

Reptilewatch JE Level 2 widespread reptiles handbook

Thank you for your interest in volunteering to be part of this project. Reptilewatch JE is an island-wide effort to record Jersey's reptiles, with the aim of detecting changes in their conservation status. By taking part, you will also be helping us to improve our knowledge on the distribution and habitat requirements of Jersey's reptiles and other species. It's also a good opportunity for you to spend some time in nature too!

In this handbook you will find out everything you need to know to become a Reptilewatch JE surveyor.

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Level 2 widespread reptile surveys

Please note that you must have completed training to carry out Level 2 surveys.

Where to survey

You can either survey a site of your choice or one provided to you by Natural Environment. If you survey a site of your own choice, you will need to arrange landowner access (see below), whereas sites provided by the coordinator will already have landowner permission arranged. Sites will be assigned to 500 m squares to help ensure there is a representative distribution of sites being surveyed across the island and to allow results to be compared against previous years.

Arranging landowner permission

If you have chosen your own site, you will need to identify and contact the landowner to arrange permission. They can often be identified by making local enquiries or by speaking to Natural Environment. A template introductory letter for requesting landowner permission is available from Natural Environment. Speaking with the landowner will also give you an opportunity to identify car parking locations, safety issues, where refugia may be laid (if allowed) and to build a relationship with them. A long-term aim of Reptilewatch JE is to gradually build the number of sites that can be accessed and repeatedly surveyed each year.

When to survey

Time of year: Jersey's reptiles can be active between March and October; relying on heat from the sun to regulate their body temperature. There is a greater chance of seeing reptiles in the spring (April to June) and autumn (mid-August to mid-October) when the cooler weather means they have to bask for longer. In comparison, they do not need to spend much time in the open during the hottest summer months to get enough heat.

Time of day: The best time of day to find reptiles depends on the weather, but peaks of activity are generally during the morning and afternoon. As the days get hotter and longer, the time that reptiles may be visible whilst basking becomes reduced and shifts further towards earlier in the mornings and later in the afternoon. Good conditions for spotting reptiles include days with sun or partial cloud with temperatures between 10 and 20°C. Strong wind and heavy rain are generally bad conditions for looking for reptiles, but

sunny periods after rain can be productive. Long periods of hot dry weather are not favourable, though you may still find green lizards and wall lizards in these conditions.

Number of surveys: You should aim to survey your site **six** times between March and October in suitable weather. If possible, conduct three visits in spring (April–June) and two in autumn (mid-August to mid-October). If you wish to, you can carry out more than six surveys.

Which species to record

You should record any observations of Jersey's four native reptiles (see the *reptiles of Jersey ID guide*):

- green lizard (*Lacerta bilineata*)
- wall lizard (*Podarcis muralis*)*
- slow worm (*Anguis fragilis*)
- grass snake (*Natrix helvetica*)*

*Due to their restricted distributions, wall lizards and grass snakes may be encountered infrequently and so are additionally surveyed through other efforts.

If you see any non-native reptiles (e.g. terrapins, corn snakes) you should also record these.

If you have received training and feel sufficiently competent, you can opt-in to record some supplementary species. These are most likely to be encountered under refugia, and consist of four groups:

1. Small mammals
 - a. Bank vole (*Myodes glareolus* ssp. *caesarius*)
 - b. Wood mouse (*Apodemus sylvaticus*)
 - c. Lesser white-toothed shrew (*Crocidura suaveolens*)*
 - d. Millet's, Common or French shrew (*Sorex coronatus*)*
2. Cockroaches (Family Ectobiidae)
 - a. Tawny cockroach (*Ectobius pallidus*)
 - b. Lesser cockroach (*Ectobius panzeri*)
3. Beetles (Order Coleoptera)
 - a. Glow worm (*Lampyrus noctiluca*)
 - b. Lesser stag beetle (*Dorcus parallelipipedus*)
4. Butterflies and moths (Order Lepidoptera)
 - a. Family Lasiocampidae
 - i. Drinker (*Euthrix potatoria*) – larva only
 - ii. Fox moth (*Macrothylacia rubi*) – larva and cocoons
 - iii. Oak eggar (*Lasiocampa quercus*) – larva and cocoons
 - b. Subfamily Arctiinae (Tigers and ermines) – larva and cocoons
 - c. Shoulder stripe (*Earophila badiata*) – adults

*The two shrew species can be difficult to distinguish from one another in the field as they rarely stay still when disturbed. Therefore, we recommend you simply record them as 'shrew species'.

ID guides for many of these species are available on the [JARG website](#) and further information is available in the [identifying supplementary species](#) section of this handbook.

How to survey

Equipment

You will need:

- ☐ a Reptilewatch JE Level 2 widespread survey form
- ☐ a pen or pencil
- ☐ a mobile phone (for use in the event of an emergency)
- ☐ 10–20 artificial refugia (available from Natural Environment, Howard Davis Farm, Trinity)

Optional (recommended):

- ☐ a camera (a smart phone camera is fine)
- ☐ species ID guides
- ☐ Global Positioning System (GPS) / GPS phone app that allows you to record coordinates
- ☐ map of survey site

The camera will allow you to take pictures of anything you are not sure about, which can help the Jersey Biodiversity Centre check the identification of what you recorded, and also so you can show others what you saw during your survey.

The GPS will allow you to record the precise location of artificial refugia and the start and end points of your survey route sections.

A printed map of your survey site will allow you to mark down your survey route and refugia locations.

Preparation

Once you have chosen your site and arranged landowner permission (if required), carry out the following:

Step 1: Read, complete and return the [Volunteer Working Agreement Form](#).

Step 2: Visit your chosen site during the day at least four weeks prior to surveying to familiarise yourself with the site and assess any risks. Update the [risk assessment](#) as necessary.

Step 3: Plan a walking survey route that encompasses the most suitable parts of the site and that will take approximately 1–2 hours to survey (small sites may require less time). A map of the site can be useful for doing this.

Suitable habitats can include long or tussocky grass, heathland, boggy or wetland areas, scrub, bramble, dense herbs, uneven or sloping areas and banks (particularly sunny south-facing areas), forest rides, woodland edges and glades, habitat edges (e.g. where dense bramble and long grass meet), field margins, piles of logs, branches, rocks, rubble, manure or compost, brownfield areas, allotments, 'wild' gardens, roadside verges, track and path edges, hedgerows, dry stone walls, rock/scree and mosaics of vegetation interspersed with small patches of open or bare ground.

Step 4: Lay out 10–20 (small sites may require fewer) artificial refugia at least four weeks prior to surveying along the survey route in areas away from public disturbance and livestock, trying to spread them evenly along the route. Press the refugia in to the vegetation and, if possible, leave them for a few weeks to bed in before carrying out your first survey. It can be helpful to plan this route ahead of your visit using online maps, and to discuss it with the landowner or manager in case there are areas they would like you to avoid. When you lay out the refugia, it is useful to record their location either by marking them on a map or recording their coordinates using the GPS. Your refugia can be recorded on the 'refugia list' on the survey form so that you can keep track of which ones you have checked on each survey. Recording their location will help you find them in future, especially if they become obscured by vegetation, and it will also mean that other surveyors and landowners can locate them if needed. You should inform the landowner or land managers of where you have placed your refugia in case any areas are scheduled for management such as mowing or grazing, which may result in damage to the refugia and to equipment, or the harm of livestock.

Step 5: Fill in your contact details and record the site details (name, location).

Step 6: Assess the connectivity and patch size of reptile habitat at your survey site.

Step 7: Carry out a habitat assessment along your survey route and divide it in to sections based on the habitat type (Figure 1), recording the length of each survey route section (see Table 1). The habitat classifications can be found in the [habitat assessment](#) section of this handbook, and in the additional [resources](#). If you are able to, record the coordinates where the route sections start and end. When you fill in your forms online you will need to draw your survey route on the map. It is also useful to note which route section each of your refugia are within. If you need assistance with this, please contact your coordinator or an experienced surveyor.

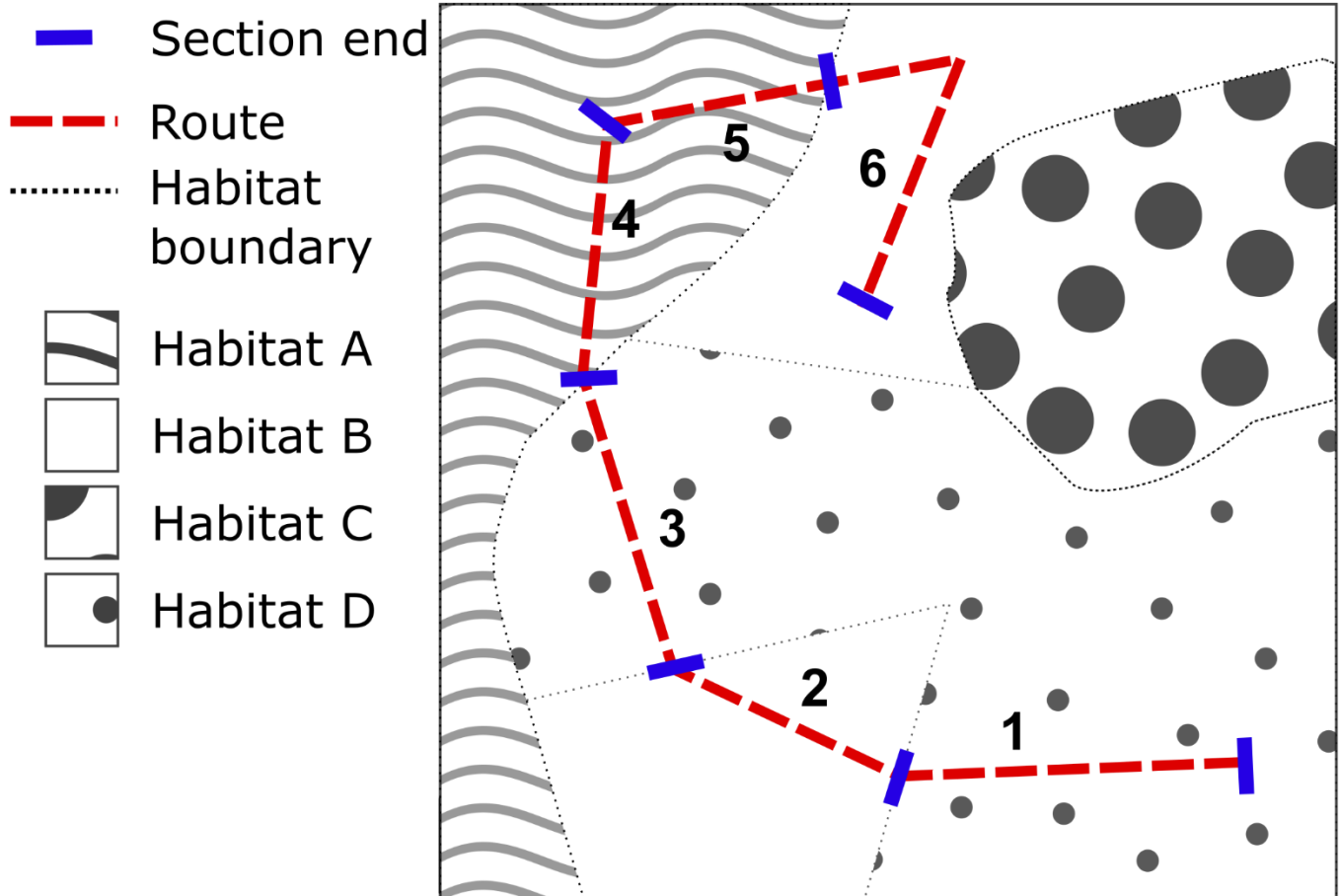


Figure 1 Example map showing a reptile survey route split in to sections based on habitat type.

Table 1 Example survey route section table.

Section number	Length (m)	Section habitat type	Habitat code	No. refugia	Section coordinates	
					Start	End
Example	150	Dense scrub	h3	3	49.224204, -2.228506	49.225063, -2.226356
1						
2						
...						
10						

How to survey

Please complete **six** surveys if possible between March and October, carrying out the following steps. If possible, conduct three visits in spring (April–June) and two in autumn (mid-August to mid-October):

- Step 8:** At the start of each survey first record the date, the visit number, start time and cloud cover. Also record which (if any) supplementary species you are recording.
- Step 9:** Spend 1–2 hours visually searching for reptiles along your survey route and check the artificial refugia as you encounter them. If you encounter any pre-existing refugia then you should check those also. When possible, take photos of what you see but be careful not to disturb the habitat and wildlife. It's therefore best to take photos from a distance or to have your camera ready when you lift an artificial refugium. Do not attempt to touch or handle any animals. **Remember**, much of Jersey's wildlife is protected by law, and should not be harmed, taken or possessed, nor should their breeding or resting sites be disturbed.
- Step 10:** Throughout the course of the survey, keep note of which refugia you have checked by ticking them off of the refugia list on the survey form. When you encounter an animal during your survey, record as much of the following information as possible: the time, species, lifestage, sex, quantity, certainty of your identification (**C**=certain, **U**=uncertain), whether the animal was in the open (**O**), under (**U**) or on top (**T**) of a refugium, the route section the animal was found in and where possible, the refugium ID (if on or under a refugium) or location coordinates of where the animal was spotted. If you need help identifying the species you saw, see the species ID guides on the [JARG website](#).
- Step 11:** At the end of the survey you should record the end time, time spent surveying, the average wind speed during the survey using the Beaufort Scale (0–6) (see Table 2) and the rainfall (**0**=none, **1**=yesterday, **2**=earlier today, **3**=during survey) – choosing the most recent applicable option. You should also note the number of both artificial and pre-existing refugia checked.
- Step 12:** [Submit your results](#), **even if you don't see anything**. Absence data is very useful.

Table 2 Beaufort scale for assessing average wind speed on a scale of 0–6.

0	0–1	Calm	Smoke rises vertically
1	1–3	Light air	Slight smoke drift
2	4–7	Light breeze	Wind felt on face and leaves rustle
3	8–12	Gentle breeze	Leaves & twigs in constant motion
4	13–18	Moderate breeze	Raises dust and small branches move
5	19–24	Fresh breeze	Small trees in leaf begin to sway
6	25–31	Strong breeze	Large branches move & trees sway

Safety

It is very important to make sure you are safe at all times during your survey. Avoid surveying areas with uneven or unstable ground. Carrying a fully charged mobile phone is also advisable in case of emergency. A [risk assessment template](#) is available at the end of this handbook which you should modify to your needs. You are under no obligation to participate or complete the survey.

It is best to do your survey with someone else, but if you are on your own then make sure you tell a responsible person where you will be and when you expect to be back. Lone working procedures are described in the [Volunteer Working Agreement](#).

Submitting your results

Once you have finished your survey, make sure you submit your data. The preferred way is online at <http://jerseybiodiversitycentre.org.je>. Alternatively, you can email it to jbc@societe-jersiaise.org or post it to:

Reptilewatch JE
Natural Environment, Growth Housing and Environment
Howard Davis Farm
Trinity
JE3 5JP

If you are carrying out a Level 2 survey, you will need to be invited to fill out the appropriate online forms by your coordinator.

Please only submit your data using one method, as submitting through multiple avenues can lead to information being duplicated.

Resources

The survey forms, species ID guides and all other information needed for completing reptile surveys are available on the Jersey Amphibian and Reptile Group (JARG) website: <https://groups.arguk.org/jarg>.

Survey results can be submitted online to the Jersey Biodiversity Centre (JBC): <http://jerseybiodiversitycentre.org.je>.

Useful links:

Species Identification

Beckmann, B. Identification guide to native earwigs, cockroaches and naturalised stick-insects - <https://www.orthoptera.org.uk/sites/default/files/pdf/Earwigs%2C%20cockroaches%20and%20stick-insects.pdf>

Butterfly conservation - <https://butterfly-conservation.org/>

UK Butterflies - <https://www.ukbutterflies.co.uk/index.php>

Eggs, larvae, pupae and adult butterflies and moths - <http://www.ukleps.org/>

Insects of the Channel Islands Facebook group (Insects) - <https://www.facebook.com/groups/518340844961982/>

Jersey Wildlife Facebook group (all wildlife) - <https://www.facebook.com/groups/225539340841170/>

Other

Amphibian and Reptile Groups of the UK (Up to date guidance for Amphibian and Reptile Groups) - <https://www.arguk.org>

Jersey Amphibian and Reptile Group Surveyors Discussion Page (Facebook) -
<https://www.facebook.com/groups/590112634750709/>

McGowan, D. and Gurnell, J. (2014). Small mammal survey Jersey 2014. Available from
<https://www.gov.je/sitecollectiondocuments/government%20and%20administration/r%20small%20mammal%20survey%20jersey%202014%2020150729%20dm.pdf>

UK Habitat Classification (habitat classification documentation and guidance) -
<http://ecountability.co.uk/ukhabworkinggroup-ukhab/>

Google Maps (maps.google.co.uk) - useful for looking at satellite maps of your site and can also be used to record refugia locations and measure survey route sections using the 'Maps' option after clicking 'Your places' page from the menu.

Habitat assessment

This section gives a detailed explanation of how habitat assessments should be carried out, and the habitat classifications and measurements that Reptilewatch JE uses. This will help us compare surveys across years, assess changes in the habitat over time and calculate which habitats are best for which species.

The habitat classifications

Reptilewatch JE uses 18 habitat classes to define terrestrial and freshwater habitats (Table 3), as described in Level 3 of the UK Habitat Classification Scheme (UK Habitat Classification Working Group, 2018). An additional six classes derived from Level 4 of the UK Habitat Classification Scheme are used to describe built-up areas and gardens in greater detail for wall lizard surveys (Table 3). Further detail on the habitat definitions, their development and relation to other habitat classification schemes are available online at <http://ecountability.co.uk/ukhabworkinggroup-ukhab/>.

How to assess the habitats along a survey route for Level 2 widespread reptile surveys and Level 3 grass snake surveys

Both the intermediate widespread reptile surveys and advanced level grass snake surveys use similar survey methods and the same approach for habitat assessment. This approach is outlined in the steps below:

- Step 1:** Visit your survey site during the day **before** carrying out your first survey and assess the risks associated with surveying it. If laying your artificial refugia on this same visit, then you should aim to do this at least four weeks before the first survey takes place. If you are happy to continue then proceed to the next step.
- Step 2:** Plan your survey route so that it encompasses as much suitable reptile habitat as possible. Level 2 routes should take approximately 1–2 hours to survey, whereas Level 3 surveys may take longer.
- Step 3:** Divide your survey route in to sections according to the **Level 3 habitat type** shown in Table 3.
- Step 4:** Record the details of each survey route section in the **survey route section table** (see an example in Table 1 above).
 - a. Number each section sequentially
 - b. Estimate the length in metres using an online mapping tool (e.g. Google Maps). If you are not sure how, ask your coordinator or an experienced surveyor to assist you.
 - c. Record the section habitat type based on the level 3 classes listed in Table 3.
 - d. Record the section habitat type code based on the level 3 classes listed in Table 3.
 - e. Record the number of artificial refugia in each section.
 - f. If possible, record the start and end coordinates for each survey route section.
 - g. Map your survey route and its sections using the online Jersey Biodiversity Centre form.

Table 3: Habitat classifications for Reptilewatch JE. Classification 3 codes should be used for Level 2 reptile surveys.

Class	Classification 2	Classification 3	Description
Terrestrial	Grassland	g1: Acid grassland	Vegetation dominated by grasses and herbs on a range of lime -deficient soils such as sands and gravels.
		g2: Calcareous grassland	Vegetation dominated by grasses and herbs (on shallow, well-drained soils (soils formed by weathering of chalk, limestone or base-rich rock).
		g3: Neutral grassland	Vegetation dominated by grasses and herbs on neutral soils (e.g. dry hay meadows, pastures and a range of grasslands which are periodically inundated with water or permanently moist).
		g4: Modified grassland	Fast-growing grasses on fertile, neutral soils. Often dominated by rye-grass and white clover. Typically managed as pasture or regularly mown for agriculture or recreation. This is an agricultural improved or semi improved grassland.
	Woodland and forest	w1: Broadleaved mixed and yew woodland	Vegetation dominated by trees (over 5m high when mature). Canopy cover over 25%. Contains at least 20% broadleaved trees (native and non-native) and yew.
		w2: Coniferous woodland	Vegetation dominated by trees (over 5m high when mature). Canopy cover over 20%. Contains at least 80% coniferous trees (native and non-native) with the exception of yew.
	Heathland and shrub	h1: Dwarf shrub heath	Vegetation has a greater than 25% cover of plant species from the heath family or dwarf gorse.
		h2: Hedgerows	A boundary line of shrubs.
		h3: Dense scrub	Patches of shrubs less than 5 meters tall (can contain occasional trees) with continuous (>90%) cover
	Wetland	f1: Bog	Rain fed inundated or waterlogged habitats where peat has formed in the past.
		f2: Fen marsh and swamp	Inundated or waterlogged lowland habitats where water is supplied by ground water or slow moving rain water as it flows through and peat doesn't form.
	Cropland	c1: Arable and horticulture	Arable cropland, commercial horticultural land (nurseries, commercial vegetable and flower plots), freshly ploughed land, annual leys, rotational set-aside and fallow.
	Urban	u1: Built-up areas and gardens	Urban and rural settlements, farm buildings, caravan parks and other man-made structures such as industrial estates, retail parks, urban parkland, waste or derelict ground and urban transport infrastructure
	Sparsely vegetated land	s1: Inland rock	Natural and artificial exposed rock surfaces such as: inland cliffs, caves, quarries and quarry waste.
		s2: Supralittoral Rock	Region of rocky shore including cliffs and slopes immediately above the highest water level.

		s3: Supralittoral Sediment	The region of shore immediately above the highest water level and subject to wetting by spray/wave splash (splash zone)
Freshwater	Rivers and lakes	r1: Standing open water and canals	Natural systems (lakes, meres, pools) and man-made waters (reservoirs, canals, ponds and gravel pits).
		r2: Rivers and streams	Rivers and streams from bank top to bank top.

Table 4 Habitat classifications for Reptilewatch JE, adapted from the UK Habitat Classification (UK Habitat Classification Working Group, 2018). Classification 3 codes should be used for Level 2 and 3 reptile surveys.

Further information is available on the [grassland habitat guidance sheet](#) or from the [UK Habitat Classification Working Group](#).

Identifying supplementary species (see our [ID guides](#) and the information below):

Small mammals

(This information has been sourced from McGowan and Gurnell (2014). Learn more [here](#))

Jersey's small mammals regularly occur under reptile survey refugia. The four species of interest are:

- Jersey bank vole (*Myodes glareolus* ssp. *caesarius*)
- Lesser white-toothed shrew (*Crocidura suaveolens*)*
- Wood mouse (*Apodemus sylvaticus*)
- Millet's, Common or French shrew (*Sorex coronatus*)*

It is unlikely that the two shrew species can be identified from one another during reptile surveys.

Species information summary

	Jersey bank vole	Wood mouse	Lesser white-toothed shrew	Millet's, Common or French shrew
Coat	Reddish / chestnut brown with light cream to dark silvery grey underneath.	Brown with paler cream underneath. Can have a yellowy tinge to the flanks.	Grey but can be reddish brown. Paler underneath. Short dense fur.	Rich brown with paler cream sides and underneath. Obvious distinction on flanks where colours meet. Short dense fur.
Tail	Short; approximately half the full body length (Flowerdew, 1993).	Long. Hairs make it appear dark on upper and lighter underneath.	Body length (excluding the head).	Short; approximately body length.
Head	Blunt nose, small eyes and small ears.	Large bulging eyes and large ears.	Small slender body. Long pointed snout with long fine whiskers. Small eyes and rounded ears. White teeth.	Pointed snout with whiskers and small eyes.
Movement	Short legs cause a scurrying type of movement.	Large hind legs give it speed and a characteristic bouncing motion.	Quicker and more aggressive than the Millet's shrew.	

	Jersey bank vole	Wood mouse	Lesser white-toothed shrew	Millet's, Common or French shrew
Breeding	<p>Breeding period: throughout the year if there are good food resources, but typically March–October</p> <p>Gestation: approximately 18 days</p> <p>Litter size: 3–5</p> <p>No. litters per year: ≤ 5</p> <p>Sexual maturity: < 1-year-old</p> <p>Lifespan: approximately 18 months</p>	<p>Breeding period: March–October and throughout the year if conditions allow</p> <p>Gestation: 19–20 days, but longer if lactating due to delayed implantation.</p> <p>Litter size: 2–9</p> <p>No. litters per year: 4 (average)</p> <p>Sexual maturity: < 1-year-old</p> <p>Lifespan: 18–20 months</p>	<p>Breeding period: March–September</p> <p>Gestation: 27–30 days</p> <p>Litter size: 1–6</p> <p>No. litters per year: ≤ 4</p> <p>Weaned after 22 days</p> <p>Sexual maturity at 5 months</p>	<p>Breed period: May–September</p> <p>Gestation: approximately 20 days.</p> <p>Litter size: 3–7</p> <p>No. litters per year: ≤ 6</p> <p>Sexual maturity: year following birth (MacDonald and Barrett, 1993)</p> <p>Lifespan: ≤ 24 months</p>
Habitats	<p>Typical: mature mixed deciduous woodlands with a thick shrub layer (Southern and Lowe 1968).</p> <p>Also occur in: hedgerows, banks, heathlands, grasslands, parks and gardens.</p> <p>Burrow 2–10 cm underground. Underground nests often around tree roots, fallen logs or in tree trunks (Corbet and Harris 1991).</p>	<p>Typical: woodlands.</p> <p>Also occur in: arable land, scrub, sand dunes, heathland, hedgerows, dry stone walls, gardens and urban parks.</p> <p>Nests are built underground, occasionally in trees or nest boxes.</p> <p>Regularly seek shelter and move underground.</p>	<p>Typical: dry bracken, heathlands, sand dunes, coastal scrub, hedgerows, banks and gardens.</p> <p>Associated with coastal habitats and grassy edge habitats.</p> <p>Uses burrows of other small mammals but also makes its own.</p> <p>Nests built in thick grass or under woody debris.</p>	<p>Typical: Heathland, scrubland, hedgerows, unmown meadows, marshes and deciduous woodlands.</p> <p>Often avoid urban areas (Meinig and Aulagnier 2014).</p> <p>Uses burrows of other small mammals.</p> <p>Nests made of grass and leaves.</p> <p>Rarely found in intensively farmed areas.</p>
Diet	<p>Varied, including fleshy fruits and soft seeds, leaves and herbs, dead leaves, buds, moss, fungi, roots, grass, insects, worms and snails.</p> <p>Known to make food stores.</p>	<p>Varied and opportunistic, including seeds, seedlings, buds, fruit, nuts, snails, worms, fungi, moss, galls, larvae, arthropods and arable weeds.</p> <p>Known to make food stores.</p>	<p>Insectivorous, eating a variety of insects.</p>	<p>Insectivorous, feeding on earthworms, slugs, beetles, woodlice and spiders.</p>

Cockroaches (Family Ectobiidae)

- Tawny cockroach (*Ectobius pallidus*)
- Lesser cockroach (*Ectobius panzeri*)

(This information has been sourced the Identification guide to native earwigs, cockroaches and naturalised insects by B. Beckmann. See

<https://www.orthoptera.org.uk/sites/default/files/pdf/Earwigs%2C%20cockroaches%20and%20stick-insects.pdf>)

Cockroach ID features

Feature	Tawny cockroach	Lesser cockroach
ADULTS		
Length	8–9.5 mm	5–8 mm
Colour	Golden-yellowish brown all over A bit of dark brown on underside of abdomen (<i>females only</i>)	Darkish brown with speckled patterning on pronotum (shield) of both sexes, and on abdomen of female
Wings	Both sexes, full	Males; full Females; short-winged, wings covering less than half the abdomen
Habitats	Woodland rides and clearings; Heathland; Dunes	Coastal scrub; Sand dunes; Vegetated shingle; Dry heathland
JUVENILES		
Wings	Wing buds visible in late instar juveniles; they are shorter and appear thicker than adult wings Left and right wing buds do not overlap (adult wings overlap left over right wing)	

Beetles (Order Coleoptera)

- Glow worm (*Lampyrus noctiluca*)
- Lesser stag beetle (*Dorcus parallelipipedus*)

Male glow-worms are more obvious than females as they possess wings with brown elytra, a clearer pronotum and a large brown spot in the middle. In comparison, females remain as larvae without wings, and are often twice the size of the males (up to 25 mm in length) (Source: <https://www.naturespot.org.uk/species/glow-worm>). They can be found under rocks, logs and refugia, particularly between May and August. They may be confused with the larvae of ladybirds or carrion beetles (Silphidae).

The lesser stag beetle is a large beetle (up to 30 mm) that is difficult to confuse for anything else. It is most likely to be seen during summer when they fly to disperse.

Butterflies and moths (Order Lepidoptera)

- Family Lasiocampidae
 - Drinker (*Euthrix potatoria*) – larva only
 - Fox moth (*Macrothylacia rubi*) – larva and cocoons
 - Oak eggar (*Lasiocampa quercus*) – larva and cocoons
- Subfamily Arctiinae (Tigers and ermines) – larva and cocoons
- Shoulder stripe (*Earophila badiata*) – adults

The larva of the Lasiocampidae are fairly distinctive due to their size and hair tufts. The Arctiinae are also relatively large and hairy caterpillars.

Sources

ARG UK (2018). ARG UK Generic Risk Assessment.

Corbet, G. and Harris, S. (1991). The Handbook of British Mammals 3rd Edit. Blackwell Scientific Publications, Oxford.

Flowerdew, J. (1993). Mice and voles. Whittet Books Ltd, London.

Macdonald, D. and Barrett, P. (2003). Mammals of Britain and Europe. Collins Field Guide, Harper Collins.

Meinig, H. and Aulagnier, S. (2016). *Sorex coronatus*. The IUCN Red List of Threatened Species 2016: e.T29663A2792030. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T29663A2792030.en>. Downloaded on 19 February 2019.

Southern, H. and Lowe, V. (1968). The pattern of distribution of prey and predation in tawny owl territories. Journal of Animal Ecology, 37, 75-97.

UK Habitat Classification Working Group (2018). The UK Habitat Classification at <http://ecountability.co.uk/ukhabworkinggroup-ukhab>