Stodmarsh National Nature Reserve

Environmental Education Pack

www.naturalengland.org.uk

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Welcome to Stodmarsh National Nature Reserve (NNR)

About Natural England

Natural England is an independent public body that protects and improves England's natural environment and encourages 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 walk away from the experience informed and eager to care for their environment.

Illustrating the wonders of nature and how Natural England manages them at the local level of Stodmarsh National Nature Reserve, will enrich the experience for the children and deepen their appreciation of the natural environment as a whole.

This, together with our 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, jointly helps us tackle the increasing pressures of climate change, land demand and pollution.

Looking at minibeasts, Stodmarsh

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Female shoveler

About the Welcome to the Wildside project

The three year Welcome to the Wildside project is part funded by the Heritage Lottery Fund and 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).

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

As part of the project, community groups and community members are joining in free guided walks and informal educational activities based on the reserves. There are also a number of events and practical hands-on activities taking place 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.

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About Stodmarsh National Nature Reserve (NNR)

Stodmarsh NNR covers 241 hectares of marshland on the bank of the Great Stour river, north-east of Canterbury. It supports important wetland bird populations.

History

The earliest recorded use of the land in the area was by the Augustinian monks who dug ditches to bring the river floodwater onto the meadows which were grazed mainly by horses.

Sluices help to control water levels at Stodmarsh

The marsh was excellent grazing for mares in foal and so became known as Stud-marsh, from which we get the modern name Stodmarsh.

In the early 18th century a flood defence barrier, the Lampen Wall, was constructed by Flemish engineers to prevent excessive flooding in the Grove Ferry area. The increasingly efficient drainage of the valley was counteracted by the opening of Chislet Colliery at the beginning of this century. The land subsided over the extensive underground workings and became waterlogged. In the 1930s the first effects of subsidence were noted as small lagoons formed in the meadows. Reedbeds then developed, encroaching from the river banks to cover the wetter areas which are ideal for their growth.

The marsh became a famous wildfowling area and was managed for shooting by a full-time gamekeeper. Some of the old wooden shooting hides can still be seen on the lake today.

The area was first noted for its wildlife value when it was declared a Site of Special Scientific Interest in 1951; later in 1968 the area was declared a National Nature Reserve. The significance of the site today is reflected in its European designations as a Special Protection Area and Special Area of Conservation, and as a Wetland of International Importance under the Ramsar Convention.

Wildlife importance

The extensive reedbeds, shallow lagoons and flooded river meadows on the reserve today are probably similar to those occurring before drainage took place. The wetland habitats attract a rich variety of wildlife and the reserve is noted in particular for its large population of breeding and wintering birds, including some rare species.

Reedbeds are rare throughout the country. Those at Stodmarsh NNR are the largest in south east England. Birds, like the bearded reedling, which breeds on the reserve in large numbers, and the bittern, which regularly winters on site, are completely dependent on reedbeds for their survival.

Hides provide the perfect place to observe birds

Other birds using the reedbeds for nesting include the marsh harrier, reed bunting and water rail.

Reedbeds are also used by swallows and sand martins on migration, with sometimes several thousand birds roosting overnight before continuing their journeys. During winter up to a dozen or so hen harriers will gather together to form a communal roost.

Birds breeding in the wet grazing meadow include mallard, shoveler, lapwing, redshank, snipe and sometimes the rare garganey duck. These grazing meadows also attract other migrant waders, in particular greenshank, ruff, black-tailed godwit and green sandpiper.

Areas flooding in winter means waterfowl numbers increase with wigeon, teal, pintail and white-fronted geese regularly recorded. Due to its close proximity to the coast and continental Europe many other migrant species are recorded at Stodmarsh NNR. Those which occur annually include osprey, hobby, whimbrel, black tern and spotted redshank.

The abundant fish life of the lagoons has attracted fish-eating birds such as the common tern, great crested and little grebe and kingfisher. The wetland habitats are also home to an abundance of insect life. Several species of dragonfly, including the rare hairy dragonfly, inhabit the area. A number of moths which rely on reedbeds for their life cycle are also present, including the rare twin-spotted wainscot.

Other animals which may be seen include fox, stoat, weasel, and the elusive water shrew. A good population of water voles exists, despite the presence of mink, and occasionally otters pass through the reserve.

Dragonfly

Bittern

Ongoing management

Managing the wetland habitats and preventing disturbance is vital for the continued existence of the wildlife found on Stodmarsh NNR. Water levels have to be carefully controlled to provide suitable conditions for wildlife, whilst ensuring that management work may be carried out throughout the seasons.

Reedbeds have to be cut regularly, otherwise they will develop into scrub and eventually woodland.

Wet meadows are grazed by cattle in summer to provide suitable conditions for breeding and wintering birds.

A system of ditches allows water to be moved around the reserve and provides habitat for a range of plants. They are managed to stop them drying up or becoming completely dominated by reeds or scrub.

Extension to reserve

In 1995, 79 hectares of fields adjoining the reserve to the south of Grove Ferry were purchased. This area, which was formerly cut for turf, is being managed as a mosaic of reedbeds, lakes and wet grazing marsh with potential for hay meadows in the drier areas. Work has entailed the raising of water levels by creating bunds and installing dams and sluices. Lagoons have also been dug, existing dykes reshaped and cattle fences and gates erected. As the area continues to develop over the next few years, it will become one of the largest reedbeds in the country.

Getting to the reserve and parking

Green travel

It is important when visiting these precious wildlife reserves that you 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 are two car parks, one at either end of the reserve.

To access the Grove Ferry end car park
take the Grove Ferry Inn turning off the A28, north east of Upstreet village, Canterbury, CT3 4BP. Follow the road down over the railway crossing and take the first left. The car park for the site is on the left before reaching the one reserved for the public house.

To access the Stodmarsh end car park
turn down a track next to The Red Lion public house in Stodmarsh village, CT3 4BA.
At the end of the track is the car park.

On-site facilities

Toilets
There are toilet facilities in the Stodmarsh NNR car park and in a neighbouring car park at the Grove Ferry end; both have disabled facilities.

At the Stodmarsh end there is an easy access nature trail, two hides, footpaths and information panels.

At the Grove Ferry end there is an easy access path, viewing mound and two hides (one wheelchair accessible); plus footpaths and information panels. There is also a seating area, next to a dipping platform, that consists of a work table and benches.

Equipment loan
Some of the activities in the education pack require equipment that can be made or bought by the school. Alternatively a selection of materials can be borrowed from the reserve if requested with sufficient prior warning.

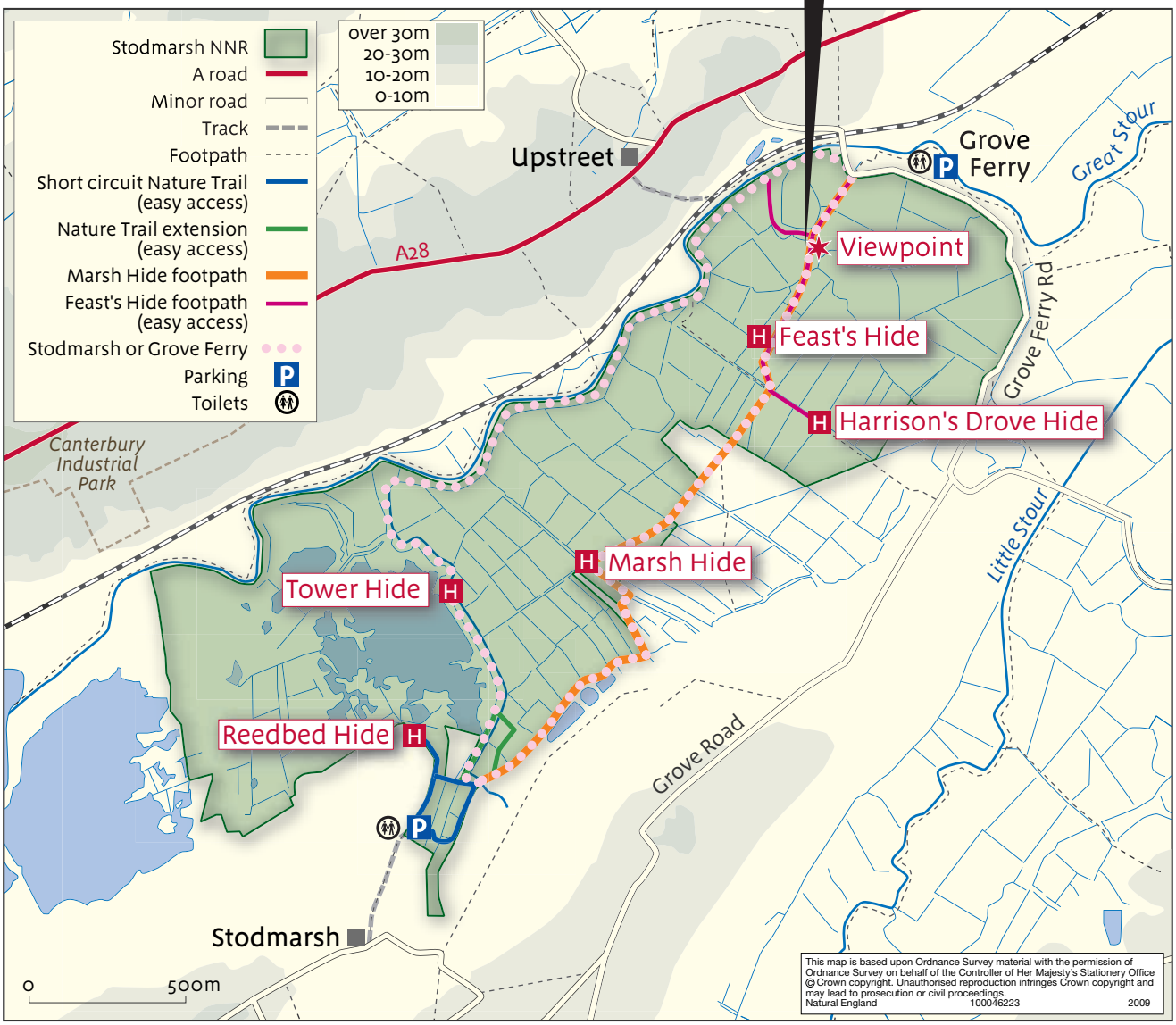
Activity areas

Some of the activities in the education pack are most effective at specific locations on the reserve. The map below shows the locations of hides, footpaths and facilities.

Pond dipping and quadrant activities

The photograph, right, is intended to assist in locating the dipping platform and education area specified for use in Activity 2 and Activity 4 of the education pack. The yellow dotted line within the photograph shows the area of reedbed to be used for quadrant surveys in Activity 2.

Site for quadrant activity, detailed in Activity 2: Habitat and adaptation



Map of Stodmarsh 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 Stodmarsh NNR. It is designed so that teachers in the local Canterbury area can take pupils out with just the pack as their 'guide'.

The pack covers key topics in the curriculum and offers ideas on pre-site preparation activities, site visit activities and follow-up activities.

Pupil worksheets are available on CD but, if preferred, activities can be completed without worksheets via discussion and teacher-led questioning. Although aimed at Key Stage 2 children, activities can adapted for those at 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 make their own risk assessments appropriate to their needs.

Funding provided by the Heritage Lottery Fund means the education pack is completely free, as are visits to the reserve.

Examining the pond life

When visiting Stodmarsh 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 and 'senses'

Aim of the landscape and 'senses' activities

- To gain an overview of Stodmarsh National Nature Reserve (NNR) and broader green space issues.
- To gain a 'sense' of the reserve through sight, touch, smell and sound.

Curriculum link:

Geography 1a, 2c, 2e,3d,3f, 7a, 7c
English Art & Design 1a, 1c
Citizenship 2a, 2j

Preparation/classroom activities

- Look at maps that show where Stodmarsh NNR is located in England (one of its two entrances is in the village of Stodmarsh, Kent). Identify the point at which the neighbouring Great Stour river is joined by the Little Stour river downstream of Stodmarsh NNR. As the reserve is a wetland site with a network of dykes and streams, water control structures, such as sluices, in the ditches control the amount of water that passes from the Lampen Stream, through the ditches and into the reedbeds and wetland areas.
- On a larger scale OS map (Landranger 179 and 189) look at the built-up urban areas that neighbour the site. Discuss the importance of the site as a green space. Discuss the wider issues surrounding green spaces and how they are threatened by pressures for housing and development.

Stodmarsh NNR is very close to housing and industrial activity

- Ask the children, before their visit, how important they feel Stodmarsh NNR is as a green space when compared with the need for housing. Ask the same question after the site visit and compare their responses.

Site visit

Teachers notes: the landscape is open and relatively flat. Many of the standing wet areas, such as the lakes, were formed by subsidence after coal mining finished taking place in the 1960s. The whole site sits in the floodplain of the Great Stour river.

Time: approximately 45 minutes (to enable the pupils to extensively familiarise themselves with the site).

Equipment: compass

Activity: to make a plan of the main landscape features (both natural and man-made) in a set area selected by the teacher and to map the 'senses' on this same plan. Alternatively walk the site as a class discussing the features, without marking them on a plan.

Activity tasks

See CD for pupils' printable version

Each child should estimate the size of the features in metres; mark north on their 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 enable everything to fit on the plan.

Some examples that could be included are as follows:

Natural features

River

Lampen Stream

Dyke (man-made channel of water)

Open water/lakes

Wet woodland

Reedbed

Grazing marsh

Hedgerow

Man-made features

Car park

Toilets

Footpath

Bench

Gates

Bird hide

Lampen Wall (defence wall)

Discuss with the class the landscape they have been looking at:

- What is the landscape like, for example is it open (you can see far off into the distance), or closed (views are restricted, for example by tall trees)?
- What do they like about the landscape?
- Invite the pupils to think of a possible way that this landscape could have been formed. Here is a clue: coal mining once took place below the site.

Next ask the pupils to mark the different sounds of the reserve on their landscape plan by marking where they first heard the sound and its level of quietness or loudness.

Discuss the sounds in terms of quietness and loudness. Compare the type of sounds to another green space they have visited, such as a woodland or park, in terms of differences and similarities.

Then ask the children to record on their plans an example of where they can find the following different textures on the reserve:

Prickly	Tickly
Rough	Smooth
Hard	Soft

Discuss the feel of these textures and whether they remind the children of anything. Next the children could mark on their plans the different smells found on the reserve and again discuss whether the smells remind them of anything.

Colour pallet

Ask the children to collect small samples of different colours in preparation for creating a colour pallet card when they return to school. Make sure the children only take fallen material such as dead leaves and petals found on the ground. This could also be a theme based exercise, such as seasonal colours, or a variety of greens, or even a variety of textures.

Teasels have a prickly texture

Reedbeds are cut back to prevent the reed becoming scrub and to encourage new reed growth.

Back at school

- Stick the different coloured items collected on the reserve onto card to make colour pallet cards. Discuss the types of colours found in nature. Ask the children to think about how these colours change seasonally throughout the year.
- You could also play the following colour game on the school playing fields. Set out clear perimeter boundaries within a safe area and invite the children to stand in the centre of this area. Specify a colour which you can see within the space and once you have called: 'Go' the children have to run and stand beside something of that colour. They then return to the centre and the game repeats with a different colour. Discuss which colours proved easiest to find and why they are dominant in nature. Include the brightness of flowers for pollination, greens for absorbing sunlight, and camouflage colours for protection.
- Ask the children to write a poem that celebrates the special smells, sounds, textures, colours and landscape of Stodmarsh NNR.
- Ask the children to create a zig zag series of four illustrations (see example, right) which show how humans and nature can exist side by side at Stodmarsh NNR. The illustrations could include:

1) A thatcher cutting reed. To stop the reed becoming scrub, different areas of reedbed are cut each year and removed to allow fresh reed growth. Years ago the removed reed was used in roof thatching and is still used for screens on the reserve.
2) Birds making the reserve their home and humans bird watching.
3) Walkers enjoying the cut back paths and wildlife hiding in the longer grass nearby.
4) Scattered trees around the site offering nesting points for birds and providing a spot of shade for a visitor to sit under in summer.

- Ask the children to find out an interesting fact via the internet about reedbeds and their relationship with sewage!

Activity 2:
Habitat and adaptation

Aim of the habitat and adaptation activities

Having had an overview of the site in Activity 1: Landscapes, it is now time to zoom in on the habitats that make up this wider landscape.

Preparation / classroom activities

- Make quadrants out of sticks either before or during the site visit (one between four pupils) by putting four sticks that are roughly 50cm long into a square (overlapping in each corner) and securing the corner overlays with string.
- Make sure the children fully understand the term habitat.

Habitats on Stodmarsh NNR

A habitat is an area with a particular group of plants and animals which exists under certain conditions.

Reedbed is a very special habitat found at Stodmarsh NNR and it likes the conditions of shallow water to grow in. Since the end of World War II farming methods have changed greatly with mechanisation and the use of chemicals increasing food production. During this period many wetland sites have been drained by farmers to allow them to grow more food and by developers for housing. As a result of this 'land reclamation' many reedbeds in the United Kingdom have been lost. In fact, Stodmarsh NNR now has the largest reedbed habitat in the south east of England.

Reedbeds are found on the edge of shallow water. They grow to approximately three metres in height and live for four to five years. Reedbeds have to be cut or burnt regularly to stop plant litter (the dead plants) building up, otherwise they will dry out and develop into scrub and eventually woodland, displacing the reedbed animals in the process. Bitterns are rare birds that like to

After reed clearance – managing the reedbeds maintains Stodmarsh NNR as a special habitat.

breed in the reedbeds , whilst other birds like the reed bunting prefer the reedbeds for food and shelter. Even mammals such as water voles use the reedbeds to move safely from one place to another.

Activity 2a: habitat plant types

Curriculum link:
Geography 2a, 2b, 7c
Sc1 2e, 2h
Sc2 4a, 4b, 4c, 5b, 5c
ICT 1a

Site visit

Time: approximately 45 minutes

Equipment: quadrants

Activity: Ask the children to list which of the landscape features identified in Activity 1 they consider to be 'habitats'. In the event that the children have not completed Activity 1, ask them to spend 10 minutes listing all the landscape features they can find in the surrounding area (see worksheet 2 on the CD for a list of examples).

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

- Reedbed
- Grazing marsh
- River or flowing water
- Wet woodland (may not be visible)
- Open water/lake
- Scrub or hedgerows or individual trees.

For this next exercise, head to the dipping platform and education area (marked on the map found in the introduction of this pack) and work together as a class on this first habitat example.

Standing in the central grassed area, select the area of reedbed that is directly adjacent to the grass and running parallel to the main reserve footpath (clearly illustrated on the map).

Working in this area will be safer as the children should not need to step off the grass to look into the quadrant.

The area adjacent to the pond dipping platform is used for the quadrant activity.

Activity tasks

See CD for pupils' printable version.

Stage 1

Circle which of the following words best describes the chosen habitat (in this first case reedbed).

Type of habitat (e.g. reedbed).....

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

Stage 2

Pace out a square that is two metres by two metres (note one long stride is approximately one metre) within the habitat (in the reedbed example do this without actually stepping into the reed). Next ask the pupils to make a visual assessment of the approximate percentage of each main component inside the square, for example:

20% bare ground	30% litter	50% shrubs
Bare ground	Marshy ground	
Leaf litter	Dead wood	
Short grass	Tall grass	Flowering plants
Reed	Shrubs	
Young trees	Large trees	
Open water	Flowing water	

Stage 3

Throw the quadrant down into the three metre square area and then count the number of different plants and the approximate frequency of each different plant found within it.

Plant name or description	Frequency
1	
2	
3	
4	

Stage 4

Finally, describe the following features of the most common species:

Height.....Colour.....

Leaf shape.....

The children should discover that in reedbeds little else grows apart from reeds. In the case of Stodmarsh NNR the principal reed is common reed (scientific name Phragmites australis).

Split the class into groups of four and ask the pupils to repeat the previous four stages for two different habitats (space is provided on the CD version worksheet), such as under a hedgerow or on a grassed area and to compare their findings. Children should not enter fields where there are animals and should keep to the main 'open access' areas. Quadrants could also be placed at a variety of distances from the path with the results being used to illustrate how fragile some plants and habitats are in terms of erosion.

The results should be very different with a much wider variety of plants growing in a grazing marsh or away from a path habitat, for example, than in a reedbed, or on a path.

Reed growing in open water.

In order to compete for the natural conditions of a habitat, such as the amount of sun or shelter available, some plants will try and grow taller, or along the ground or even in areas that other plants often avoid (such as shaded areas). This is called 'adaptation' and enables some species to not only survive but be more dominant in certain areas

The children will have now looked at the natural conditions of different habitats and recorded types and frequency of plants that have adapted to grow there.

Draw some conclusions from these findings by selecting the correct option in the following statements:

- Reeds like to grow in wet / dry conditions.
- The grazing marsh grassland at Stodmarsh NNR is exposed to wind and the cattle that graze it, therefore the type of grass plants that grow in the habitat needs to be hardy (tough)/delicate.
- In the wet woodland at Stodmarsh NNR, trees grow tall because they compete for sunlight / shade. The leaves on the trees are green, as this is a colour that absorbs maximum sunlight/shade.

Back at school

Use the data gained during task stages 1 to 4 to compile a series of pie charts and graphs. Identify and discuss any patterns made visible by these charts and graphs.

Habitat and adaptation

Activity 2b: making a habitat a home

Having looked at the plants that have 'adapted' to grow in different habitats, the animals that live in these different habitats will now be considered.

Curriculum link:
Geography 2a, 2b, 7c
Sc2 4a, 4b, 4c, 5a, 5b, 5c
English

Activity tasks

See CD for pupils' printable version

The following table includes some of the many animals found on Stodmarsh NNR, and the habitats they like to live in.

Working in pairs, ask the children to try and find a home for one of the animals listed and to stand next to their chosen area. Remind them to avoid trampling through the reedbeds in case they step on a real animal's home!

Table showing animals found on Stodmarsh NNR

ANIMAL	FAMILY GROUP	HOME
Hen harrier	Bird	Hunt over open areas with low vegetation; roost in reedbeds. Very rare and protected bird.
Bittern	Bird	Feel safe camouflaged amongst the reedbeds and feeding along narrow ditches. Very rare and protected bird.
Cetti's warbler	Bird	Rarely seen, they nest and feed in bramble and bushes along reedbed edge
Redshank	Bird	Like to breed on the fields and feed in muddy pools.
Mallard	Bird	Feel at home on open areas of water and the edges of reedbeds.
Reed warbler	Bird	Like to nest in the reedbed where they find their food.
Ramshorn snail	Molluscs	Live in the water edges and eat algae.
Reed dagger moth larvae	Insect	Live and feed on reeds.
Daubenton's bat (known as the water bat)	Mammal	Like to sleep in holes in trees close to open water where it can hunt for food.
Water vole	Mammal	Like river banks with waterside plants for food and steep earth banks for making burrows.
Grass snake	Reptile	Prefer damp habitats such as river banks and ditches but also like hedgerows, woodland and meadows. Carry out most hunting for food, such as fish, underwater.
Common frog	Amphibian	Like to hide in long grass and woodland close to shallow water sources and eat insects, slugs and worms.

© Dave Rogers

Mute Swans at Stodmarsh NNR

Once the children have found the new home of their chosen animal, approach each pair and ask why they chose that particular spot. If there is time this game can be repeated by choosing an animal from a different 'family group'.

As the habitats found on Stodmarsh NNR are so special and support many important animals and plants, the site has a number of conservation designations. This means they have been selected to be legally protected by certain conservation laws.

- All of the reserve is a Site of special Scientific Interest (SSSI) which means it is protected under the UK Wildlife and Countryside Act 1981.
- Over 60% of the site is protected by European Laws as a Special Protection Area (SPA). SPAs require protection of migratory birds and certain threatened birds.
- Most of the site is also protected by European Laws as Special Area of Conservation (SAC), which means it has some very special species and habitats.
- Over 60% of the site has international protection in its designation as a Ramsar Site. This means it is recognised as having a wetland habitat of international importance, and that is especially good for wetland birds.

So, as you can see, the habitats at Stodmarsh NNR make it a very special site indeed for birds. Although birds tend to prefer particular habitats, many will also adapt to different habitats.

For example sparrows live in both the countryside and busy towns. Many of the birds found at Stodmarsh NNR have developed particular features that allow them to live in wet habitats and this is called 'adaptation'. The types of birds you are likely to see at Stodmarsh NNR are wildfowl and waders, plus birds of prey such as the hen harrier and song-birds, such as reed warblers.

© Steve Ray

Reed warbler

Wildfowl are swans, ducks and geese and their 'adaptations' are as follows:

- Short, thick legs with webbed feet for swimming and walking on mud.
- Large bodies with a layer of fat for protection against heat loss on cold water.
- Feathers that are made waterproof by an oil released from the bird's gland when the bird preens itself.

- The beak or bill of wildfowl differs depending upon what they eat.
- Swans have bills that can sieve and bite so they can eat water plants and animals.
- Wildfowl like shovelers have wide, flat bills that can sieve animals and algae out of the water.
- Wildfowl moult all of their wing feathers at once leaving them unable to fly for several weeks. Males often have very colourful plumage (feathers). When they moult, the new feathers have brownish tips to make them less visible to predators. Once fully moulted these wear off to reveal their splendid plumage.
- Grazing wildfowl such as wigeons and geese have bills that are short and strong for biting off grass and cereals.

Waders at Stodmarsh NNR feed on insects and other invertebrates in the mud, such as bloodworm. Their adaptations are as follows:

- Camouflage colouring to protect against predators.
- Long, thin legs to wade in the water's edge.
- Some have long, sensitive beaks to search for food in the mud.
- Some have shorter bills, but good eyesight to see food clues.
- Beaks of waders are different shapes and lengths, so they are not all competing for the same food.

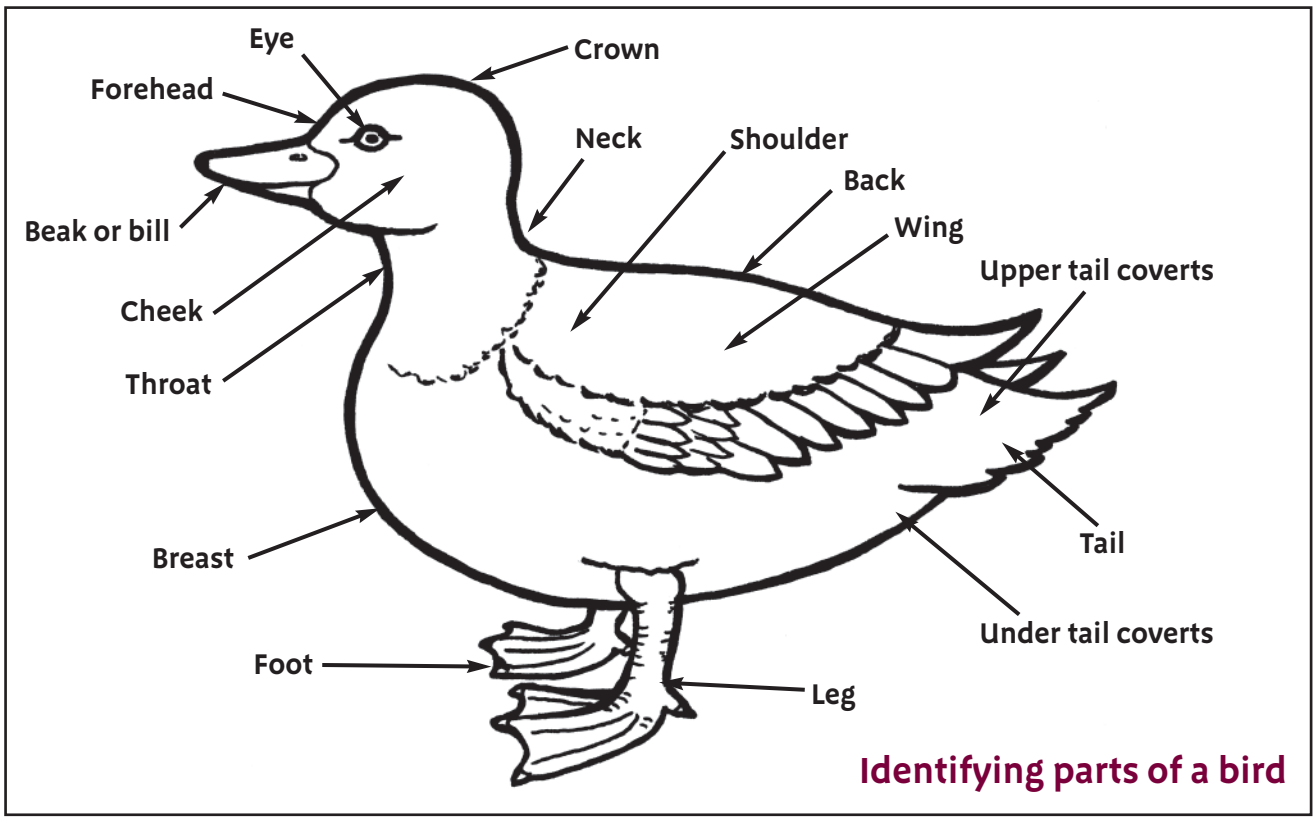
Lapwing

Head to the David Feast bird hide and see what waders or wildfowl are in view. (If you are unable to spot any there are some pictures of them on the hide wall). Look closely at one wader and one wildfowl. Ask the children to work in pairs and to describe to their partner three differences between the wader and wildfowl birds they can see, and to explain these differences in terms of adaptation, ie:

1) Beak/bill
2) Legs
3) Body shape and size

Ask the children to draw their own picture of either the wildfowl or wader they have been looking at, or even another type of bird in view, and then label the parts of the bird using the identification picture below as a guide.

Once the drawing is complete, the children need to fill out further description details in the table on page 20.



Using the table information

The table below has helped the children look more closely at the type of habitat their chosen bird prefers and how it has adapted to the habitat in terms of its behaviour and physical features. Now it should be possible to identify, not only what type of bird it is, such as a wader or wildfowl, but also the particular species it is, such as tufted duck or redshank. Ask the children to have a go at identifying the exact bird species they have drawn.

Ask the children why they think noting the date and time the bird was seen is important?

Answer: Firstly the plumage/feathers can change on a bird depending on the time of year. Also many birds only visit the reserve at certain times of the year and then migrate elsewhere. (Migration is a topic that will be covered in Activity 4: Feeding relationships).

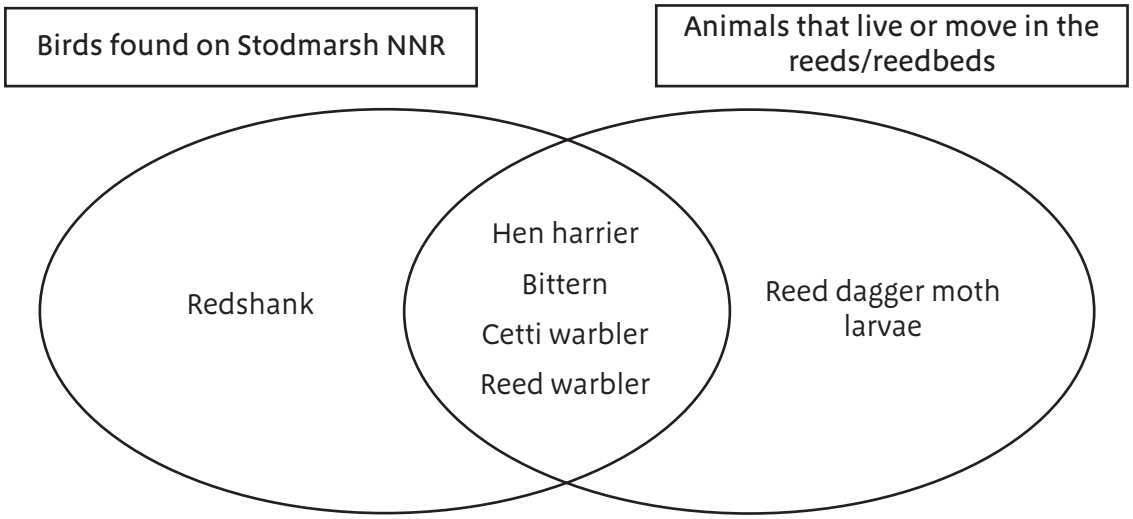
Table for identifying birds (See CD for printable pupil's version)

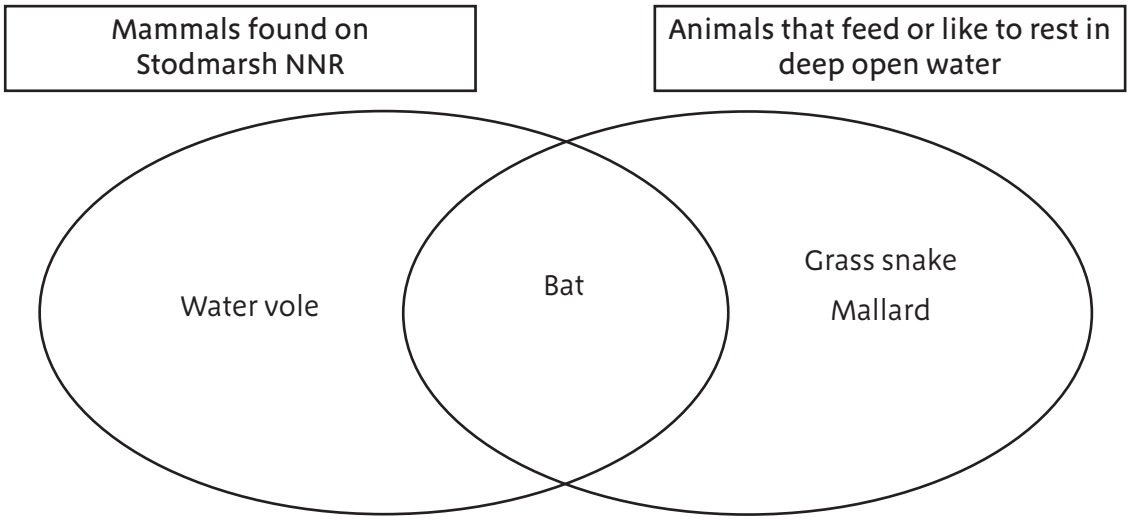
FEATURE	DETAILS
Date and time	
Place	
Size (ie. small, medium or large)	
Body shape (ie. round, long)	
Shape of tail (ie. rounded, tufted, forked, square, long, pointed, wide)	
Shape of wings (ie. rounded, tufted, forked, square, long, pointed, wide)	
Length, shape and colour of bill/beak (ie. long, thin, curved)	
Patterns and colours (ie. individual markings such as eye and throat markings)	
Behaviour (ie.feeds on the ground or by diving or by dabbling. The way it flies or walks. Flight pattern is slowing and bobbing up and down)	
If audible, describe song.	

Back at school

Venn diagrams

Based purely on the information provided in Table showing Animals found on Stodmarsh NNR (page 17), ask the children to complete the following sorting and classifying Venn diagrams (shown on CD printable pupils' version as empty circles). A more advanced activity might include the creation of a third Venn diagram of their own design.





Ideal Habitat Homes

Ask the children to choose one of animals found at Stodmarsh NNR and imagine they are that animal. A magazine called Ideal Habitat Homes is keen to include an article on the homes of Stodmarsh NNR animals and would like the animals to answer the questions listed below.
This exercise could be taken further by asking pupils to adopt a character for their chosen animal such as eccentric, bold, or timid, and answer the questions in a creative way.

- How did you make your home and did you use local materials? If so what materials did you use?
- Is your home nice and warm, or cool?
- Did you think much about shelter when building your home?
- Do you have enough water?
- Do you feel safe in your home? If so, why?
- What food does the habitat where your home is located offer you?
- Humans and natural forces (such as strong winds or storms) can put habitats at risk. What do you think the threats are to your home?
- What do you like best about your home?

Activity 3: Minibeasting

Aim of the minibeasting 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 fully understand the terms habitat, mini-habitats, and micro-habitats

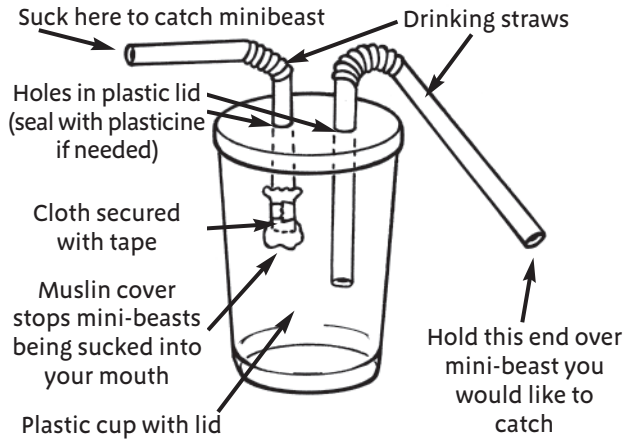
Site visit

Time: approximately 45 minutes

Equipment: pooters

Find a plastic container with lid 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).

Diagram of a pooter



Optional equipment:
White cloth and a sweep net.

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

- A reedbed
- A small patch of reeds
- An individual reed

Having explained to the children that they are all habitats, but on three different scales, ask them to find a micro-habitat of their choice, such as:

Curriculum links:
Geography 2a, 2b, 7c
Sc1 2e
Sc2 4c, 5b, 5c
Design & Technology 2a, 2b, 2c
Art & design 2a

- Under a fallen twig or leaf
- On a blade of grass
- On a reed
- In a puddle

Ask them to compare their chosen micro-habitat in two different locations; for a blade of grass in the middle of a field is likely to offer a very different home from a blade of grass at the edge of a reedbed.

In these micro-habitats we are likely to find the minibeasts that live on Stodmarsh NNR so its time to go minibeasting! Children should try to identify the minibeasts they find using ID charts (see CD for simple, printable ID chart).

Activity tasks

See CD for pupils' printable version.

Ask the children to carry out a minibeast hunt on a terrestrial habitat first. To do this they will need their pooters. 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).

Name or description of minibeast	Tally

Next, repeat the above exercise, only this time find the minibeasts by pond dipping off the pond dipping platform (see CD for printable pupils' version of table).

Equipment: dipping net and tray

Activity: try dipping in different areas, for instance a deep or shallow patch, close to the surface and close to the bottom. Where was the highest number and variety of minibeasts found – deep, shallow, on the surface, or close to the bottom?

Be careful not to disturb the mud at the bottom of the dipping area. If the water becomes too cloudy it will make identification more difficult.

Depth / location of dip	Name or description of minibeast	Tally

Recording more about minibeasts

The children could present their findings from the pond dipping activity in pie charts and graphs back at school and try to explain the patterns.

In preparation for making a minibeast passport back at school, ask the children to select one of the minibeasts they have caught and answer the following questions:

- Name / description of minibeast or what family does the minibeast 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?

Freshwater shrimp

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

Firstly, each child should produce a quick sketch of their chosen minibeast ready for a minibeast passport they are going to complete. Secondly the children should collect some natural materials from the site, such as fallen leaves and berries.

Back at school

Minibeast passport

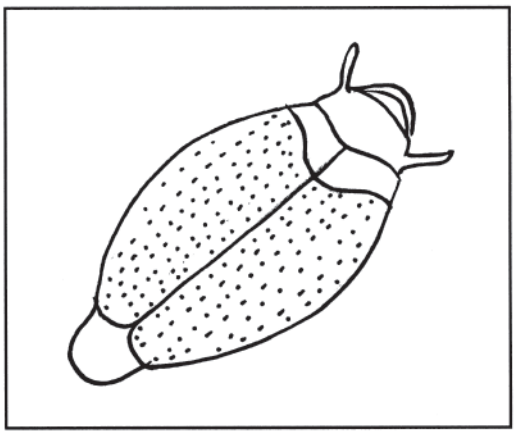
Ask the children to use the information collected in the last activity to produce the minibeast passport for their chosen minibeast (a passport style worksheet is available on the CD, with completed example on page 24).

Looking at its details, such as colour (e.g. camouflage), coat (e.g. smoothness to reduce friction), limbs (e.g. adapted for swimming) and body shape (e.g. streamlined), 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 out of recycled materials and place it in a shared display made from materials collected on site. Compare the concepts of natural materials with synthetic or man-made materials.

Minibeast passport example

STODMARSH NATIONAL NATURE RESERVE



MINIBEAST NAME:

Whirligig beetle

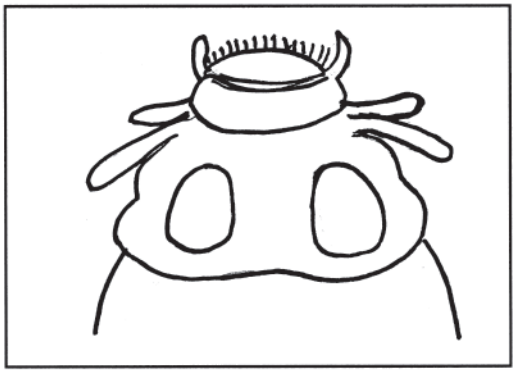
PASSPORT

FOLD

Picture of Minibeast's habitat

FOLD

Detailed picture of head



Name: Whirligig beetle

Family: Gyrinidae

Habitat: Ponds, ditches and rivers

Why is this habitat chosen:

Food and protection

Colour: Black and brown with orange legs

Coat: Shiny

Number of Legs: 6

Moves by: Swimming and flying

Body shape: Oval

Number of body sections: 3

Wings: (Yes) No

This minibeast eats: Small insects

Found in a group: (Yes) No

Defends itself by: Diving

Underwater

Illustration: Anita Luckett

Activity 4: Feeding relationships

Aim of the feeding relationships activities

To introduce the children to the food chains and food webs that exist on Stodmarsh NNR and to consider how these are affected by outside influences.

Curriculum links:
Geography 5a, 5b,
Sc2 5a, 5d, 5e
Citizenship 2a
English 3a

Preparation/classroom activities

Make sure the children fully understand the terms 'prey' and 'predator', 'producer' and 'consumer', 'herbivore' and 'carnivore'. Also introduce the term 'migration'.

- Primary producers – use the energy from the sun combined with water and nutrients to grow; for example, plants and algae.
- Primary consumers – herbivores that eat the primary producers; for example, cows eat grass.
- Secondary consumers – carnivores who prey on animals and can themselves be eaten by other animals; for example, birds eat worms.
- Tertiary consumers – carnivores, such as marsh harriers, who eat secondary consumers.

Migration is the movement of animals from one part of the world to another as an 'adaptation' to seasonal changes.

Site visit

Time: approximately 30 minutes (time dependent on how many games are played and how often they are repeated).

Equipment:
blindfolds x2 (one with bells), string.

Head to the dipping platform and education area (marked on the map found in the introduction of this pack).

Activity: hunting harrier

Finding a home which has the right climatic features such as sunlight, shelter and water, is only part of an animal's search; finding somewhere it can find food and avoid being food for another animal, is just as important.

Explain to the children that in this game if they are looking for food to eat in the form of other animals, then they are the **predator**. However if they are the one trying to avoid being food for another animal, then they are the **prey**.

Introduce the children to the marsh harrier which, along with the hen harrier, is a bird of prey with special protection from wildlife laws. This is because they are both threatened by illegal killing and habitat loss from land-drainage. Stodmarsh NNR provides the ideal habitat for the marsh harrier with dense vegetation and open waters and is therefore fortunate to have it as a resident all year round.

Marsh frog

Ask the children to form a circle in the grassed section of the education area and one child to be a marsh harrier and another child a marsh frog. Tell the children there is a marsh harrier flying over the reserve that is looking for a marsh frog for its dinner. Fortunately for the marsh frog there is a reedbed to hide in, represented by the circle of children, (please do not actually stand in the reedbed) but this also means the marsh frog cannot see the marsh harrier properly. Blindfold the two children in the centre and instruct the marsh harrier to try and tag the marsh frog. The marsh frog's blindfold could have bells on it to represent the sound of it moving through the reeds.

Hunting harrier game variations

An alternative to this game would be to remove the bells from the marsh frog's blindfold and ask the children in the surrounding circle to make a 'swish' sound of the reeds as the prey passes close to them. It is up to the group to help the marsh harrier finds its lunch.

Note: there are two further versions of this game recorded in the 'Back at school' section, that can be played in the school playground.

Food chains

The marsh frog does not spend all its time trying to avoid being eaten, as it also needs to find food itself. The way in which animals depend on other animals and plants for food is called a food chain and consists of 'producers' and 'consumers'.

Ask four pupils to be one of each of the animals and plants listed below and those remaining to place the animals in their 'food chain' order (labels for the plant and animals are available from the CD).

Reeds	Water boatman
Marsh frog	Marsh harrier

Alternatively, with a different label attached to each child's back and therefore out of view, the four children have to work out between them their correct 'food chain' order. They will need to look at each other's labels but cannot be informed of their own label.

Bacteria, fungi and small animals (such as worms and woodlice) that live in the soil and feed off dead plants and animals are called decomposers. They reduce the remains of the dead plants and animals to minerals and nutrients and recycle them back into the soil.

Grey heron

Ask the children where decomposers might fit into the food chain on page 26.

Energy is passed through the chain from one consumer to the next. Now ask the children to add arrows into the food chain on page 26, marking the flow of energy through the chain (arrows are on the CD). Ask the children whether the energy amount will remain the same throughout the chain or alternatively will some energy be lost?

Ask the children how energy is lost, covering energy outputs such as digestion, breathing, keeping warm and moving.

Ask the children why they think there needs to be more plants or primary consumers at Stodmarsh NNR and less secondary and tertiary consumers.

Introduce another two food chains that exists on Stodmarsh NNR (see below) and ask the children to put the chains in the correct order with the arrows marking the direction of the energy flow.

Algae	Water plant
Mosquito larvae	Tadpole
Fish	Diving beetle
Snake	Heron

(Labels for the food chain plants and animals are available on the CD).

Ask the children to identify which of the plants and animals in these particular food chains are 'producer's, 'consumers', 'herbivores' and 'carnivores'.

© Dave Rogers

Grass snake swimming

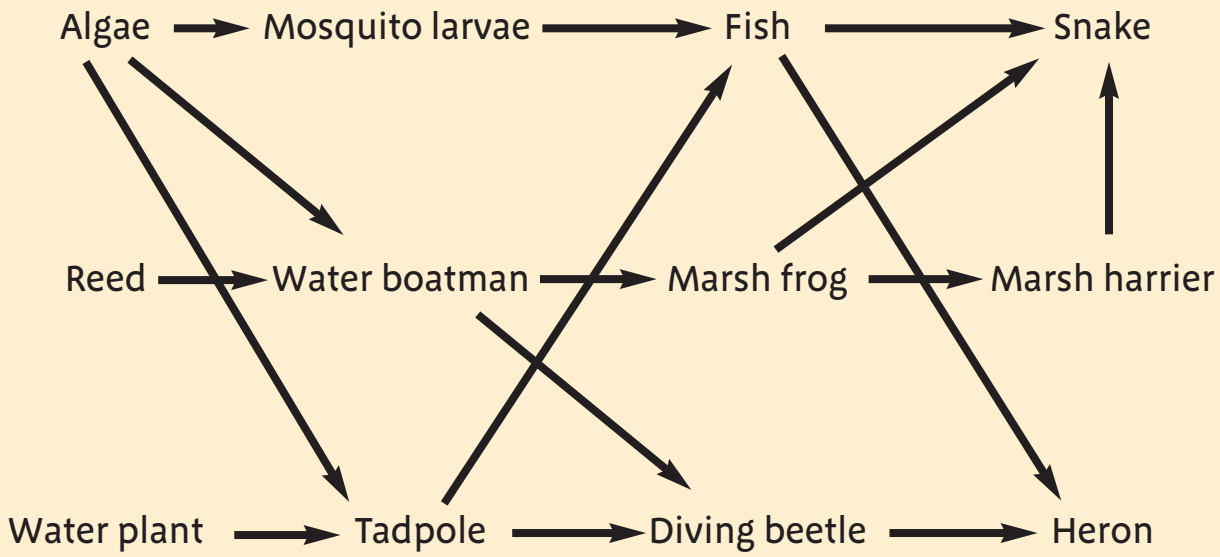
Food webs

Sometimes animals from different food chains can depend on the same plant or animal for food and food chains start to overlap. Overlapping food chains are called food webs.

Animals are 'adapted' to eating certain kinds of food, meaning that if there is a decrease in their particular food type, competition can increase between consumers.

For this next activity ask one child to be the sun and those children who were plants in the previous three food chain examples above, to take a piece of string and attach themselves to the sun. Then ask all the primary consumers to attach themselves to the plants (producers) with the string. Next introduce the secondary consumers and finally the tertiary consumers (see diagram below to show complete food web).

A typical Stodmarsh NNR food web



Teal in flight

Back at school

Many birds at Stodmarsh NNR are winter visitors that migrate to the reserve from colder latitudes in the north. As food supplies change with the seasons animals, such as birds, move to find food supplies and safe breeding areas.

Looking at migration

Those birds arriving at Stodmarsh NNR in the autumn spend the winter at the reserve because the weather is milder and food is more easily available than further north. In spring they will migrate to their chosen breeding areas and in turn other birds will arrive from the south to breed on Stodmarsh NNR.

Many of those birds arriving in the summer are insect eaters and enjoy the ample supply of insects found on the reserve at this time of year. These summer visitors will then migrate to the south in the autumn and the cycle of migration continues once again.

The problems and dangers of migration for birds include:

- Bad weather
- Predators
- Habitat damage when they arrive at their journey's end.
- Changes in landmarks on route.
- Uncontrolled shooting and trapping by humans.

Ask the children what would happen to migrating birds if more wetland habitats like Stodmarsh NNR were damaged, covered over, or even built on?

It is a bird's glands that control its time of migration and this is triggered by factors such as day length, temperature and wind direction.

Discuss how climate change might affect these migrating birds.

- Will they stop migrating in the winter or go later and return sooner?
- How would this change in migration patterns affect the bird's food supply?
- Will the birds' foods supplies, such as seeds, berries, insects and mammals necessarily adapt to climate change at the same rate ?
- What if insects adapt faster to climate change and emerge earlier in the year before the birds have returned? Similarly what if the flowers that produce the seeds do not flower in time for the insects and so miss pollination and seed producing opportunities?

Discuss why is it important that humans live in harmony with wildlife and conserve wildlife for the future?

Ask the children to make an illustrated pledge to do something for conservation. Pledges could include activities such as walking more, recycling, planting wildlife friendly plants, wasting less water, conserving energy, helping out in a nature conservation event and spreading the Conservation Pledge word amongst friends and family.

Ask the children to look up the difference between 'exotic' and 'native/indigenous' animals on the internet and to find out whether the marsh frog originates from the United Kingdom.

Walking to school is a healthy start to the day.

A further two versions of the hunting harrier game, on page 26, that can be played in the school playground are explained below.

Game version 1

One child is the marsh harrier and the rest of the class marsh frogs. Without anyone wearing blindfolds, the children play catch in a pre-set area. If they are caught by the marsh harrier they have to leave the game. Introduce additional marsh harriers as the game progresses and discuss the effect of this on the food supply.

Game version 2

Once again no children are blindfolded in this next game, instead split the class into 10 reeds, eight water boatman, four marsh frogs and two marsh harriers. Each child needs to wear a large identity tag (available from the CD). They should make themselves aware which members of the group are their prey and which are their predators. Explain that although normally plants would be stationary, for the purpose of this game they will run around like the other members of the food chain. The children have one minute to tag their prey whilst avoiding being tagged themselves. If a child is tagged they must leave the game. Stop the game after one minute and ask anyone who has not caught food to leave the game as they have died from a lack of food. Re-start the game repeating the above process until only a few contenders remain. Discuss which parts of the food chain are left and why.

Illustration: Philip Rutt

Marsh harrier

Activity 5:
Life cycles of plants and animals

Aim of plant and animal life cycle activity

To illustrate the life cycles of plants and animals by focussing on plants and animals found at Stodmarsh NNR.

Activity 5a: Plant life cycles

Curriculum links:

Sc2 3a, 3b,3c, 3d
Art & Design 1a

Classroom Activities

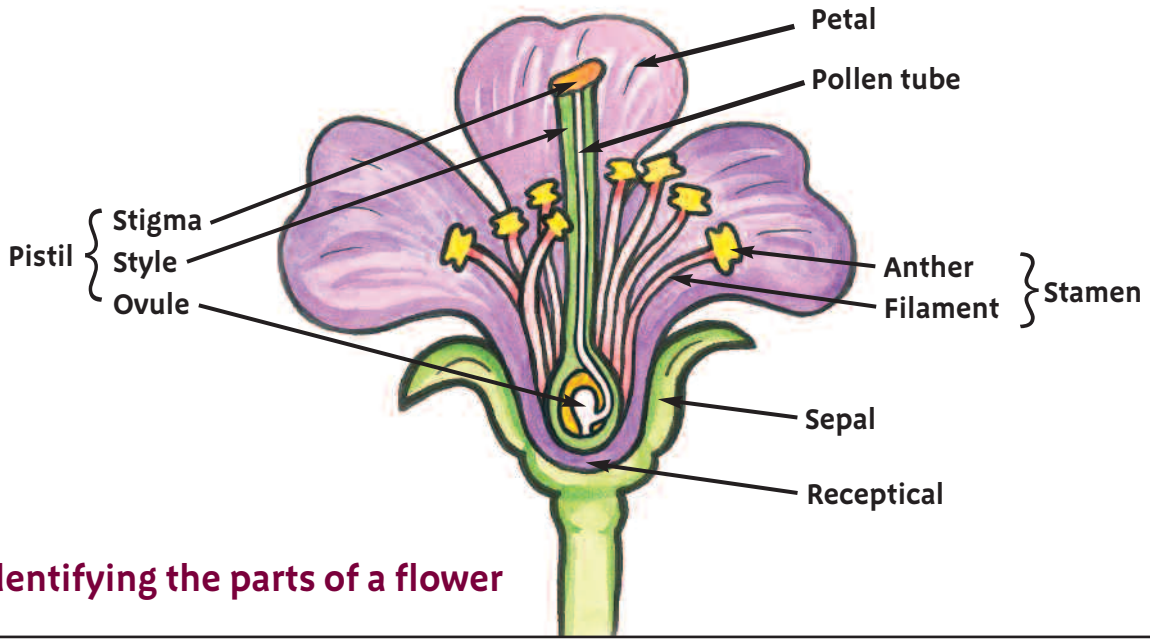
Introduce flowers to the children as the part of a plant where seeds are made through a process called pollination. Insects are attracted to the flower by its colour and smell, and transfer pollen from one flower to another. Flowering plants reproduce by making seeds and in order to grow into a new plant the seed needs to be fertilised by this transferred pollen in a process called pollination. The 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 once again.

Activity

Invite 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. Below the stigmas is the style and then the ovary where seeds are formed.
- Nectar: this is the food for the insects.



Identifying the parts of a flower

Illustration: Anita Luckett

Site visit

Time: approximately 30 minutes

Equipment:

For each flower (at least two flowers needed): energy drink (representing nectar), bag of pot pourri or cheap bottle of perfume, six ping pong balls with velcro attached for pollen, woolly hat for stigma, three or four large card petals and three socks for stamen.

For the bee: woolly hat with antennae

For the wind pollination game: pepper pot with pepper in. Children to make flower heads out of card and cover them in double-sided sticky tape.

Activity
Insect pollination game

Up to eight children will be needed to make up each flower so invite the children to become a particular part of a flower, taking the prop they need. Explain that pollination will take place between the two flowers, helped by the bee.

Ask one child to take on the role of the bee and to be attracted to one of the flowers by the colour and scent (children wave petals and scents). Whilst collecting the nectar (sports drink) in the flower, he or she rubs against the stamen and the pollen (ping pong balls) become attached to the bee (on the woolly hat).

The bee then visits the second flower and rubs the woolly hat against the stigma causing the pollen (ping pong balls) to transfer onto it. (See illustration on page 32).

At the end of the game the pollen will have been placed onto the stigma of the other flower(s) allowing pollination to take place.

Ask the children what would happen to the plant if it did not have it any one of its parts (repeat this for each of the parts in the game, plus additional parts of the plant such as roots or leaves). The children could act out the consequences. For example, a lack of stem could be represented by all the other parts of the plants pretending to collapse through having no support.

Pollination is not only performed by insects, it can also be carried out by wind and water. For reeds such as those found at Stodmarsh NNR, wind is the pollination source. The reeds flower in July to September and the pollen is carried by the wind.

Insect pollination game

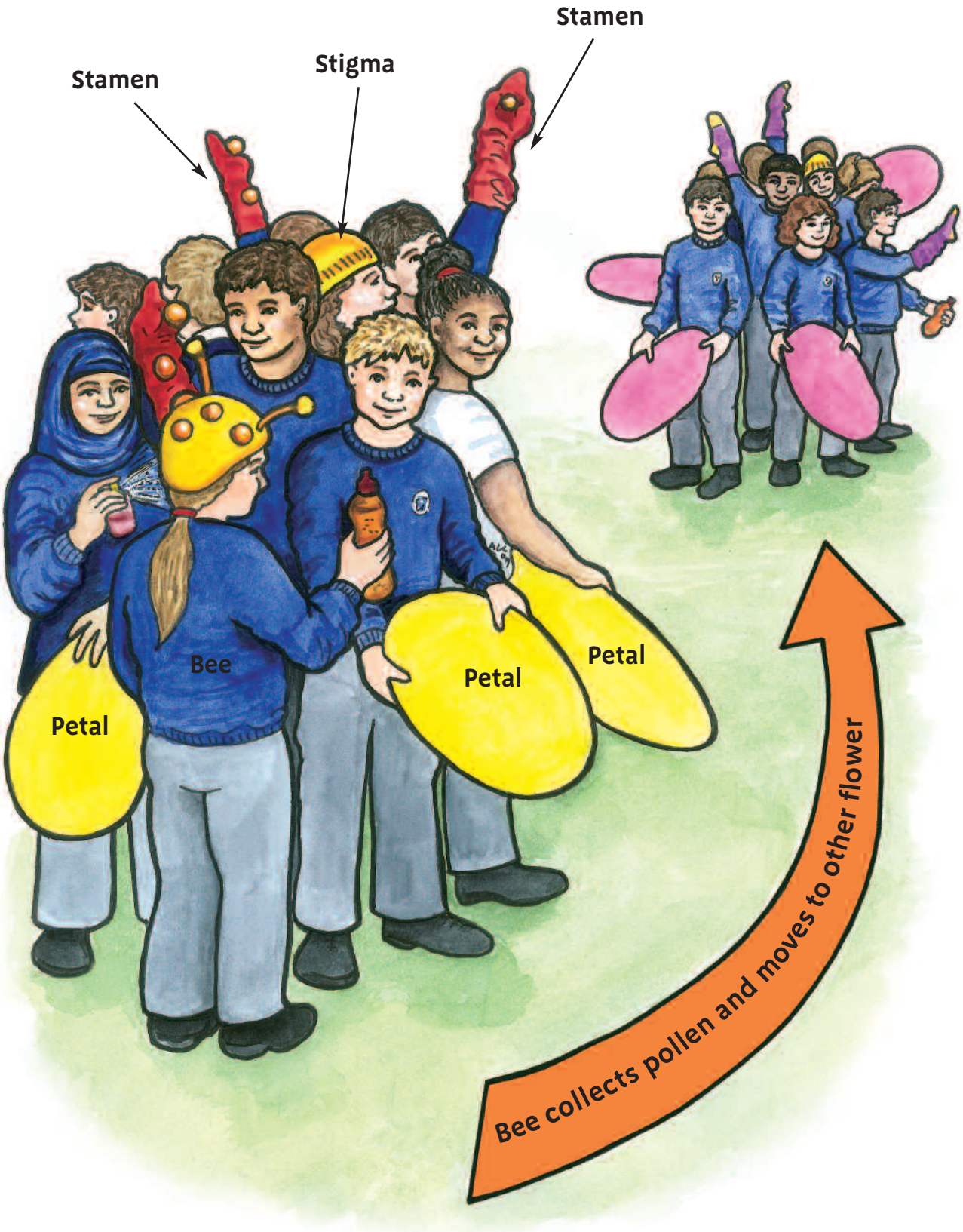


Illustration: Anita Luckett

Wind pollination game

Give the pepper pot to one child and the flower heads to the other children. Ask the children to form a circle, with the child holding the pepper pot to stand in the middle.

The child in the centre should then shake the contents of the pepper pot in the direction of the circle of children. The pepper pot shaker should not move from the centre of the circle. Equally those holding the petals should only move their upper body to reach the pollen, not their feet.

Discuss the fact that wind blown pollen does not reach all the flowers, due to influencing factors, such as wind direction and height of plants.

Back at school

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

There are two main forms of seed dispersal: wind and animal, such as birds collecting nesting material.

As previously mentioned reed flowers from July to September. The seeds then develop between August and October and like the reed pollen, they are also dispersed by the wind, during winter and spring. If the seed then has the right soil, sunlight, water and warmth, it should germinate and grow into a reed.

Dandelion flowers are an example of wind blown seeds

Complete the life cycle diagram of a reed plant, including how its seed is dispersed.
(See CD for printable diagram).

Reed is a plant that also reproduces via rhizomes. Rhizomes are horizontal plant stems which send out roots and shoots. Ask the children to identify and label a rhizome in the reed life cycle diagram.

Phragmites, Stodmarsh;

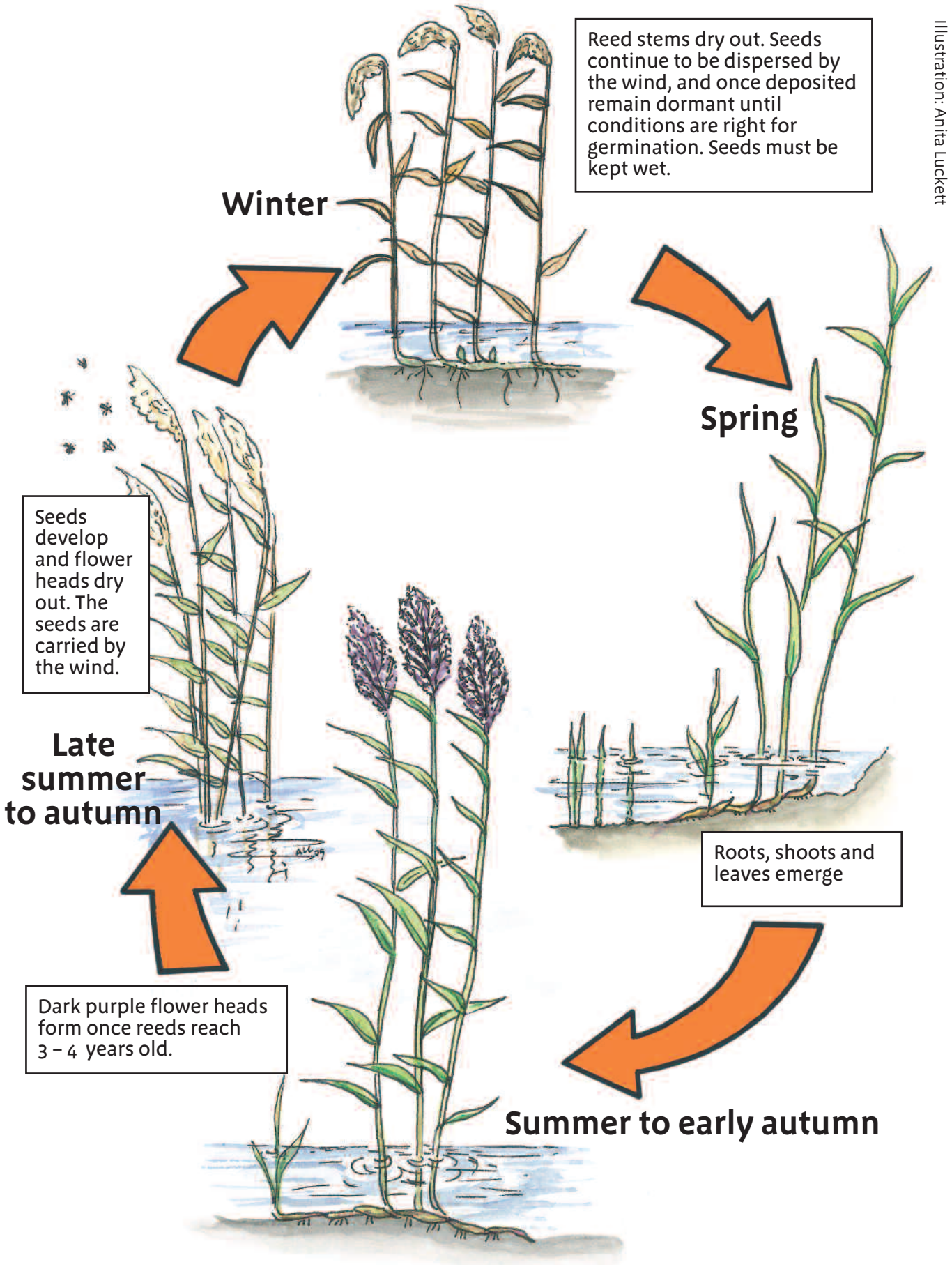


Illustration: Anita Luckett

Life cycle of a common reed

Activity 5b: animal life cycles

Having looked at the means by which plants create seeds and disperse them for germination, the life cycle of animals will now be considered.

Most animals (such as fish, mammals, reptiles and birds) have very simple life cycles. They are born, either alive from their mother, or hatch from eggs, and then grow up. Look at the life cycle diagram of a human and then ask the children, either before or after their visit, to draw a similar one for the bittern (bird) found on Stodmarsh NNR. They will need to look up the information on the internet. Discuss the similarities and differences between the human and bittern life cycles.

Curriculum links:
Sc2 1a
Music 3a, 5a, 5b

Human life cycle

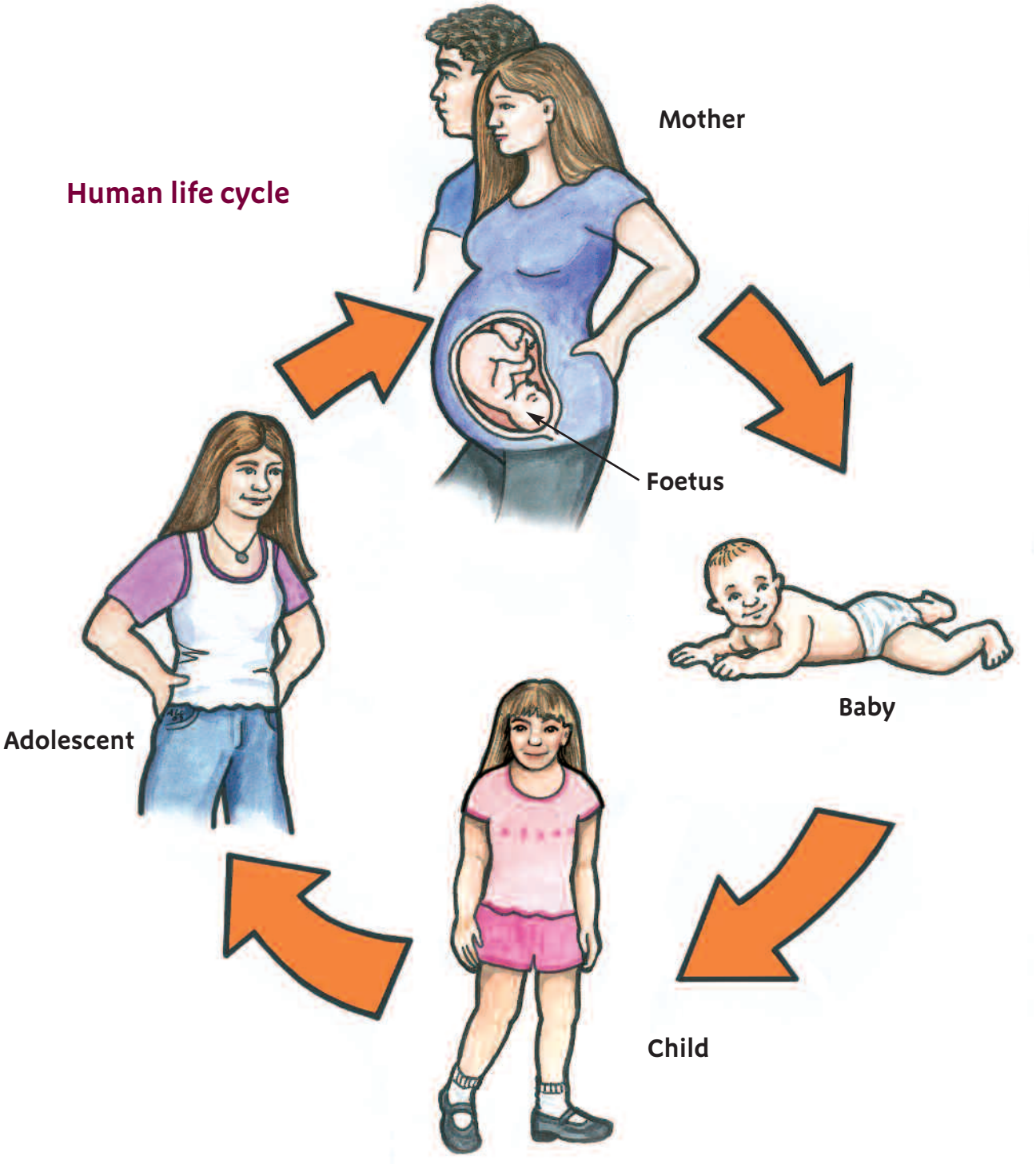


Illustration: Anita Luckett

Amphibians, like frogs and newts found at Stodmarsh NNR, have a more complicated life cycle. They go through a metamorphosis (a change) from breathing with gills underwater as a young frog, to developing lungs and breathing on land as an adult.

Site Visit

Divide the class into two groups of 10 and give five children in each group a different life cycle picture for a frog and the remaining five a description on the life cycle stage.

The children then need to pair themselves up, matching picture with description, and position themselves in a circle in the correct life cycle order. Once complete, any remaining children could then read aloud each of the annotated stages in order.

Life cycle of a common frog

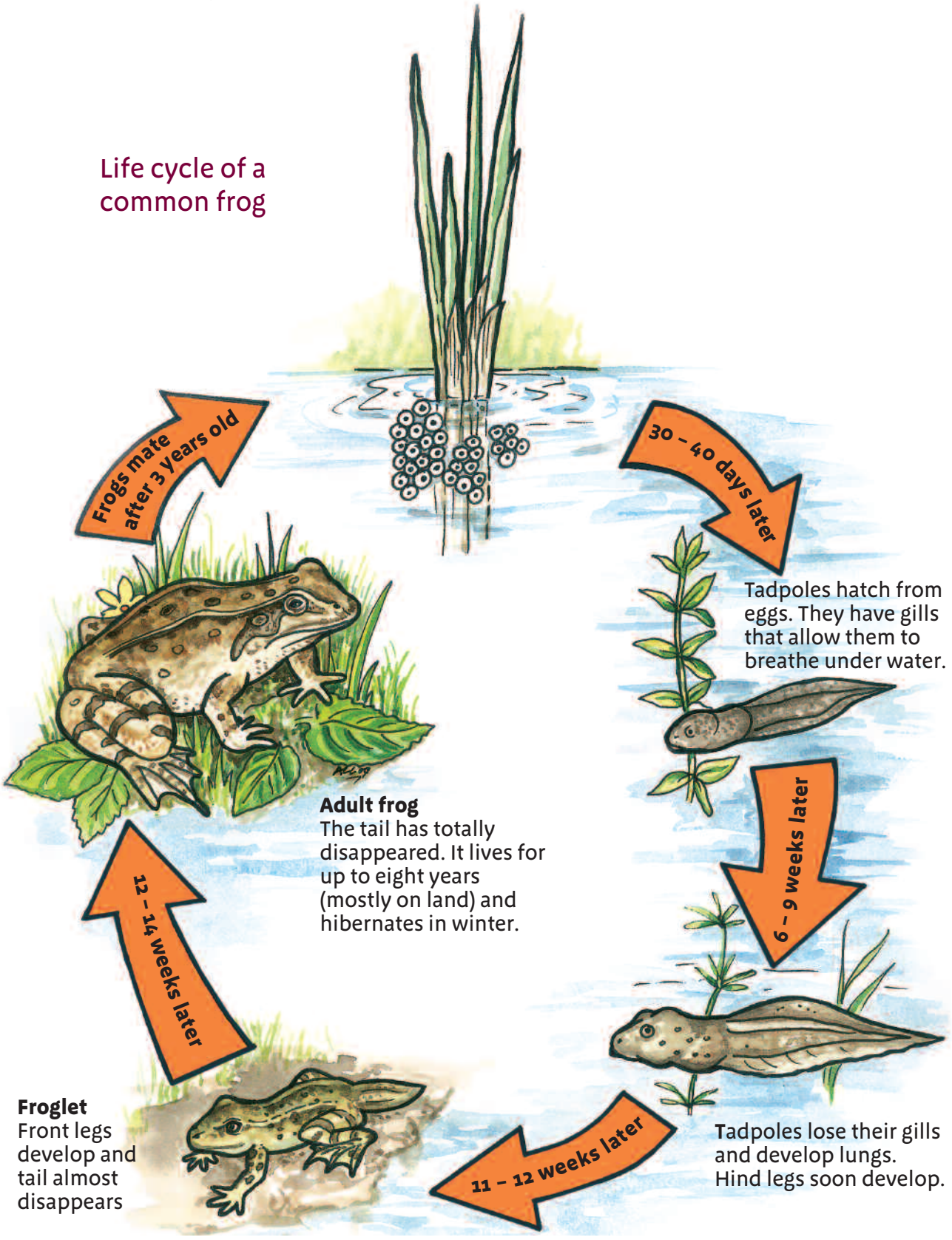


Illustration: Anita Luckett

Insect life cycle

Butterflies go through a complete metamorphosis, changing from a pupa encased in a chrysalis, to a beautiful flying butterfly. Repeat the previous frog life cycle game on page 36 for the butterfly.

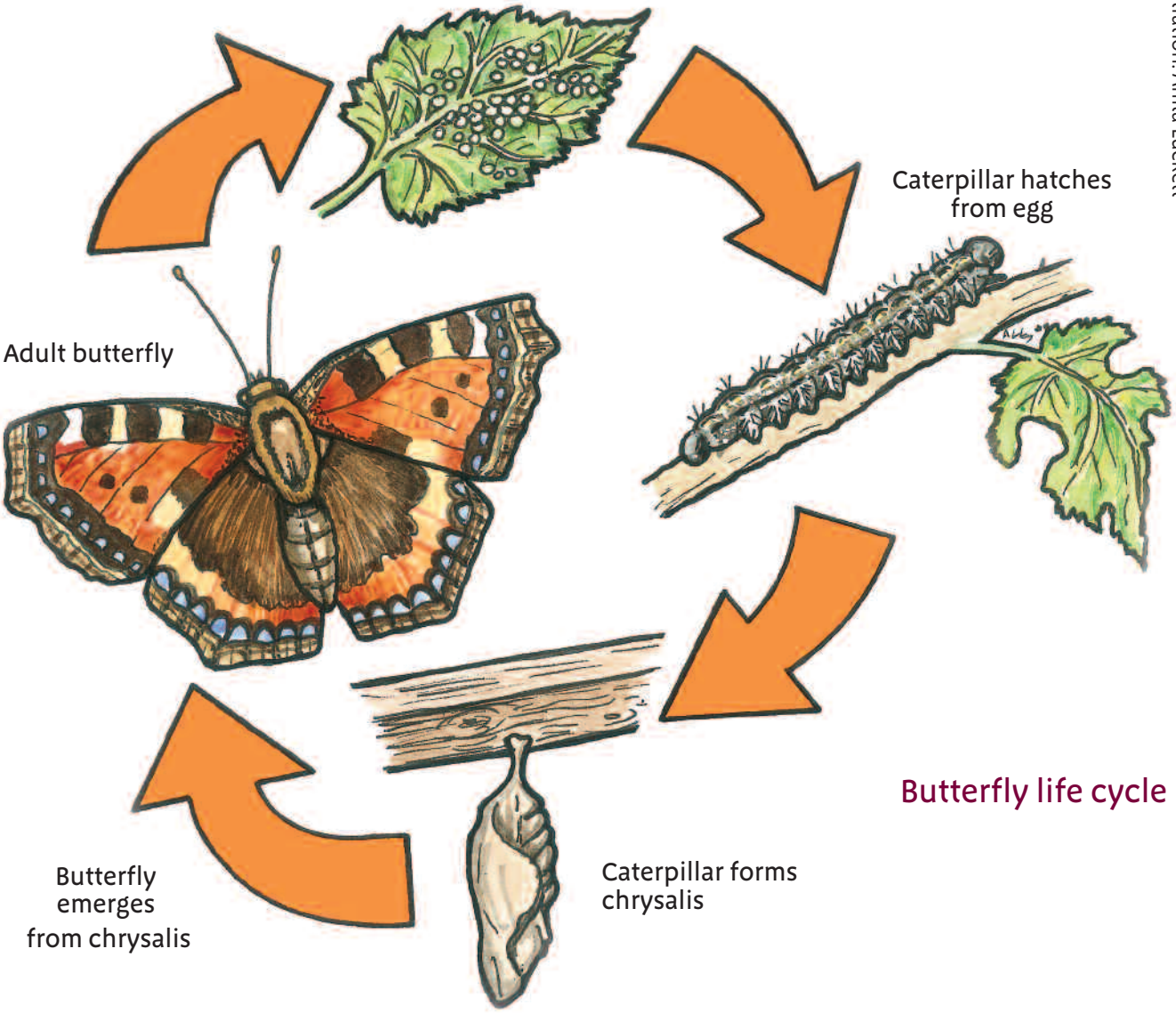


Illustration: Anita Luckett

Butterfly life cycle

Back at school

Invite the children to first choose a plant type found at Stodmarsh NNR and think of how it pollinates and disperses seed. Then choose instruments that represent the dormant seed, roots and shoots emerging, leaves and flowers developing, wind pollination, reproduction of new seeds and seed dispersal. Think of the seasons and type of weather that is taking place during each stage. The children might like to include the sound of reedbeds in the background.

© Paul Glendell

The sound of music and nature

Further learning opportunities

Aside from Stodmarsh NNR, the Welcome to the Wildside project also focuses on two other reserves in east Kent – Wye NNR and Ham Street Woods NNR.

Wye NNR is a chalk grassland and woodland site with steep coombes, situated on the outskirts of the village of Wye, near Ashford. Ham Street Woods NNR lies in the village of Hamstreet, near Ashford and is a woodland that 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.

Wye NNR

To find out more information regarding the sites please contact the project via the details provided on the back cover of this education pack.

Ham Street NNR

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Image credits

Cover	Phragmites, photo © Dave Rogers
Page 39	Phragmites, photo © Tom Cann

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 Stodmarsh 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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