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A refuge for *Lepus europaeus meridiei* Hilzheimer, 1906.


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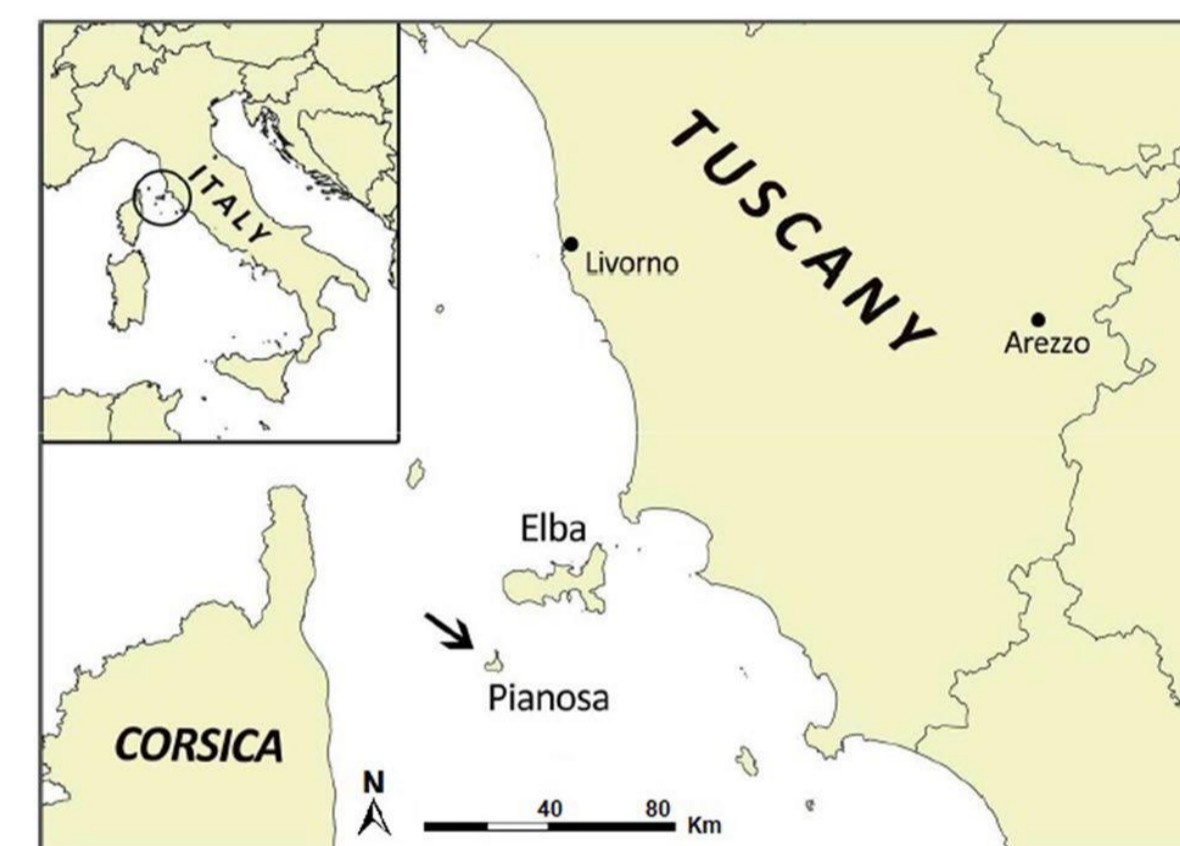
Introduction

 The European brown hare (*Lepus europaeus* Pallas, 1778) is one of the most translocated mammals in Europe. In Italy, due to the massive restocking of allochthonous individuals for hunting purposes, the populations have lost their native gene pool. At least 6 million animals have been imported from various countries since the beginning of the 20th century. Thanks to RESTO CON LIFE project, it was possible to study the hare population inhabiting the island of Pianosa (Italy, Tuscan Archipelago National Park).

Pianosa Island

 Pianosa island has a surface of 1,002 ha and is characterized by Mediterranean scrubland habitat. The mammalofauna is represented by Rodents, Chiroptera and a small population of European brown hare.

The island is very important for ornithofauna during migration periods and nesting site for about 40 species.




Pianosa Island (Livorno province, Tuscany, Italy).



The *Lepus europaeus meridiei* of Pianosa island.


The origins

 The origin of *L. europaeus* population on Pianosa is not clear. There are a few paleontological records from this island regarding the Genus *Lepus*, dating back to the late Pleistocene (De Stefano 1913; Azzaroli 1978).

Simonelli (1884) reported the opinion of the local prison's Director of a possible introduction between 1840 and 1850. Also Sommier (1909) reported the introduction in the same years. But Repetti (1835) wrote about the presence of an earlier population of "hares" on Pianosa.

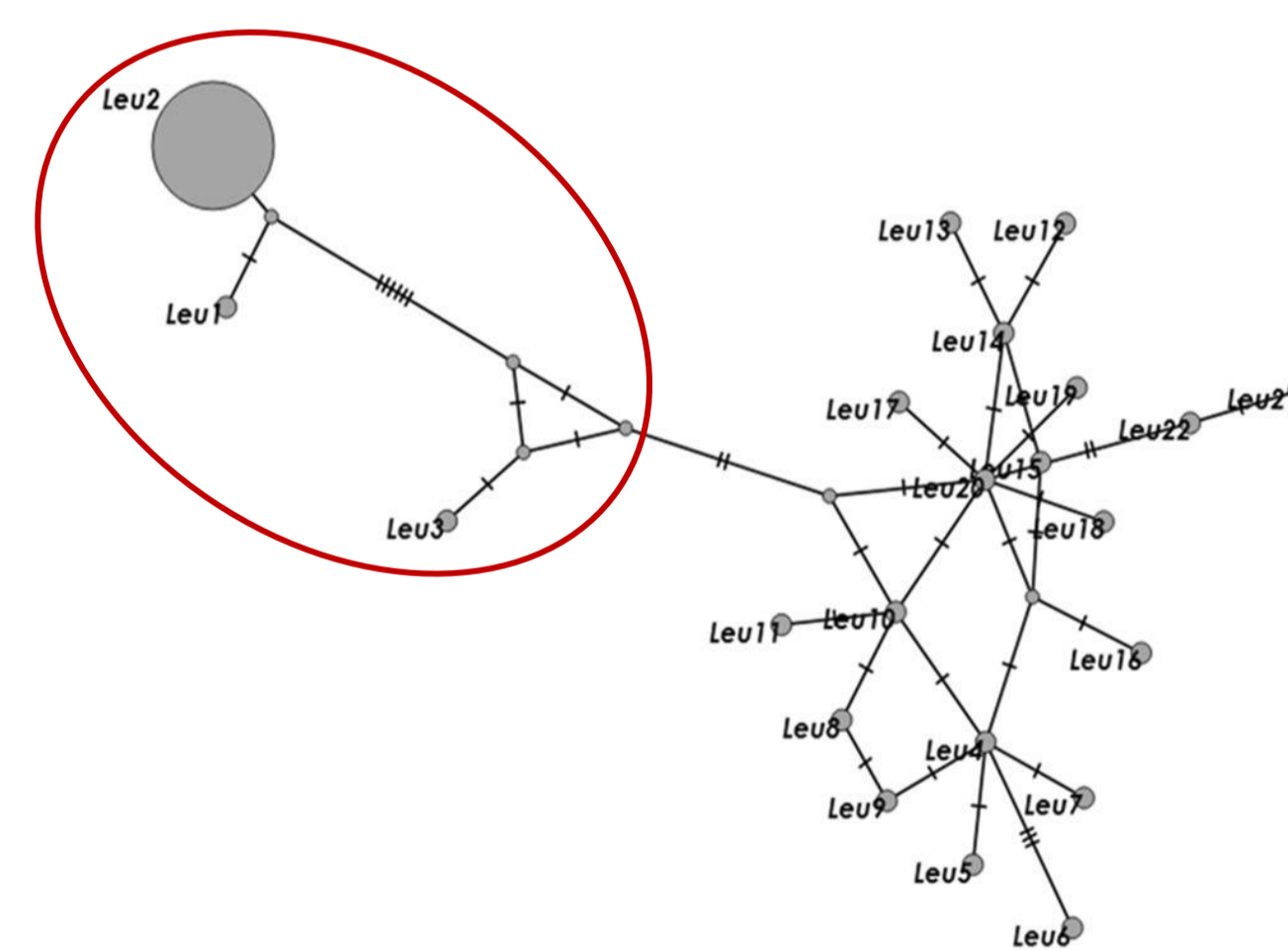
In 1856 an Agricultural State Prison was established on the island, but in 1998 the penitentiary was decommissioned. The island is part of the National Park and it is included in the Natura2000 Network.

The «rediscovery»

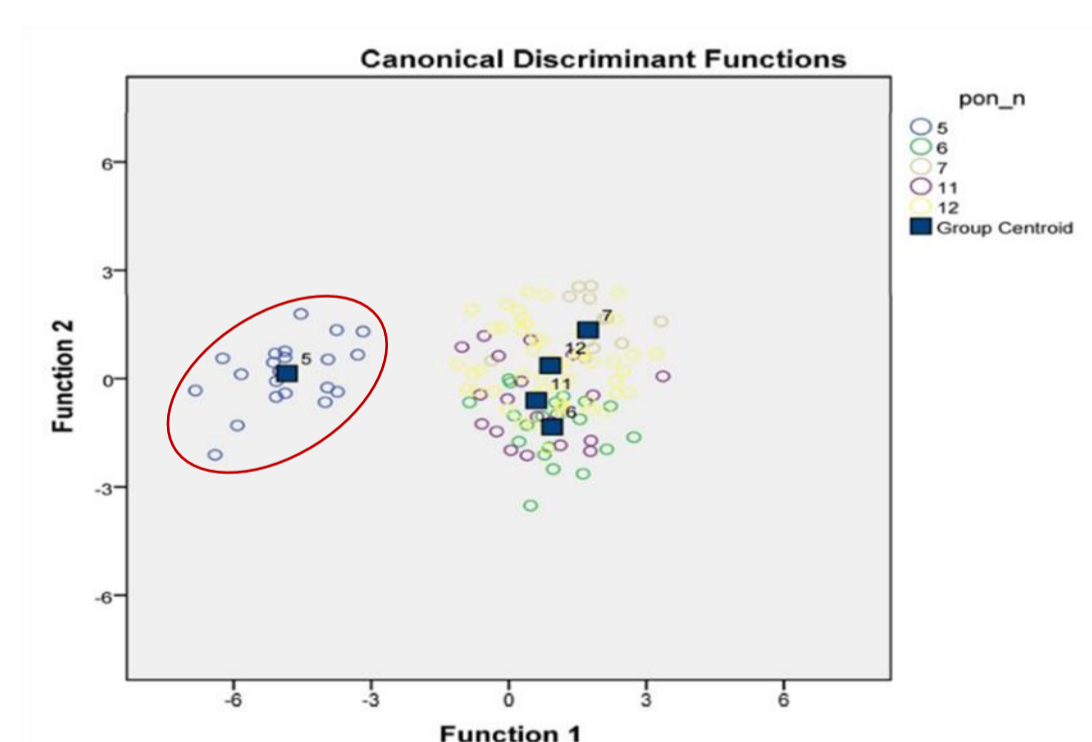
 Genetic analysis (Mengoni *et al.*, 2018) evidenced the presence of one of the three ancestral haplotypes formerly described in *Lepus europaeus meridiei* Hilzheimer, 1906, once inhabiting Northern and Central Italy (Pierpaoli *et al.*, 1999; Canu *et al.*, 2013).

Moreover, autosomal markers allowed describing a genetic differentiation from the other Italian populations.

In addition, Pianosa hare skull morphology showed significantly smaller measurements when compared to historical Italian samples (Riga *et al.*, 2018). These differences denote a long isolation period.



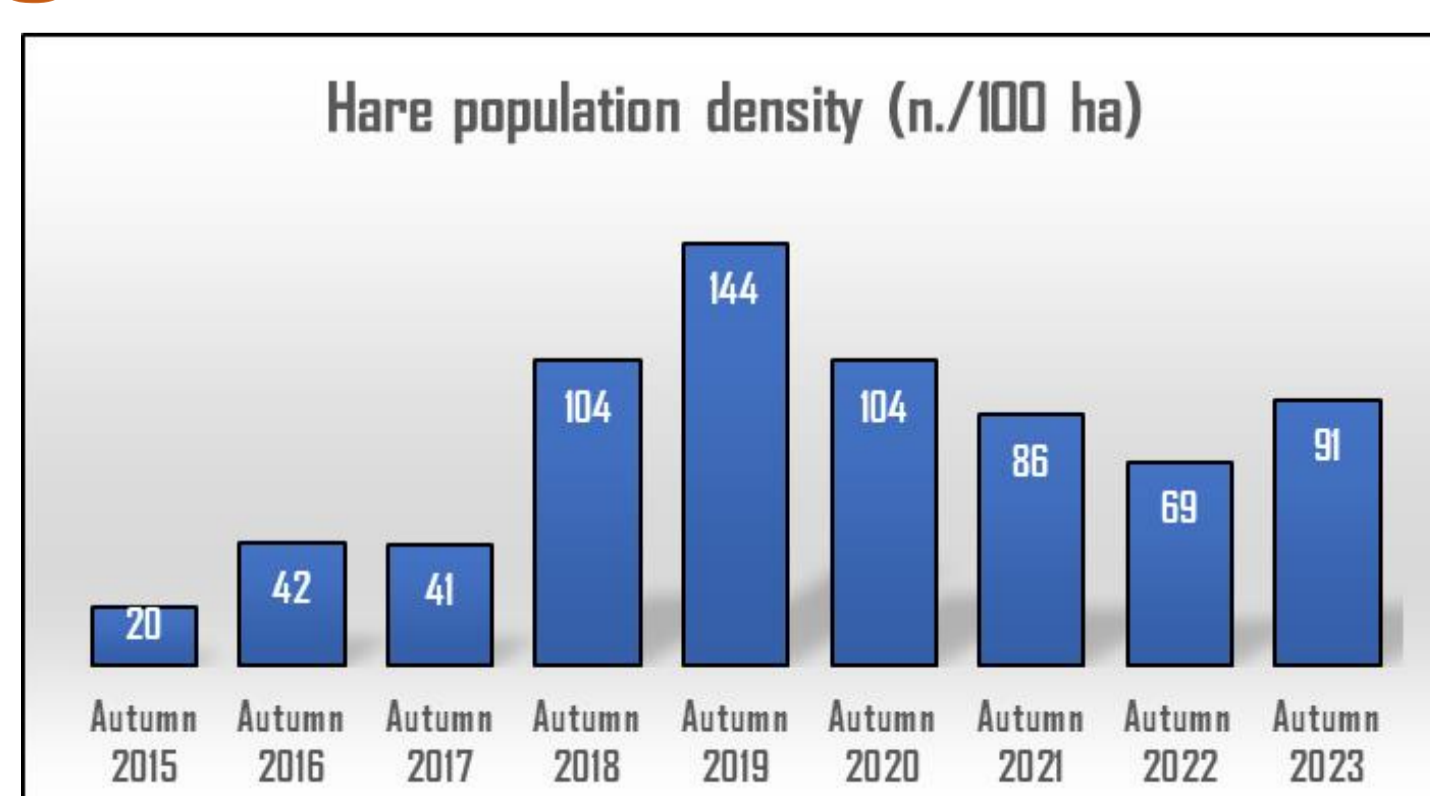
Median-joining network: all Pianosa samples carry the Leu2 haplotype (Mengoni *et al.*, 2018).




Canonical discriminant analysis, graph of the first two discriminant functions (populations: 5 Pianosa, 6 South America, 7 Eastern Europe, 11 historical Italian, 12 recent Italian) (Riga *et al.*, 2018).

The monitoring


 A standardized annual monitoring through spot-lights transects counts has been in place since 2015.



Conclusions

 This unique population is important for Italian biodiversity as it represents at least an evolutionarily significant unit (ESU) and Conservation Unit (CU), which requires proper monitoring and protection measures, including *ex-situ* conservation strategies.

A Conservation Plan has been produced. The population is currently stable, with density having improved following the removal of a feral cat population. Given the presence of *L. europaeus* populations with a mixed gene pool in the Italian peninsula, the establishment of a new population in a new isolated site could better ensure the *taxon* safety.

 **References** – Canu A., Scandura M., Luchetti S., Cossu A., Iacolina L., Bazzanti M., Apollonio M. (2013) Influence of management regime and population history on genetic diversity and population structure of brown hares (*Lepus europaeus*) in an Italian province. *Eur J Wildl Res* 59(6):783–793; De Stefano G. (1914) Nuovo contributo alla dimostrazione che gli avanzi dei mammiferi fossili della raccolta Pisani appartengono all'Isola di Pianosa. *Rivista Italiana di Paleontologia*. XX, II: 70-72; Mengoni C., V. Trocchi, N. Mucci, C. Gotti, F. Giannini, E. Mallia, C. Geminiani e N. Baccetti (2018) The secret of Pianosa island: an Italian native population of European brown hare (*Lepus europaeus meridiei* Hilzheimer, 1906). *Conservation Genetics* <https://doi.org/10.1007/s10592-018-1077-4>; Pierpaoli M., Riga F., Trocchi V., Randi E. (1999) Species distinction and evolutionary relationships of the Italian hare (*Lepus corsicanus*) as described by mitochondrial DNA sequencing. *Mol Ecol* 8(11):1805–1817; Repetti E. (1835) *Dizionario geografico fisico e storico della Toscana*. Firenze II:607–611; Riga F., V. Trocchi, F. Giannini, C. Gotti e N. Baccetti (2018) Is *Lepus europaeus* native to the Pianosa Island? XI Congresso Italiano di Teriologia. *Hystrix*, 29 (suppl.), Riassunti; Simonelli V. (1884) Notizie sulla flora e sulla fauna di Pianosa. *Atti della Società Toscana di Scienze Naturali*. Verbalì IV, pp 64–68; Sommier S. (1909) L'isola di Pianosa nel Mar Tirreno e la sua Flora. *Rivista Geografica Italiana*, 16: 441-464, 528-540, 585-606..