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A STUDY ON THE AMERICAN MINK *NEOVISON VISON* ALONG SOME WATERCOURSES OF FRIULI (NORTH-EASTERN ITALY)

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Riassunto - Indagine sul Visone americano *Neovison vison* lungo alcuni corsi d'acqua del Friuli
Da agosto a dicembre 2012 è stata effettuata un'indagine lungo un tratto del fiume Tagliamento, del torrente Degano e del torrente Melò al fine di stabilire la presenza di popolazioni di Visone americano *Neovison vison* e la loro diffusione. Lungo i primi due corsi d'acqua sono state individuate popolazioni autonome dal punto di vista riproduttivo. La popolazione della Val Degano è la più settentrionale in Italia ed è stata rilevata in un tratto di oltre 10 Km (670-1100 m s.l.m.), quella della Val Tagliamento in un tratto di circa 3 Km (500-525 m s.l.m.). Si suppone la presenza di popolazioni in altri corsi d'acqua in quanto la specie è stata segnalata anche lungo il torrente But e nell'alto corso del fiume Piave (Regione Veneto). Si conclude suggerendo di proibire la possibilità di allestire allevamenti e di eliminare le popolazioni riproduttive.
Parole chiave: Visone americano, *Neovison vison*, *Mustelidae*, Friuli, Italia Nord-orientale, Distribuzione, Altitudine, Habitat, Riproduzione.

Abstract – A study was conducted from August to December 2012 along stretches of the Tagliamento River, the Degano River and the Melò River to determine the presence of populations of the American mink *Neovison vison* and their spread. Autonomous breeding populations were detected along the first two watercourses. The Degano Valley population is the northernmost one in Italy and was recorded in a stretch of over 10 Km (670-1100 m a.s.l.), while the Tagliamento Valley population inhabits a stretch of about 3 Km (500-525 m a.s.l.). The presence of populations in other watercourses is very likely since the species has also been reported along the But River and in the upper course of the Piave River (Veneto Region). It is suggested that the possibility of establishing fur farms be prohibited and that the breeding populations be eliminated.
Key words: American mink, *Neovison vison*, *Mustelidae*, Friuli, North-eastern Italy, Distribution, Altitude, Habitat, Breeding.

1. – Introduction

The American mink *Neovison vison* is a semi-aquatic mustelid native to North America. In the twentieth century, it was imported as a fur animal into various countries and is currently distributed in Europe, Asia and South America. In Italy there are feral populations especially in the north-east and centre (BONESI & PALAZON, 2007) as well as one in Sardinia (SPAGNESI & DE MARINIS, 2002). In the past, several fur farms were set up in Friuli (North-eastern Italy) from which individuals escaped or were released. On the night between 30 and 31 August 2003, an action by an animal rights group (Animal Liberation Front) led to the release of ca. 3400 individuals from the Vernier farm at Invillino (335 m a.s.l., Tagliamento Valley, Municipality of Villa Santina). Although a thousand animals were recovered in the days following the release and subsequently another 400, minks were found dead or seen in different localities in the following weeks and within a couple of months they were contacted more than 50 Km from the release point and on various mountains, even above 1500 m a.s.l. (RASSATI, 2005). In some cases the speed of dispersal appears

An American mink. Lake Cavazzo - Visone americano. Lago di Cavazzo
(Photo G. Rassati)

An American mink. Degano Valley - Visone americano. Val Degano
(Photo G. Rassati)

to have been favoured by transport in motor vehicles, as the animals crawled into the engine compartment or other empty spaces. Most of the released individuals did not survive the winter but contacts were also recorded in the following spring in environments suitable to the species such as Lake Cavazzo (RASSATI, 2005).

The presumed existence of populations able to reproduce had its first confirmation in the observation on 2-6-2008 of an individual at the locality Fulìn (800 m a.s.l., Degano Valley, Municipality of Rigolato), nearly 25 Km north of the Vernier farm. Although it was not possible to establish with certainty that the observed individual was a descendant of the minks released from the Vernier farm, it was decided to investigate the two watercourses and their riparian belts closest to the release point, namely the Tagliamento River and the Degano River, in order to establish the presence of populations and their spread. The Melò River, about 3 Km south of Lake Cavazzo, was also monitored for the same purpose.

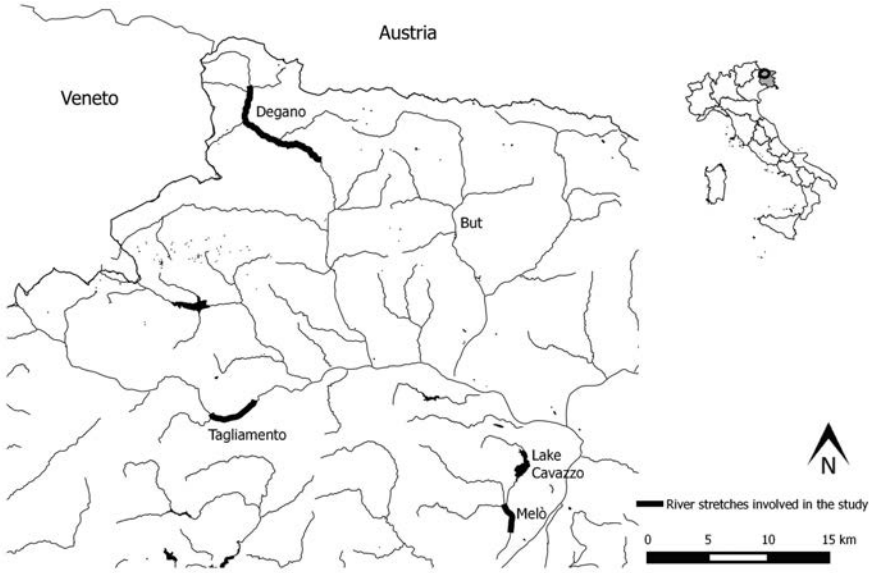

Figure 1 - River stretches involved in the study
Figura 1 - Tratti di fiume interessati dallo studio

2. – Study areas and Methods

The study was carried out from August to December 2012.

Since an individual was observed on 16-7-2012 in Degano Valley along the river near the village of Forni Avoltri (850 m a.s.l.) about 3 Km upstream of the observation on 2-6-2008, it was decided to examine the northernmost part of the valley (Fig. 1). In the study area (46°35'N, 12°48'E) the gravel bed is 10 to 50 m wide, has a variable gradient and consists of small to large material with boulders in some points. Some rocky zones are found along the banks. The watercourse is largely bordered by thick-

Habitat of the American mink in Degano Valley - Habitat del Visone americano in Val Degano
(Photo G. Rassati)

Habitat of the American mink in Tagliamento Valley - Habitat del Visone americano in Val Tagliamento
(Photo G. Rassati)

ets, mainly of Willows *Salix* spp. and Grey alder *Alnus incana*. There are woods mainly of Norway spruce *Picea abies*, Silver fir *Abies alba* and European beech *Fagus sylvatica* on the steep banks. In the investigated stretch, the watercourse has some weirs and a small dam for the production of electricity and it flows through the village of Forni Avoltri; there are paved roads above the riverbanks, some with a considerable flow of vehicles (Regional Road 355).

In Tagliamento Valley the study involved the stretch between the Caprizzi dam (Municipalities of Socchieve and Ampezzo) and the Nero Stream (Fig. 1). This dam, which forms a small lake, is about 15 Km upstream of the Vernier farm and it causes the absence of water downstream for most of the year. In the investigated area (46°22'N, 12°46'E) the gravel bed is between 70 and 250 m wide, has a low gradient and is composed mainly of small material. In addition, it is devoid of vegetation except for some fluvial islands covered with thickets (also present along the edges of the riverbed) consisting mainly of *Salix* spp. and *Alnus incana*. The steep banks have woods mainly of *Fagus sylvatica*, while in some zones *Picea abies* predominates. There are some rocky zones along the banks. The only human settlements are downstream of the dam and consist of a few scattered houses. The only paved road crosses the river 500 m upstream of the dam and then leads away from it.

Along the Melò River the study involved a stretch west of the village of Trasaghis (Fig. 1). In this zone (180 m a.s.l.; 46°17'N, 13°03'E) the bed is occupied entirely by water, is 10 to 20 m wide, and has a low gradient. The riparian wood consists of Black poplar *Populus nigra*, *Salix* spp., Hop-hornbeam *Ostrya carpinifolia*, Manna ash *Fraxinus ornus*, Black locust *Robinia pseudacacia*, European ash *Fraxinus excelsior* etc. The right bank skirts mountain slopes and the left faces the Friuli plain. The investigated stretch is bordered by a paved road.

The survey was conducted by means of camera traps set along watercourses at various points variable distances apart since their choice was based on the available data (zones where data were already available were avoided), the presence of human settlements and the tranquillity of the area. Each camera trap was baited with food and left in place for 4 days. In the case of a negative response, the camera trap was repositioned and baited at the same point within 3-4 days for a maximum of two 3-day sessions. In case of a negative response after a total of 10 days it was assumed that the species was absent.

The total number of days of camera trapping was 30 in Degano Valley, 22 in Tagliamento Valley and 20 along the Melò River.

"Passages" were obtained from the analysis of the films, where "passage" means the entry of a mink in the field of view of the camera trap resulting in the beginning of filming which lasted for 60 seconds. If the animal moved in and out of the field of view several times before the end of the film, or remained in the field of view when one film ended and the next began, it was considered as one passage. The passages were considered nocturnal when only the objects illuminated by the camera trap LEDs were visible and diurnal when sunlight illuminated the entire field of view.

Signs of presence were also sought and sighting was attempted.

Finally, other information came from people who saw minks by chance and sometimes photographed or filmed them.

3. – Results

In Degano Valley, camera traps were set at six points and films of *Neovison vison* were obtained at five of them (the northernmost ones). The taxon was present from the zone upstream of the confluence of the Bordaglia Stream (about 2.5 Km from the Austrian border) to the vicinity of the village of Rigolato in a stretch of over 10 Km (670-1100 m a.s.l.); it was also observed in the Acqualena Stream (the main right tributary in the investigated stretch). Observations were also made in the stretch of the Degano River flowing through the village of Forni Avoltri.

In Tagliamento Valley, camera traps were set at four points and films of *Neovison vison* were obtained at three of them (at the points closest to the Caprizzi dam); thus minks were present from the dam for about 3 Km upstream (500-525 m a.s.l.) and in the first stretch of the Grasia Stream (right tributary).

The species was not found at the two points with camera traps along the Melò River.

At all the camera trap points with positive records (n=8), the records occurred within the first (62%) or second day (38%) after deployment.

Considering the total number of days of camera trapping only at the points where the species was found, films were obtained in 75% of the days in Degano Valley (n=20) and in 67% of the days in Tagliamento Valley (n=12). In Degano Valley, 27 passages were recorded (1.35 passages/day) of which 81% at night and 19% during the day; in Tagliamento Valley, 9 passages were recorded (0.75 passages/day) of which 89% at night and 11% during the day.

The fur colour was generally dark brown.

To provide a more complete picture, Table 1 reports other mammalian taxa filmed in the three study areas, with the exception of bats.

Table 1 - Mammalian taxa filmed in the three study areas
Tabella 1 - Taxa di Mammiferi filmati nelle tre aree indagate

	Degano Valley	Tagliamento Valley	Melò
Neomys sp.	x	x	
Glis glis		x	
Myodes glareolus		x	
Apodemus agrarius			x
Apodemus sp.	x	x	x
Rattus sp.*	x	x	x
Vulpes vulpes	x	x	x
Martes foina	x	x	x

* In Degano Valley the films can be referred to *Rattus norvegicus*
*In Val Degano i filmati sono riferibili a *Rattus norvegicus*

4. – Discussion

The collected data allowed the detection of two populations autonomous in terms of reproduction, given that fur farms have not been established in Friuli for about ten years and that the possibility of illegal farms, which might support these populations

through the escape or release of individuals, seems rather remote. For this reason the two populations almost certainly originated from the release in August 2003. In the inhabited zone in Tagliamento Valley the species was also contacted in the period subsequent to the release (RASSATI, 2005).

In view of the large number of individuals released, it is likely that there are also populations along other watercourses, since there was a "fan-like" diffusion of the animals from the release point (cf. RASSATI, 2005). The lack of records along the Melò River and, conversely, the establishment of the species in alpine valleys could indicate a greater possibility of the existence of populations in the mountain sector of Friuli. This possibility is strengthened by the observation subsequent to the study period of an individual along the But River near the village of Timau (815 m a.s.l., Municipality of Paluzza, RASSATI, pers. obs.). Moreover, the species is present in the upper course of the Piave River (Veneto Region, RASSATI, pers. obs.) in a zone immediately to the west of the one it occupies in Degano Valley. Since there were no fur farms in the northern sector of Veneto in the period 1997-2008 and the Carnic ones were those closest to Piave Valley (IORDAN *et al.*, 2012), it is likely that this population originated from the Friulan population. Hence the founders had to travel at least 1.5 Km through a wooded environment (coniferous woodland) devoid of surface waters and to move over a mountain saddle at almost 1300 m a.s.l.

In the past, records of the presence of the species were collected in the northern sector of Friuli, very likely due to releases or escapes also from another fur farm (Fachin-Zanier of Socchieve, 405 m a.s.l., Tagliamento Valley) (RASSATI, 2005). However the present study is the first case in which the presence of breeding populations is documented (cf. BOITANI *et al*., 2003; IORDAN *et al.*, 2012). Moreover the mink population of Degano Valley is the northernmost one in Italy.

Most of the contacts took place along watercourses. It was also verified that the small dam along the Degano River, although not an insurmountable barrier, is an obstacle; in fact both direct observations and tracks indicated that to cross it the animals had to ascend through the wood and then move along a stretch of paved road. Also in other zones of the Degano Valley and in Tagliamento Valley, the species used the woods along the slopes up to a distance of about 50 m from the riverbed.

The similarity in ecological niche to the Eurasian otter *Lutra lutra* and European polecat *Mustela putorius* can lead to competition (BUENO, 1996; KAUHALA, 1996; RUIZ-OLMO *et al.*, 1997; BONESI & MACDONALD, 2004; BONESI & MACDONALD, 2004a; BONESI *et al.*, 2004; BRZEZIŃSKI *et al.*, 2008; GARCÍA *et al.*, 2009; BRZEZIŃSKI *et al.*, 2010). The former species became extinct in both investigated valleys in the second half of the twentieth century (RASSATI, 2005, unpubl. data), while the latter species was found in syntopy with *Neovison vison* only in Tagliamento Valley (RASSATI, unpubl. data), where however it is rare. The most common mustelid, recorded at each point where camera traps were set, is the Stone marten *Martes foina*, with which there might be spatial and trophic competition.

Neovison vison feeds on several species of Mammalia, Aves, Reptilia, Amphibia and Invertebrata, on which it can have a marked impact (CRAIK, 1995; FERRERAS & MACDONALD, 1999; BARTOSZEWICZ & ZALEWSKI, 2003; HAMMERSHØJ, 2004; BONESI & PALAZON, 2007; REY, 2008; FISCHER *et al.*, 2009; ROY

et al., 2009; KRAWCZYK *et al.*, 2013). In the study areas, it is thought that it could negatively affect the Little ringed plover *Charadrius dubius*, Common sandpiper *Actitis hypoleucos*, White-throated dipper *Cinclus cinclus* and White-clawed crayfish *Austropotamobius pallipes* while in the urban area it could prey on domestic poultry: in Forni Avoltri, some chicken coops are located on the shore of the Degano River. In addition, one mink was photographed at a small fish farm near the above-mentioned village and another was observed hunting in a stretch where a release for fishing purposes had just been carried out.

The two predators thought to have the greatest impact are the Eurasian eagle owl *Bubo bubo* and the Red fox *Vulpes vulpes*. Indeed, there are eagle owl breeding sites in the vicinity of the stretches inhabited by *Neovison vison* in both Degano Valley and Tagliamento Valley (RASSATI, 2013) and the raptor usually frequents the rivers in search of food (RASSATI, pers. obs.). However, foxes were filmed by the camera traps at only a few points and with low frequency.

In Degano Valley, in the stretch flowing through the village, minks could be killed both by humans and dogs or cats, even along the riverbed since the banks in that zone have low vegetation cover and structural diversity.

The following aspects emerge based on what has been reported above and the general knowledge on the species:

1 - The escape or release of animals is always a concrete possibility in the presence of fur farms.

2 - The establishment of populations capable of reproduction was verified.

3 - *Neovison vison* is an alien species that can compete with other Mustelidae, affect populations of native species of Mammalia, Aves, Reptilia, Amphibia and Invertebrata, and cause damage to domestic animals and fish farms.

4 - The presence of at least two breeding populations and probably a third one indicates the possibility that there may be other populations and the good colonization potential in mountain areas of valleys located in river catchments different from the "original" one, with the risk of uncontrolled expansion.

5 - When the species is too widespread, it is very difficult to eradicate it (cf. BONESI & PALAZON, 2007).

Therefore, given the present state of affairs (the legal possibility to open fur farms), as reported by RASSATI (2005), it is necessary that new applications for authorization be carefully evaluated and, if granted, that appropriate measures be taken to prevent the escape of animals. In the latter case, or in the case of releases due to sabotage, there must be a previously prepared plan to be followed for the recovery of the animals by rapid intervention "teams". However, the most rational thing is to prohibit the possibility of setting up fur farms, in contrast to what has been proposed for mountain zones by a public authority (ERSA, 1988), when instead the public authority should be contemplating the removal of such farms and the breeding populations.

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