

# MIPP

## Monitoring of Insects with Public Participation

### LAYMAN'S REPORT



LIFE11 NAT/IT/000252

Monitoring of insects with public participation

With the contribution of the LIFE financial instrument of the European Union

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# Background

## The situation prior to the project

Photo F. Lemma

Photo S. Hardersen

Although Italy hosts a very important part of Europe's biodiversity, at the same time however many species are threatened. The Habitats Directive (92/43/EEC), one of the pillars of European nature conservation, safeguards biodiversity through the conservation of natural habitats and of wild fauna and flora. It imposes to maintain or restore a favourable conservation status of habitats and populations. A further important obligation deriving from this Directive is the set-up of a European ecological network of special areas of conservation, entitled Natura 2000. Additionally, the Habitats Directive requires the Member States to carry out monitoring to determine the conservation status of the protected habitats and species. The Directive lists a total of 117 species of insects; of these 49 species are present in Italy. However, there is still no nationally accepted and widely applied monitoring system for these insects. In addition,



Photo F. Lemma

for many insect species listed in the Habitats Directive, the current knowledge of their distribution in Italy is fragmentary and many records are outdated.

The main objective of the LIFE project Monitoring of Insect with Public Participation (MIPP) is to develop and test methods for the monitoring of five species of beetles listed in Annexes II and IV of the Habitats Directive (*Osmoderma eremita*, *Lucanus cervus*, *Cerambyx cerdo*, *Rosalia alpina* and *Morimus funereus*). A second objective of the project is the collection of faunistic data, gathered by citizens, via the web and with an app for smartphones. The third aim is to inform and educate the general public on issues such as Natura 2000, Habitats Directive, monitoring and saproxylic insects.



Photo E. Maurizi





Natura 2000 is a network of sites created by the European Union for the protection and conservation of habitats, animals and plants identified as priority species by the EU Member States. Sites belonging to the Natura 2000 Network are "Special Areas of Conservation" established by the Habitats Directive and "Special Protection Areas" identified under the Birds Directive (Directive 79/409/EEC).

The LIFE programme is an instrument of the European Union that finances projects which contribute to sustainable development. The LIFE+ programme promotes, in particular, three components: "Nature and Biodiversity", "Environmental Policy and Governance" and "Information and Communication". The LIFE+ project MIPP was funded under the component "Nature and Biodiversity".

## Natura 2000 and the LIFE programme



In 2017, the 25th anniversary of the LIFE Programme and of the Habitats Directive was celebrated; both had been approved on 21 May 1992. Since then, they have been important pillars for sustainable development in Europe and have contributed significantly to the conservation of our natural heritage. During these 25 years, LIFE has funded nearly 4500 projects, of which over 1000 are still ongoing. The budget for the LIFE programme for 2014-2020 is set at €3.4 billion. In addition to conserving European nature, LIFE has created many jobs, helped develop professional skills and resulted in much attention for nature protection.





# The MIPP project

The LIFE project MIPP (Monitoring of Insects with Public Participation, LIFE11 NAT/IT/000252) was co-funded by the European Commission under the LIFE+ Programme. It is a project of the Comando Unità per la Tutela Forestale, Ambientale e Agroalimentare (Command Unit for the Protection of Forests, Environment and Food) of the Carabinieri. The associated beneficiaries are: Sapienza - University of Rome, University Roma Tre, Italian Ministry for the Environment, Region Lombardy and the Council for Agricultural Research and Economics - Research Centre for Plant Protection and Certification.



Photo E. Capogna

## A

Actions

Each LIFE project consists of several Actions for which the various beneficiaries are responsible. The Actions A (Preparatory Actions) of the project MIPP are concerned with: a literature review of the methods proposed for the monitoring of the five species of beetles, the definition of the research to be carried out and the creation of a website.

## C

Actions

The seven Actions C are mainly concerned with the development of monitoring methods for the five beetle species *Osmoderma eremita*, *Lucanus cervus*, *Cerambyx cerdo*, *Rosalia alpina* and *Morimus asper*. The research, carried out in five Italian forests, allowed to define methods to ascertain the conservation status of their populations with relatively little effort. Another Action C focuses on the collection of faunistic data, gathered by citizens.

## E

Actions

The 13 Actions E of the project MIPP are all concerned with dissemination. The numerous activities include: guided tours, technical seminars, internet pages, organisation of a European workshop, publication of guidelines, visits to other LIFE projects, publication of articles in newspapers and magazines, TV and radio interviews and publication of a Layman's report.

## F

Actions

The Actions F are concerned with the management and administration of the project (personnel, finances, actions), as well as the drafting of an "After-LIFE Plan". This plan sets out how monitoring and collection of faunistic records with the help of citizens will be continued once the project MIPP is concluded.



# Monitoring and scientific research



Photos clockwise: S. Corezzola, S. Hardersen, S. Chiari, F. Lemma

## THE ECOLOGICAL CATEGORY OF SAPROXYLICS

A saproxylic is an organism that depends on the presence of dead wood. A well known example are the woodpeckers (e.g. Great Spotted Woodpecker), which feed on insect larvae living in dead logs. Also, amongst insects, many species depend on the presence of dead wood. However, not all saproxylics feed directly on woody material; many are in fact predators or parasites of xylophagous insects. Others feed on fungi or on other organisms which live in dead wood. This complex food chain is based on the energy and on the nutrients accumulated for decades or centuries by a growing tree. Once a tree is dead, the slow and complicated process of wood decay begins. Primary saproxylics, like

longhorn beetles, begin colonising the trunk and create galleries. These provide access to the wood for many other species, such as fungi and other insects. In this way, the wood becomes a habitat with a high biodiversity. It is estimated that more than 30% of all forest species are saproxylics. Therefore the removal of dead trees from the forest results in a very important loss of biodiversity and this includes many rare and protected species. Many of these are extinct in numerous forests and survive only in some natural reserves. Saproxylics are of fundamental importance for the ecology of forests as they play a key-role in the recycling of wood.



## The target species

# 2

### *Osmoderma eremita*



Photo A. Campanaro

The larvae of *Osmoderma eremita* live exclusively in tree cavities rich in "wood mould". Important factors for the presence of this species are cavities with the right level of moisture, as well as a sufficient number of trees with cavities. This species can be found in forests, avenues and parks with mature trees such as oaks, beech trees, willows or mulberries.

### *Lucanus cervus*



Photo F. Lemma

The stag beetle is amongst the largest beetles in Italy and in Europe and its most striking feature are large jaws, present only in males. The larvae live in decomposing wood, generally oak trees and complete their development in 3-5 years.

### *Cerambyx cerdo*



Photo L. Spada

*Cerambyx cerdo* is a large beetle with long antennae. Its main habitats are oak forests in the plains and hills, urban parks and the countryside where old oak trees are still present. The species prefers trunks exposed to the sun and here the larvae feed on oak wood and develop in 3-4 years.

### *Morimus asper/funereus*



Photo K. Kravos

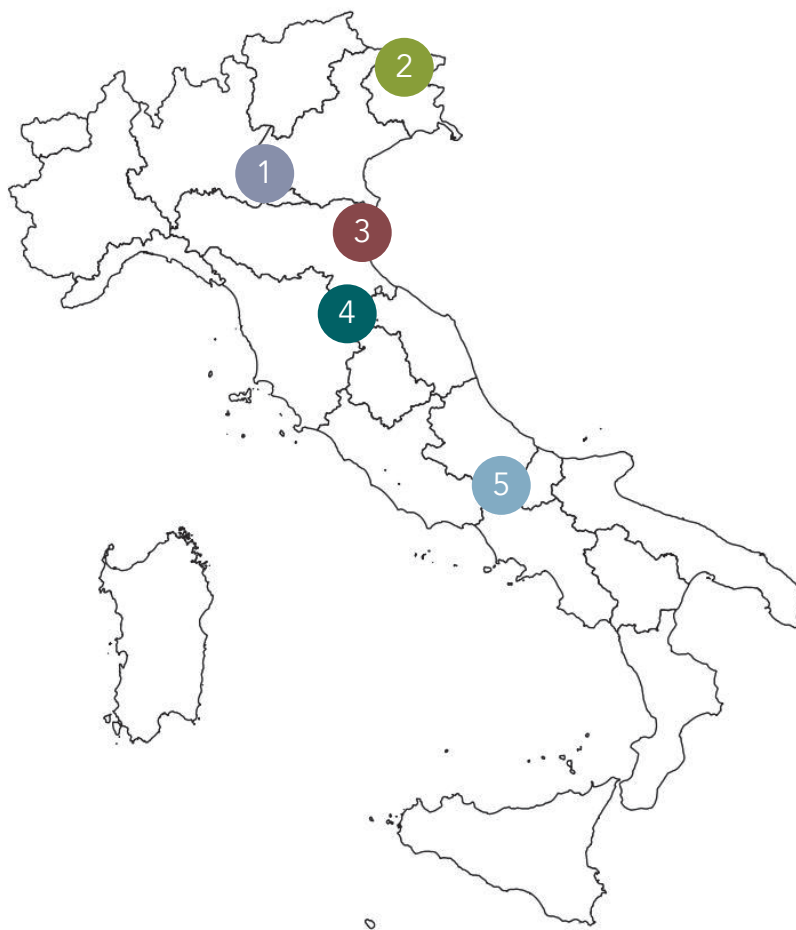
The taxonomy of the genus *Morimus* is complicated and includes populations which vary widely in colour. It is believed that all European populations belong to one species, *M. asper*. This species is amongst the first to colonise fallen trees and the larvae live on freshly dead wood.

### *Rosalia alpina*



Photo M. Maura

*Rosalia alpina* is a very distinctive species; its vibrant blue-grey colour with black spots on the elytra and the black-striped antennae make this beetle unmistakable. It typically lives in beech forests between 500m and 1500m a.s.l., where the larvae feed on the dead wood of large beech trees, preferably in standing trunks.



The research of the LIFE project MIPP was carried out mainly in five forest areas, most of these being managed by the Comando Unità per la Tutela Forestale, Ambientale e Agroalimentare (Command Unit for the Protection of Forests, Environment and Food) of the Carabinieri (CUTFAA). In larger areas, such as the Parco Nazionale d'Abruzzo, Lazio e Molise, research was conducted in specific sites. All study areas are an integral part of the Natura 2000 network and, for each of these, several target species have been recorded. The data collected in the various reserves often represent the first quantitative data for the target species of the MIPP project.



#### 1. BOSCO DELLA FONTANA

The nature reserve Bosco della Fontana is located in the province of Mantova, at approximately 25m a.s.l. It is managed by the CUTFAA – Reparto Biodiversità di Verona. This ancient forest, which covers an area of 200 hectares, is one of the last remnants of the oak-hornbeam forests that once covered the entire Po Valley. The Reserve is home to populations of *Lucanus cervus*, *Morimus asper asper* and *Cerambyx cerdo*; a few kilometres from the reserve, a population of *Osmoderma eremita* can be found.



The Parco naturale regionale delle Prealpi Giulie covers an area of about 9400 hectares and is located in the mountains close to the Slovenian border, at an altitude between 300 and 2587m a.s.l. Beech forests, which cover 60% of the total area, are the dominant forest type. The next most important forests are those of black pine and Scots pine. These forests are home to populations of *Morimus asper funereus*, *Rosalia alpina* and *Lucanus cervus*.



Photo S. Hardersen



Photo M. Bardiani

### 3. BOSCO DELLA MESOLA

The reserve Bosco della Mesola is located in the province of Ferrara, at an altitude of approximately 3m a.s.l. and is managed by the CUTFAA - Reparto Biodiversità di Punta Marina. The reserve covers an area of 1058 ha and the "*Quercus ilex* and *Quercus rotundifolia* forests" and "Eastern white oak woods" are the dominant forest types. The research conducted during the project MIPP focused on monitoring methods for *Cerambyx cerdo* and *Morimus asper asper*.

### 4. FORESTE CASENTINESI

The research was carried out in two forests (Foresta della Lama and Castagneto di Camaldoli), located in the Apennines between Tuscany and Romagna. These are managed by the CUTFAA - Reparto Biodiversità di Pratovecchio. Another site, the Sasso Fratino natural reserve has recently become a UNESCO World Heritage Site. All these reserves are located within the National Park Foreste Casentinesi, Monte Falterona and Campigna, home to four target species: *Lucanus cervus*, *Osmoderma eremita*, *Rosalia alpina* and *Morimus asper asper*.



Photo M. Bardiani

### 5. CASTEL DI SANGRO

The National Park Abruzzo, Lazio e Molise is one of the oldest parks in Italy, situated mostly in the region Abruzzo. Research for the project MIPP was conducted in four sites: Difesa di Pescasseroli, Val Fondillo, Riserva Naturale Orientata Feudo Intramonti and Colle di Licco, Zio Mas. The latter two are managed by CUTFAA - Reparto Biodiversità di Castel di Sangro. The research carried out in this study area was dedicated to the development of monitoring methods for *Osmoderma eremita* and *Rosalia alpina*.



Photo A. Cini





The methods tested for the monitoring of the five species of beetles were based on a detailed literature review to define the most appropriate approaches. These methods had also been critically reviewed by 15 experts from other European countries. The methods for each species were tested for 3 years in two different study areas. As a result of this work, the most suitable methods were identified, considering ecology, micro-habitat and phenology.



*LUCANUS CERVUS*

Although the stag beetles are active mainly in June and July, adults are cryptic and difficult to find in the forests. However, males are easily observed around sunset when they fly to locate females. Thus, two methods tested were based on sighting and capturing specimens at sunset, along 500m transects. A third method applied was the collection of remains of dead individuals. The fourth method used traps, with an attractant containing alcohol and sugar.



Although the adults of *Osmoderma eremita* are active mainly in July and August, they are difficult to observe even during this phase as they often hide in tree cavities, the habitat of the larvae. During the project, window traps suspended from branches with pheromone lures, pitfall traps placed in the cavities and wood mould sampling were tested. Another method applied was the detection dog "Osmodog", trained to find the larvae of *Osmoderma eremita*.



Photo F. Lemma



Photo F. Leandri

### CERAMBYX CERDO

The adults of *Cerambyx cerdo* are present mainly in June and July and are most active in the evening/night. During the project MIPP four methods were tested: artificial sap (made from the sap of the manna ash) as an attractive bait, traps with an attractant containing alcohol and sugar (wine, beer, fruit, sugar), Visual Encounter Surveys on tree trunks and collecting remains of predation along 500-metre transects.

### ROSALIA ALPINA

The adults of *Rosalia alpina* are present mainly in July and August and are generally active during the hottest hours of the day. This makes it relatively easy to find them. For the monitoring, two types of trunks were used. The first type was suitable "natural" trees (i.e. trunk with dead wood and exposed to direct sunlight, at least for a few hours during the day). The second type was "artificial" structures, such as tripods made with beech wood or large logs placed on the ground. On these structures, adults were searched for visually.



Photo Archivio CNBF



Photo S. Hardersen

### MORIMUS ASPER

*Morimus asper* adults are present for a very long time during the year; from April to August and are most active in the evening/night. During the project MIPP various methods were tested, such as pitfall traps with potentially attractive substances. In addition, the attractiveness of several artificial structures was investigated: large trunks, stumps and wood piles made from freshly cut wood. On these structures, adults were searched for visually during the evening, with the help of a torch.





# Dissemination

Educational  
activities  
at school

Interviews

Press  
releases

A variety of dissemination activities were carried out by the MIPP staff during 2014 - June 2017 in several areas of Italy. These activities aimed to: 1) communicate the topics of the project such as the protection and conservation of old forest, saproxylic insects, dead wood and the knowledge of Natura 2000 and Habitats Directive; 2) recruit people to record the 9 insects studied by the MIPP project. The MIPP staff encountered citizens "face-to-face" during seminars, workshops, dissemination events in cities, in science museums and in nature reserves. Other means used to contact the public were talks and posters at conferences and guided tours. Additionally, a specific education programme, named "MIPP-iacciono gli insetti", for schools was carried out in several Italian regions and a dedicated booklet was produced. The general public, as well as specific audiences, such as pupils from primary and high schools, students and professors from universities and technical personnel of nature reserves, were involved in the above activities. A total of 449 activities were carried out during 2014 - June 2017, reaching an approximate number of 15135 citizens (Table A).







Media-related communication activities by the MIPP project were the web site [www.lifemipp.eu](http://www.lifemipp.eu), social networks (Facebook, YouTube and Twitter), two documentaries screened on national TV, 17 interviews on national TV and Radio channels, monthly press releases and 145 magazine/newspaper articles (Table B). Additionally, specific educational material was produced, such as identification guides (available online), posters (950 copies), leaflets (65000 copies printed), booklets (17600 copies), comic-strips "Osmodog" (36 produced in collaboration with a graphic studio) and notice boards (35 installed in 10 nature reserves).

To maintain contact with citizen scientists, reports and news were sent to all participants in a bimonthly newsletter. As an incentive, MIPP citizen scientists were able to keep track and



visualise their records on a map on the web-site. At the end of each season, participants were rewarded with small gadgets, relating to the number of records sent.



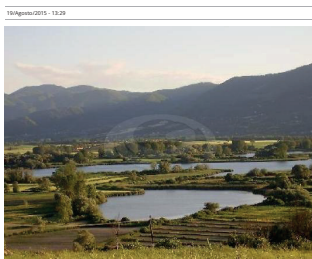
	2014		2015		2016		2017		Total	
	Activities	Citizens	Activities	Citizens	Activities	Citizens	Activities	Citizens	Activities	Citizens
Seminars and Workshops	24	617	30	2064	26	652	7	334	87	3667
Divulagation events	18	545	20	968	18	1539	1	16	57	3068
Conferences	4	50	2	140	3	NA	1	NA	10	190
Guided tours	9	437	52	1366	4	170	3	128	68	2101
Educational activities at school	58	1923	70	1862	60	1370	39	954	227	6109
Total	113	3572	174	6400	111	3731	51	1432	449	15135

Table A. Number of “face to face” dissemination activities (Activities) and number of citizens (Citizens) reached from 2014 to June 2017. (NA=data not available)

	2014	2015	2016	2017	Total
Documentaries	1	1	0	0	2
Press releases	9	12	13	8	42
Magazines and newspaper articles	42	37	48	18	145
Interviews on TV or Radio	4	5	4	5	17
Total	56	55	65	30	206

Table B. Number of dissemination activities performed by media tools from 2014 to June 2017.

Monitoraggio di insetti alla Riserva Naturale dei Laghi Lungo e Ripasottile



Domani, giovedì 20 agosto, alle ore 9.00 appuntamento al centro visite di Ripasottile all'interno della Riserva Naturale dei Laghi Lungo e Ripasottile con il personale dell'ufficio tecnico area agronomico-forestale ed esperti dell'università degli Studi Roma Tre per la presentazione del progetto Life "Mipp". Monitoraggio di insetti con la partecipazione pubblica che coinvolge i cittadini nel monitoraggio e tutela della biodiversità. I cittadini protagonisti della ricerca. È questo lo spirito del progetto sulla citizen science il cui obiettivo è coinvolgere il pubblico nella raccolta di dati ecologici su specie animali e vegetali, complice la diffusione di una maggiore sensibilità verso i problemi dell'ambiente e lo sviluppo di nuovi strumenti tecnologici (dagli smartphone ai social network) che hanno reso molto semplice raccogliere e comunicare informazioni a distanza.

Il cittadino come interfaccia tra mondo della ricerca e istituzionale, con l'obiettivo di promuovere nuove politiche ambientali, è lo scopo delle due giornate organizzate interamente dedicate al progetto Life (programma dell'Unione Europea che finanzia i progetti sull'ambiente, la natura e il clima) sulla citizen science. Giovedì 20 agosto, dalle ore 9.00 alle ore 12.00 presso il centro visite di Ripasottile (ingresso gratuito), il personale dell'ufficio tecnico settore agronomico-forestale insieme alla tirocinante dell'università degli Studi Roma Tre parleranno delle proprie esperienze e delle opportunità legate al coinvolgimento dei cittadini nel progetto "Mipp". Il cui obiettivo è monitorare la presenza nei boschi italiani di alcune specie di insetti protetti dalla "Direttiva Habitat". I collezionisti saporitici Osmodera eremita, Lucanus cervus, Cerambyx cerdo, Rosalia alpina e Morimus asperifurereus; le farfalline Lopingia achine, Parnassius apollo e Zerynthia polydora; la cavalletta Saga pedo) cercando di catturarle per raccogliere più dati possibili sulle popolazioni notturne di questi animali per scopi conservazionistici (si tratta di specie minacciate dalle politiche di sfruttamento delle foreste in cui vivono). Se vi sentite dei veri naturalisti - scrivono dal centro visite - potete fare la vostra parte nel progetto Life Mipp (Monitoring of insects with public participation) e contribuire alla tutela di 5 collezionisti presenti in Italia perché il rispetto e la salvaguardia della natura passano attraverso l'impegno di tutti. La giornata verrà ripetuta il giorno 27/08/2015.

**20 TROVABILI**  
SCIENZE E RICONOSCIMENTI Un'App per diventare cittadini scienziati

## Grazie a «Mipp» la vita dei boschi non ha più segreti

Premio dell'European Natura 2000 Award 2016 per il progetto coordinato dal Centro nazionale per lo studio e la conservazione della biodiversità

**La scheda**  
Teseo l'«Osmodog» è un sito per partecipare al Citizen Science

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## Un weekend di passeggiate al chiaro di luna nel 'boscone'

Mini-tour, sotto la guida dei ricercatori Life Mipp, alla scoperta della piccola fauna saporitica

Mesola. Nell'ambito della sagra "Sapori d'Autunno 2014, Tartufi, funghi e delizie del sottobosco", organizzata dalla Pro loco di Mesola (Fe), i ricercatori del progetto europeo Life "Mipp", assieme al corpo forestale di Stato, oggi, venerdì 31 ottobre e domani, sabato 1 novembre, a partire dalle 21, accompagneranno i visitatori in una passeggiata notturna nel Gran Bosco della Mesola alla scoperta della piccola fauna saporitica: si tratta di quegli insetti la cui sopravvivenza è legata al legno morto e la cui presenza nei boschi italiani è indice di buona salute di tutto l'ecosistema. Si tratta di una visita gratuita, con obbligo di prenotazione (chiamare l'ufficio I.A.T. al 0533-993354), dalla durata di circa 2 ore.

**NATIONAL GEOGRAPHIC ITALIA**

## Cani, insetti e cittadini scienziati

Un progetto e un sito di citizen science che hanno lo scopo di sviluppare in Italia il monitoraggio e la valutazione dello stato di conservazione di specie di insetti

di Giuseppe Carpaneto

Teseo è in grado di individuare insetti rari nelle cavità degli alberi.  
Fotografia di Sönke Hardersen

## La scheda

### Teseo l'«Osmodog» è un sito per partecipare al Citizen Science

**Teseo a caccia dello scarabeo eremita che vive nelle cavità del legno**

Tra i Citizen Science c'è un cane molecolare (cioè addestrato per riconoscere uno o più odori specifici in molecole volatili). È Teseo, un Golden Retriever nato tre anni fa e addestrato per diventare un «fiutatore di coleotteri». Ci sono infatti coleotteri che vivono all'interno di profonde cavità del legno e sarebbe impossibile individuarli senza tagliare la pianta o usare trappole che li possono disturbare.

Teseo è soprannominato dai ricercatori Osmodog perché addestrato a fiutare lo scarabeo eremita (Osmodera eremita), un coleottero dai colori poco appariscenti che vive solo nelle cavità degli alberi, dalla pianura fino a 1300 metri di altitudine, in boschi di querce, faggi, castagni, salici e gelsi. I maschi segnalano la loro presenza alle femmine per l'accoppiamento emettendo un odore simile a quello di una pesca molto matura. È proprio questo odore che viene intercettato da Teseo.

**DOVE SI TROVA L'APP.** Sul sito lifemipp.eu vengono visualizzati i dati faunistici raccolti dai cittadini e si trovano i link per scaricare l'app Mipp secondo il sistema operativo del proprio smartphone.

Nel periodo 2014-15 il progetto è finanziato dall'Unione Europea per cinque anni fino al 2017 con 2,7 milioni di euro) ci sono state 1.296 segnalazioni di cittadini validate dai ricercatori: 980 sono state confermate perché corrispondono alle 9 specie target del Mipp; 237 rifiutate perché non corrispondono alle specie target e 79 sono state invece ritenute d'interesse pur non rientrando nel target.

Il decalogo dell'associazione europea di Citizen Science, che fa riferimento al Museo di storia naturale di Londra, prevede che i cittadini coinvolti in attività scientifiche generino nuova conoscenza o comprensione; producano un risultato scientifico originale; siano un vantaggio anche per gli scienziati; rispettino una metodologia di ricerca con dati che vengono inviati, resi pubblici e di libero accesso, quindi riconosciuti anche nelle pubblicazioni.

Nell'ultimo decennio sono cresciuti notevolmente i progetti di Citizen Science, grazie anche all'avvento dei nuovi media che facilitano la comunicazione e la rendono economica e accessibile a tutti.

L'utilizzo dei cittadini per la raccolta dati è determinante per la buona riuscita e a volte per la fattibilità stessa di certi studi che richiedono una gran quantità di dati o uno sforzo molto esteso di campionamento.

I cittadini partecipano per diverse motivazioni: per migliorare le proprie conoscenze scientifiche e per sensibilizzare su temi di tutela e conservazione della natura. VZ



# Osmodog - TESEO



Teseo is a Golden Retriever born on 22 March 2013 and, since his arrival in the MIPP-team, he has played a very important role in the project. Teseo is the first detection dog trained to find the highly threatened saproxylic beetle *Osmoderma eremita*.

Detection dogs have a very sensitive sense of smell and can signal a target accurately and efficiently to the handler. These dogs are often employed for search and rescue, to combat illegal trafficking of wildlife, to detect substances such as explosives and to detect certain types of cancer.

During the Project MIPP, Teseo (also called "Osmodog") was trained to search for the larvae of *Osmoderma eremita*. A Golden Retriever had been chosen for this work as this breed is widely used in searches for biological targets. The larvae of the hermit beetle live inside cavities of

large, old trees in the wood mould (small wood fragments mixed with other organic material). *Wood Mould Sampling* (WMS) is the most commonly used method for monitoring *Osmoderma eremita*. This method consists in extracting the organic material from the cavities and checking for signs of the target species; a time-consuming procedure which may damage the tar-

get species as well as the entire community living in the cavity. In contrast, the use of a detection dog to monitor the species does not pose any risk to the species living within the trees as there is no direct interference.

Fabio, a researcher of the MIPP project and handler of Teseo, used the method of positive reinforcement to train the dog. This method consists in rewarding immediately after correct signalling. During work sessions in the





field, Teseo would sit down in front of the source of the smell and bark to signal to the handler that a tree with the target species had been found.

At two years of age and after having passed some tests to verify its accuracy (i.e. the overall proportion of correct indications) as well as its efficiency (i.e. the average time spent to search one tree), the dog started the real fieldwork. This meant leaving the parks and green areas of Rome and working in the Abruzzo mountains of the National Park "Abruzzo Lazio e Molise" as well as in the large forests of the "Foreste Casentinesi" of the Tosco-Romagna Apennines. Tree-lined roads in the



Po Valley were also visited and Teseo checked a total of more than 1000 trees. Osmodog proved to be more accurate and much faster than the WMS method in finding the larvae (i.e. in colonised trees) of the target species in the field. Thus, Teseo proved to be a very useful "tool" for the monitoring and the conservation of *Osmoderma eremita*.

During the LIFE project, not only did Teseo have the task of finding the larvae of *Osmoderma eremita* but he also proved invaluable for dissemination and communication.



The participation of the dog was key for many initiatives. Teseo was also used as a testimonial for the conservation of forest biodiversity, as well as being the subject of several magazines articles and documentaries.



Teseo



# Citizen Science

"Citizens Science" is a scientific method that actively engages "common people" in scientific research. The origins of this activity date back to the eighteenth century, but only in the last decades has Citizen Science started to fulfil its true potential, thanks to the advent of new, internet-based technologies. Today, Citizen Science is key in many fields: in marine and terrestrial biology, from geology to the study of climate change and from chemistry to physics. In meteorology and astronomy, this new approach has also been applied successfully.

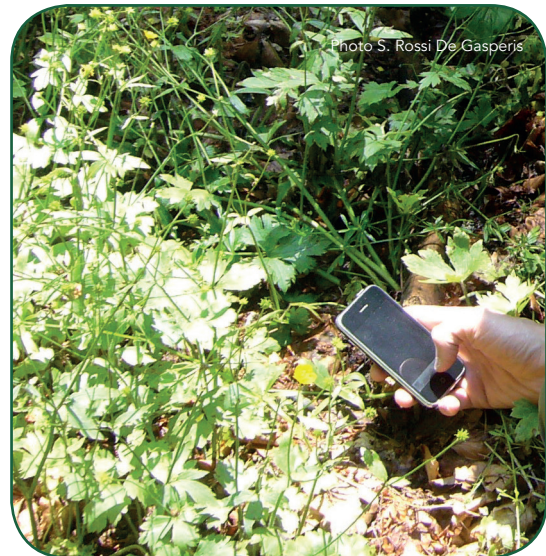
## THE BENEFITS OF CITIZEN SCIENCE

The engagement of citizens allows much more data to be obtained than would have been possible by using a few "experts". On the other hand, the citizens who participate in the scientific research can learn much about a specific topic and acquire new skills; at the same time their awareness increases for particular issues of common interest.

The European Citizen Science Association (ECSA) is a non-profit association based on a network of researchers, communicators and research centres that promote the development of Citizen Science in Europe. The LIFE MIPP project has been an ECSA member since 2015.



[www.ecsa.citizen-science.net](http://www.ecsa.citizen-science.net)



## FIUTO PER LA BIODIVERSITA'

### GENERAZIONE APP...



## The Citizen Science of MIPP

Citizens are called upon to provide records for 9 protected species of insects. In addition to the 5 species of saproxylic beetles, the other target species are: 3 species of butterflies (*Lopinga achine*, *Zerynthia polyxena/cassandra* and *Parnassius apollo*) and the bush cricket *Saga pedo*. These additional 4 species, all included in Annex IV of the Habitats Directive, have been selected as they are relatively large and can be determined with relative ease, even if they are not related to the forest environment or dead wood. The records provided by citizens are important for assessing the geographical distribution of these species in Italy, one of the parameters used to establish their conservation status, as temporal variations in distribution assist in the understanding of whether a species is in decline or expanding.



Photo S. Hardersen

***Lopinga achine*** the species occurs in clearings or along forest edges. In Italy, it is present exclusively in the Alps, from approximately 300m to 1600m a.s.l. Adults are active between June and July. The caterpillars feed mainly on the sedge *Carex montana*.



Photo P. Mazzei

***Parnassius apollo*** the species is mainly found in alpine and sub-alpine dry grasslands, on sunny and rocky slopes, generally above 1000m a.s.l. The caterpillars feed on plants of the genera *Sedum* and *Sempervivum*.



Photo F. Tomasinielli

***Zerynthia polyxena/cassandra*** the species is most common in open habitats, such as clearings and forest edges, slopes and meadows. In Italy, it can be found from sea level up to 1000m a.s.l. Adults are active mainly in April and May. The caterpillars feed on plants of the genus *Aristolochia*.

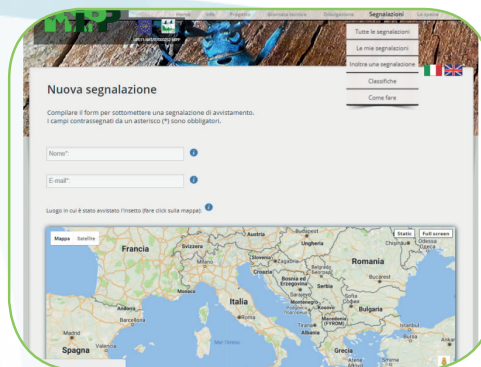
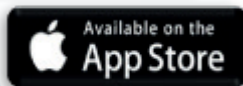
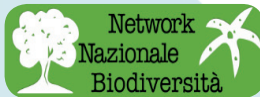
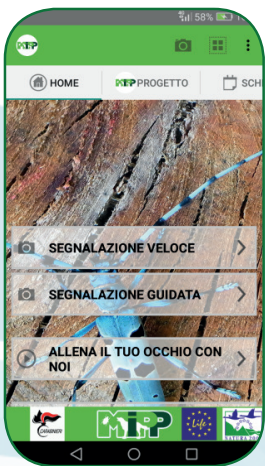
***Saga pedo*** this species is typical for warm, dry and open environments. Adults can be found from June to the beginning of autumn. Females produce eggs which do not require fertilisation for their development (parthenogenesis).



Photo F. Tomasinielli



## The system for submitting records



Records can be sent using the project portal ([www.lifemipp.eu](http://www.lifemipp.eu)) or via a dedicated app (MIPP). Both tools allow the complete set of information to be sent including: coordinates, date of observation and photograph of the animal. The following optional information can also be transmitted: place and habitat where the individual was photographed. The portal as well as the app contains a section dedicated to the identification of the target species, with species charts that can be consulted by citizens. All records which have been submitted and confirmed by the project's experts are displayed to the general public.

The recorders receive e-mails containing updates on the status of the record and the result of the validation. The experts of the project can also directly contact the recorder to ask for additional information, if needed for the validation process.

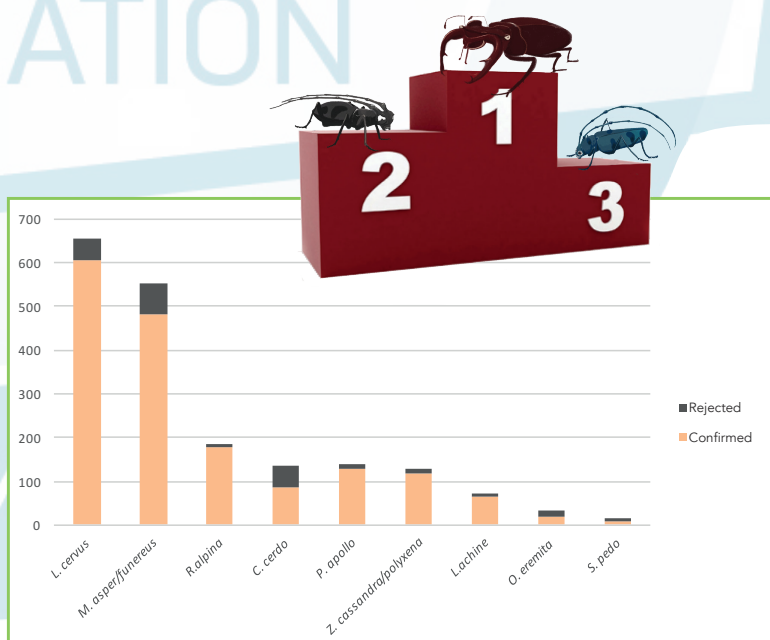
All records, those confirmed and also those rejected, are retained in the project database. The confirmed records are made available to the National Network of Biodiversity (the national database on the distribution of Italian species of the Ministry of the Environment).

## Results obtained

Between 2014 and 2016, a total of 695 citizens submitted records to the project (182 in the first year, 295 in the second year and 335 in the third year). Of the 2308 records sent, 71.6% were submitted via the web portal and 28.4% via the app. For all data submitted, 73% were confirmed. *Lucanus cervus* was the most commonly recorded species (605 confirmed reports), followed by *Morimus asper* and *Rosalia alpina*. In contrast, *Osmoderma eremita* and *Saga pedo* were confirmed to be the most elusive species, with the lowest number of records received.

The data sets for the 4 species with most records (see above plus *Parnassius apollo*) also allowed aspects of their ecology to be analysed, such as altitudinal distribution (records from various altitudinal range), activity period (phenology) and how phenology varies in relation to altitude.

These analyses showed that peak activity (the period of time with the highest number of records) moved forward during the season at a higher quota. For *Lucanus cervus* and *Morimus asper*, it was also found that the length of the activity period decreased with increasing altitude.



# MONITORING PROTOCOLS – technical summaries

Here, five short technical summaries of the monitoring guidelines are presented, a “hands on” and compact form of the work published in the journal *Nature Conservation*. These summaries are meant to be simple tools for all involved in the conservation and monitoring of the five target saproxylic beetles of the LIFE project MIPP (*Lucanus cervus*, *Osmoderma eremita*, *Cerambyx cerdo*, *Rosalia alpina* and *Morimus asper*). Each summary consists of 3 sections; the first contains information about ecology, distribution and identification. The second section is a brief description of the standard monitoring method (how and when) and the final page contains the field sheet to be compiled during the monitoring sessions.

These summaries are the “practical” short form of the monitoring guidelines realised during the MIPP project and presented in Mantova during the International Symposium (24-26 May 2017) and on the occasion of the Technical Day for Managers (29 May 2017). These monitoring methods will be officially proposed to all Italian regions. The guidelines, which have been published in the scientific journal *Nature Conservation*, are available for download in Italian [<https://ab.pensoft.net/article/21672/>] and in English [<https://ebooks.pensoft.net/book/13187/guidelines-for-the-monitoring-of-the-saproxylic-beetles-protected-in-europe>].







# Monitoring of *Lucanus cervus*

Systematics and distributions  
Identification  
Ecology

1

Description of the method

2

Field sheet

3

1

**Order:** Coleoptera  
**Family:** Lucanidae  
**Genus** *Lucanus*

## Systematic and distribution

In Europe, 5 species belonging to *Lucanus* genus are present: *Lucanus cervus*, *L. barbarossa*, *L. tetraodon*, *L. ibericus* and *L. pontbrianti*. In Italy, *L. cervus* occurs in the northern and central regions (Lazio and Marche represent the southern limits), whereas in the south and in part of the centre, *L. tetrao-*

*don* is present (recently also recorded in Emilia-Romagna, Lombardy and Liguria). In particular, there is a well-documented area where both species overlap in central Italy. Here the two species may coexist (Figure 1).

## Identification

*Lucanus cervus* is the largest European beetle: males are 30-89 mm long and females are 25-49 mm long. The colour varies from reddish-brown to very dark brown, almost black. The species exhibits a strong sexual dimorphism: the male has large mandibles, longer than the head; the female has much shorter mandibles, shorter than the

head. The number of antennal segments and the position of the largest inner tooth of the mandible, allow *L. cervus* to be distinguished from *L. tetraodon* (see identifica-

tion chart). In areas where the species overlap, individuals may exhibit intermediate morphological characters, making identification difficult.

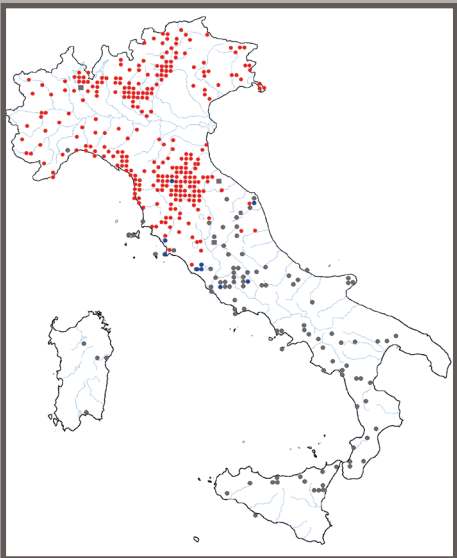
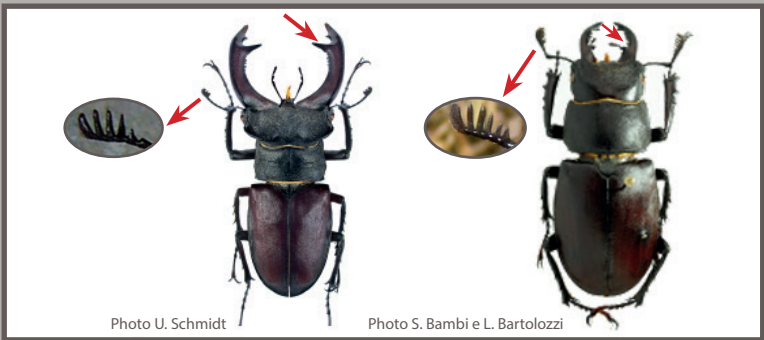


Fig. 1 Italian distribution of *Lucanus cervus* (red dots) and *L. tetraodon* (grey dots and squares); sites with the presence of both species are indicated with blue dots (Bartolozzi and Maggini 2007, modified).



	<i>L. cervus</i>	<i>L. tetraodon</i>
MANDIBLE	Median tooth lying in the distal half (towards the apical fork)	Median tooth lying in the proximal half (towards the base of the mandible)
ANTENNAE	Club made up by 4 or 5 antennal segments	Club usually made up by 6 (5 or rarely 7) antennal segments



Fig. 2 Examples of habitats with deadwood suitable for ovideposition (white arrows) (Photo M. Bardiani, A. Campanaro, M. Bardiani).

Ecology

The main habitat of *L. cervus* are mature deciduous forests, characterised by deadwood in contact with the ground, from sea level to 1000 m a.s.l. Females lay eggs deep in the ground, close to decaying deadwood (suitable for larval development). Each female produces up to 100 eggs (which can be laid in more than one site). The larvae develop in 3-5 years and, for metamorphosis,

move from the deadwood into the ground and form a cocoon (in autumn). The adults, which live only for a few weeks, emerge in spring and are active from May to August/September (this period is shorter at higher altitudes). The species shows peak-activity between June and July. In this period, it is easy to observe males flying at dusk in their search for females (which usually stay on ground).



### Description of the method

The method is based on the sightings of stag beetle adults by an operator who walks slowly (at constant speed) along a standard transect (500 m) around sunset. The protocol: i) locate suitable transect (mainly straight), such as forest tracks without or poor canopy closure (Figure 3), where to carry out the transect walks (from 1 to 4 paths per study area, spaced at least 200 m apart); ii) mark the start-point, the end and each intermediate 100 metres of the transect with red and white barricade tape or with number plates; register coordinates of start and end points of the transect with a GPS; iii) plan the monitoring period and the number of sessions (Table 1); iv) at each session, an operator starts the transect walk 15 minutes before sunset (sunset time should be recorded for each session) and finishes 15 minutes after sunset (500 m in 30 minutes; each 100 m in 6 minutes); v) the operator notes on



Fig. 3 Examples of canopy openness above the transect (Photo M. Bardiani and I. Toni).

the field-sheet each *Lucanus cervus* sighting (male, female, undetected sex, in flight, walking) using the code reported on the field-sheet; vi) the number of individuals sighted per session and transect should be inserted into a spreadsheet; vii) in case of strong wind or heavy rain, the monitoring session should be moved within the week or cancelled; viii) after the last session, a mean value of sightings for the year (number of individuals per transect and per session) should be calculated.

**Tab. 1 Monitoring protocol of *Lucanus cervus***

Method	Sightings along transect at dusk
Number of transects	from 1 to 4
Distance between transects	at least 200 m
Length of transect	500 m
Transect subdivision	100 m
Monitoring period	June-July
Survey frequency (for each transect)	Once a week
Number of repeats for areas up to 400 m a.s.l. (survey week of the year suggested)	6 (23 <sup>rd</sup> - 28 <sup>th</sup> )
Number of repeats for areas above 400 m a.s.l. (survey week of the year suggested)	5 (26 <sup>th</sup> - 30 <sup>th</sup> )
Survey-time of the day	Dusk
Survey duration	30' (from 15' before to 15' after sunset time)
Number of operators	1 per transect
Equipment for setting up transects	measuring tape, barrier tape (or numbered plates), GPS
Survey equipment	a clipboard, a field-sheet, a head torch, a pencil, a clock, thermometer



### 3- Field-sheet



Study area	_____		Date	_____	_____	_____	_____
	_____			weekday	day	month	year
Operator	_____		Sunset time	_____		Session n°	_____
Transect code	_____	Transect direction	S-F	F-S	Windspeed	0 - 1 - 2 - 3 - 4	

**F**

30'

24'

18'

12'

transect direction

**S**

5 metres

5 metres

path

**S**

100 m

200 m

300 m

400 m

500 m

transect direction

**F**

initial time \_\_\_\_\_

initial temperature \_\_\_\_\_

initial humidity \_\_\_\_\_

end time \_\_\_\_\_

final temperature \_\_\_\_\_

final humidity \_\_\_\_\_

**CODES**

M    male

F    female

U    unknown

0    not flying

1    flying < 2 m

2    flying > 2 m

0    no wind

1    moves grass

2    moves small branches

3    moves big branches

4    moves trunks

**notes**

**other species**





# Monitoring of *Osmoderma eremita*

Systematics and distributions  
Identification  
Ecology

1

Description of the method

2

Field sheet

3

1

**Order:** Coleoptera  
**Family:** Scarabaeidae  
**Genus:** *Osmoderma*

## Systematic and distribution

There are at least 4 species of hermit beetle in Europe: *O. eremita* and *O. cristinae*, distributed in western Europe and *O. barnabita* and *O. lassallei* present in eastern Europe. In Italy (Figure 1), *O. eremita* is present in northern and central Italy, whereas *O. cristinae* is endemic to Sicily. In southern Italy

(from Campania to Calabria), there are also sparse populations of the sub-species *O. eremita italicum*.

## Identification

*O. eremita* is a mid-sized (25-40 mm) beetle of bronze or black colour with metallic reflexes. The males have a median longitudinal groove on the pronotum more pronounced than in the females (Figure 2). Although a specialist entomologist is needed to distinguish the three taxa present in Italy morphologically, their particular geographical distribution makes the determination of species or sub-species rather easy.

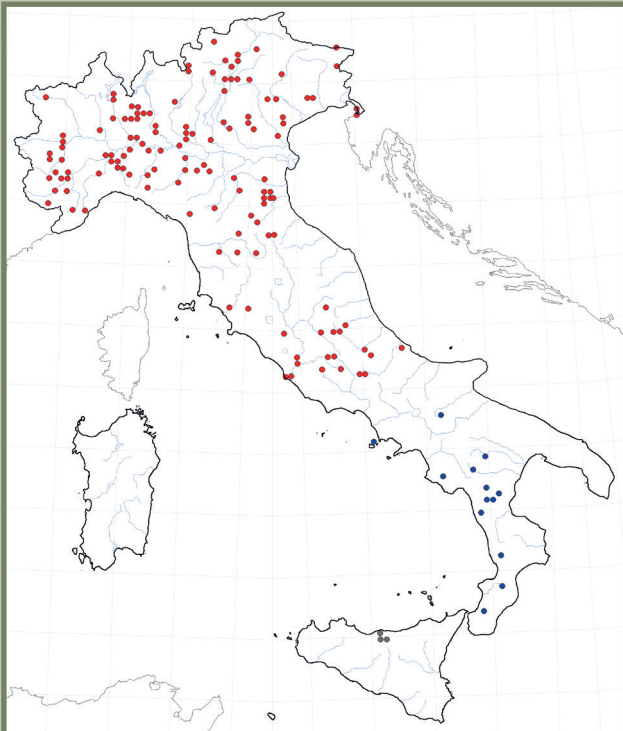


Fig. 1 Distribution in Italy of *Osmoderma e. eremita* (red dots), *O. e. italicum* (blue dots) and *O. cristinae* (grey dots). (Brandmayr et al. 2007, modified).

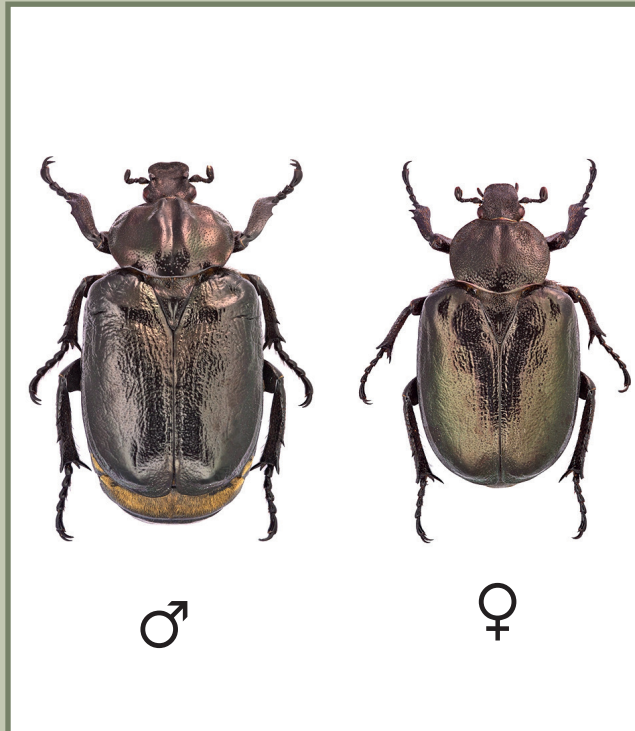


Fig. 2 Habitus of *O. eremita* male and female (Photo A. Ballerio).



Fig. 3 Typical habitat consisting of a senescent hollow tree (Photo E. Maurizi).



Fig. 4 *O. eremita* larva habitus (Photo S. Dourlot).

## Ecology

*Osmoderma eremita* is an obligate saproxyllic beetle, strictly dependent on the presence of dead wood in mature hollow trees (Figure 3). The larvae mainly develop in oaks, but also in chestnuts, limes, willows, beech and fruit trees. The females oviposit from 20 to 80 eggs in the hollows of trunks of moribund trees, in which the larvae (Figure 4) live from 2 to 4 years, digging into the wood mould in the tree cavity. At the end

of the life cycle, larvae (about 75 mm long) build an oval cocoon formed from their excrement and fragments of wood. During the summer months (early July to early August), adults emerge and are active for about 20-30 days (males) or at most 90 days (females), flying no more than a few hundred metres (100-250 m) in the surrounding area. Adult males emit a pheromone, attractive for females, that has a distinctive and intense smell, similar to fermented fruit (such as peach or apricot).



Description of the method

One week before monitoring, attach the Black Cross Window Traps (BCWT) to tree branches (about 2.0-2.5 m high), map and number these with a GPS (Figure 5, Table 1). Activate the traps the day before the start of the monitoring, removing the lid from the collector and inserting into the panel a tube containing a cotton roll immersed in 1.2 ml of pheromone. Check the traps every two days and change the pheromone tubes once a week. At the beginning and at the end of each check, note date, time and weather conditions on the field-sheet (Table 2). During the check, count and photograph the captured individuals in each trap - distinguishing males from females - and note the data on the field-sheet. Immediately, release the individuals on the tree and go to the next BCWT. At the end of the monitoring season, deactivate the traps by closing the collectors with their lids and by removing the pheromone tubes.



Fig. 5 Pheromone Trap (BCWT) for collection of *O. eremita*. A. Trap equipped with a tube containing pheromone, B. Positioning on a branch of a tree, C. Inserting the funnel into the collector, D. a hermit beetle caught at the bottom of the collector (Photo by E. Capogna A-B, F. Bernardini C-D).

Tab. 1 Monitoring protocol of *Osmoderma eremita*

Method	pheromone trap (or Black Cross Window Trap)*
Number of traps	30 BCTW for each site
Placement of traps	random or along transect or in a grid (500 x 500 m)
Distance between traps	100 m
Monitoring period	July - September
Number of surveys	23
Frequency of surveys	every two days
Time of the day	09:00-18:00
Number of operators	2
Hours per person	24
Equipment	GPS, clip-board, field-sheet, pencil, clock, plastic Eppendorf vials with pheromone, cotton dental rolls, tweezers, camera, pole with a hook (e.g. clothes hanger as reacher)

\* **Material for building one BCWT:** 2 black panels (25 x 350 cm), 1 plastic funnel (Ø 30 cm), 1 collector made of a plastic container with a screw cap (vol. 500 ml), 1 hook made from iron wire, 1 small iron wire hook to secure the tube on a panel;  
Commitment: 2 days, 2 operators, 24 hours per person; Construction period: winter and / or spring months before monitoring.



### 3- Field-sheet

[illegible]





\*

# Monitoring of *Cerambyx cerdo*

Systematics and distributions  
Identification  
Ecology

1

Description of the method

2

Field sheet

3

1

**Order:** Coleoptera  
**Family:** Cerambycidae  
**Genus:** *Cerambyx*

## Systematic and Distribution

In Europe there are at least seven species of the genus *Cerambyx*; five are present in Italy: *C. cerdo*, *C. miles*, *C. scopolii*, *C. welensii* and *C. nodulosus*. *Cerambyx cerdo* is present in most of Europe and in Italy is known from all regions, with the only exception of Valle d'Aosta (Figure 1). In many parts of

Italy *C. cerdo* occurs together with its sister-species *C. welensii*.

## Identification

Adults of *C. cerdo* are between 17-56 mm long (without antennae). The body is black, while the tip of the elytra is brown-red. In males the antennae much exceed the length of the body and this allows to tell them from females. *Cerambyx cerdo* is easily distinguished from most other species of the genus *Cerambyx*, which do not possess a tooth at the tip of the elytra; the only exception is *C. welensii* (see identification table).



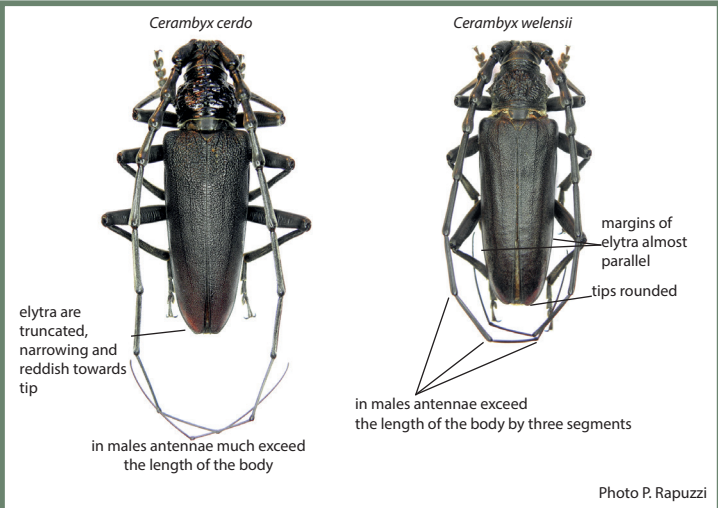
Fig. 1 Distribution map of *Cerambyx cerdo* for Italy (Sama 2007).



Fig. 2 Larva of *Cerambyx cerdo*, photographed inside a gallery (Photo A. Mazzei).

Ecology

*Cerambyx cerdo* is typical for old oak-forests, from the plains to hill-country. The species mainly colonises large, old oaks exposed to the sun in rural and urban environments (e.g. parks, tree-lined avenues). In addition to oaks, the species can also develop in other deciduous tree species. The main factors that render a tree suitable for colonisation by *C. cerdo* are: reduced vitality,



	<i>C. cerdo</i>	<i>C. welensii</i>
ELYTRA	Almost without hairs and shiny black; narrowing towards the tip; apices of the elytra are truncated and of reddish colour.	Entirely brown and covered with thin white or yellow setae; margins almost parallel; tip of elytra rounded.
ANTENNAE	In males, much longer than the length of the body. In females, antennae reach 2/3 of the length of the elytra.	In males, longer than the body by three segments. In females, antennae reach 1/2 of the length of the elytra.



Fig. 3 Exit holes created by *Cerambyx cerdo* (Photo L. Redolfi De Zan).

large diameter of the trunk (greater than 50 cm) with thick bark and exposure to direct sunlight. The larvae (Figure 2) are xylophagous and develop in 3-4 years in the wood of the trunk or in large branches. The adults emerge (Figure 3) in spring-summer, can live for up to two months and feed on sap oozing from trees and on ripe fruit. Adults are active mainly during the night and can be observed from May to August.



### Description of the method

The baited traps used for *C. cerdo* consist of two jars; the upper one is the capture chamber and the lower jar contains the liquid bait. The material required for building a trap consists of: two HDPE plastic jars (1000 cm<sup>3</sup> each) with screw caps, a 10 cm diameter funnel and a metal mesh (mesh size 2x2 mm). Holes with a diameter of 76 mm need to be cut in the screw caps and in the bottom of the upper jar. Traps are assembled by attaching a perforated cap with 4 screws to the perforated bottom of the capture chamber. The metal mesh needs to be inserted between the two pieces, which prevents the captured individuals falling into the liquid bait. The tip of the funnel is cut, creating a bottom hole with a diameter of 4 cm. This funnel is attached to the second perforated cap and then screwed on to the capture chamber. The bait mixture consists of 50% red wine and 50% white wine, with the addition of 220 g of sugar, for a final volume of 500 cm<sup>3</sup>. The mixture should be prepared one week before the trap is activated in order to obtain a liquid with an appropriate degree of fermentation and to allow the



Fig. 4 Positioning of a pair of traps, at the two heights specified A. over a branch higher than 10 m; B. at the trunk at 1.5 - 2 m; C. details of the modified lid with funnel and the modified capture chamber (Photo M. Bardiani).

sugar to dissolve completely. Traps are arranged in pairs on oaks (Figure 4). Monitoring is carried out by checking the traps (between 08:00 and 11:00) three times a week for a total of five weeks. Traps are activated on Monday and are checked in three consecutive mornings (i.e. until Thursday). The number of captured adults is registered on the field-sheets provided. Each week, after having checked the traps for the third time, these are temporarily deactivated, by closing the jar with a lid and removing the one modified with the funnel (Table 1).

Tab. 1 Monitoring protocol of <i>Cerambyx cerdo</i>	
Method	Baited trap
Number of baited traps	20 traps for each site
Number of trees	10 (along forest roads or pathway)
Position on tree	One trap on the trunk (1.5–2 m high); the other on branches (over 10 m high)
Distance between trees with baited trap	At least 100 m
Monitoring period	June-July
Number of weeks	5
Number of surveys	15
Frequency of surveys	Three per week
Time of the day	08:00h - 11:00h
Number of operators	2
Hours per person	40
Equipment	A clipboard, a field-sheet, a pencil, GPS, a rope, two replacement jars, bottles with mixture (wine-sugar)



3- Field-sheet



Study area \_\_\_\_\_ Date \_\_\_\_\_ Operator name \_\_\_\_\_ Survey \_\_\_\_/15 Start time: \_\_\_\_\_ End time: \_\_\_\_\_

High Trap					Low trap				
	Check	Sex	Captures	Notes		Check	Sex	Captures	Notes
1		M			1		M		
		F					F		
2		M			2		M		
		F					F		
3		M			3		M		
		F					F		
4		M			4		M		
		F					F		
5		M			5		M		
		F					F		
6		M			6		M		
		F					F		
7		M			7		M		
		F					F		
8		M			8		M		
		F					F		
9		M			9		M		
		F					F		
10		M			10		M		
		F					F		





# Monitoring of *Rosalia alpina*

Systematics and distributions  
Identification  
Ecology

1

Description of the method

2

Field sheet

3

1

**Order:** Coleoptera  
**Family:** Cerambycidae  
**Genus:** *Rosalia*

## Systematic and Distribution

*Rosalia alpina* is the only European representative of the genus *Rosalia*. The species occurs in the mountainous regions of central and southern Europe and in the north up to southern Sweden. The species is also present in Turkey, Syria and in the Caucasus

region, although it is absent from Great Britain and Holland. In Italy, *R. alpina* is distributed in the Alps and Apennines, throughout the mainland and in Sicily, always with localised populations (Figure 1).

## Identification

Adults of *Rosalia alpina* are beautiful and unmistakable for their ash-blue background colour, with black spots on the prothorax and elytra (Figure 2); antennae are long with tufts of blue hairs towards the apex of each segment. The length of adults varies from 15 to 38 mm.



Fig. 1 Distribution of *R. alpina* in Italy (Sama 2007).



Fig. 2 Adult of *R. alpina* (Photo P. Buonpane).



Fig. 3 Example of habitat of *R. alpina* (Photo S. Rossi De Gasperis).

## Ecology

The species reproduces exclusively in dead or dying trees and in dead parts of healthy trees and stumps (Figure 3). *Rosalia alpina* is characteristic in mature and thermophilic beech forests, from the mountainous belt to the alpine region (between 500 and 1500 m a.s.l.) on south and south-west facing slopes. The species is also present in mesophilic mixed forests, without a dominance of beech which may even be absent. In these cases, the dominant tree is *Acer pseudoplatanus*, although *Fraxinus excelsior*, *Tilia platyphyllos* and *T. cordata* may also be

present. In Central Europe, the xylophagous larvae normally develop in beech wood (*Fagus sylvatica*), though less frequently in other tree species. However, in southern Europe, they can also develop in the wood of other tree species such as white willow (*Salix alba*), common hazel (*Corylus avellana*), sweet chestnut (*Castanea sativa*), common ash (*Fraxinus excelsior*), small-leaved linden (*Tilia cordata*), common hornbeam (*Carpinus betulus*) and, in one case, a larva was observed in a dying oak tree. Relatively little is known about ecological preferences of *R. alpina* in the southernmost areas of its distribution.



Description of the method

Monitoring consists of searching and counting individuals of *Rosalia alpina* on selected trees. A total of 15 trees must be chosen, these being dead or partially dead and their trunks must have a minimum diameter of 30 cm (measured at breast height). These trees need to be exposed to direct sunlight, at least during the central hours of the day and must be easily accessible by the operators. The selected trees should be relatively close to each other, best if connected by a single path. It is advisable to search the entire forest for suitable trees before defining those to be monitored. The selected trees must be checked once a week, during the period of peak activity of *R. alpina*, exclusively in days with no rain and with an average daily temperature above 20° C. In case of bad weather, the field-work should be postponed to another day of the week. The interval between successive monitoring sessions should be 5–9 days. The searches are carried out by two operators simultaneously, examining the surface of the trunks for about 1-2 minutes (large diameter trees require relatively longer time). It is important that the operators communicate with each other to avoid double counting some individuals. They also need to check large cracks and cavities for adults. The upper part of the trunk should be searched with binoculars. All sighted individuals are to be reported on the appropriate field-sheets (Section 3).



Fig. 4 Example of a tree to be monitored (Photo Archivio MIPP).

Tab. 1 Monitoring protocol of *Rosalia alpina*

Method	Searching wild trees (dead or partially dead)
Number of trees	15 for each site to be monitored
Position of trees	Along transects
Distance between trees	50 m - 300 m
Monitoring period	July-August
Number repeats	5
Frequency of surveys	Once per week
Time of the day	11:00 - 15:00
Number of operators	2
Hours per person	10
Equipment	A clipboard, a field-sheet, a pencil, a clock, binoculars and GPS



### 3- Field-sheet



Study area: \_\_\_\_\_

Year: \_\_\_\_\_

Tree ID	Survey_1	Survey_2	Survey_3	Survey_4	Survey_5
	Date (mm/dd)	Date (mm/dd)	Date (mm/dd)	Date (mm/dd)	Date (mm/dd)
	Surveyor name(s)	Surveyor name(s)	Surveyor name(s)	Surveyor name(s)	Surveyor name(s)
	Start (hh:mm)	Start (hh:mm)	Start (hh:mm)	Start (hh:mm)	Start (hh:mm)
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
	End (hh:mm)	End (hh:mm)	End (hh:mm)	End (hh:mm)	End (hh:mm)

Notes:





# Monitoring of *Morimus asper*

Systematics and distributions  
Identification  
Ecology

1

Description of the method

2

Field sheet

3

1

**Order:** Coleoptera  
**Family:** Cerambycidae  
**Genus:** *Morimus*

## Systematic and Distribution

The taxonomy of the genus *Morimus* is complex and unresolved. Until some years ago, the European populations of this genus were divided into five species; and only *M. funereus* is listed in Annex II of the Habitats Directive. Today, several authors consider *M. asper* and *M. funereus* as subspecies of *M.*

*asper*. In Italy, *M. asper* is present in all regions, including the major islands (Figure 1).

## Identification

Adults of *M. asper* measure 15-40 mm and have an elongated-oval body. The elytra are fused, with a grainy look and are typically dark grey or opaque black. Each elytron bears two black spots but these can be hardly visible in individuals with a dark background colour. This background colour differs amongst the various taxa throughout the species range (e.g. *M. a. asper*: dark, almost black; *M. a. funereus*: light grey with obvious spots). A conspicuous sexual dimorphism exists in the

antennal length of *M. asper*, as in many other longhorn beetles. Male antennae exceed the

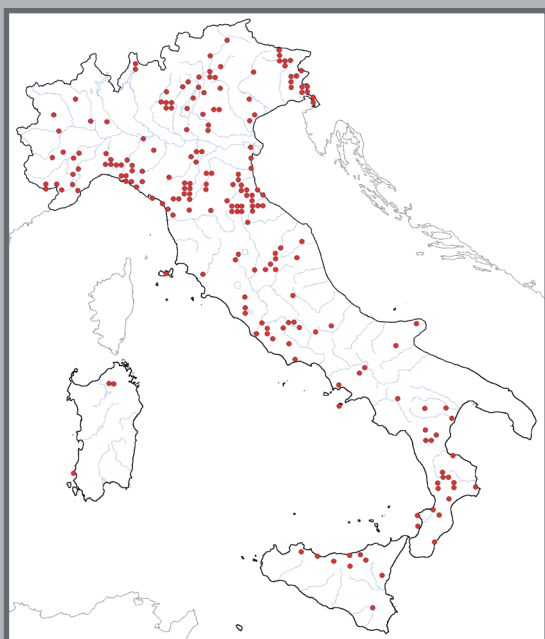


Fig. 1 Distribution map of *Morimus asper* in Italy (Sama 2007).



Fig. 3 The typical habitat of *Morimus asper*: trunks and stumps of recently fallen trees in an old-growth forest (Photo M. Bardiani).

## Ecology

*Morimus asper* is a silvicolous, xylophagous and saproxylic species, which live in old-growth deciduous and mixed forests (mainly beech and oaks) with a medium-high density of dead wood (e.g. standing dead trees, stumps, trunks on the ground but also wood piles and logs with a diameter greater than 13 cm; Figures 3 and 4). *M. asper* lives over a wide altitudinal range in Italy: 0 - 1800 m a.s.l. Females lay more than 100 eggs in dead wood and the larvae develop in 3-5 years. Larvae of the last stage create pupal cells in the wood, up to 8 cm in length.

length of the body, female antennae are at most as long as the body.

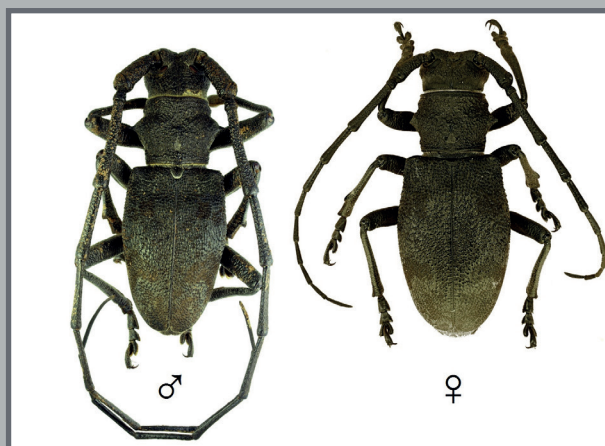


Fig. 2 Sexual dimorphism in *Morimus asper* (Photo by Federico Romiti).



Fig. 4 An individual of *Morimus asper funereus* on freshly cut trunks (Photo S. Hardersen).

The pupa matures in just over 20 days. The fresh adult remains inside the pupal cell for another 14-20 days, prior to emergence, producing a circular exit hole of 8-12 mm in diameter. In Italy, adults are active from late March to mid-July in the lowlands. In the mountains, activity lasts from mid-May to early August. Adults are most active in the evening/night. Males and females of *M. asper* are able to overwinter and can survive for more than a year (life-span can exceed 400 days in the wild). Adults are flightless and have a very limited dispersal capacity: generally, less than 100 m and rarely, more than a few hundred metres (up to 450 m).



Description of the method

Seven wood piles (with a volume of 0.3 m<sup>3</sup>) must be used, made from trees (trunks or branches) which had recently fallen or from freshly cut trees (Table 1). The individual logs should be positioned in 2-4 layers, have a diameter between 13-45 cm and a standard length of 60 cm (Figure 5). The protocol: i) use the dominant native hardwood timber present in the study area (if present: beech, oak or hornbeam); ii) arrange 7 wood piles along linear transects with a distance of 100 m between them; iii) take note of date, time, temperature and name of operators at the beginning and the end of each check, (Section 3); iv) two operators simultaneously searching for *M. asper* by sight on the surface of the wood pile, amongst the logs and at the base of the pile (using a torch); v) the operators switching sides and thus each operator checking the entire wood pile again; vi) count individuals collected, specifying the number of males and females on the field-sheet (Section 3); vii) release individuals on the same log pile; viii) check wood piles after 20:00, once a week, for five weeks, beginning when *M. asper* starts being active (April - May).



Fig. 5 A wood pile, built from freshly cut beech, used for monitoring *Morimus asper* (Photo S. Hardersen).



Fig. 6 Two operators simultaneously searching for *Morimus asper* (Photo M. Maura).

Tab. 1 Monitoring protocol of *M. asper*

Method	Freshly cut log piles
Number of log piles	7 for each site to be monitored
Placement of log piles	Along transects
Distance between log piles	100 m
Monitoring period	April-July
Number repeats	5
Frequency of surveys	Once per week
Time of the day	20:00-24:00
Number of operators	2
Hours per person	5
Equipment	A clipboard, a field-sheet, a head torch, a pencil, a clock, holding box for beetles, two kneepads



### 3- Field-sheet



Date

Time of start

Time of end

Site

## Temperature

## Operators

[illegible]



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SAPIENZA  
UNIVERSITÀ DI ROMA



European Workshop  
24<sup>th</sup> - 26<sup>th</sup> May 2017, Mantova - ITALY



Conference for managers of Italian reserves  
29<sup>th</sup> May 2017, Mantova - ITALY