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A new area of occurrence of an endemic Italian hare inferred by camera trapping

ABSTRACT

The Italian Hare *Lepus corsicanus*, endemic of Central and Southern Italy, was recorded for the first time in the Northern part of the province of Grosseto (Southern Tuscany), through camera trapping. This observation was localized at the edge of a mixed oakwood (*Quercus cerris* and *Q. pubescens*), in the surroundings of the village of Prata (Loc. Vado a Rimolli, 512 m a.s.l.). The record here reported expands the Tuscan extent of occurrence of this species by over 60 km to the north. Restocking of the European Brown Hare *Lepus europaeus* occurs in this area, and hunting pressure may threaten the endemic taxon. Further researches and genetic surveys are recommended to address conservation plans.

Key Words**:** *Lepus corsicanus,* extent of occurrence, conservation status, Southern Tuscany.

Research applications of camera trapping include the detection of rare, elusive species (Gil-Sànchez *et al*., 2010; Anile *et al*., 2012; Bartolommei *et al*., 2012) and possibly help the assessment of their distribution range (Cutler & Swann, 1999; O'Connell *et al*., 2011).

Abundance of individuals of a certain species is higher in the core area of its global distribution range with respect to the range edges (Brown, 1984; Sagarin *et al.,* 2006); in these last areas, camera trapping surveys may represent an useful conservation tool to detect occurrence and to address appropriate management programs (De Luca & Rovero 2006; O'Connell *et al*., 2011).

Italian Hare *Lepus corsicanus* (De Winton, 1898), also referred as Apennine Hare by some authors, has been for long considered as a subspecies of the European Brown Hare *L. europaeus* Pallas, 1778. In the last decades, both morphological (Palacios, 1996; Lo Valvo *et al*., 1997; Riga *et al*., 2001) and molecular analyses (Pierpaoli *et al*., 1999) confirmed that it represents a different species, endemic to Central and Southern Italy - with scattered and isolated population - and to Sicily - where its distribution is less fragmented (Fig. 1: Macchia *et al*., 2005; Angelici & Luiselli, 2007; Guglielmi *et al*., 2011). It has also been introduced in Corsica (Vigne, 1992) where it occurs in several sites (Pietri *et al.*, 2010).

Mediterranean maquis alternated with ecotones, pastures and grasslands in the nearby of woods and scrubwoods represent the most suitable habitats for *L. corsicanus* (Lo Valvo *et al.*, 1997; Angelici *et al*., 2010). In Southern Tuscany, the species selected

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Fig. 1. Current distribution of *Lepus corsicanus*. The white circle identifies the study area.

areas covered by mixed deciduous woods (e.g. *Quercus cerris* L. and *Q. frainetto* Ten.: Macchia *et al*., 2005).

Main threats to this Italian endemic taxon are represented by habitat fragmentation, population isolation and low population densities (Trocchi & Riga, 2001; Guglielmi *et al*., 2011). Direct competition with *L. europaeus* has to be confirmed, since only few cases of direct conflict has been observed (Angelici *et al*., 2010; Guglielmi *et al*., 2011). Moreover *L. corsicanus* seems to be receptive to the European Brown Hare Syndrome (EBHS: Guberti *et al*., 2000), a fatal pathology transmitted by *L. europaeus*.

Where the two species occur in simpatry, *L. corsicanus* is confined at higher altitudes, with respect to *L. europaeus* (Angelici & Luiselli, 2007). This altitudinal segregation may also be the result of an alteration of the distribution of *L. europaeus* due to restockings (Guglielmi *et al*., 2011), since *L. corsicanus* usually occurs at lower altitudes (Macchia *et al.,* 2005; Ricci *et al*., 2007). No evidence of hybridization between *L. corsicanus* and *L. europaeus* has been detected in Italy (Randi *et al*., 2007), although genetic introgression has been found in Corsica (Pietri *et al*., 2011).

Although no international conservation measurement has been taken for the conservation of this species, the Italian Government, in accordance with "Istituto Superiore per la Protezione e la Ricerca Ambientale" (ISPRA), modified the national law 157/92 (DPCM 7/5/2003) and included *L. corsicanus* within the list of game species only for Sicily. Thus, this endemic lagomorph is formerly protected for the rest of its distribution range (Trocchi & Riga, 2001). Hunting pressure - particularly intense in Central Italy- represents a serious threat for *L. corsicanus*, as it is difficult in the field to discriminate this species from *L. europaeus*, a game species subjected to restocking processes (Trocchi & Riga, 2001). Also for this reason, a detailed knowledge of the distribution of the endemic species is necessary, in order to correctly define management plans and wildlife management policies. It implies that a detailed knowledge of the distribution of the endemic species is crucial to design management plans and addressed wildlife management policies.

The study area is a rural hilly landscape (475-903 m a.s.l.) located in the northern part of the province of Grosseto (Southern Tuscany), in a Site of Communitary Importance (SCI IT51A0002 "Poggi di Prata": Tuscany regional law 56/2000). The average annual rainfall is of approximately 1,000 mm, average annual temperature of about 12° C, and an average year thermal excursions of about 18° C (Selvi & Stefanini, 2010). Habitat types (Cantini *et al*., 2013) include mixed deciduous woods (mostly *Q. cerris* and *Castanea sativa* Miller: 67.03%), fallows (19.49%), agricultural areas (7.78%), scrubwoods (2.43%), human settlements (1.57%) and pinewoods (1.70) (Cantini *et al*., 2013).

A camera trapping survey (camera traps Ziboni Tecnofauna Explorer Case 1988 and Multipir 12) was set up to carry out a check-list of terrestrial mammals. It involved 1,005 trap nights at 47 trap sites from September 2011 to December 2012, throughout the whole study area.

Lepus europaeus was captured 83 times (9.93% of total captures) at 31 sites, whereas *L. corsicanus* was photographed only twice (0.24% of total captures). Both shoots were taken in September 2012, in Loc. "Vado a Rimolli", at the edge of a mixed oakwood (*Q. cerris* and *Q. pubescens* Willd.), toward an olive grove, in the immediate surroundings of the village of Prata (UTM coordinates: 32T 661533, 4770839, 512 m a.s.l.). Individuals of *L. corsicanus* were identified at the species level by one of the authors (M. Scalisi), according to the main phenotypic features of this taxon: definite separation between the white color of the belly and the tawny color of the flanks,

black spot on the nape, thigh and rump uniformly reddish (Palacios, 1996; Trocchi & Riga, 2001; Angelici & Spagnesi, 2008: Fig. 2).

Fig. 2. Italian hares photo-trapped in "Poggi di Prata", province of Grosseto, on 18th and 26th September 2012, respectively at 21:19 and 21:38.

Activity rhythms of this species are still poorly known (Trocchi & Riga, 2001); our photo were both taken at the start of the night, thus confirming data from Guglielmi *et al.* (2011).

L. europaeus has been detected in all the habitat types previously described, with the only exception of human settlements, reflecting the high restocking rate occurring in the study area (about 20-30 individuals released a year: Hunting District Gr6, unpublished data), with shots mainly concentrated at dusk.

Italian peninsular populations of the threatened *L. corsicanus* are highly fragmented. Thus, the conservation of the existing populations necessarily require a detailed and constantly updated knowledge on their distribution and consistency. Genetic sampling and health monitoring would be also recommended for all the populations of the province of Grosseto, consistently with the national action plan (Trocchi & Riga, 2001), as our camera trap inventory was not exhaustive. Even if *L. corsicanus* seems to be present at low densities in "Poggi di Prata" (2/839 photos), a prudent hunting management policy of the European brown hare, involving the organization of meetings and outreach activities on sustainable exploitation, would be recommended.

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RIASSUNTO

Una nuova area di presenza di una lepre endemica italiana rilevata con fototrappola;

La lepre italica *Lepus corsicanus*, endemica dell'Italia centrale e meridionale, è stata registrata per la prima volta nella porzione settentrionale della Provincia di Grosseto (Toscana meridionale), attraverso fototrappola. L'osservazione è localizzata ai margini di un bosco di *Quercus cerris* e *Q. pubescens*, in prossimità del paese di Prata (Loc. Vado a Rimolli, 512 m s.l.m.). Il dato qui riportato espande l'areale toscano conosciuto per questa specie di oltre 60 km a nord. Gli interventi di ripopolamento di lepre comune *Lepus europaeus* effettuati nell'area e la pressione venatoria potrebbero costituire una minaccia per il taxon endemico. Ulteriori ricerche e analisi genetiche sono raccomandate per indirizzare al meglio piani di conservazione e gestione.

Parole chiave**:** *Lepus corsicanus,* areale di distribuzione, stato di conservazione, Toscana meridionale.

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