Wye
National Nature Reserve
Environmental Education Pack

www.naturalengland.org.uk

heritage lottery fund
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NATURAL ENGLAND

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Welcome to Wye National Nature Reserve (NNR)

About Natural England

Natural England is an independent public body that protects and improves England's natural environment, while encouraging people to enjoy and get involved in their surroundings. It is our responsibility to see that England's rich natural environment can adapt and survive intact for future generations to enjoy.

Working with children is an integral part of Natural England's work to secure a sustainable future. Through exciting educational opportunities, such as those offered by this education pack, Natural England hopes children will become better informed and more eager to care for their environment.

A visit to Wye NNR will illustrate the wonders of nature, and how Natural England manages the reserve, giving children a deeper understanding of their natural environment.

We work with farmers and land managers; business and industry; planners and developers; national, regional and local government; interest groups and local communities to help them improve their local environment. Alongside educational opportunities, this work helps us tackle the increasing pressures of climate change, land demand and pollution.

The Devil's Kneading Trough at Wye NNR

© Dan Tuson

Grazing helps to conserve habitats on Wye NNR

About the Welcome to the Wildside project

The Welcome to the Wildside project aims to put people back in touch with nature on three National Nature Reserves (NNRs) in Kent – Wye NNR (near Ashford), Ham Street Woods NNR (near Ashford) and Stodmarsh NNR (near Canterbury). The three-year project is part-funded by the Heritage Lottery Fund.

NNRs are areas that receive special protection due to their unique habitats and wildlife. By helping communities learn more about the wildlife on the reserves and how they can help protect it, it is hoped that both the wildlife and community will benefit.

As part of the project, community groups and local residents are taking part in free guided walks and informal educational activities based on the reserves. There are also a number of events and practical hands-on activities to enable a wide range of people to reconnect with their natural heritage. This education pack forms part of the 'formal education' element of the project.

© Dan Tuson

Burnet moth

About Wye National Nature Reserve (NNR)

Stretching for almost 2.5 km along the scarp face of the North Downs to the north-east of Ashford, Wye NNR is designated as a Site of Special Scientific Interest (SSSI) and on a European level as a Special Area of Conservation (SAC) for orchid rich grasslands, and beech and yew woodland. It is one of the best and most extensive examples of chalk grassland in Kent, supporting a wide variety of species including several rare plants such as the late spider orchid and the stinking hellebore, plus a range of scarce butterfly and moth species, such as the chalkhill blue and adonis blue butterflies.

The reserve is carefully managed to look after its wildlife – through a combination of grazing (with sheep and cattle from local farms) and manual and mechanical scrub clearance. This maintains a range of habitats, including short grass for orchids and other wildflowers, longer grass for insects such as butterflies and moths, and woodland for dormice and other plants and animals.

One of the conspicuous features of the reserve is the Devil's Kneading Trough – one of several coombes (steep sided dry valleys) created during a 1,000 year period after the last Ice Age, around 10,000 years ago. Intense freezing and thawing of the chalk surface led to torrents of water flowing down the slopes, carving out the chalk to form the steep coombes we see today.

© Dave Rogers

Gatekeeper Pyronia tithonus

History

Incredibly, fossilised sharks' teeth have been found on Wye Downs! The underlying chalk is a clue to how the sharks' teeth got here. Eighty-five million years ago, this area of Kent was covered with sea water and the remains of billions of small sea creatures formed the chalk of the North Downs.

The site has been used by humans since prehistoric times, with evidence of cultivation dating from the mid Neolithic period (around 3000BC). The intriguing ridges on the eastern side of the Devil's Kneading Trough are called terracettes, which are formed by soil movement, otherwise known as 'soil creep'. The soil particles have expanded when at saturation point and then contracted once they have dried out, causing them to creep. The results of this movement have been emphasised by sheep walking along the hillsides as they grazed.

© Anita Luckett

Terracettes on Wye NNR

The site is mentioned in the Domesday Book (1086 AD) and the area of the reserve has not changed significantly since then. During medieval times, the slopes would have been used for grazing sheep and there is evidence that small-scale arable farming began at this time on the man-made lynchets (flat farming areas). The manor of Wye was given to Battle Abbey as a gift from William the Conqueror and many of the crops grown here were transported by cart to Battle, near Hastings.

The Crown memorial was created by students in 1902 to celebrate the coronation of King Edward VII. It was restored between 1991-1995. A Millennium

stone and compass rose were installed above the Crown in 2000 and 2003, respectively.

During the Second World War, Wye NNR was used for military training. Evidence of rifle and artillery practice can still be found in the base and on the sides of the Devil's Kneading Trough.

The site became a nature reserve in 1961, when a local entomologist realised the importance of the site for the species it supported and sought to have it protected. A great deal of research was carried out at the time to catalogue the species present.

Geology

The Devil's Kneading Trough is one of seven coombes in the area. It is made up mostly of soft lower chalk, although a bed of middle chalk can be found near Millstone Point. Its present form can be traced to a period of intense freezing and thawing of the chalk surface during a 1,000 year period after the last Ice Age. This led to a sludgy layer of frost-damaged rock being carried away each year in meltwater torrents, resulting in the gradual widening and deepening of the coombe. The chalk debris was subsequently deposited in 'fans' over the land immediately to the south. Geologists have used the fossils in the fan deposits (particularly snails) to reconstruct the environmental changes that occurred when the landscape was increasingly afforested from the late Devensian period to the present day.

Wildlife importance

The rich mosaic of chalk grasslands, scrub and woodland is home to many rare and uncommon species of both flora and fauna. More than 21 species of orchid have been recorded on the reserve. These include the pyramidal orchid, the lady orchid, and the early and late spider orchid – the latter of which is only found in Kent. South-east England is the most northerly distribution limit for many orchid species, which is why we find such a rich variety here. In just one metre square of short turf, you may find up to 40 different plant species and the reserve supports 400 kinds of plants.

The grassland is very important for the protection of the different moths and butterflies that make this area special, such as the chalkhill blue, marbled white, the adonis blue, silver spotted skipper and Duke of Burgundy butterflies. There are also reptiles such as adders, grass snakes, slow worms (a legless lizard) and the common lizard.

A hazel dormouse during hibernation

The woodland and scrub areas are home to several species of mammal including badgers, rabbits, wood mice and dormice. Hazel trees were managed during the middle ages to provide wood to make wattle hurdles, which were used for containing stock, principally sheep, on Wye NNR. The hazelnut forms part of the staple diet of the hazel dormouse, together with the blackberry and other fruits.

Ongoing management

Managing the chalk grassland and public education are vital for the continuing protection of the rare flora and fauna species found in the reserve. Scrub clearance is an ongoing activity in keeping the downland free from encroaching shrubs – to ensure that the grassland is not overwhelmed and that orchid and invertebrate habitats are protected.

The many different wildflowers, moths and butterflies on the reserve need varying heights of grass to thrive, so careful management is required to maintain a mix of grassland. This is achieved by controlling both the length of time and time of year that sections of the reserve are grazed, and by moving the animals on a rotational basis. Furthermore, different grazing animals produce different results. For example, cattle produce an uneven sward of long and short grass, while sheep produce a very short, even sward. Goats are browsing animals, which help to keep the scrub in check.

Goats browsing near Plunkett's Glade at Wye NNR

© Dan Tuson

Getting to the reserve and parking

Green travel

When visiting these precious wildlife reserves, it is important to think about the environmental impact of your travel choices. Please read our green travel information, which is available on the website, when you plan your school/group visit.

Parking

There is a car park located opposite the reserve, next to the Devil's Kneading Trough restaurant. From the village of Wye take the Hastingleigh road (heading towards Hastingleigh) and past the restaurant; the car park is the next turning on the left. There is also a coach park located directly adjacent to the reserve.

On-site facilities

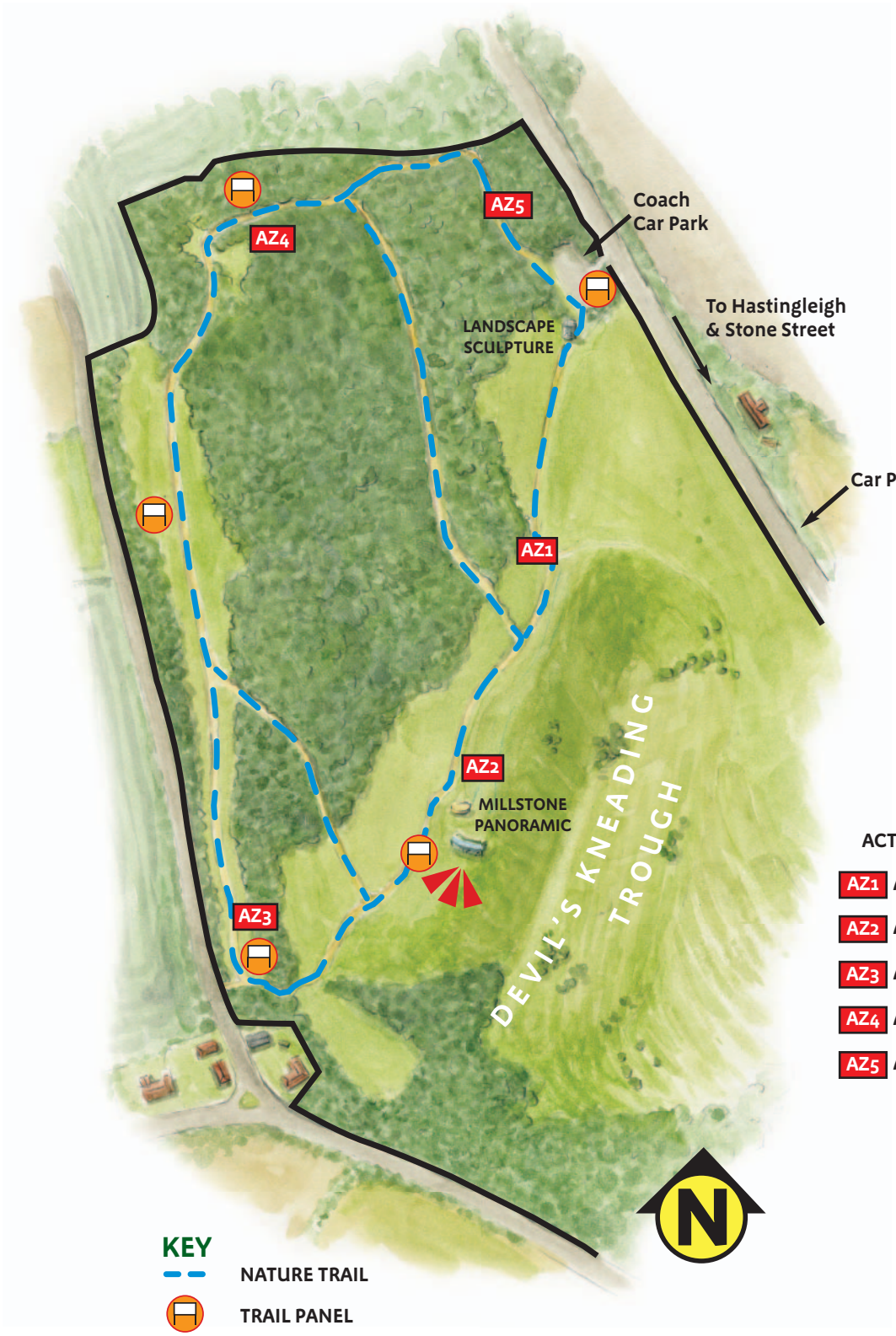
There are no toilet facilities at the Wye NNR. Public toilets are available in the village of Wye, opposite the parish church.

The top part of the NNR may be accessible to those with limited mobility but, owing to the steep gradient of much of the reserve, other parts may not be so easily accessible for wheelchair users or those with limited mobility.

© Emma Griffiths

Activity areas

Five activity areas have been identified where suggested site activities can take place. These areas have been selected because they offer a variety of environments for children to explore and provide teachers and group leaders with sufficient space to carry out whole class activities, while still affording the necessary protection for the rare species of the NNR. These zones are shown on the map below.



Map of Wye National Nature Reserve

About the education pack

The aim of the education pack is to bring a more practical experience of the curriculum to pupils at Key Stage 2, and to increase their appreciation of wildlife and sites such as Wye NNR. It is designed so that teachers in the local Wye and Ashford area can take pupils out with just the pack as a 'guide'.

Learning about butterflies at Wye NNR

The pack covers key topics in the curriculum and offers ideas on preparation, site visit and follow-up activities. Pupil worksheets are available to print from the CD, but activities can just as easily be completed without worksheets via discussion and teacher-led questioning. Although aimed at Key Stage 2 children, activities can also be adapted for those in Key Stage 1.

Even though there is hazard guidance on the CD, it is recommended that teachers and support staff undertake a site visit beforehand, to familiarise themselves with the reserve and to complete their own risk assessments.

Funding provided by the Heritage Lottery Fund means that the education pack is completely free.

When visiting Wye National Nature Reserve please follow the Countryside Code!

- Be safe – plan ahead and follow any signs.
- Protect plants and animals and take your litter home.
- Leave gates and property as you find them.
- Keep dogs under close control.
- Consider other people.

For further information go to
www.countrysideaccess.gov.uk

Activity 1: Landscapes

Aim of the landscape activities

To gain an overview of Wye NNR and wider green space issues.

Preparation/classroom activities

- Look at maps showing where Wye NNR is located in England.
- Identify the principal towns and villages nearby. Discuss the site as a green space and the importance of such spaces for people and wildlife both now and in the past.

Site visit

AZ1, 2 & 5

Equipment: compass.

Activity: children should make a plan of the main features (both natural and man-made) of an area defined by the teacher. (See CD for the map worksheet.)

They should estimate the size of the features in metres; mark north on the map using a compass; draw a blue arrow pointing in the direction of their house and draw a red arrow pointing in the direction of the school. A key system should be used to identify the different features.

Checking the compass

Curriculum links:
Geography – 1a, 2c, 2e, 3a, 3c, 3d, 3e, 4, 5
Art and Design – 1a, 1c, 4a
Citizenship – 2a, 2j
English (En3) – 1a, 5b, 6a, 9

Some examples that could be included are as follows:

Natural features

Woodland

Scrub areas

Ant hills

Hills/slopes

Bare ground

Coombes (such as the dry river valley known as the Devil's Kneading Trough)

Man-made features

Fences

Restaurant building

Water troughs for animals

Benches

Gates

Discuss with the class the landscape around them. Here are some suggested questions as a starting point but other questions relevant to the topic of study can be used:

What is the area like?

Is it open? (i.e. can they see far into the distance?)

Is it closed? (Are views restricted by trees?)

What colours can be seen?

What do they like about the landscape?

How do they think it was formed?

Activity tasks

© John Pieterse

View of the countryside from the Millstone

Activity: Panoramic views at Millstone Point AZ 2

The purpose of the next activity is to encourage children to look at the Stour Valley and its neighbouring land and begin to notice the varied landscape.

See if the children can spot the following:

a) Willesborough Windmill

b) River Stour

c) Parish Church, Wye

d) Wind Turbines on Romney Marsh

e) M20 Motorway

Activity: A journey in art AZ1, 2 & 5

The objective of the next activity is to illustrate the impact and influence that open green spaces can have on our senses and how such feelings can inspire our creative thinking.

Explain to the children that they are going to explore the space they have been working in and how it affects their senses. They should record their findings in the form of a journey stick.

During their walk, the children should collect small samples of materials they encounter, such as fallen leaves, acorns, flowers, berries and feathers. These items should then be attached to their journey stick with string or wool. Different wool colours could be used to represent their experiences, feelings and observations during their journey. For example, the colour blue may mean a bird song to them, or a piece of yellow wool may be applied to their stick at the point when they stepped out of a shaded area into the sunshine.

It is thought that journey sticks were used by Aborigines and Native Americans to help them talk about their walkabout journeys in the wilderness when they returned to camp. Storytelling and sharing information in this way is an important part of their culture.

Once the journey is completed, ask the children to work in pairs and compare their journey sticks.

This activity could be repeated at different times of the year to obtain a view across the changing seasons.

Illustration: Anita Luckett

A completed journey stick

The journey sticks could be supported by using digital cameras to capture specific moments or areas of interest during their journey, both in panoramic and close up fields of vision.

Note: Make sure the children only take material found on the ground. Children should also be reminded not to put any material in or near their mouths and to make sure they wash their hands or use antibacterial wipes.

Rotting wood – a home for wildlife.

Back at school

- Ask the children to write a poem that celebrates the special colours, textures and landscape of Wye NNR. They could also use their journey sticks to help them write a narrative about the route they took through the landscape.
- Stick the different coloured items collected on the journey sticks onto card to make colour palette cards and discuss the types of colours found in nature and how they change across the seasons. Alternatively, use the materials to create a collage of the landscape.
- Create watercolour paintings or pastel drawings of a chosen section of landscape, or particular details of plants, leaves or flowers using gathered materials or photographs for inspiration.

Activity 2: Historical studies

Aim of the historical study activities

To gain a historical overview of Wye NNR and the importance of maintaining the site for future generations.

Curriculum links:

History – 1, 2a, 5, 7, 8, 9, 10, 11b	Art – 2a, 5c
Citizenship – 2a, 2j	ICT – 1
English (En1) – 3, 4	PE – 10b
Maths (Ma2) – 3b, 3j, 3k, 4	

Wye NNR and its surrounding area offers potential links with several topics usually covered during Key Stage 2 History. The area is one of the most important periglacial sites in Britain and was formed over a period of 1,000 years following the last Ice Age. As the permafrost melted, water ran down gouging out the coombes that are so characteristic of this area.

The oldest evidence of occupation on the site, near the top of the coombe, is from the Neolithic period when people first turned from a nomadic lifestyle to form settlements, extract iron ore, grow crops and graze their animals.

More recently, the site was used for artillery practice during the Second World War and is still occasionally used by the army for military manoeuvres today.

The possible burial mound near the Devil's Kneading Trough

A Neolithic settlement

Activity tasks

See CD for pupils' printable version

Activity: Historical treasure hunt AZ 5

In this activity children will try to identify features that could have been created during the Iron Age or Bronze Age (pre-history). The NNR was also widely used in medieval times and local landowners used different methods of marking out their boundaries. As these features can be difficult to identify, please contact the project via the details on the back cover of this education pack, if further guidance is required.

Clue 1:
Inside the wooded area, near the coach park, just visible through the trees, is a large mound/small hill. Explaining that the area was not always covered in woodland, encourage children to consider why they think the earth mound was created and positioned at the top of the hill?

Teacher's note: it is highly possible that the mound was an ancient burial mound, known as a barrow.

© Anita Luckett

Part of the medieval ditch and bank system at Wye NNR, showing the ditch in the foreground and bank above.

Clue 2:
In the woodland area there is evidence of a ditch and bank. Ask the children what this might have been used for?

Teacher's note: this is a medieval ditch and bank system used for keeping animals within a person's land and for creating the boundaries of land ownership. There are lots of numeracy questions that could be completed with the children in this section. For example, if it took seven men one year to dig 1,000 yards of ditch and they were paid one pound between them (work to the basis that there were 20 shillings to the pound), you could ask the children how much each individual received or how long it would take to dig a ditch 3,000 yards long.

Clue 3:
Different types of trees have very different leaf forms and colours. Some trees are evergreen and have easily identifiable features, such as yew trees. Yew trees were often found on boundary lines as their dark foliage could be identified from a distance, enabling land owners to look out from their manor houses and see the extent of their lands. There is still an ancient yew present in the woodland. Try to find this tree (it is near a kissing gate close to AZ4).

Teacher's note: all parts of yew trees are highly poisonous, so children should identify it only by sight and not touch the tree at all.

Activity: A woodsman's workplace AZ 4
See CD for pupils' printable version

Go to Plunkett's Glade at the bottom of the hazel plantation. Here are a few suggested questions to get the children thinking:

- What do you notice about the area?
- Do you recognise any of the types of tree? Can you identify them?
- Who might have worked or works today in an area like this? Is there anything here that leads you to this conclusion?

Encourage the children to find some small pieces of charcoal that can be used to make sketches of the shelter and the charcoal kiln.

© Anita Luckett

Goat shelter and charcoal kiln

Activity: Your country needs you! AZ 2

The bottom of the Devil's Kneading Trough holds a secret! During the Second World War it was home to an army rifle and artillery training range for the Home Guard. The area is best observed from AZ 2. The British Army still use all sorts of areas for their practice manoeuvres, including some National Nature Reserves!

The Devil's Kneading Trough has metal posts sticking up out of the ground about half way along the bottom of it. These were used for holding targets while the Home Guards practiced their shooting skills. Towards the end of the trough, a bank held in place by metal posts and corrugated metal can still be seen; this is where the main targets were placed. You can still see the remains of an Anderson shelter where soldiers sheltered while their fellow soldiers were practising .

In groups of 4–6 ask the children to improvise a short role play by adopting the following roles:

Trainee soldiers

Commanding officers

Interviewer

Encourage the children to think about how it might have felt to be a soldier, completing final training before being sent to the front. What noises can they hear? Children should explore how they feel about being sent overseas? Are they excited? Are they scared?

The Women's Land Army were also an important part of the war effort on the Home Front and Land Girls, as they were known, were stationed in and around the Wye area. The women in the Land Army, who attended Wye Agricultural College, were responsible for carrying out the agricultural jobs that the men serving in the Army, Royal Navy and Royal Air Force would have otherwise been doing. They had to work long days and it was very heavy work as, although tractors were in use at that time, fuel was rationed.

If preferred, the pupils could take the roles of land girls, local landowners and farmers instead of soldiers.

Courtesy of Wye Historical Society

Learning to plough in Wye

Activity: Is bigger better? AZ 2

While the reserve has a great deal of history of its own, it also affords fantastic views over the Stour Valley and surrounding area. The following activity takes advantage of this panoramic view to encourage children to think about reasons for settlement in the area generally, plus the importance of agriculture and how farming methods have evolved over time.

Using digital cameras, ask the children to take panoramic pictures that will enable them to continue working with this wonderful landscape back at school.

Ask the children to look down into the Stour Valley and surrounding area and encourage them to find answers to the following questions: What do they notice about the fields? Why do they think the fields have changed? What are the advantages and disadvantages of the different types of field?

Teacher's note: the fields to the left are part of the Brabourne Estate, which has been managed to maintain hedgerows and small fields; the fields to the right are more typical of the fields we have become accustomed to seeing – large and open to facilitate mechanical methods. The way land management has evolved over time can be clearly seen when viewing the area in this way.

Photo courtesy of Wye Historical Society

Land Army girl at work in Wye

Back at school

ICT research activity

There are many websites available for the children to research the Second World War. Several of them refer to evacuees being sent to Wye, land girls working the farms around Wye and army training taking place. Take care though to look for Wye, Kent not the Wye valley on the borders of England and Wales!

Evacuees

At the beginning of the war, Wye was a destination for evacuees. Children should imagine that they live in a big city like London or Sheffield and have been evacuated to Wye. Children should discuss with their partners then write down:

- The advantages and disadvantages of being an evacuee.
- What would it have been like to be away from their family?
- How do they think life in the country with wide open spaces like Wye NNR would be different from life in the city?

Timeline

Taking into consideration all that has been learnt about the different people who have used the site during its long history, the children could put together a time line assembly to help the rest of the school understand this amazing National Nature Reserve.

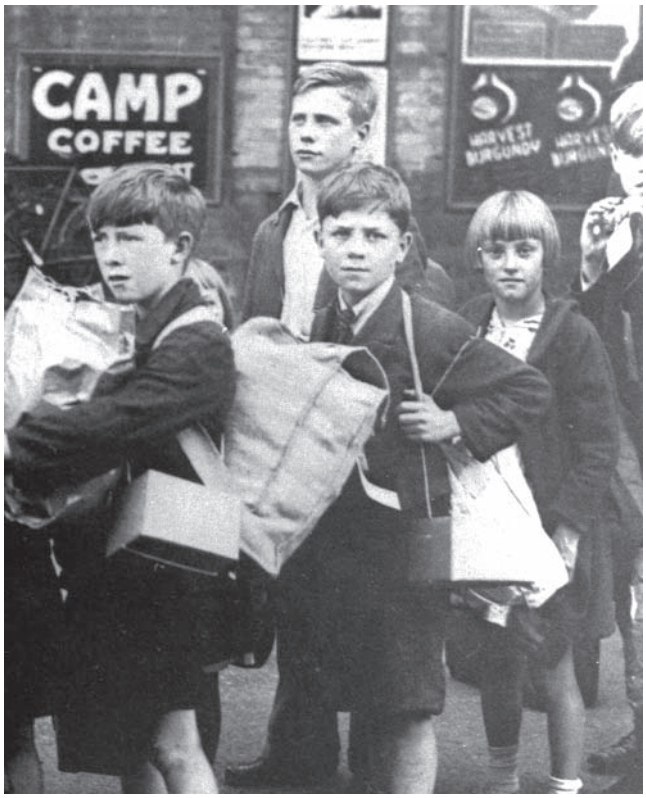


Photo courtesy of Wye Historical Society

Kent evacuees

Farming methods

Using the photographs of the landscape taken earlier, discuss further the evolution of farming methods and how society has changed. Compare with other areas of the world where crops are still farmed manually (eg China – rice fields) or with animals (eg India). Children could also look at areas such as North America and Canada where crops are cultivated on vast open prairies.

Land Army girls training at Wye College

Photo courtesy of Wye Historical Society

Activity 3: Habitats

Aim of the habitat activities:

To recognise the range of habitats on the reserve. Having had an overview of the site while looking at the landscape, it is now time to zoom in on some of the different habitats that make up the reserve. Children will be asked to think about how the habitats might have been created, plus how they are being maintained at present and what the future may hold.

Preparation/classroom activities

Ask the children to:

- Read the fact sheet about dormice and complete a worksheet.
- Learn how to identify a hazel tree from its form, leaves and nuts (see CD worksheet).
- Make a hazel dormouse nest out of shredded newspaper.
- Make sure the children fully understand the term habitat. A habitat is an area with a particular group of plants and animals, which exists under certain conditions.
- Research and colour in the flower ID sheet available on the CD.

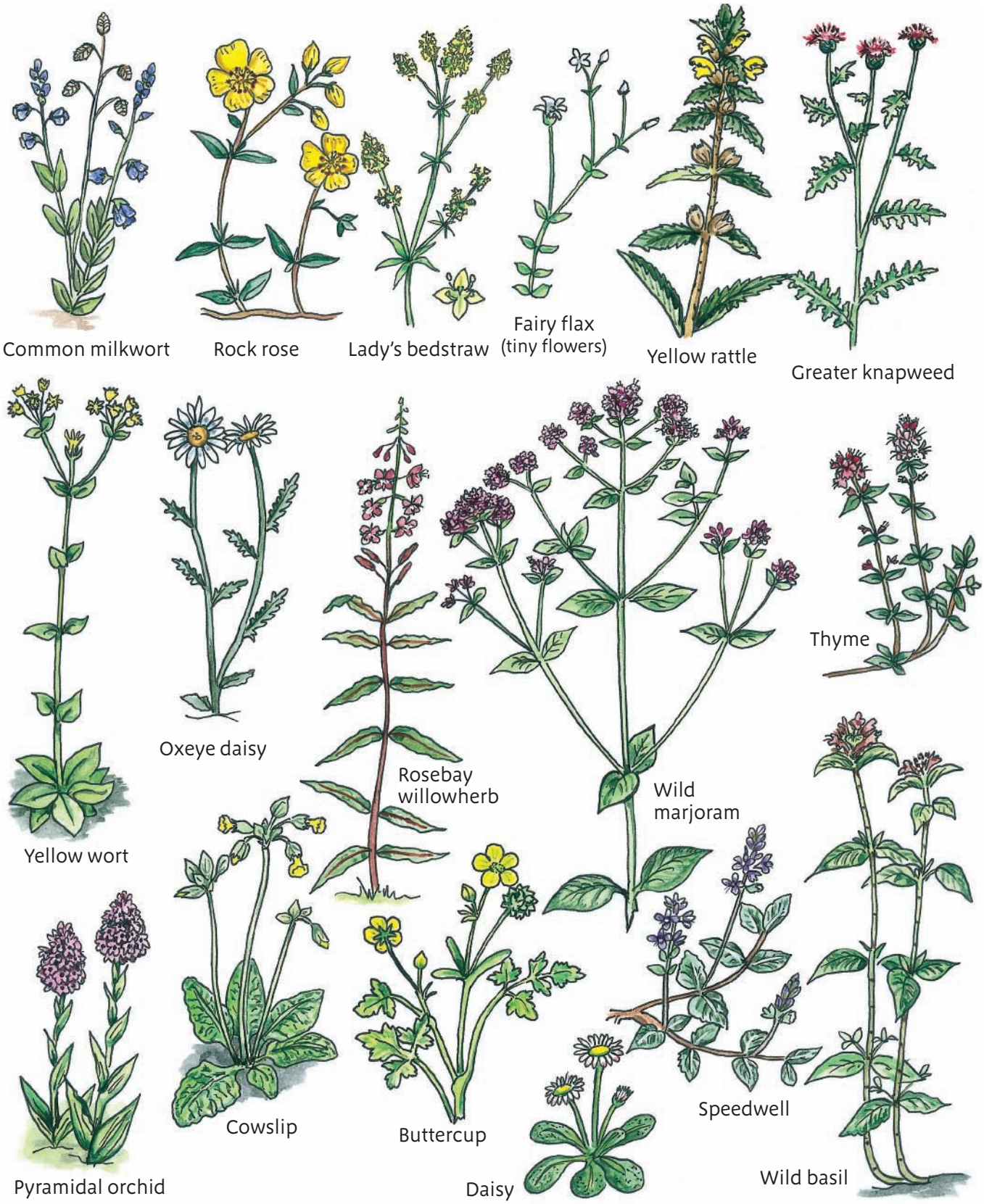
Chalk grassland is a very special habitat found at Wye NNR. The gradient of the reserve means that mechanical cultivation is very difficult, so historically the area was grazed by sheep and cattle. As a result, the meadows on the reserve have been unimproved (not cultivated) since Tudor times. This is what has led to the rich collection of different species and outstanding variety of wildlife. Many wildflower species grow very well in a low-nutrient environment, as they are not in direct competition with more vigorous species, which tend to take over nutrient-rich soils. The grassland is now made up of areas of short grass where orchids flourish in spring and summer, and longer grass in meadows where wildflowers, moths and butterflies can be found.

Curriculum links:
Science (Sc2) – 1, 2f, 3, 4
ICT – 1, 3
English

Wye NNR meadows in summer

Habitats

Wildflower identification sheet



Activity tasks

See CD for pupils' printable version

Activity: Habitat identification AZ1, 2 & 5

Equipment: notebooks, voice recorders, digital cameras and quadrats.

Ask the children to list the natural landscape features identified in activity 1 that they consider to be habitats. If this is the first visit to the site then the children should spend 10-15 minutes looking round to identify possible habitats.

As a class draw together the identified habitats, making sure all of the following principal habitats have been noted:

- Chalk grassland
- Scrub
- Mature woodland (left uncut)
- Coppiced woodland (cut)

Ask the children what the habitats are like and to think about how these different areas may have been created.

Teacher's notes: in the woodland the linear arrangement of the hazel trees suggests that this was actually a planted copse to provide wood for hurdle making and hazelnuts for food.

Focusing on using interesting adjectives, encourage the children to describe the different habitats. Ask the children to make notes, use voice recorders or cameras to help them remember.

As a starter, they could identify whether the habitat is:

a)	dark	shaded	light
b)	wet	damp	dry
c)	open	semi-sheltered	fully sheltered

They can then use other interesting adjectives to describe the area in greater detail.

Snail, nuts and a seedling on the coppiced woodland floor

Chalk grassland habitat

Chalk grassland habitats have been lost as grazing has declined and agriculture has intensified in the form of fertiliser use, herbicide application, ploughing and re-seeding.

Today, the UK is thought to hold 50 per cent of the global calcareous (alkaline, including chalk and limestone) grassland. Kent contains about 20 per cent of the south-east region's resource and 5 per cent of the UK total. Lowland calcareous grassland is a priority Kent Biodiversity Action Plan habitat because only 1,600 hectares are left in the county.

Ferns in a damp area of Wye NNR woodland

A hundred years ago most of the reserve was open grassland, here at Wye NNR. However, because grazing declined, about 30 per cent of the reserve is now covered by trees and scrub. This mosaic of habitats adds to the variety of wildlife found on the reserve.

Some scrub areas on Wye NNR are being restored to grassland. In Denton's Field, for example, the scrub has been cut back in stages and grazed by cattle. The resulting short turf is now supporting thriving populations of a range of orchids. Twenty-one species have been recorded on Wye NNR, including the rare late spider orchid.

Other wildflowers of the chalk grassland include horseshoe vetch, cowslip, marjoram, oxeye daisy, knapweed, buttercup and autumn gentian. The children could use the flower identity sheet on the CD to try and identify some of these flowers.

Activity: Summer sums AZ2 or 3

Children should use quadrats of 1 metre square and work in groups of four. They throw down the squares into an area of grassland and look at the different types of plant that are growing in the square. They should then complete a frequency chart and compare the results with another group who has been working at least 5 metres away, perhaps further down the slope or in a more shaded area.

Name or description	Frequency

Thinking about habitats, encourage the children to discuss what kind of animals might make their home in the grass? Are they able to find any evidence to suggest anything lives here?

Ask the children to think about what might happen if these grassland areas were destroyed.

Activity: Web of life AZ2 or 3

Equipment: one large ball of wool/string of any colour, the grassland web of life identity labels on the CD.

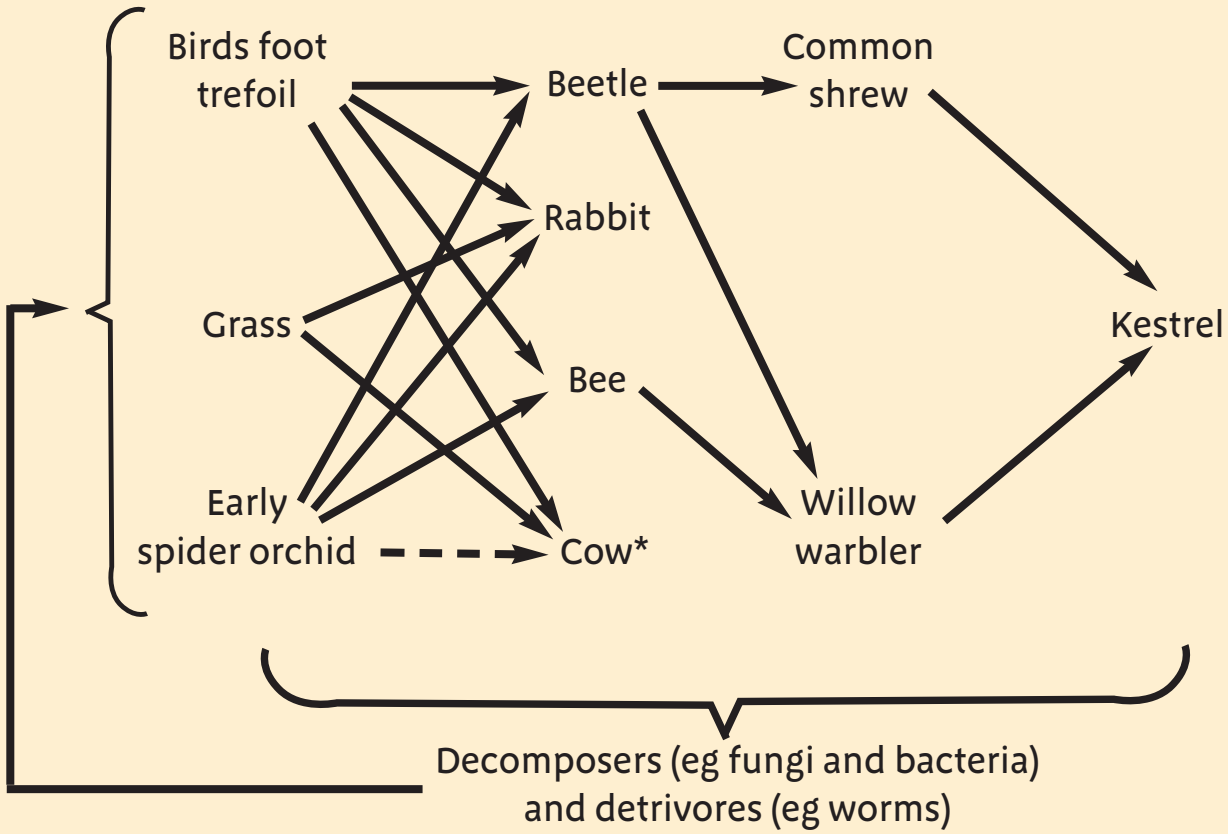
Ask the children to think about all the living things found in the chalk grassland here at Wye NNR. Ask 10 pupils to choose a plant or animal from the web of life diagram on page 21 (labels for the plants and animals are available on the CD).

Ask one child to imagine he or she is the sun and to take hold of the end of a piece of string. He or she will be the first element in the web, the primary energy source.

Ask the children to think about how a particular grassland plant or animal gets its energy, and who gets energy from it (i.e. who eats it?). One by one, link together each new species by passing the ball of string from child to child linking them to the next species they eat, or are eaten by. Eventually, the children will have created a complicated web reflecting the food webs of the reserve.

Ant hills in the chalk grassland

Web of Life: Wye NNR grassland



Teacher's notes*: when introducing the cow, the potential positioning of humans within the web could be discussed. It may also be worth illustrating that the cows' grazing regime has to be managed to ensure the orchids, such as the early spider orchid, are not eaten by the cows.

Now ask what would happen if one of the species is removed. Ask the child representing that species to sit down on the ground. How are the other species affected? What happens to the web? Experiment with different species disappearing (i.e. different children sitting down).

In this way, the children will see how different species interact with each other in a habitat, and how each has an important role to play in the ecosystem.

Birds foot trefoil

Activity: The green green grass AZ2

In this activity the children will learn about the management of grassland and controlling succession. Use two groups of children to compare the effects of grazing and scrub clearance versus non-grazing regimes.

Group 1: Grassland with grazing and scrub clearance

Three children pretend to be cows, and three scrub clearing machines. The remaining children are patches of grass.

The aim of the game is for each child to try and change from grass into scrub and then into a tree.

1. Children who are a patch of grass crouch down, swaying gently in the breeze for 10 seconds.
2. After 10 seconds as grass, they can grow into scrub (crouching with prickly arms and fingers outstretched in strange shapes).
3. After 10 seconds as scrub, they can grow into a tree (standing tall with arms up high).

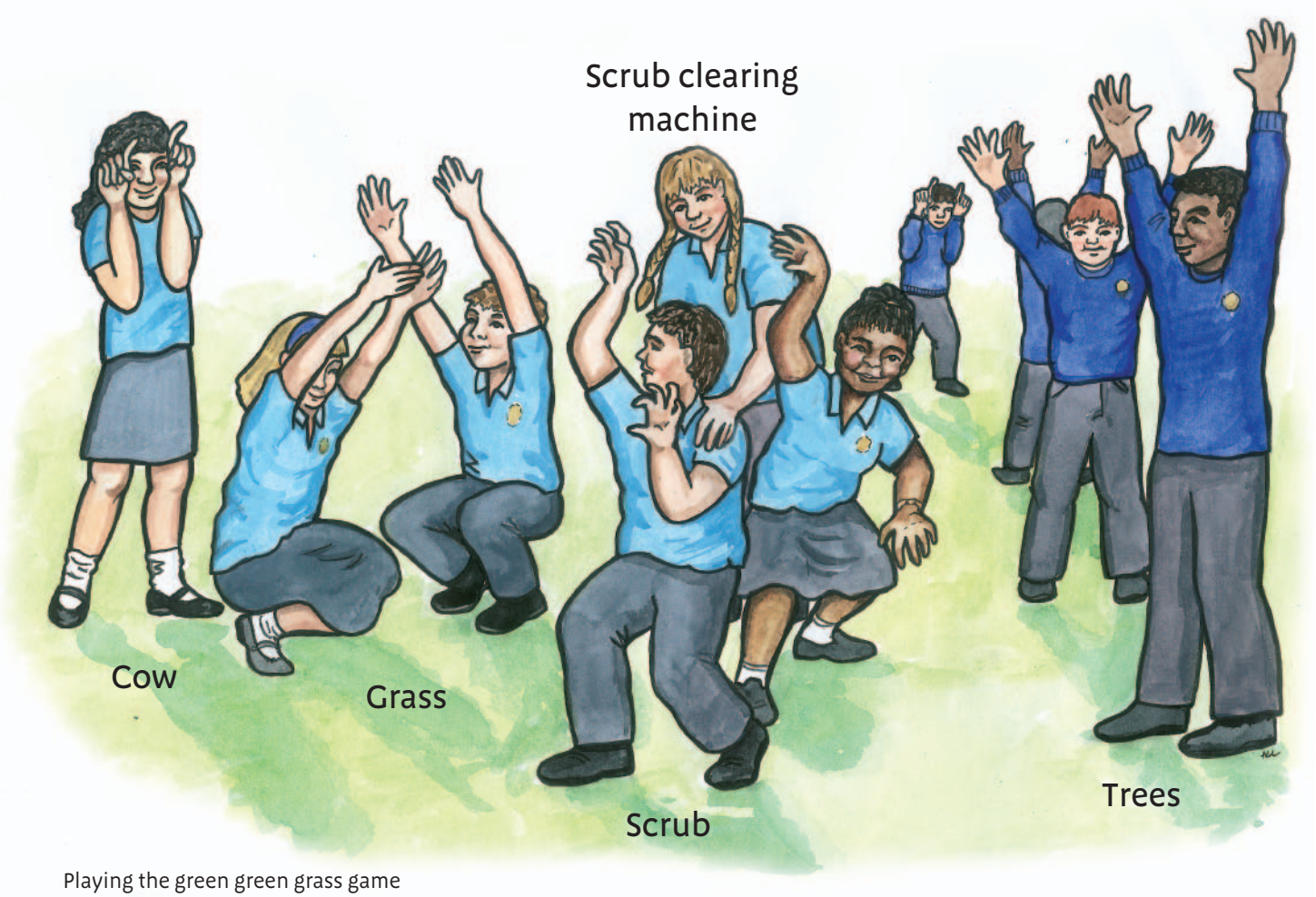
© Dave Rogers

Scrub clearing machines help to preserve rare habitats

4. However, if a scrub patch is nibbled by a cow or cut by a scrub clearing machine, by being tapped gently on the shoulder, they must go back to being grass and try to grow into scrub again, and then into a tree. If they manage to become a tree, then they stay that way for the rest of the game.

Group 2: Grassland without grazing

All children start off as blades of grass. After 20 seconds, they can grow into a patch of scrub. After another 20 seconds, they can grow into a tree. Look at the result!



Playing the green green grass game

Coppiced hazel woodland in winter at Wye NNR

Woodland

A variety of woodland trees are found on Wye NNR including beech, ash, yew and English oak (also known as pedunculate oak). There is also a special hazel woodland here, the home of the hazel dormouse.

The hazel wood on the reserve was planted in the 17th century and has since been managed as a traditional coppiced woodland. Coppicing is when a tree is cut down to just above ground level, which encourages new growth of multiple shoots. After a few years, the wooden shoots (called rods) can be harvested. Hazel coppice rods can be used to make wattle hurdles for fencing, tools, domestic utensils, firewood, charcoal and many other purposes. The hazelnuts produced were an important food source for people and animals.

Coppicing promotes biological diversity because more light can reach the woodland floor, encouraging the growth of wildflowers. Also, because coppicing can be managed to produce wood of different ages, it can provide a variety of habitats and resources for wildlife.

Within the woods at the shrub layer, you can also find field maple, wild cherry, wych elm and whitebeam. The ground vegetation in the woods includes dog's mercury, wood anemone and bramble. Birds found in the woodland include the hawfinch, lesser-spotted woodpecker and nightingale.

Activity: Life-giving coppicing game

In this activity children will learn about coppicing and its benefits to wildlife and humans.

Use two groups of children to compare the life of a coppiced and non-coppiced hazel tree.

Group 1:
What happens to an un-coppiced hazel tree?
Explain to the children that although hazel trees can grow from one stem (trunk), they more frequently grow multi stemmed from the outset. This growth form contrasts to most other trees which only grow multi-stemmed once they have been coppiced. For the purposes of the game to follow, the hazel tree will be multi-stemmed.

1. Six children pretend to be a young hazel tree, crouching together, back to back. Each child represents a hazel rod (tall straight vertical stems).

   They gradually grow by standing up slowly with their arms outstretched in the air.
2. Some children can pretend to be dormice happily scurrying around the tree nibbling the hazelnuts, and nesting in the leaf litter on the ground.

Life-giving coppicing game: uncoppiced trees

Illustration: Anita Luckett

3. The tree grows larger and heavier. Some of the rods break off and fall to the ground allowing rot to set in (two or three of the children should safely sink to the floor). The dormice leave in search of an alternative feeding source.

4. During stages 1 to 3 the remaining children slowly count to 60 in multiples of five. At the count of 60 the tree is fully grown and those representing it should then safely sink to the floor as the tree's life is now over. This demonstrates that the normal lifespan of a hazel tree is 60 years.

A hurdle made at Wye NNR

Group 2:
What happens to a coppiced hazel tree?

1. Once again six children pretend to be a young hazel tree (crouching together back to back). Each child represents a hazel rod gradually growing by standing up slowly. However in this version of the game their arms are never fully outstretched, as full growth is never reached. Some children can pretend to be dormice happily scurrying around the tree nibbling the hazelnuts, and nesting in the leaf litter on the ground. Whilst this is happening the remaining children count up to 10 (each count representing 1 year).
2. Once the number ten has been reached, one of the watching children should pretend to be a woodsman with a saw and coppice the hazel at the level of the children's ankles. As they are sawn, the children squat down to form a stool (meaning a stump) of coppiced hazel tree. The child playing the part of the woodsman pretends to go home, carrying several cut rods over his or her shoulder, leaving the coppiced hazel to grow back.
3. The children grow tall again (remembering to not reach full outstretched growth) representing new rods and the dormice return. Meanwhile the children who are watching continue counting from 11 to 20.
4. At the number 20 the woodsman returns to cut the hazel and so forth at every multiple of 10 until the 60th year is reached. At 60, pause the game and ask the children what had happened to the uncoppiced hazel after 60 years.
5. Restart the game, only this time ask the children to leap into the future by starting their counting at 590 and ending at 600. The hazel tree now collapses. Its life is over after 600 years.

To ensure understanding, ask the children the following questions:

a) In this game, how many times did the woodsman manage to coppice the hazel tree before it finally died?

Answer: Up to 60 times. Calculated as 600 years divided by 10 years = 60 harvests.

b) How much wood could a real woodsman and his descendants harvest over 600 years if 20 rods are harvested every 10 years?

Answer: 1,200 rods. Calculated as (600 years divided by 10 years) x 20 rods = 1,200 rods.

c) How many fence hurdles could have been made from one coppiced hazel tree after 600 years? Note that the hazel tree is harvested every 10 years producing 20 rods each time and each fence hurdle uses 10 rods.

Answer: 120 hurdles. Calculated as (600 years divided by 10 years) x 20 rods divided by 10 rods used per hurdle = 120 hurdles.

Life-giving coppicing game: coppiced trees

Illustration: Anita Luckett

Encourage the children to think about other animals that would benefit from the shelter and food found in a long-lived hazel tree (eg insects and birds). Hazel coppicing can support a range of wildlife because the woodsman can manage the trees so that they exist at different stages of growth, providing a variety of habitats for the wildlife to benefit from.

Note: there is a very old hazel coppice at Wye NNR, planted in 1661.

Finally, create a role-play activity where children pretend to be a woodsman, and his family and friends – putting the harvested hazel coppice to all sorts of good uses. These could include making fires to keep warm, fences to keep animals away from crops and carving spoons, bowls and other useful household objects.

Activity: Which tree? AZ5

Using the tree identification sheet included in this pack (also available on the CD), children should collect from the ground examples of different types of leaves, such as those that are simple/compound or linear/lobed. The children could then use these back at school to create a key. This could also become an ICT activity using a branching database application.

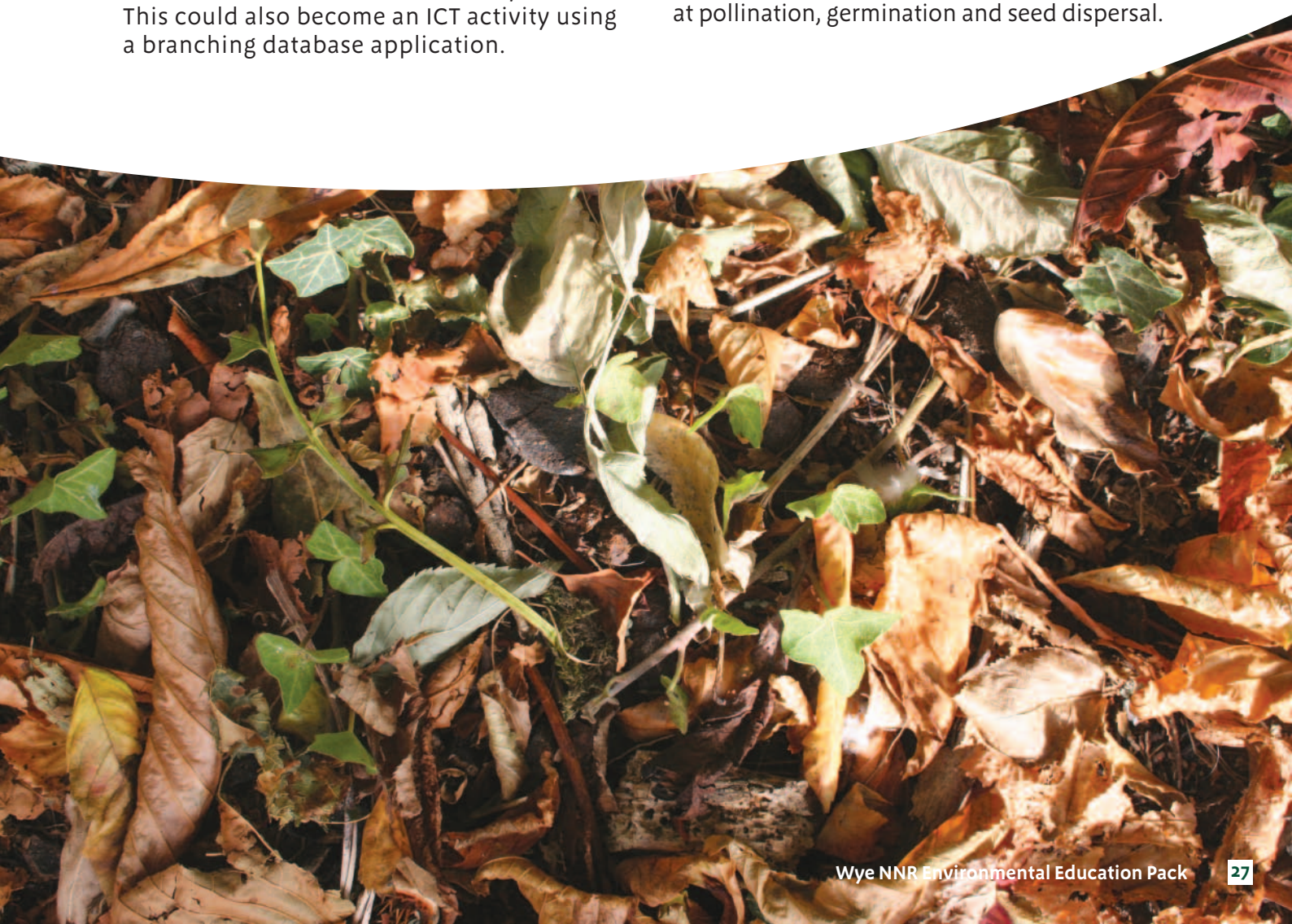
Next, ask the children to identify at least two different habitats that might be found in the woodland area. For example, look for holes in the ground that might be homes to badgers. Using fallen twigs, look closely into the leaf litter on the ground and watch for minibeasts scurrying away. Ask the children what other animals might live in an area like this.

Back at school

Discuss with the children:

- What did they learn from the grazing activity?
- On a whiteboard, list the animals from the web of life game and ask the children to independently draw the web the class had created on the reserve.
- Using the tree identification guides included on the CD, identify tree species from materials gathered while on the reserve, such as leaves, twigs or seeds.
- Discuss with the children what plants need in order to survive.

Teacher's notes: This topic may have been taught in Key Stage 1 but revision of the topic and comparison with human physiological needs will be useful before children start to look at pollination, germination and seed dispersal.



Activity 4: Minibeasts

Aim of the minibeast activities

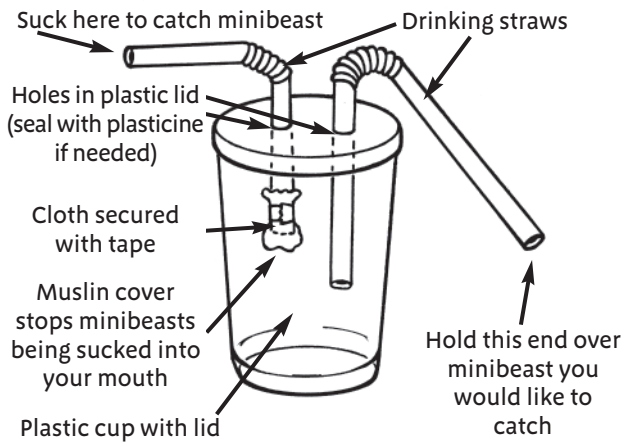
To introduce habitats in terms of scale and to consider the type of animals that might live in smaller habitats.

Preparation/classroom activities

Make sure the children understand the terms habitat and micro-habitat.

Find a plastic container and make two holes in the lid. Insert a straw into each of the two holes and put a piece of thin cloth around the end of one straw (the end which will sit inside the container), securing it with some tape (see diagram below) to create a pooter.

Diagram of a pooter



Site visit

Equipment: pooters (made by children from plastic container).

Optional equipment:
white cloth and a sweep net.

Activity: ask the children which of the following is a habitat:

- a copse (a small wood)
- a tree
- a meadow
- a pile of leaf litter
- small patch of grassland
- a leaf
- a blade of grass

Curriculum links:
Science (Sc1) – 2h
Science (Sc2) – 1a, 1b, 4, 5a, 5b, 5c, 5d
ICT – 1, 3a
Art – 1a

Explain that all of these are habitats, but on very different scales. Children should then investigate a micro-habitat of their choice (such as under a fallen leaf or on a blade of grass) to see what they can find.

Activity tasks

See CD for pupils' printable version.

Ask the children to carry out a minibeast hunt using their pooter. Make sure the children avoid minibeasts that are too large or slimy to suck into the pooter. The sweep net can also be used; simply walk along gently sweeping the net back and forward. Or shake some branches on a tree onto a white cloth and gather round to see what has been found. Make sure all minibeasts are returned to their original habitat.

Ask the children to record the number of minibeasts found on their hunt (see CD for printable version of chart). The children could chart their findings back at school using their ICT skills.

Habitat description	Name or description of minibeast	Frequency

Looking at captured minibeasts

In preparation for making a minibeast passport back at school, ask the children to select one particular minibeast and answer the following questions:

- What is the name/description of the minibeast, or what family does it belong to?
- What habitat was it found in?
- What colour is it?
- How many legs does it have?
- How does it move?
- Does it have wings?
- What is its body shape?
- How many sections does its body have?
- What is its coat like? For example, is it smooth?
- How does it defend itself?
- What does it eat?
- Does it appear singly or in a group?
- Why does it live in this habitat?

There are two classroom-based activities that the children need to prepare for before leaving the reserve.

- Each child should produce a quick sketch of their chosen minibeast ready for a minibeast passport they are going to complete.
- Each child should collect some natural materials from the site, such as fallen leaves, berries, grasses or seeds.

Back at school

Minibeast passport – its all in the detail

Ask the children to use the information collected in the last activity to produce a passport for their chosen minibeast (a passport style worksheet is available on the CD, with completed example on page 30).

Looking at its details, such as colour (eg camouflage), limbs (eg adapted for climbing or jumping) and body shape, ask the children how their minibeast is adapted to living in its chosen habitat.

The children could then make a model version of this minibeast from the gathered materials and place it in a display for the rest of the school to see.

Earthworms

Minibeast passport example

WYE NATIONAL NATURE RESERVE

MINIBEAST NAME:

Wood louse

PASSPORT

FOLD

Picture of Minibeast's habitat

FOLD

Detailed picture of head

Name: Wood louse

Family: Oniscus

Habitat: dark damp places

Why is this habitat chosen:

They dry out in sunshine

Colour: brown

Coat: hard segments

Number of Legs: 16

Moves by: walking

Body shape: oval

Number of body sections: 14

Wings: Yes / (No)

This minibeast eats: decaying plant matter

Found in a group: (Yes) No

Defends itself by: rolling up

Lives a dark, hiding in daytime

Activity 5:
Plant and animal lifecycles

Aim of the plant and animal lifecycle activities

To introduce children to the lifecycles of different plants and animals found at Wye NNR.

The incredible diversity of the site could allow for lots of investigative activities. The grassland is rich in butterfly and moth life, so let's take a look at the lifecycle of a butterfly and a flower.

Activity 5a: Plant lifecycles

Classroom Activities

Introduce flowers to the children as the part of a plant where seeds are made through a process called pollination. Insects are attracted to the flower by its colour and smell, and transfer pollen from one flower to another. Flowering plants reproduce by making seeds. In order to grow into a new plant, the seed needs to be fertilised by this transferred pollen in a process called pollination. The fertilised seed is then dispersed and if it lands in a spot with the correct amount of air, water, sun and soil, the seed will germinate. It should then grow into a plant that flowers and the cycle will begin again.

Curriculum links:

Science (Sc2) – 1, 2f, 3
Art & Design – 1a
P.E. – 6a, 6b

Activity

To better understand the parts of a flower, ask the children to make a flower out of art and craft materials, such as pipe cleaners, tissue paper and coloured card, and label the different parts (see labelled flower below).

The labels could include:

- Petals: brightly coloured and scented to attract insects.
- Sepals: green leaves around the outside of the flower used to protect it whilst still in bud.
- Stamen: the male part of the flower which has two parts – the filaments (a thin stalk) and the anther, where pollen is made.
- Carpel: the female part of the flower which has three parts. At the top are the stigmas, where pollen lands. The style is found below the stigmas and then the ovary (or multiple ovules) where seeds are formed.
- Nectar: this is the food for the insects.

Identifying the parts of a flower

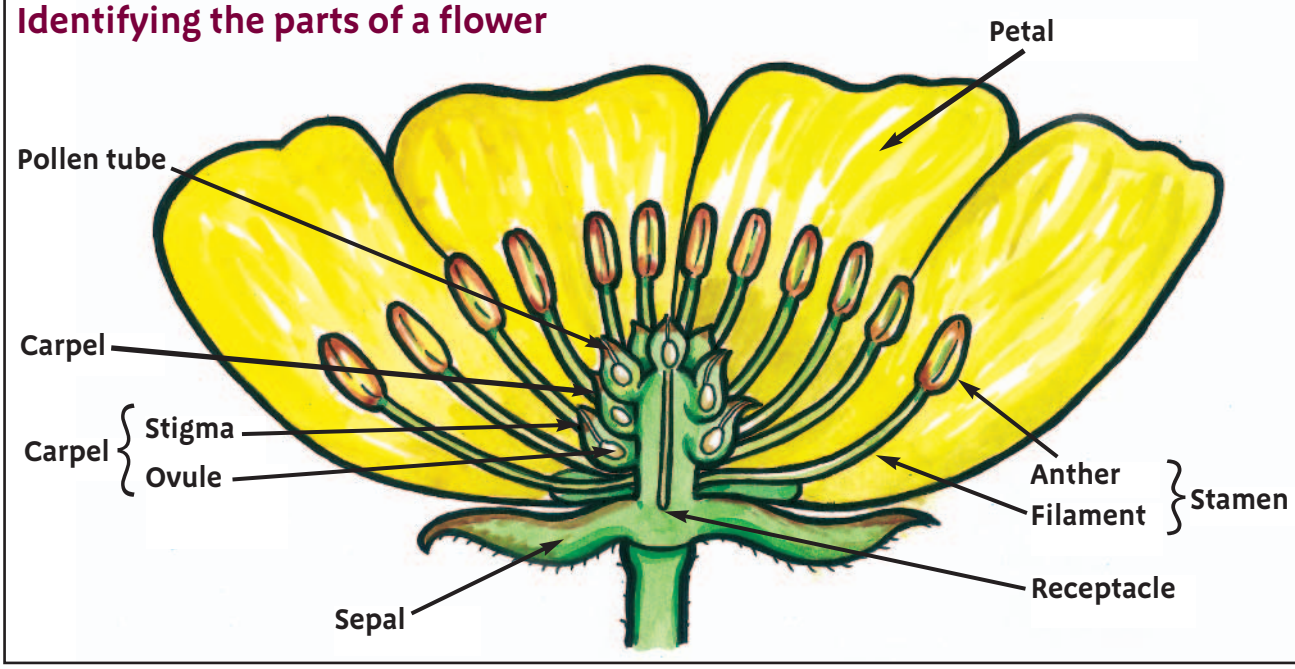


Illustration: Anita Luckett

Dissected primula and elephant's ears flowers

Plant dissecting activity: male or female?

If possible, pick a flower from the garden or school grounds and dissect it with the children, asking them to identify the different parts. Flowers such as buttercups have parts that are easy to identify. Please do not pick flowers from the wild.

Site visit

Pollination game AZ2

The aim of the game is to bring the process of plant pollination to life by acting out the different parts of a flower and how they are involved. It also demonstrates the plant's dependency on insect pollinators and what pollinating insects get from a plant.

Equipment/roles needed:

1. Petals – two sets of four shaped and coloured petals made from stiff card (about 50 cm or more in length). Each petal should be tapered at the base, so that a child can hold it up.
2. Socks – four pairs (or more) of long socks. These are worn on the hands of the children representing the stamens (one pair of socks per child and at least two children per flower).
3. Ping pong balls – 8 or more ping-pong balls with Velcro strips on them (to stick to the socks).
4. Two woolly 'bobble' hats – worn by the two children who represent the stigmas.
5. Two small cartons of fruit juice – one for each flower, to represent the nectar.
6. Pollinator costume – a bee costume could be as simple as some wire for antennae attached to a bobble hat, a stripy sweater and some cardboard wings. You could also make a butterfly costume.
7. Drinking straws – each pollinator should have a drinking straw, representing the insect's mouthparts to be used to drink from the nectar source.

Some of the equipment listed is desirable rather than essential. However, visual learning appeals to many children who will become engaged and motivated to participate. Part of the exercise can be to ask children what parts they think may be necessary for the process and involve the class in designing and making the items needed (perhaps with reference to their earlier dissection activity).

Insect pollination game

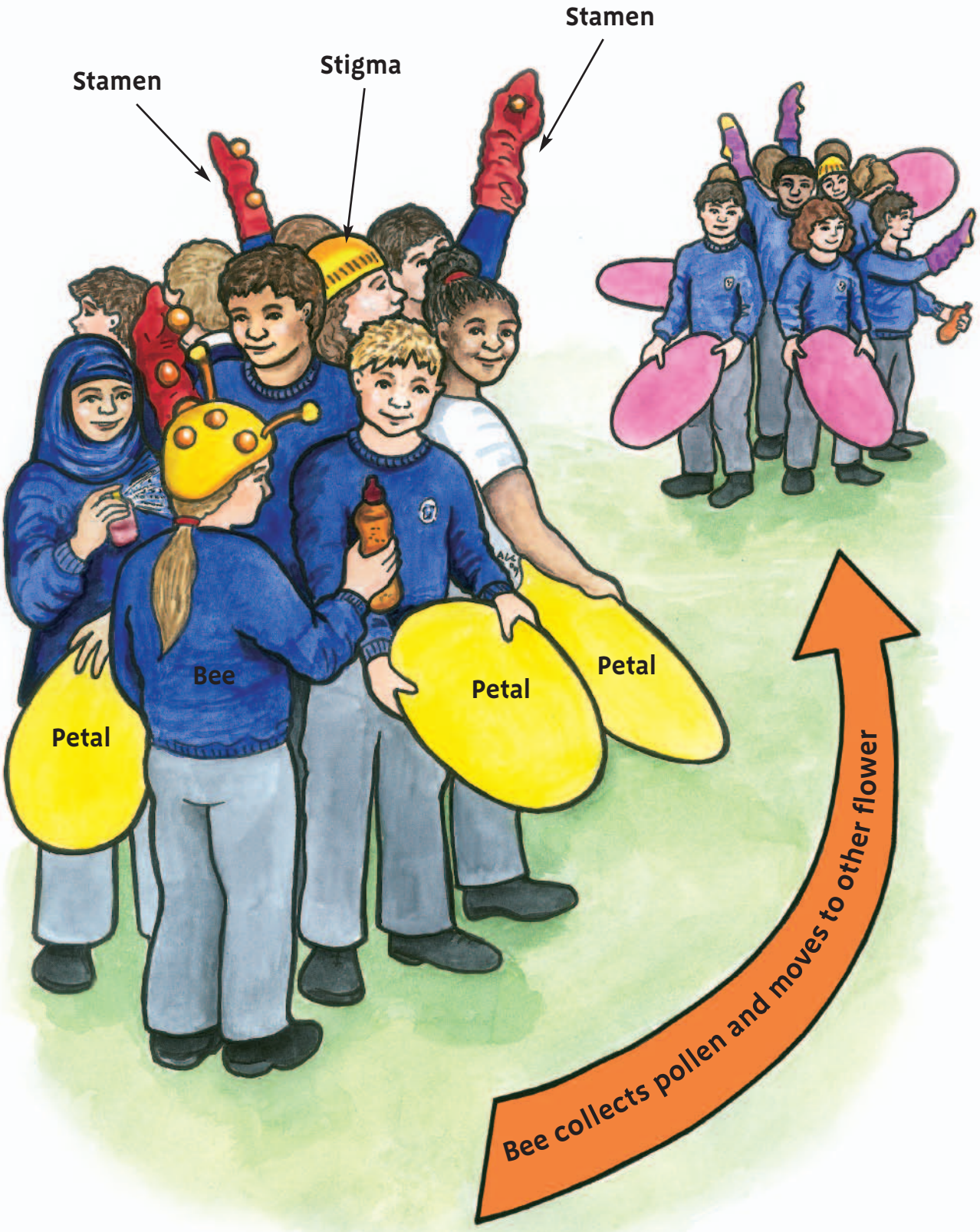


Illustration: Anita Luckett

How to play

1. Two sets of five children each hold up a petal and each group forms the outermost circle of a flower.
2. Children representing stamens should share out the 'pollen grains' evenly between them, sticking them onto their sock-covered hands. They should then stand inside the petal ring and hold up their hands to present the 'pollen'.
3. Each child playing the role of a 'stigma' stands in the centre of a flower and holds up his/her bobble-hat-covered head to receive pollen.
4. Drink cartons should be put by the feet of the 'petals' and are where the visiting pollinator might like to come and sip 'nectar' through their straw.
5. The children act out the process of pollination by playing the role of various flower parts, or by being the pollinating insect. One child takes the part of the pollinator and 'flies' between two 'flowers', removing pollen from the stamens of one and placing it on the stigma of the other.
6. The pollinator may then transport pollen of the second plant back to the stigma of the first plant, etc.
7. Encourage the children to discuss what they have just acted out. The process can be developed further by discussing the stages of fertilisation, seed growth and dispersal.

Modifications

- Have more than two flowers, so the pollinator has to choose which to visit, based on how pretty the petals are, or how tasty they find carton of drink ('nectar').
- Allow the 'petals' to call out encouragement, then discuss how plants attract the attention of pollinators without being able to shout (eg bright colours, sweet scents, and flowers that 'dance' in a breeze).
- Some flowers are only pollinated by insects with long tongues (eg butterflies). In a game with two 'pollinators', a butterfly and a bee, the 'bee' could be given a very short drinking straw, while the 'butterfly' has a long one. The juice carton ('nectar') could be hidden at the centre of the flower with the child who is the 'stigma'. The stigma could only let the 'butterfly' with the long straw reach it (transferring pollen to his/her head), and not let the short-tongue bee near it.

Back at school

Having looked at pollination and fertilisation as a source of seed creation, now let us look at what happens to seeds generally.

The children should complete the lifecycle diagram of a blackberry/ bramble plant (see CD for printable diagram).

Bramble Lifecycle

Dispersal:
seeds are dispersed by many different types of animal including birds (such as blackbirds, thrushes, chaffinches, starlings, robins and pheasants) as well as mammals (including foxes and mice).

Fruit: by late summer and early autumn, the blackberry fruit is ripe and its seeds are fully developed.

Seed

Germination: the blackberry seed settles into the soil and usually in the second year after being dispersed, with a little warmth and water, it germinates into a bramble plant.

Flowers and pollination:
three years from seed, the bramble plant produces white flowers. Nectar and pollen attract insects such as bumblebees, honey bees, hoverflies, wasps, butterflies, moths, flies and lacewings. They help to pollinate the plants by passing pollen from one flower to another.

Illustration: Anita Luckett

Activity 5b: Animal lifecycles

Having looked at how plants create seeds, germinate and disperse those seeds, the lifecycle of animals will now be investigated. Generally, animals have simple lifecycles that are similar to the human lifecycle. Most fish, reptiles, birds and mammals are either born alive from their mother or they hatch from eggs and then they grow up. However, some creatures, like butterflies and moths, have a more complicated lifecycle that includes a period of metamorphosis.

Lifecycle of the chalkhill blue butterfly

1. In July and August eggs are laid by the adult female butterfly singly on a stem of horseshoe vetch or in nearby vegetation.
2. The caterpillar/larvae hatches from the egg the following spring and starts to feed on the leaf of the horseshoe vetch.
3. After 9 to 10 weeks the caterpillar/larvae turns into a chrysalis. The chrysalis protects the caterpillar during its transformation into a butterfly.
4. After 4 weeks the metamorphosis is complete and an adult chalkhill blue butterfly emerges from the chrysalis. Male and female butterflies then mate and the lifecycle begins again.

Teachers note: the larvae of the chalkhill blue secretes a sugary substance which is very attractive to ants and in return the ants give the larva some protection against predators. The ants then bury the chrysalis and 4 weeks later the adult emerges from underground.

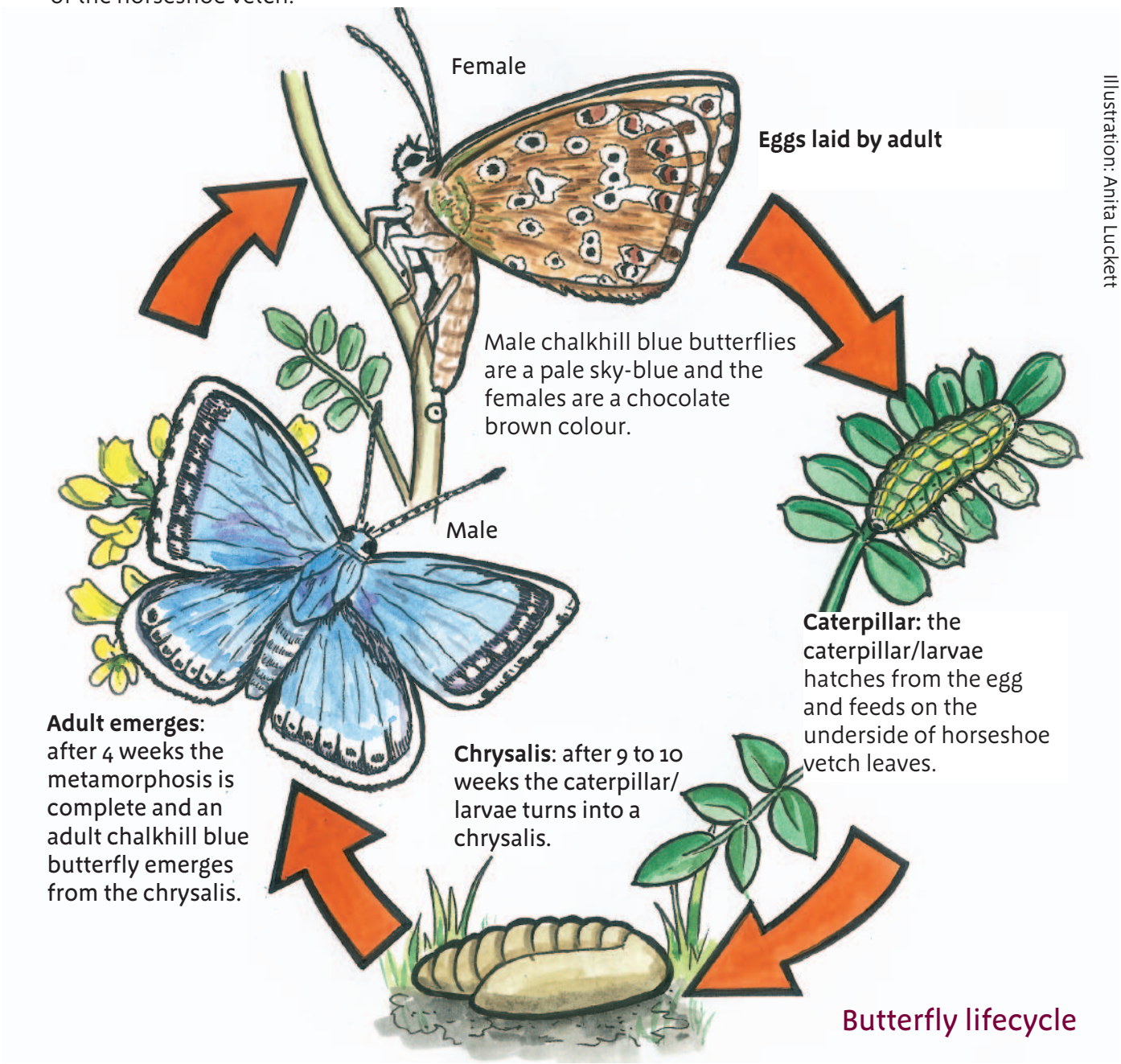


Illustration: Anita Luckett

Butterfly lifecycle

Activity: Flutterby butterfly

Ask the children to represent the butterfly lifecycle in dance or mime.

The children should complete the lifecycle diagram of the chalkhill blue butterfly on the CD worksheet. Discuss the differences between the human (see below) and the butterfly lifecycle.

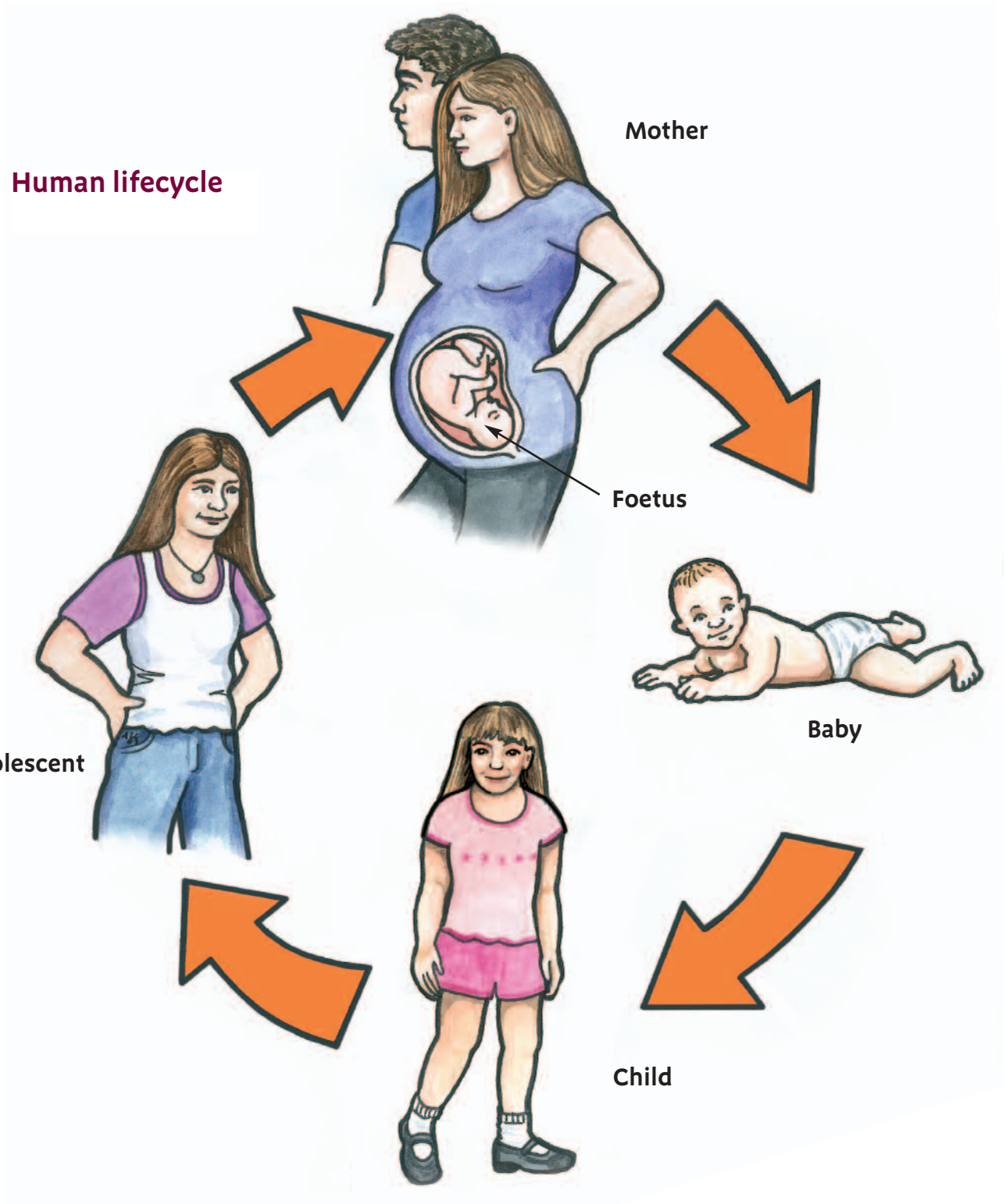


Illustration: Anita Luckett

Further learning opportunities

As well as the Wye NNR, the Welcome to the Wildside project also focuses on two other reserves in east Kent – Stodmarsh NNR and Hamstreet Woods NNR.

Stodmarsh NNR is a marshland area on the bank of the Great Stour river, north-east of Canterbury, supporting important wetland bird populations. Ham Street Woods NNR lies in the village of Hamstreet, near Ashford, and is a remnant of ancient woodland which was once a continuous oak forest covering the Weald.

Collectively, the three NNRs provide children with an enhanced opportunity for learning and a rich personal experience of nature.

Ham Street Woods NNR

To obtain further information regarding the sites, please contact the project using the details provided on the back cover of this education pack.

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Stodmarsh NNR

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Journey Sticks video can be found at: http://www.teachers.tv/video/23949

Plants for Primary Pupils
Parts of a Plant and their Functions
by SAPS and FSC 2004

Games for the Outdoor Classroom
by FACE – Farming and Countryside Education

Image credits

Cover — Devil's Kneading Trough, photo © John Pieterse

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This pack contains a series of National Curriculum linked activities suitable for Key Stage 2 pupils. Some activities are adaptable for younger or older age groups, if necessary.

The pack is divided into a series of key topics, each with activities suitable for use in the classroom and on Wye National Nature Reserve.

A detailed map of the site is included within the pack to help you find your way around. There is also a CD containing worksheets, useful images and any additional resources you might need for the activities.

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