LIFE+ Nature 2011 NAT/IT/000252

Implementing Citizen-Science approaches in the study and conservation of saproxylic insects: the LIFE MIPP Project

Redolfi De Zan L., Campanaro A., Bardiani M., Hardersen S., Maura M., Maurizi E., Mosconi F.,Toscano E., Zapponi L., Zauli A., Audisio P., Bologna M.A., Carpaneto G.M., Roversi P.F., Sabbatini Peverieri G., Mason F.

LIFE project MIPP
Monitoring of Insects with Public Participation

6 Italian Beneficiaries, coordination by Carabinieri National Forest Service

Budget: € 2.734.430

Duration of the project: **2012-2017**

28 Actions, **4 main goals**:

1. Development and assessment of **standard monitoring protocols** for saproxylic beetles
2. Tranining of **Osmodog**
3. **Education and dissemination**
4. Collection of occurence data from the public (**citizen science**)

www.lifemipp.eu

What is CITIZEN SCIENCE?

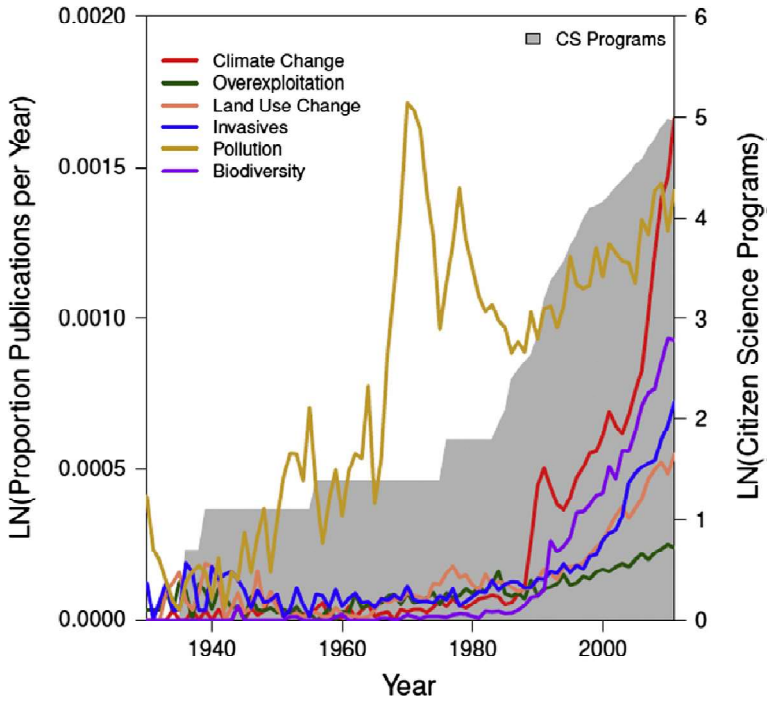
"Scientists and the public work together to investigate and address emergent environmental issues" (Kobori et al. 2016)

People could be involved at all level of the scientific process:

- ✓ RESEARCH DESIGN
- ✓ DATA COLLECTION
- ✓ DATA PROCESSING
- ✓ EDUCATION

CS has grown rapidly in recent years:

- ✓ More than 500 English-language citizen science projects on biodiversity research are known (Kobori et al. 2016)
- ✓ A number of databases exists (e.g., CitizenScience.org, SciStarter.com)
- ✓ Publication of data from citizen science projects in peer-reviewed journals are increasing



Annual trends of publication in peer-reviewed journals, as a proportion of total publications (log scale); and of establishment of biodiversity-related citizen science projects (1930–2011; log scale) (Theobald et al. 2015).

ECSA – European Citizen Science Association: we are member!

EUROPEAN CITIZEN SCIENCE ASSOCIATION

Ten principles of citizen science

https://ecsa.citizen-science.net/documents

UPCOMING EVENTS

FIRST ITALIAN CITIZEN SCIENCE CONFERENCE ROMA 2017

November 23rd – 25th 2017

Partner Events
First Italian Citizen Science Conference

February 1st - 3rd 2018

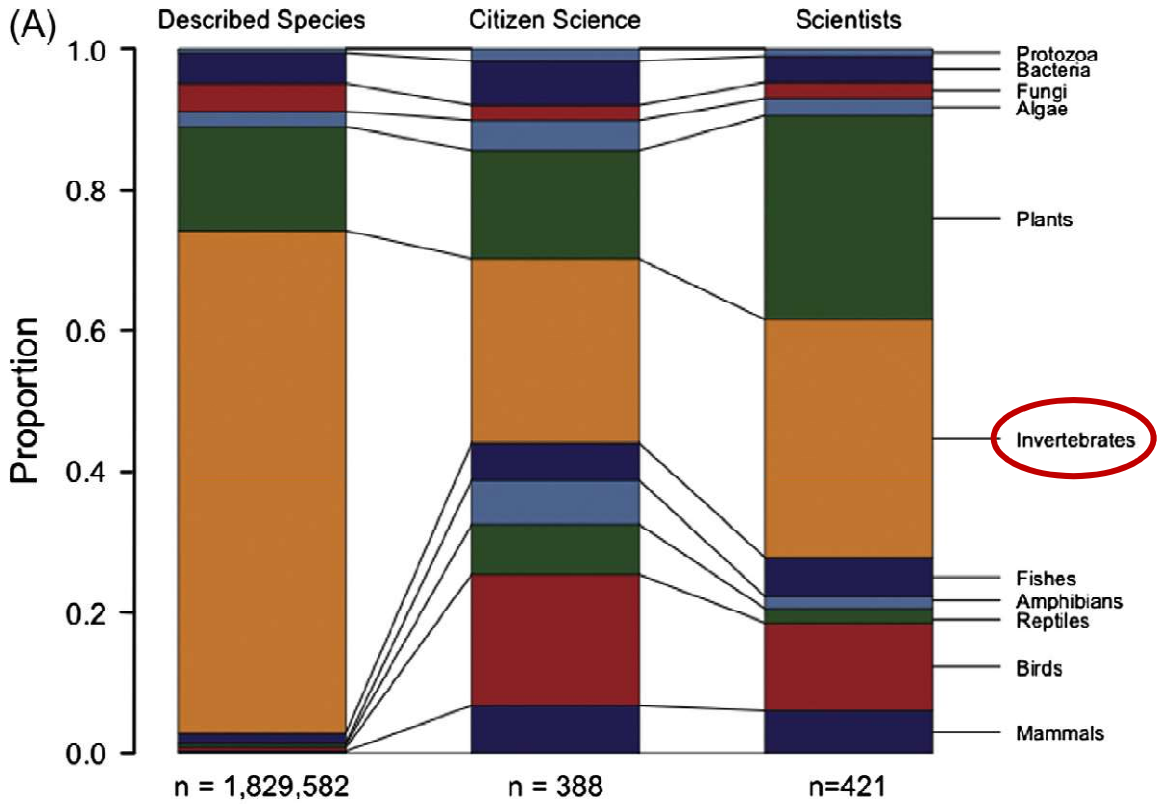
Partner Events
Austrian Citizen Science Conference

CITIZEN SCIENCE AND INSECTS

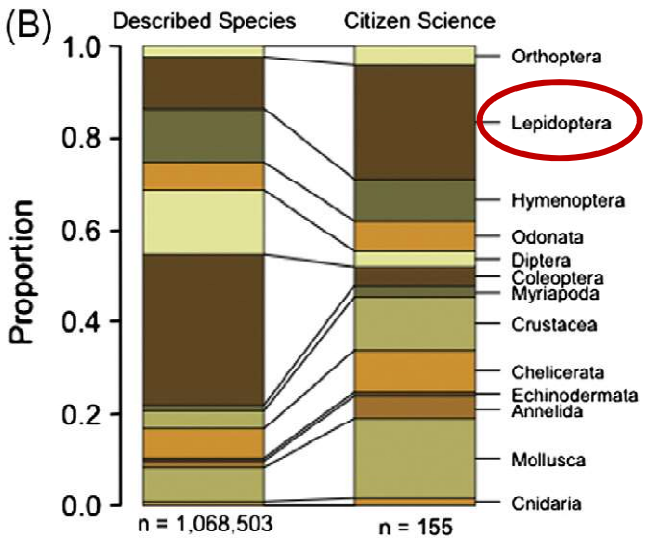
The CS approach has been applied for insect monitoring in a great number of projects:

- ✓ **Urban**: butterflies monitoring in Chicago, New York and Tokyo (Matteson et al. 2012, Washitani et al. 2013); Invasive Alien Bumblebee in Hokkaido (Kadoya et al. 2009)…
- ✓ **National**: butterfly monitoring in Germany (www.science4you.org), Ireland (Donnelly et al. 2014) and Malaysia (Wilson et al. 2015); anglers monitoring initiative of UK (www.riverflies.org); UK Ladybird Survey (UKLS; www.ladybird-sur- vey.org); insect monitoring in South Africa (Lovell et al. 2009); Swedish Species Observations System (www.artportalen.se)...
- ✓ **Continental**: Monarch Larva Monitoring Project (http://monarchlab.org/mlmp); migration and trends of Monarch butterflies (Oberhauser and Prysby 2008, Howard and Davis 2009, Davis 2015); Fireflies (Firefly Watch USA), Lost Ladybug Project (LLP; http://lostladybug.org); Swiss pan-European study of the migratory behaviour of the Red Admiral butterfly (https://insectmigration.wordpress.com/red-admiral-migration/)...

CITIZEN SCIENCE AND INSECTS

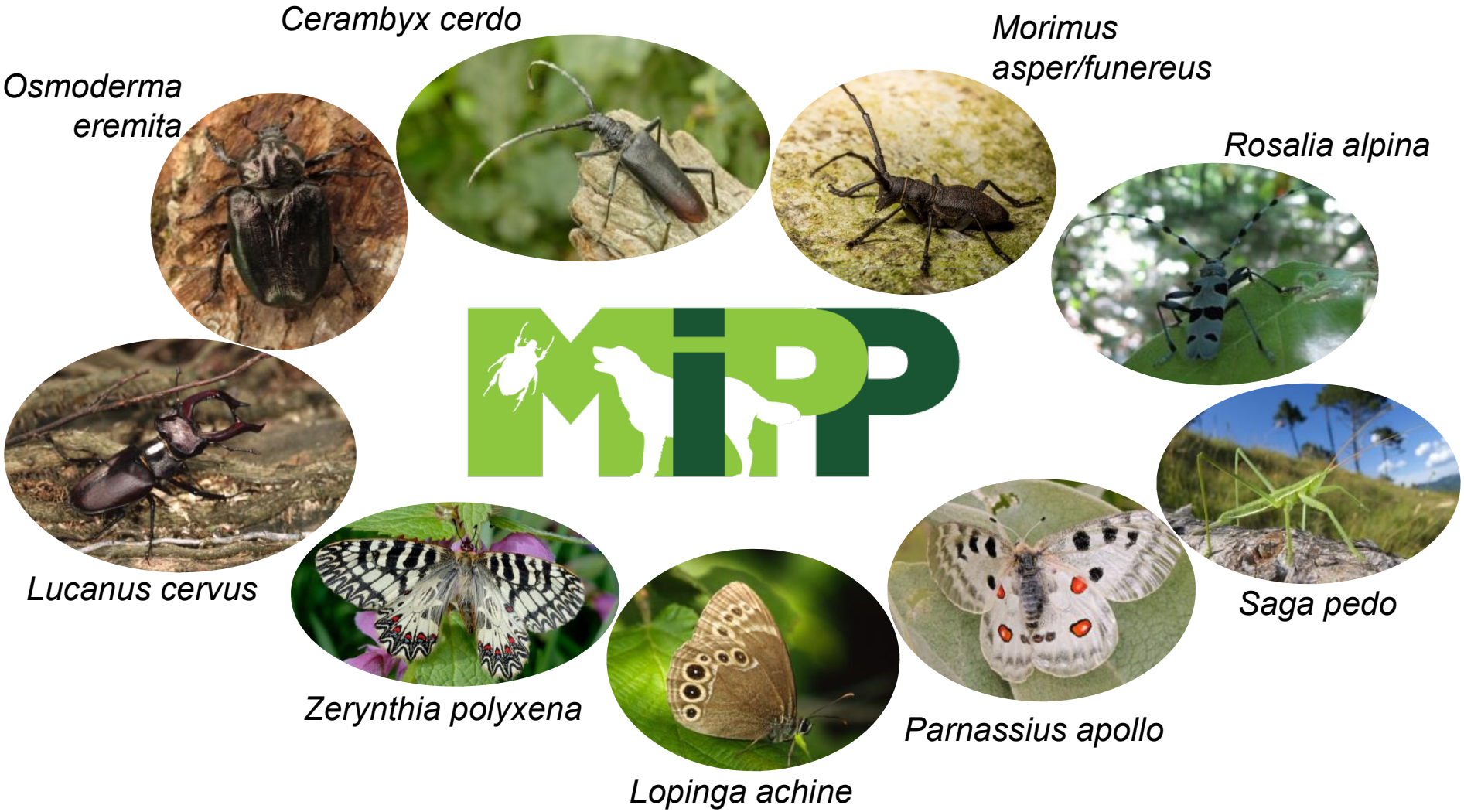


Taxonomic and ecosystem representation of citizen science projects relative to mainstream science (Theobald et al. 2015)



Invertebrates were under-sampled by citizen science and, within invertebrates, butterflies were oversampled and **beetles were under-sampled**

The project MIPP is the first LIFE project which gathers records of insect species listed in the Habitats Directive by means of volunteers



CHARACTERISTICS OF THE CITIZEN SCIENCE PROGRAM

Aims were:

1. **education**: increasing the public knowledge on the habitat, biology and threats of the target species;
2. **awareness**: promoting environmental awareness and changes in attitudes and behaviour of the public;
3. **faunistic knowledge**: mapping the current distribution of the target species.

Sampling scheme: “Cross sectional surveying" (Tulloch et al. 2013): volunteers are free to choose WHEN and WHERE to collect occurrence data.

Data quality: MIPP is a "verified citizen science" program (Gardiner et al. 87 2012), as validation of data is ensured by specialists, based on photographs.

HOW DO WE CONTACT THE CITIZENS?

A total of **403** activities were carried out during 2014-2016, with approximately **14,000** citizens reached drectly

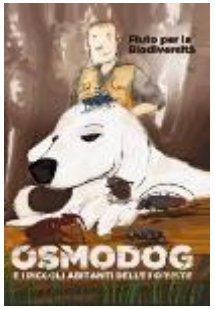
EVENTS LESSONS

SOCIAL WEB

GADGETS

PUBLICATIONS

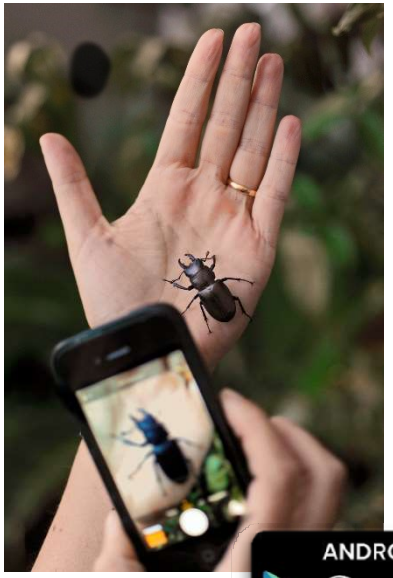
MEDIA (newspapers, radio, TV)



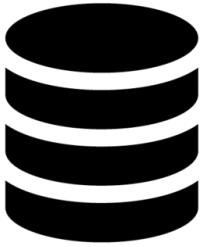
THE WORKFLOW

www.lifemipp.eu

OR

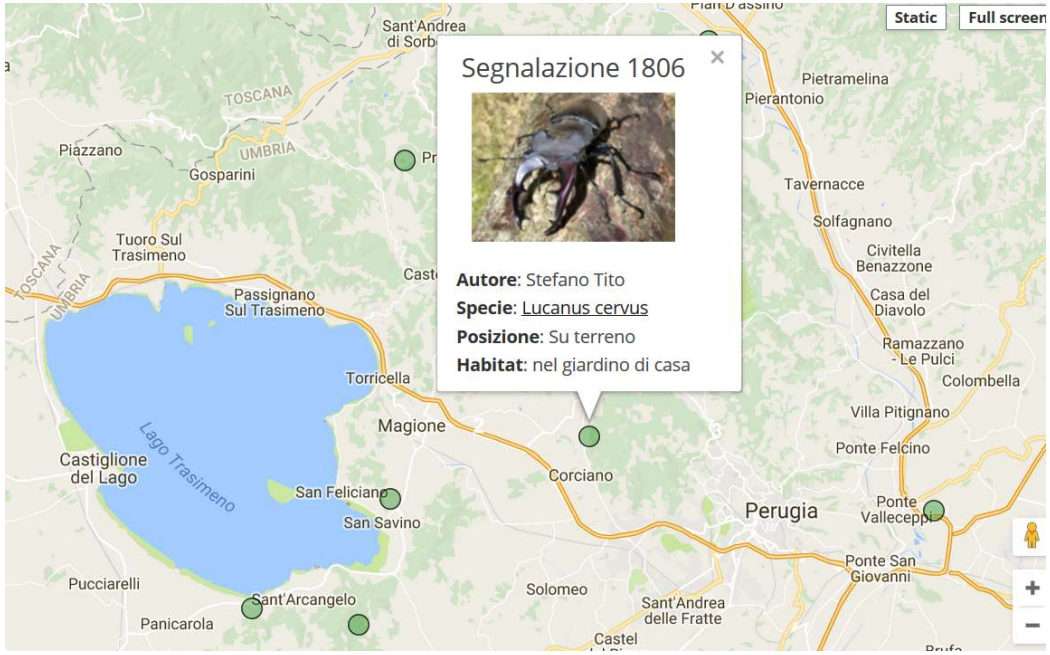


DATA
VALIDATION
BY EXPERTS



NATIONAL DB

Network Nazionale Biodiversità



ANDROID APP ON Google play

Available on the App Store

Windows Store

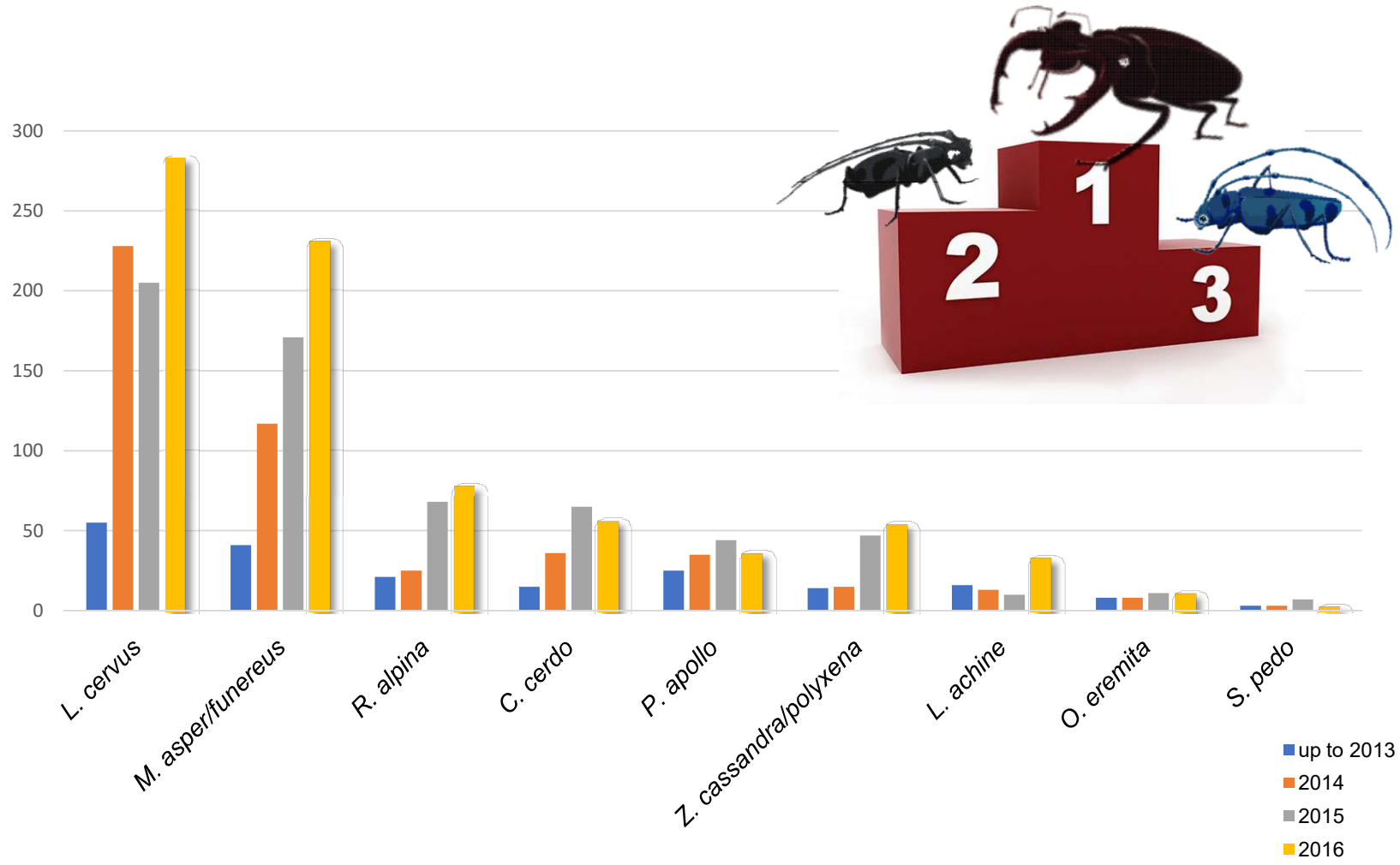
Easy procedure
Friendly tools
Validation process

RESULTS

In the period 2014-2016: **2,308** records collected and validated by specialist

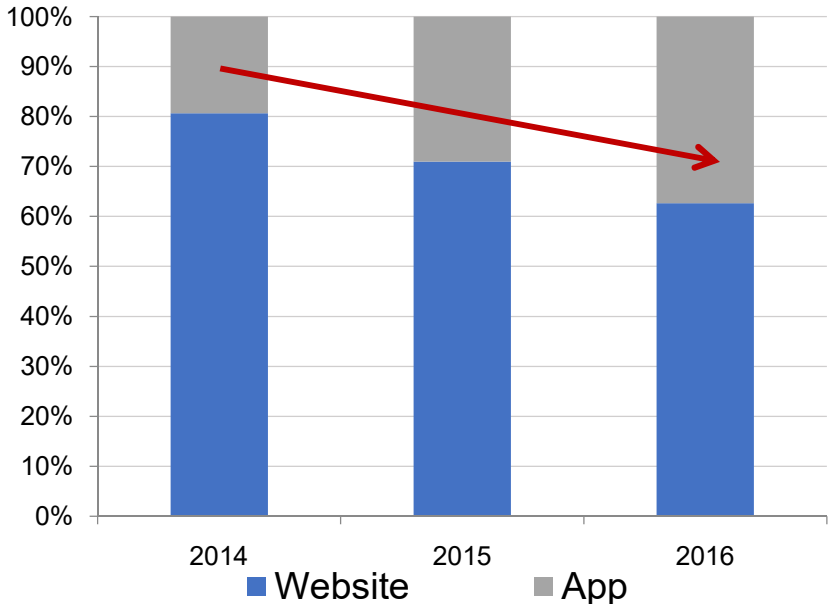
1,691 of these were confirmed (73,26 %)

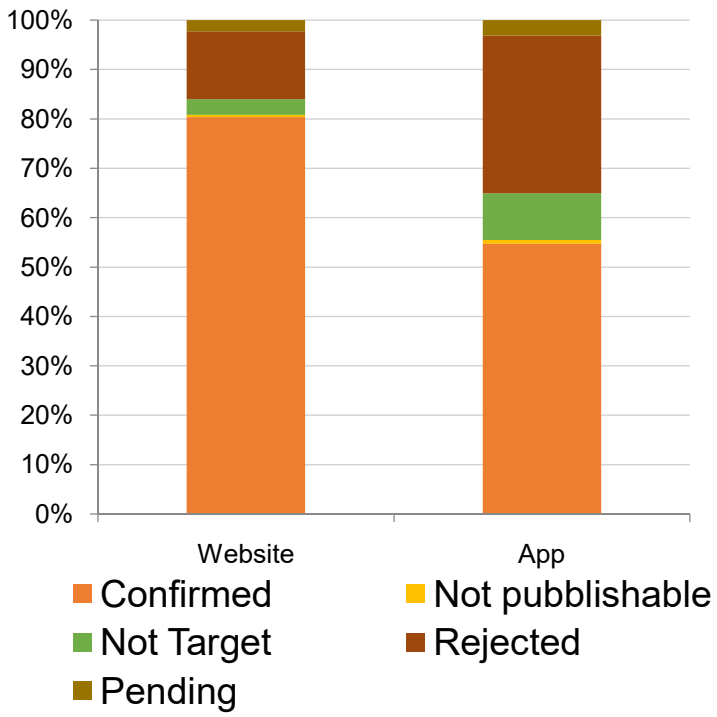
MOST RECORDED SPECIES



APP vs. WEBSITE

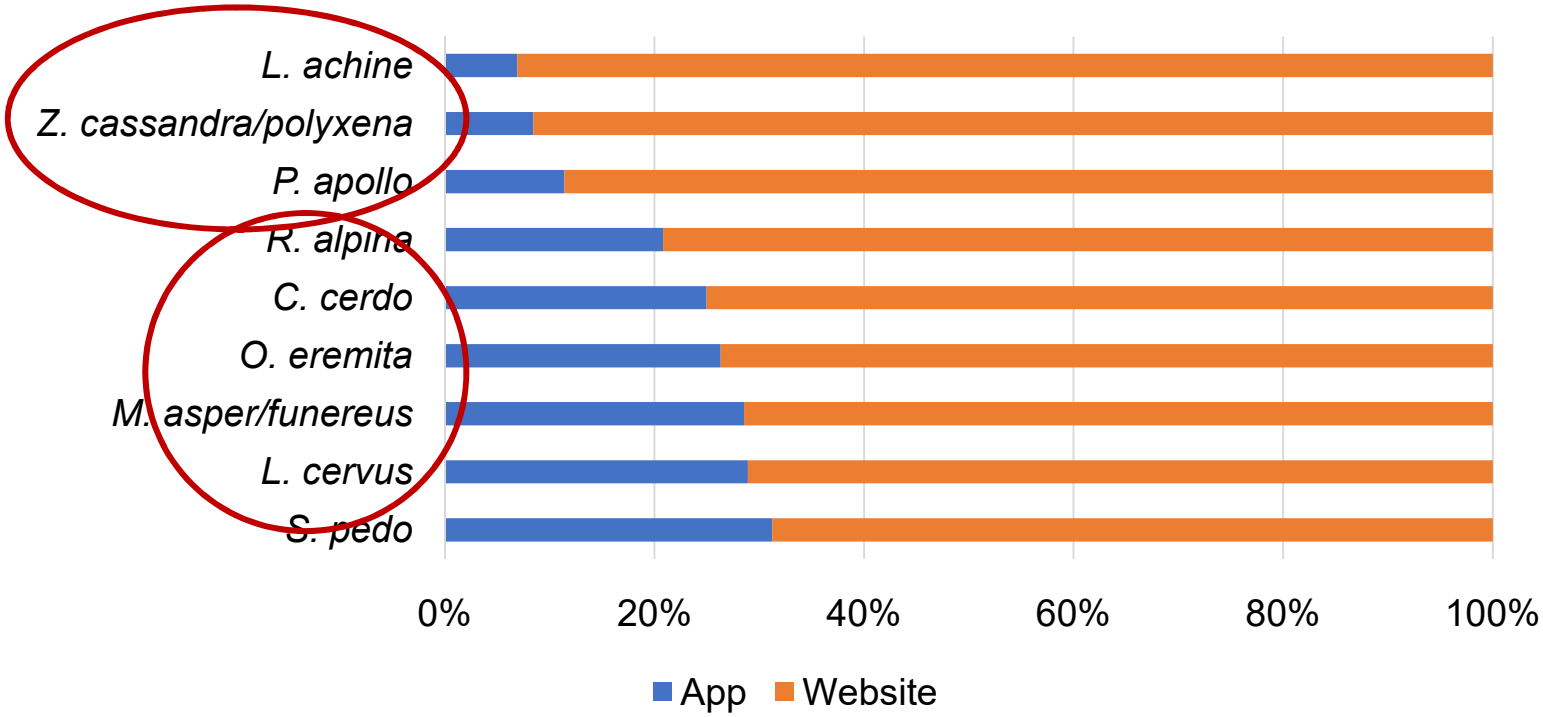
Most records were submitted via the web-site (n=1,653, 71.6 %)





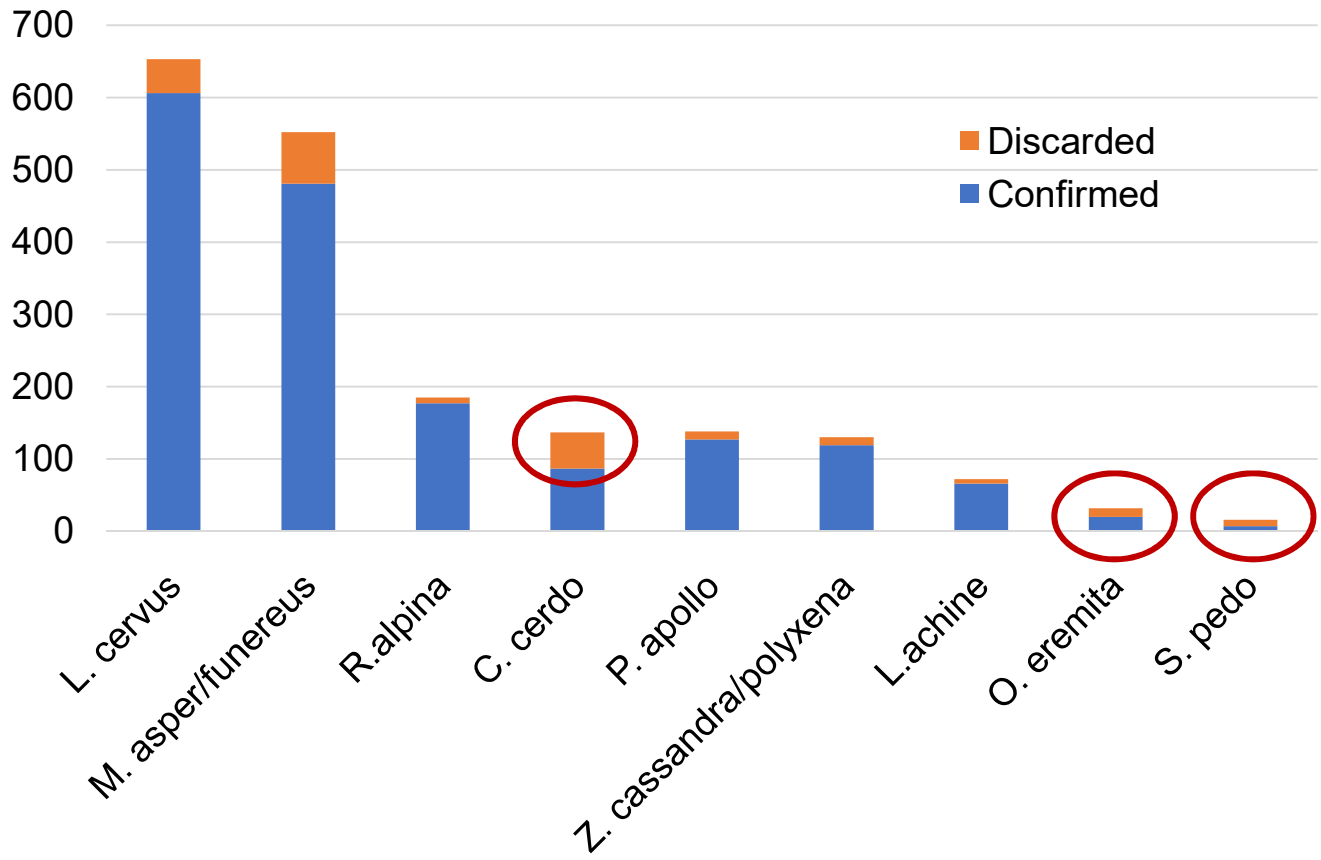
APP vs. WEBSITE

The app was used to transmit **21%** to **31%** of record for the 5 beetle species. In contrast, for the butterflies only **7% -11%** of records were transmitted via app.

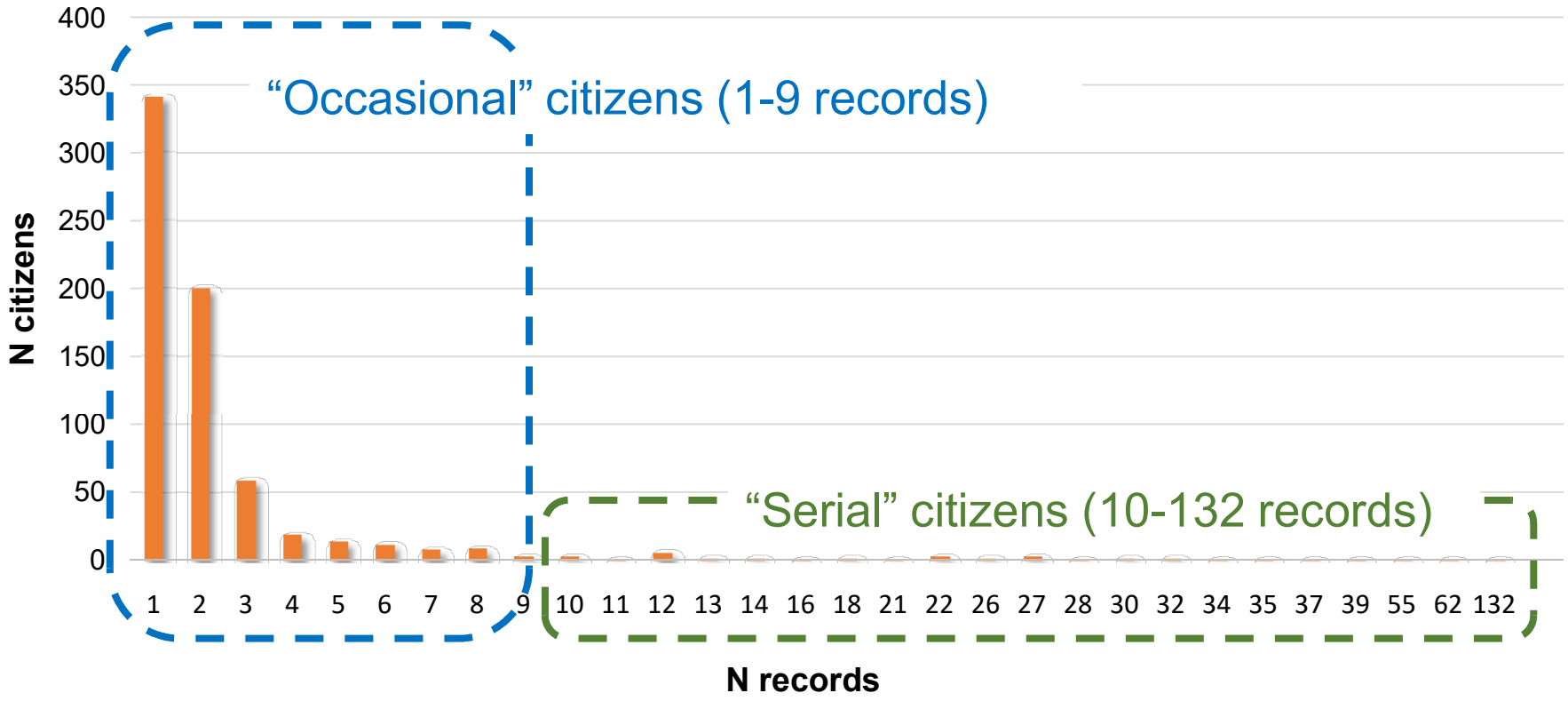


DATA QUALITY PER SPECIES

The proportion of confirmed records for *L. cervus*, *M. asper*, *R. alpina*, *P. apollo*, *Z. cassandra/polyxena* and *L. achine* varied between **87%** and **96%** .
For *C. cerdo*, *O. eremita* and *S. pedo* between **44%** and **64%.**



CITIZENS vs. RECORDS



CASE STUDY: CAN WE MAP SAPROXYLIC DISTRIBUTION USING CITIZEN SCIENCE DATA?

Yes, we can!

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/bioc

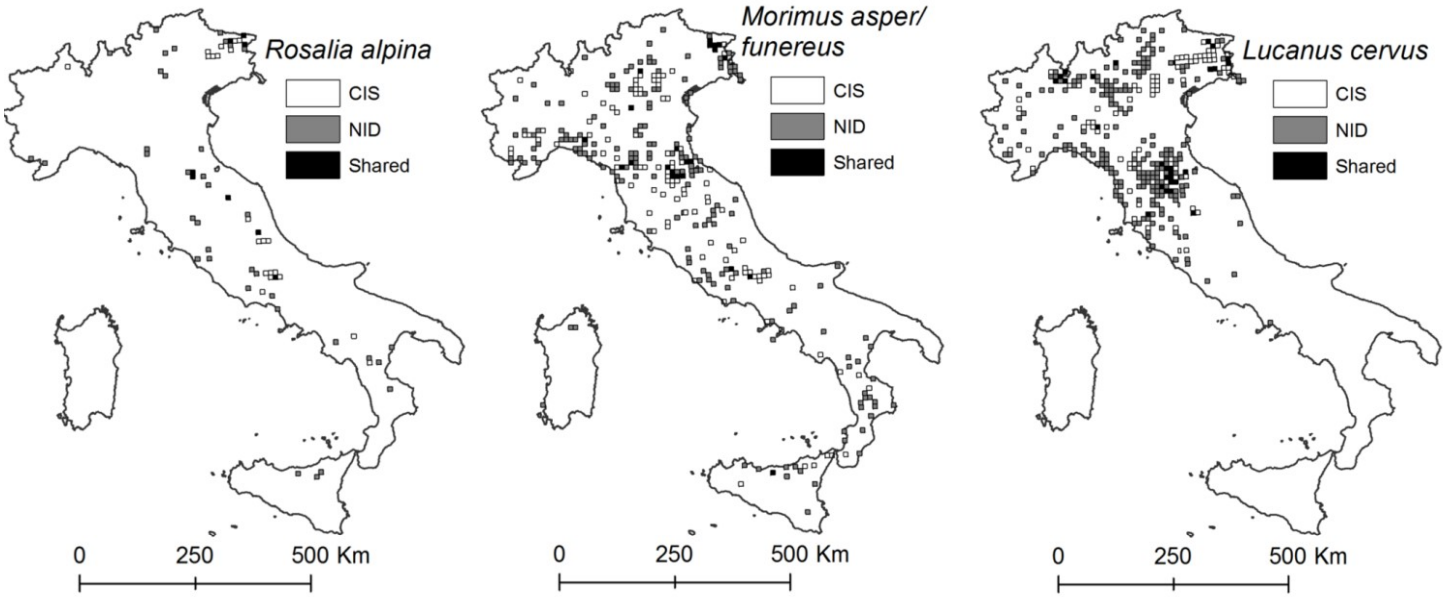
Citizen science data as an efficient tool for mapping protected saproxylic beetles

L. Zapponi [a,b,1], A. Cini [c,d,1], M. Bardiani [b,c], S. Hardersen [b], M. Maura [c,e], E. Maurizi [c,e], L. Redolfi De Zan [b,c], P. Audisio [f], M.A. Bologna [e], G.M. Carpaneto [e], P.F. Roversi [c], G. Sabbatini Peverieri [c], F. Mason [b], A. Campanaro [b,c,*]

We compared distribution obtained using two Italian datasets:

- **Citizes Science Data -** collected during two years (2014-2015) within the MIPP project
- **National Inventory Data -** CkMap, records collected by experts, 2 data frames: 25 years (1979-2003) and 10 years (1994-2003)

Results: species range



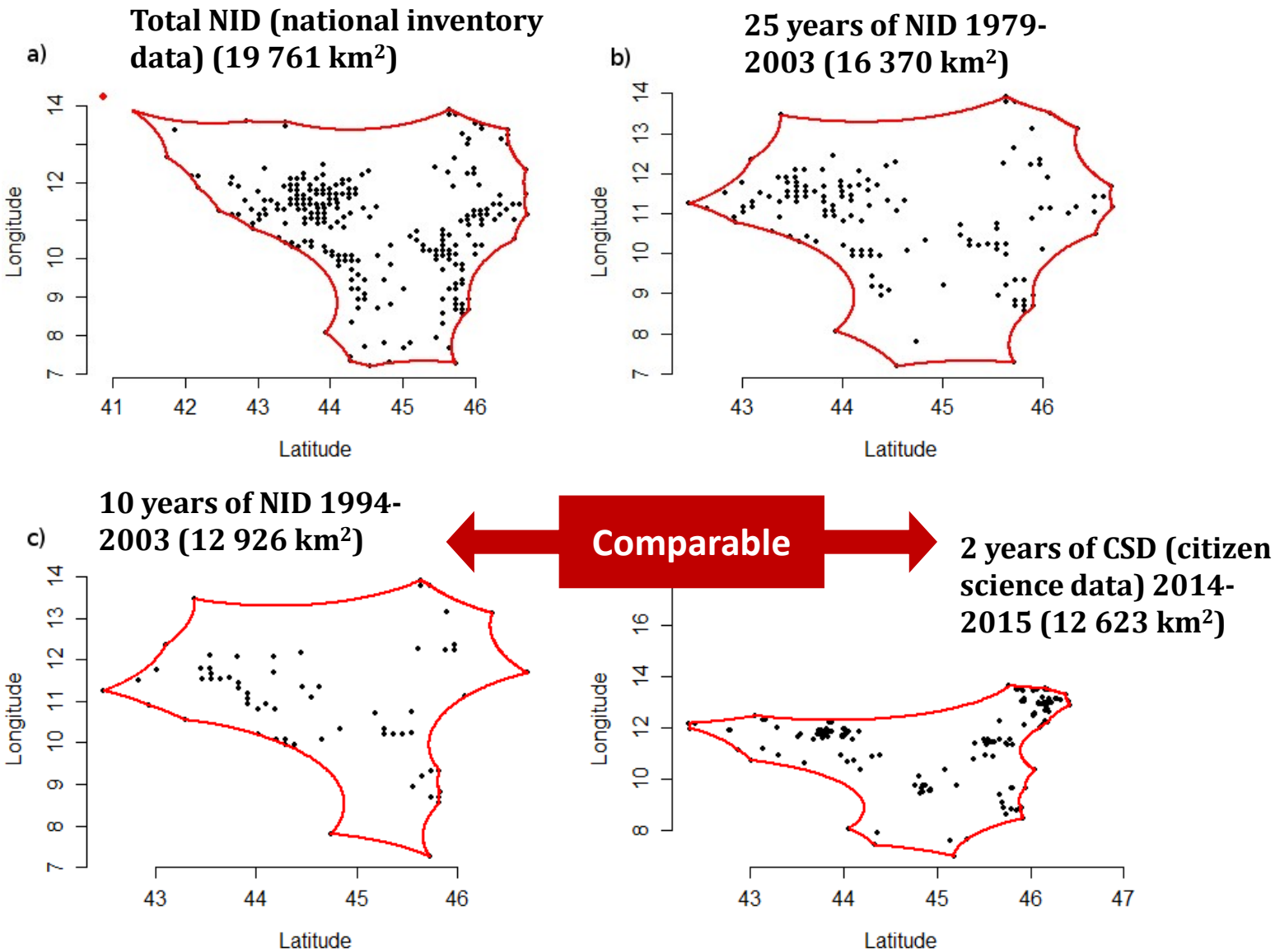
Low overlap of occupied cells/ a considerable increase in the number of cells

	CSD	NID	Shared	Range expansion
Lucanus	147	218	8%	24%
Morimus	139	202	9%	36%
Rosalia	31	47	15%	31%

The dataset obtained in two years by citizens resulted in an **increase of the distributional ranges** of three beetle species, compared to a national inventory provided by experts

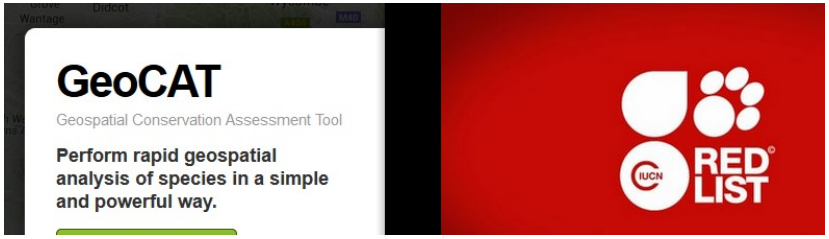
Results: area occupied by *Lucanus cervus*

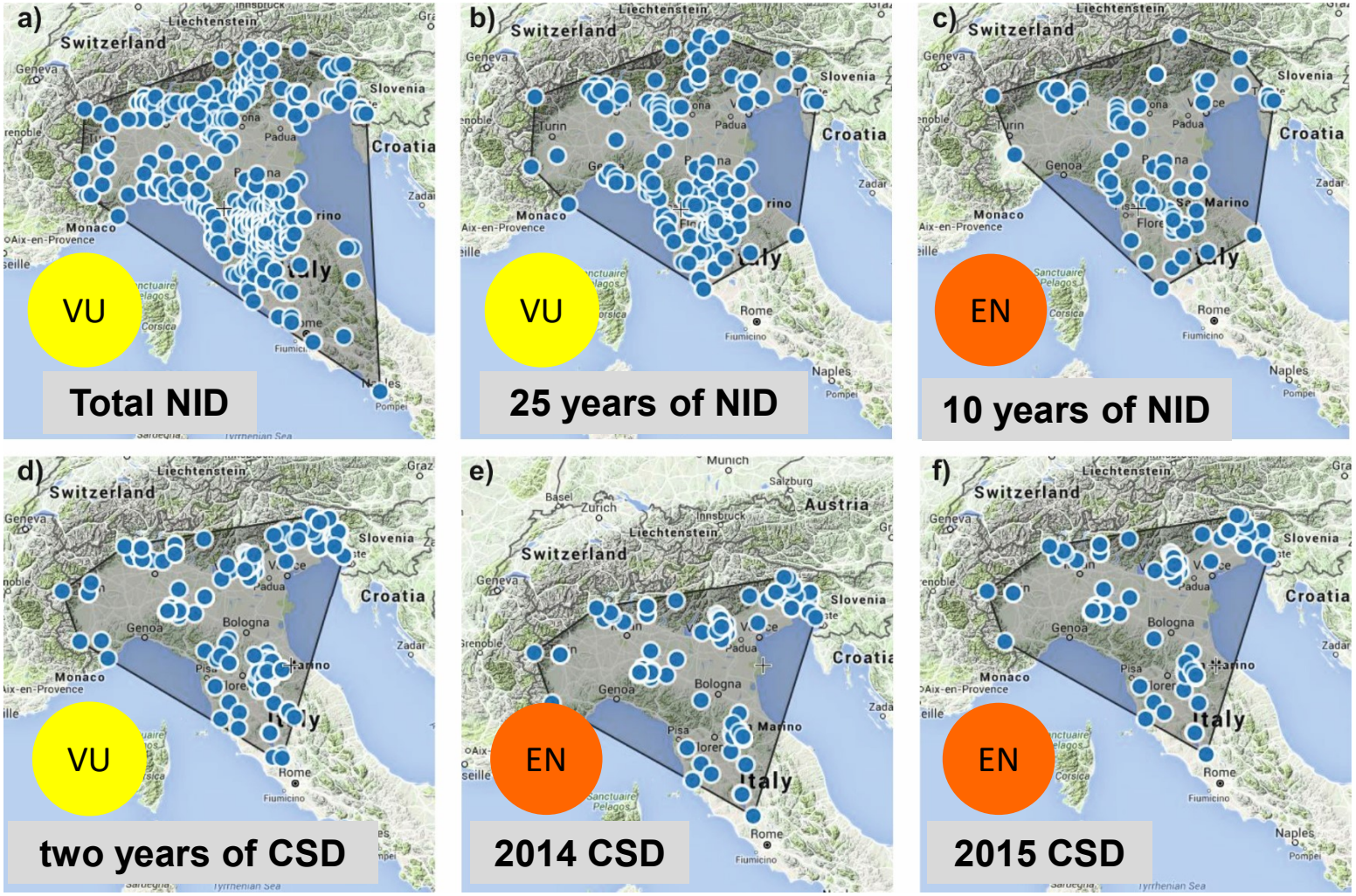
Estimate the area occupied with α-hulls (exclude discontinuities within a range)



Extent of occurrence (EEO)

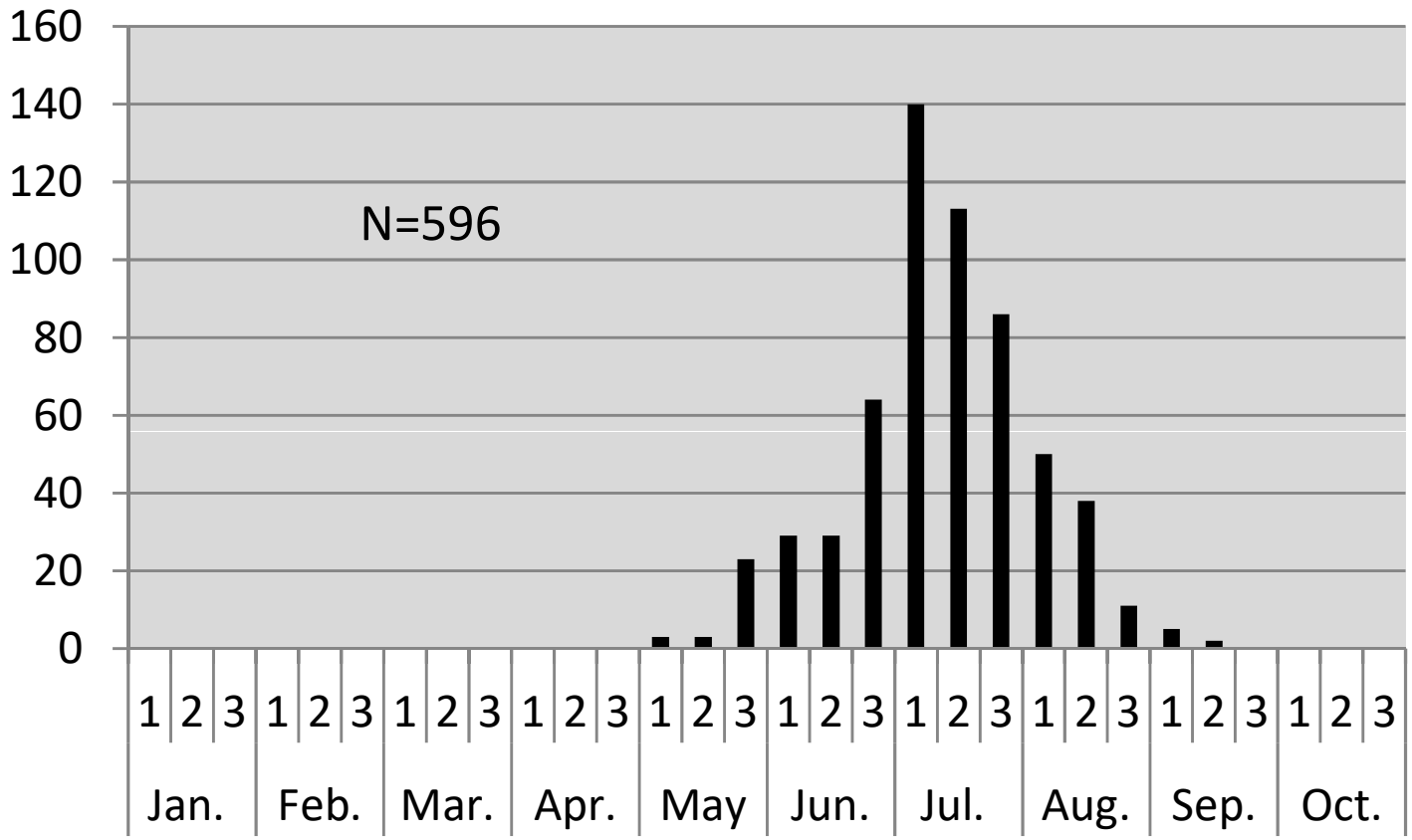
Derive the extent of occurrence (EOO) and area of occupancy (AOO), measures on which the criterion B of the IUCN assessment is based





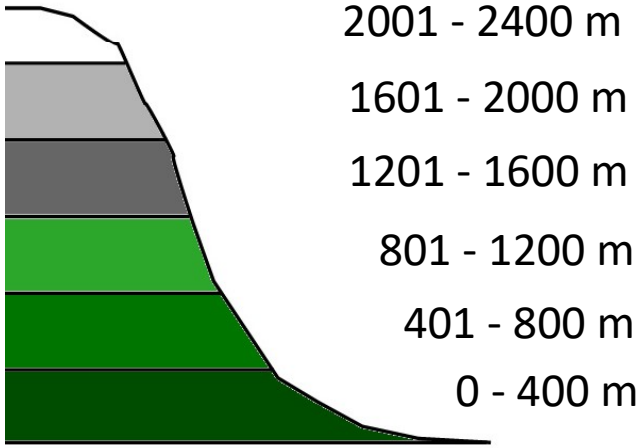
CASE STUDY: Phenology of *Lucanus cervus*

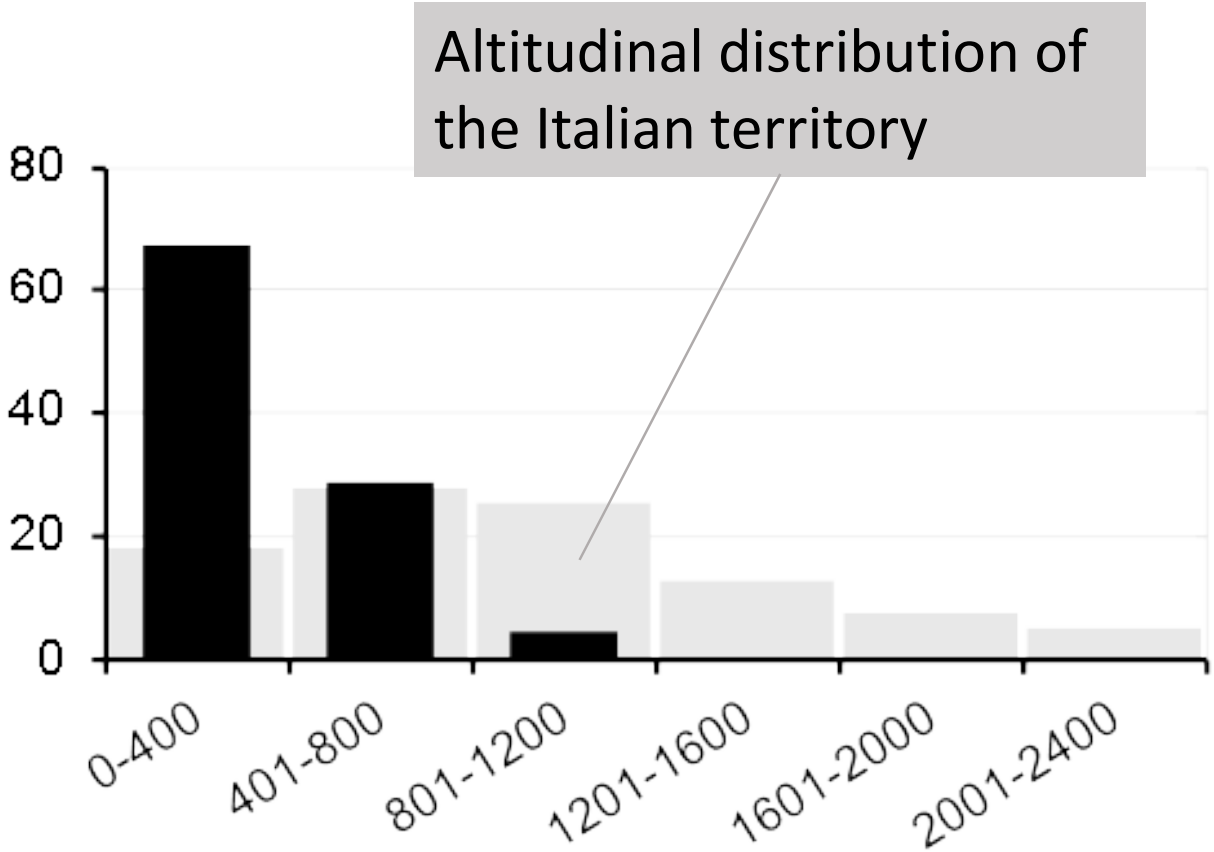
Citizen Science data are also useful to investigate phenology



CASE STUDY:
Altitudinal distribution of *Lucanus cervus*

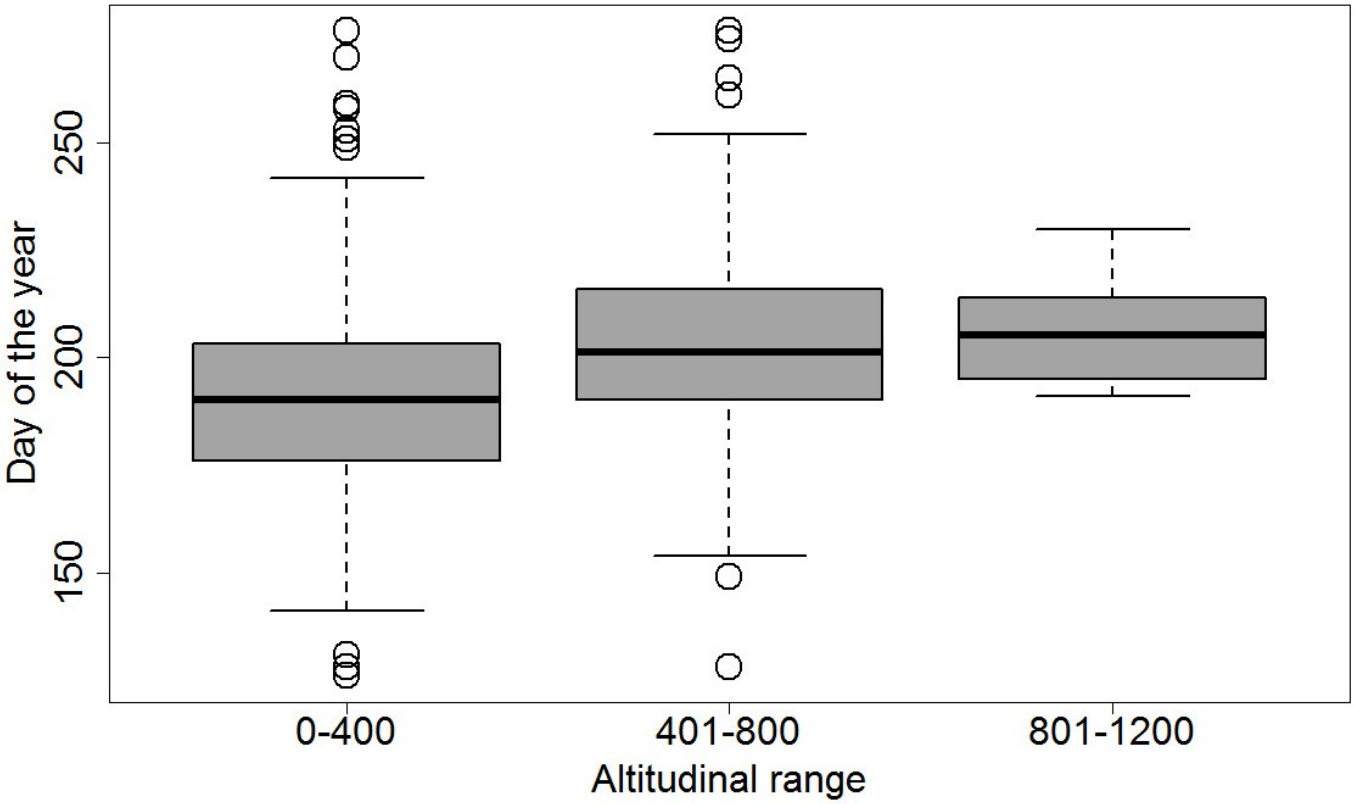
Citizen Science data are also useful to investigate the altitudinal distribution





Phenology of *Lucanus cervus* at different altitudes

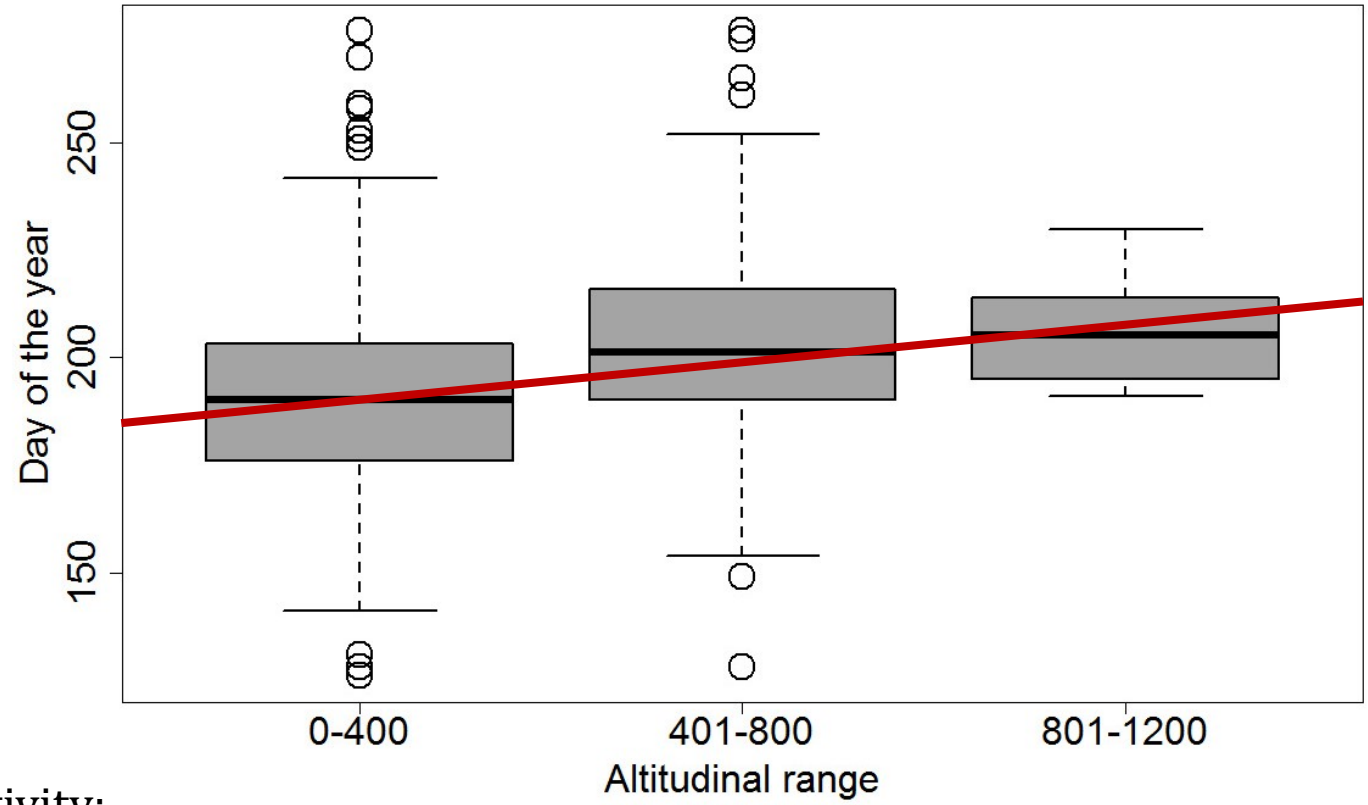
Can Citizen Science data be used to investigate changes in phenology with increasing altitude?



Phenology of *Lucanus cervus* at different altitudes

Can Citizen Science data be used to investigate changes in phenology with increasing altitude?

Two processes – 1: delayed phenology

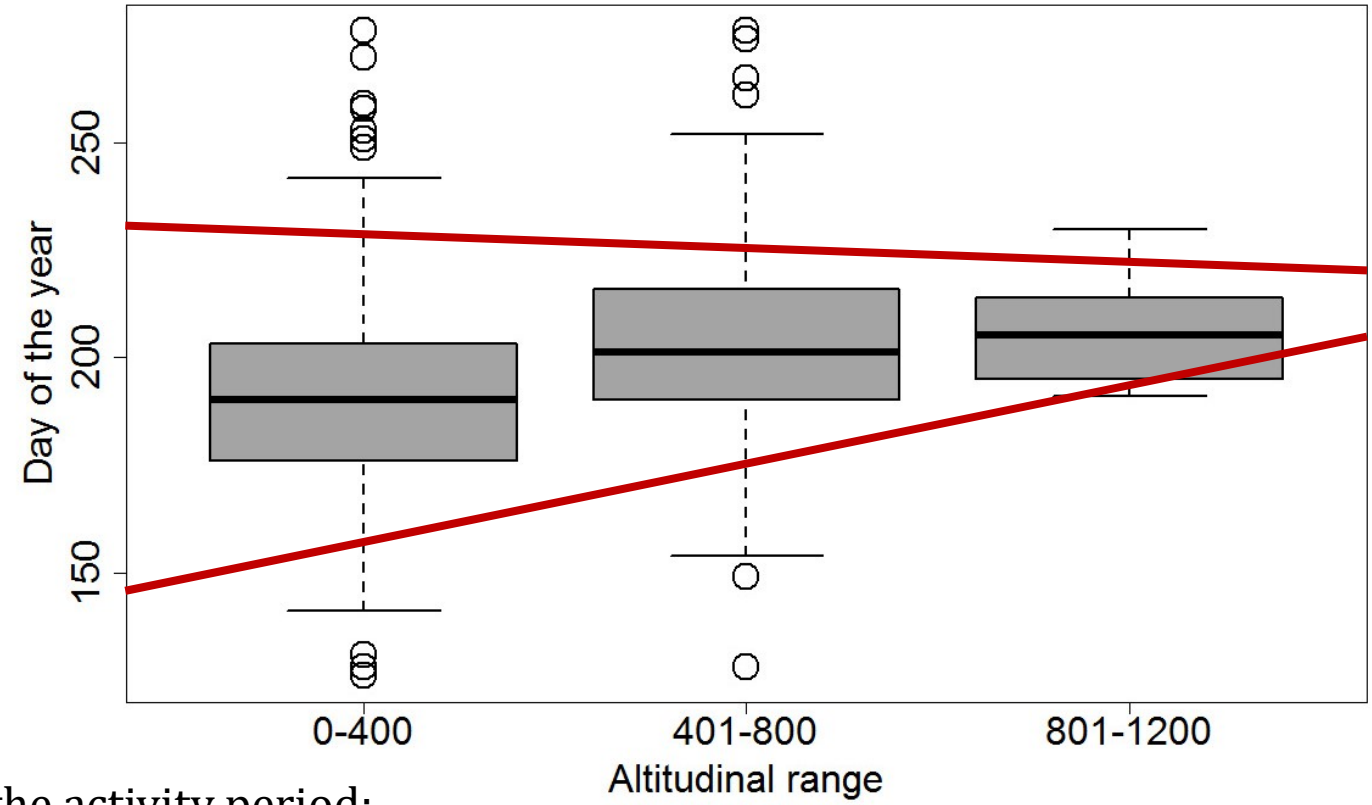


Peak of activity:
09 July, altitudinal range: (0-400 m)
20 July (401-800 m)
24 July(801-1,200 m)

Phenology of *Lucanus cervus* at different altitudes

Can Citizen Science data be used to investigate changes in phenology with increasing altitude?

Two processes – 2: shortened phenology



Length of the activity period:
27 days at 0-400 m
26 days at 401-800 m
19 days at 801-1,200 m

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Stefano, CFS San Godenzo, Charles, checco, chiandet, Chiara, Chiara Giraudo, Chiara L., chiara moretti, Chiara zorzetto, chiarag86, ChondroCasteddu , chopper, Christian Gervasoni, CiakNatura, ciliegia, cirucci, classe II B Scuola Primaria Turoldo Tolmezzo, Claudia, Claudio berselli, Claudio Cagnan, claudio necci, Claudio Nieddu, Cocci Marco, coleottero , Cooperativa In Quiete - Foreste Casentinesi, Corrado Zanini, Cosimo, cosmin latan, Costantino, cristian.1977, Cristiana Cocciufa, Cristiana Merli, Cristina, Cristina Lamana Sanz, Cristina Martellotti, Cutone Luciano, Cuzziol Simone, daghalfio, dagonet, Damianvalerio Barca, daniel parkour, Daniela, Daniela Frattura, Daniele Birtele, Daniele Di Santo, Daniele Nasci, Daniele Salvi, DaniGP, Dario Cancian, dav, David GuixÃ©, davide, Davide Mosetti, Davide Scaccini, davideboz, Debora Pelosi, Denise, Destroyer99, detta, Dianne Poulin, Diego Giacomuzzi, Diego Lunardi, Dilkia, Dino Caliaro, domenico, Domenico vinci, Domenico Vitale, dusky&checco, E.Cavallini, edo, Eduardo Quarta, Edy, efisio cabula, El Griso, Elena, Elena Lupoli, Elena vigano, eli mordasini, Eliaferro, elipela, Elisa, Elisa Mangolini, elisa leger, Elisa Torretta, Elisabetta, Elvire, Emanuela, emanuela c., emanuela vanda, Emanuele, emanuele lucioli, Emilia, Emilio, Emilio Acone, Emma Minari, Enrico, Enrico Busato, Enrico Dolgan, enrico.fr, Eraldo Bocca, Ermes Fuzzi, Eugenio Ferrari , F.D.S., fabiana, Fabio, Fabio Cianferoni, Fabio Garzuglia, Fabio Marconcini, Fabio Mastropasqua, fabio romiti, FabioMinati, fabrichris, Fabrizio, Fabrizio Bulgarini, Fausto Leandri, Fede, Federica, Federica Candelato, Federica Valli, Federico, Federico Romiti, federico80, federicocastellano, Felice Puopolo, ferrogt, Ferron Giancarlo, Filippo La Civita, Fioretto Mauro, Flavio, Flavio Marzialetti, -FRA'-, FraMars, France, Francesca, Francesca Galli, francesca graziani, Francesca Mattei, Francesca Tantalo, francesca26, francesco, Francesco Boldrin, francesco cancellieri, Francesco Chiappetta, Francesco e Edoardo Pozzi, Francesco Ferreri, francesco iacoella, francesco maria sabatini, Francesco Paoli, Francesco Pilat, francesco rossi, Francesco Tortorici, franco, franco amata, FraPinUTBCZ, frignano, Fulvio Fraticelli, Fulvio Tolazzi, Gabriele, Gabriele Bano, Gabriele Cristiani, gabriele oddi, Gabriele Semboloni, gabriele senczuk, Gabriella Marconi, Gabrio Alberini, gaetano lombardo, gaia.marani, genzano2014, germano, Germano Commessatti, Germano Ferrando, Gessica, Giacomo Bruni, Giacomo Galli, Giampiero Tirone, Giampio D'Amico, Gian Luca Tonelli, Gianantonio Governatori, Giancarlodidio, gianluca bonavigo, Gianluca Doremi, Gianluca Governatori, Gianluca Marchi, gianluca scaglioni, Gianni Ciabattini, Gianni De Marco, Gianni De Marco 2, Gil, Gilli, ginger, Gino, giomatLTER, giorgia , Giorgiangela , Giorgio, Giorgio de Simon, Giorgio Mariottini, Giorgio Venturini, giosue08, Giovanna Misiano, Giovanna Saija, Giovanni , Giovanni Bettacchioli, Giovanni Degrati, Giovanni Magno, Giovanni Corbino, Giulia Albani Rocchetti, Giulia Assogna, Giulia Leonarduzzi, Giulia Ricciardi, giuliaflowers, GiuliaLuzi, giuliana, Giulio, Giulio Picchi, Giuseppe Cillis, Giuseppe Cosenza, Giuseppe Martino, Giuseppe Parenti, Giuseppe Saba, GiuseppeVolta, grazia salvadori, Graziana Talamonti, Gregory, guernica, Guglielmotti M. 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crea
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Cerambyx cerdo

forma delle elitre ristretta piuttosto bruscamente verso l'apice

Cerambyx welensii
(= *C. velutinus*)

fine pubescenza

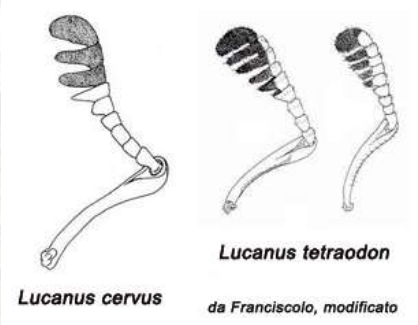
Cerambyx miles

senza dentino all'angolo suturale

Cerambyx scopolii

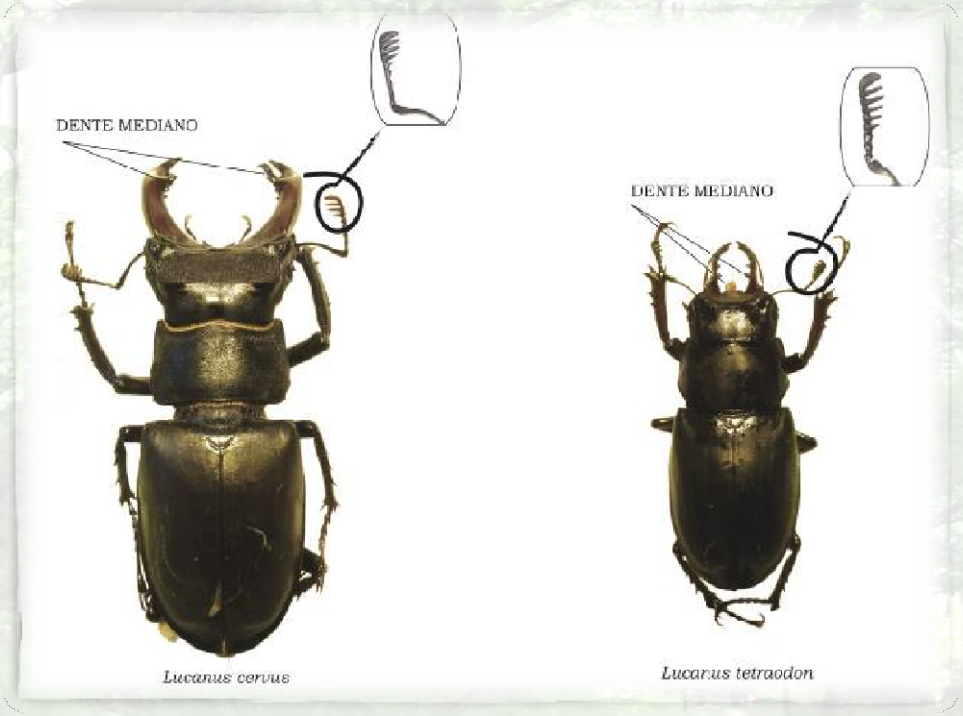
dimensioni ridotte

Lucanus tetraodon



Lucanus cervus

Dorcus parallelipipedus



Gnorimus variabilis

Osmoderma eremita

Valgus hemipterus

Netocia morio

Il processo di validazione

Ogni specie ha un **referente** al quale vengono inviate le segnalazioni

Tasso di rifiuto = 15-20%

SPECIE SIMILI

SPECIE DIVERSE

Direttiva 92/43/CEE
per la conservazione degli habitat naturali e seminaturali e della flora e della fauna Selvatica