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# UTILIZATION OF TRACKING PLATES TO VERIFY THE PRESENCE OF THE EUROPEAN POLECAT (*MUSTELA PUTORIUS*) IN THE NORTHERN APENNINES

RICCARDO FONTANA[1], AMBROGIO LANZI[1], MASSIMILIANO GIANAROLI[1], FRANCESCA AMOROSI[1], ELENA LELLI[2]

[1]Studio Professionale Fontana-Gianaroli-Lanzi, Via Togliatti 1/V, 42048 Rubiera (RE), Italy; e-mail: studio@studio-geco.it
[2]via Nazionale per Carpi, 1033, 41010 Modena

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ABSTRACT - The presence of the European polecat (*Mustela putorius*) in the Alto Appennino Modenese Regional Park (Emilia-Romagna, northern Italy) was verified by means of tracking plates. Collected foot-marks were compared to a reference collection of footprints belonging to ferret *M. putorius furo* and stone marten *Martes foina*. Four standard measures of footprints were considered. Discriminant function analysis was used to distinguish the target species from the others. Twenty-three footprints belonging to polecats were found.

*Key words*: *Mustela putorius*, European polecat, tracking-plates, northern Apennines, Italy

RIASSUNTO - ***Utilizzo di trappole a passaggio* (tracking-plates) *per l'accertamento della presenza della puzzola (*Mustela putorius*) nell'Appennino settentrionale.*** Vengono esposti i risultati di uno studio mirato a verificare la presenza della puzzola (*Mustela putorius*) nel Parco Regionale dell'Alto Appennino modenese (Emilia-Romagna), condotto mediante utilizzo di trappole a passaggio (*tracking-plates*). Le impronte raccolte sul campo sono state confrontate con una collezione di impronte di riferimento appartenenti a furetto *M. putorius furo* e faina *Martes foina*. Da ciascuna impronta sono state rilevate quattro misure. Per separare la specie target dalle altre si è fatto ricorso all'analisi statistica discriminante. La presenza della puzzola nell'area di studio è stata confermata da 23 impronte raccolte sul campo.

*Parole chiave*: *Mustela putorius*, Puzzola, *tracking-plates,* Appennino settentrionale, Italia

## INTRODUCTION

Being very elusive and active at night, the European polecat (*Mustela putorious*) is hardly detectable in nature. For this main reason, its Italian range is scarcely known (Genovesi and De Marinis, 2003). As the species is listed in the Directive Habitat 92/43 EEC (Annex V) and is of conservation concern in Italy, a study was conducted in order to detect its presence in the Alto Appennino Modenese Regional Park (Parco del Frignano), as part of a research program of investment in the protected areas of the Emilia-Romagna Region (northern Italy). Information on the ecology of polecats, which inhabit a

great variety of habitats (Blandford, 1987), along with historical and recent records reported by local check-lists (Costa *et al*., 1998; Sala and Gianaroli, 2006), led us to believe this mustelid to be present in the study area. We corroborated this hypothesis by means of intensive trappings using tracking plates. This methodological approach, thanks to the advantages it provides (limited field crew and non-invasiveness) in comparison to traditional forms of capture, is widely used, particularly in North America, for a large number of *taxa*, including mustelids (Orloff *et al*., 1993; Zielinski and Kucera, 1995; Nams and Gillis, 2003).

## STUDY AREA AND METHODS

The Alto Appennino Modenese Regional Park covers an area of approximately 153 km² in the mountainous portion of the province of Modena (Fig. 1), with an altitude ranging between 500 and 2165 m a.s.l. This area is characterized by extensive forests of beech (*Fagus sylvatica*), alternating with open areas (pastures, cultivated fields, high-elevation meadows) and, to a smaller extent, human settlements. Trapping areas were selected by means of stratified sampling (Camussi *et al*., 1995). The survey area, using Esri™ ArcVieW 9.0, was subdivided in 155 square cells, each cell representing 1 km², according to the UTM cartographic grid. For each square, 14 environmental variables were calculated, including 11 habitat surfaces (ridge meadows or moors; cliffs, stone beds, and screes; beech forests; broadleaf forests; mixed forests; coniferous forests; uncultivated fields with shrubs and trees; cultivated fields, pastures and grasslands; pools, lakes and ponds; streams, ditches and creeks; urban areas), the linear development of contour lines, the development of the perimeter of environmental types and Shannon's environmental diversity index score (Ferrari, 2001).

By means of multivariate statistical methods (cluster and discriminant analysis), a representative sample (18 cells of 1 km²) was randomly extracted (Rossi, 1993). Analyses were performed using WinSTAT® for Excel and XLStat © 6.0.


Figure 1 - Location of the study area (in black) in the Emilia-Romagna region (northern Italy).

Two separate trapping sessions were carried out, each one requiring the simultaneous working of 18 tracking plates laid out over nine squares (two plates per square) for 15 consecutive days in autumn 2004. This season was chosen as it coincides with the dispersal of young polecats (Genovesi and De Marinis, 2003), which, being less diffident and experienced, are easier to capture than adults. Each tracking plate was made up of a base in alveolar plastic material (750x260x10 mm) and a cover made up of two plates of black plastic material (400x700x3 mm). This material was assembled on site forming a tube, with the aim of creating a "den effect", in order to lessen the animals' diffidence. Inside the tube, an aluminium plate was placed (750x250x1 mm), covered with soot for about two-thirds of its length, and with white adhesive paper for the remaining third. One end of the tube was closed off with wire-netting and the tracking plate was blended in with the setting using vegetation and debris found on site. Poultry scraps were used to attract the animals inside the trap and scented bait ("GUSTO", Minnesota Trapline Products) was spread around the area (Slauson *et al*., 2002). The tracking plates were checked every two days. Paper strips with animal tracks were removed and replaced with new ones. Tracks were preserved with a fixative in order not to alter their features. Collected footprints which could belong to polecats were selected for further analysis; in addition, whenever possible, the footprints of non-target species were identified to species-level, in order to check for selectivity and efficacy of the method. *M. putorius* and stone marten *M. foina* footprints can be confused, so reference footprints were obtained, using the same tracking plates employed in the survey area, from living individuals of the stone marten and the ferret *M. p. furo* vel *M. furo* (one adult male and one adult female for each species). The ferret is considered to be the domesticated form of the European polecat (De Marinis, 2003). The clearest and most complete footprints from both field and reference collection were measured (Fig. 2) according to the standard method proposed by Taylor and Raphael (1988), and the suggestions of Zielinski and Truex (1995) regarding detection techniques. Collected data underwent discriminant function analysis (Roessler and Ungerer, 2006). We assumed that if footprints collected in the field belonged to the polecat, they would be less similar to those of the stone marten than to those of the ferret.

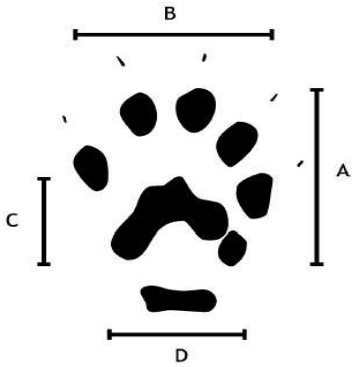


Figure 2 - Standard measurements of mustelids footprints: A – from the distal edge of the foremost toe to the back edge of the palm pad; B – maximum width; C – height of palm pads; D – width of palm pads (from Taylor and Raphael, 1988 modified).

## RESULTS AND DISCUSSION

Sixty three tracking plates showed mammal tracks. Polecat-like footprints were found five times (7.9%) on two separate tracking plates located in the same square, for a total of 23 footprints. The capture sites, at about 1150 m a.s.l., were in a mixed

broadleaves forest, with a prevalence of beech, alongside a stream. Other *taxa* were sampled, cats being the most frequent species (27%) followed by dogs (3.2%) and badgers *Meles meles* (1.6%) detected at 1510 m a.s.l. Feline footprints were assigned to the domesticated form as *F. silvestris* is not present in the survey area (Angelici, 2003; Genovesi, 2002) nor was it in the recent past (Sala and Gianaroli, 2006).

The discriminant analysis of the field and reference footprints (Tab. 1) correctly classified 92.7% of cases (Tab. 2), clearly distinguishing between *Mustela* and *Martes* (100%), whilst, as expected, the difference between polecat-like footprints and those of the ferret was less clear (87.8%).

Since the ferret has never been recorded in the study area, the polecat-like footprints collected in the field are attributable to *Mustela putorius,* which, considering the few and isolated findings recorded, seems to attain low densities.

The finding of the polecat in a wooded riparian habitat agrees with data recorded in Italy (Prigioni and De Marinis, 1995; Striglioni, 1998) and abroad (Roger *et al*., 1988; Lodé, 1993; Brzezinski *et al*., 1992).

Table 1 - Morphometric measurements of footprints (for abbreviations see Fig. 2) from both field (polecat-like) and reference collection (stone marten and ferret). Confidence Intervals (C.I.) 95%, are calculated according to Fowler and Cohen (1993), for small samples.

| Measurements | Species | N | Mean (SD) | ± C.I. 95% |
|---|---|---|---|---|
| A | Stone marten | 28 | 38.53 (2.65) | 1.03 |
| | Ferret | 18 | 26.33 (1.85) | 0.92 |
| | Polecat | 23 | 28.65 (1.47 | 0.63 |
| B | Stone marten | 28 | 29.36 (2.39) | 0.93 |
| | Ferret | 18 | 23.22 (2.88) | 1.43 |
| | Polecat | 23 | 22.57 (1.70) | 0.74 |
| C | Stone marten | 28 | 17.39 (2.28) | 0.89 |
| | Ferret | 18 | 9.33 (1.41) | 0.70 |
| | Polecat | 23 | 12.65 (1.85) | 0.80 |
| D | Stone marten | 28 | 18.68 (1.63) | 0.63 |
| | Ferret | 18 | 13.28 (2.24) | 1.12 |
| | Polecat | 23 | 13.22 (2.19) | 0.95 |

Table 2 - Results of the discriminant analysis.

| VARIABLES | FUNCTION | |
|---|---|---|
| A-B-C-D | 1 | 2 |
| Eigenvalue | 8.09 | 0.44 |
| Variance (percent) | 94.79 | 5.21 |
| Percent cumulative | 94.79 | 100 |
| Canonic correlation | 0.94 | 0.55 |
| Wilks Lambda | 0.0762 | 0.6925 |
| $\chi^2$ | 166.03 | 23.70 |
| Degrees of freedom | 8 | 3 |
| P | <0.01 | <0.01 |
| Standardized coefficients | 1 | 2 |
| Var A | 1.14 | 0.34 |
| Var B | 0.32 | 0.39 |
| Var C | -0.13 | -1.11 |
| Var D | 0.28 | 0.30 |

CLASSIFICATION RESULTS

| | N | Stone marten | Ferret | Polecat |
|---|---|---|---|---|
| Stone marten | 28 | 28 | 0 | 0 |
| Ferret | 18 | 0 | 17 | 1 |
| Polecat | 23 | 0 | 4 | 19 |

Applying the method adopted in this study for longer periods and more sample units, more information probably would have been gathered, nevertheless a higher sampling effort would have compromised the favourable costs-benefits ratio, which is one of the main strong points of this method. In addition, in our study area the likelihood of finding the polecat could have been substantially reduced by cats, which proved to be particularly "trap-prone".

Concerning the collection of reference footprints, a nationwide census of the facilities (zoos, rescue centres, etc) which host individuals belonging to species of interest could provide a footprints database useful for further analysis. Lastly, we would like to stress that the presence of European polecat - ferret hybrids has been reported for Great Britain (Davison *et al.*, 1999). Therefore, we argue that biochemical investigation is needed (e.g. mitochondrial DNA analysis), to ascertain the genetic identity of wild populations of *M. putorius*.

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