





Dormouse Project. Monitoring of the edible dormouse *(Glis glis)*

Dormouse Project. Monitoring of the edible dormouse *(Glis glis)* with nest boxes



Dormouse Project. Monitoring of the edible dormouse (*Glis glis***) with nest boxes** Version 2 (November 2020)

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INTRODUCTION

The Dormouse Project

This initiative focuses on the population monitoring and study of the edible dormouse (Glis glis) in Catalonia and in different parts of the Iberian Peninsula.

It has a monitoring programme coordinated by the Natural Science Museum of Granollers, as well as a broad network of stations and collaborators that enable a permanent collection of data.

What is it intended to achieve?

- To know the population variations of this species and their causes related to changes in the climate and the environment by means of a simple methodology.
- To strengthen the network and collect data on the species throughout its distribution in the Iberian Peninsula.
- To define key aspects of its demography (survival, fertility, etc.).
- To establish the main threats to the species within the framework of the process of global change (climate and land use change, etc.).
- To obtain data on the species in those areas at the limit of its distribution.
- To provide information for a forest management that is more compatible with biodiversity.
- To publicize the species in order to raise public awareness and invite volunteers to participate in the monitoring programme.
- To collect data on other species that share the habitat with the edible dormouse.

Who is the edible dormouse (*Glis glis*)?

The edible dormouse is a rodent that is distributed practically throughout all Europe, associated with the presence of deciduous forest.

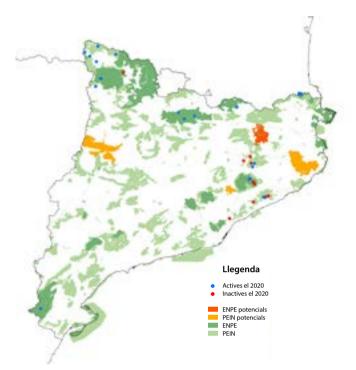
In the Iberian Peninsula, it is restricted to the northern Eurosiberian strip, between 50 and 2000 metres of altitude and a rainfall range between 525 and 1850 mm per year. Its presence is usually associated with beech and oak forests, which have a greater supply of natural cavities than young forests.

It is mainly vegetarian with a singular dependence on nuts (acorns, beechnuts, hazelnuts, etc.).



Why the edible dormouse?

- Iberian populations have been negatively affected by the low availability of natural cavities derived from the intensive forest exploitation until the mid-20th century.
- Its specialist and hibernating nature makes it a very sensitive species to environmental changes and habitat disturbance.
- As a small forest mammal, it becomes an important part of the base of the food web in these environments, and a recurrent prey in the diet of emblematic and threatened carnivores, such as the European wildcat (*Felis silvestris*).
- The Iberian Peninsula is the south-western boundary of the European distribution of the species, but its presence in some areas is uncertain due to a lack of information. Monitoring allows us to delimit the real boundaries of its distribution.
- The southernmost populations of the Iberian Peninsula are found in Catalonia. The study of these populations can provide fundamental information on the adaptive capacities of the species in the context of global change, which will reduce the optimal habitat available.
- Despite being a very difficult animal to see in the forest, the nest boxes are an excellent tool for its detection and study, as well as for its dissemination.
- Continuous and systematic monitoring over time allows us to know how their populations fluctuate and how changes in climate and landscape will affect them.
- Monitoring results are an appropriate tool to induce a more compatible and respectful management of the biodiversity linked to forest ecosystems.



Background and monitoring history

Arboreal and nocturnal, the edible dormouse is a very difficult species to see and study, as it rarely comes down to the forest floor during its active period (spring-autumn). Therefore, conventional trapping does not usually provide much information on the species, requiring other sampling systems. The edible dormouse easily occupies wooden nest boxes, which have allowed us to obtain abundant information on its biology and population dynamics in Europe.

The lack of studies in the Iberian Peninsula and the few existing records of this species in Catalonia prompted, in 2004, the beginning of the first monitoring programme in the Montnegre i el Corredor Natural Park.

The good results obtained encouraged, from 2007 onwards, the expansion of the monitoring programme to other areas of the Catalan territory, but also throughout Catalonia, where it currently has 101 different stations in 5 autonomous communities.

In Catalonia, after more than a decade of monitoring, the Dormouse Project is increasingly consolidated with around 30 active stations.

Outreach and awareness-raising

The project is aimed at raising awareness and bringing this species closer to the public, by means of educational activities open to families and naturalists. It also offers activities with a more technical and specialized content, such as courses or training sessions for potential collaborators or people interested in expanding their knowledge.

CREATE A Monitoring Station

Choosing the optimal area

It is necessary to choose a quiet deciduous forest are, with species such as oak, beech, chestnut, hazel, etc. In mature forests, with old trees, it should be considered that the reinforcement of nest boxes might be ignored by edible dormice due to the high availability of natural holes. In forest areas with less availability of natural cavities, nest boxes will be much more useful for this species.

It is recommended that the trees chosen to support the nest boxes are live specimens of a deciduous fruit-producing species, as edible dormice often obtain food from the same tree where they nest. In order to install the nest box correctly, it is important that the selected tree has a diameter of more than 25 cm.

It is important that the area chosen for the installation of the nest boxes is out of reach of regular forest harvesting, as this activity directly affects edible dormouse populations and the monitoring with nest boxes. It is recommended to look for locations on public land within protected areas, where the managers of the chosen area should be informed of our intention beforehand. In the case of private land, it is always necessary to contact the owners.

It is essential that the person interested in creating a station contacts the project coordination beforehand by **emailing info@dormice.org** and informs them of the proposal. In this way, it will be possible to jointly assess the most suitable area.

Nest boxes

The nest boxes for edible dormice are made of spruce or pine wood and have a resinous coating of non-toxic vegetable origin that provides plant-based, non-toxic resin coating, which offers protection against water and a more natural colour. The dimensions of these boxes are 30x15x15 cm, with a thickness of 2 cm and an entrance hole of about 5.8 cm in diameter. (Annex 2)

Unlike other nest boxes, this model is installed with the entrance hole facing the tree trunk. This makes it more difficult for predators to access the nest and reduces bird occupancy.

Installing the nest boxes

The basic sampling unit is the fixed linear nest box stations, which contain 6 nest boxes each. The total length of the station or line should be approximately 150 meters, from box number 1 to box number 6. The boxes shall be placed at an equidistant spacing of 30 meters and at a height of between 2.5 and 3 meters above the ground. Within the same area, the minimum distance between stations must be 300 meters, thus they can be considered as independent stations.

"Build or buy your own nesting boxes. Contact the museum" The boxes should be installed between January and April. This gives the edible dormice enough time to find the boxes and familiarize with them after hibernation.

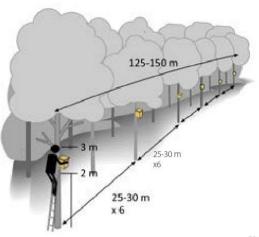
It is possible to take an existing but inactive station. In this case, it is also necessary to contact the project coordination at **info@lirons.org**.

Material needed to install the nest boxes:

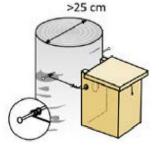
- A minimum of two people is recommended.
- Boxes (6 boxes / station)
- Aluminium folding ladder
- Pliers and hammer
- Schwegler 5x85 mm aluminium spanners (2 spanners / box)
- Plastic coated galvanised wire (1 metre / box) -Leather gloves
- Leather gloves
- Permanent marker
- Pencil
- Station log sheet (see "Cards and resources")
- GPS or mobile device to pick up the station (1 meter / box)
- GPS or mobile device to take the coordinates
- Tape measure to register the perimeter of the trees where the boxes are installed.

Recommendations on the characteristics of the material

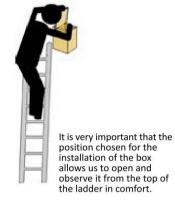
- Ladder: it is recommended to use an aluminium, telescopic ladder that takes up little space in the boot of the car and is easy to manoeuvre inside the forest. For safety reasons, the inspection of the nest boxes should be carried out by at least two people.
- **Nails:** to fix the boxes to the trees, it is recommended to use aluminium nails, as they do not rust and do not cause problems to the sawing machines.
- Wire: galvanized wire coated with plastic, such as the one used in garden fences, should be used.



Installing the nesting boxes:



-Schwegler aluminium nails 5x85 mm (2 nails/box) -Plastic coated galvanised wire (1 meter/box)



Nest box numbering:

Each nest box shall have a number from 1 to 6 according to the position it occupies within the station. This number shall be written on the front or bottom of the box, visible from the ground to facilitate later identification.

Measure the perimeter and determine the species of the supporting tree:

The species of the tree where each box has been placed must be determined and its perimeter measured. By using a tape measure, take the measurement at breast height (approximately 1.5 meters above the ground). This will provide information about the characteristics of the supporting tree.

It is recommended that the trees supporting the nest boxes have a diameter of more than 25 centimeters. The nest box will be well positioned on the trunk, leaving the necessary space for the animals to enter and exit through the hole without having to climb out of it. The information shall be recorded on the nesting box sheet and on the station log sheet.

Nest box logging:

Once the nest boxes are installed, it is essential to fill in the **<u>Station Log Sheet</u>**. Once at home, enter this information in the project website. In the project website section of this protocol, the steps to follow are detailed

CHECK YOUR NEST BOXES

Effort and review period

The boxes are checked a total of 5 times a year.

A **monthly check from July to October between the 15th and 25th** is requested, coinciding with the activity peak of the species in the nest boxes. Moreover, a cleaning check should be performed in June (any day of the month).

Field calendar:

Month of check	Day of check	What it coincides with
June	Any day	Cleaning and repairing the boxes. Great tit leaves the boxes where it has bred. Very occasional occupations of edible dormouse.
July	One day from the 15th to the 25th of that month	First regular occupations. Mating and search for breeding shelters by females.
August		Mating and onset of breeding
September		Reproduction and breastfeeding
October		Dispersal of juveniles and pre-hibernation of adults

Checking methodology

The nest boxes will be checked during the day, as this is when the edible dormice are most inactive and can be found resting inside. The boxes should never be checked in the evening or at night, when the edible dormice start their daily activity, this would complicate their observation and the determination of the current occupancy.

The inspection should be swift and careful, trying to disturb the animals as little as possible.

Data can be collected using two different protocols. Before enrolling the monitoring programme, it is necessary to decide which protocol will be applied:

1. Basic protocol:

The basic or non-manipulation protocol consists of visual monitoring of the nest boxes without direct manipulation of the specimens that we find. This protocol, designed for citizen involvement, allows data collection in a simple way and can be applied by any person or group without previous experience.

Steps to check the boxes and collect the data correctly:

- 1. Place the ladder to access the nesting box. It is important that the ladder is well supported and stable to carry out the inspection safely.
- 2. Open the lid of the box and look inside.
- 3. If there is any occupation, determine and count what you see:

a. If there are activity evidence: write down the type of evidence (nest, food, faeces) and what species it belongs to.

b. If any species is present: determine the species occupying the box and count the number of individuals, determine their age (A, Y, J, RP, GP, OEP, E or C) and activity (Ac, T, D, P).

c. In the case of edible dormice, juveniles (J) presence can be determined by their smaller appearance and by the time they appear (these are the young that have already dispersed and have become autonomous individuals). They are found from October to December.

Following the basic protocol without manipulation, it is difficult to differentiate adult individuals (A) from yearlings (Y). In case of doubt, we will classify them all as adults (A).

4. If there is leaf litter or other material inside the box that makes it difficult to see whether there are individuals or not, you can choose to take the box down and inspect it on the ground. In any case, to get a good view of the content of the box, it will be necessary to:

a. Remove leaves (using silicone tweezers or your hands) until you can determine if there are any individuals.

b. Keep the extracted litter in a bag (inspection with the nest box hanging) or make a pile on the ground (inspection with the nest box not hanging).

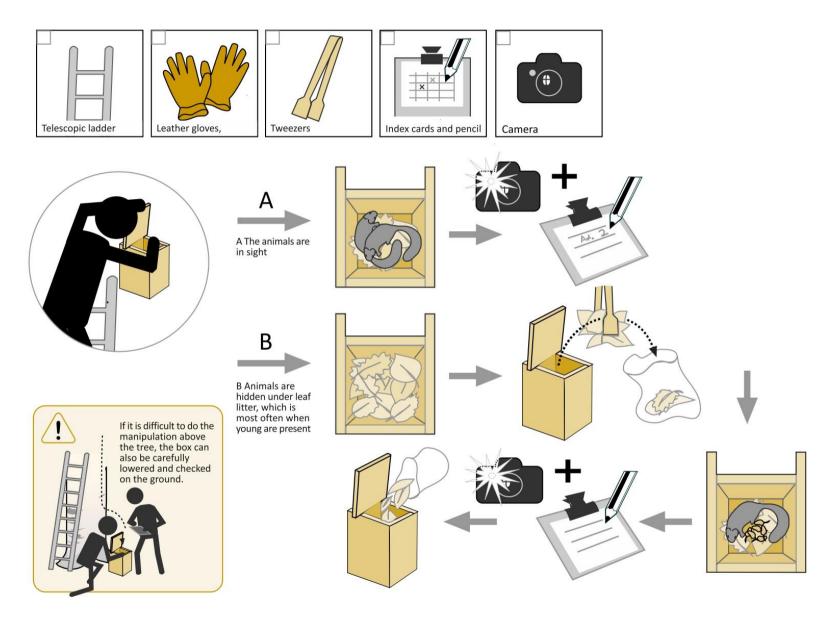
c. Once you are sure that everything has been checked and noted down correctly, place the extracted leaf litter inside the box again.

- 5. Close the box, hang it up if it has been lowered and finally proceed to check the next one.
- 6. All data should be correctly recorded in the **Basic Field Sheet**.

On edible dormouse breeding nests inside nest boxes according to the basic protocol

- Edible dormouse might occupy the boxes occasionally or permanently. When temporal occupations occur (e.g., dispersing individuals), it is difficult to build a nest as the edible dormouse will spend only a few hours in the box. On the other hand, when there are permanent occupations (e.g. breeding females), they tend to build a nest, filling the inside of the box with green and tender leaves, taken in most cases from the same tree where the box is located. When there is a nest with abundant leaf litter that practically occupies the entire inside of the box, it is very likely to become a breeding nest. Each breeding female will have a main nest where she will breed, but she can also have other secondary nests within her territory. The latter are emergency nests, which she uses when for some reason she must leave the main nest.
- Apart from the leaf litter, the presence of the adult female can often prevent the young from being seen. In this case, make sure that all the individuals have been counted and their age class determined. This will provide essential data of births and their reproductive patterns.
- It should be considered that edible dormice are not aggressive by nature, nor do they jump on us or on our hands to bite. The first thing they try to do is to hide or escape from our presence and they only bite in case we catch them in the wrong way.

BASIC PROTOCOL



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2. Advanced protocol:

The advanced protocol involves manipulating edible dormouse specimens to mark them and take biometric measurements for more detailed monitoring.

For this type of survey, a certain amount of training and prior knowledge of how to handle the species is required.

Steps to follow to check the boxes correctly:

- 1. Set up the ladder to access the nest box. It is important that the ladder is stable so that the inspection can be carried out safely.
- 2. Place an artificial plug (cloth) to cover the hole in the box to prevent individuals from escaping before opening the box.
- 3. Open the lid of the box and observe the inside.

The target species is the edible dormouse, therefore, the data concerning this species must be carefully recorded. Apart from the edible dormouse, there might be **other species of interest** occupying the nest boxes and their presence and signs should be noted down (see section Field data collection).

4. If there are edible dormice without young (RP, GP and OEP):

a. The edible dormouse individuals that are present in the boxes at the time of the survey are captured and placed in the cloth bags separately.

- **b.** For each specimen we check whether it is marked (recapture) or not:o:
 - If it is marked, the number is read and the code is noted down in the notebook.
 - If it is not marked, mark it with an ear tag and write down the code in the notebook.
- c. For each specimen, we take the following data:
 - Weight (in grams)
 - Sex (M, F, ND)
 - Age (A, Y, J, RP, GP, OEP, ND)
 - Status (SA, NSA, R, NR, DISP, LAC, T, D, P, Ab, ND)
- 5. If edible dormice with young are present (RP, GP and OEP):

a. The female is first captured and placed in a separate bag from the offspring. Usually there will be only one adult, the mother, but occasionally there may be more than one female. In this case, each female will be in a separate bag.

b. Then the pups are collected and placed together in a bag.

c. Once you get off the ladder, take the data of the pups (weight, sex, age and status). Although they are together in the same bag, individual measurements are taken one by one and, after that, they are placed in another bag. The pups are not marked.

d. Once the data of the pups have been taken and before proceeding with the female, all the pups are returned together to the nest box where they were found.

e. Then proceed to collect data from the female (follow the instructions in point 4 above).

f. When the data from the female have been collected, carefully return it to the nesting box where the pups are.

g. The artificial plug is removed. This step is vitally important, never leave the plug in place.

h. Close the nest box properly.

6. If there is no edible dormouse but there is evidence of occupancy:

a. Note down the types of evidence: nest, food and/or droppings.

b. The material of which the nest is made can be noted in observations (e.g., green oak leaves, dry beech leaves, moss, etc.),

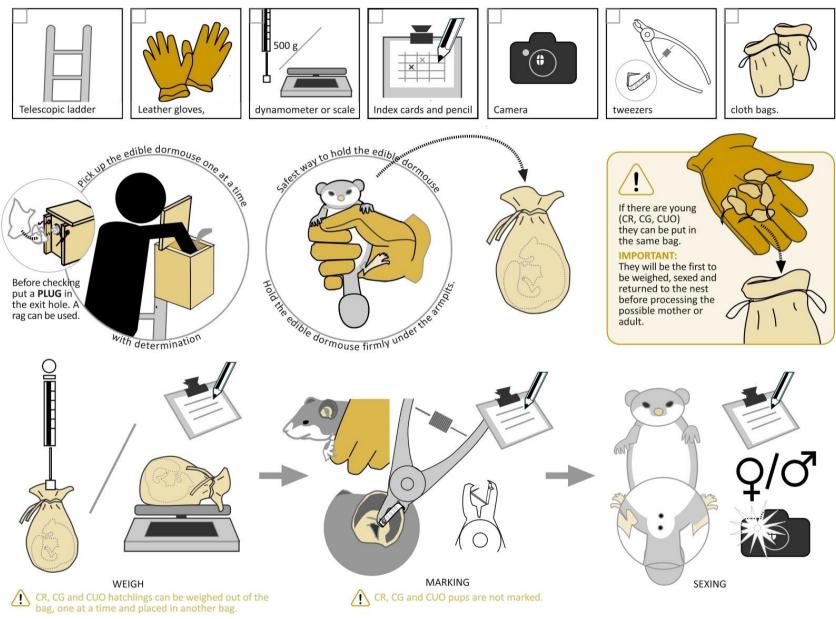
7. If there are no edible dormice or signs of occupation:

a. The artificial plug shall be removed, and the next box shall be checked. CAUTION: Never leave the plug in place.

b. Note down that the box has been checked by marking the status of the box on the record card.

8. All data should be correctly recorded on the **Advanced Field Sheet**.







Data collection in the field

When checking the nest boxes, it is very important to correctly record the data in the Field Sheet corresponding to the type of protocol we are following (Basic Field Sheet or Advanced Field Sheet). A

different sheet should be used for each day of checking and the box status field sheet should always be filled in, so that there is evidence that the box has been checked even if it was empty.

See Annex 1 to know how to determine the phenology and age categories of the edible dormouse, as well as the sex of the individuals.

Occupation by other species:

Apart from the edible dormouse, there might be other species of interest occupying the nest boxes, such as other small mammals, Chiroptera, birds, Lepidoptera or Hymenoptera.

Only edible dormice are manipulated. For all other species, the species name, number of individuals, age, status and reproductive status should be determined with the naked eye or by deduction, or simply omitted if it is not possible to quess.

For further information on the identification of the different species of small mammals and bats that can be found inside the nest boxes, it is advisable to consult the website of the SEMICE project (Monitoring of common small mammals) and the one of the Bat Monitoring Programme. For butterflies, check the CBMS butterfly monitoring. All these programmes are coordinated by the Natural Science Museum of Granollers.

How to differentiate between signs of edible dormice and mice

- Mice generally build a nest with dry leaves that they pick up from the ground.
- Edible dormice build a nest with tender green leaves that they usually take from the same tree where the box is installed or from branches that are very close to the nest box.
- Mouse droppings are very small and cylindrical, and they are never aggregated, unlike those of the edible dormouse, which are usually aggregated to form twisted, black and shiny droppings.
- When eating nuts, e.g., hazelnuts, mice gnaw the fruit in a circle to gain access to the inside of the nut, leaving teeth marks all around the opening. The edible dormouse, on the other hand, usually leaves only a single incisor mark, the result of the jaws being forced open.
- To see images, click here.





On the occupation of birds

- Some birds occupy the nest boxes for breeding. The breeding takes place in spring, so they might occupy the boxes before the edible dormice start using them (usually from July onwards).
- If any active bird nests are detected during the checks, they will be respected. Once they have fledged, the old nest can then be removed.
- Whenever possible, it is recommended to remove old bird nests (see section Personal hygiene and safety) to keep the boxes clean and avoid accumulations of material that could hinder our work of determining recent signs of edible dormice.
- Depending on the time of year, some birds might use nest boxes only for roosting. In this case, only droppings will be observed, easily distinguishable from rodent droppings because they have a whitish part.
- The birds that most frequently occupy the nest boxes are the great tits. This species builds its nest by depositing twigs at the base and providing a large amount of moss to build the rest of the nest.
- To see images, click here.

ENTER Your data

To participate in the project, you need to register at www.dormice.org.

Register a station and its boxes

Once the location of a new station has been decided and communicated, it must be registered on the website portal. Please note that when a new sampling station is registered, it is not automatically displayed in the public part of the website (Explore data) until it has been validated by the project coordination. Once it has been validated, it receives a definitive code and it is automatically visible.

Relocating a nest box

In the exceptional case that a registered nesting box must be relocated (because the tree has fallen or because it is no longer accessible), the old box should be deregistered (including the date when it was found inaccessible) and the new box should be registered with a new location and date of registration (day of installation).

If a box has disappeared (stolen, etc.), but the tree where it was located is still in good condition, it does not have to be deregistered as the new box should be installed in the same place (same tree). In this case, you can simply note down the observation in the comments section when you complete the box status section when entering the overhaul data.

Enter the data from revisions

The data of the field revisions must be entered into the project portal before December.

Quickly, easily and automatically, the data are incorporated into the monitoring database to be validated and visualized.

For security reasons, all field sheets should always be saved.

Downloading data

The platform allows you to explore the data of the entire monitoring network and download the data associated with your stations.

The steps to follow to register a station, log in and download the data can be consulted in the following **tutorial**.



HEALTH AND PERSONAL SAFETY

Cleaning and repairing the boxes

- It is necessary to carry out an annual cleaning check of the boxes.
- It is recommended to clean the boxes during the month of June because at this time, if the boxes have been occupied by birds, the chicks will have already fledged and only the old nests will be found, which can be removed without any problem.
- During the winter, edible dormice do not use the boxes for hibernation. If one is found by chance, it should not be touched, only its occupancy should be noted down.
- During cleaning, it is recommended to take down the boxes and do the operation on the floor in a more comfortable and safer way.
- It is very important to leave the box clean, by removing the old material so that it does not interfere later when determining new clues.
- During this review, it is a good time to repair or replace those boxes that are damaged or missing. Therefore, during the clean-up check, take the inspection material and the tools to repair the boxes (hammer, nails, screws, pliers, wire, etc.).
- Loose

Ethics and personal safety

Precaucions alhora d'instal·lar i revisar les caixes niu:

- This protocol requires installing nest boxes at 2.5-3 meters above the ground with the aid of a ladder. At this height, it is not necessary for the observer to climb higher than 2 meters above the ground.
- If the person wants to climb higher than 2 meters from the ground, it is essential to use the necessary personal protective equipment as described in the relevant legislation.
- Ensure you have the permits and/or authorizations from the different administrations and bodies responsible for the management of the natural area where you are working, as well as specific licenses for the activity you are carrying out, when necessary, in force.
- Notify the owners of the properties where the work is being carried out and explain the project to neighbours who might be curious about the boxes.
- The monitoring of wild fauna is always carried out with the utmost respect and care in order to disturb the animals as little as possible.
- Make sure you have an insurance policy. If you do not have a personal or work insurance that covers these tasks, please contact the Natural Science Museum of Granollers at the beginning of the year.

Basic hygiene rules:

- Always carry a first aid kit with basic disinfection products (iodine, hydroalcoholic gel, plasters, etc.).
- Always use work gloves (leather, nylon and polyurethane or similar) to avoid direct contact with excrement, urine and blood.
- Keep tetanus vaccination up to date.
- Do not eat or smoke during check-ups.
- Clean hands with soap and water or with hydroalcoholic gel.
- Wash equipment (tools, bags, rags, etc.) after each day.

Precautions in the presence of Hymenoptera:

- On rare occasions they may occupy the nest boxes.
- If, when approaching a nest box, you notice the presence of bees or wasps around it, do not go up to check the box to avoid exposing yourself to stings.
- If the presence of hymenopterans is detected once the nest box has been opened, it must be closed quickly to avoid disturbing the nest.
- In no case should the identification of the hymenopteran species be prioritized over the personal safety.
- The nests of the native European hornet (*Vespa crabro*) can be confused with the nests of the invasive Asian hornet (*Vespa velutina*).
- In the case of the Asian hornet (*Vespa velutina*), a primary nest may occasionally be found inside the nest box. Their stings are not more dangerous than those of native wasps.

What to do in case of attack?

When touching or coming very close to a nest, one or more workers may emerge to deter the intruder without stinging them. If the disturbance on the nest persists, a group attack by many workers may occur, resulting in many stings. Flee quickly whenever possible and without hesitation.

What to do in case of a sting?

Asian hornet stings are painful due to the large size of the stinger, but they are not more dangerous than those of native European hornet. Most people who are stung by Asian hornet have local symptoms of pain, redness and swelling of the area, which disappear after several days.

- If the reaction is normal:

- 1. Wash the area with soap and water and apply ice or cold water if possible.
- 2. During the first moments of the sting, you can try to denature the components of the venom by applying heat to the sting.
- If an allergic reaction occurs:

Allergic people may experience general symptoms such as itching all over the body, a rise in body temperature, low blood pressure, respiratory problems, cardiovascular problems, and other serious symptoms. In case of multiple stings, the inoculation of venom can also cause these symptoms. If an allergic reaction is observed after an Asian hornet attack, without losing your composure but urgently, call 061 or go as soon as possible to a medical center to receive appropriate treatment, as these symptoms can be very serious and even lead to anaphylactic shock.

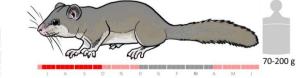
For more information, consult the following **protocol**.

Addresses and links of interest

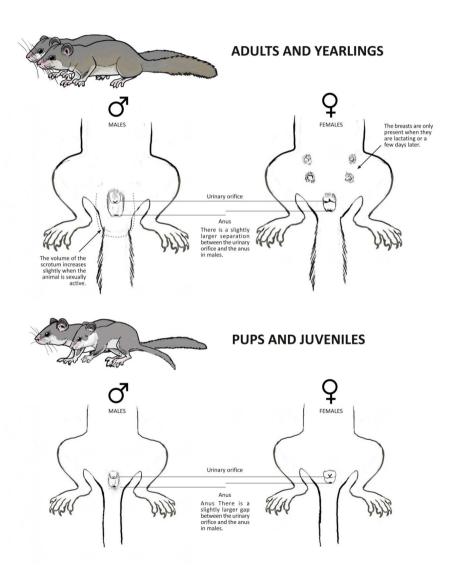
- Natural Science Museum of Granollers
- Dormouse Project
- Monitoring of common micromammals in Spain (SEMICE)
- Bat Monitoring Programme
- <u>Catalan Butterfly Monitoring Scheme</u>
- Atlas and Red Book of the terrestrial mammals in Spain
- Virtual guide to the signs of the mammals of the Iberian Peninsula, Balearic and Canary IslandsSEO BirdLife

ANNEX

AGE CLASSES OF THE EDIBLE DORMOUSE Glis glis Rose pup (CR) 0-4 dies à 2-5 g N PA G A M Grey pup (CG) 5-14 dies Phenological chronogram* Ň (Each box= one week Probability of finding animals in this stage) Maximum probability à Lower probability. Locally 5-20 g None found Hibernating A ON DGFMA M O.N.D. Months Open-eyed pup (CUO) 14-30 days It should be noted that It should be noted that phenology may vary according to environmental conditions of the year and geographical region. Weight The size of the weighs drawing is directly proportional to the average weight of the 15-35 g 6-20 g Indicates the range of weights that can overlap in different stages S O N D G F Pet 1 A M A stages Juveniles (J) From 1st month to 1st hibernation Zn 35-100 g and second s M D G Rd A Yearlings (Y) First year, after the first hibernation 66 400 GGG 60-150 g J A S O N D G F M A M Adults (A) From the second year onwards



SEXING OF THE EDIBLE DORMOUSE Glis glis



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