



European Workshop

Monitoring of saproxylic beetles and other insects protected in the European Union

24th - 26th May 2017 | Mantova - ITALY

PROGRAMME & ABSTRACT BOOK





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COVER FIGURES

Clockwise from top: *Morimus asper/funereus* [Photo by Archivio CNBF] | *Rosalia alpina* [by P. Buonpane] | *Cerambyx cerdo* [by P. Niolu] | *Osmoderma eremita* [Photo by A. Campanaro] | *Osmodog and the handler* [Photo by S. Hardersen] | *Lucanus cervus* [by F. Lemma]



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9.30 **Check-in and Welcome Breakfast**

10.00 **Opening and introduction to the Project**
Project manager F. Mason and other authorities

10:30 **Introduction to *Lucanus cervus* - M. Méndez**

10:55 **Monitoring of *L. cervus* - M. Bardiani**

11:20 **Introduction to *Morimus asper/funereus* - A. Vrezec**

11:45 **Monitoring of *M. asper/funereus* - S. Hardersen**

12:10 **Introduction to *Cerambyx cerdo* - J. Buse**

12:35 **Monitoring of *C. cerdo* - L. Redolfi De Zan**

13.00 **LUNCH AT LEISURE**

14:30 **Introduction to *Rosalia alpina* - L. Čížek**

14:55 **Monitoring of *R. alpina* - A. Campanaro**

SESSION I

Open to external contribution

Chair M. A. Bologna

15:20 **Detection of stag beetle oviposition sites by combining telemetry and emergence traps - M. Tini**

15:35 **Latitudinal cline in weapon allometry and phenology of the European stag beetle - D. Scaccini**

15:50 **COFFEE BREAK**

16:20 **Attraction of different types of wood for adults of *Morimus asper* (Coleoptera, Cerambycidae) - G. Leonarduzzi**

16:35 **Inventorying and monitoring *Cucujus cinnaberinus* in the Netherlands - J. Noordijk**

16:50 **New Italian records of *Lichenophanes varius* (Illiger, 1801) (Coleoptera, Bostrichidae) - G. Nardi**

17:05 **First applications of the monitoring methodology of *Coenagrion mercuriale castellanii* in the Life Eremita Project in Emilia-Romagna region - R. Fabbri**



PROGRAMME

25th May, Thursday

SESSION II

Open to external contribution

Chair S. Hardersen

- 9:00 Inventory of *Osmoderma eremita* and *Cucujus cinnaberinus* in Lithuania - *D. Bastyté*
- 9:15 Spatial analysis of the habitat and distribution of *Osmoderma eremita* (Scop.) in trees outside of woodlands - *B. Dodelin*
- 9:30 Evidence for bottlenecks and population substructuring of the East European Hermit beetle (*Osmoderma barnabita*) - *M. Landvik*
- 9:45 Conservation project “Hermit beetle” (*Osmoderma eremita*) in southern Styria (Austria) - *G. Sauseng*
- 10:00 The saproxylic ant *Liometopum microcephalum* - endangered and requiring monitoring across its distribution area - *J. Schlaghamerský*
- 10:15 *Cucujus cinnaberinus* (Scopoli 1763) at its terra typica in Slovenia: historical overview, distribution patterns and habitat selection - *A. Vrezec*

10:30

COFFEE BREAK

SESSION III

Open to external contribution

Chair A. Campanaro

- 11:00 Genetic variation in small, Polish edge populations of the great capricorn beetle (*Cerambyx cerdo* Linnaeus, 1758) based on microsatellite analysis - *M. Przewoźny*
- 11:15 Protection of the largest Great Capricorn (*Cerambyx cerdo*) metapopulation in Brandenburg (Germany) - *J. Stegner*
- 11:30 Monitoring and management of *Cerambyx cerdo* in the Mediterranean region – a review and the potential role of citizen science - *P. Casula*
- 11:45 AISA - Applied Index of Saproxylic Activity – A new tool to monitor the activity of saproxylic invertebrates in forest ecosystems - *J. G. Soutinho*
- 12:00 Characterization of the saproxylic communities of a fir and a Turkey oak forest in Central Italy: faunistic and conservation insights - *F. Parisi*
- 12:15 Bus transfer to the Nature Reserve “Bosco Fontana”
- 13:00 Presentation of the Reserve and of the management plan - *V. Andriani*



13:30 **LUNCH AT BOSCO FONTANA**

14:30 **Visit to the Gonzaga Hunting Lodge - L. Sala**

15:00 **Field demonstrations of the monitoring methods developed within the LIFE MIPP Project**

17:30 **Bus transfer to Mantova**

26th May, Friday

09:00 **Life MIPP: the Citizen Science - A. Campanaro**

09:25 **Introduction to *Osmoderma eremita* - M. Larsson**

09:50 **Life MIPP: monitoring *O. eremita* - M. Maura**

10:15 **Life MIPP: a “conservation detection dog” for *O. eremita* - F. Mosconi**

10:40 **COFFEE BREAK**

SESSION IV

Open to external contribution

Chair P. Audisio

11:00 **Can we successfully monitor population density decline of elusive invertebrates? A statistical power analysis on *Lucanus cervus* - A. Thomas**

11:15 **Natura 2000 beetles (Coleoptera) in Croatia: overview and additions to the list - B. Lauš & M. Zadravec**

11:30 **Patterns of distribution and landscape connectivity of the stag beetle in a human-dominated landscape - F. Della Rocca**

11:45 **Monitoring of saproxylic beetles in Croatia: following a path of stag beetle - L. Katušić**

12:00 **FAGUS Project: innovative silvicultural treatments, structural heterogeneity and biodiversity in the Apennine beech. The point of view of saproxylic beetles - F. Parisi**

12:15 **The role of monumental trees for the preservation of saproxylic biodiversity: re-thinking their management in cultural landscapes - L. Zapponi**

12:30 **Could tree-related microhabitats be relevant conservation forestry targets and/or biodiversity indicators?- L. Larrieu**



PROGRAMME

26th May, Friday

12:45 **Increasing biodiversity at La Mandria natural park (North-West Italy) by managing veteran trees and forests for public use - G. Rezza**

13:00 **LUNCH AT LEISURE** and Picture of the Group

SPECIAL SESSION

LIFE Projects for invertebrates

Chair A. Salsi

14:30 **Introduction - A. Salsi**

14:45 **Invited Project - LIFE European Red Lists - K. Alexander**

15:05 **Invited Project - LIFE EREMITA - M. Palazzini**

15:25 **Invited Project - LIFE BTG - C. Greiff-Andersson**

15:45 **Invited Project - LIFE IP GESTIRE 2020 - G. Bonalume**

16:05 **Discussion**

16:35 **Round-table on future threats and opportunities**





ABSTRACTS



INTRODUCTION TO *LUCANUS CERVUS*

AUTHOR

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ABSTRACT

I provide an overview of the knowledge accumulated about *Lucanus cervus* from 1900 to the present times, with emphasis in basic ecology and biology. Two main phases can be distinguished: (1) the “natural history” phase covers almost the whole XX century, and (2) the “quantitative ecology” phase, starting approximately at the turn of the century. Two aspects of the biology of *L. cervus* have been traditionally studied in the natural history phase: adult phenology and sexual dimorphism. The quantitative ecology phase has provided additional insights into these traditional topics and added new areas of interest, such as dispersal ability and habitat selection. Major gaps in current knowledge are larval demography and landscape ecology. Advances in population genetics and monitoring offer good opportunities to fill these gaps. In particular, monitoring programs are needed to establish long term studies of abundance and phenology.

GUIDELINES FOR THE MONITORING OF *LUCANUS CERVUS*

AUTHORS

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ABSTRACT

Lucanus cervus is one of the most charismatic saproxylic beetles, widely distributed in Europe. The species is typical of mature deciduous forest, especially oak woodlands. Loss and fragmentation of suitable habitats is one of the major threats for this species, included in the Annexes II of the Habitats Directive. Despite several studies carried out in the last years for the monitoring of the species, an analytical comparison between them is still lacking.

The aim of this paper is i) to review the current knowledge about systematics, ecology and conservation practices on *L. cervus*, ii) to present the research carried out during the Life MIPP project, in order to define a standard monitoring method, with a quick protocol, useful to answer the obligations of the Habitats Directive. Overall, five methods were tested during three years in two different study areas. Based on these results, a suitable standard method for *L. cervus* is here proposed, followed by a discussion about constraints, spatial validity and possible interferences. Finally, in order to assess the conservation status of populations and to compare them over time, a method for the calculation of a reference value, based on the monitoring method, is provided.





INTRODUCTION TO *MORIMUS ASPER*/*MORIMUS FUNEREUS*: OVERVIEW OF KNOWLEDGE ON SPECIES ECOLOGY WITH EMPHASIS TO THE STUDIES IN SLOVENIA

AUTHOR

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ABSTRACT

The cerambycid *Morimus funereus* (Mulsant 1862) is a saproxylic beetle species included to EU Habitat Directive for which Natura 2000 sites are declared and monitoring should be established. However, the species ecology was less studied, but not species physiology. In the genus *Morimus* several taxa were described due to quite distinct morphological differences and till recently mainly two species were considered with several subspecies: *Morimus asper* (Sulzer 1776) and *M. funereus*. Recent molecular studies however suggested that described taxa within genus *Morimus* actually represent one morphologically and genetically very variable species (Solano et al. 2013), and according to priority rule in zoological nomenclature this would be *Morimus asper* according to the description of Sulzer (1776). The species was however known to sciences before by Scopoli (1763), who described it as a variant of *Lamia textor* (referring to *M. funereus*). Nevertheless, the taxonomic revision considering morphological and molecular data is still lacking, and traditional taxonomic differentiation of the genus *Morimus* is thus still valid. This is important in the light of EU Habitat Directive which considers as species of European conservation concern only *M. funereus* distributed in E and SE Europe, but not *M. asper* distributed also in SW Europe. Taxonomic clarification thus opens an important nature conservation questions in Europe. The species *M. asper/funereus* is a polyphagous flightless large-sized beetle typical for lowland and montane forests. Recent studies revealed that it is mainly nocturnal and crepuscular beetle attracted to freshly cut wood and stumps, where it also lay eggs. The adults can be active from January till October (with peak of activity between May and June), and can hibernate with two years of life-span. Although the species is considered as polyphagous found on deciduous as well as coniferous trees it still show some preferences to host trees like *Sambucus*, *Juglans*, *Quercus*, *Alnus*, *Populus*, *Tilia* and *Abies*, but not *Fagus* or *Picea*. The species was found to be quite tolerant to altitude and was found from sea level up to 1600 m asl, but majority of finds were from 400 to 800 m asl. Otherwise the species inhabits quite large array of different forest habitats. The monitoring methods development are currently focused to the aggregation habit of the beetle at freshly cut wood using daytime surveys or traps, while the development of advanced and more efficient methods using pheromones or other semiochemicals are still awaiting new research.



GUIDELINES FOR THE MONITORING OF *MORIMUS ASPER FUNEREUS* AND *M. ASPER ASPER*

AUTHORS

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ABSTRACT

Morimus asper is a morphologically variable longhorn beetle that occurs in large parts of southern and central Europe. This saproxylic beetle is widespread in old-growth forests or well-structured woodlands and its populations are currently threatened by forest practices, such as the removal of wood (branches and logs). *M. funereus* had been considered a valid species by some authors and was included in Annex II of the Habitats Directive. However, a recent molecular study found that all European and Turkish populations should be referred to a single species, *M. asper*. Here we review the monitoring methods proposed for *M. asper* (sensu lato), in the various European countries, and present the research carried out during the Life MIPP project, which was aimed at developing guidelines for its monitoring. The experiments conducted, mainly with log piles built from freshly cut wood, investigated, amongst other things, the importance of wood type, diameter of logs and age of wood, for the number of individuals observed. Based on our results and on a literature review, a detailed monitoring method for *M. asper* is here proposed, together with a discussion on its constraints, spatial validity and possible interferences. In order to facilitate the assessment of the conservation status of populations of *M. asper* and to allow for comparisons between populations and over time, a method for the calculation of a reference value, based on the monitoring method, is also presented.

KEYWORDS

Habitats Directive, saproxylic beetles, Coleoptera, Cerambycidae, monitoring methods, forest biodiversity





THE GREAT CAPRICORN *CERAMBYX CERDO* IN EUROPE

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ABSTRACT

With a body length of up to 55 mm, *Cerambyx cerdo* is one of the largest European longhorn beetles living in Europe. The great capricorn is an endangered beetle listed in the European Union's Habitats Directive and it has suffered a dramatic decline in the number of populations and in population sizes over the last century, particularly in Central Europe. European Union member states must take appropriate steps to avoid the deterioration of habitats of the great capricorn beetle as well as any significant disturbance. Member states shall also take positive measures to conserve and, if necessary, restore the species to a favourable conservation status. I'm going to present an overview of knowledge regarding habitat requirements, its spatial distribution and dispersal capacity. For any assessment of the conservation status of the great capricorn it is crucial to make reliable estimates of population size. This is largely done by counting the emergence holes in colonized trees, but this method is problematic when other *Cerambyx* species of the same body size occur at the same trees. New promising approaches have been developed and tested within the MIPP project.



GUIDELINES FOR THE MONITORING OF *CERAMBYX CERDO*

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ABSTRACT

Cerambyx cerdo is a longhorn beetle widely distributed in southern and central Europe. This saproxylic beetle is generally associated with oak forests with the presence of mature or partially dead and sun exposed trees. Its populations are currently threatened by forest practices such as the removal of partially dead trees and the decline of the number of old oak trees situated in open or semi-open landscapes. Thus, *C. cerdo* was included in the Annexes II and IV of the Habitats Directive. The present paper is part of a special issue on monitoring of saproxylic beetles protected in Europe, based on the research carried out during the LIFE-MIPP project, with a revision of the current knowledge on systematics, ecology and conservation of *C. cerdo*. The main aim of the present paper is testing different monitoring methods in order to develop a quick and repeatable protocol for the conservation of this species. The methods tested were: artificial sap attracting the adults, baited traps, VES (visual encounter survey) and collecting remains of predation along transects. Based on our results, a detailed monitoring method for *C. cerdo* using baited trap is here proposed, together with a discussion on its constraints, spatial validity and possible interferences. In order to assess the conservation status of populations of *C. cerdo* in Europe, and to compare populations over time, a method for the calculation of a reference value, based on the monitoring method, is provided.





WELL KNOWN OR UNKNOWN? WHAT DO WE KNOW ABOUT *ROSALIA ALPINA* VICTIM OR PERPETRATOR OF MYTHS SURROUNDING ITS BIOLOGY

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ABSTRACT

There are few insect species as popular and strictly protected as *R. alpina* in Europe. Despite the steady increase in number of studies focusing on the beetle in recent years, *R. alpina* still successfully defies our efforts to characterise its biology.

While considered a montane, highly threatened species, the beetle happily expanded into some European lowlands, and continuously inhabited others. Considered a beech specialist, its populations eagerly exploited numerous tree species sometimes thousands of kilometres away from the beech distribution range. Considered a relict species, its population genetic structure is homogenous over vast distances. Considered notoriously sun-loving species, adults of *R. alpina* carefully avoid direct sun and the species profits from expansion of closed canopy forest.

Available information on *R. alpina* biology often seems misleading and confusing. The species accounts tend to stubbornly repeat information originating from “grey” sources and often rather mirror expectations and prejudices of individual authors, than available information based on quantitative data. The beetle itself, however, might be the main perpetrator of this confusion. We show that owing to its high ecological plasticity combined with certain strict requirements, virtually anything written about the species might be true or false, depending on habitat and region studied. Effective strategies for its conservation hence need to consider its local as well as its universal habitat requirements.



GUIDELINES FOR THE MONITORING OF *ROSALIA ALPINA*

AUTHORS

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ABSTRACT

Rosalia alpina (Linnaeus, 1758), is a large longhorn beetle (Coleoptera: Cerambycidae), protected by the Habitats Directive, which typically inhabits beech forests characterized by the presence of mature, dead (or moribund) and sun exposed trees. A revision of the current knowledge on systematics, ecology and conservation of *R. alpina* is reported. The research was carried out as part of the LIFE MIPP project which aims to find a standard monitoring method of saproxylic beetles protected in Europe. For monitoring this species, different methods we tested and compared in two areas of the Apennines, utilizing wild trees, logs and tripods (artificially built with beech woods), all potentially suitable for the reproduction of the species. Even if all methods succeeded in the survey of the target species, our results showed that the use of wild trees outperformed other methods. Indeed, the use of wild trees allowed to observe more adults and required less intensive labour. However, monitoring the rosalia longicorn on wild trees has the main disadvantage that they can be hardly considered “standard sampling units”, as each tree may be differently attractive to adults. Our results demonstrated that the most important factors influencing the attractiveness of single trunks were wood volume, sun-exposure and decay stage. Based on the results obtained during the project LIFE MIPP as well as on a literature review, a standard monitoring method for *R. alpina* was developed.



DETECTION OF STAG BEETLE OVIPOSITION SITES BY COMBINING TELEMETRY AND EMERGENCE TRAPS

AUTHORS

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ABSTRACT

The European stag beetle, *Lucanus cervus*, is a flagship species for conservation of old-growth forests, protected under the Habitats Directive. Many aspects of its ecology remain poorly known, in particular parameters limiting the larval development. The objectives of this work were: (1) to explore the feasibility of a scarcely invasive method for detecting oviposition sites; (2) to quantify the number of traps and operators needed for obtaining a number of beetles suitable for statistical analysis; (3) to attempt the characterization of overground ecological parameters recorded in the oviposition sites. In 2014, twelve females were followed by means of radio-telemetry to detect potential oviposition sites in a relict broadleaf forest of northern Italy. In 2015, emergence traps were set in nine sites selected from the 21 sites where females were recorded to dig in the soil near to dead wood during the previous year. Traps were checked in 2015 and 2016 flight seasons. Overall, 15 stag beetles were sampled from five emergence trap sites, therefore upgraded to real oviposition sites. All oviposition sites were characterised in terms of typology of dead wood, tree species, canopy openness, dead wood volume, decomposition stage and wood hardness. Our method (telemetry + emergence traps) gave a substantial aid to find newly emerged beetles. The advantage of the method is its low degree of invasiveness while its drawback is the amount of effort needed. Calculations were made to assess the number of operators and traps needed to gather a number of data suitable for statistical analysis.

KEYWORDS

Emergence traps, radio-telemetry, saproxylic insects, dead wood, oviposition sites

LATITUDINAL CLINE IN WEAPON ALLOMETRY AND PHENOLOGY OF THE EUROPEAN STAG BEETLE

AUTHORS

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ABSTRACT

Animal body size commonly exhibits a remarkable variation in response to environmental conditions. Latitude, when correlated with temperature, rainfall and seasonality, represents one of the main determinants of variation in body size, as well as in allometry. It has long been recognised that populations of larger body size are found in colder environments (Bergmann's Rule), a cornerstone of evolutionary ecology. However, the way in which latitude might influence investment in exaggerated weapons of animals has received little attention. The European stag beetle *Lucanus cervus* (Linnaeus, 1758) is the focus of this study. Males of this species exhibit exaggerated mandibles, mainly used as weapons during intra-sexual conflicts. Five populations ranging from northern Italy to the southern limit of the distribution of *L. cervus* were analysed. Combining morphological and phenological data, latitudinal variation in body size, weapon investment and activity period of the adults were evaluated. The analysis of the allometry of mandibles strongly supported the presence of two male morphs. Large males (major morph) invest significantly more in weapons compared to males of the minor morph. Consistent with Bergmann's Rule, these results confirmed that the stag beetle body size increased at higher latitudes (N) and that this increase in size triggers an arms race which leads to further exaggeration of male weapons which is particularly evident in major males. In this morph, the mandible allometric coefficient line was steeper for the northern populations. The activity period also varied with latitude, beginning later at lower latitudes. Characterisation and comparison of adult phenologies provide valuable data to be used in the design of monitoring programmes for this threatened species and are important for modelling the species responses to climate change.



ATTRACTIVITY OF DIFFERENT TYPES OF WOOD FOR ADULTS OF *MORIMUS ASPER* (COLEOPTERA, CERAMBYCIDAE): TWO CASE STUDIES

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ABSTRACT

Morimus asper reproduces mainly in freshly dead wood and as a consequence, populations suffer modern forestry practices. The taxon *M. funereus*, now incorporated into the species *M. asper*, is protected by the Habitats Directive and its monitoring has received attention in recent years. Larvae of *M. asper* are polyphagous, but some studies indicate that adults prefer the wood of some tree species. Freshly cut log piles, which attract adults, have been proposed as a monitoring tool. For monitoring programs it is essential to select the most appropriate wood and therefore the attractivity of different types of wood for adults of *M. asper* was investigated in two sites in northern Italian, using freshly cut log piles. The first experiment was carried out in the Nature Reserve Bosco della Fontana (a lowland forest, Mantua province), testing two autochthonous species (*Carpinus betulus* and *Fraxinus ornus*) and two allochthonous species (*Juglans nigra* and *Quercus rubra*). The second study was conducted in the Parco Naturale Regionale delle Prealpi Giulie (a mountain area, Udine province), employing *Fagus sylvatica*, *Fraxinus excelsior* and *Picea abies* (all autochthonous species). The population of this area belongs to the taxon formerly named *M. funereus*. In both sites adults clearly preferred the wood of some species: *Juglans nigra* at Bosco della Fontana and *Fagus sylvatica* in the mountain area. These results confirmed that it is important to select tree species which are attractive to *M. asper* for future long term monitoring programs and to use the same tree species every year.

INVENTORYING AND MONITORING *CUCUJUS CINNABERINUS* IN THE NETHERLANDS

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ABSTRACT

Cucujus cinnaberinus – a saproxylic beetle species of the Habitats Directive – was discovered in the Netherlands in 2012. The species has been intensively inventoried in the past years, providing an insight in the specific biotope in this country: moist forests on alluvial soils with recently died deciduous trees, mainly *Populus*. Inventorying this species is problematic, since it usually involves removing the bark of trees to find larvae or adults. This results in serious damage to the biotope. Since *C. cinnaberinus* has to be monitored for reporting on its favourable conservation status, we are examining alternative ways to establish its persistence in established locations without damaging dead trees. Interception traps with acidic acid proved to be not efficient. A pilot study in which fresh poplar stems from elsewhere are brought in the forest seemed effective in providing a way to monitor the species without reducing suitable biotope and will be further examined.





NEW ITALIAN RECORDS OF *LICHENOPHANES VARIUS* (ILLIGER, 1801) (COLEOPTERA, BOSTRICHIDAE)

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ABSTRACT

Lichenophanes varius (Illiger, 1801) is a Turano-European-Mediterranean species. It is protected, at different levels, in most of European countries in which it occurs, and it is classified as “NT” (Near Threatened) in the IUCN European Red List of Saproxylous Beetles, while in Italy, it is classified as “EN” (Endangered). Its larvae are saproxylous and develop in the wood (branks and rotting trunks) of many broadleaved tree genera (*Acer*, *Carpinus*, *Quercus*, etc.). Nevertheless, this beetle seems attack only wood invaded by the mycelia of *Biscogniauxia* spp. (Pyrenomycetes, Xylariaceae). The Italian distribution and ecology of *L. varius* are updated on the basis of recent records, moreover, the authors discuss the possibility that the global warming can promote a resurgence of attacks from the above-mentioned phyto-pathogen fungi in Italian forests, and therefore this climatic change can also favour the populations of this beetle.

KEYWORDS

Bostrichidae, Nature Reserves, faunistic, *Lichenophanes*, conservation



FIRST APPLICATIONS OF THE MONITORING METHODOLOGY OF *COENAGRION MERCURIALE CASTELLANII* IN THE LIFE EREMITA PROJECT IN EMILIA-ROMAGNA REGION

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ABSTRACT

Italian Southern Damselfly *Coenagrion mercuriale castellanii* is extremely rare and threatened in the Emilia-Romagna region (Northern Italy). Currently the species occurs only in two areas: the Marecchia river basin (Rimini province) and the Messinian Gypsum outcrops of the Vena del Gesso romagnola (Ravenna/Bologna province). For the first time in Italy there was the possibility to study the species thanks to the monitoring program of the EREMITA project (LIFE14 NAT/IT/000209), started in 2016 and lasting for five years.

In the Marecchia river basin the capture-mark-recapture (CMR) monitoring method was used on the active adult males. Additionally, physical characteristics of the local habitat were monitored. The species was active from April to the third week of July, much earlier than the period reported in literature, with the maximum activity peak was on 12th May. A total of 1888 adults were observed, including 1812 males (96% of the specimens), and only 76 females. 375 males were marked in different dates, but only 8 males were recaptured. The monitoring will be carried on in the next years of the EREMITA project in order to check whether the population is able to sustain the translocation of some specimens in other regional areas from where the species recently disappeared and where the habitat will be suitable after solving the main environmental threats within the frames of the EREMITA project.

KEYWORDS

Coenagrion mercuriale castellanii, monitoring, Emilia-Romagna region, Life EREMITA.





INVENTORY OF *OSMODERMA EREMITA* AND *CUCUJUS CINNABERINUS* IN LITHUANIA

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ABSTRACT

For the last 10 years *O.eremita* and *C.cinnaberinus* are monitored in Lithuania according to the approved methodologies. The monitoring is implemented once in 3 years in Natura 2000 sites designated for the species. There are 15 Natura 2000 sites designated for *O.eremita*, and 5 Natura 2000 designated for *C.cinnaberinus* in Lithuania. Despite these monitoring efforts in species reports, provided to EU according to the Article 17 of the Habitats Directive, it is defined on the national level, that overall assessment of *O.eremita* is inadequate and future prospects are poor, overall assessment of *C.cinnaberinus* is unknown, future prospects – unknown. Therefore in 2016 inventory of *O. eremita* and *C.cinnaberinus* was started on the national level. 50 areas were chosen to be inventoried for each species (100 areas in total), defining relative abundance of the species in the areas and habitat quality. The areas were chosen so, that they would be equally distributed in the whole area of Lithuania, the species potentially could be found there, the priority was given for the areas outside of Natura 2000 sites. The inventory started autumn 2016 looking for excrements of *O. eremita*, larvae and beetles of *C.cinnaberinus*, assessing their habitats. It will continue in summer 2017 with pheromone traps for *O.eremita*. This inventory will help to answer the questions raised by the Article 17 about overall state and future prospects of these rare and protected saproxylic species in Lithuania.

KEYWORDS

Osmoderma eremita, *Cucujus cinnaberinus*, Lithuania



A SPATIAL ANALYSIS OF THE HABITAT AND DISTRIBUTION OF *OSMODERMA EREMITA* IN TREES OUTSIDE WOODLANDS IN NORMANDY (FRANCE)

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ABSTRACT

Osmoderma eremita is an endangered and obligate saproxylic beetle with strict habitat needs. It occurs mainly in veteran trees, a threatened habitat in Europe, specially in traditional agricultural landscapes. Thereafter, a priority goal is to localise populations, understand the key features of host-trees and protect or manage them efficiently.

The aim of this work is to analyse the data from survey of 8,014 trees (pollarded or in hedgerows) in Normandy (France). Collected informations covered trees species, hollow description, hedgerow length and distance to the nearest tree occupied by *Osmoderma*.

Analysis was conducted at two spatial scales: 250m and 1km². Generalised linear models were used to find key characteristics and to predict area of potential presence of the species.

A cavity suitable for the hermit beetle was found on 61% of the trees. *Osmoderma eremita* was detected in 42 trees, mainly in *Salix* (30 observations). At the 250m scale, a maximum of 19 trees hosting *Osmoderma* has been found. The mean number of host tree is 0.56 per patch for a mean number of tree of 106.31 (75 patches). Largest populations of *Osmoderma* have been found in the larger hollow trees patches. At the 1km² scale, 17 ladders host *Osmoderma*, corresponding to 63km of arbored hedgerow. Upon 3km of hedgerow per km², the presence of *Osmoderma* is significantly higher. This may serve to guide future researches targeting the species and is an important argument for the conservation of hedgerows.





POPULATION SUBSTRUCTURING OF THE HERMIT BEETLE (*OSMODERMA EREMITA SENSU LATO*) IN EAST EUROPE

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ABSTRACT

The hermit beetle (*Osmoderma* sp.) is a flagship taxon in the conservation of old growth broadleaf forests in Europe. The genus includes a cryptic species complex in its European distribution area with species belonging into two wider clades. In this paper we focus on clarifying the genetic relationships of the eastern clade *Osmoderma barnabita* populations, which are distributed from Greece to Finland. We collected hind leg samples (n= 186) for a comparative mitochondrial DNA analysis from Latvia (Pededze valley) and Finland (Turku region). As a supplementary material (n= 10), we used recently collected East European museum specimens together with previously published GenBank data. In total we found 26 closely related haplotypes in mitochondrial cytochrome c oxidase subunit I gene. The abundantly sampled single East Latvian population (n= 89) comprised 18 different haplotypes, while only one unique haplotype was detected from the northernmost European population in Finland (n= 97). Our results suggest occurrence of one dominant mtDNA COI haplotype in the northern parts of the East Europe, to which most of the other haplotypes are linked by one or two mutations. Such development is likely to come about after bottleneck effect of the ancient population, with later occurred expansion of related subpopulations. While *O. barnabita* is widely distributed over Eastern Europe, the species appears structured as distinct subpopulations, with patterns of genetic diversity influenced by population history and little homogenization by ongoing gene flow. From a conservation perspective, the patterns uncovered suggest that regional populations should be managed as separate subunits.

KEYWORDS

Osmoderma barnabita, subpopulations, demographic history, mtDNA, COI



CONSERVATION PROJECT „HERMIT BEETLE“ (*OSMODERMA EREMITA*) IN SOUTHERN STYRIA (AUSTRIA)

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ABSTRACT

The hermit beetle, *Osmoderma eremita* s. l. (Col., Scarabaeidae) is under increasing extinction risk due to progressive habitat fragmentation with loss of suitable hollow trees for breeding. Within agricultural areas, the beetle preferably inhabits meadows with scattered old fruit trees. The aims of this project are the identification of *Osmoderma*-habitats in cooperation with landowners and to raise public awareness and participation. Conservation of confirmed habitats is supported by direct “tree bonus” payments by the federal province Styria/Austria, as well as funding for conservation of meadows within the Natura 2000 program or for biotope conservation itself.

In the first project year, we investigated 70 sites in the region of southern Styria, mostly meadows with scattered old fruit trees, parks, willow alleys, and single tree monuments. The hermit beetle was detected in 15 trees in 9 different locations, increasing the total number of locations with *O. eremita* confirmations in Styria to 30. Confirmations were achieved by findings of living larvae, typical scat pellets, chitin fragments of beetle. The searches were assisted by detection dogs trained for *O. eremita* („Austrian Osmodog“). Contracts for conservation measures for a total of 7 trees were made with 5 farmers.

Project funding is provided by LE14-20 program of the Federal Province Styria and the European Union.

KEYWORDS

Osmoderma eremita, conservation, detection, “Osmodog”





THE SAPROXYLIC ANT *LIOMETOPUM MICROCEPHALUM* – ENDANGERED AND REQUIRING MONITORING ACROSS ITS DISTRIBUTION AREA

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ABSTRACT

Liometopum microcephalum is a saproxylic ant, building nests in old trees, mostly oaks. Colonies are large, aggressive, and have a strong (but poorly studied) impact on the invertebrate community. Several arthropods are closely associated with the species. Its distribution is Pontomediterranean, ranging from Italy in the west to the Russian Lower Volga and western Iran in the east. Populations are mostly isolated, due to severe fragmentation of suitable habitat. The species is thermophilic and, particularly in the north, mostly restricted to alluvial lowland forests. A recent phylogeographic study shows high genetic diversification, the ancient character of the populations in the Levant, late colonization of the Apennine Peninsula, and survival during the last glaciations in two to three extra-Mediterranean refugia. The species is red-listed for several countries or regions, but hardly any focused conservation measures have been taken. In SE Czechia, at the northwestern border of its range, there is a big population of ca 900 colonies that has been inventoried in 2002-2004 and monitored since then (though not intensively). Logging, the decline of old trees in meadows and removal of old trees in parks present risks. No other population of comparable size is known. In many countries only few colonies at a few sites have survived. In others (e.g. Italy) the actual situation is unclear as most records are 50-100 years old. The mapping and further monitoring of colonies across the species' range would be highly desirable for assessing its situation and promoting its protection.

KEYWORDS

Formicidae, veteran trees, *Quercus*, arboricolous



***CUCUJUS CINNABERINUS* (SCOPOLI 1763) AT ITS TERRA TYPICA IN SLOVENIA: HISTORICAL OVERVIEW, DISTRIBUTION PATTERNS AND HABITAT SELECTION**

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ABSTRACT

The beetle *Cucujus cinnaberinus* is one of the saproxylic species, for which research intensity in Europe was greatly intensified in recent years after its designation as qualification species within Natura 2000 network. We have investigated the history of the species and influence of abiotic and biotic variables on the distribution of *C. cinnaberinus* at the edge of its range in Slovenia, which is also *terra typica* for the species. The species was first described by Joannes A. Scopoli in 1763 from Carniola, duchy within Habsburg Monarchy. Today most of Carniolian territory is situated within Slovenia, where *C. cinnaberinus* is particularly common in Eastern part, but very scarce at the Western part of the country. The Scopoli's type specimen most probably originated from the provinces Carniolia Inferior or Media, today in SE part of Slovenia, since no historical or recent data on *C. cinnaberinus* exists from other parts of former Duchy of Carniola. The bulk of the species population in Slovenia is confined to lowlands, between 100 and 300 m a.s.l., but the species was found up to over 1200 m a.s.l. with relatively high frequency of occurrence in dead tree trunks in montane forests between 700 and 1100 m a.s.l. At macrohabitat scale beside altitude important habitat parameters defining species distribution were also the amount of deciduous trees and deadwood mass in forest stands. For the larval habitat, the species preferred deciduous trees, native (e.g. *Tilia*, *Populus*, *Acer*) as well as non-native (*Robinia*), while higher occupation rate was recorded in thicker and longer tree trunks. The species was found also in coniferous trees (*Abies*), but those are mostly avoided.



GENETIC VARIATION IN SMALL, POLISH EDGE POPULATIONS OF THE GREAT CAPRICORN BEETLE (*CERAMBYX CERDO* LINNAEUS, 1758) BASED ON MICROSATELLITE ANALYSIS

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ABSTRACT

The great capricorn beetle (*Cerambyx cerdo*) is distributed from northern Africa to central Europe, where becomes much more scattered and forms isolated populations, and up to the Caucasus region and northern Iran. This is an obligate saproxylic beetle occurring mainly on different oak species (e.g., *Quercus robur* and *Q. petraea*). This species is protected by Polish law under the “Special Protection” category (1952). The objectives of this work were to: identify a new set of polymorphic microsatellite markers and test their efficiency to detect polymorphism, and using SSR markers characterized by the highest Polymorphism Information Content (PIC) values, to assess the genetic variability in small, isolated populations of *C. cerdo* from southern and central Poland. A new set of SSR markers was developed from an enriched genomic library of repeated sequences, using biotinylated oligonucleotide sequences bound to streptavidin-coated magnetic beads. Fifteen the 5'-biotinylated sequences were used as probes. To assess the genetic variability in Polish populations a survey of microsatellite markers already available and the new set of SSR markers was performed. Genetic drift and very limited gene flow is found to be important in determining the genetic variability in the analyzed populations. The developed SSR markers showed the potential to evaluate random processes and population isolation at the edge of species range.

KEYWORDS

Cerambyx cerdo, genetic variation, microsatellite analysis, Poland

PROTECTION OF THE LARGEST GREAT CAPRICORN (*CERAMBYX CERDO*) METAPOPOPULATION IN BRANDENBURG (GERMANY)

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ABSTRACT

The Great Capricorn (*Cerambyx cerdo*) is a highly endangered species in Germany. In Federal State of Brandenburg, the Capricorn was almost completely investigated last years, which significantly improved the level of knowledge of distribution. Currently there are 79 metapopulations in 33 occurrences in Brandenburg with approximately 3,700 breeding trees. The most important occurrence area with >1,800 known breeding trees in 9 metapopulations is located in the Baruth Glacial Valley southern Berlin.

The highest amount of currently settled trees was recently found at the avenues along country roads. In tree-lined streets and villages, the populations of the Great Capricorn are threatened because of the cutting of trees which results dangerous for human safety. It is expected, that these populations will collapse in the coming decades.

In forests of the nature preserve "Schöbendorfer Busch" (SCI DE 3946-301), the number of settled trees has declined considerably in the past 20 years due to planting of ecologically less valuable and more shading tree species and loss of diverse of age structure. New management strategies of these forests intends to adapt guidelines consistently to the ecological requirements of *Cerambyx* (also *Osmoderma* and *Lucanus*). The aim is to allow a shift of the metapopulation centers from country roads into the forest in the next decades.

Key measures will be: transformation of pine forests into oak forests; promotion of common oaks in more open forests; creating a more balanced age structure of oaks and artificial tree maturation programme as interim measure to bridge existing gaps in tree age structure.

KEYWORDS

Cerambyx cerdo, metapopulation, protection, management, Germany





MONITORING GREAT CAPRICORN BEETLES IN MEDITERRANEAN FORESTS: A PRACTITIONER'S PERSPECTIVE

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ABSTRACT

Cerambyx cerdo and Mediterranean oak habitats (*Quercus ilex* and *Quercus suber*) are protected by Habitat Directive. However, these habitats are also widely used for wood and cork production in many areas of the Mediterranean basin. The beetle feeds into the wood of trees, and can be perceived by practitioners as an umbrella species (conservational biologists) or as a pest (forest practitioners). Given this double perception, monitoring programs involving forest practitioners could focus on assessing: a) conservation status of species and habitats (distribution and abundance of insects, of reproductive sites, and of related habitat structures, such as holes, snags, damaged trees); b) eventual pest status and effects on the forest production; c) management options to achieve both conservational and economical benefits. A simple monitoring scheme based on transects and visual counts was developed to assess distribution and relative abundance of beetles in relation to habitat structures in different management scenarios of the Sardinian sclerophyllous oak forests. Considering that in these ecosystems little is known about species habitat requirements and effects of land management, we evaluate whether: a) coppice with standards, b) conversion to high forest, c) dehesas, d) no management (open vs. dense old growth woodlands), affect the density of adult insects and its habitat. Preliminary data suggest that adult beetles and habitat structures are generally rare, but issues of detectability need to be addressed. As habitat structure should be monitored to assess favourable habitat conditions, this monitoring scheme can be complementary to methods more focussed on detecting and identifying insects.

KEYWORDS

Citizen science, habitat conservation, ecological structures, monitoring, species conservation.



AISA- APPLIED INDEX OF SAPROXYLIC ACTIVITY – A NEW TOOL TO MONITOR THE ACTIVITY OF SAPROXYLIC INVERTEBRATES IN FOREST ECOSYSTEMS

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ABSTRACT

Saproxylic invertebrates are organisms that depend on deadwood in a moment of their life cycle and are one of the most diverse groups in forest ecosystems. Saproxylic organisms help to provide several fundamental services that keep forests healthy such as the recycling of organic matter and carbon sequestration.

Species that live inside deadwood leave emergence holes when they exit it. Those bore holes can be easily counted and used to assess saproxylic activity in a certain area, allowing to indirectly estimate the weight of saproxylic organisms on forest ecosystem services.

In this work we present an easy comparative tool to monitor saproxylic activity in forests – the **Applied Index of Saproxylic Activity**.

Our main results show that saproxylic activity varies with habitat and tree genus. The decomposition stage and the volume of surrounding deadwood positively affects the saproxylic activity in a tree stand. Also, large trees show less activity than small ones, despite being the favourite habitat for large saproxylic species. *Quercus* sp. dead trees have a significantly higher role on the conservation of the saproxylic invertebrates when compared with *Pinus* sp..

Although further data is needed, AISA appears to be a good method to monitor saproxylic activity. The continued sampling throughout more seasons and future sampling refinements will allow to better demonstrate the utility of this method.



CHARACTERIZATION OF THE SAPROXYLIC COMMUNITIES OF A FIR AND A TURKEY OAK FOREST IN CENTRAL ITALY: FAUNISTIC AND CONSERVATION INSIGHTS

AUTHORS

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ABSTRACT

We present the results of the analysis of beetle assemblage in two forests of the region of Molise (Central Italy): a fir and a Turkey oak forest. The surveys were conducted in the years 2012 and 2013 (Abeti Soprani), 2014 and 2015 (Bosco Pennataro) with particular attention to the saproxylic communities, by the use of 50 window interception traps and 50 emergence traps on a wooded area of approximately 230 ha by location. Overall, in four years of monitoring, we have been collected 8.614 individuals belonging to 324 species and 47 different families of beetles. Analyzing the species in both studied sites showed that 35.7% of the taxa are not included in the red list IUCN. In detail, the CR and DD categories meet the 2% of the species; the LC protection class has 79.2% of the taxa; 11.5% are beetles included in the NT and 7.3% appear to be vulnerable (VU). In the last group are: *Hapalaraea pygmaea* (Paykull, 1800) and *Quedius truncicola* Fairmaire & Laboulbène, 1856 (Staphylinidae), *Calambus bipustulatus* (Linnaeus, 1767) and *Stenagostus rhombeus* (Olivier, 1790) (Elateridae), *Eurythyrea austriaca* (Linnaeus, 1767) (Buprestidae), *Trichoceble floralis floralis* (Olivier 1790) (Melyridae) and *Glischrochilus quadriguttatus* (Fabricius, 1776) (Nitidulidae). The results indicate the need, for both the studied sites, of specific conservation actions to protect can play a particularly important role in the conservation of saproxylics beetles and, more generally, of forest environments in Italy.

KEYWORDS

Saproxylic communities, Central Italy, Conservation

ANALYSES OF OCCURRENCE DATA OF PROTECTED INSECT SPECIES COLLECTED BY CITIZENS IN ITALY

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ABSTRACT

Citizen science, which means that scientists and the public work together for a scientific purpose, has grown rapidly in recent years, also for mapping of species of conservation interest. The Life project “Monitoring Insects with Public Participation” (MIPP) actively promoted the collaboration among scientists, public administrations and citizens in the collection of occurrence data of nine insect species listed in the Habitats Directive: *Lucanus cervus*, *Osmoderma eremita*, *Cerambyx cerdo*, *Rosalia alpina*, *Morimus asper/funereus*, *Lopinga achine*, *Parnassius apollo*, *Zerynthia cassandra/polyxena* and *Saga pedo*. These species were selected because they share two main characteristics: (i) they are listed in the Annexes II and IV of the Habitats Directive, (ii) they are large and relatively easy to identify. From 2014 to 2016 many different strategies were applied to contact and engage the public and approximately 14,000 citizens were reached directly. Additionally, printed and on-line material informed the public on this project. Citizens could transmit data on the target species, accompanied by a photograph, via the web-site of the project or through a dedicated application for smart phones and tablets. All records were validated by experts based on the pictures sent by citizens. A total number of 2,308 records were transmitted and 1,691 of these were confirmed. The species most commonly recorded was *L. cervus*, followed by *M. asper/funereus* and *R. alpina*. Data collected by citizen scientist allowed a detailed analysis on altitudinal distribution and phenology of the species.





INTRODUCTION TO *OSMODERMA EREMITA*

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ABSTRACT

The hermit beetle *Osmoderma eremita* and its congeners represent an icon in saproxylic beetle conservaton. Its early adoption as a protected species in the Habitats Directive has spawned many studies to understand aspects of *Osmoderma* biology that are essential for their conservation. For a saproxylic insect, *Osmoderma* beetles are relatively amenable to surveys of high precision, with a strong association to tree hollows where they can be monitored based on fragments and fecal pellets as well as pitfall traps. Migrating individuals can also be monitored with traps baited with the characteristic *Osmoderma* pheromone, further increasing the probability of detecting local populations. Based on systematic surveys their habitat preferences and crucial habitat resources have been studied, including different types of tree hollows, tree species, and stand characteristics. Mark-recapture studies have characterized their population sizes and population dynamics. In more Northern parts of Europe *Osmoderma* are characterized by local metapopulation dynamics centered around individual trees, whereas in the Mediterranean the association to individual trees appears much weaker. With additional aid of radio telemetry, studies of their dispersal biology have revealed their limited dispersal capacity, constituting a long-term threat in an increasingly fragmented landscape. Information about *Osmoderma* conservaton biology from the last few decades reveals that *Osmoderma* beetles are indeed an excellent choice as symbols for the habitat of old, hollow trees. *Osmoderma* spp constitute good indicators for tree localities with high conservation value in the form of long continuity and a comparatively rich fauna of saproxylic insects associated with hollow trees.



GUIDELINES FOR THE MONITORING OF *OSMODERMA EREMITA* (SCOPOLI, 1763) AND CLOSELY RELATED SPECIES (COLEOPTERA: SCARABAEIDAE: CETONIINAE)

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ABSTRACT

Osmoderma eremita is a saproxylic scarab beetle protected by the Habitats Directive in the European Union. A revision of the current knowledge on systematics, ecology, ethology and conservation of *O. eremita* and its allied species is provided. In addition, two methods for monitoring *O. eremita* populations in several localities of central Italy were experimentally tested: (1) the widely used pitfall traps placed inside the tree cavities, and (2) the black cross windows traps baited with a specific pheromone produced by males. The first method, often used in northern and central Europe, did not give acceptable results in Italy probably because of the scarcity of veteran trees with large hollows. It could be used successfully only in areas where: 1) tree hollows are abundant, enough large and full of wood mould for planting a pitfall trap; 2) the team is composed by several operators in order to ensure the checking of at least 150 traps every two days during the whole period of mating activities (15 July-25 August). The second method, consisting in hanging 30 black cross window traps to trees in suitable habitats during the mating period and checking them every two days, resulted to be the best method for capturing a significant number of individuals, although it cannot be used every year because of possible disturbances on mating activities of the species. Based on these results, a suitable standard method for *O. eremita* is proposed and a discussion about constraints, spatial validity and possible interference is provided.





A TRAINED DOG FOR THE MONITORING OF *OSMODERMA EREMITA*

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ABSTRACT

One aim of the MIPP Project (www.lifemipp.eu) was to develop non-invasive monitoring methods for selected saproxylic beetles. Here we propose a method for monitoring the larvae of *Osmoderma eremita* in their natural habitat, hollow trees, using a conservation detection dog (CDD). Wood mould sampling (WMS), the standard method to detect hermit beetle and other saproxylic insects inside tree hollows, is time consuming and exposes the target species, and the whole saproxylic communities, to some risks. In contrast, CDDs are of no risk to the species living inside trees while at the same time offering a powerful tool for surveying the insects. Here the methods applied to train the dog are presented, together with the results for accuracy (the overall proportion of correct indications), sensitivity (the proportion of correct positive indications) and specificity (the proportion of correct negative indications) obtained once the CDD had been fully trained. These results are presented for nitrocellulose filters with the odour of the target species, for larvae living inside hollow trees, and for frass and remains of adults. We also present a comparison of the efficiency between the CDD and WMS and we show that employing the dog is less time consuming than WMS.

We also review the literature on training CDDs for nature conservation tasks, with particular references to cases involving Coleoptera.

KEYWORDS

Conservation detection dog, *Osmoderma eremita*, saproxylic beetles, Habitats Directive, monitoring methods, conservation biology



CAN WE SUCCESSFULLY MONITOR POPULATION DENSITY DECLINE OF ELUSIVE INVERTEBRATES? A STATISTICAL POWER ANALYSIS ON *LUCANUS CERVUS*

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ABSTRACT

Monitoring global biodiversity is essential for understanding and countering its current loss. However, monitoring of many species is hindered by their difficult detection due to crepuscular activity, hidden part of the life cycle and short activity period. Few power analyses of declining trends have been published for terrestrial invertebrates. Consequently, it is impossible to evaluate the possibility of monitoring elusive invertebrates. Here we use data from monitoring transects of the European stag beetle, *Lucanus cervus*, to investigate whether the population trend of this elusive species can be adequately monitored. Data from studies in UK, Switzerland and Germany were compiled to parameterize a simulation model explaining the stag beetle abundance as a function of temperature and seasonality. Using a Monte-Carlo simulation we evaluate the effort needed to detect a population abundance decline of 1%/year or stronger over a period of 12 years. We show that 90 transects need to be monitored at least three times per season in weekly intervals during warm evenings. If the peak abundance period can be successfully predicted, transect walks can be reduced to two by concentrating them in this period. We conclude that monitoring stag beetles is feasible and effort is comparable to other species. Based on this example, we assume that many other elusive species with similar life history traits can be monitored with moderate efforts. As saproxylic invertebrates account for a large share of the forest biodiversity but many are elusive, we propose that at least some flagship species are included in monitoring programmes.

KEYWORDS

Lucanus cervus, Natura 2000 monitoring, elusive saproxylic beetles, Monte-Carlo simulation, population decline





NATURA 2000 BEETLES (COLEOPTERA) IN CROATIA: OVERVIEW AND ADDITIONS TO THE LIST

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ABSTRACT

After becoming a member of the European Union in 2013, Croatia has proclaimed the ecological network (Natura 2000) in its territory. So far ten species of beetles from the Annexes of the Habitats Directive have been recognized for the country and incorporated into relevant legislation, including two priority species(*), and three species marked as “scientific reserve” (**) for which no Special Protection Areas (SPAs) are yet assigned: *Graphoderus bilineatus*, *Leptodirus hochenwartii*, *Lucanus cervus*, *Carabus variolosus*, *Cerambyx cerdo*, *Morimus funereus*, *Rosalia alpina**, *Osmoderma eremita**, **, *Rhysodes sulcatus*** and *Cucujus cinnaberinus***. Examining the available historical literature records, as well as museum collections, it became apparent that all previous overviews of Natura 2000 Coleoptera species in Croatia were incomplete, and at least four additional species need to be added to the list: *Phryganophilus ruficollis**, *Dytiscus latissimus*, *Bolbelasmus unicornis* and *Limoniscus violaceus*. While *B. unicornis* was recently reconfirmed in Croatia, for the remaining three species adequate and targeted surveys are needed in order to confirm their current occurrence and status. Possibly, additional species present in neighbouring countries (e.g. *Pilemia tigrina*), may be recorded in Croatia in the near future with more systematic field surveys aimed to the least surveyed regions of the country.

KEYWORDS

Natura 2000, Coleoptera, beetles, species list, Croatia



PATTERNS OF DISTRIBUTION AND LANDSCAPE CONNECTIVITY OF THE STAG BEETLE IN A HUMAN-DOMINATED LANDSCAPE

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ABSTRACT

Urbanization and the spread of agriculture have resulted in high levels of forest loss, habitat fragmentation and degradation in many regions of the world. In Italy, the Po Plain is the most human-dominated landscape of the country and after decades of exploitations, old-growth forests are reduced to small and isolated patches, often threatened also by invasive tree species such as the black locust (*Robinia pseudoacacia*). In these habitats, the occurrence of many forest-dependent species is related to the quality and availability of suitable areas as well as the connectivity between the remaining forested patches.

Thus, we applied recently developed species distribution models, namely Ensemble of Small Models (ESMs), to identify areas of occurrence of a rare and endangered saproxylic beetle species, *Lucanus cervus*. We used the inverse of the resulting distribution map as resistance maps to estimate landscape connectivity for this species.

The ESMs showed high predictive accuracy and the derived ecological corridors let us identify important areas during dispersal of the target species. Moreover, response curves showed that the both the probability of presence and landscape connectivity increased as the percentage of both native and invasive forests did, as well as habitat diversity, while decreased as human settlements and disturbance increased.

Concluding, stag beetles can persist in a human dominated landscape only if forest patches occur, including black locust trees. We confirmed the predictive accuracy of ESMs in modelling rare species distributions, and we showed how they can be applied to identify ecological corridors to promote species conservation.

KEYWORDS

Circuitscape, *invasive species*, *Lucanus cervus*, *Robinia pseudoacacia*, *Species Distribution Models*.





MONITORING OF SAPROXYLIC BEETLES IN CROATIA: FOLLOWING A PATH OF STAG BEETLE

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ABSTRACT

As a member of the European Union, Croatia has to report on conservation status of around 220 animal non-bird species listed on the annexes of the Habitats Directive, for which purpose monitoring system is being established. Concerning saproxylic beetles, Croatia has to report on conservation status of seven species present on its territory: *Lucanus cervus*, *Cerambyx cerdo*, *Morimus funereus*, *Rhysodes sulcatus*, *Cucujus cinnaberinus*, *Rosalia alpina* and *Osmoderma eremita complex*. Out of these species, monitoring programme has been established only for *Lucanus cervus*, which partially includes participation of non-experts. In 2015 and 2016 public campaign was organized in order to collect observations of saproxylic beetles easily recognizable to public: *Lucanus cervus*, *Morimus funereus* and *Rosalia alpina*. Data gathered through this campaign serve as an addition to the mapping activities and monitoring of the species' range. So far, more than 650 citizen observations were collected, providing data on species presence in 216 10x10 km grid cells intended for reporting on species' range. Besides public campaign, since 2014, public institutions for managing nature protected values have been involved in population monitoring, for which they received education through several workshops. Altogether 15 transects have been established for monitoring of stag beetles so far, and visited every year. Besides results yielded on standard transects, we will discuss data collected by live tree traps and during tree trunk survey at night together with some additional observations. By now eight public institutions have been involved in stag beetle population monitoring but the number is continuously increasing.



FAGUS PROJECT: INNOVATIVE SILVICULTURAL TREATMENTS, STRUCTURAL HETEROGENEITY AND BIODIVERSITY IN THE APENNINE BEECH. THE POINT OF VIEW OF SAPROXYLIC BEETLES

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ABSTRACT

Ecosystems are extremely complex, and an adequate knowledge of the whole biodiversity spectrum is hardly achievable. Forest management practices are primary drivers of diversity and may enhance or decrease forest biodiversity according to the applied measures. In this study, we focused on six semi-natural pure beech (*Fagus sylvatica* L.) forests located in the Apennines, within two Italian National Parks.

It was analyzed species richness of five groups of forest-dwelling organisms (beetles, saproxylic and epigeous fungi, birds and epiphytic lichens).

We tested the short-term effects of alternative thinning methods on the saproxylic beetles diversity and abundance. They were sampled before and after the implementation of silvicultural practices, on a total area of 700 ha, where also the structural forest features and deadwood amounts were recorded. The silvicultural interventions applied were the following: (1) creation of gaps of different size, (2) selection cutting to favour multi-cohort structures and (3) artificial increase of deadwood. Forest-dwelling beetles were sampled using window flight traps and ectors on deadwood. As a result, we observed a significant increase in the number of saproxylic beetles (specimens and species) monitored, especially where the forest structure was highly diversified and deadwood was present.

We observed various specimens of *Rosalia alpina* (Linnaeus, 1758), *Morimus asper* Sulzer, 1776, *Leptura aurulenta* (Fabricius, 1793), *Dicerca alni* (Fischer, 1824) and *Lucanus tetraodon* Thunberg, 1806.

Our findings provided a better knowledge of the short-term effects of silvicultural treatments aimed to increase biodiversity, providing a valid contribution to conjugate forest production and biodiversity conservation in montane beech forests.

KEYWORDS

Apennines, structural heterogeneity, saproxylic beetles



THE ROLE OF MONUMENTAL TREES FOR THE PRESERVATION OF FOREST BIODIVERSITY

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ABSTRACT

Italy is implementing a new list of remarkable senescent trees (i.e. monumental trees). To unify the process at the national scale, the Law n.10 14/01/2013 and Ministerial Decree 23/10/2014 established that Municipalities have to make surveys and assess the status of monumental trees, according to predefined protocols. There are seven criteria that should be met, alternatively or in conjunction, to be included. Trees are designated according to their value in relation to: age and size, shape, botanic rarity, architecture, landscape, historic-cultural-religious aspects and ecological attributes. The targets of the census are single trees and tree lines, shrubs with a remarkable development, belonging to both native and allochthonous species.

The census is still ongoing and the provisional list includes more than a thousand trees. The vast majority of the included trees belong to 5 genera: *Quercus*, *Larix*, *Cedrus*, *Fagus* and *Platanus* and are unevenly distributed in the territory. The most common criterion used to designate trees is the one related to size and shape. The inclusion of the ecological value represents a novelty, compared with previous similar surveys. It focuses on animal species that live in the trees, considering their rarity, conservation status (included in the Habitats Directive and/or Red Lists) and thus, it aims at the preservation of saproxylic species and other animals strictly dependent on the availability of tree microhabitats. Compared to the other criteria, preserving a tree for its ecological role requires a profound cultural shift, recognising the value of microhabitats, structures that have historically been considered defects and managed accordingly.

KEYWORDS

Deadwood, microhabitat, saproxylic, senescent tree.



COULD TREE-RELATED MICROHABITATS BE RELEVANT FOREST BIODIVERSITY INDICATORS?

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ABSTRACT

Over the last decades, the conservation of forest taxa has been increasingly tackled by the development of biodiversity-friendly forestry practices. Such practices may focus on the retention of key structures such as microhabitat-bearing trees. Tree-related microhabitats (TreMs), such as cavities or wood-decaying fungi are widely recognized as key features for associated specialist taxa which require their particular substrate or microclimatic conditions. At the stand scale, TreMs contribute to increase the structural heterogeneity which is in turn expected to favor biodiversity. TreMs have therefore been suggested as indirect biodiversity indicators or conservation targets.

From the compilation of available results, we infer that the relationship between TreMs and local biodiversity is strongly influenced by the forest context, the target taxon or the stand openness. Only a few studies have provided practical benchmarks, such as the minimum density of TreM-bearing trees to be retained by forest managers in production forests. We also point out that the strength of the biodiversity-TreMs relationship is affected by the identity of the response (i.e. overall diversity vs diversity of TreM-associated taxa) or the predictive variable (i.e. TreM density vs diversity), and also by both the TreM and taxon sampling methods.





INCREASING BIODIVERSITY AT LA MANDRIA NATURAL PARK (NORTH-WEST ITALY) BY MANAGING VETERAN TREES AND FORESTS FOR PUBLIC USE

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ABSTRACT

La Mandria natural park (SIC IT1110079) preserves one of the last and largest lowland forests (*Quercus-carpinetum*) in Northern Italy. Over 1,000 hectares are public forest and, since 1976, they have been managed in order to allow tree aging, particularly where native species such as *Quercus robur* are present. Forest aging involves the increase of deadwood amount and big trees, both hosting a rich biodiversity. About a fifth of all the registered species within the park are in some way connected to decayed and dead wood.

Apart from historic and landscape interest, veteran trees, particularly oak trees, offer microhabitats to many saproxylic insects, among which *Osmoderma eremita* (Annex II/IV of the Council Directive 92/43/EEC), *Lucanus cervus* and *Cerambyx cerdo*, together with other xylobiontic organisms, as the rare moss *Dicranum viride*. Veteran trees and dead wood are fundamental to reach biological maturity and to increase biodiversity within the park.

As the largest public natural park within Turin metropolitan area, La Mandria is a highly frequented site. For this reason, actions are being undertaken to manage tree risk without compromising veteran trees conservation. Along the paths, in particular, risk is being assessed and trees are pruned and/or consolidated with specific ropes. Dying and dead trees are being reduced to the trunk as “totems” in order to maintain verticality.

The park main concern is to find and experience management ways, possibly shared with other public lowland forest managers, to conserve and increase biodiversity ensuring public safety.

KEYWORDS

Veteran trees, xylobiontic species, public, risk assessment, tree management



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VENUE

SALONE MANTEGNESCO

Fondazione Università di Mantova
Via Scarsellini 2, 46100
Mantova

Nature Reserve
“BOSCO FONTANA”
Strada Mantova 29, 46045
Marmirolo (MN)



SOCIAL DINNER

@ RISTORANTE MASSERIA

Piazza Broletto, 8 46100
Mantova
Ph +39 0376 365303 | www.ristorantemasseria.it

Thursday, 25 MAY - h 20:00



GENERAL INFORMATION

OFFICIAL WORKSHOP LANGUAGE

English

INTERNET / WIFI

WiFi connection is available at the Workshop Venue, Salone Mantegna. Free access. Mantova free WIFI is available in the city centre. Registration is required. Please select the net “Mantova free wifi” and follow the instructions. A code will be sent per SMS to the mobile phone number provided in the registration.

BADGES

Badges must be visibly worn at all times, also during coffee breaks and during the lunch and the technical visit at Bosco Fontana.

COFFEE BREAKS and LUNCH AT BOSCO FONTANA

Coffee breaks and lunch at Bosco Fontana will be served to registered participants wearing their badges. For dietary special needs we aim to provide a variety of foods including alternatives in case of special diet restriction. Lunches on May, 24th and May, 26th will be at leisure.

CERTIFICATE OF ATTENDANCE

Certificates will be sent by email upon request to wsmipp2017@sistemacongressi.com after the Workshop.

PERSONS WITH SPECIAL NEEDS

Every effort has been made to ensure that people with special needs are catered for during the conference. Should you require any specific assistance, please let us know in advance to enable to assist in making your stay at the conference a pleasant and comfortable one.

LIABILITY

In registering for the Workshop, participants agree that neither the Scientific/Organizing Committees nor the Organizing Secretariat assumes any liability.

CURRENCY

The local currency is € (Euro). Automatic teller machines are available in Mantova city centre. Most hotels, restaurants and shops accept major credit cards but please always check first!

TIPPING

Tipping up to 10% for outstanding service is of course accepted, but not necessarily expected in Italian restaurants, hotels and taxis.

ELECTRICITY

Electricity in Italy is 220 volts, 50 cycles alternating current (AC).

EMERGENCY NUMBERS

Italy Country Code is +39 and Mantua City Code is 0376.

Emergency number: 112.

Scientific Committee | Alessandro Campanaro +39 334 6197732

Local Organizing Secretariat | Sistema Congressi +39 349 1954203

wsmipp2017@sistematicongressi.com

PHARMACIES

Pharmacies can provide medicaments for most common ailments. The closest pharmacy to the Workshop Venue is:

Farmacia Cooperativa Mantovana

Via Giuseppe Verdi, 58, 46100 Mantova - www.farmaciacooperativamantovana.it

Opening hours: Mo-Fr: 8:30-13.00, 15:30-19:30 | Sa 8:30-13:00.

SHOPPING

Shops in the city centre are usually open from Tuesday to Saturday 10.00-19.30, and on Monday 15.30-19.30.

SMOKING

Smoking is not allowed in public places.

CLIMATE

Mantova enjoys a humid subtropical climate characteristic for the Po plain.

Mantova's climate is classified as warm and temperate. The rainfall in Mantova is significant, with precipitation even during the driest month. The average temperature in May is about 20°C.

WWW.LIFEMIPP.EU

