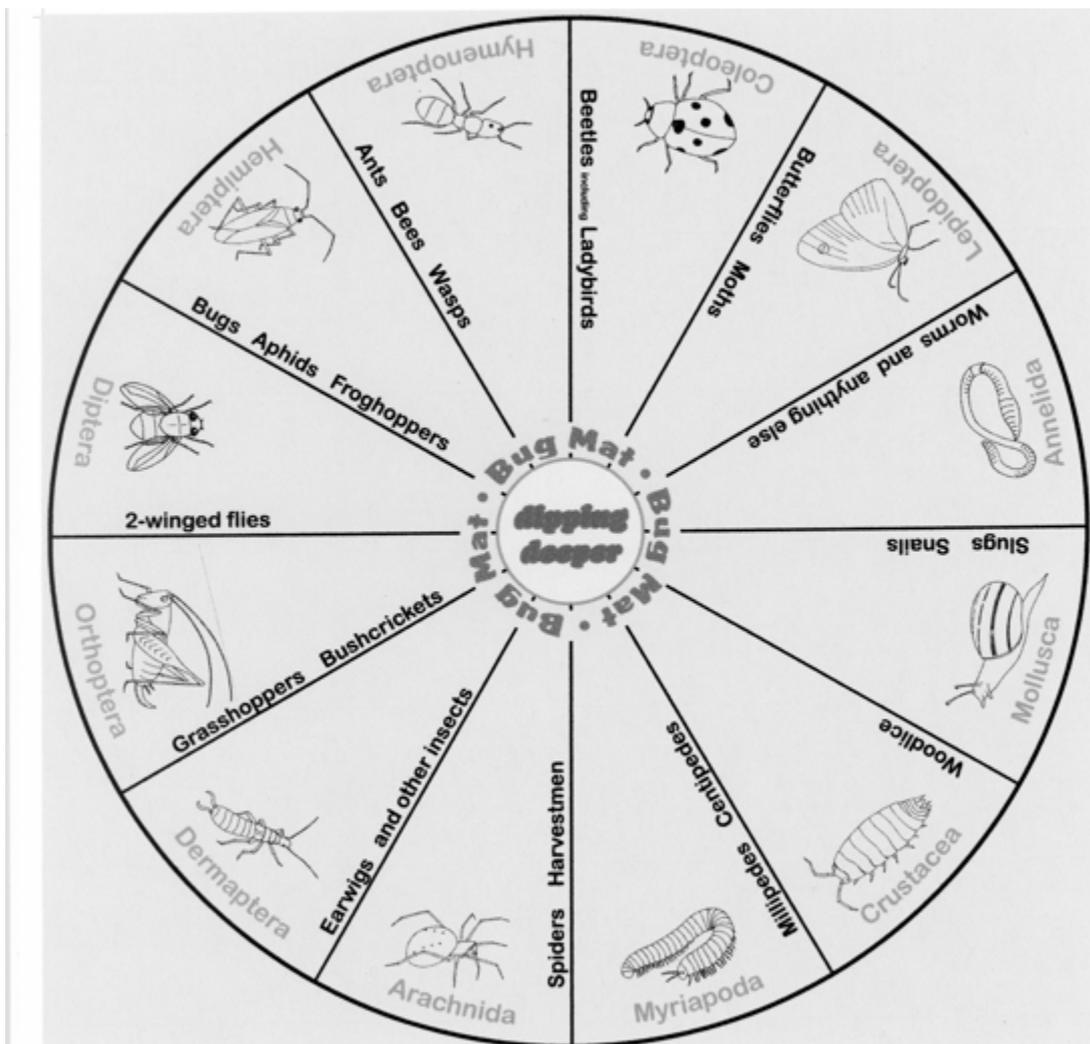


The Bug Mat

A floor mat that will add extra dimensions to bug-hunting expeditions



Designed and produced by

Roslyne Ecological as part of the [Dipping Deeper](#) range of resource materials to assist with learning about ecology and the natural world

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Working with the Bug Mat

The Bug Mat is an aid to sorting and evaluating a collection of invertebrate animals that has been made by a group of students by pitfall trapping, sweep-netting, tree beating or just simply searching.

The Bug Mat measures approximately 120 cm in diameter and is printed on a durable vinyl material. There are 12 sectors on the mat, and each one is labelled with both a common name and the scientific name of a group of animals. There is also an illustration of one example from each animal group. The 12 groups have been chosen to cover the invertebrate animals that are most regularly encountered during typical collecting activities, but there are also some catch-all provisions so that no animal needs to be excluded from the sorting exercise.



Animals being collected and placed on the mat during beating and sweeping sessions.

At the collecting site, the Bug Mat can be spread on the ground and the animals, contained in closable specimen pots, placed in the appropriate sectors. When all the animals have been placed, the arrangement can be used to describe the invertebrate animal community, and to discuss various aspects of ecology. By using a camera to photograph the mat from overhead, a permanent record can be kept. This photo can later be used to convert the result into numerical data for display and more detailed comparisons between habitats, collecting methods, etc. In order to identify the collection site, a write-on/wipe-off label can be placed in the centre of the mat before the photo is taken.



Pitfall Trapping:
Animals are caught
in a plastic cup and
then tipped into a
white tray



The Invertebrate Animal Groups.

An identification sheet will be available in due course, to help make decisions as to what goes where.

The tables below list the Bug Mat sectors and give the types of animals that will be included in each sector when distributing the animals. There is also a brief description of the key features to look for when deciding where to place unfamiliar animals.

Bug Mat Sector	Animals to include	Shared features
Worms and anything else	Earthworms and any invertebrate that is not an insect and cannot be placed in other sectors. Check for the possibility of insect larvae being placed here.	Worm-like body; no legs; no clear head or eyes
Slugs Snails	Slugs and snails	Soft, unsegmented body; no legs; with or without a shell;
Woodlice	Woodlice	Short segmented body; Obvious antennae; compound eyes; 7 pairs of legs
Millipedes Centipedes	Millipedes and Centipedes	Long segmented body; more than 8 pairs of legs; compound eyes; antennae. There is a difficulty over the pill millipede which can be confused with the pill bug - a woodlouse - when rolled up in a ball.
Spiders Harvestmen	Spiders, harvestmen, mites, ticks, scorpions and pseudoscorpions	4 pairs of legs; pincer like mouth-parts; body of 1 or 2 parts; simple eyes, no antennae. Palps may be large enough to resemble antennae or an extra pair of legs



Bug Mat Sector	Animals to include	Shared features
The following sectors are all Insect groups so adults share the features of insects:	Larvae can be quite different, with no wings or developing wing buds only. Legs may be none or more than 3 pairs. Eyes simple or compound or both.	Body in three parts: head, thorax abdomen, 3 pairs of legs, 1 pair of antennae, 2 pairs of wings. Features below state differences to the norm.
Earwigs and other insects	Earwigs and any insect that cannot be placed e.g. Lacewings and sawflies. Use this sector for Springtails when pitfall trapping.	Glossy brown; wings tightly folded leaving abdomen exposed; pincers at the end of the body. Juveniles similar but wingless and may be pale or even white.
Grasshoppers Bushcrickets	Grasshoppers, bushcrickets, crickets, cockroaches	Apart from cockroaches, the hind legs are strongly developed. Juveniles have wingbuds.
2-winged flies	A very large and varied group including houseflies, midges, hoverflies, horseflies, blowflies	Adults have 1 pair of wings and a pair of small halteres, often very difficult to see. Larvae are usually maggot like with simple eyes and some have pro-legs
Bugs Aphids Froghoppers	Shieldbugs, plant bugs, capsids, froghoppers, leaf-hoppers, aphids	Shieldbugs and plant bugs have coloured wings folded over the back forming an X. The young have wing buds which leave the segmented abdomen exposed. Froghoppers' wings form a tented shape. Their wingless young are found in "cuckoo spit". Aphids can have transparent wings, but most adults as well as juveniles are wingless. All of the above have tube-like mouthparts.
Ants Bees Wasps	Ants, honey bees, bumblebees, solitary bees, wasps, digger wasps, ichneumons, gall wasps	All of this group have a narrow "waist" at the base of the abdomen. Apart from worker ants, they all have 2 pairs of wings although the hind wings can be small. Larvae are rarely encountered in bug hunts unless an ants' nest is disturbed.
Beetles inc Ladybirds	Ground beetles, rove beetles, soldier beetles, ladybirds, longhorn beetles, dung beetles, chafers, leaf beetles, weevils	All adult beetles have the forewings modified to form covers for the hindwings. In rove beetles these are short, leaving abdominal segments exposed. The wing cases meet down the centre of the back forming a straight line. Beetle larvae take various forms from maggot-like to active hunters.
Butterflies Moths	Butterflies, moths and their caterpillars	Adults have opaque patterned wings. Unlikely to be confused with anything other than Caddisflies which usually have long fine antennae that are not clubbed at the end. Caterpillars have 3 pairs true legs and not more than 5 pairs of soft prolegs. Sawfly caterpillars have more prolegs which start from the 2 nd abdominal segment.

Examples of the data produced

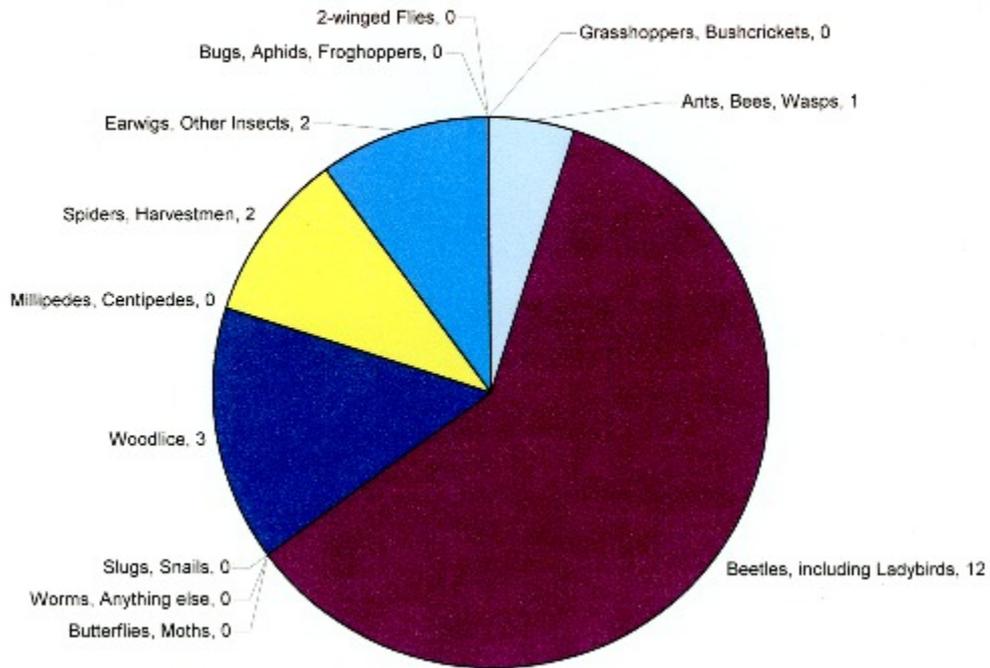
These are examples of actual collections that were made. They are results from a set of 6 pitfall traps and a 10-15 minute session spent using sweep nets in rough vegetation and beating and shaking bushes.

Bug Mat Sector	Pitfall Trapping	Sweeping and Beating
Worms, Anything else	0	0
Slugs, Snails	0	0
Woodlice	3	1
Millipedes, Centipedes	0	0
Spiders, Harvestmen	2	12
Earwigs, Other Insects	2	3
Grasshoppers, Bushcrickets	0	2
2-winged Flies	0	1
Bugs, Aphids, Froghoppers	0	1
Ants, Bees, Wasps	1	2
Beetles, including Ladybirds	12	4
Butterflies, Moths	0	3

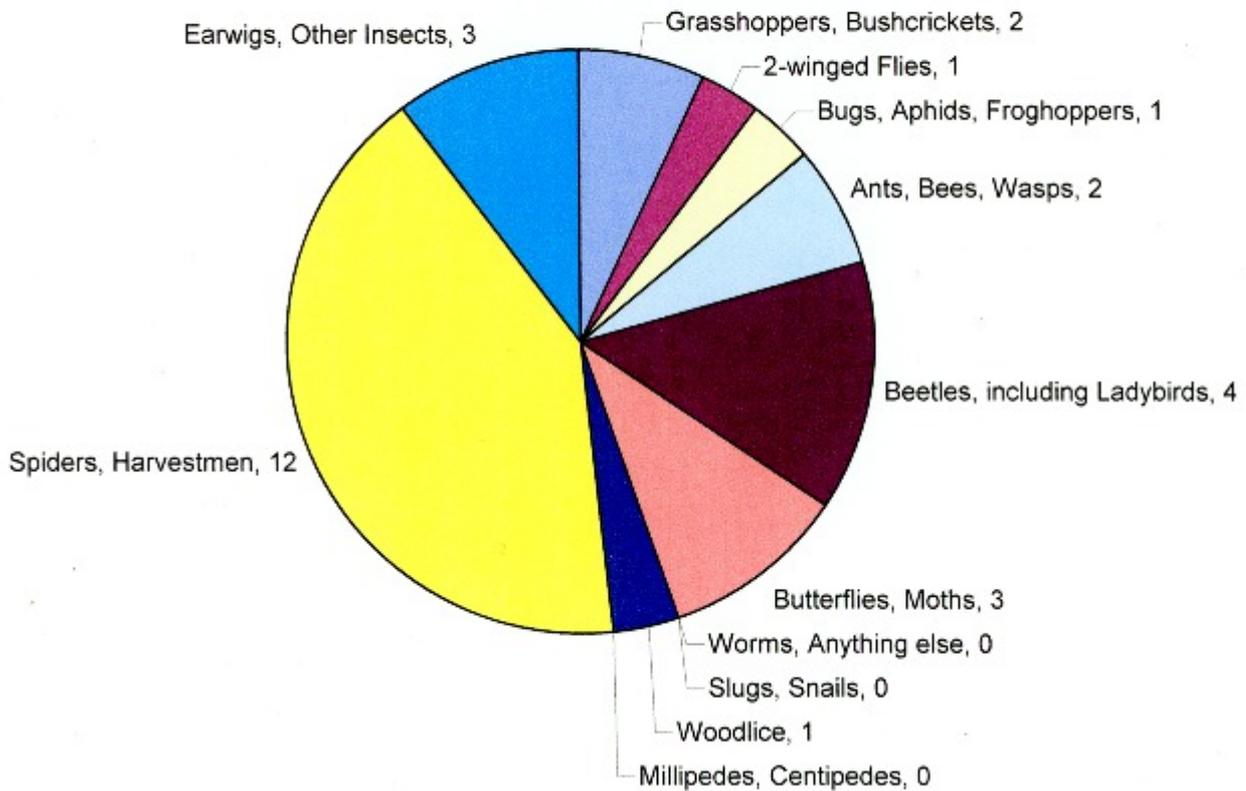
The Sweep and Beat collection photo



Pitfall trapping example



Sweeping and Beating example



Practicalities: a few issues to consider when using the Bug Mat

During some bug hunting sessions, diligent students may find a vast number of very small creatures. The advice can be to ignore the very small stuff, which is sensible for most school age work and should not detract from the valuable descriptions that are produced. Even with this pre-condition, putting one animal in each pot can prove time consuming and quickly deplete the stock of pots. Possible solutions are to introduce some discs or counters that be used in place of pots so that more than one animal can be in a single pot and an appropriate number of counters added to the Bug Mat sector. Alternatively the number of animals in a pot could be written clearly on the lid of the pot in felt pen, but this is difficult in wet conditions.

When some animals are going to be taken back to an indoor study area for further examination, the Bug Mat provides an easy way to include a selection of animals to take and especially makes it easy to select those that were unidentified at the time and so have been placed in the two catch-all sectors.

Springtails are often very numerous in pitfall traps but rarely encountered in other collections so they have not been given their own sector. They fall into the "Earwigs and other insects" sector which can be relabelled during pitfall trapping if required. Labels for this purpose, and for placing in the centre of the mat to identify the collecting site, can be made by laminating a sheet of paper which has been pre-printed or which can be used as a write-on/wipe-off label using whiteboard pens.

Windy days can make it tricky to keep the Bug Mat in place on the ground. This is quite a rare occurrence but there are pegs that can be used to lip over the edge of the mat and anchor it. Inserting eyelets is a possibility being considered but it would effect the cost of the Bug Mat.

Strong shadows cast across the mat will make photography tricky. Try to choose a location that is not effected by the shadows cast by trees or buildings. If it is the shadows of students, ask them to move away while the photo is taken.

When bug hunting has to fit into a strictly time-tabled day, there can be problems caused by weather and the natural activity patterns of the animals. Sweep-netting and bush or tree shaking are best done when the temperature has had a chance to rise during the morning. If possible, empty pitfall traps early in the day and save the other bug hunting methods for later. On wet days or just after rain, collecting from vegetation will be disastrous as many of the animals will become sodden and irreparably damaged. Restrict collecting methods to visual searches on these occasions. One important message to give, is that the animals which are collected are to be looked after and that the aim is to return them unharmed to the habitat from which they were taken. By pre-sorting animals on the Bug Mat, there is an easy way to select a small number for further study and to release immediately the majority of the animals that have been collected.



Happy Hunting!

Note

The Bug Mat and these instructions are currently in trial version.
A production version should be available in 2016 following the current trial period.
Any feedback with regard to the mat or to these notes will be gratefully received.

Please forward to Dr. Richard Osmond at Roslyne Ecological

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