

DISTRIBUTION OF MUSTELIDS IN ADAMELLO-BRENTA PARK AND SURROUNDING AREAS (CENTRAL ITALIAN ALPS)

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ABSTRACT – The survey, conducted in 1991-93 on a study area of 1085 km², has permitted to define the distribution maps according to 6.4x5.5 km grid of the following species: *Meles meles*, *Mustela erminea*, *Mustela nivalis*, *Martes foina* and *Martes martes*. *Mustela putorius* and *Lutra lutra*, recorded since 1960 and 1970 respectively, were not checked. From the analysis of 201 records (sightings, signs of presence, animals found dead and skins), we found that the badger, weasel and stone marten selected middle-low altitude (since 1000 m a.s.l.), the pine marten and stoat the middle-high altitude. The former species frequented mainly agricultural lands of bottom of the valley with built-up areas, the latter ones occurred mainly in forest habitat of secluded valleys (the pine marten), and in stony ground and alpine prairies (the stoat). The badger was the most diffuse species, the pine marten the least one. On a total of 46 grids of the study area, 32.6% presented three mustelid species, 17.4% five species. The badger and the stone marten were the species with the greatest overlapping range (61.7% of the grids), the weasel and the stoat with the smallest one (23.4% of the grids).

Key words: Distribution, Mustelids, Central Italian Alps.

RIASSUNTO – *Distribuzione dei Mustelidi nel Parco Adamello-Brenta e aree limitrofe (Trentino, Alpi centrali)* – L'indagine, condotta nei 1991-93, ha interessato un'area di 1085 km² e ha permesso di definire le mappe di distribuzione, secondo una griglia di 6,4x5,5 km desunta dalla Carta Topografica generale (scala 1:10000) edita dalla Provincia Autonoma di Trento, di cinque specie: *Meles meles*, *Mustela erminea*, *Mustela nivalis*, *Martes foina* e *Martes martes*. La presenza di *Mustela putorius* e di *Lutra lutra*, accertata fino intorno agli anni '60 e '70 rispettivamente, non è stata invece confermata. Dall'analisi di 201 segnalazioni (osservazioni dirette, segni di presenza, animali trovati morti o imbalsamati) è stato rilevato che le fasce altitudinali medio-basse (fino a 1000 m) sono selezionate da tasso, donnola e faina che frequentano soprattutto ambienti coltivati di fondovalle con presenza di centri abitati, quelle medio-alte da martora e ermellino che utilizzano rispettivamente comprensori forestali delle valiate interne e ambienti con presenza di versanti detritici, praterie alpine e malghe.

La specie più diffusa è risultata il tasso, quella meno diffusa la martora. Il 32,6% delle 46 griglie, in cui è stata suddivisa l'area di studio, mostra la presenza di 3 specie, il 17,4% di 5 specie. Il tasso e la faina sono risultate le specie con maggior sovrapposizione di areale di distribuzione (61,7% delle griglie), la donnola e l'ermellino quelle con minor sovrapposizione (23,4% delle griglie)

Parole chiave: Distribuzione, Mustelidi, Alpi centrali.

INTRODUCTION

In Italy the knowledge of the distribution and status of mammals is poor for most species. This is specially true for carnivores because of their cryptic and

nocturnal habits that make them difficult to detect. For Mustelidae family, only the otter (*Lutra lutra*) range is accurately known now (Prigioni and Fumagalli, 1992; Prigioni, in this volume).

The present paper is a part of a triennial study (1991-1993) on the ecology of mustelids in Italian alpine habitat. This research, promoted by the Adamello-Brenta Natural Park, is linked with the Italian Mammal Atlas Project started in 1990 (Prigioni et al., 1991).

STUDY AREA

It is located in the central Alps (Trento province), covers 1085 km² with an altitude ranging from 280 m to 3556 m a.s.l. and includes the mountain group of Brenta and partially those of Adamello and Presanella. The division of the study area per altitudinal bands is shown in Tab. 1. The area protected as nature park is 614 km². The study area is characterized by a transition climate between the prealpine and interior alpine (Arrighetti, 1973). About 1/3 of the study area is forested. Broadleaves woods, scattered between the prevailing apple orchards and meadows, occur in bottom of the valleys with a dominance of *Ostrya carpinifolia*, *Quercus pubescens* and *Fraxinus ornus* in the dry and sunny zones, and of *Acer* spp., *Tilia* spp. and *Fagus sylvatica* in wet and shady zones. The coniferous forest is prevalent and often reach 2000 in a.s.l. *Picea abies* forms monospecific woods or, more often, mixed woods in association with *Abies alba* and *Larix decidila*. The alpine pastures and prairies are bordered from several shrubs with a dominance of *Pinus mugo*, *Alnus viridis*, *Rhododendron* spp., *Juniperus communis* and *Vaccinium* spp.

Tab. 1 – Surface of the study area shared per altitudinal ranges.

Altitudinal ranges (m a.s.l.)	% of surface
< 500	1.0
500 - 1000	15.0
1000- 1500	19.0
1500- 2000	27.0
2000 - 2500	23.0
> 2500	15.0

METHODS

Two-hundred-one distribution records (sightings, dead animals, signs of presence as dens, footprints, faeces) were collected in 1991-93 by field survey and by interview of foresters, gamekeepers and naturalists. Records from interview were checked before being used for distribution map of the species. Animals found dead and skins (in some cases photographs) has been especially considered to identify species of the genus *Martes*. For the polecat *Mustela putorius* and the otter a bibliographical research was made.

Records were mapped on a 1:10000 scale maps according a grid 6.4x5.5 km so that the study area was divided in 46 grids.

For five mustelids the altitudinal range selection was tested using the following index (Robel et al., 1970):

$$PI = \frac{PFS_i}{PAR_i}$$

where PFS_i is the percent frequency of a species in i th altitudinal range calculated considering the records found in each altitudinal range over the total number of records, and PAR_i is the availability of each altitudinal range expressed as percentage of surface of the study area. When $PI < 1$ the altitudinal range was avoided, when $PI = 1$ the altitudinal range was used in proportion to availability, and when $PI > 1$ the altitudinal range was selected.

RESULTS

Five mustelid species (badger, stoat, weasel, stone marten, pine marten) were detected, while no recent records of the otter and the polecat were found.

The badger was the most widespread species, the pine marten the least one (Fig 1a). Three mustelid species occurred on 32.6% of the grids, 5 species on 17.4% (Fig. 1b). The badger and the stone marten showed the greatest overlapping range (61.7% of the grids), the weasel and the stoat the smallest one (23.4% of the grids).

An analysis of the distribution of each mustelid species and of the sharing of records according to altitudinal range follows (Fig. 2 and Tab. 2).

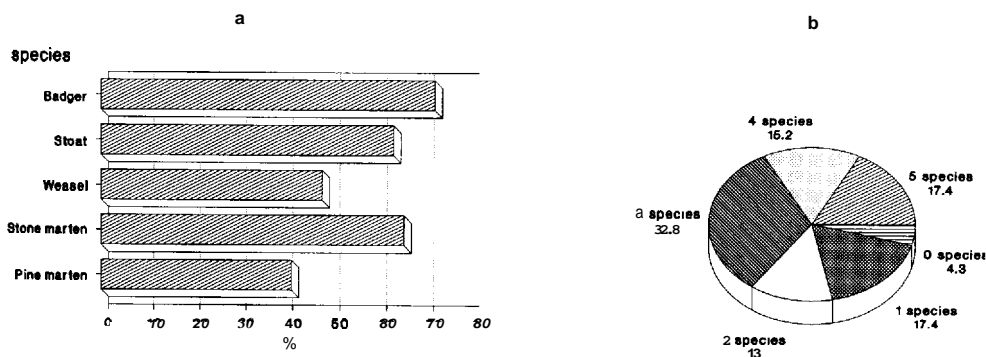
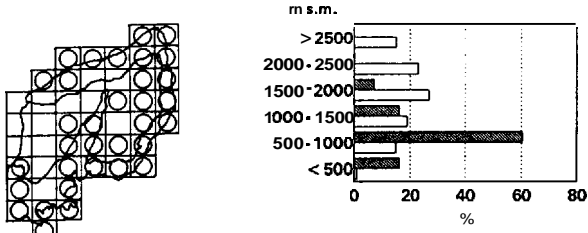


Fig. 1 – Distribution of the species expressed as percentage of grids where each species was detected (a) and percentage of grids with a number of species varying from 0 to 5 (b).

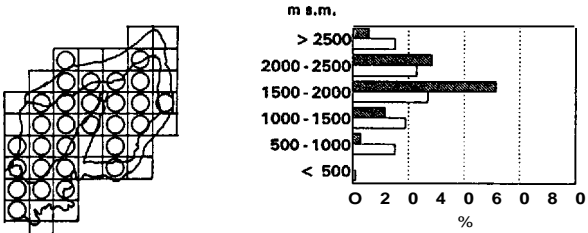
Tab. 2 – Values of the altitudinal range preference index (PI) calculated for five mustelid species (N = number of records; altitudinal ranges: 1) < 500 m; 2) 500-1000 m; 3) 1000-1500 m; 4) 1500-2000 m; 5) 2000-2500 m; 6) > 2500 m).

	N	1	2	3	4	5	6
<i>Meles meles</i>	68	16.1	4.0	0.8	0.3		
<i>Mustela erminea</i>	35		0.2	0.7	1.9	1.2	0.4
<i>Mustela nivalis</i>	28	10.3	3.9	1.5	0.1		
<i>Martes martes</i>	24		0.8	2.8	1.2		
<i>Martes foina</i>	46	15.5	4.6	0.6	0.1		

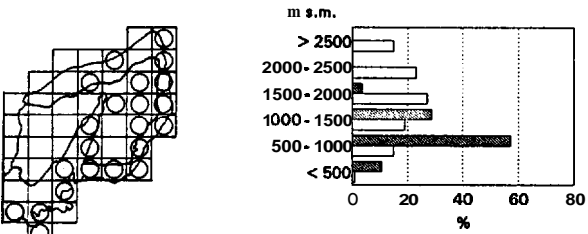
Meles meles



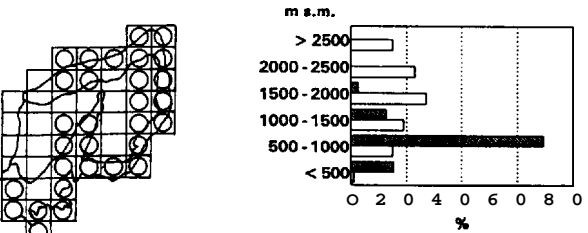
Mustela erminea



Mustela nivalis



Martes foina



Martes martes

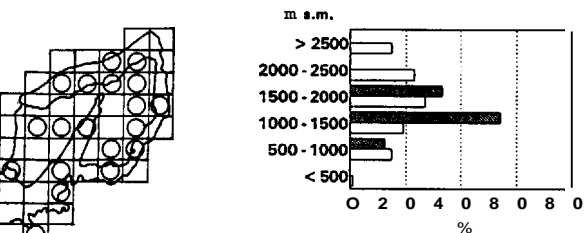


Fig. 2 – Distribution maps of 5 mustelid species and percentage of records in relation to the availability of altitudinal bands.

Badger *Meles meles* — Sixty-eight records were distributed between 250 m to 1930 m a.s.l.; most of these occurred in riverine habitats and in prevalently agricultural land. The badger selected middle-low altitudes and occasionally occurred over 1500 m a.s.l. Several specimens were killed by road traffic.

Stoat *Mustela erminea* — Thirty-five records were collected between 800 m and 2650 m a.s.l. The middle-high altitudes were selected. Some records occurred in middle-low altitude in winter. The majority of sightings was made close to "malghe" (summer alpine pastures with cowshed) and mountain refuges, and in stony ground and alpine prairies.

Weasel *Mustela nivalis* — Twenty-eight records were distributed between 280 m to 1680 m a.s.l. The species selected the middle-low altitude, occasionally occurred over 1500 m and frequented mainly meadows and agricultural lands of bottom of the valley and of middle mountain. Several individuals were found dead in apple orchards owing to chemical treatments.

Polecat *Mustela putorius* — The last record of presence happened in 1960 (Campodenno, Valley of Non, 500 m a.s.l.). In the study area the species seems to be disappeared so as in the whole province of Trento.

Otter *Lutra lutra* — Only historical records all previous to 1970 were collected. This confirms what found in other otter surveys (Cagnolaro et al., 1973; Pavan et al., 1983; Pedrini et al., 1986).

Pine marten *Martes martes* — A total of 24 records were gathered between 700 m and 1900 m a.s.l. The species selected mainly the 1000-1500 m altitudinal range and occurred in secluded valley dominated by coniferous and beech forests. It frequented also mixed woods at 500-1000 m a.s.l., where we captured a specimen by live-trapping (750 m a.s.l.). No records was found in urban areas of middle mountain and bottom of the valley.

Stone marten *Martes foina* — Forty-six records were found between **220** and 1700 m a.s.l. The species selected the middle-low altitude, occasionally occurred over 1500 m and frequented mainly agricultural lands and woods of bottom of the valley and of middle mountain. In these habitats, characterized by urban development, it is increasing. On the other hand some sightings were made 10 km away from urban areas.

DISCUSSION

The survey has provided a first picture of the actual distribution of mustelids, till now based on the anecdotal data and informed opinion. The disappearance of the otter agrees with that occurred on all Italian alpine arc, where several combined factors (e.g. destruction of the bankside vegetation, depletion of fish resources,

pollution) compromised riverine habitats. This environmental alteration can have also determined the disappearance of the polecat in the study area, although persecution seems to have played a main role.

On the other hand, the Adamello-Brenta park preserves still suitable habitat for the pine marten (most records of this species was collected inside it) and other endangered carnivores like the brown bear (*Ursus arctos*) which occurs with a small population (Osti, 1991) and the lynx (*Lynx lynx*) recently recorded (Mayr pers. com.).

The difficulty of observation and identification of mustelids in nature has been the main limiting factor of this survey not permitting to solve much doubt about the determination of species of the genera *Mustela* and *Martes* on the basis of signs of presence, and to obtain information about abundance and population changes of the species. In this respect, further research addressed to provide at least indexes of relative abundance is urgently required.

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REFERENCES

- ARRIGHETTI, A. 1973. Il clima. In Tomasi G (red.): L'ambiente naturale e umano dei parchi del Trentino, rilevamenti e studi coordinati dal Museo Tridentino di Scienze naturali, Trento.
- CAGNOLARO, L., ROSSO, D., SPAGNESI, M. & B. VENTURI. 1975. Inchiesta sulla distribuzione della Lontra (*Lutra lutra*) in Italia e nei Cantoni Ticino e Grigioni (Svizzera) 1971-1973. Ricerche di Biologia della Selvaggina 63, 120pp.
- OSTI, F. 1991. L'orso bruno nel Trentino. Distribuzione, biologia, ecologia e protezione della specie. Servizio Parchi e Foreste Demaniali della Provincia Autonoma di Trento, Museo Tridentino di Scienze Naturali. Collana Naturalistica, 209 pp.
- PAVAN, M. & P. MAZZOLDI. 1983. Banca dati della distribuzione geografica di 22 specie di Mammiferi in Italia. Ministero Agricoltura e Foreste, Collana Verde, 66: 33-279.
- PEDRINI, P., CALDONAZZI, M., MAYR, S. & S. ZANGHELLINI. 1986. La Lontra nel Trentino. In Cassola (red.): La Lontra in Italia. WWF Serie Atti e Studi, 5: 34-38.
- PRIGIONI, C., CANTINI, M., DEBERNARDI, P., PATRIARCA, E. & A. ZILIO. 1991. Progetto Atlante Mammiferi Italia (P.A.M.I.). Guida per il rilevatore. Dipartimento di Biologia Animale, Università di Pavia, 1: 24.
- PRIGIONI, C. & R. FUMAGALLI. 1992. La Lontra: status e conservazione in Italia. In La Lontra: specie minacciata in Italia. Ministero dell'Agricoltura e delle Foreste. Collana Verde, 89: 1-27.
- PRIGIONI, C. Guidelines for the feasibility study of reintroduction of the otter *Lutra lutra* in Italy: the Project of the Ticino Valley (North-Western Italy). (in this volume).
- ROBEL, R.J., BRIGGS, J.N., CEBULA, J.J., SILVY, N.J., VIERS, C.E. & P.G. WATT. 1970. Greater prairie chicken ranges, movements, and habitat usage in Kansas. J. Wildl. Manage. 34: 286-306.