellent climbing capabilities. Apart from the thermal insulation role of hides (Lachat Feller, 1993; Posillico & Lovari, this volume), we hypothesize that the defensive aspect of resting sites plays a role in their selection. Similar parameters recorded for the two reproduction dens appear to confirm the latter hypothesis.

Association in resting sites between adults of different sex, as recorded also in previous studies (Muskens et al., 1989; Skirnisson, 1986), and between adults and young, appear to confirm the intrasexual territoriality model (Powell, 1979), that foresees overlap between adults of different sex, and avoidance between adults of the same sex. Furthermore, the frequent association recorded in the present research seems to indicate a remarkable tolerance within the mating pair.

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REFERENCES

- Cock, M.J.W., 1978 - The assessment of preference. *J.Anim.Ecol.* 47: 805-816.

- Herrmann, M., 1994 - Habitat Use and Spatial Organization by the Stone Marten. In: The biology and conservation of martens, sables and fishers (S.W. Buskirk, A.S. Harestad, M.G. Raphael & R.A. Powell, eds.). Cornell Univ. Press. Ithaca, N.Y.: 122-136
- Lachat Feller, N., 1993 - Utilisation des gîtes par la fouine (*Martes foina*) dans le Jura suisse. Z.saugetierk.:330-336.
- Muskens, G.J.D.M., Meuwissen, L.T.J. and Broekhuizen, S., 1989 - Simultaneous use of day-hides in Beech Martens (*Martes foina* Erxleben 1777). Population-sokologie marderartiger Säugetiere: 409-421. Wiss. Beitr. Univ. Halle 1989/37.
- Posillico, M. and Lovari, S., 1994 - Differenze stagionali nelle caratteristiche dei ricoveri della Faina (*Martes foina*). I Congresso Italiano di Teriologia, Riassunti:132.
- Powell, R.A., 1979 - Mustelid spacing patterns : variations on a theme by Mustela. Z. Tierpsychol., SO: 153-165.
- Skirnisson, K., 1986 - Untersuchungen zum Raumzeit-system freilebender Steinmarder (*Martes foina* Erxleben 1777). Beiträge zur Wildbiologie, 6: 1-200.