Biodiversity Explorers

Primary Schools Education Pack

Acknowledgements

This publication was produced by Cork City Council . It was researched and written by Joanne O' Keeffe, Ecologist, Cork City Council.

Cork City Council would like to acknowledge the use of some pictures which were taken with permission from the Irish Wildlife Trust, UK Woodland Trust 'Nature Detectives', and UK Wildlife Trust.

Introduction

Cork City supports a wide and varied array of plants and animals. The green spaces of the city such as gardens, parks, and areas such as the ponds, lakes, rivers and Cork Harbour provide havens for many species more usually found in rural situations. Indeed many of the urban structures of the city, e.g. the walls and buildings, also provide homes to species which specialise in living in cities.

This education pack has been produced to help raise awareness of the wealth of nature in the city and also indicates where and how nature in the city can be seen and enjoyed, through the map that accompanies this pack.

This pack has been funded by Cork City Council so it will be completely free of charge to schools, along with other educational resources which can be used in conjunction with this pack, e.g., 'Wild things at Schools', which have been made available to you through the Cork City Council website, www.corkcity.ie , and 'Cork City Otters', a publication made by the Irish Wildlife Trust Cork Branch.

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Mathematics	Skills Numbers Data Algebra	• 'Be a Biodiversity Detective' • **'BioBlitz'**
Geography	Maps, Globes, and Graphical Skills Geography Investigation Skills Environmental Awareness and Care Natural Environments	• 'Be a Biodiversity Detective' • **'BioBlitz'** • 'Create a Bug Hotel' • Using Map of Cork City's Biodiversity
Science	Working Scientifically Design and Making Environmental Awareness and Care	• 'Be a Biodiversity Detective' • **'BioBlitz'** • 'Create a Bug Hotel' • Nature Games and Activities • Using ID Sheets and ID Key
Art	Drawings Paint and Colour	• **'BioBlitz'** • 'Create a Bug Hotel'
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About 'Biodiversity Explorers'

Biodiversity Explorers is a nature educational pack that aims to bring a more practical experience of the curriculum to pupils and to increase their appreciation of wildlife and areas of biodiversity around the city.

This pack covers curriculum strands in Language, Art, Maths and SESE. As well as encouraging and awareness of biodiversity in their school and local area, this pack can also prepare the school and class for their GreenSchools Ireland 'Green Flag' Award.

An introduction into the biodiversity of Cork City is followed by many nature orientated worksheets and activities, along with Identification Sheets and an ID Key, which can be given to each student while out on their field trip. Also included are fun nature games which can be completed via discussion and teacher led questioning e.g., The Web of Life.

A map of Cork City, showing areas of biodiversity is also included. They are scattered all over the city, and many are in walking distance. They are the perfect place to show how urban biodiversity can be incorporated into city live, once it is cared and protected for. The class can conduct their own field study of the area, using the information sheets provided in the pack, e.g., ID sheets, and BioBlitz survey. The class can play games and activities that are orientated around nature and biodiversity. These can be played either indoors or outdoors and are also provided for in this pack. Although this pack is aimed for 3rd to 6th class pupils, the content can be adapted by teachers for younger ages.

Getting kids and young people involved in biodiversity issues is not only important for the future of our wildlife, but can also be quite easy! Something as simple as a bird table in the garden or at school can foster an interest. There is a wide range of resources available to teachers and parents in Cork to get the ball rolling. This pack is one such resource which aims to highlight our local biodiversity within the city, and around their locality.

Biodiversity and Natural Heritage:

When thinking about biodiversity our minds may be drawn towards images of wild, open and rugged landscapes but aspects of biodiversity surround us all in the urban environment. We share our city not only with humans, but with plants, birds and other animals who regard it as home just as much as we do, and in many cases, were there before we were!

Kids enjoy wildlife when it is shown and carried out in a fun, explorative way that engages their interest, making them more willing to get involved. Activities such as making a bird table for school and watching it being used can be enough to get the ball rolling.

This pack aims to describe the biodiversity of Cork City, and provide activities and information to help inform classes of the nature within the city. It is also a tool to help guide you and your class on a field trip in the city.

Did you know?

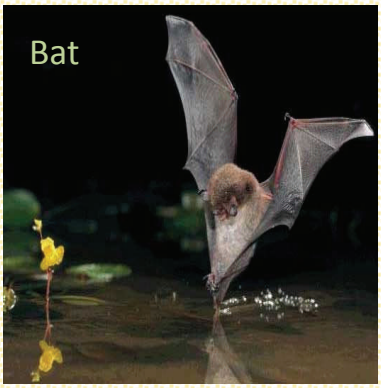
- Biodiversity is the variety of life on Earth. It includes everything from the tiniest microorganisms, to the tallest trees, from creatures in the deepest parts of the ocean to the birds soaring high in the sky. It also includes the wide variety of habitats that these organisms live in, which make up an ecosystem.
- It plays an important role in our everyday lives as it is a source of economic, cultural and human wellbeing.
- Elements of biodiversity purify our air, decompose our waste, contain our water supplies, help moderate flooding and form part of important nutrients cycles.
- Biodiversity also provides the food we eat and the insects that pollinate our food. For example, Honeybees pollinate many of the crops that we see and eat every day, such as onions, celery, broccoli, apples, and many others.
- Agriculture, marine and freshwater resources depend fundamentally on biodiversity.

Cork City's Biodiversity

Cork City supports a wide range of plants and animals. Some are common species, some rare, some legally protected and some are seen as pests. The green spaces of the city provide havens for species more usually found in rural situations whilst the structures of the city, the walls and buildings, provide homes to specialist species, e.g., rare Round-leaved Crane's Bill and Little Robin, which are protected plant species growing on the rocky limestone outcrops and walls in Cork City and County

- ***Some Important Protected Species seen in Cork City:***

· Ireland is home to ten bat species. **Cork City's populations includes 7 of these 10 species**! These include: Common Pipistrelle, Soprano Pipistrelle, Brown long-eared, Leisler's, Daubenton's, Natterer's and Whiskered bat. Bats can be seen flying erratically around street lights and parks in search of their prey, midges, using the city trees as feeding perches, or skimming the water for its prey.

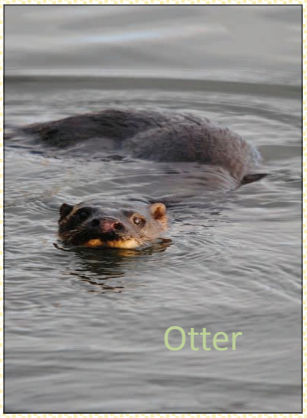

Bat

Did you know?

Cork has the largest population of Leisler's in Ireland and Europe! They are Europe's rarest and fastest bat species!

· Otters are quite common along the River Lee through the city and people have been lucky enough to see them swimming in the river. The shoreline from Blackrock around Mahon to the Douglas Estuary also provides an excellent otter habitat, as well as Blackpool, Curragheen and Togher.

· Hedgehogs are present in larger gardens and parks, and can be quite common in suburban areas preferring places with both under-growth in which to shelter and open areas rich in earthworms, slugs, snails, beetles and other invertebrates on which to feed.


Otter

· In a typical year more than 100 species of bird will be seen in Cork City. Of these approximately 40 breed regularly in the city, and a further 10 or 15 may breed occasionally in small numbers. The remainder are mainly migrant birds seen in spring and autumn including the thousands of waders that can be seen on the outskirts of the city along the Douglas Estuary and Lough Mahon.

· Of the most spectacular birds that nests in Cork City is the Peregrine Falcon. This large and magnificent falcon has used a few sites in the city to nest and can be seen regularly in the skies above the city. The peregrine's smaller relative the Kestrel also occurs in the city, nesting on old buildings and cliff faces. They eat small mammals and catch them by hovering. If you see a small bird of prey hovering determinedly unmoving from the same spot, it will invariable be a Kestrel.

· A number of fish species can be found in the River Lee within Cork City. Atlantic salmon, a species protected under the EU Habitats Directive, pass through, adults heading upstream to spawn, juveniles heading downstream to the open sea.

Some important Biodiversity sites within the city:

If your school has the ability to take a trip into the city to discover places where biodiversity can be found, here are a few suggested areas.

· Fragments of marshland persist at the city's margins, for example the Glen Area, or along the Lee Fields towards the west of the city, and Mahon and Blackrock, along the boardwalk, where coastal habitats can be enjoyed and bird watching can be done from around Estuary.

· The Lough is an oval spring-fed limestone lake of six hectares lying in a shallow depression. Until the 1930s, the island consisted of unstable swampy land dominated by great reedmace, however through the process of natural selection; Willow species have gradually become established and now forms a dense low woodland. The Lough supports important winter populations of ducks, particularly Shoveler and Pochard.

· The Atlantic Pond is a breeding site for grey herons and these magnificent birds can be viewed easily from the Marina Road where it passes the pond. The Pond is also home to other waterbirds and mallard, Little Grebe and Little Egret. In the winter Tufted Duck, Pochard and many species of gull can also be seen.

· Fitzgerald's Park includes a lot of mature coniferous trees, which are favoured by Coal Tits. These trees are home to good populations of many common bird species that favour this parkland habitat such as Mistle Thrush, Chaffinch and Greenfinch. In the small ornamental pond Goldcrests, Moorhens and Mallards can be seen and the park's beautifully maintained flower beds play host to many bees, hover flies, butterflies and other insects.

· Beaumont Quarry, Ballintemple, is also a haven for wildlife. This disused limestone quarry is home to rare protected flora species, such as the Little Robin, *Geranium purpureum.* Be advised there are many safety issues associated with entering this area.

Photo: Little Robin, courtesy of IWT Cork Branch.

Record your sightings!

These species, along with many other protected and non protected species play a very important role in maintaining the city's natural heritage. It is only fair that we protect these species, and their habitats. The National Biodiversity Data Centre, www.biodiversityireland.ie together with www.biology.ie have many monitoring programmes for both plants and animals around Ireland. So, if ever you see an animal killed on our roads, or a new plant in your area, or a mammal wandering around our garden, log on to these websites, and record your sightings. This work goes a long way in painting the picture of Ireland biodiversity, so continually needs our input.

National Biodiversity Week is held usually in May each year. Perhaps your school could organise an event or activity for a Biodiversity Action Day around this time. You could involve your whole school, your home and local community and teach them about biodiversity in the area, and the threats to biodiversity, and what everyone can do to help.

Threats to Biodiversity:

Ireland has a wealth of biodiversity from peatlands to woodlands, hedgerows, sand dunes and seas to all the animals and plants that depend on these habitats for survival.

However, biodiversity is declining at an alarming rate, rates comparable to major extinctions in history. This loss is being driven by human impacts yet, biodiversity supports the ecological functions that provide the many natural goods and services on which we depend on. E.g. our important and strongly growing agriculture industry would be impossible without essential ecosystem services such as pollination by insects and soil conditioning by earthworms.

In our daily lives, natural ecosystems work to supply benefits from storing and filtering drinking water to providing locations for a stress-relieving woodland walk.

Here are the main drivers identified as threats to biodiversity, all caused by human activity.

Habitat Destruction and Fragmentation

The landscape has changed dramatically in recent years due to the construction of new roads and developments, and large scale construction occurring in fragile areas, such as wetlands that have been drained and infilled. In Ireland, upland open habitats, such as rough grassland, scrub and heath, have been changed by agriculture and afforestation. In South America alone, over 70 million hectares of forest have been lost to deforestation. These areas are home to some of the greatest concentrations of biodiversity in the world.

Did you know?

Ireland has among the lowest woodland cover in Europe as only 9% of land is covered with woodland!

The spread of non-native invasive species

Species that are non-native to a particular area can sometimes spread very quickly, e.g. the Zebra mussel and Japanese knotweed, which have both spread rapidly in Ireland in the past two decades. As a result, invasive species can cause ecological damage to an ecosystem by changing the habitat in terms of soil composition, vegetation structure and changes in water or light levels. This in turn affect the food webs of the ecosystem, which some native species not being able to compete with invasive species for resources. The grey squirrel is also an invasive species in Ireland which was introduced from North America in 1911. This squirrel is slowly increasing and spreading throughout Ireland, with the native Red squirrels declining as a result. Invasive species can arrive into Ireland through various human activities such as recreational marine activities and trade and shipping with other countries.

Pollution

Pollution is caused by human-made sources, but also natural sources, such as natural disasters like hurricanes or tsunamis. Pollution can have a huge impact, altering the balance within ecosystems, and is the cause of death for millions of animals and plants around the world every year. It is estimated that over one million sea birds and 100,000 turtles and sea mammals are killed by litter pollution every year! Eutrophication, the over enrichment of lakes and seas by nutrients, is causing huge problems for aquatic and marine life around the world and here in Ireland.

Over exploitation of natural resources

The environment provides the basics for everything we need to survive, from air, food and water, to fossil fuels, building materials and clothing. Our dependence on our natural environment for these resources is obvious; however we still don't appreciate the value they bring to our lives. Our natural resources include water, woodland forestry, peat, fossil fuels, food, and soil. Peat Bogs, are being harvested as an energy source. This has caused changes in the water flow and surface water quality, as the peat releases the water stored by the plants when it gets cut.

Intensive farming practices

The extensive use of chemicals and pesticides, the removal of hedgerows and modernising agricultural practices greatly reduce the level of biodiversity in an area. Monoculture farming, where a single crop is planted, e.g., grass, makes up 80% of Ireland's farming. This has caused declines of many species of birds, bees and insects which we rely on to pollinate our crops.

Climate change

It is now widely accepted that the current global rate of change in climate is as a result of human activity. As global air or sea temperature changes, even by just 1 or 2 degrees, the habitats in which species live will also change and may even become uninhabitable to some species. According to the Intergovernmental Panel on Climate Change, 70% of species could be put at a greater risk of extinction if temperatures continue to change.

Protecting Biodiversity

Protecting biodiversity is fairly easy. The world works quite well the way it was designed, so all humans need to do is let it function! Here are some tips to improve biodiversity in your garden or school:

- Create a wildlife area: Wild garden areas attract many valuable species. They can be encouraged by letting the grass grow, putting out bird food, digging small ponds to encourage aquatic wildlife, providing a water supply/baths, providing logs and timber piles suitable as shelter and food.
- Plant native species of trees and flowers. Many of our insects and birds are adapted to living on native plants and trees. e.g., The native Oak tree accommodates over 250 different insect species! Don't plant or introduce any non native invasive plant or animal species into any habitat.
- Cut down your "carbon footprint" which leads to pollution and ultimately climate change. REDUCE, REUSE AND RECYCLE whenever possible.

Unfortunately many of our actions have resulted in damage to biodiversity. To protect our biodiversity now and in the future, laws have been created to mind what we have left. These laws include:

The Wildlife (Amendment) Act 2010. The principle act being the Wildlife Act 1976. This is the national law to protect wildlife and habitats in Ireland.

Flora Protection Order 1999. This order forms under the above Wildlife Act and protects 68 different plant species found in Ireland.

EU Habitats Directive (92/43/EEC). Created in 1992, this European Directive provided for the protection of threatened plants and habitats around Europe. These habitats are known as Special Conservation Areas (SAC)

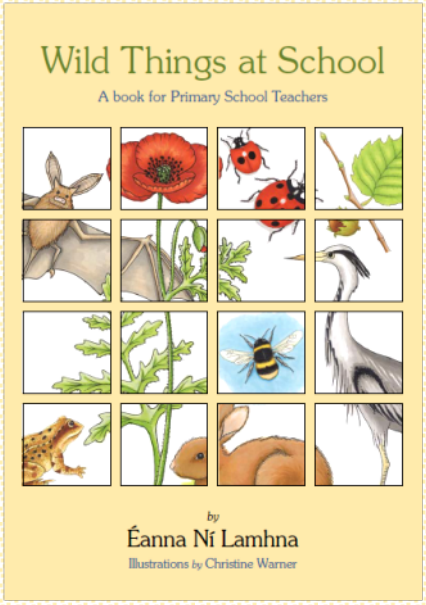
EU Birds Directive (79/409/EEC) Created in 1979, this Directive provided for the protection and conservation of wild birds across the EU. Their habitat is also protected and known as a Special Protection Area, or, SPA.

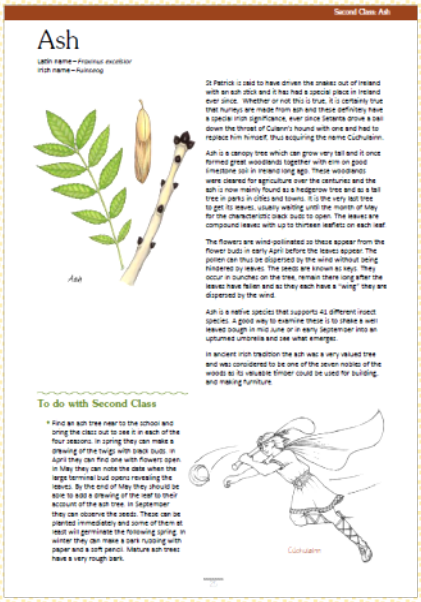
Wildschools Booklet and Worksheets

In 2009, Heritage Officers of Meath, Monaghan and Laois County Councils published an educational booklet called 'Wild Things at Schools' This publication was written by Éanna Ní Lamhna and illustrated by Christine Warner and is a beautiful resource for primary school teachers. The booklet provides an excellent opportunity for kids in each class to experience nature within their area, getting them familiar with common species of plants and animals. It may also help them and make it easier to take up introductory science and ecology modules in secondary school.

This pack has been made available online, through the link shown below, which is on the Heritage Council website. This pack will also be available to download in PDF format in the 'Heritage' Section of the Cork City Council Websites, www.corkcity.ie

http://www.heritagecouncil.ie/education/publications/





Outdoor Activities and Games

One of the main aims of this pack is to get the class to explore the biodiversity of their area or community or even around the city if possible. This section contains a number of games that are based on providing the students with an understanding of and respect for their environment while encompassing different strands of the curriculum.

Each activity is designed to be hands on, getting each student involved, introducing them to the natural world where skills and concepts from the curriculum are developed through active learning.

These activities include:

- Be a Biodiversity Detective
- BioBlitz Survey
- Create a Bug Hotel
- Nature Games and Activities

Hopefully these activities will introduce the class on how to record biodiversity, and also provide an opportunity to encourage the class to become responsible for building an area where flora and fauna can colonise, which they can monitor over time. Sensory activities and awareness games have been incorporated into the Nature games, such as 'Bath and Moth', where children learn about sound and echolocation.

Classes of all ages can take part in making a school 'bug hotel' while the two surveys are aimed for older (BioBlitz) and younger (Be a Biodiversity Detective) classes.

While back as the classroom:

After your field trip, you might have results showing the abundance or species, or areas where they were found, etc. All these results can be summarised and graphed and used to make a presentation or project to other classes or to the school. This can link in well with other curriculum strands, such as maths, arts, and geography, and language. Over time, especially using the bug hotel, surveys can be done each year, on the abundance and diversity of species 'checking in', so students can start to compare the biodiversity over a number of years.

Be a Biodiversity Detective!

Tree Detective Activity Sheet

Have a look around your school area, along the hedgerows and parks, can you find three different trees? Can you draw a leaf from each one and try to identify at least two of them, using the Tree ID Sheet, which are at the back of this pack. Additional worksheet are also available in Appendix 2.

This leaf is from a _____	This leaf is from a _____	This leaf is from a _____

Activity: Find Your Tree

Materials required: One blindfold per 2 or 3 pupils

Method:

1. Divide students into teams of 2 or 3.

2. One student in each team volunteers to be blindfolded while the other team members carefully lead their blindfolded member to a tree.

3. The blindfolded member is then encouraged to get to know the selected tree by touch alone - by feeling the bark texture, finding the location of branches and any other distinguishing features of their tree.

4. Still blindfolded the student is carefully led back to where he/she started and they are invited to remove their blindfold and try to find “their” tree, using their sense of touch to confirm it.

Plant Detective Activity Sheet

Equipment: 1 sheet of paper (ideally on a clipboard) and a pencil per student. Packs of coloured pencils (or crayons for junior students)

Method:

Look carefully into the grassy areas of the park and you try and find some of the plants shown on the identification sheets that are in this pack. You might see their flowers in spring and summer or only find their leafy parts in the park during the autumn and winter months. Can you see other plants that are not on the ID sheets? Choose three plants to draw but only draw what you actually see and not just a copy of the ID sheet.

Junior classes can simply do leaf rubbings using the side of crayons with the selected leaves under their pages.

This is a drawing from a leaf or flower from a _____	This is a drawing from a leaf or flower from a _____	This is a drawing from a leaf or flower from a _____

MiniBeast Hunt Activity Sheet

Equipment Required:

1 x Pooter, 1 x Magnifying Glass, Copy of the Minibeasts ID Key and ID Sheet, a pencil and a blank page for drawing per pair or group of students. Clipboards if available and don't forget to cover with a clear plastic bag on rainy days.

Method:

1. Look for mini beasts in likely locations such as under leaves, stones or other objects.

2. Use the pooter to collect the mini beasts that you find as follows:

3. For mini beasts with legs (such as woodlouse, spiders and millipedes) – point the end of the clear tube of the pooter over the mini beast. Suck through the green tube until the mini beast lands in the plastic cup of the pooter.

4. For mini beasts with no legs (such as slugs, snails and worms) – remove the lid of the pooter and lift the mini beast into the plastic cup of the pooter with the aid of a leaf or stick taking care not to injure the mini beast as you do so.

Carefully replace the lid onto the pooter.

Activity A:

Use the magnifying glass to examine one of the mini beasts in your pooter.

Carefully draw a large diagram of the mini beast, showing its general shape, any marks on its body and any other features that you have noticed such as body sections, legs or antennae on its head.

Activity B:

Use the Identification key sheets to identify the mini beasts that you have collected in your pooter. Look at one mini beast at a time, and use the ID Key sheet to identify them. Draw a circle around each of the questions on the key to which you answered YES.

Draw a square around whichever mini beast or beasts that you think that you have in your pooter.

Don't forget to carefully release the mini beasts once you are finished this activity!

Bird Life Activity Sheet


Cormorant

Materials: Binoculars if possible, Copy of the Bird Life Recording Sheet below, on a clipboard, pencils/colouring pencils, A laminated copy of The Bird Identification Sheet from this pack.

Method:

1. Stand quietly along an area where there are trees or water nearby. Be very quiet and still, act as a "hide" for spying at the bird life.

2. Become familiar with the binoculars, getting the focusing right before you start.

3. Try and see as many birds as you can. Aim for a duck and one other bird. Then draw the birds on your A4 page (make the drawing as large as possible and use your colour pencils if you can)

5. Now try and name the birds that you have drawn by using the ID sheets provided.

Bird Life Recording Sheet:

Bird Name:	Date:
Description:	
My Drawing:	

BioBlitz

Objectives: To name several native plants and animals in your area. Plan and carry out a survey of the natural environment in your locality.

Curriculum Links: Science: Living Things, Environmental Awareness and Care.
Geography: Natural Environments, Environmental Awareness and Care.
Mathematics and Art

Ages: 10-12+, Survey can be simplified for younger ages.

Materials: Paper, Pencils, Plastic Bags/Containers, and Surveying Equipment: Pooters, Sweep-nets, Hula Hoops/ Quadrats, and ID Sheets.

Background:

In Ireland, the National Biodiversity Data Centre hosts a BioBlitz in a few locations all on the same day. This event usually coincides with International Biodiversity Week in May. A 'BioBlitz' event is where wildlife experts race against the clock, usually 24 hours, to find as many species as they can in a particular area. This activity will give students a chance to explore the diversity of life in their locality. They will also see how scientists collect data and information about biodiversity.

This activity includes a local Ecosurvey, which can be done in preparation prior to the field survey. After, students can go to a nearby grass area, hedgerow, park, wooded area or on school grounds to conduct a BioBlitz survey. This whole activity can be done over a few days.

Local Ecosurvey

This survey can be done like a project itself. You may want to ask a local knowledgeable person, or naturalist or park attendant for answers if you are unsure. Copy the questions below and distribute to the class.

1. What major habitat climate type do you live in? (E.g., Desert, Rain Forest, Temperate, Tundra etc.)
2. Name 3 Native trees that grow in your area. Collect a leaf from each one.
3. Can you name 3 edible plants that grow in your area?
4. Name 1 plant in your area which is poisonous/ irritable to humans.
5. Can you name 10 native animals, of any species, in your locality?
6. List 3 migratory birds in Cork City. Can you list the seasons in which you see them?
7. How has your area changed in the past 10-15 years? Maybe you need to talk to some local people or your parents or grandparents?
8. What species, if any, are threatened in your area?
9. Are there any protected areas near your community? Why are they protected?
10. Can you name a non-native invasive alien species that has created a problem in your area? Can you say why it is a problem?

Outdoor BioBlitz survey

Students can sketch a simple site map of the area. This can include any water, hedges, grassland areas, and rough areas where some plants are growing. This can take 30-45 mins. Students can take a copy of the BioBlitz survey sheet, at the back of this activity, and write down species they see. Don't forget the survey equipment!

Take note of the weather on your survey day, as this may have an effect of the amount of species you record. In groups, students can use the methods below survey the area, and later compile results in class. Students can collect samples, such as leaves, nuts, seeds that have already fallen to the ground. They can also take sketches of items that should not be collected.

1. **Pooters:** Many 'minibeasts' can be collected by placing the tube with mesh at the end of the tube in your mouth and the other tube over the animal. Inhale through the tube to suck the animal up the tube into the container. Don't forget to let the insect go after you have identified it!

2. **Hula Hoops:** By placing a hoop on the ground, at a number of random places, students can identify plants in the area.

3. **Sweepnets:** In areas where grass is tall or where there are hedgerows, use a sweep net in the figure of 8 to collect any flying insects of spiders etc.

4. **Beating Tray:** Place a tray under some branches/trees and gently shake, or use a twig/stick to tap with. What species have fallen into the tray?

5. **Scan and listen:** At the end of the survey activities, sit down for a few minutes to listen and watch for any birds that are in the area. Take note of the birds you see, can you hear and recognise their call?

Back at the classroom

Students can group their findings together and discuss what they saw and found in the habitat. Did they find any native species or non native invasive species? Was there a particular area where most plants were distributed? Are some plants adapted to living in certain areas? What factors might affect the number of species they found, i.e., time of year, weather? Where they surprised about anything they found or didn't find?

Project Display:

The class can produce a presentation or chart and display their findings and discussion of the habitat survey. Students can produce graphs or pie charts etc., of their results. If your school is in the Green-Schools Programme, this project can help with gaining your Biodiversity Flag.

Recording Biodiversity:

The National Biodiversity Data Centre records sightings of all species seen in Ireland. After you have completed your own class survey, you and your teacher can log on to www.biology.ie and submit your sightings. This will help in painting a picture of Ireland's current biodiversity.

Habitat Map

Date: Weather:

Draw a simple map of the habitat you are surveying.

Legend:

E.g.: = Grass Area

Plant Species

Plant Species	Identification Features

'Minibeasts'

Species found	How and where did you find it?

Bird Species

Bird Species	What was it doing?

Mammals: Can you see any signs of mammals in the area?

Mammal species	Where did you see the mammal, and what was it doing?

Vegetation Sampling Recording:

Using the quadrat/hula hoop 10 times, note the presence or absence (×/ ✓) of plant species. Using the DAFOR scale below, can you estimate % frequency of a certain plant within the hoop? Is there a difference in plants in grassland areas and hedgerow areas?

The DAFOR Scale can be used to roughly classify the frequency of each plant species. The **DAFOR** scale works on % cover. **D**ominant = **>75%**, **A**bundant = **75 - 51%**, **F**requent = **50 - 26%**, **O**ccasional = **25 - 11%**, **R**are **10 - 1 %**

E.g., Dandelion was present in 5/10 quadrats =50%= Frequent.

Species	1	2	3	4	5	6	7	8	9	10	Total	DAFOR Scale

Create a Bug Hotel

Objectives: To increase knowledge of biodiversity in the garden. To create a habitat for mini-beasts in the area, with regular monitoring of the species using the habitat.
Curriculum Links:
SESE: Living things, environmental awareness and care, observing, recording, insect identification, food chains.
Languages: New words, literacy, spelling.
Art: Making insect hotels/drawings/photographs/creativity.
SPHE: Myself & the wider world, active and responsible citizenship.
Informal Curriculum: Green Schools Programme, Discover Primary Science.
Ages: 9+

Background:

In natural habitats there are endless nooks and crannies where mini-beasts, properly known as invertebrates, can shelter. These wildlife retreats can be made different shapes and sizes, made from reclaimed materials, or natural objects, which reduces cost, helps them blend in with their surroundings and is probably more attractive to the mini-beast guests. A surprisingly wide variety of invertebrates can be found including bees, woodlice, spiders, earwigs, lacewings, ladybirds, beetle larvae, centipedes and many more! Established gardens can also provide lots of hiding places, but gardeners often like to tidy away debris where invertebrates might live. Schools may also feel pressure to keep their plots tidy, which can limit the amount of natural cover for the area. We can help provide more homes by creating bug hotels, which are often interesting and attractive creations in their own right.

How to construct your Bug Hotel

The Basic Structure:

In a quiet or unused corner, preferably near trees or hedges, gather between 2-6 old wooden pallets or something similar, and stack them up. Make sure it's not too shaded. Some of the wood/timber can be damp, some can be dry. This will attract different species to your bug hotel!

Fill in the Gaps:

There are many different ways to fill in the gaps in the layers. Here are a few suggestions:

Dead wood and loose bark: This is an increasingly rare habitat as we tidy our gardens, parks and amenity woodlands. Crevices under the bark hold centipedes and woodlice, beetles and spiders. Woodlice and millipedes help to break down woody plant material. They are essential parts of the garden recycling system.

Holes for solitary bees. You can make a home for solitary bees by collecting old canes or pieces of hollow plant stems, then placing them in a length of plastic drainpipe or a section from a plas-

tic drinks bottle. You can also make holes in wooden logs. Solitary bees like warmth, so place your habitat in a sunny spot, perhaps on a south-fencing wall.

Frog hole. Frogs eat many slugs and other garden pests. Although they need a pond to breed in, they can spend most of the year out of water. We use stone and tiles as these provide the cool damp conditions amphibians need. Newts may also take advantage of these conditions.

Straw, Hay and Dry Leaves: These provide many opportunities for invertebrates to burrow in and find safe hibernation sites.

Lacewing homes. You can make a home for lacewings by rolling up a piece of corrugated cardboard and putting it in a waterproof cylinder, such as an old lemonade bottle.

Pictures taken from Wildlife Trusts Website.

Monitoring your bug hotel

Over time, your bug hotel will be bursting with wildlife! At regular intervals, approximately 3-4 times a year, your class can have a look at the bug hotel, and record some of the species that they see using it. Use the Minibeasts ID key in this pack to identify species that you see. It is also a good idea to compare seasons, and in time, even compare years! You can even record your sightings on the National Biodiversity Data Centre website, www.biodiversityireland.ie , where they monitor species in Ireland.

Picture taken from Wildlife Trusts website.

Back at the classroom

Students can group their findings together and discuss what they saw and found in the habitat. Was there a particular area where invertebrates were distributed more? Are some plants after colonizing in certain areas? What factors might affect the number of species they found, i.e., time of year, weather? Where they surprised about anything they found or didn't find? Did they find other species using the habitat, such as birds?

Project Display:

The class can produce a project or presentation and display their findings of the bug hotel. They can discuss the results and explain why they think they found such results. Students can produce graphs or pie charts etc.

Research projects

Maths – count mini-beast species that have gathered in the in the hotel.

SESE – identify insects in the bug hotel or a garden close by, investigate food chains of pests and predators, and research the food web of some common minibeasts.

Local Heritage – What pests did our ancestors have in their gardens?

Geography – does soil type affect types of pests in the garden?

Ideas for designing your class 'Bug Hotel'

'Minibeasts'

Species Found:	What type of material/habitat did you find it on?	Time of year:

Nature Games and Activities:

Below are some nature games and activities that can be played at the end of a field trip, or in class when discussing the topic of biodiversity. These games are a fun way of exploring learning about biodiversity, without being in a classroom. 'Video Links' at the end of this pack, provides some YouTube and Internet links to some videos of selected games in this topic.

String Stories: *also see Video Links*

Teacher Notes: This activity can be introduced as a way of illustrating a story using their imagination and the nature around them. At the end of your day/field study, this activity is a good way of reflecting and sharing their experiences of the day.

Time: 20 mins.

You will need: 30-40cm of colourful string lengths for each child. While kids are doing activity, the teacher should find a large long branch that has enough space for all the strings to tie on.

Activity: This method may be easier than the stick represented in the picture, as the strings are hanging loosely, with their materials hanging off each string.

Ask the class to tie a loop on top of the string. Get the class to use their imagination and think up of any story, preferably imaginary! Find things in the area, that can represent people/events/things in their own story, e.g., twigs, leaves, grass and seeds/nuts etc., and tie them onto the string. Eventually, when they are finished, slide the strings onto the large branch. The class will them end up with a large beautiful display of nature for their classroom, each string telling a different story.

Smelly Cocktails:

Teacher Notes: Explain that the smell of plants/flowers can change when it is altered, and that our noses can remember over 10,000 scents!

Time: 15 mins.

You will need: Empty clean yogurt pots, something to stir with, like a fallen twig from the ground/ stick etc.

Activity: Tell the class to make their own 'smelly cocktails' by choosing different flowers/ leaves and placing them in the yogurt pots and crushing them with the twigs, and releasing their smell. This can be done in groups or individually. Afterwards, let the class smell each other's smelly cocktails, seeing if they can remember each other's one.

Scavenger Hunt:

Teacher Notes: These hunts are great ways of exploring the outdoors, while arousing their creativity. Set either a time limit, or play until a team has found everything on the list. If a tie-break occurs, extra points go for the most creative finds!

Time: approx 15-20 mins + discussion afterwards.

You will need: a scavenger hunt bag, and a scavenger hunt list.

Activity: Give everybody a scavenger hunt bag and list. Remind everybody to collect only the things that can be put back, and not to take anything that is still in use, e.g., pulling leaves/branches from trees etc. Ideas for hunt: feather, a few different types of seeds/nut from trees, something smooth, rough, round, smelly, curly, straight, a sign that an animal lives there, signs that humans have been here etc.

Human Tree Symphony: *also see Video Links*

Teacher Notes: By getting the class to make a model human tree, they will understand the inner workings of a tree. This is a fun exercise that will get the class enthusiastic for exploring nature. No equipment required.

Time: 20 mins.

Activity: Everyone sit in a wide circle. Choose kids for the assigned roles as shown below.

Roles:

Heartwood: The heartwood is actually dead and preserved by strong resins. It is the framework that holds up the tree.
Action: standing strong and straight in the center.
Say: —' Ta- Dum, Ta-Dum, Ta-Dum'

Taproots: Anchors the tree and draws water up from ground.
Action: Circle the heartwood, joining hands.
Say: Make slurping noises!!

Xylem— carries nutrients up from roots
Action: join hands and make a ring around the main root, facing inwards. Draw water up from the roots by lowering hands (still joined) and raising them above their heads.
Say: —Gurgle, gurgle—slurp slurp

Cambium— the actively growing layer that creates new xylem and phloem cells
Action: Hands joined, circle the xylem.
Say: —We make new cells

Phloem— transports food down from the leaves
Action: Join hands around cambium – hold out arms above heads, grabbing food and lower it down (squat) extending arms and opening hands to release food) – raise and lower again
Say: —Food to the tree

Leaves—make food through photosynthesis
Action: stand outside the circle facing out, raise and flutter hands
Say: —We make food

Outer bark—protects inner parts of tree.
Action: form circle around the tree facing OUT-elbows locked into each other, look tough, stomping feet, providing a barrier for the tree.
Say: —'Keep Out'!

At the end, have all parts of the tree saying and doing their actions at the same time.

Bat and Moth:

Teacher Notes: With the aid of the Wild Things at School Booklet**,** talk briefly about bats, and how they find their food through echolocation.
Time: 15-20 mins.
You will need: 1 blindfold.
Activity: Stand children in a circle. Choose someone to be a bat. Choose someone to be a moth. Blindfold the bat and not the moth. The moth finds a place to stand, and does not move. The bat goes around saying 'bat' while the moth replies with 'moth'. Thus a sort of echolocation can be used by the bat, to locate the moth. The bat must tag the moth to be able to eat it. If the game runs a bit long, get the circle to step forward a bit to make the space smaller for the bat.

Noah's Ark:

Teacher Notes: This game is fun and awakens their enthusiasm for the topic. It is aimed more for younger ages. **'**Find your mate amid the herd of cavorting beasts and birds on Noah's Ark'.
You will need: Index cards, Pencil.
Time: 15-20 mins.
Activity: Count the numbers of players in the group, then, make a list of animals half as long as the number of players. Write the name of each animal on two cards. Shuffle the cards and then pass them out. Each child reads the cards and becomes the animal on it, but keeping it secret. They can only make the noise that the animal makes or actions etc., no talking allowed!

Bark Rubbings:

Teacher Notes: Make as many bark rubbings from as many different tree species as possible, and hang them up in the classroom.
Time: 15-20 mins.
You will need: Tracing paper/A4 paper, pencils.
Activity: Get the class to identify different trees in the area, and try and rub the bark of each one. Remember to write down the name of the tree your stencilled. Afterwards, look at each piece, and see if you can notice differences between them.

The Web of Life (What is Biodiversity?):

Teacher Notes: This activity is a good introduction to biodiversity and shows how the natural world is interlinked. Discuss food-webs before this activity starts.

Time: 15-20 mins**.**

You will need: A ball of string (approximately 20m). Labels for each student in the activity, each one with the name of an organism or element in an eco-system. Here is an example list from a woodland river ecosystem - rain, river, oak tree, soil, fish, frog, heron, otter, spider, fly, beetle, bat, bluebell, bee, and squirrel.

Activity: Approximately 15 per group. All stand in a circle. Each student is given a label to stick on the front of their jumper, and a ball of string.

One student (e.g. the squirrel) holds the end of the string, then hands the ball to another student (e.g. the oak tree), while making a statement about the relationship between the two things on the stickers (e.g. the squirrel eats acorns from the oak tree). Now, the "squirrel" is holding the end of the string, and the "oak-tree" is holding the ball.

Next, the oak-tree passes the ball to a third child, again making a statement, but holding on to the string (e.g. the oak tree needs water from the rain in order to grow). Now two children are holding onto the string at different places and the third is holding the ball

The activity continues like this, with the ball being passed back and forth, but each child holding onto the string. Every time the string is passed the child passing it must make a statement.

Some elements, such as the river and the rain in the above example, will have multiple connections to other elements. In this case, a child may be holding the string in 3 or 4 different places.

Soon a web of string will have been created.

Note *It's important that everyone holds the web taut*

To demonstrate how the web can be disrupted, you can remove one of the key elements from the web. Examples: The **river** has been polluted or the **oak tree** has been cut down. Then the student with that sticker lets go of all the bits of string he or she is holding. The web is no longer resilient. You can also ask the students to make statements about the consequences of these elements being removed (e.g. without the river, the frogs will disappear from the forest, without the oak trees, there will be no leaf-litter so the soil will not be as rich and the bluebells won't grow etc.).

Useful Organisations and other Interesting Links

Local groups and contacts:

Cork City Council Heritage Officer	**Niamh Twomey** **Cork City Council, City Hall, Anglesea St., Cork.** **www.corkcity.ie**
Lifetime Lab	**Lifetime Lab, Lee Road, Cork.** **www.lifetimelab.ie** **Tel: 021 494 1500**
Cork Environmental Forum	**c/o Bernadette Connolly, Development Co-ordinator.** Mount Carmel, Kilcolman, Enniskeane, Co. Cork. **www.cef.ie**
Cork County Bat Group	**Conor Kelleher** **'Northants', Spring Lane, Carrigagulla, Ballinagree, Macroom, Co. Cork.** **www.corkcountybatgroup.ie** **Tel: 021 733 9247**
Cork County Nature Trust	**Dara Fitzpatrick** **http://countynaturetrust.tripod.com** **Tel: 087 998 3680**
Irish Wildlife Trust, Cork Branch	**Gill Weyman** **Clogher, Dunmanway, Co. Cork.** **www.corkbranch.weebly.com/** **www.iwt.ie**

Regional and National Organisations:

An Taisce National Trust	www.antaisce.org
BirdWatch Ireland	www.birdwatchireland.ie
CRANN	www.crann.ie
ENFO, Environmental Information Service.	www.enfo.ie
EPA, Environmental Protection Agency	www.epa.ie
Greenschools Ireland	www.greenschoolsireland.org
Invasive Species Ireland	www.invasivespeciesireland.com
Irish Wildflowers	www.irishwildflowers.ie
Leave No Trace Ireland	www.leavenotraceireland.org
National Biodiversity Data Centre	www.biodiversityireland.ie
Nature Calendar	www.biology.ie
The Heritage Council	www.heritagecouncil.ie
National Parks and Wildlife Service, NPWS	www.npws.ie www.noticenature.ie
Sustainable Energy Ireland	www.sei.ie
The Tree Council of Ireland	www.treecouncil.ie
Wild Flowers of Ireland	www.wildflowersofireland.net
Eco-UNESCO	www.ecounesco.ie

Video Links:

Build a Human Tree: http://www.youtube.com/watch?v=gXMZa3LGAS8

String Stories and other environmental games: https://sites.google.com/site/primaryenvironmentalgames/games/journey-sticks

Appendix 1

Identification Sheets and ID Key

Identification Sheets

If the class are out exploring a nearby area, they can use the following ID Sheets on their trip. They include ID Sheets for many wild flowers, mammals, birds, trees and minibeasts species that you might see on a daily basis, some are rare, so you would be very lucky if you were able to see them!

An ID Key for minibeasts is also included in the pack. It will help you identify some of the many mini-beasts you may find, along your trip. Getting the class to try and work through an ID key is a good way to introduce the class to survey techniques that are used by ecologists and zoologists around the world.

These ID Sheets and ID Key can be easily photocopied and handed out to each student before their field study.

Wild Spring flowers ID Sheet

As the weather starts to get warmer and the days longer, you will start to notice flowers beginning to bloom. Talk a walk along a woodland pr park area and try and spot some of the common spring flowers listed below. Can you see any others that are not shown below?

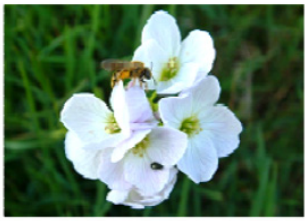
☐ Bramble

☐ Dog rose

☐ Colt's-foot

☐ Bluebell

☐ Cuckooflower



☐ Rowan

☐ Lesser celandine

☐ Oxeye daisy

☐ Horse chestnut

☐ Elder

☐ Primrose

☐ Hawthorn

☐ Snowdrop

☐ Hazel

☐ Blackthorn

☐ Purple lilac

☐ Garlic mustard

☐ Wood anemone

Mammal ID Sheet

Mammals are warm blooded creatures that breathe air, have fur covering their body, and usually give birth to live young rather than eggs. Keep your eyes peeled for these mammals next time you're in the woods. Some are very shy and some are more active at night, so if you don't see them look out for other signs of them instead, like droppings, burrows, pieces of fur, nibbled food and animal tracks in the mud.

Common Garden Bird Species

At first you may find it difficult to spot and identify birds before they fly off again! Here are just some of the many common garden bird species you might see.

☐ Blackbird

☐ Blue tit

☐ Chaffinch

☐ Collared dove

☐ Great tit

☐ Greenfinch

☐ Magpie

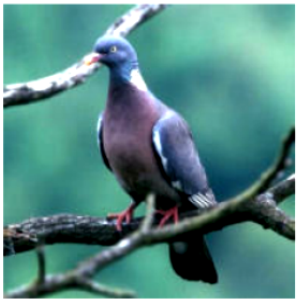
☐ Robin

☐ Siskin

☐ Starling

☐ Treecreeper

☐ Woodpigeon



Winter Twigs of some Common Trees

Ash	Field Maple	Birch	Alder	Elder	Hazel	Beech	Horse Chestnut	Rowan
								
Oak	Lime	Lilac	Hawthorn	Blackthorn	Larch	Sycamore	Dog Rose	Elm
								

Leaves of some Common Trees

☐ alder

☐ ash

☐ beech

☐ birch

☐ elder

☐ field maple

☐ hawthorn

☐ hazel

☐ holly

☐ horse chestnut

☐ oak

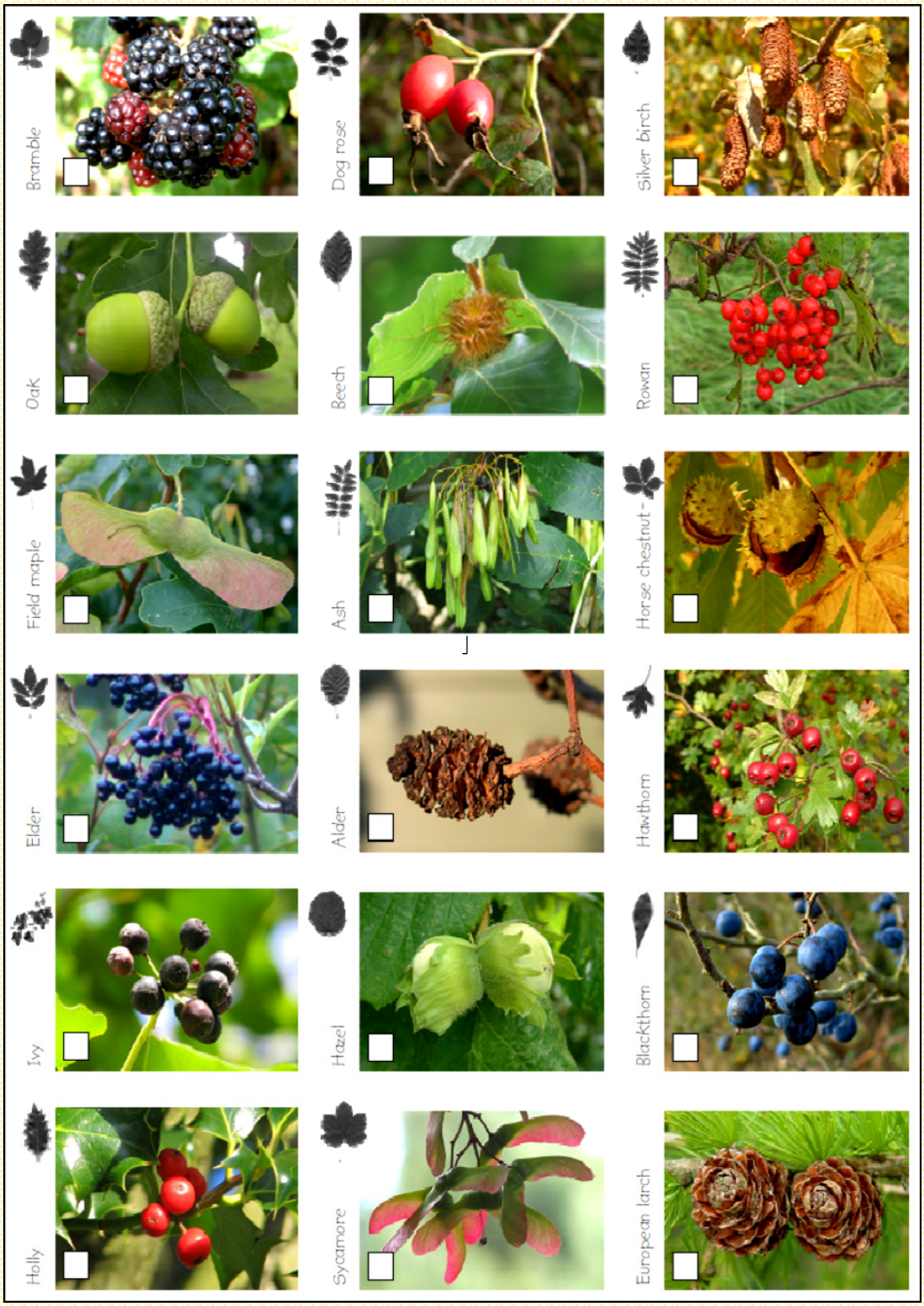
☐ rowan

☐ sycamore

Have you found any other leaves? Draw or stick them here and find out their names.

_____ _____ _____

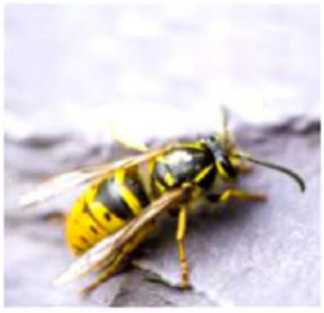
Fruits and Seeds of some Common Trees



Common Minibeasts

Minibeasts are found in a diverse range of habitats and there are many different ways of searching for and collecting them. Turning over rocks and stones, ruffling through debris and leaves on the woodland floor, and searching through meadows and shrubs, you will be surprised as to how much you find. Can you find other minibeasts, with the help of the ID key below that are not shown below?

☐ Wasp

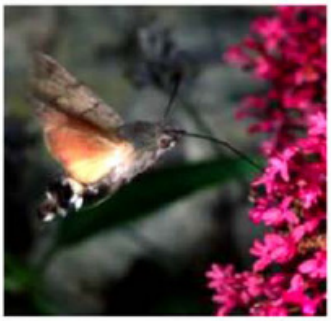


☐ Dragonfly

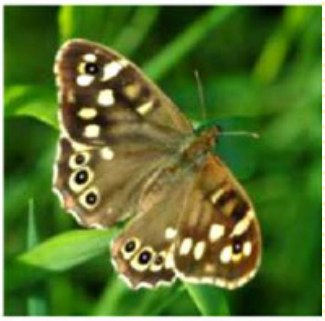
☐ Honey bee

☐ Fly

☐ Moth

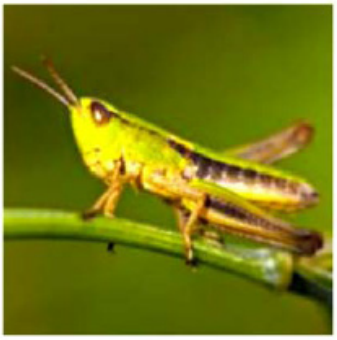


☐ Butterfly



☐ Snail

☐ Grasshopper



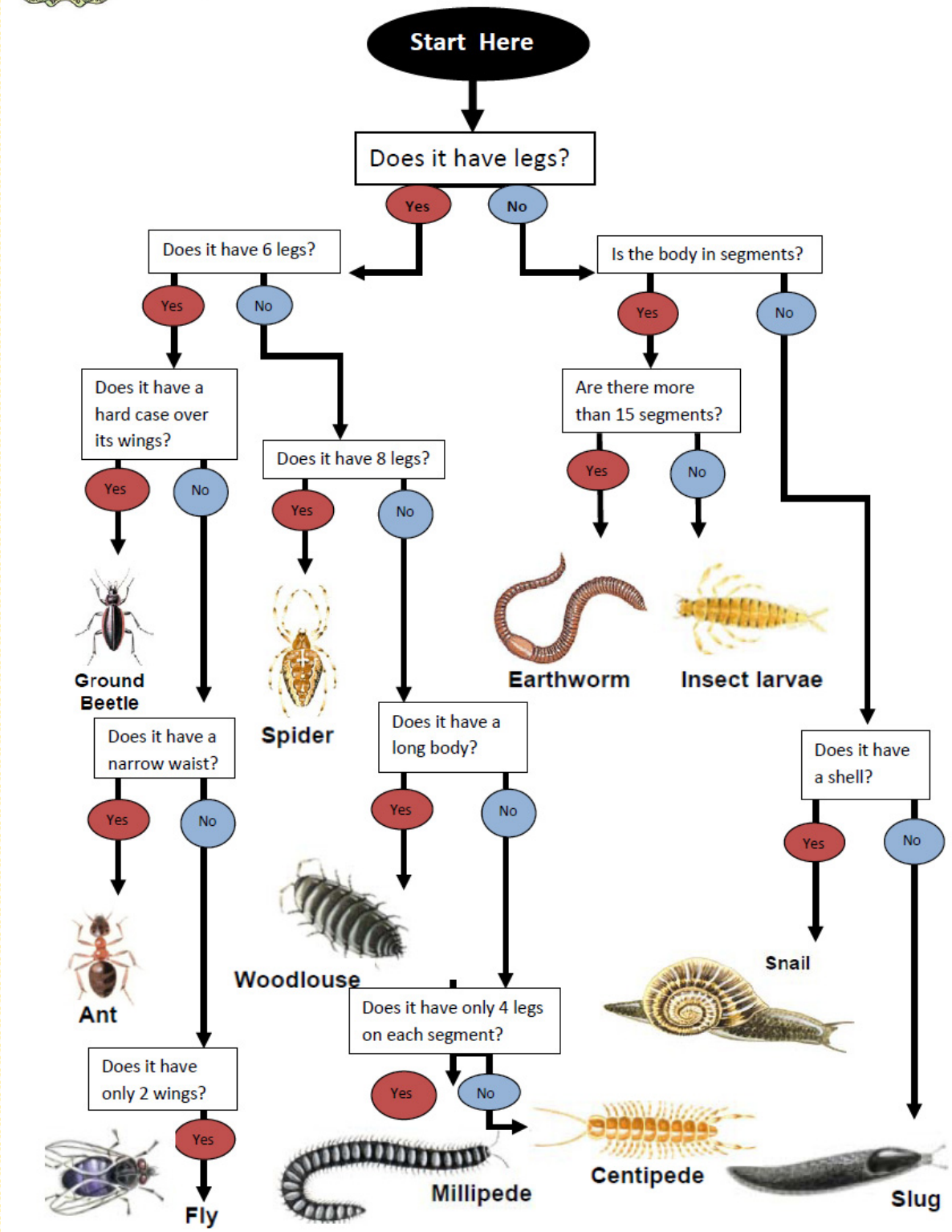
☐ Centipede

☐ Earthworm

☐ Woodlouse

☐ Slug

Common Minibeasts ID Key



Appendix 2

Additional Worksheets

This is a:

This is a: