

II. MITTEILUNGEN – SHORT COMMUNICATIONS

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Habitat use of male European mink (*Mustela lutreola*) during the activity period in south western Europe

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1 Introduction

Precise knowledge of habitat requirements is of paramount importance for species conservation. The European mink (*Mustela lutreola*) is a riparian mustelid native to Europe. It has experienced a severe decline over the last decades which has led to extinction in most countries of its previous range (YOUNGMAN, 1982). Even if no single factor has been identified as responsible for the decline, in the Eastern part of its range aggressive physical interactions with the American mink (*Mustela vison*) have been suggested to be the reason for the disappearance in some areas (MACDONALD et al., 2002). However, this may not be valid in western areas, where the decline seems to be the result of anthropogenic pressures, more precisely, the combination of intensive trapping, alteration of water quality and habitat modification (LODÉ et al., 2001).

Habitat degradation is widely suggested as one of the possible causes for the decline of the species, especially in its the western population (LODÉ et al., 2001). However, data are needed on the habitat use of European mink to test this suggestion (MACDONALD et al., 2002) as most studies on the subject are merely descriptive and based on trapping data. The aim of this paper is to describe the habitat use of the European mink during the activity period based on statistical analyses of radio-tracking data.

2 Materials and methods

2.1 Study area

The study was conducted at the Urdaibai Biosphere Reserve (UBR), Basque Country (SW Europe). The UBR covers an area of 230 km². The landscape is hilly and rugged. The main river (Oka) and its tributaries show low pollution levels, except near the main towns where levels of nutrients and heavy metals are high (DEPARTMENT OF ENVIRONMENT AND LAND ORDINATION, 2001). The upper parts of the streams are the least modified ones. The medium parts of the rivers show various degrees of preservation, including well-preserved stretches, stretches forested with exotic plantations and disturbed areas with heliophytic formations. Finally, the lower parts are the most modified, as forested areas are scarce and river bank vegetation is mainly composed of brambles (*Rubus* sp.) or absent (NAVARRO, 1980).

2.2 Methods

Live-trapping, handling, tagging and radio tracking of the individuals is described in detail in ZABALA et al. (2001) and GARIN et al. (2002). In this paper we studied four male European mink inhabiting riparian habitats. Males inhabiting marshes were excluded from the

Table. Variables used for the description of habitat use of mink. "Bramble cover" stands for the degree of bramble cover in the river bank. "Riparian forest" stands for the degree of forest cover in the river bank. "Forest cover" for the degree of forest cover in the polygon, and "Forest cover density" for the density of tree cover within the forested area in the polygon. "River" indicates the characteristics of the stretch in the polygon. "Main use" indicates the use given to the land inside the polygon (Meadows included grasslands as well as small crop cultures). "Road" and "Paths" show, respectively, the metres of paved roads and forest paths included in the polygon. Finally, "Buildings" indicates the number of buildings that fall totally or considerably inside the polygon. Values quoted are the Jacobs' index value for each class, while statistical significance ($p < 0.05$) using Bonferroni's inequality test is indicated by an asterisk (*)

Variable	Class	Use	Variable	Class	Use
Bramble cover	0-25%	-0.0629*	Forest cover density	0-40%	0.0969*
	26-50%	0.1394		41-100%	-0.2132*
	51-75%	0.1709	River	Streams	-0.0560
	76-100%	0.2262		Stream river	0.0432
Riparian forest	0-25%	0.3233	Main use	Urban	0.2211
	26-50%	0.2559		Meadows	0.1029
	51-75%	-0.0545		Forest cultures	-0.2353
	76-100%	0.0216		Autochthonous forests	-0.0343
Forest cover	0-33%	0.1447	Road	Others	-1
	34-66%	-0.0588		0	-0.0314
	67-100%	-0.1909		1-150	0.0014
Buildings	0	-0.0627	Path	>150	0.2320
	1	0.0764		0	0.0009
	2	0.2606		1-50	0.0637
3 or more		0.1738		>50	-0.1099

analysis as landscape features differ from those of rivers. In order to avoid bias due to temporal correlation of data, only one active location per day was considered for analysis (AEBISCHER et al., 1993). Locations were taken during the night activity period at least one hour after the start of the activity period. Linear home ranges were calculated with 95% of the locations as the length of waterways used by mink (WHITE and GARROT, 1990).

Habitat was characterised after 9 variables related with biologic features and level of human impact. Several classes were considered in each variable (table 1). For this purpose, a buffer area of 25 m was set at each side of the river stretches included in the home range of mink, using a Geographic Information System (GIS) (ESRI, 1996). Then, home ranges of mink were subdivided into several polygons of 100 m length each. Values for the variables "bramble cover" and "riparian forest" were estimated in the field for each polygon. Values for the rest of variables were obtained through the GIS. For each variable we tested independence between availability and use of categories using X^2 analysis, and we applied Bonferroni's inequality to test for statistical significance of selection within each category (MANLY et al., 1993).

Since the aim of this paper is the description of the habitat used by the European mink within the study area, not the determination of the variables ruling its habitat selection, each variable with statistical significance obtained with the Bonferroni's inequality test was

considered as descriptive of the habitat used by the European mink, without testing independence between variables. The degree of electivity for each class within the variables was assessed through the Jacobs' index. The statistical significance limit was set at $p < 0.05$.

3 Results

During the activity period, male European mink used most habitat categories in an opportunistic way (Table). The only exceptions were areas with dense forest cover and areas with almost no bramble patches, which were rejected, and areas with little forest cover, which were selected.

4 Discussion

Instead of the least disturbed areas, mink preferred areas exposed to human activities, such as patches with little forest cover and a certain degree of bramble cover by the river side. Forested areas do not allow the development of heliophytic vegetation like brambles and grasslands. Dense bramble provides mink with shelter (GARIN et al, 2002). These areas are used not only as resting site but probably also for hiding as well as for hunting and consumption of prey (DUNSTONE, 1993). On the other hand, grasslands with shrub patches enhance rodent availability (GARDE and ESCALA, 2000), which are one of the main food items of European mink in the Iberian Peninsula (PALAZÓN, 1997). Indeed, selective use of the home range guided by availability of prey is well documented in similar species (WEBER, 1989; DUNSTONE, 1993; LODE, 2000). However, since precise data on mink diet and food availability in different habitats is lacking for the study area, it is difficult to assess the role of these factors for habitat use.

The most important result of the present study is the non selective use of most of the habitat types, which indicates tolerance, and in some cases preference, for anthropogenically modified habitats. This is at variance with reported classical European mink habitat use patterns, derived partially or totally from distribution, trapping and historic data. These reports describe the preferred habitat of the species as natural woodland streams (YOUNGMAN, 1982; SIDOROVICH and MACDONALD, 2001; PALAZÓN, 1997). Our results suggest that European mink do not prefer pristine habitats, but habitats with features like bramble patches. Tolerance to habitat alteration gives a glimpse of hope to the species, as conservation may be possible also in altered areas. However, further research is needed in order to determine which habitat characteristics are favourable for the European mink and which are detrimental for the species, and thereby to provide a basis for the conservation of landscape and habitat features that support its presence.

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Summary

We studied the habitat use of four male European mink in riparian habitats of south-western Europe during the activity period. Mink used areas with a certain degree of bramble or shrub cover at the riverbank, and low forest cover. On the other hand, mink avoided areas with dense forest cover, whilst other categories were used as amenable, including modified areas and areas with a moderate degree of human activities. Dense bramble cover allow mink to forage safely and handle prey. Dense forest cover prevents development of undergrowth. More attention should be paid to landscape and habitat features for the conservation of European mink.

Key words: European mink, *Mustela lutreola*, habitat use, South western Europe.

Zusammenfassung

Habitatnutzung männlicher Nerze (Mustela lutreola) in Südwest-Europa während der Aktivitätsphase

Wir untersuchten die Habitatnutzung von vier männlichen Nerzen während der Aktivitätsphase in ufernahen Bereichen Südwest-Europas. Die Nerze nutzten Gebiete mit Brombeerbewuchs oder Strauchbedeckung sowie geringer Waldbedeckung entlang des Flußufers, während sie dicht bewaldete Gebiete mieden. Andere Flächen, einschließlich modifizierter Bereiche mit einem gewissen Grad an Störung durch den Menschen, wurden dagegen genutzt. Dichter Brombeerbewuchs bietet den Nerzen Deckung während Fang und Verzehr der Beute. Dichte Waldbedeckung verhindert die Bildung eines solchen Unterwuchses. Beim Schutz des Nerzes sollte Landschafts- beziehungsweise Habitat-elementen größere Aufmerksamkeit geschenkt werden.

Schlüsselwörter: Nerz, *Mustela lutreola*, Habitatnutzung, Südwest-Europa

Résumé

Utilisation de l'habitat de visons mâles (Mustela lutreola) dans le Sud-Ouest de l'Europe pendant la phase d'activité

Nous avons étudié l'utilisation de l'habitat de quatre visons mâles au cours de leur phase d'activité dans des sites rivulaires du Sud-Ouest de l'Europe. Les visons faisaient usage de sites présentant une certaine abondance de Ronce ou de végétation buissonnante de même qu'un couvert forestier léger. Par ailleurs, ils évitaient les sites densément arborés tandis que d'autres espaces convenables étaient utilisés, en ce compris des sites altérés et présentant un certain degré de dérangement lié aux activités humaines. Un couvert dense de ronciers permettait au Vison de s'alimenter en sécurité et de consommer ses proies. Un couvert forestier dense empêche le développement d'un sous-étage. Une plus grande attention devrait être dévolue à des types de paysage et d'habitat favorables à la conservation du Vison.

Mots-clés: Vison, *Mustela lutreola*, utilisation de l'habitat, Sud-Ouest de l'Europe.

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References

- AEBISCHER, N.J.; ROBERTSON, P.A.; KENWARD R.E., 1993: Compositional analysis of habitat use from animal radio-tracking data. *Ecology* **74**, 1313–1325.
- DEPARTMENT OF ENVIRONMENT AND LAND ORDINATION, 2001: Medio Ambiente en la Comunidad Autónoma del País Vasco. Basque Government. Vitoria-Gasteiz.
- DUNSTONE, N., 1993. The mink. London: T & AD Poyser.
- GARDE, J.M.; ESCALA, M.C., 2000: The diet of the southern water vole, *Arvicola sapidus* in southern Navarra (Spain). *Folia Zool.* **49**, 287–293.

- GARIN, I.; ZUBEROGOITIA, I.; ZABALA, J.; AIHARTZA, J.; CLEVINGER, A.; RALLO, A., 2002: Home range of European mink (*Mustela lutreola* L.) in Southwestern Europe. *Acta Theriol.* **47**, 55–62.
- LODÉ, T., 2000. Functional response and area-restricted search in a predator: seasonal exploitation of anurans by the European polecat, *Mustela putorius*. *Austral Ecology* **23**, 223–231.
- LODÉ, T.; CORNIER, J.P.; LE JAQUES, D., 2001: Decline in endangered species as an indication of anthropic pressures: the case of European mink *Mustela lutreola* western populations. *Environ. Manage.* **28**, 221–227.
- MACDONALD, D.W.; SIDOROVICH, V.E.; MARAN, T.; KRUK, H., 2002: European mink, *Mustela lutreola*: analyses for conservation. Wildlife Conservation Research Unit. Oxford
- MANLY, F.J.; MACDONALD, L.; THOMAS, D.L., 1993: Resource selection by animals. London: Chapman & Hall.
- NAVARRO, C., 1980: Contribución al estudio de la flora y vegetación del Duranguesado y la Busturia. Ph. D. dissertation. Universidad Computense de Madrid, Madrid.
- PALAZÓN, S., 1997: Distribución, morfología y ecología del visón Europeo (*Mustela lutreola* Linnaeus, 1761) en la Península Ibérica. Ph. D. Thesis. Universitat de Barcelona.
- SIDOROVICH, V.E.; MACDONALD, D.W., 2001: Density dynamics and changes in habitat use by the European mink and other native mustelids in connection with the American mink expansion in Belarus. *Netherlands J. Zool.* **51**, 107–126.
- WEBER, D., 1989: The ecological significance of resting sites and the seasonal habitat change in polecats (*Mustela putorius*). *J. Zool.* **217**, 629–638.
- White, G.C.; Garrotr, A., 1990: Analysis of wildlife radio-tracking data, 1st edition. London: Academic Press.
- YOUNGMAN, P.M., 1982: Distribution and systematics of the European Mink *Mustela lutreola* Linnaeus 1761. *Acta Zool. Fenn.* **166**, 1–48.
- ZABALA, J.; ZUBEROGOITIA, I.; GARIN, I.; AIHARTZA, J.R., 2001: Small carnivore trappability: seasonal changes and mortality. A case study on European mink *Mustela lutreola* and spotted genet *Genetta genetta*. *Small Carnivore Conserv.* **25**, 9–11.

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