

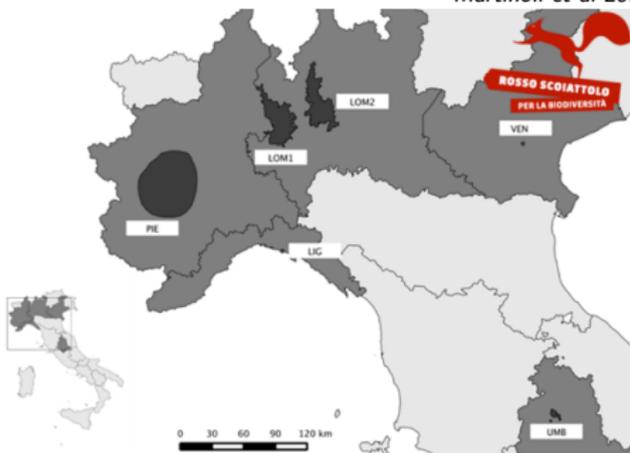


The LIFE U-SAVEREDS Project: avoid the expansion of grey squirrel in central Italy

V La Morgia, D Capizzi, D Paoloni, P Genovesi

Where did it all begin?

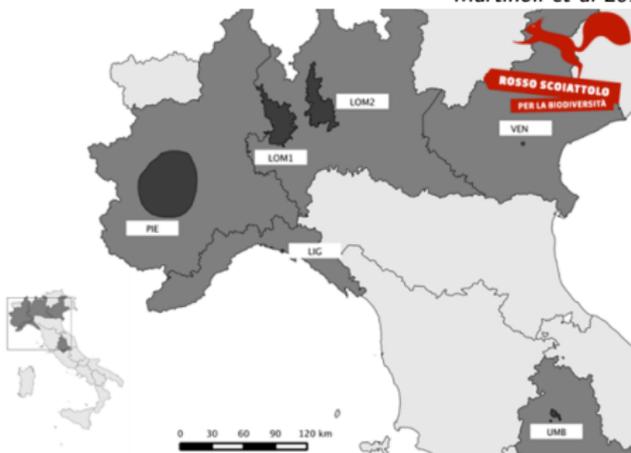
Martinoli et al 2010



*Bertolino & Genovesi 2003, Bertolino 2009,
Bertolino et al 2000, 2014*

Where did it all begin?

Martinoli et al 2010

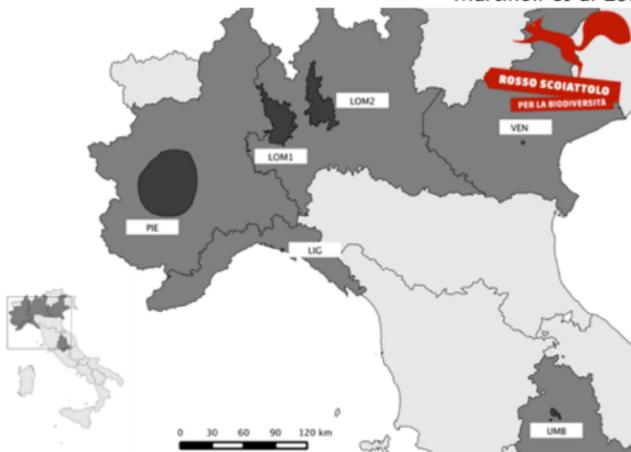


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Where did it all begin?

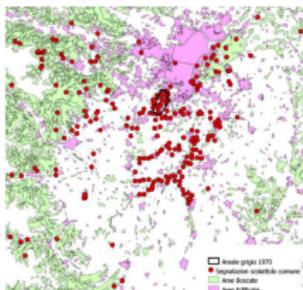
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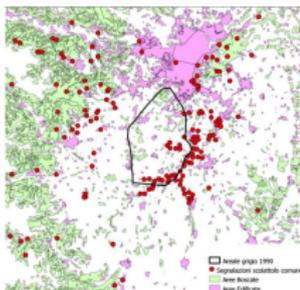
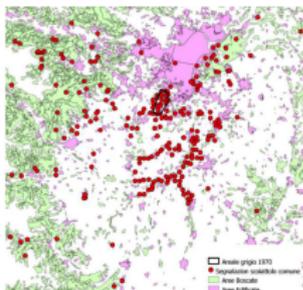
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And then we know the story

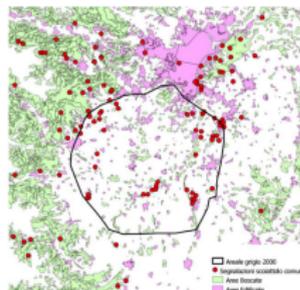
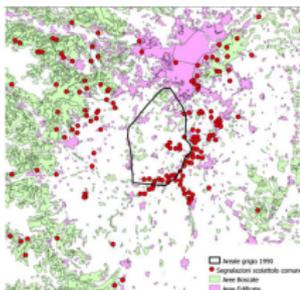
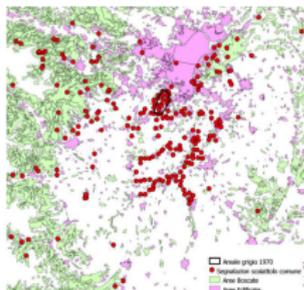


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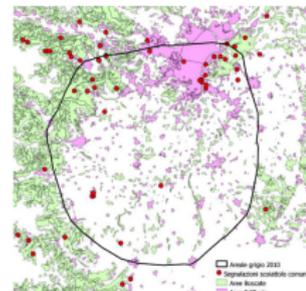
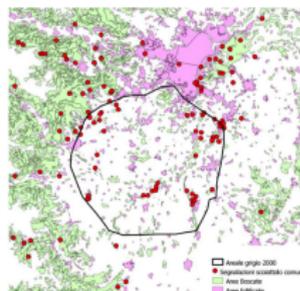
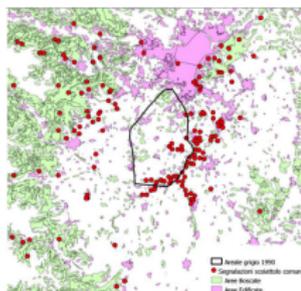
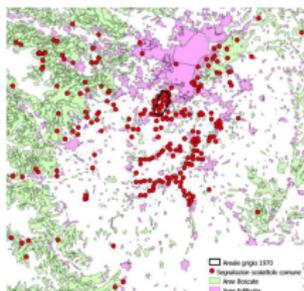
From Stupinigi, grey squirrels began their expansion...

And then we know the story



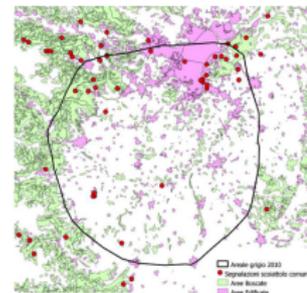
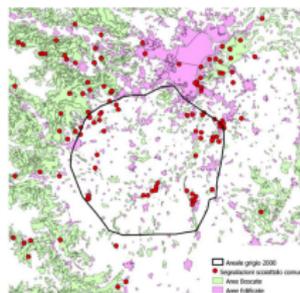
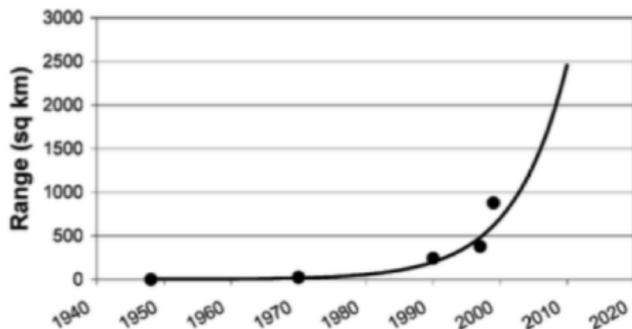
From Stupinigi, grey squirrels began their expansion...
 ... and at the same time red squirrels disappeared

And then we know the story



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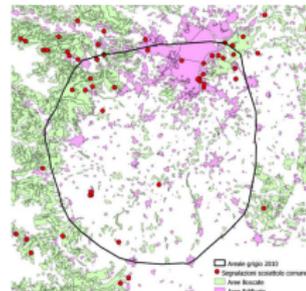
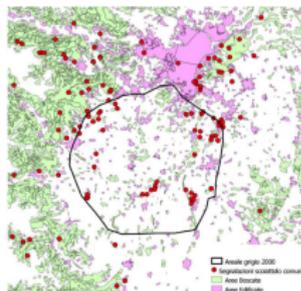
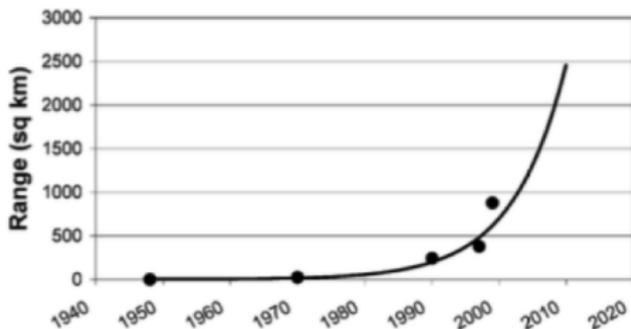


From Stupinigi, grey squirrels began their expansion...

... and at the same time red squirrels disappeared

First, limited increase in range, than exponential growth

And then we know the story



From Stupinigi, grey squirrels began their expansion...

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First, limited increase in range, then exponential growth

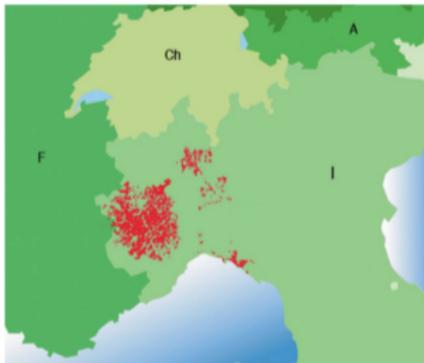
Why did it happen?

Strong opposition of animal rights groups

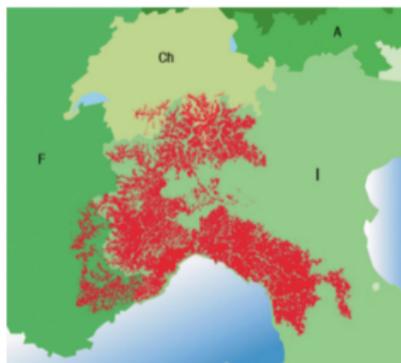
The removal activities were stopped

Genovesi & Bertolino 2001

Where will we go from here?



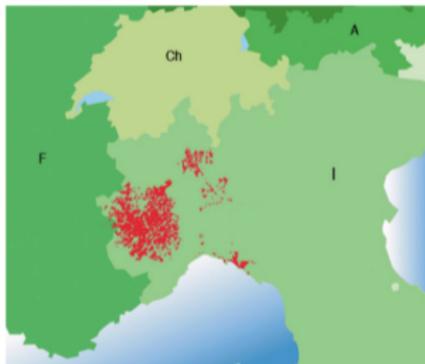
2030



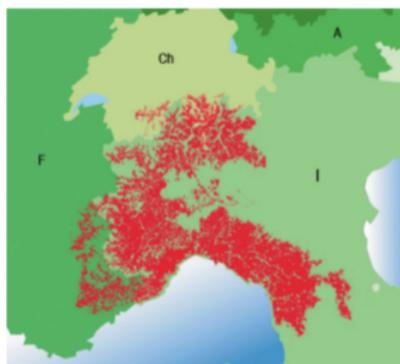
2100

Future expansion of the grey squirrel populations

Where will we go from here?



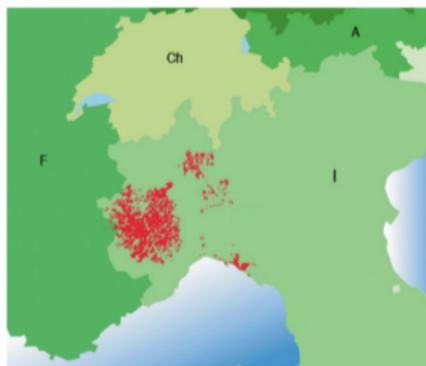
2030



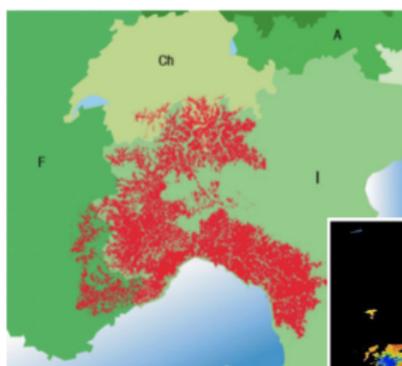
2100

Isolated populations become connected

Where will we go from here?

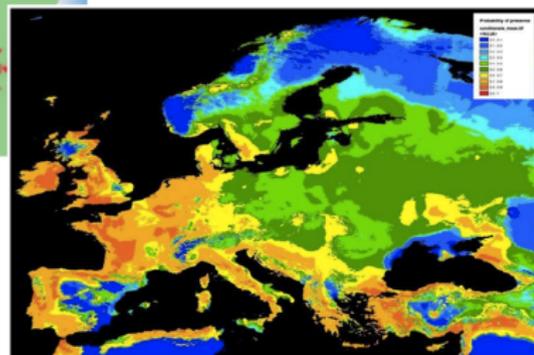


2030



2100

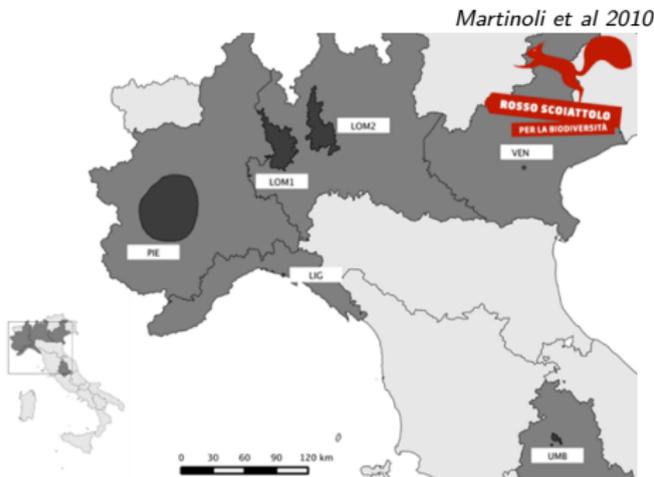
Di Febraro et al. 2013



It looks like a grey future for Europe

Bertolino et al. 2014

What about the other grey squirrel populations?

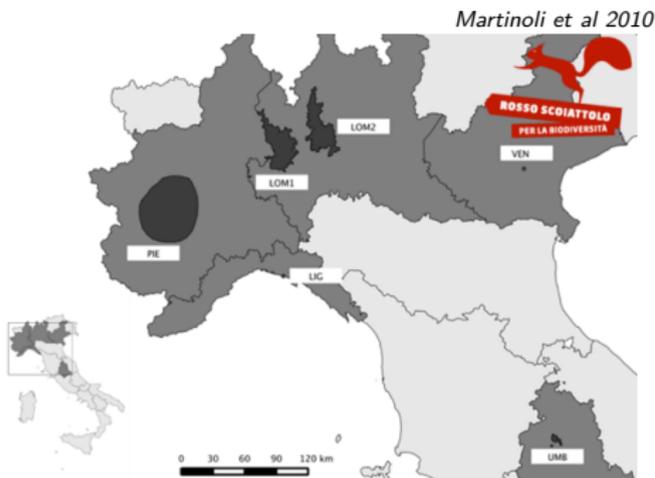


*Bertolino & Genovesi 2003, Bertolino 2009,
 Bertolino et al 2000, 2014*

Lombardy

- several populations
- difficulties linked to the access to private properties

What about the other grey squirrel populations?



Bertolino & Genovesi 2003, Bertolino 2009,
Bertolino et al 2000, 2014

Lombardy

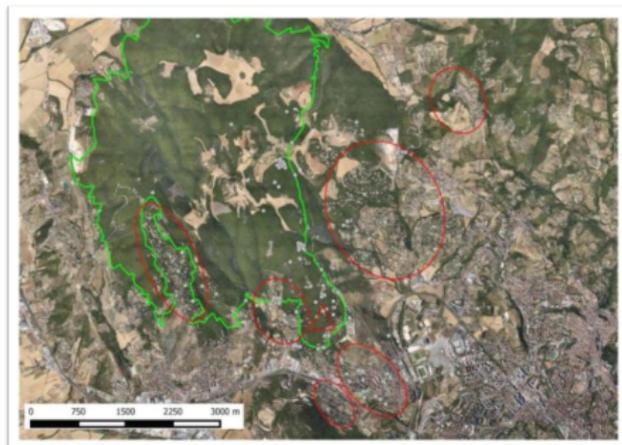
- several populations
- difficulties linked to the access to private properties

Liguria (Genoa)

- urban population
- surgical sterilization and translocation

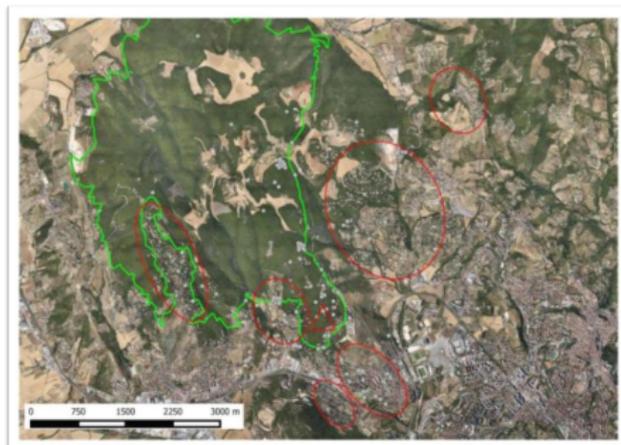
Umbria: a **new** challenge!

- recent introduction (detected in **2000** - 50 km^2)
- eradication attempt



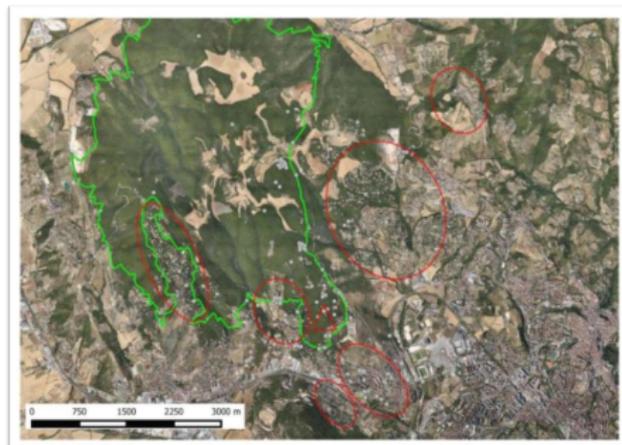
Umbria: a **new** challenge!

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- distribution centered on the **city** of Perugia
- **social issues** due to citizens' opposition



Umbria: a **new** challenge!

- recent introduction (detected in **2000** - 50 km^2)
- eradication attempt
- distribution centered on the **city** of Perugia
- **social issues** due to citizens' opposition
- private land **accessibility**



Aims of the LIFE U-SAVEREDS Project

- 1 protect the red squirrel and biodiversity
 - restore red squirrel populations
 - improve habitat quality
- 2 inform citizens about the threat posed by alien species

To restore red squirrel populations, we have to remove grey squirrels

Phase I
KNOWLEDGE

Phase II
MANAGEMENT

Phase III
MONITORING

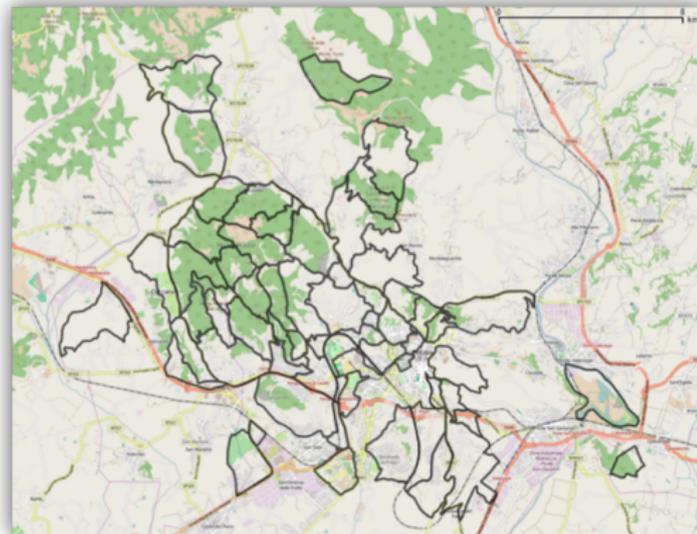
COMMUNICATION

How we are acting

Fine scale characterization

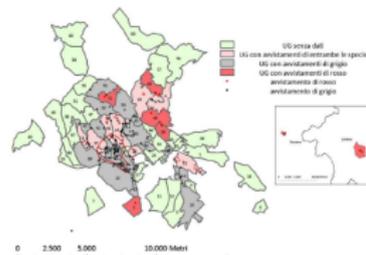
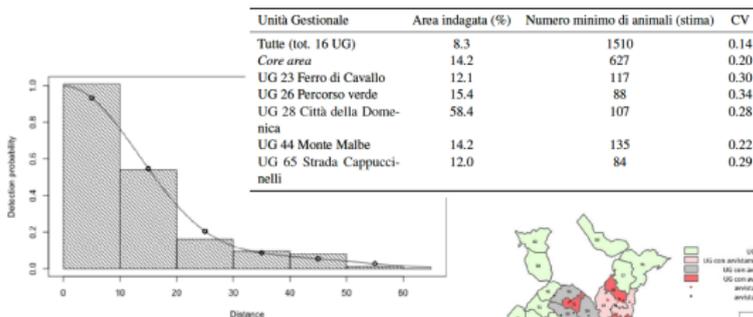
Management Units (MUs)
 homogeneous areas, base units for
 management

Total area: 105.6 km²
 MUs extent: 40-160 ha



Field activities

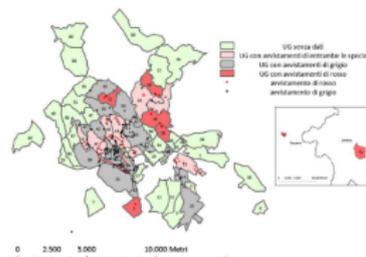
At the end of 2015, the **grey** squirrel was widely distributed and expanding its range (29 MUs - 40 km²), while the **red** squirrel persisted in a few areas (15 MUs - 30 km²) within the grey squirrel range and showed a **clumped, shrinking distribution**.



Field activities

Through point distance sampling, in a central area of 13.5 km² (16 MUs), we estimated a **minimum of 1510 grey squirrels** (CV 14%), while the **reds were just 112** (CV 32%).

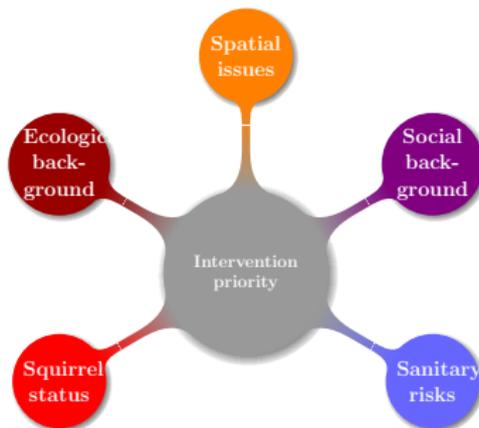
Most of the grey squirrels (627 animals, CV 20%) were located within a core area of 4 km²



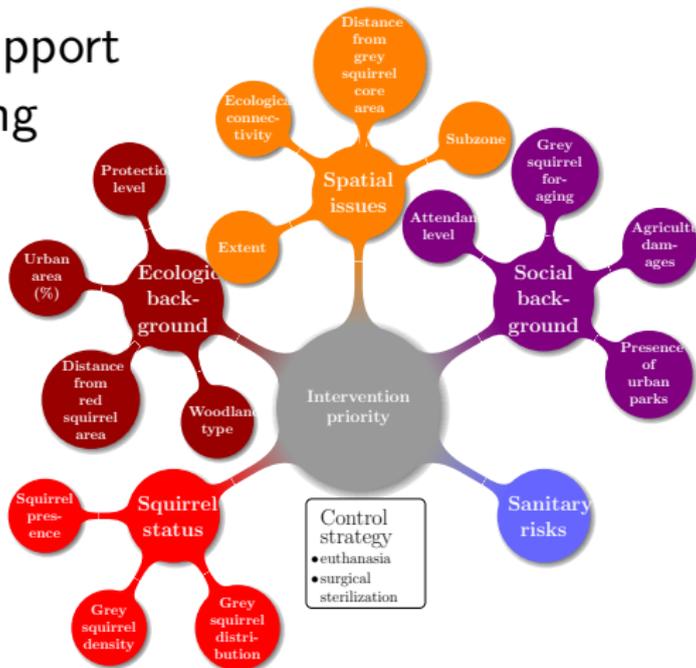
A model to support decision making

We needed a strategy: in which MUs should we act first?

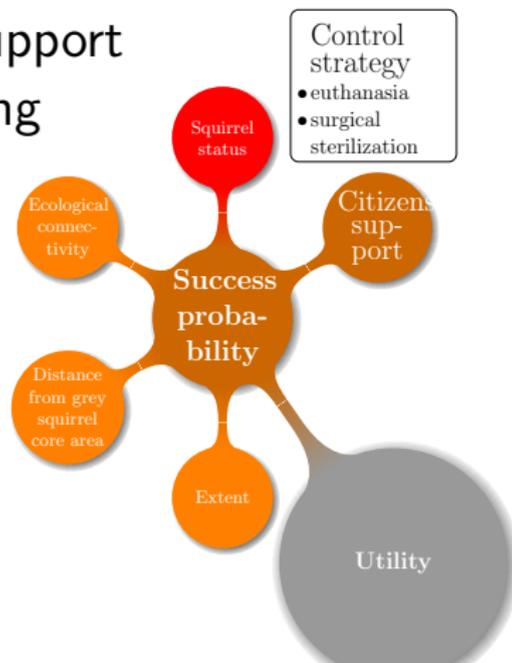
- 1 define intervention priority on the basis of latent variables



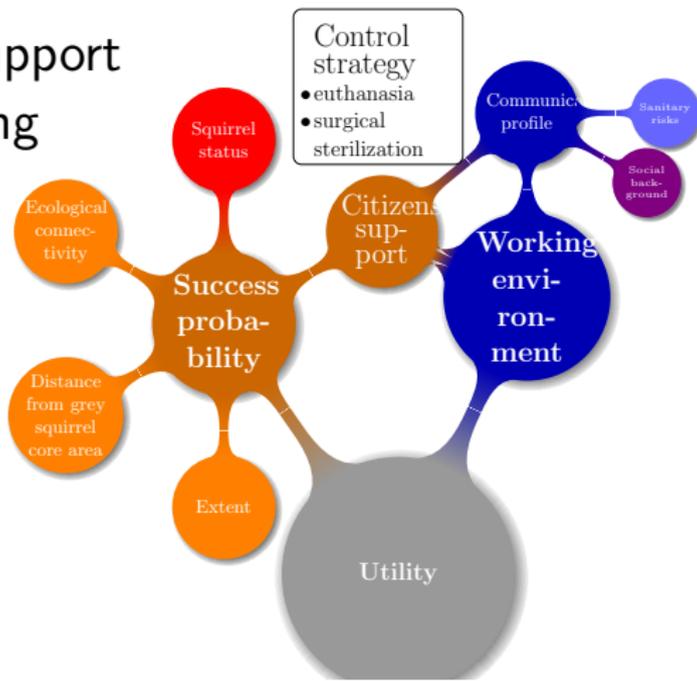
A model to support decision making



A model to support decision making



A model to support decision making





LIFE13 BIO/IT/000204



Communications activities come in handy

Regional and National Surveys

Local TV

Radio

Local press

Inform about biodiversity and alien species



www.usavereds.eu



LIFE13 BIO/IT/000204



Communications activities come in handy

But what about the **access to private properties?**

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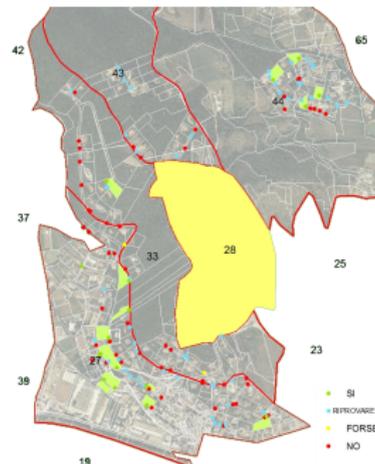


www.usavereds.eu

Communications activities come in handy

But what about the access to private properties?

Overall accessible area:
71% (21-86%)



Results

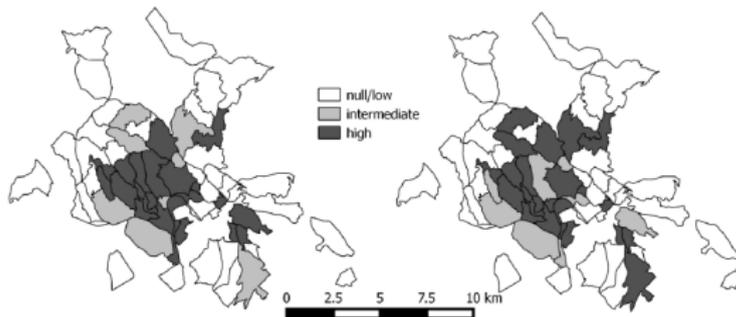
Influence Diagram (ID) - Bayesian Belief Network (BBN) decision model

gRain package in R environment - La Morgia et al 2016

- 1 reduce reproductive rate

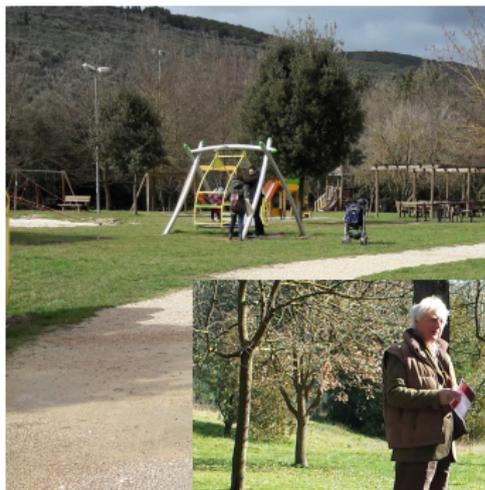
Gosso et al 2012

- 2 prevent further expansion

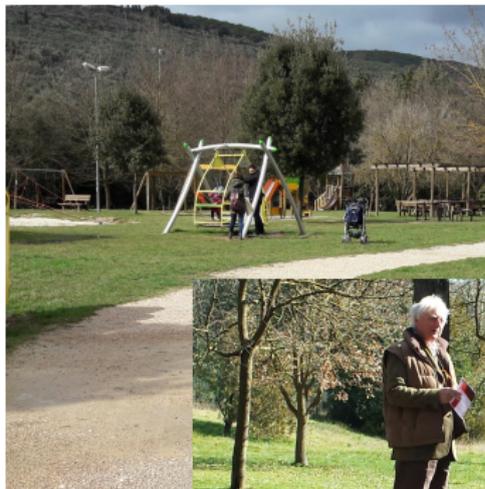


500 animals removed in 2016 - red squirrels are back! (in some areas)

Social conflicts



Social conflicts





LIFE13 BIO/IT/000204



IAS Regulation: a good reason not to give up

4.11.2014

EN

Official Journal of the European Union

L 317/35

REGULATION (EU) No 1143/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 22 October 2014
on the prevention and management of the introduction and spread of invasive alien species

- 1 prevention
- 2 early detection and rapid eradication
- 3 management



www.usavereds.eu

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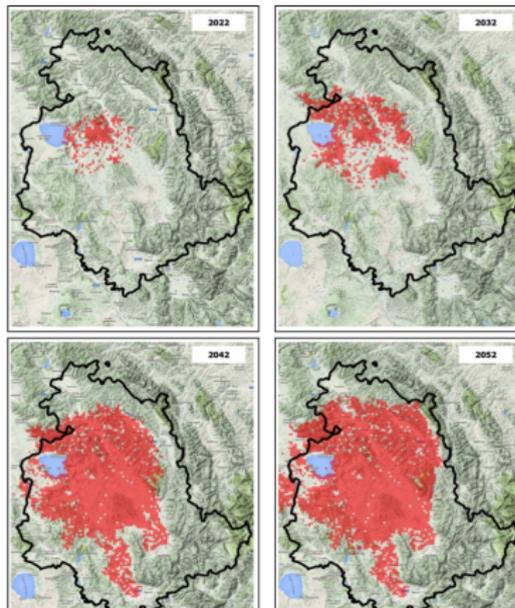
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Inter-Ministerial Order of 24 December 2012, "Provisions for control of possession and trade of alien squirrels" led to the ban on trade and regulated breeding and keeping of three species of alien squirrels

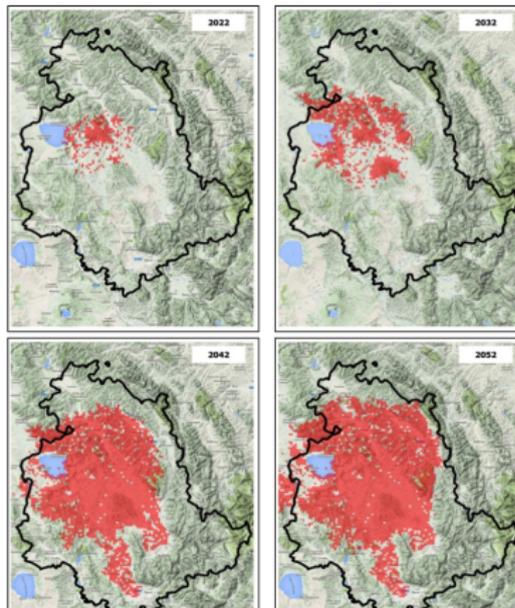
Why is Umbria so relevant?

Modelling the future expansion of the grey squirrel in Umbria



Why is Umbria so relevant?

Modelling the future expansion
 of the grey squirrel in Umbria
2024 - grey squirrel reaches the
 neighboring regions

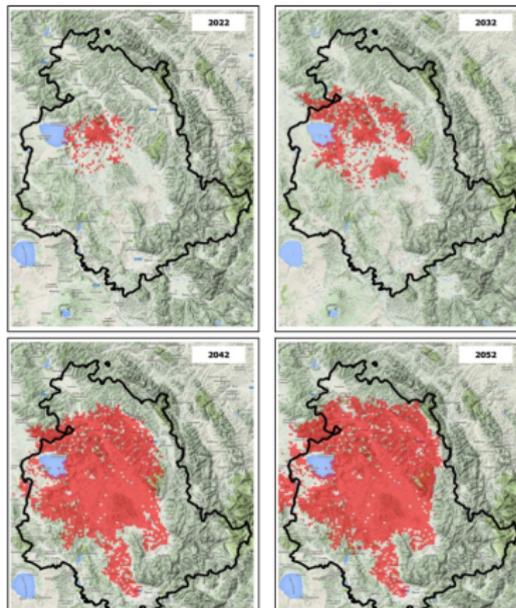


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2024 - grey squirrel reaches the neighboring regions

2052 - start of the Apennine colonization



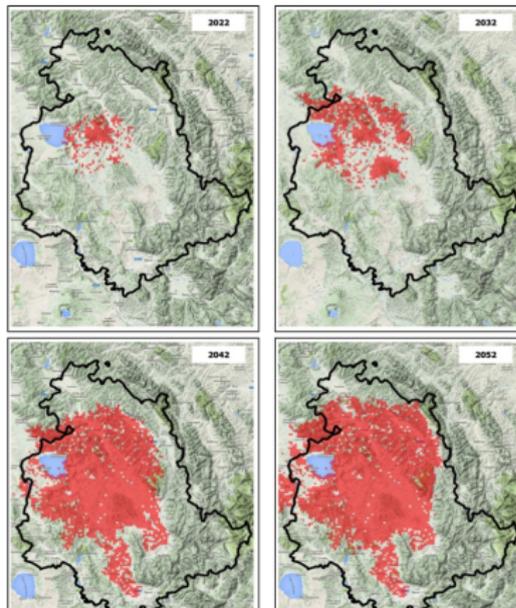
Why is Umbria so relevant?

Modelling the future expansion of the grey squirrel in Umbria

2024 - grey squirrel reaches the neighboring regions

2052 - start of the Apennine colonization

Are we going to let it happen again?



Early Warning System and Rapid Response

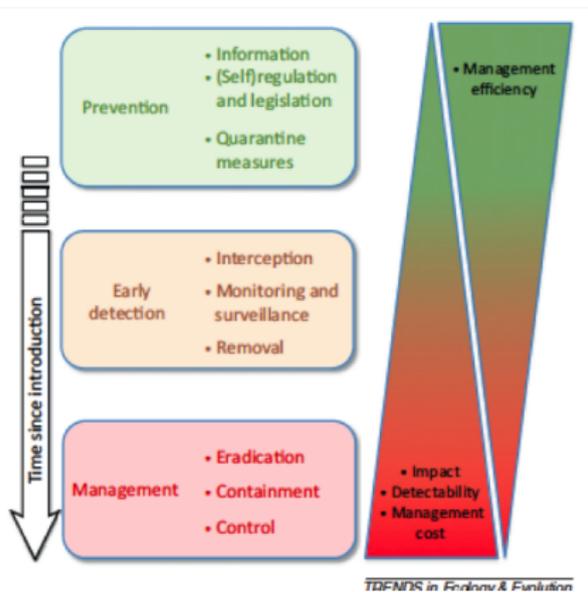
Develop an **effective system** for rapid detection of alien squirrels

Introductory part

- it informs about the threats posed by alien species
- it provides info on the alien squirrels in Italy (e.g. *Callosciurus finlaysonii*, *C. erythraeus*, *C. niger*, *Tamias sibiricus*)
- it enforces the new EU Regulation no. 1143/2014



Early Warning System and Rapid Response



Institutions and stakeholders to be involved in training and **awareness activities** are identified

Aim: to broaden as much as possible the number of potential observers outside Umbria

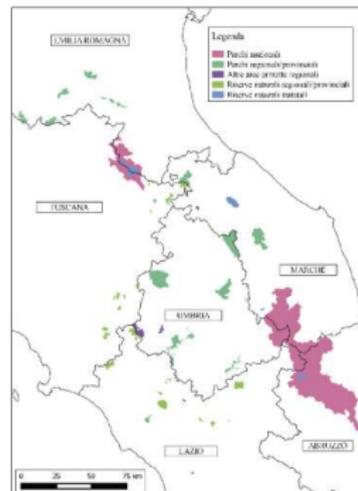
Implementation

Target regions are those situated at the border with Umbria

(Emilia-Romagna, Marche, Tuscany and Latium)

Institutions and stakeholders

- National (3) and Regional (26) Parks
- Corpo Forestale dello Stato ("forest rangers")
- public agencies
- Universities
- hunters
- farmers



Implementation

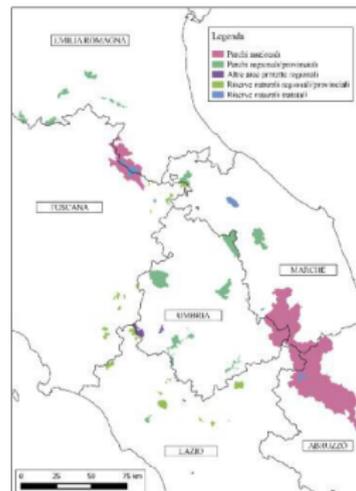
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Targeted seminars



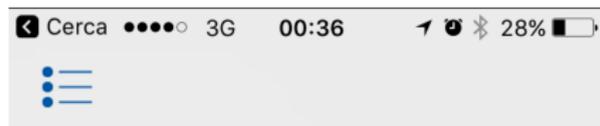
Seminars



Data collection

Records

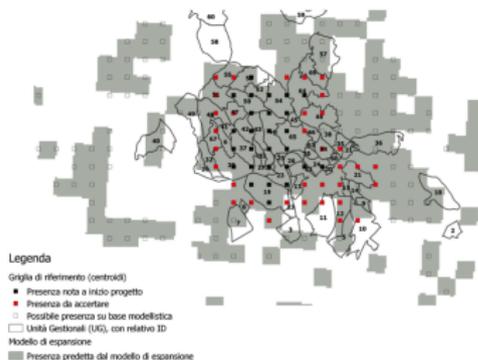
- 1 sent by e-mail
 - to the LIFE U-SAVEREDS staff
 - to segnalazioni@usavereds.eu
- 2 online platforms (e.g. using smartphone apps)
 - ornitho.it
 - CS-MON app ('Squirrels' campaign)



Monitoring

To be implemented upon receipt of a reporting

- 1 reliability assessment (scale 1 - low to 4 - high)
- 2 update of squirrel database
- 3 field investigations (e.g. protocol for camera trapping)



Adaptive sampling scheme

Management



Set up of an Alien Squirrel Emergency Team

- made up of LIFE U-SAVEREDS staff members & squirrel experts
- fill in the gap between the reporting and the active management
- contact and support public agencies in the development of management plans

In conclusion



"Feeding the squirrels" by Dave Townsend
 Flickr: Feeding the squirrels. CC BY-SA 2.0 Commons

Issues

- resource challenges
- coordination of culling activities
- access to private properties
- social conflicts

In conclusion



"Feeding the squirrels" by Dave Townsend
 Flickr: Feeding the squirrels. CC BY-SA 2.0 Commons

Issues

- resource challenges
- coordination of culling activities
- access to private properties
- social conflicts

Opportunities

- LIFE Projects
- eradication still feasible in central Italy
- set up of a first EWSRR

Thank you for your attention

