YORKSHIRE DALES
MILLENNIUM TRUST

Into the Meadows
Education Resource Pack

For teachers and group leaders
Includes worksheets, activities, quizzes and games

Welcome

...to the *Into the Meadows Resource Pack*, which is packed full of fantastic information, activities and games that aim to celebrate and explain to children the importance of hay meadows from both an agricultural and environmental perspective. The pack provides teacher's notes, background information, activities, resources and useful contacts and links.

The pack has been produced by the Yorkshire Dales Millennium Trust (or YDMT for short). YDMT has been involving different audiences with the Dales meadows for several years through events, activities, publications, and by working with schools. The pack has been written by Tanya St. Pierre (Into the Meadows Education Officer) and Don Gamble (Hay Time Project Manager).

The pack supports the delivery of the National Curriculum at Key Stage 1 and 2. The activities are designed to inspire and appeal to children (and adults!) and make learning and exploration fun as well as educational. Many of the activities encourage team working and collaborative learning, enabling children to work together and to problem-solve, which helps to build confidence, self-esteem, responsibility and independence. They also encourage creativity and some involve physical exercise. Activities can be adapted to accommodate children's ages, learning styles, experience, levels of achievement and differing needs.

The pack contains a mix of indoor- and outdoor-based activities, many of which we've tried and tested with schools as part of our Into the Meadows project. Some have been adapted from activities that are widely used within the context of outdoor learning, some are new versions of old activities and others are brand new. While the indoor-only activities provide valuable learning opportunities, children will gain most by also visiting meadows and directly experiencing them.

Who it's aimed at

The pack is aimed at teachers and other educators to help them make best use of meadows as educational resources.

The pack has been written specifically for schools in or close to the Yorkshire Dales National Park, but it may be of interest to schools outside the area. The activities can also be used during residential visits, extra curricula clubs, informal education and youth work.

How to use the pack

The pack is divided into eight sections and each section has a number of topics. Sections 1 to 4 focus on the landscape of the Yorkshire Dales and the meadows' place within it, how meadows came about, their importance for plants and animals, and how the meadows were traditionally managed. Sections 5 and 6 enable you to plan a meadow visit and carry out field-based activities. Section 7 is full of practical and fun things the children can do to help protect and celebrate our meadows, while Section 8 contains details about publications, websites etc referred to in the pack, as well as information about additional resources that complement the pack's activities and that will help you to find out more.

Sections 1 to 6 can be worked through in the order in which they are set out, but Section 7 is more flexible and some activities can be carried out before or after the meadow visit. Alternatively dip into different sections to fit your planning requirements.

We have used icons to link activities to the relevant key stage and subject area, allowing teachers and educationalists to adapt their planning to the curriculum framework.

Most of the activities require the children to be provided with copies of the worksheets etc in the pack. These can be printed off from the PDF of the pack on the accompanying DVD-ROM. For some activities you'll need the Into the Meadows poster (A1 size) and Flowers and grasses of hay meadows guides. PDFs of these resources are on the DVD-ROM as well.

Within the pack there are also Countryside Code leaflets and a packet of wildflower seeds.

About YDMT

YDMT is a registered charity involved in a wide variety of projects that help care for the landscape, environment and communities in this very special place - the Yorkshire Dales. Since 1997 we've helped to deliver more than 1,300 inspiring projects worth around £25 million in the Dales and the surrounding area, helping to conserve the wonderful jigsaw of features which make up the Dales landscape.

One of the activities that we're most proud to have been involved with is meadow restoration and education. Together with the Yorkshire Dales National Park Authority we set up the Hay Time project in 2006. We work closely with farmers to restore meadows by harvesting seed from species-rich meadows and spreading it on nearby meadows that have lost some of their wildlife value. This has been shown to successfully re-introduce a diverse range of meadow wildflowers and grasses. Linked to this practical conservation work we've also provided educational opportunities for local schools, residents and visitors to find out more about the natural, cultural and historical heritage of the Dales meadows, a distinctive feature of the area. Hay Time won the Environmental Projects categories of the 2010 Yorkshire Rural Awards and the 2012 Charity Awards (a highly prestigious national award scheme which recognises excellence in the charity sector). We've also published an acclaimed book, Hay Time in the Yorkshire Dales, which can be ordered from our website (www.ydmt.org).

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NATURAL ENGLAND

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Introduction

Visually stunning and teeming with wildlife, traditionally managed species-rich hay meadows are of high nature conservation and landscape value and an important part of our rural and cultural heritage. Meadows exist because of the hard work of generations of farmers, who carefully and consistently managed them to provide hay to feed their livestock through the winter. Over the last sixty years or so, however, there has been a huge shift to agricultural intensification and most farmers now manage their fields to produce silage, but these fields support far fewer species of plants and animals. Once a common site throughout the UK, only 2% of the meadows that existed still remain, and species-rich hay meadows are now rare and isolated. The Yorkshire Dales is one of the few strongholds in Britain where traditionally managed species-rich hay meadows still exist in significant numbers.

Depending on their botanical composition, species-rich meadows are classed as either upland or lowland meadows. Upland meadows are largely confined to northern England, with less than 900 ha remaining including around 100 ha in the Yorkshire Dales. Lowland meadows are more widely distributed than upland meadows but there are less than 10,500 ha in the whole of England and Wales, with only around 100 ha surviving in the Yorkshire Dales area. Upland and lowland meadows are of national and international importance: both are UK Biodiversity Action Plan priority habitats and upland hay meadows are also an Annex 1 habitat in the EU Habitats Directive.

While traditionally managed hay meadows support some rare plants, their real importance lies in their species composition. Their low fertility soils coupled with the impact of grazing and cutting means that individual species are unable to dominate, resulting in the very richest hay meadows containing over 30 species per square metre and up to 120 species per field. They are of high habitat value for a range of fauna, many of which are also UK Biodiversity Action Plan species: they provide feeding areas for invertebrates, bats and other mammals, and feeding and nesting sites for birds.

Species-rich meadows may also play a part in tackling climate change, as they store more carbon than species-poor meadows, and their importance for wildlife will increase as climate change impacts on other habitats. They also retain rainwater and nitrates better, so helping to reduce flood risk and water pollution.

Such meadows have evolved over hundreds of years and, along with other traditional farming practices and features such as dry stone walls and field barns, they have helped shape the Dales landscape into what it is today. A hay meadow may be the oldest link with the past that a settlement has, perhaps even older than the oldest building in the settlement, so the loss of a hay meadow constitutes the loss of a historical place as much as a wildlife habitat and landscape feature.

Yorkshire Dales hay meadows are truly special and that's why it's important that we safeguard the remaining meadows and restore meadows that have lost some of their wildlife value. Raising awareness of the importance of species-rich hay meadows and helping connect children with their local landscape is vital if they are to value the rich and diverse Dales landscape in which they live, now and in years to come.

Section 1: Hay – what's it all about?

Hay meadows are an important part of the Dales landscape. This section helps to set the scene in regards to hay meadows as a feature within the landscape. It also explains what hay is, how hay meadows came about, how meadows are managed through the seasons, and provides examples of the farming year and the changes in meadow management technology over the years. Within this section you'll also find four photocards of some of the best, publicly-accessible meadows in the Yorkshire Dales (see pages 10-13).

Topic 1: The Yorkshire Dales - our landscape

My Yorkshire Dales postcard

KS1

Prepare: Print (enlarged to A3) *The Yorkshire Dales - our landscape* illustration (page 14). Print (double-sided) a selection of the *My Yorkshire Dales postcard* sheets (pages 16-19), making sure you have enough for each child to choose one.

Discuss: Use the information on page 15 to explore and discuss the different landscape features that make up this unique area. Where possible get the class to look outside to see what Yorkshire Dales features surround them. Ask them about key human and physical features they know e.g. local rivers, villages, barns and walls.

Explain: The Dales landscape is very much a farming landscape. Centuries of sheep and cattle farming have made their mark upon this landscape, providing distinct heritage features such as dry stone walls, field barns, meadows and pastures. One of the most colourful features of the Yorkshire Dales are the species-rich hay meadows, which bring a blaze of colour in June and July and are filled with a wide variety of wildflowers and grasses including red clover, yellow rattle, meadow buttercup and the uncommon wood crane's-bill.

Do: Ask each child to choose a postcard. Get the children to colour it in and send it to a relative or friend, telling them what makes the Dales so special and why it's worth visiting. Alternatively, ask the children to describe the picture on the front of the postcard and write about it.

Extension activity: Using aerial photographs downloadable from Google Earth get the children to identify the different human and physical features of their local area. Using tracing paper, trace over aerial photographs to make a map of the local area, listing the features using a simple key.

The Yorkshire Dales - our landscape

KS2

Prepare: For each child print (double-sided) *The Yorkshire Dales - our landscape* factsheet (pages 14-15), and (double-sided) *The Yorkshire Dales - landscape features* worksheet (page 20) and *Yorkshire Dales map* (page 21).

Discuss: Use the factsheet to discuss human and physical features in the local area. Encourage the children to share information about features that they already know in their area - rivers, villages, dales etc.

Explore: Visit the YDNPA website and learn more about the special qualities of this beautiful area: www.yorkshiredales.org.uk/specialplace/specialquality-beinghere

Do: In groups, ask the children to read through the factsheet and think about the questions raised, which can be discussed in their groups. Using the map, children can then locate the 12 main dales of the Yorkshire Dales.

Answers: Arkengarthdale, Bishopdale, Chapel-le-Dale, Coverdale, Dentdale, Garsdale, Littondale, Malhamdale, Ribblesdale, Swaledale, Wensleydale, Wharfedale.

Extension activity: Use a map or the internet (e.g. Bing maps) to find other dales in the Yorkshire Dales area. Within their workbooks children can then describe the features of the dale they live in.

Topic 2: What are hay meadows and what is hay?

KS1

Hay and Silage

Prepare: Print (double-sided and enlarged to A3) the *Hay* factsheet and factcards (pages 22-23) and the *Silage* factsheet and factcards (pages 24-25).

Do: Use the photographs and factcards to describe to the children how hay and silage is made. Ask the children if they know if hay or silage is made on farms near where they live.

KS2

Hay or Silage: advantages and disadvantages

The purpose of this activity is for children to decide upon the advantages and disadvantages of hay making and silage making for both a Dales farmer and for wildlife, from the information given.

Prepare: Print (single-sided) the *Hay* factsheet and factcards (pages 22-23) and the *Hay* worksheet (page 26) for half the class to work in pairs or small groups. Print (single-sided) the *Silage* factsheet and factcards (pages 24-25) and *Silage* worksheet (page 27) for the other half of the class to work in pairs or small groups. Give each pair or group four differently coloured highlighter pens or pencils and a pair of scissors.

Discuss: Look at the photographs of the hay meadow and the silage field. Discuss which photograph the children prefer and why. Ask the children what they already know about hay meadows and silage fields.

Do: In their pairs or groups, ask the children to cut out their factcards. Working through each factcard at a time, ask the children to highlight the advantages and disadvantages for farmers and the advantages and disadvantages for wildlife, using one of the four pens for each of the options. Ask the children to then write their answers on their worksheets. Refer to the teacher's notes (page 7) for suggested answers.

Discuss: As a class, discuss the responses from different groups or individuals for making hay or silage. Consider different viewpoints:

- *Which method is best for wildlife?*
- *Which method is best for the farmer?*
- *Which method do you prefer, and why?*

Extension question: If you were a Dales farmer and could choose whether you made silage, hay, or both what would you choose to do and why? Write two or more paragraphs to explain your answer.

Additional facts

Hay meadow: Grassland that is mown by the farmers to produce an annual crop of hay. A range of wildflowers and grasses grow in a meadow.

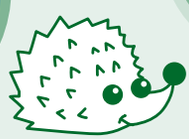
Silage field: Usually consists of one dominant grass, perennial rye grass. The field is planted as a high yield crop and in a good year a Dales farmer can take up to three crops of silage from one field.

Pasture: Grassland that is used for grazing at any time of the year. The grassland is not used to produce silage or hay crops.

Haylage: Feed that is halfway between hay and silage. The feed is cut when green, chopped, wilted and then stored in a special airtight tower silo or as round bales.

Hay: Dried grass that has been made into small square or large round bales.

Silage: Fermented, high-moisture fodder.



Hay or Silage: teacher's notes

	Advantages of hay	Disadvantages of hay
FARMER	• Hay can be easily stored in barns • The farmer doesn't need to plough and re-seed the field so less preparation time than making silage • Good quality hay can fetch a good price • Good quality hay is good for animal health (as it contains trace elements and minerals*) • Small bales can be easily transported (e.g. back of a quad bike) • Farmers can get grants to manage their meadows traditionally • Cheaper than silage because the farmer doesn't need to buy expensive fertiliser*	• A hay crop depends upon good weather • If the weather is bad the whole crop could be ruined • Collecting hay bales by hand can be a tiring job and may need helpers • Additional feed may need to be bought in as only one crop of hay can be harvested in a year
WILDLIFE	• Wildflowers and grasses are allowed to set seed to grow back every year • Less harmful to the environment than silage fields (no chemical fertilisers are used, which leach into the soil and waterways*) • One of the best habitats for wildlife • Home to a wide variety of animals and plants • Up to 120 different wildflowers and grasses • Provide food and shelter when animals need to raise their young • Supports a rich and complex ecosystem*	• There is little food or shelter for wildlife after the hay meadow is cut
	Other considerations: Hay meadows are part of the Yorkshire Dales' rich landscape and heritage, which helps to attract tourists which boosts the local economy.	

	Advantages of silage	Disadvantages of silage
FARMER	• Three crops of fodder can be harvested • Farmer does not need prolonged spell of good weather to make silage • Farmer may not need to buy additional feed in winter • Silage makes high protein food good for dairy herds • Silage can be stored outdoors in wrapped bales near livestock, saving on indoor space • Normally only one person required to harvest the silage	• Chemical fertilisers need to be added which can be expensive • Big expensive machinery may need to be bought or hired in
WILDLIFE	• May offer shelter to some wildlife	• Wildflowers and grasses cannot compete with the vigorous rye grass and disappear from fields • Silage fields offer very little food for wildlife • As silage fields are cropped so often many animals do not nest here, as they would be disturbed • Silage fields have much less wildlife value and a less complex ecosystem than hay meadows • Chemical fertilisers may pollute our rivers and waterways, affecting wildlife and water quality
	Other considerations: Silage bales can look unsightly and need to be transported by farm machinery as they are too heavy to carry.	

*Additional facts not included on the factcards.

Topic 3: How hay meadows came about

My meadow timeline

KS1

Prepare: Print the *Hay meadows through the ages* factsheets (pages 28-29) for each small group. Each sheet will need to be cut in half to make four cards in total.

Discuss: Have there always been hay meadows in the Yorkshire Dales? Get the children to think about what the landscape might have looked like hundreds of years ago and how it might have changed over time and what has influenced this change - farming, industry, settlements etc. Explain that, even though hay meadows have existed for over 4,000 years, there has been little change in the way that hay meadows have been managed, however the tools used by farmers have changed (e.g. scythes have been replaced by tractor-pulled mowers). Many meadows today are known to be 200 years old or more and have evolved to become important habitats.

Do: Ask the children to look at the cards and see if they can put them in the right order chronologically. In groups, ask the children to compare and contrast the scenes on their cards.

How hay meadows have changed over time

KS2

Prepare: Print the *Hay meadows through time* factsheets (pages 30-36) so that each child or small group has one of the seven cards.

Do: Ask the children to read through the information on their card, drawing out the key points and facts about what happened in that time period.

Discuss: Often information is displayed on an interpretation panel, providing key points and facts.

Design: Tell the children that they are now going to individually design a poster displaying facts about hay meadows and farming at the time described by their card. The posters can then be displayed in chronological order as an information panel about hay meadows and farming in the Dales at different times throughout history.

Topic 4: A year in the life of a hay meadow

The hay meadow calendar

KS1

Prepare: Print *The hay meadow calendar* worksheets (pages 37-38) for each child.

Discuss: Get the children to think about things that happen or things they might do in the four seasons e.g. new shoots and buds appear in spring, we wear shorts in summer because it's hot, some animals hibernate in autumn, in the winter children might make a snowman.

Explain: The farmer also does certain things at different times of year. Using the information overleaf, explain the activities that the farmer does through the seasons.

Spring: Lambing begins and ewes and their lambs graze the meadow. This time of year is also good for farmers to tend their land. Using a tractor the farmer rolls, harrows and spreads farmyard manure (muck) on the meadow. This evens out bumps and helps the hay crop grow well. Soon daylight hours begin to lengthen and as the temperature slowly rises the soil warms up and young shoots emerge. The weather is often mixed at this time of year.

Summer: Lambing time ends in mid-May and the meadows are 'shut-up', which means that all the farm animals are moved out of the meadow to allow the hay crop to grow. The grasses and wildflowers are left to grow tall in the hot summer sun. Haytime usually starts in July. The hay is cut and left to dry. The farmer turns the hay with a tedding machine to help it dry. Once the hay is dry the farmer uses a baler to make the loose hay into square or round bales tied with string. The hay can then be taken to a barn to be stored for winter. Cattle or sheep are put on the meadow to graze off any stumps or loose hay and new growth, which farmers call the 'fog' or 'aftermath'.

Autumn: From September to November sheep or cattle are allowed to graze the meadows. The weather turns windy and wet and by the end of autumn the grass has stopped growing because it is too cold. Many animals that live in a meadow in summer look for shelter in long grass nearby or woods. Some animals like hedgehogs hibernate for the winter.

Winter: Nights draw in quickly and the weather is much colder, it might even snow. Because the grass has stopped growing, hay that was made during the summer is fed to sheep and cattle. Hopefully farmers should have enough hay stored in the barn to feed their animals through the winter. If there is enough snow you might make a snowman.

Do: Ask the children to match the pictures with the season. The children need to cut out the pictures (on the second page) and paste them onto the season photos (first page).

Review: You may wish to consolidate learning by explaining that as the seasons change through the year so does the length of daylight, the temperature and the weather. Hay meadow plants need warmth, moisture and sunlight to grow and the best time for these conditions is late spring and early summer, when the daylight hours are the greatest and the sun is at its strongest. Farmers must cut their hay while the grass is tall and the seed is ripe, before the meadow plants die back (by late August). Therefore farmers have to make sure that they do things at the right time of year. Because hay is an important fodder crop, farmers also add other nutrients to the meadow to help the meadow grow, which is why they apply farmyard manure (or muck) in spring. Farmers have to put their land to maximum use, so meadows are used for grazing at other times of the year.

Extension activity: In workbooks describe what happens to the meadow at different times of the year.

A year in the life of a hay meadow

KS2

Prepare: Print *A year in the life of a hay meadow* factsheet (page 39) for each group or pair, and *A year in the life of a hay meadow* worksheet (page 40) for each child.

Discuss: Use the factsheet to talk through what happens to a meadow through the year.

Do: Ask the children to describe what is happening in each of the images on their worksheet and to write their answers in the boxes, using the information on the factsheet.

Muker Meadows, Swaledale

This is one of twelve traditional meadows found in the flat valley bottom of Swaledale. The meadows here are amongst the best upland hay meadows in the Yorkshire Dales. Tourists come from far and wide to see the spectacular summer display of wildflowers and grasses. The pinky-purple wildflower is wood crane's-bill.

Colt Park Meadow, Ribblesdale

Found high up (340m) on the side of Ingleborough, the wildflowers and grasses that grow here have to be tough to withstand the cold weather and short growing season. This meadow is used for scientific research that helps tell us how climate change and different farming methods affect the hay crop and the wildflowers and grasses within it.

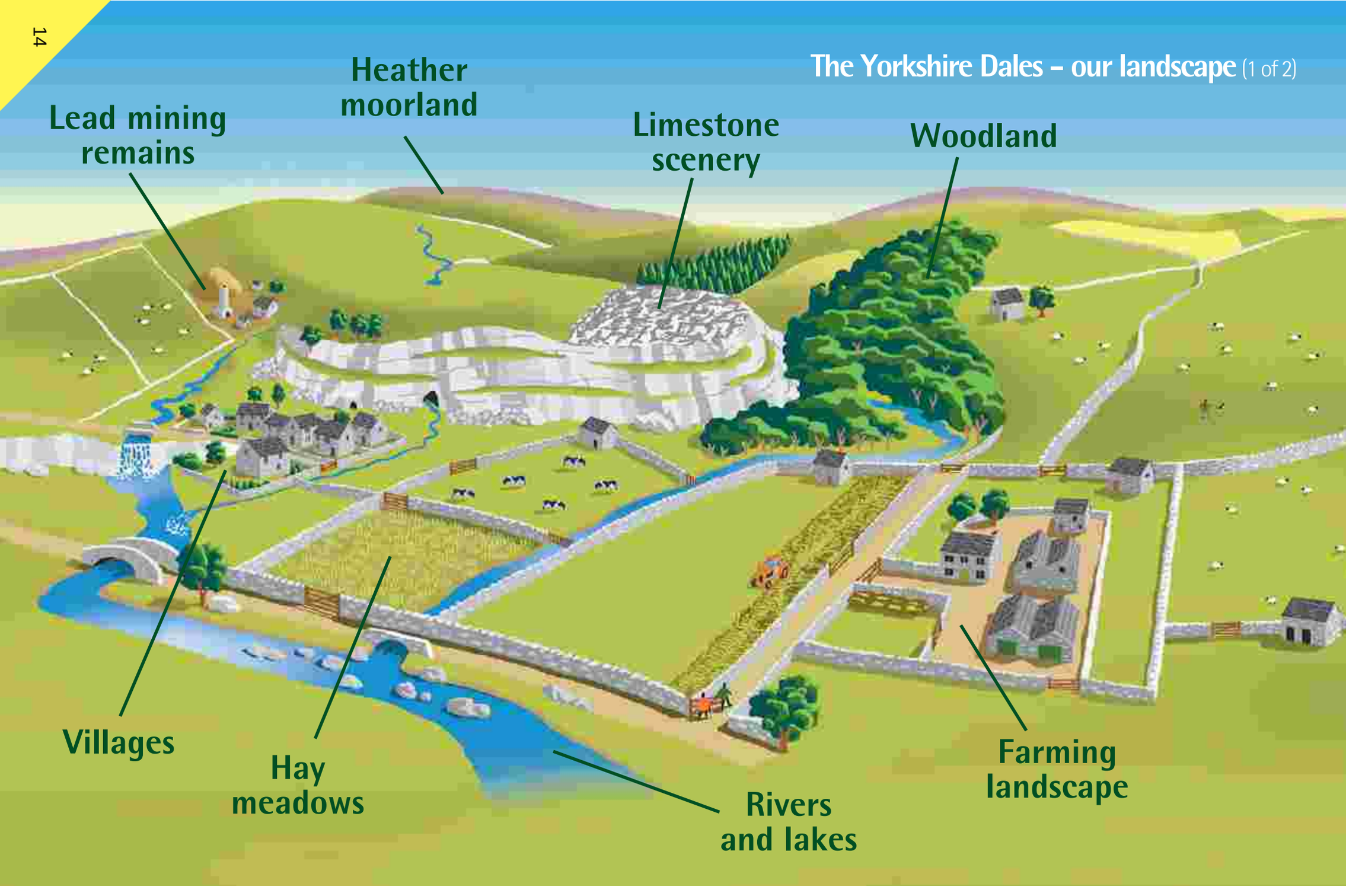
Askrigg Bottoms Meadow, Wensleydale

This meadow is a very pretty sight in summer as it has an abundance of wildflowers and grasses such as ox-eye daisy, great burnet and melancholy thistle that all jostle together for space. It is a very special and important meadow because it is so rare. The meadow regularly gets flooded in wet months as it runs alongside the river Ure.

Shoolbred Meadow, Dentdale

Not only do hay meadows make a fantastic splash of colour in the summer months, with their golden hues of yellow and different shades of red and pink, they also support a wide range of insects and other animals. This meadow in Dentdale is home to the chimney sweeper moth which feeds on pignut, a wildflower that grows here.

The Yorkshire Dales – our landscape (1 of 2)



The Yorkshire Dales – our landscape (2 of 2)

Lead mining remains

Lead mining started about 2,000 years ago in Roman times, and the industry thrived in the mid-18th century but finally stopped around 1900, when lead became cheaper to buy from other countries. In Swaledale and Wharfedale the remains of buildings, mines and pits linked to the mining and processing of lead can still be seen. Beneath the ground there is a vast network of shafts and levels.

Heather moorland

The high gritstone tops of the Dales are blanketed with heather. Although it looks like a wild landscape, heather moorland is carefully managed to support red grouse, because grouse shooting is a popular sport. Strips of heather are deliberately burned in the winter to help new shoots to grow, and this creates a patchwork of heather of different ages, each providing either food, shelter or breeding areas for red grouse.

Limestone scenery

The Dales are well-known for limestone outcrops and scars (cliffs). In some areas there is limestone pavement, blocks of limestone (clints) separated by large vertical cracks (grikes). There's also a network of underground caves. All of these features are due to limestone being slowly dissolved over thousands of years by naturally acidic rainwater (pollution makes it more acidic). People used to burn limestone to make lime, and the remains of field kilns can be seen around the Dales. Lime was spread on the land to make it less acidic and better for growing grass, and it was also used to make mortar for buildings.

Woodland

Woodland of native trees such as ash, hazel, hawthorn and bird cherry are important habitats for a wide range of animals, birds and plants. Woodlands used to be important for people too, as they provided wood for fuel and building materials. Woodlands only cover a tiny proportion of the area nowadays, though, as most of the woodland that once covered the Dales has disappeared because since medieval times the land has mostly been used to grow grass to feed livestock.

Villages

Many of the villages of the Dales began hundreds of years ago, perhaps starting as an isolated farmstead and gradually expanding as the growing population needed new houses to live in. Because the buildings are built in a similar style using locally-quarried stone, they fit into the landscape really well. Some buildings have lintels (a stone block over a doorway) that have the year they were built carved into them, so we know that some houses date back to the 1600s. Today, new buildings also have to be designed to fit into the local style, as otherwise the character of the village would be spoilt.

Hay meadows

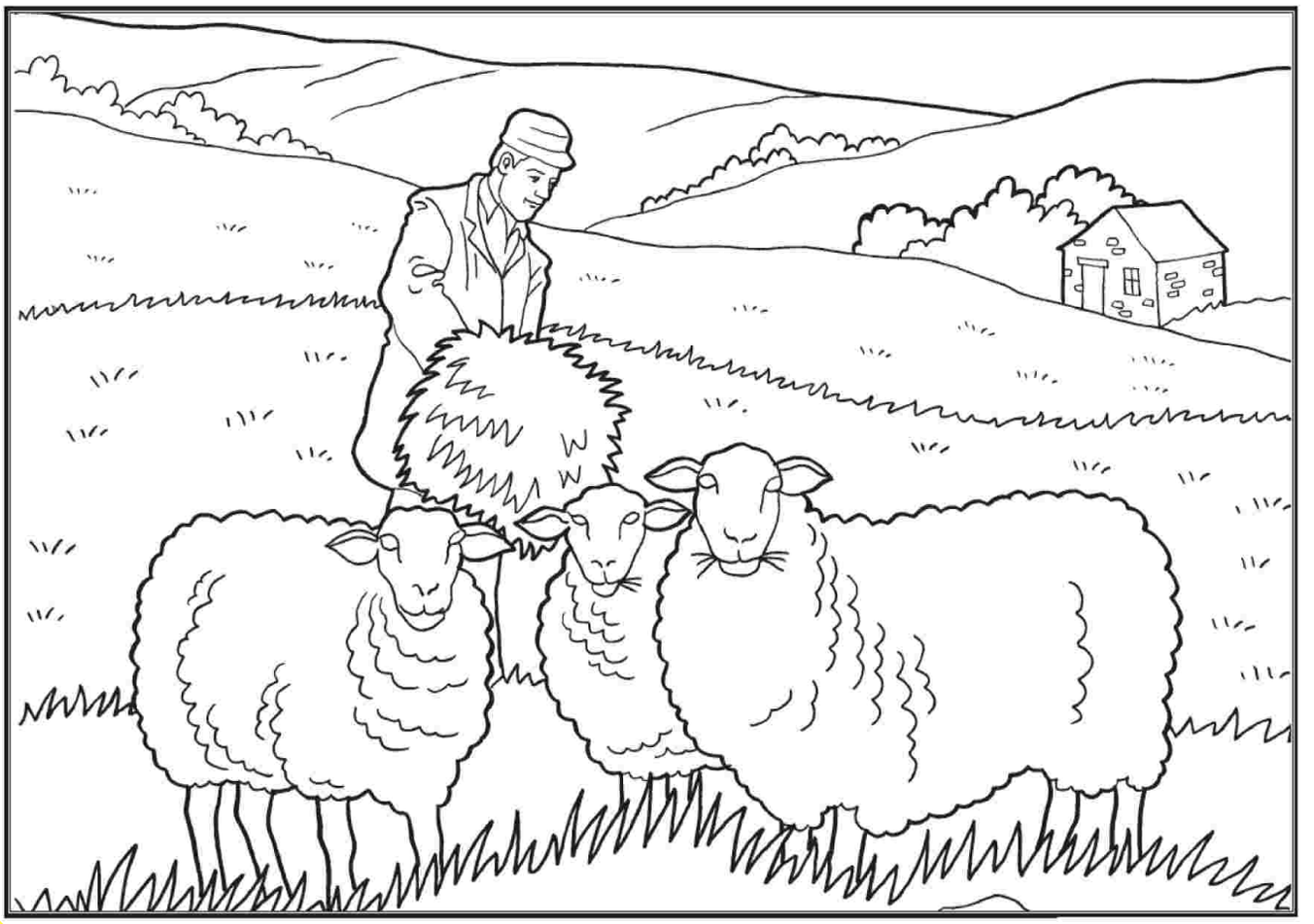
In May and June, flower-rich hay meadows are one of the most beautiful landscape features of the Dales. These meadows have been carefully managed for years. The farmers don't put any chemical fertiliser on them and they cut the meadows in July, after the wildflowers have had time to produce seed. There aren't many such meadows left, though, as most grassland is now managed to produce silage.

Rivers and lakes

The valleys (dales) were shaped by glaciers during the Ice Ages, slowly moving and grinding down the rock. Rivers and the weather have continued to shape the landscape. The Dales water is mostly unpolluted, although sometimes it looks brown. This is because it gets stained as it trickles through peat. Being so clean, rivers are an important habitat for many fish, mammals, crustaceans and insects. Malham Tarn and Semer Water are the only natural lakes in the Dales.

Farming landscape

The thousands of miles of dry stone walls and the hundreds of field barns are landscape features that show how important farming has been and continues to be in the Dales. Most of the walls and barns date back a few hundred years, but some walls were built during the Iron Age, about 3000 years ago. Modern farming doesn't rely as much on the old walls and barns: walls are expensive to maintain and are often replaced with fences, and barns aren't used to house cattle and hay over the winter anymore and so many are falling down.

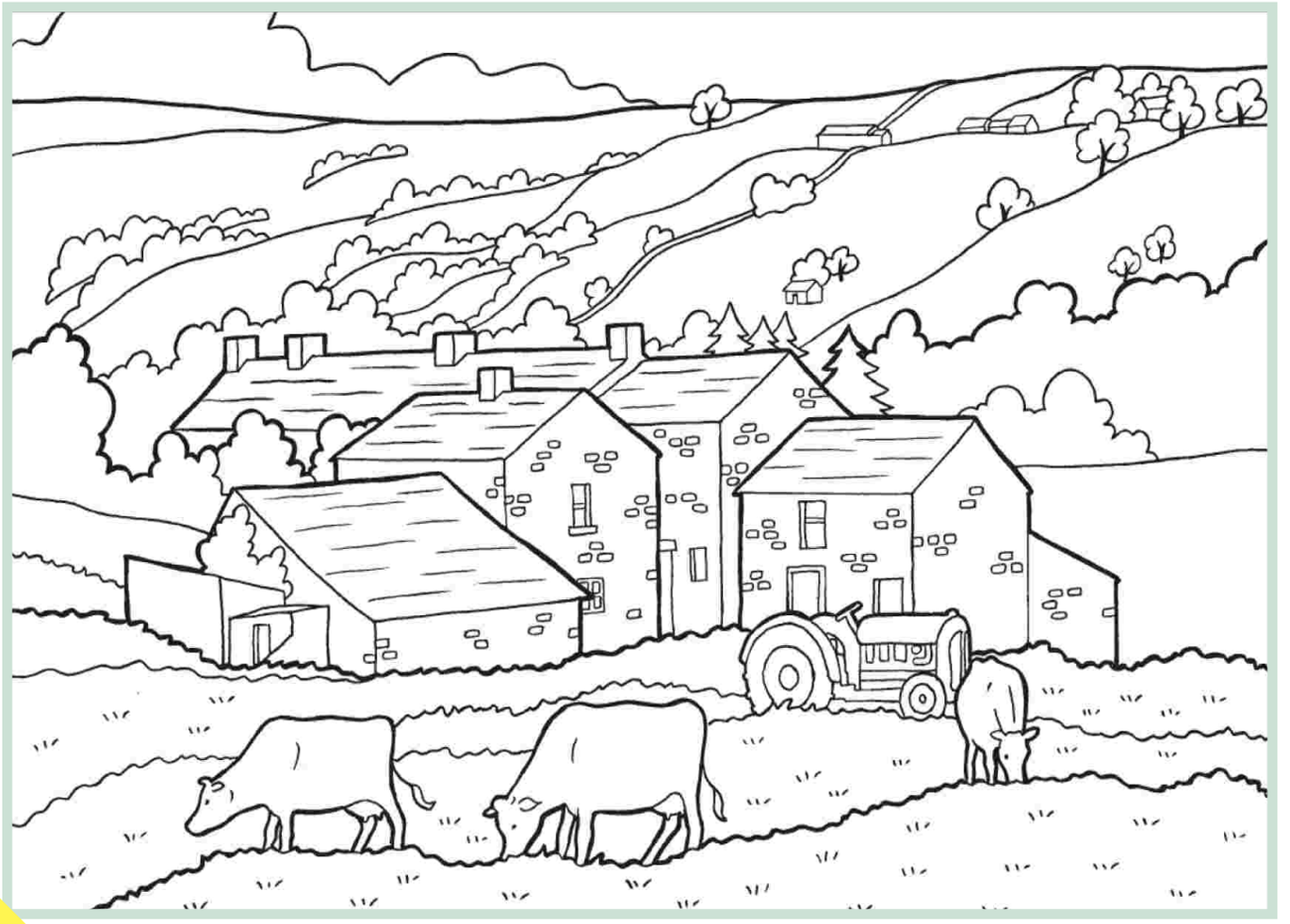


My Yorkshire Dales postcard (2 of 4)

Dales wildlife is very special. Curlews like to nest in hay meadows in the Yorkshire Dales.

Sheep would not survive the cold Dales winter if farmers did not feed them extra hay.

My Yorkshire Dales postcard (3 of 4)



Hay time: Meadows are cut in summertime to make hay, to feed the farm animals in winter.

Farming is important in the Dales. Grass is the most valuable crop for farmers.

Name:

Many people living in the Dales might look out of their window and see a landscape that is dominated by hillsides and fields, with cattle or sheep grazing, and a patchwork of dry stone walls and field barns.

The landscape (countryside) that surrounds us in the Yorkshire Dales is very special and is like no other in the country. Hills and valleys shape and divide our landscape into the different 'dales' that make up the Yorkshire Dales. **Which is your nearest dale?**

In many parts of the Dales, the underlying rock is limestone. Here, this white-grey rock dominates the scenery, creating dramatic scars, crags and limestone pavement. Dark brown rock called gritstone can be seen on hill summits and moorland areas and is often blanketed by heather or purple moor grass in the north and east of the Dales.

Few trees and woodlands exist here, making upland areas of the Dales very open and windswept. There are isolated farmsteads in the more remote areas, whilst traditional stone-built villages with cottages and farms dating back as far as the 17th century contain larger pockets of the Dales population. **Do you have old buildings in the village or town where you live?**

The Yorkshire Dales are also home to some of the best hay meadows in Britain. Hay meadows provide an important fodder crop to feed farm animals and, with up to 120 different kinds of wildflowers and grasses, species-rich meadows are also a very important habitat for wildlife.

Both upland and lowland species-rich hay meadows can be found in the Yorkshire Dales. Upland hay meadows are particularly special as they are very rare and only found in the upland dales of northern England. Some of the best meadows in the Dales can be found in Swaledale, Wensleydale, Langstrothdale and Wharfedale. Many tourists come to the Dales in summertime to see these beautiful meadows in flower.

In 1954 a large area of the Yorkshire Dales was designated a National Park. Hay meadows, along with other features that make the Yorkshire Dales special and unique, count towards this National Park designation.

Why do many of these features remain today? It's because farming is still the prime use of our landscape. The Yorkshire Dales National Park Authority (YDNPA) works to ensure that the qualities that make the Yorkshire Dales special remain here to be enjoyed today and in the future.

Visit the YDNPA website (www.yorkshiredales.org) and learn more about what makes the Yorkshire Dales National Park special. **How many different qualities or features can you find?**

What are species-rich meadows?

Traditional species-rich hay meadows such as those found in the Yorkshire Dales are a rare and important habitat of high nature conservation value. They are dependent on traditional management where no chemical fertiliser is added. This management allows a rich diversity of common, less common and rare meadow plants to grow together. The best species-rich meadows can have up to 30 different wildflowers and grasses per square metre and 120 species per field.

Hills and valleys divide our landscape into the 12 main 'dales' that help make up the Yorkshire Dales area, can you name them?

Use the map overleaf to help you.

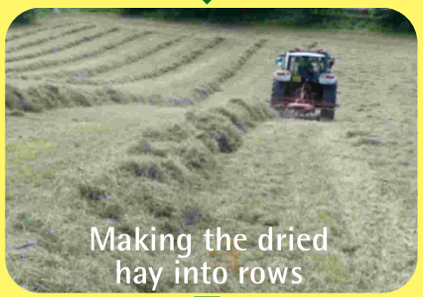
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

Yorkshire Dales map

Showing the 12 main dales

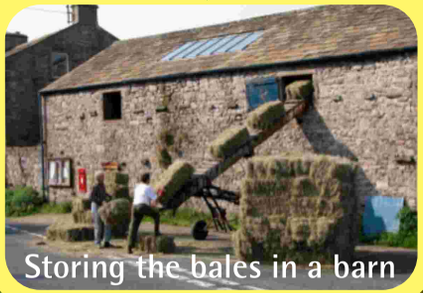
Hay

Mowing the meadow



Making the dried hay into rows

Making the rowed-up hay into square bales



Storing the bales in a barn

HAY FACTCARD
Hay meadows are grasslands that are mown by farmers for an annual crop of hay. The vegetation (wildflowers and grasses) is allowed to grow from April to mid-July. The crop is then cut, dried and made into bales so that it can be easily stored in barns or sheds and fed to livestock over the winter as hay. Farmyard manure (muck) is cheap and readily available and may be spread on the land along with a little lime to help the hay crop grow. This makes hay a relatively cheap crop to produce for the farmer.

HAY FACTCARD
In the Dales many hay meadows are still managed in a traditional way, which allows the wildflowers and grasses that grow in the meadow to set seed naturally and grow back year after year. With modern machinery, managing hay meadows and making hay involves less work than making silage, as the farmer doesn't need to plough and reseed the field and add chemical fertilisers. Allowing meadows to grow in a more traditional way is less harmful to the environment, as no chemical fertilisers are added.

HAY FACTCARD
Today, hay is mostly grown in the north and west of Britain. Livestock farmers keep sheep and cattle here as these areas have more rain and are good for growing grass for the animals to eat. Sweet smelling, good quality hay can fetch a good price for farmers, as it is highly prized and is thought to be good for animal health. Hay is also used to feed horses, zoo animals and even pet guinea pigs.

HAY FACTCARD
Traditionally managed hay meadows are one of the best habitats for wildlife and are home to a wide variety of animals and plants. A good meadow may have up to 120 different types of wildflowers and grasses. After the hay is cut there is little food or shelter for wildlife but hay meadows provide food and shelter at the most important time of year when animals need to feed and raise their young. If hay meadows disappear many of our wildlife and wild plant species would struggle to survive. Fortunately, traditional hay meadows are recognised for their special importance for wildlife and some farmers are paid extra money to grow hay crops on their land.

HAY FACTCARD
A good hay crop depends upon good weather, as the cut grass needs to be turned and dried in the field for at least three days. The weather in the Yorkshire Dales can be very wet, and if it rains all summer farmers may lose their entire hay crop.

HAY FACTCARD
Hay meadows have been managed for centuries and are part of our rich Dales landscape and heritage. Many tourists come to the Yorkshire Dales to visit the colourful meadows in the summer months, and they often stay and buy goods from Dales villages and towns, helping to support the local economy.

HAY FACTCARD
Small, square bales of hay are especially useful in winter, when they can be carried on the back of a quad bike to feed livestock in more remote locations. Only one hay crop can be harvested in a year, so farmers may have to buy in extra feed if they cannot grow enough hay to feed their livestock in winter.

Silage

A forage harvester cutting the silage

Making a silage clamp

Bailing silage

Wrapping the silage bales

A stack of big bales

SILAGE FACTCARD
Silage fields are lush green fields of grass. Usually only one type of grass called rye grass grows in the field. This grass is very vigorous, and the farmer adds chemical fertiliser known as 'till' to help the grass grow faster. Chemical fertilisers can be expensive to buy, but in a good year a Dales farmer can take up to three crops of silage from one field.

SILAGE FACTCARD
Unlike hay, silage can be cut and then collected the next day without having to be dried and turned for so long or often. This means that the farmer does not have to rely on a long spell of dry weather and usually enough fodder can be grown to feed livestock in winter without having to buy in additional feed.

SILAGE FACTCARD
Large, wrapped bales of silage can be stored outside, saving on indoor space. Some people think this makes the countryside look unsightly, but it allows the farmer to keep the bales in areas near to livestock.

SILAGE FACTCARD
Many silage fields were once hay meadows with lots of wildflowers and grasses in them. Today silage is known as a mono-crop because only one plant species grows in a silage field, as wildflowers and grasses are unable to compete with the more vigorous rye grass and quickly disappear from the fields. Without a variety of wildflowers and grasses, silage fields offer little in the way of food for wildlife. While some animals may take shelter here, very few creatures nest here because the field is cut so regularly.

SILAGE FACTCARD
Big, expensive tractors and equipment that allow the farmer to crop silage easily may need to be bought or hired in. The job usually requires just one person.

SILAGE FACTCARD
Once cut the grass doesn't need to be dried like hay, it can be placed into a heap and covered with a plastic sheet weighted down with old tyres (known as a 'clamp'), or made into big bales and wrapped in plastic film. The silage is then fed to cattle in winter.

SILAGE FACTCARD
Silage is a good crop to grow for the dairy farmer as it provides a high protein feed which is important for dairy herds. Cows need lots of protein to produce milk.

Name:

Hay

Read through the *Hay* factcards carefully then using this information list the advantages and disadvantages that growing hay might have for a farmer and wildlife.

	Advantages of hay	Disadvantages of hay
FARMER		
WILDLIFE		

Into the Meadows

Name:

Silage

Read through the ***Silage*** factcards carefully then using this information list the advantages and disadvantages that growing silage might have for a farmer and wildlife.

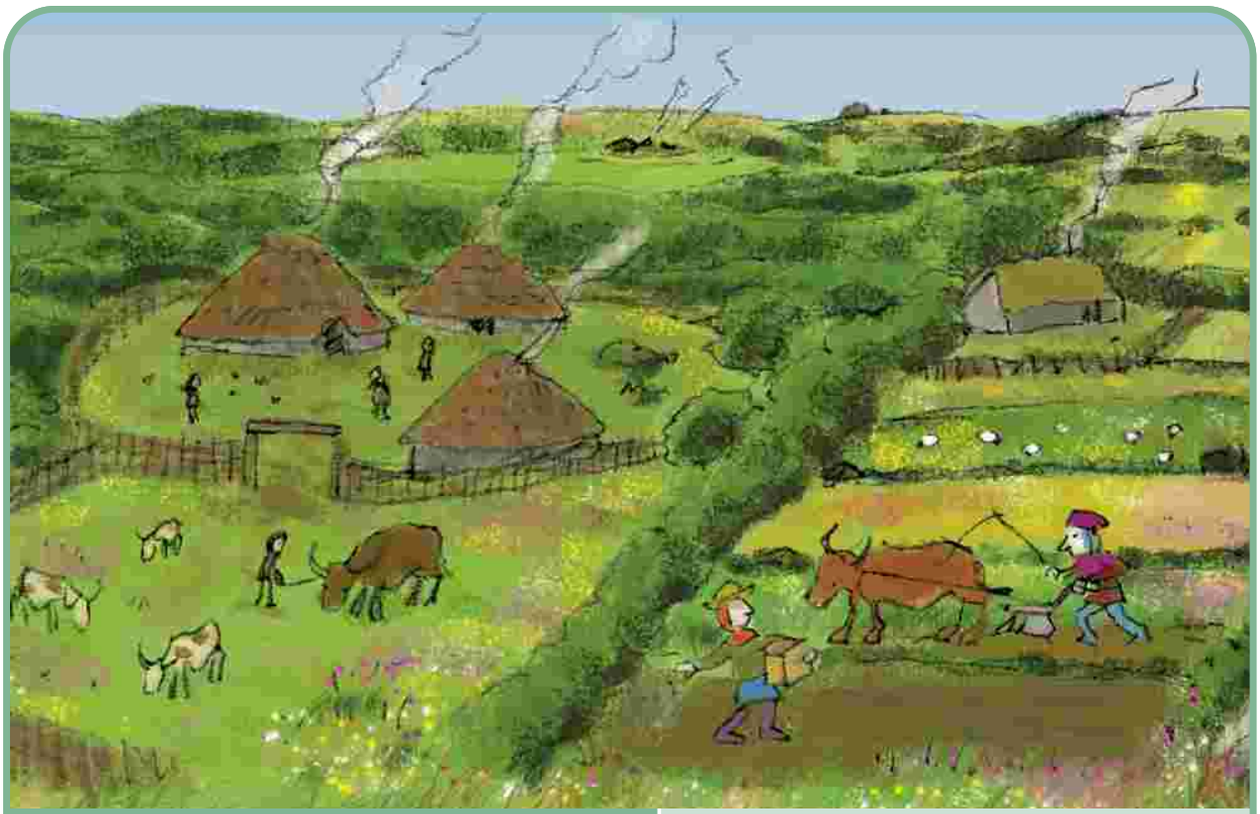
	Advantages of silage	Disadvantages of silage
FARMER		
WILDLIFE		

Into the Meadows

Hay meadows through the ages (1 of 2)

10,000 years ago
(8000 BC)

8,000 years ago
(6000 BC)



4,500 years ago
(2500 BC)

600 years ago
(AD 1400)

Hay meadows through the ages (2 of 2)

250 years ago
(1750)

150 years ago
(1850)

1950

Present day

Hay meadows through time

10,000 - 6,000 years ago: Stone Age times - the origins of meadows

10,000 years ago (8000 BC)
Much of Britain was covered in dense woodland

8,000 years ago (6000 BC)
Stone Age man created clearings in the woodland to hunt wild animals

As the Ice Age ended around 12,600 years ago, people began to move back into Britain. Sea level was lower than it is today and Britain was still joined to the rest of Europe by a land bridge. This allowed nomadic hunter-gatherers to follow the seasonal migration of animals such as reindeer, wild horses and auroch (wild cattle).

As Britain's climate warmed up, most of the land gradually became covered in dense woodland known as 'the wildwood', and the large herds of reindeer and horses that had once roamed the open landscape were replaced by woodland animals such as red and roe deer, wild pig and elk. These animals were harder to hunt, so hunters began to burn areas of woodland to create open clearings which would attract animals to graze on the tender shoots of grasses and wildflowers, making it easier for them to be hunted using bows and arrows or spears. These clearings can be thought of as early meadows, and many of the plant species that grew in the clearings are still found in hay meadows today.

By 6,000 years ago, rising sea level had submerged the low-lying land connecting Britain with the continent and so Britain became an island.

Hay meadows through time

6,000 years ago: Stone Age people begin farming in the Yorkshire Dales

4,500 years ago (2500 BC)
Early farmers lived in small settlements and kept livestock

People continued to clear the wildwood and cattle, sheep, goats and pigs slowly became domesticated. To protect their livestock from predators such as wolves, they kept their animals close to their settlements and even took them into their houses overnight and during the winter. Fences or hurdles would be used to enclose the livestock.

Fodder was needed to feed the domesticated livestock over the winter and early farmers started to manage some of their best land to produce hay.

This was usually land nearest to the homesteads in the woodland clearings. As people gradually replaced their stone tools and weapons with metal ones, first bronze and then iron around 2,500 years ago, they were able to make sickles to cut the meadows. A sickle is a hand-held tool with a sharp, curved blade. The sickle only allowed the user to harvest small patches of land each day, which made it a very slow process. The cut grass was then dried and stored to be fed to the animals as hay over winter.

Arable crops such as wheat and barley were also grown and a more settled lifestyle was established. This kind of farming began to increase as the population of the Yorkshire Dales grew during this time.

Over the next 1,500 years the area became inhabited by new settlers - Romans, Anglo-Saxons and Vikings - but the ability to make hay to keep livestock through the winter remained an important part of farming.

Hay meadows through time

AD 1000 - 1500: The Middle Ages - Medieval communal field systems

600 years ago (AD 1400)
Peasants worked the land owned by others

By the Middle Ages farming was far more organised and operated under what was known as the 'feudal system', where peasants lived on and farmed land owned by wealthy landlords or powerful monasteries. Most of the land in Yorkshire was managed this way.

In return for growing crops, making hay and rearing livestock for their landlord, peasants were able to grow their own crops on strips of open land. This system was known as the open-field system and because the land was used by the community it was known as common or communal land. Generally fields close to the settlement were used as meadows to produce hay, while the rougher land higher up the hillsides was used as pasture for summer grazing. The Domesday Book (1086) records hay meadows in eight out of ten English settlements.

Hay was vital to ensure the survival of the livestock over winter on which all the peasants and estate owners depended. Meadows were highly prized as the hay crop helped to feed oxen which ploughed the arable fields. One acre of meadow was said to have three times the value of one acre of arable land. Wool was also a valuable commodity and hay was needed for the vast flocks of sheep that were managed by the monasteries in the outlying farmsteads.

Wherever possible, horses or oxen were used to drag the hay load to the barn, however haytiming required the whole community to help as everything else continued to be done by hand.

Hay meadows through time

1500 - 1800: Land enclosure

1750
New landowners enclosed their land with walls and hedges

Gradually the old feudal system gave way to a money system as landlords began to either sell off land on their estates or charge rent for the use of it. The dissolution of the monasteries in 1536 brought about some of the biggest changes as King Henry VIII seized all the land owned by monasteries and sold it to the tenants or new landlords. Very soon most of the common fields and meadows in the valley bottoms had been sold off and were enclosed by their new owners.

Enclosing land helped to establish ownership by the new landowner. Fields and meadows were enclosed by either planting hedges or building walls using stones, a material which was readily available in the Dales. Many of the scattered strips from the open-field system were sold or swapped to make groups of fields which were then fenced or walled by their new owners and turned mostly into hay meadows, which had more value than arable crops.

Around this time scythes replaced sickles. Poorer farmers who were unable to buy or rent land were forced to grow hay on whatever common land that was left, generally meadows on the valley sides and uplands. Here lime was spread to improve or 'sweeten' the land. Eventually a series of Enclosure Acts by Parliament through the 18th and 19th centuries allowed villagers to own a portion of the common land that they were using, so long as they could afford to fence or wall it. This led to many more walls being built as meadows, pasture and even the rough common grazing land became sub-divided.

Stone barns started to replace timber barns and for convenience were built near to or in a meadow. The barns stored the hay crop from the surrounding meadow and housed cattle in the winter. Any manure or 'muck' produced by the over-wintering cattle was spread on the land to help enrich it for the next crop of hay.

Many families with smaller plots of land struggled to survive and turned towards the growing lead mining and textile industries in the Dales to provide an additional source of income.

Hay meadows through time

1800 - 1950: Labour-intensive practices

1850
Lots of people were needed to manage the meadows

The growth in towns and industry brought about by the Industrial Revolution led to an increase in demand for milk, cheese and meat. This generated great wealth for those farmers who had managed to buy land.

Better roads, canals and the arrival of the railways meant that farmers didn't need to grow subsistence arable crops as these could be brought in. Instead more land was given over to grazing sheep and cattle, and hay became the main crop.

The need to increase agricultural output led to the further building of barns and dry stone walls often high up on the hillside. Lime kilns sprung up all over as farmers tried to improve their land and create meadows and pasture for the expanding herds of dairy and beef cattle and sheep.

By the end of the 19th century, the Victorian inventions of horse-drawn machinery such as the single-bar cutter and horse rake made hay making easier, but it was still very labour-intensive and teams of workers were required to mow the hay. These teams were often recruited from all over the land, with some coming from as far as Ireland to help during hay making time. Often horses were also hired and brought in by train to work during this time.

By the early 20th century the lead, coal and textile industries had declined but farming continued as the mainstay of the Dales economy.

Hay meadows through time

1950 – present day: mechanisation

1950
Farms are becoming mechanised

After World War Two, the Government saw the need to increase the production and security of food supplies. Farmers were encouraged to intensify their farming methods so that they could get higher yields from their land. Many old meadows were 'improved' by being ploughed up and re-seeded with a single or only a few varieties of fast-growing grasses like perennial rye grass, and artificial fertiliser was increasingly used. Farmers also started to make silage instead of hay, as they could harvest more than one crop of silage each year, and making silage is far less dependent on dry weather.

With the introduction of the 'little grey fergie' and other early tractors in the 1950s, farms increasingly used machinery to do the work. Teams of workers were no longer required and horses along with scythes and hay rakes became redundant, as traditional hay making practices became a thing of the past. Technological advances quickly saw tractors becoming larger and drum- and disc-mowers replacing the old finger-bar mower.

From the mid-1960s new varieties of grasses were developed but these were only useful for making silage. By the 1970s farmers were encouraged to keep more livestock, which led to more meadows being turned into silage fields to enable even greater yields of winter fodder. Sheep numbers in the Yorkshire Dales increased by 70% between the 1950s and the 1970s, and over-grazing became a major cause of habitat loss.

Hay meadows through time

Present day

Present day
Most farms now make silage

Silage is now the main fodder crop for cattle throughout the Dales. Modern, intensive farming methods using large tractors, balers and trailers mean that few people are needed to manage a farm. Many small farms have been joined together to form larger farms - the number of large farms over 100 hectares has trebled since 1990. The high cost of maintaining dry stone walls, larger farm machinery and the practice of making silage instead of hay, has also led to the creation of larger fields. Many field barns are unable to accommodate large tractors and their machinery and are disused or have fallen down.

Very few wildflowers can survive in fields managed for silage. Since the 1950s the UK has lost 98% of its hay meadows and less than 100 hectares remain in the Yorkshire Dales. Many of the wildflowers, grasses and wildlife that once thrived in these meadows have become rare or even lost. The remaining species-rich hay meadows are now recognised to be of national and international importance as they provide vital feeding and nesting areas for our wild insects, mammals and birds.

Farmers who want to continue to traditionally manage some of their meadows can get advice and support from organisations such as Natural England and the Yorkshire Dales National Park Authority. The Yorkshire Dales Millennium Trust is helping farmers to restore meadows through the Hay Time project.

The remaining meadows, along with dry stone walls and traditional farm buildings, are special features of the Dales landscape and hundreds of thousands of people come here in the summer to enjoy their beauty.

Name:

The hay meadow calendar

Spring

Summer

Winter

Autumn

The hay meadow calendar

Can you match up the pictures with the season?
Cut out the pictures and paste them onto the season in the hay meadow calendar to show what happens to a hay meadow through the year. Can you think of other things that happen in each season?

A year in the life of a hay meadow (1 of 2)

Early March is a good time for farmers to tend their land. Using a tractor the farmer rolls, harrows and spreads muck on the meadow. This evens out any bumps and helps the hay crop grow well.

Lambs in the Dales are usually born from mid-March to late April. Ewes and their lambs are allowed to graze the meadows which are starting to grow again.

By mid-May the meadows are 'shut up', this means that all the farm animals are moved out of the meadow to allow the hay crop to grow. The grasses and wildflowers are left to grow tall.

Depending on the weather, haytime starts in July. The hay is cut and left to dry. The farmer then turns the hay with a tedding machine to help it dry. Once the hay is dry the farmer uses a baler to make the loose hay into square or round bales tied with string. The hay can then be taken to a barn to be stored for winter. Cattle or sheep are put on the meadow to eat uncollected hay and graze the new growth (farmers call this the 'fog' or 'aftermath').

From September to November sheep are allowed to graze the meadows. Then the meadows are often cleared of farm animals from December through to the end of February, as the grass has stopped growing.

Name:

A year in the life of a hay meadow (2 of 2)

In each box, write a short description to explain what is happening in the meadow at different times of the year. Use the information on the factsheet to help you.

Early March

Mid-March to April

December to February

May to late June

September to November

July

Section 2: Flora of the meadow

This section provides activities that introduce and familiarise children with plants that are found in a Yorkshire Dales hay meadow. It covers topics such as adaptation, lifecycles, pollination and seed dispersal, and includes activities that enable children to recognise the different parts of a plant and learn how to identify different meadow species.

The wildflower and grass species found in a Yorkshire Dales hay meadow have adapted to living in a cold, northern upland climate. Whilst many meadows contain similar species, the abundance of each depends upon altitude, soil composition and fertility, grazing regimes and seed dispersal. The photos of Dales meadows on pages 10 to 13 demonstrate these differences very well!

Wildflowers in the farmed landscape

Before the advent of chemical fertilisers, pesticides and herbicides many wildflowers grew amongst the crops in our farmed landscape. The kind of wildflowers depended on what the farmer was using the field for, such as either growing hay or corn. The relatively cold, wet climate of the Yorkshire Dales suits growing grass, whilst arable crops are grown in warmer, drier areas of Britain. Hay meadows and cornfields support very different suites of wildflowers.

Hay meadows contain wildflowers and wild grasses such as sweet vernal grass, wood crane's-bill, meadow buttercup and yellow rattle and were once a common sight across Britain.

The Hay Time Project works with farmers in the Yorkshire Dales to reverse the loss of species-rich meadows.

Cornfields contain wildflowers such as poppies, cornflowers, corncockle and corn marigold, plants that were once a common sight in arable fields across Britain, growing amongst crops such as barley and wheat.

The Cornfield Flowers Project works with farmers in East Yorkshire to reverse the loss of cornfield wildflowers.

Since the 1940s hay meadow and cornfield species have suffered major declines throughout Britain due to intensification of farming practices, with many wildflowers becoming extremely rare and some extinct.

Topic 1: Wildflowers and grasses of a Yorkshire Dales hay meadow

Into the Meadows poster quiz - match the wildflowers

KS2

Prepare: Print the *Flowers and grasses of hay meadows* guide (pages 49-52) for pairs or small groups. You will also need the *Into the Meadows* A1 poster.

Discuss: Introduce the children to the different species within the guide. Ask the children to think about the features of the plants:

- Height of plant
- Colour of flowers/seeds
- Shape of flower (are the flowers in groups or on separate stems?)
- Number of petals
- Leaves - spiky, toothed, lobed, separate, grouped, hairy, smooth

Do: Divide the class into small groups (4-6). Ask one group at a time to identify a wildflower species in the poster, using the guide to help them. Ask them what feature(s) of the wildflower helped them to identify it. The group that correctly identifies the most wildflowers wins. This activity can be simplified for KS1, where the children find differently coloured wildflowers within the poster and learn some of their common names. Nineteen wildflower species can be found in both the guide and the poster, and a labelled copy of the poster is on page 53. Five grasses also feature within the poster but are tricky to find.

Explain: Using the information in the box opposite, explain how rare and important the species-rich hay meadow habitats are, especially the upland hay meadows that we have here in the Dales.

UK importance of hay meadows

Due to their ability to support a rich and diverse range of species, species-rich hay meadows are recognised to be of high importance for the conservation of biodiversity in England. They are priority habitats to protect in the UK Biodiversity Action Plan. Some hay meadows are also protected as Sites of Special Scientific Interest (SSSI), as they contain rare and endangered plants and animals. The Northern upland hay meadows that are found in the Yorkshire Dales are one of the rarest grassland habitats in Britain, and are largely restricted to Swaledale and Wensleydale. Lowland species-rich hay meadows are more widespread throughout the Dales. All species-rich meadows are rare and vulnerable and rely on the traditional management practices that have allowed a complex ecosystem within the meadow to evolve over centuries.

Drawing a meadow plant

KS1 KS2

Prepare: Print the *Flowers and grasses of hay meadows* guide (pages 49-52) for pairs or small groups. You will also need the *Into the Meadows* A1 poster. Each child will need a sheet of blank A4 paper.

Discuss: Using the poster and the guides, introduce the children to the different wildflowers and grasses shown in the meadow poster. A labelled copy of the poster is on page 53. Using the guide for reference, see if the children can find the different species in the hay meadow poster. Ask the children to think about the different features of the plants:

- Height of plant
- Colour of flowers/seeds
- Shape of flower (are the flowers in groups or on separate stems?)
- Number of petals
- Leaves - spiky, toothed, lobed, separate, grouped, hairy, smooth
- Which flower is the most abundant?

Do: On A4 paper ask the children to accurately draw and colour a wildflower or grass from the guide, thinking about the features and size of each plant. (These can be used for the meadow drama in Section 6.) Ask the children to draw as many species as possible to build up a class meadow.

Meadow frieze

KS1 KS2

Prepare: This activity takes a lot of preparation but the results are stunning and ideal for display. You will need:

- A large piece of mid-weight calico, roughly 1m high x 1.5m long (readily available in fabric shops)
- A set of textile paints
- Assorted coloured fabrics, wool, felt, scraps, buttons
- Flower templates (5 of each, see page 54), printed onto card and cut out
- Bug templates (5 of each, see page 55), printed onto card and cut out
- Fabric glue or super tacky glue
- Fabric crayons to draw around templates

Draw your design onto the calico either in pencil or using fabric crayon. Paint the background for your meadow onto the calico, building the colours in layers e.g. fields first, then sky, and then features such as trees and walls, so the paints don't bleed into each other. (This stage could be done with a small and competent KS2 group.) Tip: dilute the paints with water so that they go further. Wait for the background to dry completely before gluing on flowers and insects.

Do: Using the *Into the Meadows* poster and the *Flowers and grasses of hay meadows* guide as supporting reference material, ask the children to select a wildflower, grass or insect that can be found in a meadow. Then get the children to draw it, either free-hand or using one of the templates, onto a piece of fabric, cut it out and decorate it to make it look as realistic as possible. Tip: get the children to draw the outline on the reverse of the fabric so that it doesn't show when cut out. Encourage the class to create a variety of different species, then arrange all the flowers, grasses and bugs onto the backdrop and glue in place.

Topic 2: The features and characteristics of plants

The parts of a buttercup

KS1 KS2

Prepare: Print the *Parts of a buttercup* worksheet (page 56) for each child.

Discuss: Explain to the children what the different parts of a plant do:

The **flowerhead** makes seeds for the plant.

The **stem** supports the plant. It contains thin tubes for carrying food, minerals and water.

Leaves make food for the plant. They take in carbon dioxide and release oxygen into the air.

Roots soak up water and minerals and store food for the plant. They also anchor the plant and keep it steady and upright in the soil.

Do: In the blank boxes on the worksheet, ask the children to name the parts of a buttercup. Alternatively, the children can cut out the words at the bottom of the worksheet and glue them into the correct box.

If possible, show the children a buttercup and other flowering plants within the school grounds. You could get the children to photograph the flower parts, then print them off and label them. The labelled photographs could be made into a display.

Extension: Ask the children to write simple explanations in their textbooks of what each part of the plant does.

Compare and contrast wildflowers

KS2

This is a really good activity to get the children thinking scientifically about the different features of plants and will prepare them for what to look for in the field when trying to identify species.

Prepare: Print the *Flowers and grasses of hay meadows* guide (pages 49-52) for pairs or small groups. Print the *Compare and contrast wildflowers* worksheet (page 57) for each child.

Do: Ask the children to compare and contrast two similar but different plants e.g. meadow buttercup and marsh marigold. They can do this by simply using the guide. Ask the children to record the differences on the worksheet.

Discuss: What are the key differences, what are the key similarities? Although one species may look similar to another, often features such as flowering time, number of petals, shape of leaves and plant height are different. These differences help us to distinguish between similar species and identify plants correctly. Other species to compare could be selfheal and betony, knapweed and melancholy thistle, or pignut and meadowsweet.

Dissecting a flower

KS2

Prepare: Print *The parts and functions of a flower* factsheet (page 58) for each child. Each child will also need:

- One flowerhead
- Pair of plastic tweezers
- 15cm strip of double-sided sticky tape stuck to card
- Blu-tack or a bung with a cross cut in it (to hold the flower)
- Sticky-back plastic (to cover their flower card strips)

The choice of flower depends upon the time of year and what might be available in your school grounds, which might include tulip, daffodil, crane's-bill (hardy geranium) and rosebay willowherb.

Discuss: As a class, read through and discuss the factsheet.

Do: To make dissection easier, children can push their flower into blu-tack or use a bung with a cross cut in it. Get the children to carefully dissect their flower following the instructions on the sheet. When the children have finished, cover their flower card strips with sticky-back plastic.

The knowledge gained from this activity will help the children to recognise the parts of a flower in the field, and encourage them to use the correct terminology early on.

Topic 3: Names of meadow plants

Design your own meadow flower

KS1

Prepare: Collect a range of old gardening magazines or pictures of flowers that the children can cut up.

Discuss: Talk to the children about the different wildflowers that can be found in a hay meadow. Highlight why they are different e.g. colour, smell, shape and size. Ask the children what would their perfect meadow flower look like? What key features would it have? Would it be good for insects or birds - how? Would it be poisonous or edible, why?

Do: Tell the children that they are going to make their own meadow flower. Remind them they will need to include the different parts of a flowering plant e.g. flowerhead, stem, leaf and roots. When thinking of their design, encourage the children to look at pictures of flowers, or ask the children to cut out petals and leaves from flower pictures in old gardening magazines. See who can come up with the most imaginative name that describes their new meadow flower.

Be a botanist!

KS2

Prepare: For each pair or small group print (all double-sided) the *Be a botanist!* factsheet (pages 59-60) and the *Flowers and grasses of hay meadows* guide (pages 49-52).

Do: As a class read through the information on both sides of the factsheet. Using the internet, the meadow guide and previous knowledge, encourage the children to research how different plants adapt to their environment.

Discuss: Using a class mind map, help children plan and organise their task. First of all the children will need to design their meadow flower, so encourage the children to think about what adaptations their flower would have to suit its specific environment, and why. Then discuss the different features e.g. colour, size, shape, flowering time, that reflect any adaptations that their meadow flower has. Encourage the children to be as inventive as possible. Build up a word bank of descriptive and scientific language as you go along.

Do: Children should plan how they wish to lay out their letter (or email). They will need to introduce themselves, report their findings, and use their drawings and scientific information to describe their meadow flower. Remind the children they will need to say where the new flower was found - they could simply name a dale in Yorkshire or they could be more specific and use a grid reference.

Extension activity: Ask the children to find the Latin or Greek name for their flower. Use a translation site on the internet to help.

Topic 4: Plant pollination, germination and seed dispersal

Bumblebee Game

KS1 KS2

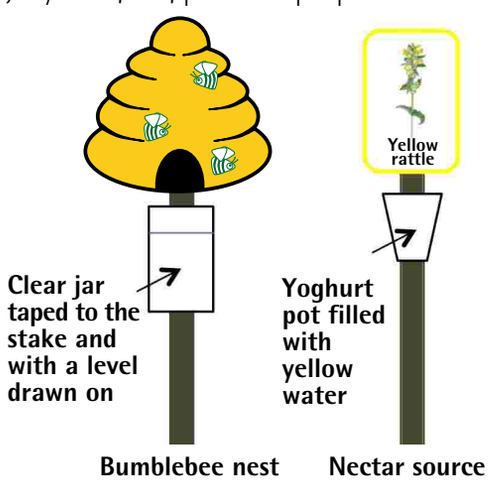
Although this game takes a while to prepare, it's great fun and helps to reinforce learning about plant reproduction through pollination.

Prepare:

- Print five copies of each of the *Wildflowers* sheets (pages 61-62). You may wish to enlarge them. Cut them up so you have five copies of each of the four wildflowers.
- Print four copies of the *Bumblebee nests* sheet (page 63). Stick a wildflower label onto each nest.
- 20 empty yoghurt pots
- 24 stakes or canes
- Four small clear pots or jars, all the same size and with a level drawn on
- Drawing pins
- Sticky tape
- Plastic paint pipettes (one per child)
- Hammer
- Water and four colourings (such as food colouring or powder paint) - yellow, red, pink and purple

Setting up the game

1. Make up a bumblebee nest and five nectar sources for each of the four wildflowers (see the examples shown on the right).
2. Space out the four bumblebee nests 1m apart in a row across the near end of the field. Hammer them upright into the ground, facing out towards the field.
3. Randomly spread all of the nectar sources around the rest of the field. Hammer them upright into the ground, facing the nests.
4. The nectar for each flower is coloured water (yellow for yellow rattle, purple for selfheal, red for red clover, and pink for betony). Prepare enough of each nectar to put equal amounts into each flower's nectar pot, making sure that you use the right colour for each flower.



Explain:

1. Tell the children that bumblebees collect nectar to make honey, and that they also collect and spread pollen, which helps plants reproduce (make new plants).
2. For the Bumblebee Game the class will be split into four groups and each group will be named after one of four wildflowers - yellow rattle, selfheal, red clover and betony. This will also be the name of their nest. The children will pretend to be bumblebees collecting nectar to take back to their nests. The nectar is coloured water and the children will use pipettes to collect the nectar from their wildflowers.

3. Explain how many bumblebees can leave the nest at once (the game is much quicker if more than one bee can fly at any one time), and show the children how to use the pipettes if they've not used them before. Each bumblebee gets the chance to go to one flower of the right type, collect as much nectar as they can using the pipette and then deposit it in the honeycomb (jar) at the nest. Each bumblebee can only visit one flower each time they leave the nest - they need to fill their pipette as much as possible from the nectar at that flower before they return. If they go to the wrong type of flower they need to empty their pipette out before they get back to the nest. If the wrong colour nectar is squirted into the honeycomb all of the nectar must be emptied out and the team starts again.
4. The first team to fill their nest honeycomb (or reach a set level) wins.

Do: Split into four nest teams. The game usually takes between 10-20 minutes, depending on how many bumblebees are allowed to leave the nest at any one time.

Variations

- Vary the quantities of nectar in each flower according to how far it is from the nest i.e. increasing quantities with increasing distance from the nests. This means that the nearest nectar sources are soon used up and the bumblebees need to forage further from their nests. Make sure that this is the same for each kind of flower.
- Introduce a predator such as a bat or swallow - if a bumblebee is caught before it returns to the nest they must empty their pipette and go back to their nest (they can play again when it is their turn to fly next).
- Bumblebees can't talk - they tell other bumblebees where the nectar-rich flowers are by waggling their bottoms in the right direction. This is called a waggledance. See if your children can do the same!

Discuss: Using the bumblebee facts below, discuss the importance of bumblebees and their role in pollination. Encourage the children to think of ways they can help bumblebees e.g. planting nectar-rich flowers or making a mini-meadow at home or school.

Bumblebee facts

- Bumblebees store the nectar as a honey-like substance in their nest. This helps feed the queen and her young and the workers too!
- Bumblebees collect pollen in little sacs on their back legs (these act as shopping bags which they fill with pollen to take back to the nest to feed the young bumblebee larvae as they hatch out). The pollen is rich in protein and vitamins.
- When the bumblebee moves from flower to flower, pollen is transferred as the bumblebee brushes against the stigma and stamen within the flower, this helps to pollinate plants.
- Bumblebees are very important as they help pollinate crops that we eat, such as apples, strawberries, and beans. In fact one in every three mouthfuls of food that we eat has been pollinated by an insect. Just think, if there were no bumblebees there would be no tomatoes and no tomato ketchup!
- Species-rich hay meadows are one of the best habitats for bumblebees as they contain a rich variety and abundance of nectar-rich flowers.
- Sadly many of our pollinators such as bumblebees are in decline because of the loss of habitats such as species-rich hay meadows. Without pollinators to help our wildflowers set seed, we are in danger of losing many wildflowers too.

What can you do to help?

- Plant a variety of nectar-rich flowers in your school grounds. These can be shrubs, perennials or annuals and ideally their flowering times should overlap from April to October.
- Make a wildflower meadow (see the instructions on page 145). If you can use locally-sourced wildflower seed this is even better as it helps boost the seed bank, and your bumblebees will be lapping up the nectar all summer long! Visit the Bumblebee Conservation Trust website www.bbct.org.uk for more information on child-friendly activities.

The Seed Game

KS1 KS2

This activity helps children to understand how different types of meadow seeds are dispersed. You will need a brightly coloured bean bag and a large space for the children to move around in.

Explain: You are going to show how different flowers disperse their seeds.

Do: The first activity is about plants that simply drop their seed close to them, such as yellow rattle and betony. Give one child a beanbag and get them to spread their arms like flower stalks. The beanbag represents the seed. Ask the child to drop the beanbag - this represents the flower releasing its ripe seed. Get another child to stand where the seed lands - they become a new flower. They pick up the seed, spread their arms and drop it, whereupon another child becomes a flower where the seed lands, until you run out of children. The children should be very close together when this game finishes.

Discuss: Is this a good way for plants to grow? Do we find many flowers growing close together? Is this a good or a bad thing? If some plants are too close together, there is not enough light to make food or nutrients in the soil to support them all, so some might die. However, for other species this can be a good thing, as they may squeeze out other plants growing close by. Can we think of other ways that plants disperse seeds? Try to elicit responses that lead to wind, birds and people.

Do: Now the seed is going to be dispersed by air, like seed of grasses and hawkbits (which look like a dandelion 'clock'). Give the beanbag to a child. This time the beanbag (seed) has to be thrown as far as they can, so the plants grow some distance from their parent. Where the seed lands, another child becomes a flower.

Discuss: Is this a good dispersal method? Other meadow species have ingenious dispersal methods, such as wood crane's-bill which catapults its seed out of the seedpod when it's ripe! These methods space the flowers apart but the seeds could land anywhere - in the shade, on water or on concrete where it can't grow. Any seeds landing in an area where they can't grow will die.

Do: The seed is now going to be dispersed by birds. Ask one child to pretend to be a flower e.g. knapweed or melancholy thistle, and one child to be a bird e.g. goldfinch. The bird 'eats' the seed, flies away from the flower and drops the seed.

Discuss: This dispersal method has the same advantages and disadvantages as wind dispersal, but also some seed that's eaten will be digested and so will not produce a new flower. Most meadow flowers and grasses are unable to spread far because of how they disperse. They can usually spread from field to adjoining field easily but any further is difficult. This is why you might see some species in some of the dales but not in others. When plants have grown in one area for a long time they have adapted to conditions in that area e.g. its climate, soil and altitude. The seed that the plant produces is said to be of local provenance to that area. It may be slightly different to seed produced by the same species in a different area, because each has adapted to the specific conditions in which they live. Seed is also dispersed by people. The best wildflower seeds to plant are those of local provenance because they have the greatest chances of survival, also you are helping to support a unique seed bank. The Yorkshire Dales Millennium Trust helps farmers to get local provenance wildflower seed from a nearby meadow to put on meadows that don't have many different plant species in them, helping to ensure that we don't lose our local hay meadow wildflowers and grasses forever.

The life cycle of meadow plants

KS2

Prepare: Print (double-sided) *The life cycle of meadow plants* (pages 64-65) for each child.

Do: Read to the class the factsheet. On their worksheet, ask the children to correctly link the descriptions with the pictures.

Topic 5: Top Trumps

Top Trumps

KS1 KS2

On pages 66 to 69 there are 36 cards, each with a wildflower or grass species found in a meadow. 24 of the plants also feature in the *Into the Meadows* poster and these cards include the plant reference number in the top left corner. The cards can be used in a variety of ways, from sorting activities e.g. colour of flowers, to playing the well-known game of Top Trumps.

Prepare: For each group, print the *Top Trumps* card set (pages 66-69) onto thin white card and cut them out.

Do: To play Top Trumps, all of the cards are dealt as equally as possible to the players (groups of four children work best). Each player holds their cards in a pile face up so that they can only see their top card and so that players can't see each other's cards. The starting player - usually the player to the left of the dealer - reads out a value from their first card e.g. "wildlife value 7". Everyone then reads out the wildlife value on their top card and whoever has the highest value wins that 'round' and puts the cards at the bottom of their pile. Whoever won the cards then chooses a value from their next card and the game continues. If two or more cards have the same value, then all of the cards are placed in the middle and the same player continues with their next card. The winner of this round collects the cards from the middle as well. Players drop out of the game as they run out of cards, and whoever eventually manages to collect all the cards wins the game.

Flowers and grasses of hay meadows
in the Yorkshire Dales

Hay Time
Working with farmers to restore meadows across the Dales

The Hay Time project aims to enhance and restore upland and lowland meadows throughout the Yorkshire Dales. It aims to do this by providing advice on meadow management and by actively restoring meadows using seed harvested from species-rich donor meadows to increase the plant diversity of meadows that have lost some of their nature conservation value.

Working closely with farmers and other land managers is central to the project. Meadow restoration and management provides additional income for farmers under agri-environment schemes.

Hay Time is being run jointly by the Yorkshire Dales Millennium Trust (YDMT) and the Yorkshire Dales National Park Authority. A sister project is being run by the North Pennines AONB Partnership.

YDMT is a charity that works to support the environmental, social and economic well-being of this special area. Since it was established in 1997, it has undertaken more than 600 conservation, heritage and education projects worth over £15 million. These include restoring natural habitats such as woodlands and rivers, conserving built heritage such as drystone walls, barns and village features, running the Learning in Limestone Country project, and setting up countryside management training and apprenticeships. It also administers the Sustainable Development Funds within the Yorkshire Dales National Park and Nidderdale AONB, and the North Yorkshire Aggregates Grants Scheme.

For further information and to find out how you can help support the work of YDMT, please contact:

Hay Time Project Officer
Yorkshire Dales Millennium Trust
The Old Post Office
Clapham
LA2 8DP
Tel: 015242 51002

Website: www.ydmt.org
Email: info@ydmt.org

Hay Time is supported by:

This guide is printed on paper that is 75% recycled (60% post-consumer, 15% post-industrial, 25% virgin fibre - of which 10% is FSC sourced), FSC and NAPM certified and chlorine free.

YORKSHIRE DALES National Park Authority

Hay Time
Working with farmers to restore meadows across the Dales

YORKSHIRE DALES MILLENNIUM TRUST

Hay meadow grasses

Sweet vernal grass

Flowering time: April-July

Characteristic sweet, 'freshly mown hay' smell when stem base crushed. Tufts of hairs where leaf meets stem. Spike-like flower head.

Size: 10-100 cm

Yellow oat-grass

Flowering time: June-July

Yellow spikelets (flowers) with bent awns. Flower head can appear 'fluffy' when dry. Downwards pointing hairs at base of stem.

Size: 20-80 cm

Quaking grass

Flowering time: May-August

Very distinctive grass with delicate, triangular, flat, purplish spikelets that 'quake' in the breeze.

Size: 15-75 cm

Red fescue

Flowering time: May-July

Variable grass that generally has fine, needle-like leaves that can't be unfolded. Spikelets are often reddish.

Size: 20-100 cm

Common bent

Flowering time: June-August

Spikelets are very small and often purple when young. Triangular leaves at 45° to stem.

Size: 10-70 cm

Crested dog's-tail

Flowering time: June-August

Bristled, one-sided, spike-like flower head, often with lilac pollen. Dark green leaves at base, that are glossy and grooved on the upper surface.

Size: to 75 cm

The Yorkshire Dales National Park

The Yorkshire Dales was designated a National Park in 1954 in recognition of its outstanding scenery, diversity of wildlife habitats and rich cultural heritage. Covering an area of 1762 square kilometres and with 20 main dales, it straddles the central Pennines in North Yorkshire and Cumbria. It is a living, working environment, home to 20,000 people. The park is administered by the Yorkshire Dales National Park Authority, the purposes of which are 'to conserve and enhance the natural beauty, wildlife and cultural heritage' and 'to promote opportunities for the understanding and enjoyment of the special qualities of the park'.

Traditional species-rich hay meadows, such as those found in the Yorkshire Dales, are a rare and important habitat of high nature conservation value. Dales meadows are also an iconic component of our rural heritage and, together with drystone walls and field barns, are a characteristic and valued feature of the landscape. Many visitors are attracted to the Dales in early summer to see the colourful display of flowers and all the associated fauna that feed, bask and nest in the meadows.

Species-rich hay meadows are dependent on traditional management, which involves a single hay cut in mid-late July, aftermath grazing and no chemical fertiliser inputs. Such management allows a rich diversity of common, less common and rare meadow plants to grow together. The Dales are host to both upland and lowland species-rich hay meadows. Upland meadows are particularly special as they are almost entirely restricted to the upland dales of Northern England. Some of the best meadows in the Dales can be found in Swaledale, Langstrothdale and Wharfedale.

Muker Meadows, Swaledale

Please respect the hay crop!

When harvested, hay is an important fodder crop for the farmer's livestock. Please walk in single file along footpaths, take care not to trample the growing hay and follow the Countryside Code.

Less common hay meadow plants

Common bistort

Flowering time: June-August

Hairless plant with oval leaves on winged stalks. Flower head a cylindrical spike containing many pink flowers. Grows in damp meadows.

Size: 30-100 cm

Devil's-bit scabious

Flowering time: June-October

Undivided, untoothed leaves in opposite pairs. Dark blue-purple, tight flower head.

Size: 50-100 cm

Similar species: Field scabious has lilac flowers with a looser flower head. The stem leaves are divided nearly to the midrib.

Eyebright

Flowering time: June-October

Very variable plant as there are over 20 species. Distinctive white flowers with yolk-yellow centres. Glossy, deeply toothed, pointed oval leaves.

Size: to 50 cm, but often much shorter

Yellow rattle

Flowering time: May-August

Upright stem with unstalked, pointed, toothed leaves and yellow hooded flowers. Seeds rattle in the capsules when ripe.

Size: to 50 cm

Bird's-foot-trefoil

Flowering time: May-September

Variable, spreading species. Each leaf has five leaflets, two of which are positioned at the base of the stalk. Deep yellow-orange flowers, often tinged with scarlet.

Size: 10-50 cm long

Betony

Flowering time: June-September

Round-toothed, oblong, heart-shaped leaves, with stem leaves in few distant pairs. Pinky-purple flowers protrude loosely from square flower head.

Size: 10-60 cm

Special plants of upland hay meadows

Globeflower

Flowering time: May-August

Resembles buttercup but flowers are enclosed, lemon-yellow 'globes'. Leaves divided and toothed. Hairless.

Size: 40-70 cm

Water avens

Flowering time: May-September

Drooping, bell-shaped, peach and red-purple flowers. Lower leaves with alternate leaflets of increasing size towards large, unlobed, end leaflet.

Size: to 50 cm

Great burnet

Flowering time: June-September

Dull crimson, oblong flower heads on tall stems. Leaves with up to seven pairs of toothed leaflets.

Size: to 120 cm

Lady's mantle

Flowering time: June-September

Very variable plant as there are over ten species. Round leaves with scalloped, toothed edge. Leaves often look as if they have been folded. Tiny green flowers in clusters.

Size: 10-30 cm

Wood crane's-bill

Flowering time: June-July

Tufted, hairy plant with mauve five-petalled flowers. Divided, toothed leaves. Leaf stalks ungrooved. Seed head ends in a long pointed beak, hence the name 'crane's-bill'.

Size: 30-70 cm

Similar species: Meadow crane's-bill has a blue flower with unnotched petals. The leaves are much more divided and deeply toothed.

Melancholy thistle

Flowering time: July-August

Tall, erect, spineless thistle with unwinged, cottony stems. Flower heads usually solitary. Leaves green and hairless above but distinctly white-felted below, with soft prickles on the edge.

Size: 45-120 cm

Common hay meadow plants

Meadow buttercup

Flowering time: May-July

Divided leaves. Flower stalks not grooved.

Size: 20-60 cm

Similar species: Bulbous buttercup and creeping buttercup both have a stalked central lobe to the leaf. Creeping buttercup, which has creeping runners, is not normally found in traditionally-managed meadows.

Ribwort plantain

Flowering time: April-October

Long leaves with conspicuous veins. Furrowed stem. Tough, brown flower head with tiny white flowers.

Size: 10-40 cm

Common sorrel

Flowering time: May-July

Arrow-shaped leaves with lobes at the base that point backwards. Upper leaves clasp stem.

Size: 30-100 cm

Pignut

Flowering time: May-July

Delicate white-flowered umbel. Stem hairless with threadlike upper leaves and finely divided lower leaves.

Size: 20-40 cm

Similar species: Cow parsley is not normally found in traditionally-managed meadows. It has less divided lower leaves (resembling parsley) and grows to 100 cm.

Selfheal

Flowering time: June-October

Downy with pairs of pointed oval leaves. Purple/blue flowers form oblong flower head.

Size: to 30 cm

Red clover

Flowering time: May-September

Hairy. Leaflets in threes, often with white crescents on upper surface. Deep pink flower head.

Size: 20-40 cm

Similar species: White clover lacks hairs, has white flower heads and creeps along the ground.

Less common hay meadow plants

Rough hawkbit

Flowering time: June-September

Flower head dandelion-like on unbranched, densely hairy stem. Leaves densely covered with forked hairs.

Size: 10-40 cm

Similar species: Autumn hawkbit has sparse un-forked hairs on leaves and branched flower stem. Cat's-ear also has a branched flower stem, with thick, spongy leaves that have a prominent white midrib and unforked hairs.

Meadow vetchling

Flowering time: July-August

Scrambling plant of the pea family. Pairs of thin, pointed oval leaflets. Stems end in tendrils that wrap around other vegetation for support. Seed pods black when ripe.

Size: 30-120 cm long

Common knapweed

Flowering time: July-September

Large, stout, hairy plant with thistle-like flowers, but no prickles. Blackish-brown scales below flower head. Lower leaves oval and pointed, upper leaves stalkless and more linear.

Size: 15-100 cm

Ox-eye daisy

Flowering time: May-September

Resembles a large daisy. Lower leaves spoon-shaped. Stem leaves are toothed and clasp the stem.

Size: 50-80 cm

Meadowsweet

Flowering time: June-September

Pairs of tiny leaflets alternate with larger ones, to a three-part end-leaflet. Leaflets white-woolly or pale green below. Fragrant cream flowers. Grows in wet meadows.

Size: to 120 cm

Marsh marigold

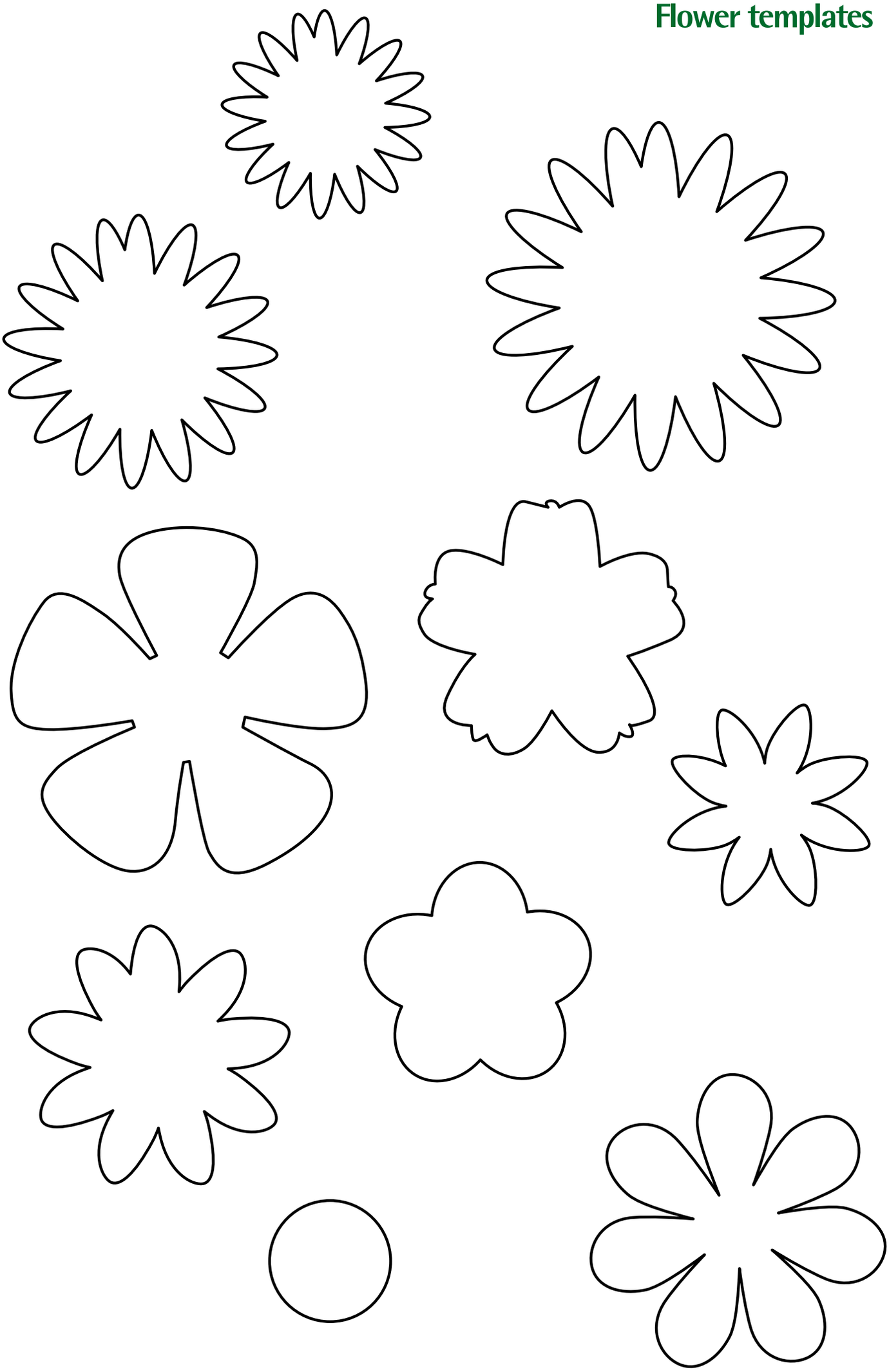
Flowering time: March-July

Large heart/kidney-shaped, shiny, dark green leaves. Bright yellow flowers. Grows in wet meadows.

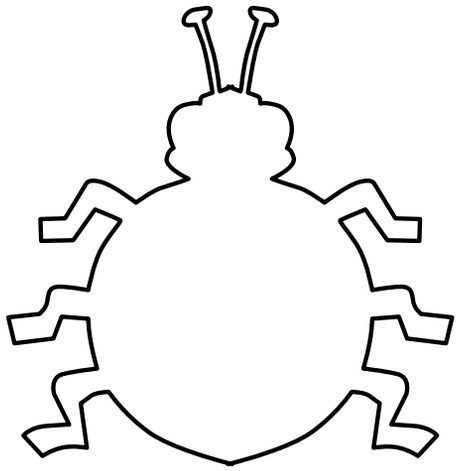
Size: 20-60 cm

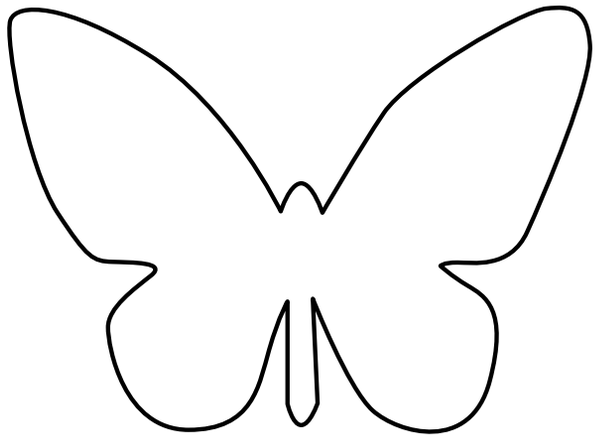
1: Betony
2: Great burnet
3: Ox-eye daisy
4: Meadow buttercup
5: Wood crane's-bill
6: Meadowsweet
7: Yellow rattle
8: Eyebright
9: Selfheal
10: Pignut
11: Ribwort plantain
12: Knapweed
13: Red clover
14: Melancholy thistle
15: Rough hawkbit
16: Sorrel
17: Bird's-foot-trefoil
18: Meadow vetchling
19: Red fescue
20: Crested dog's-tail
21: Yellow oatgrass
22: Common bent
23: Sweet vernal grass
24: Lady's mantle
25: Creeping thistle

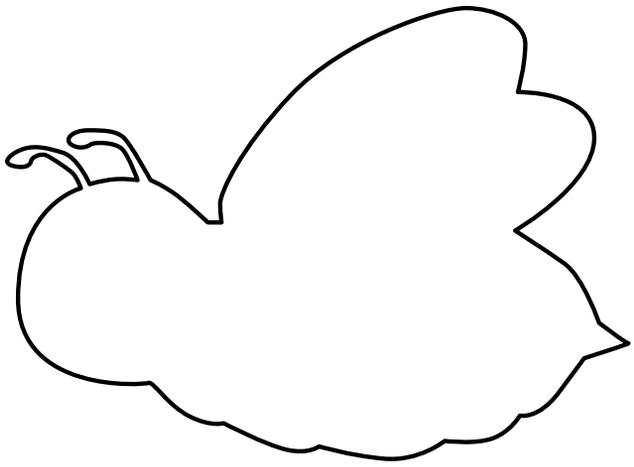
Flower templates

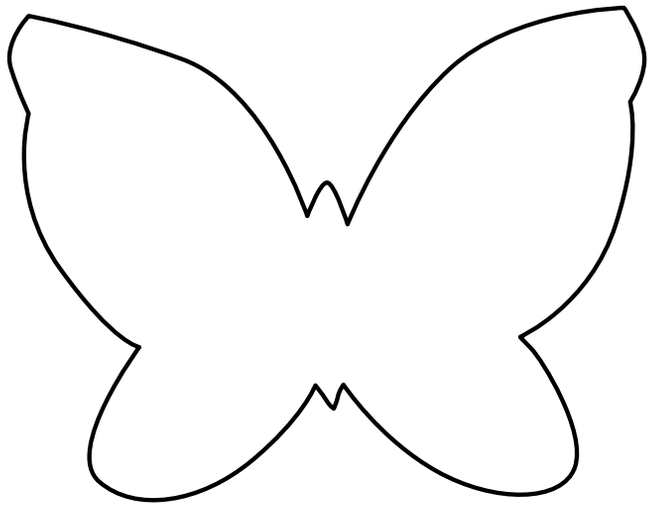


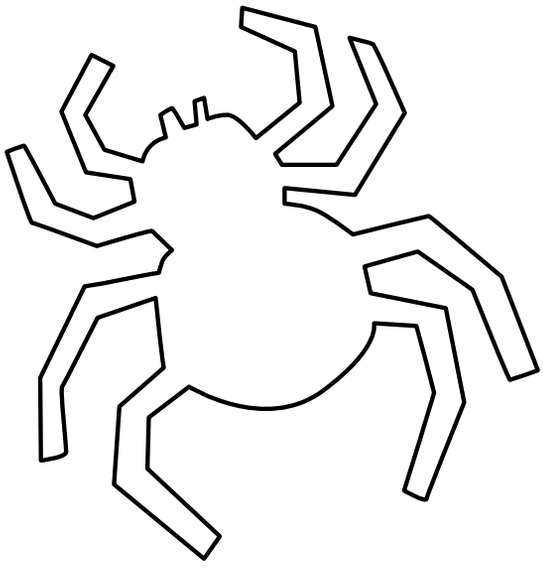
Bug templates

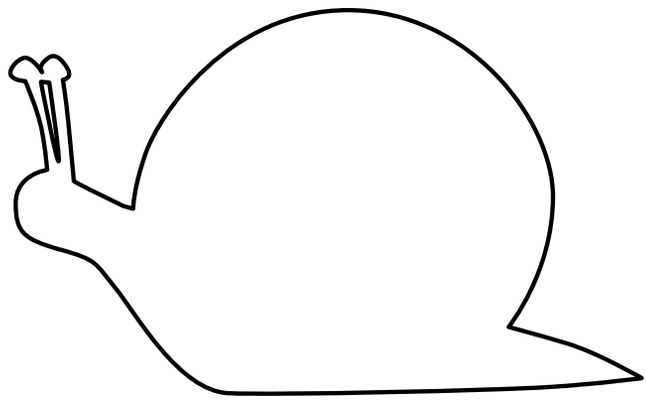












Name:

Parts of a buttercup

Can you label the different parts of the buttercup correctly?
Use the words below to help you.

stem | flowerhead | root | leaves

Name:

Compare and contrast wildflowers

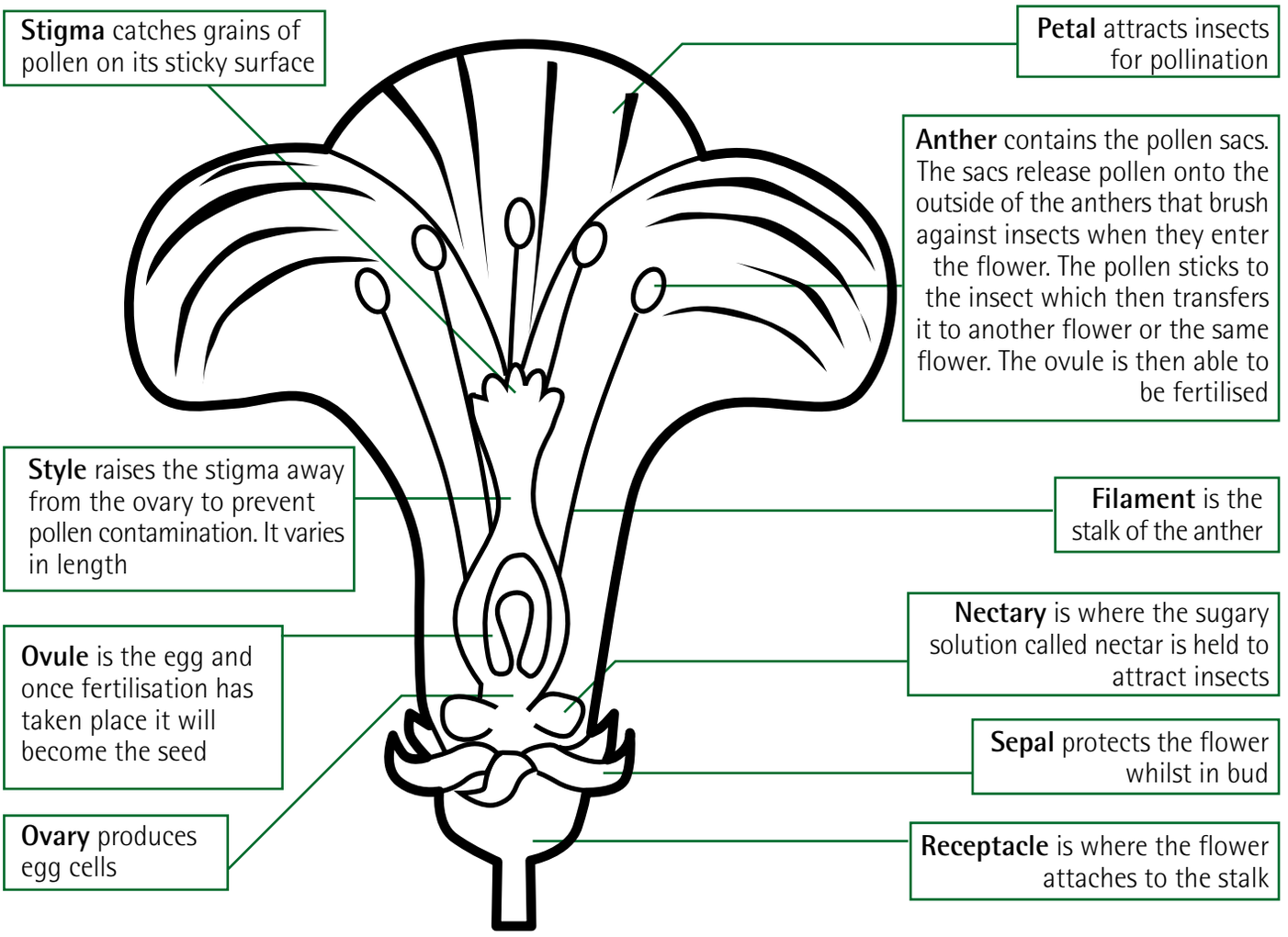
While one plant may look similar to another, often features such as flowering time, number of petals, shape of leaves and plant height are different. These differences help us to distinguish between similar species and to identify plants correctly.

Feature	Flower 1 Name:	Flower 2 Name:
Height:		
Flowers: (draw and describe them)		
Colour		
Grouped or on separate stems		
Number of petals		
Leaves: (draw and describe them)		
Hairy/non-hairy		
Flowering time:		
Unusual features:		

The parts and functions of a flower

Flowers are the parts of a plant responsible for one important function: **reproduction**!

Parts of the flower include **petals**, **sepals**, one or more **carpels**, and **stamens**.
Carpels are the female reproduction parts of the flower. Each carpel includes an **ovary** (where the ovules are produced; **ovules** are the female reproductive cells, the eggs), a **style** (a tube on top of the ovary), and a **stigma** (which receives the pollen during fertilisation).
Stamens are the male reproductive parts of flowers. A stamen consists of a **filament** and an **anther** (which produces pollen). Pollen contains the male reproductive cells which fertilise ovules.



Can you find the parts of a flower?

Dissecting a flower:

1. Starting at the base of the flower, carefully remove the outer ring (whorl) of parts, these are the sepals. Use fingers or tweezers to do this.
2. Place the sepals on the left hand side of your sellotape strip, carefully placing them slightly apart from each other in a row, like the picture above.
3. Next remove the second whorl of parts, these are the petals.
4. Place the petals onto the strip, to the right of the sepals.
5. Now carefully remove the stamens (anther and filament) and stick them onto the strip next to the petals.
6. Finally remove the carpel or carpels and place then onto the strip.
7. When complete ask your teacher to cover the flower parts with a piece of wider sellotape or sticky-backed plastic.
8. Your strip should look something like this:

How many petals does your flower have?

In 1831 a young naturalist called Charles Darwin set sail on the naval survey ship HMS Beagle. Darwin was there to collect plant and animal specimens from the countries that the ship visited. The voyage took five years and Darwin made lots of new discoveries.

When he returned, Darwin began to study other plants and animals and found that those best suited to their environment are more likely to survive. Darwin went on to become the most famous naturalist in the world and he changed the way people think about life on earth.

Your task

Around the world there are an estimated 80,500 plant species, yet scientists believe that many more remain unknown to us.

Imagine you are a botanist in a hay meadow and have discovered a new wildflower. What does it look like? Does it have any special properties? How has it adapted to its environment? What would you name it? Is it good for wildlife? Why?

Write to the Darwin Science Weekly Journal to tell them about your new find. Include drawings and as many descriptions of the flower's features and properties as possible. Use the examples of real meadow plants on this page and the information overleaf to help you.

Lady's mantle *Alchemilla* species

The folded leaves of this plant look a bit like a Tudor mantle (or cloak). Water droplets form on the leaves and people used the water in magic potions and alchemy (the medieval belief that some metals could be changed into gold).

Meadow buttercup *Ranunculus acris*

Ranunculus is Latin for 'little frog' and was probably called this because many buttercup species are found near water, like frogs. The name buttercup is thought to come from a false belief that the plants give butter its yellow colour (in fact it is poisonous to cows and other livestock).

Wood crane's-bill *Geranium sylvaticum*

The seed head of this flower ends in a long pointed beak, hence the name 'crane's-bill' (the scientific name is from the Greek geranos, a crane). Its seed pods 'explode' when ripe, throwing the seeds several metres away from the parent plant.

Facts about meadow flowers

Flowers like wood crane's-bill have adapted from living in ash woodlands. They are often found in sheltered parts alongside walls and in the shade of trees.

Most of the plants that survive in hay meadows are able to drop their seed before the hay is cut in July.

Some plants such as red clover smell sweetly to attract pollinators.

Adaptation

Plants and animals grow and develop to cope with the conditions of their environment. The wildflowers and grasses that live in a Yorkshire Dales hay meadow have adapted to living within a cold, northern, upland climate.

Many plants like buttercups have a short growing season. This means that they only grow when the weather is mildest e.g. from March to July.

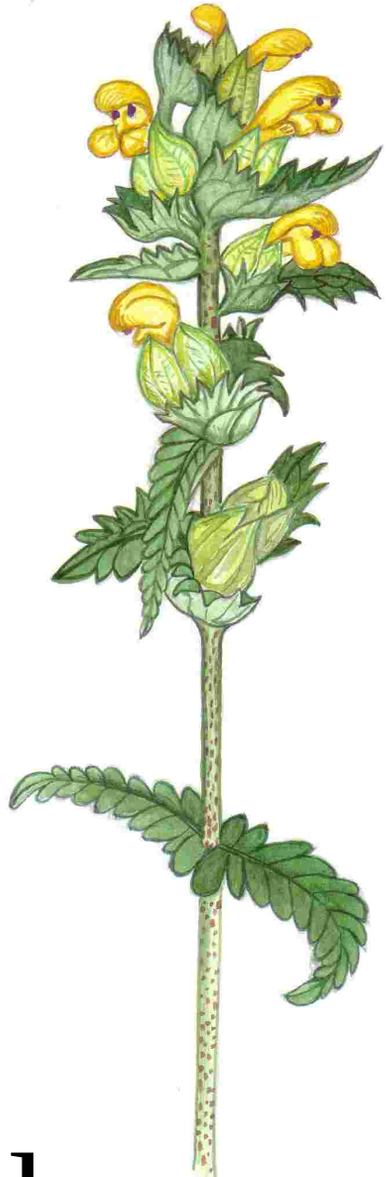
All of these plants have an amazing ability to cope with cold winters. The seeds of yellow rattle have such tough cases that they can only start to germinate after a hard frost has cracked the shell.

How meadow plants got their names

Through the ages meadow flowers have been given all sorts of common names. Often names varied from village to village across the land, but this meant that some plants confusingly had up to a dozen different names!

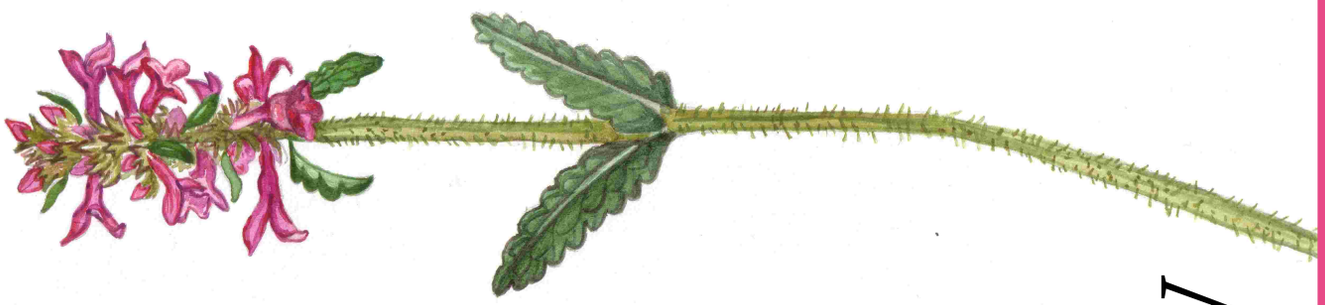
In the 18th century, Swedish naturalist Carl Linnaeus decided to create a system of grouping and naming animals and plants using Latin and Greek names, because these were the international languages of science at the time. Charles Darwin used this system to name the species he found. Today all plants and animals have a common name and a Latin or Greek name.

The common name for this plant is yellow rattle and its Latin name is *Rhinanthus minor*.

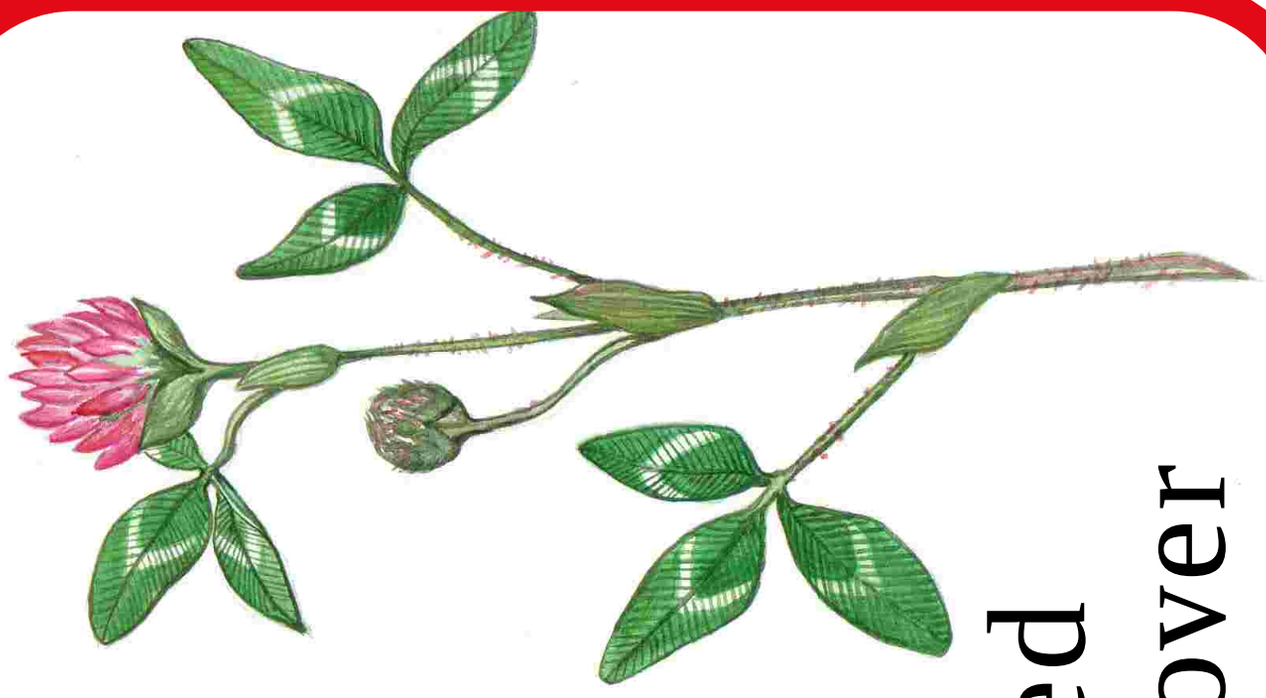


Yellow rattle

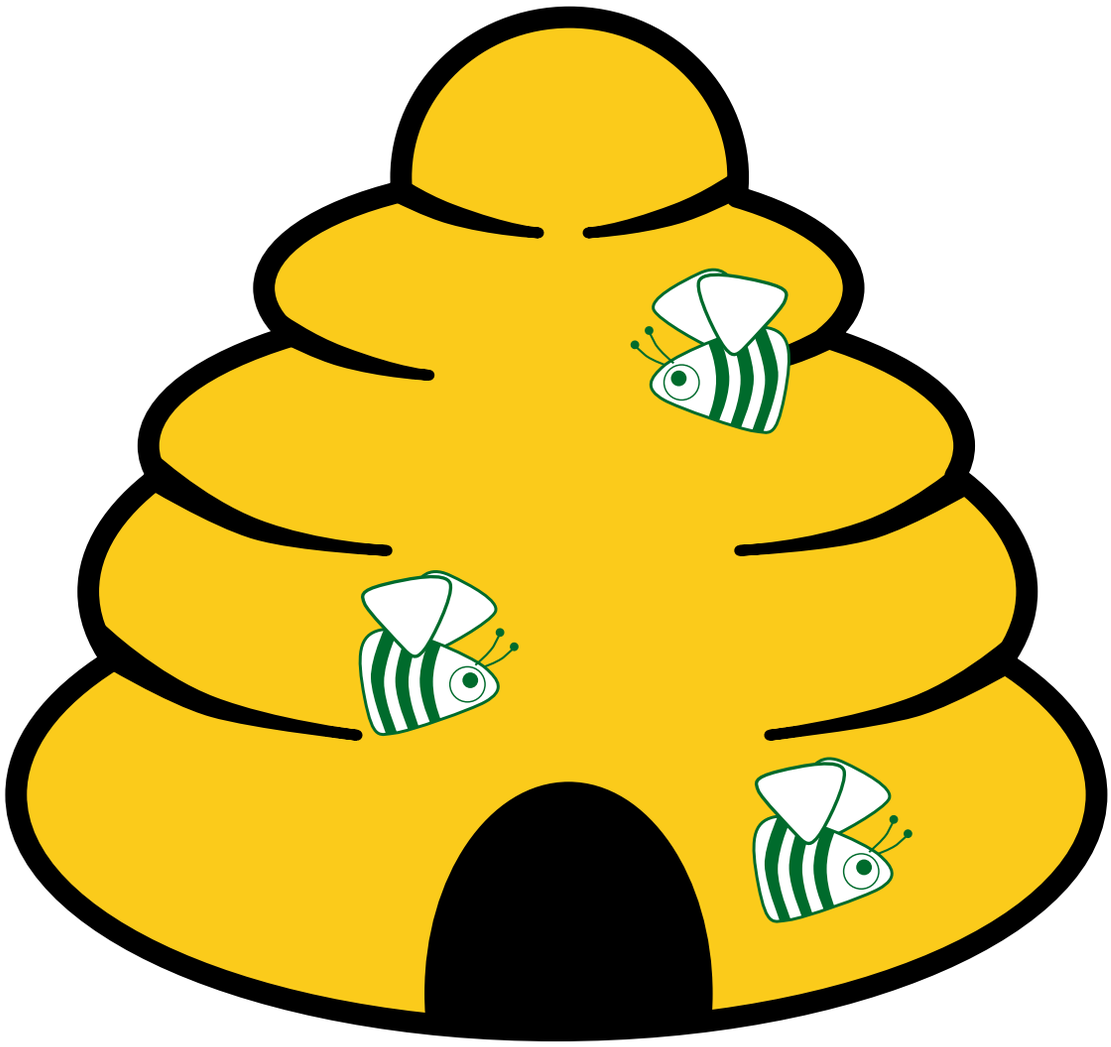
Selfheal



Betony



Red clover



Yellow rattle nest

Betony nest

Selfheal nest

Red clover nest

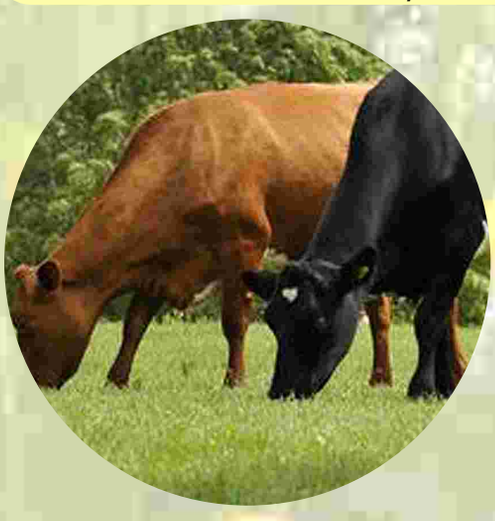
The life cycle of meadow plants (1 of 2)

A meadow plant begins its life as a seed that lies on the surface of the meadow waiting for the right conditions to start to grow. The seed needs warmth, oxygen and water for it to grow into a plant. This process is known as germination. Some meadow seeds can start to germinate in the early autumn, while the soil is still quite warm and moist. Other seeds will wait until the spring, when the weather warms up and daylight hours become longer.

As farmers use their meadows for grazing in early spring, young plants are unable to grow very much. By mid to late spring farmers take their livestock out of the meadow to let the wildflowers and grasses grow tall. Most meadow grasses and wildflowers will come into flower in June and July before the meadow is cut for hay.

Insects play an important role in the meadow, as they collect pollen and nectar from flowering plants and while doing so they transfer pollen between plants. Pollen is also blown by the wind. Once pollen reaches the reproductive parts of another flower fertilisation takes place and seeds can begin to form.

By the time the farmer cuts the meadow for hay in mid-July, most of the seeds of the plants will be ripe. The seeds will have either fallen to the ground already or will be shaken loose by the farmer's cutting and strewing machinery. Many plants that live within a hay meadow can complete their full life cycle before the farmer cuts the field for hay.



After the hay has been dried and the hay bales taken out of the field, the farmer lets their sheep and cattle back in to graze. Their hooves trample the seeds into the ground, helping them make good contact with the soil and the cycle of life begins again

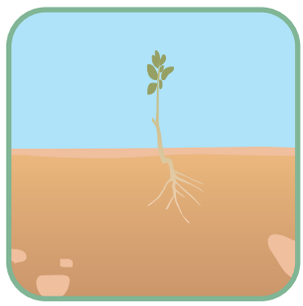
Name:

The life cycle of meadow plants (2 of 2)

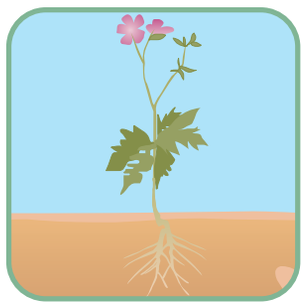
Can you match the description with the picture?
The pictures show the life cycle of a meadow plant but the descriptions are in the wrong order. Can you match the pictures and the descriptions? Draw a line to connect each picture with its description.

The seeds are scattered by animals or the wind. Plants like wood crane's-bill catapult the seeds away. This process is called **dispersal**. Some of the seeds are trampled into the ground and will grow into new plants.

The plant grows tall, more leaves grow and the bud opens to show the flower.

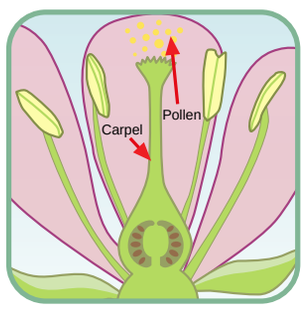


When conditions are right roots begin to form around the seed under the soil. This process is known as **germination**.



Pollen reaches the carpel of the new flower. Pollen then travels to the ovary where it fertilises egg cells (ovules) to make seeds. This process is called **fertilisation**.

The stem, flower bud and leaves emerge above the soil.



Pollen is carried by insects or blown by the wind from one flower to another. This process is called **pollination**.

1

Betony

Betony was used to treat lots of illnesses, and it was planted in churchyards to keep evil spirits away.

Size	10 - 60 cm
Wildlife value	7
Rarity	6
Wow factor	6

2

Great burnet

The leaves of this plant taste like cucumber and can be washed and eaten in salads.

Size	up to 120 cm
Wildlife value	6
Rarity	7
Wow factor	7

3

Ox-eye daisy

Bigger than a normal daisy. It produces up to 4,000 seeds every summer.

Size	50 - 80 cm
Wildlife value	7
Rarity	5
Wow factor	8

4

Meadow buttercup

Although found in meadows, cows don't like to eat it! Hold it under your chin – if your chin glows yellow, you like butter.

Size	20 - 60 cm
Wildlife value	7
Rarity	3
Wow factor	6

5

Wood crane's-bill

An important plant in the upland hay meadows of the Yorkshire Dales. Ripe seeds are 'catapulted' away from the plant.

Size	30 - 70 cm
Wildlife value	6
Rarity	8
Wow factor	9

6

Meadowsweet

Its sweet-smelling leaves were spread on the floors of medieval houses and churches to make the rooms smell nice.

Size	up to 120 cm
Wildlife value	6
Rarity	5
Wow factor	7

7

Yellow rattle

It takes water and nutrients from the roots of grasses. When the seed is dry it rattles in its seed pod - time to make hay!

Size	up to 50 cm
Wildlife value	9
Rarity	8
Wow factor	8

8

Eyebright

This plant was used to treat eye infections. There are more than 20 different Eyebright species and some are very rare.

Size	up to 50 cm
Wildlife value	8
Rarity	10
Wow factor	8

9

Selfheal

This plant was once used in a wide range of herbal medicines.

Size	up to 30 cm
Wildlife value	6
Rarity	3
Wow factor	7

10

Pignut

Pigs love to dig up the chestnut-like tubers. People can eat the 'nuts' raw or roasted.

Size	20 - 40 cm
Wildlife value	8
Rarity	7
Wow factor	7

11

Ribwort plantain

The seeds stay on the plant over the winter - a good food source for birds. Leaves were used to stop cuts from bleeding.

Size	10 - 40 cm
Wildlife value	7
Rarity	3
Wow factor	4

12

Knapweed

Lots of insects like this plant, such as bumblebees, hoverflies, butterflies, and day-flying moths.

Size	15 -100 cm
Wildlife value	9
Rarity	6
Wow factor	7

13

Red clover

An important nectar source for bumblebees and many other insects. The flowers can be used in salads .

Size	20 - 40 cm
Wildlife value	9
Rarity	5
Wow factor	7

14

Melancholy thistle

So-called because its flower heads droop and look a bit sad, but actually it's a really lovely flower!

Size	45 - 120 cm
Wildlife value	9
Rarity	8
Wow factor	8

15

Rough hawkbit

It looks like a dandelion and it even forms a 'clock' so that its seed is carried away on the wind.

Size	10 - 40 cm
Wildlife value	7
Rarity	8
Wow factor	7

16

Sorrel

In June it gives meadows a reddish haze. The leaves are full of Vitamin C and can be used in salads, soups and sauces.

Size	10 - 50 cm
Wildlife value	8
Rarity	4
Wow factor	5

17

Bird's-foot-trefoil

Its seed pods look like a bird's foot, and it's known as 'bacon and eggs' because of its red and yellow flowers.

Size	10 - 50 cm
Wildlife value	8
Rarity	8
Wow factor	7

18

Meadow vetchling

It curls its tendrils around other plants to help it stay upright. Its heavy seeds mean it only spreads slowly.

Size	30 - 120 cm
Wildlife value	7
Rarity	7
Wow factor	7

19

Red fescue

This is a common grass found on a wide range of grasslands and other habitats.

Size	20 - 100 cm
Wildlife value	3
Rarity	3
Wow factor	3

20

Crested dog's-tail

So-called because it looks a little bit like a dog's tail! It is the food plant for larvae of several butterfly species.

Size	up to 75 cm
Wildlife value	7
Rarity	2
Wow factor	3

21

Yellow oat-grass

Its flower head turns from green to golden-yellow and looks fluffy when dry.

Size	20 - 80 cm
Wildlife value	4
Rarity	4
Wow factor	5

22

Common bent

This is a common plant found on a wide range of grassland types.

Size	10 - 70 cm
Wildlife value	2
Rarity	2
Wow factor	2

23

Sweet vernal grass

This grass gives newly-mown hay its sweet smell. The stalk has a biscuit-like sweetness when chewed.

Size	10 - 100 cm
Wildlife value	6
Rarity	6
Wow factor	6

24

Lady's mantle

The water that forms on leaves was used in magic potions. Some species are very rare and only found in meadows.

Size	10 - 30 cm
Wildlife value	6
Rarity	10
Wow factor	10

Common bistort

Also known as snakeroot because its root was used to make snakebite remedies. Leaves and shoots can be eaten as a salad.

Size	30 - 100 cm
Wildlife value	6
Rarity	7
Wow factor	8

Devil's-bit scabious

Once used as a cure for the plague. It's said that the devil bit off the root tip to reduce the plant's healing qualities.

Size	50 - 100 cm
Wildlife value	8
Rarity	7
Wow factor	8

Globeflower

A lovely plant found mainly in north and west Britain in upland meadows and along riverbanks.

Size	40 - 70 cm
Wildlife value	6
Rarity	9
Wow factor	9

Top Trumps (4 of 4)

Ragged robin

The stalk is covered in tiny, downward-pointing hairs that stop ants from attacking the 'ragged' flowers.

Size	20 - 50 cm
Wildlife value	8
Rarity	8
Wow factor	7

Sneezewort

Its leaves have saw-toothed edges and the smell of the flowers makes you sneeze!

Size	30 - 60 cm
Wildlife value	5
Rarity	7
Wow factor	7

Marsh marigold

Its bright yellow flowers bloom early in the spring, providing an early source of nectar and pollen for many insects.

Size	20 - 60 cm
Wildlife value	8
Rarity	7
Wow factor	8

Quaking grass

A very distinctive grass, its delicate, triangular, flat spikelets 'quake' in the breeze!

Size	15 - 75 cm
Wildlife value	7
Rarity	8
Wow factor	8

Water avens

Boiling the fresh or dried root in water makes a nice chocolate-tasting drink.

Size	up to 50 cm
Wildlife value	6
Rarity	6
Wow factor	8

Meadow saxifrage

Its Latin name is linked to its use as a medicinal plant, when it was used to break up gall stones and kidney stones.

Size	10 - 40 cm
Wildlife value	8
Rarity	7
Wow factor	7

Wood anemone

The Ancient Greeks believed it was a gift from the wind god Anemos, sent to herald his coming in spring.

Size	10 – 25 cm
Wildlife value	6
Rarity	6
Wow factor	8

Marsh valerian

It was used traditionally to aid sleep and restoration.
.

Size	10 - 30 cm
Wildlife value	6
Rarity	6
Wow factor	6

Meadow fescue

A common grass found throughout the UK.

Size	up to 80 cm
Wildlife value	2
Rarity	2
Wow factor	2

Section 3: Fauna of the meadow

This section provides information on the animal species that can be found within a Yorkshire Dales hay meadow. It explains the importance of species-rich hay meadows as a habitat and demonstrates the inter-relationships between the different species of plants and animals which make up this complex ecosystem. Activities encourage children to recognise and group animals depending upon their characteristics.

Topic 1: Hay meadow habitat

Into the Meadows poster quiz - find the animals

KS1 KS2

Do: Using the *Into the Meadows* A1 poster, ask the children to identify and name (if they can) the different animals in the meadow. A labelled copy of the poster is on page 75.

Food chain game

KS1 KS2

Prepare: Print out and laminate the 24 *Food chain game* cards on page 76 to 77. If you need more cards, make more copies of the insect cards.

Do: Distribute the cards among the children, who then have to find the other members of their food chain. The cards are colour-coded (but the children do not need to know that!).

Extension activity: Get the children to record their food chain in their workbooks as a simple picture diagram.

Hay meadow habitat

KS2

Prepare: Enlarge (to A3) and print the 32 *Hay meadow fauna* cards on pages 78-79. Cut up to make individual cards and laminate them.

Discuss: Show the children the *Into the Meadows* A1 poster. Ask the children to find and name (if they can) the different animals within the hay meadow.

Do: Find a space where children can move about. Hand out a fauna card to each child and ask them to sort themselves into groups as follows:

- Invertebrates / vertebrates
- Insects, Annelids, Molluscs, Arachnids, Mammals, Birds
- Carnivores / herbivores / omnivores
- Common or rare

Discuss: Either within their group or as a class, discuss what they know about each group and which features the animals in each group have in common. Which group has the most number of animals? What other groups of animals are there e.g. fish, reptiles and amphibians, and where do they live?

Explain: Different animals live in different habitats depending upon their needs. Whilst a hay meadow is an important grassland habitat for the specific animals they have discussed, many different habitats are required to support the variety of living things on earth (biodiversity).

Extension question: Why do we group animals? Explain that as there are so many animals and plants, it helps us understand them if we divide them into groups based on particular features they have in common. This puts animals and plants into an order and allows us to study the relationship between different types of animals or plants within a group.

Definitions

Biodiversity: the variety of life on earth. This includes differences in genetic make-up, differences in species of animal, plant etc., and the different types of ecosystems found within an area.

Habitat: different combinations of species occur in different environments where physical conditions (rock types and climate) and biological conditions (e.g. vegetation type) can vary.

Ecosystem: where different species and their habitats interact to form a variety of ecological systems e.g. cycling water, gases and nutrients, and converting energy from the sun to other forms of energy. If any part of the ecosystem is damaged or destroyed, it might not be able to continue to function properly.

Topic 2: Hay meadow food web

Food web game

KS2

This activity shows the complexity of food webs and how living things in a hay meadow are connected. Each child takes on the role of a part of the food web, be it the sun, plant or animal, and they are connected to their classmates according to whether they 'eat' or 'are eaten by' whatever part their classmates are playing. The *Hay meadow food web* (page 73) shows the possible links within the food web and can be used for reference.

Prepare: This game requires a fair amount of space, so a school hall, playground or playing field is ideal. You will need:

- A sticky label for each child
- The *Into the Meadows* poster
- Print, cut up and laminate the *Hay meadow fauna* cards (pages 78-79)

Explain: Plants and animals in a hay meadow interact with each other and may depend upon each other for their survival. They also provide many functions e.g. converting energy from the sun, decomposing dead matter, adding nutrients to the soil, and in doing so they convert energy from one form to another. These different functions interact to create an ecosystem. If any part of the ecosystem is damaged or destroyed, the balance is upset and the ecosystem may not be able to continue to function properly.

Discuss: Using the cards as prompts, discuss how different parts of the hay meadow ecosystem depend on others e.g. plants, fungi, bacteria ('producers') provide a food source for other creatures ('consumers') to eat, whilst the top predators, also consumers, in turn eat them. Remind children that the sun is the ultimate source of energy, and that ecosystems can be affected by human activity.

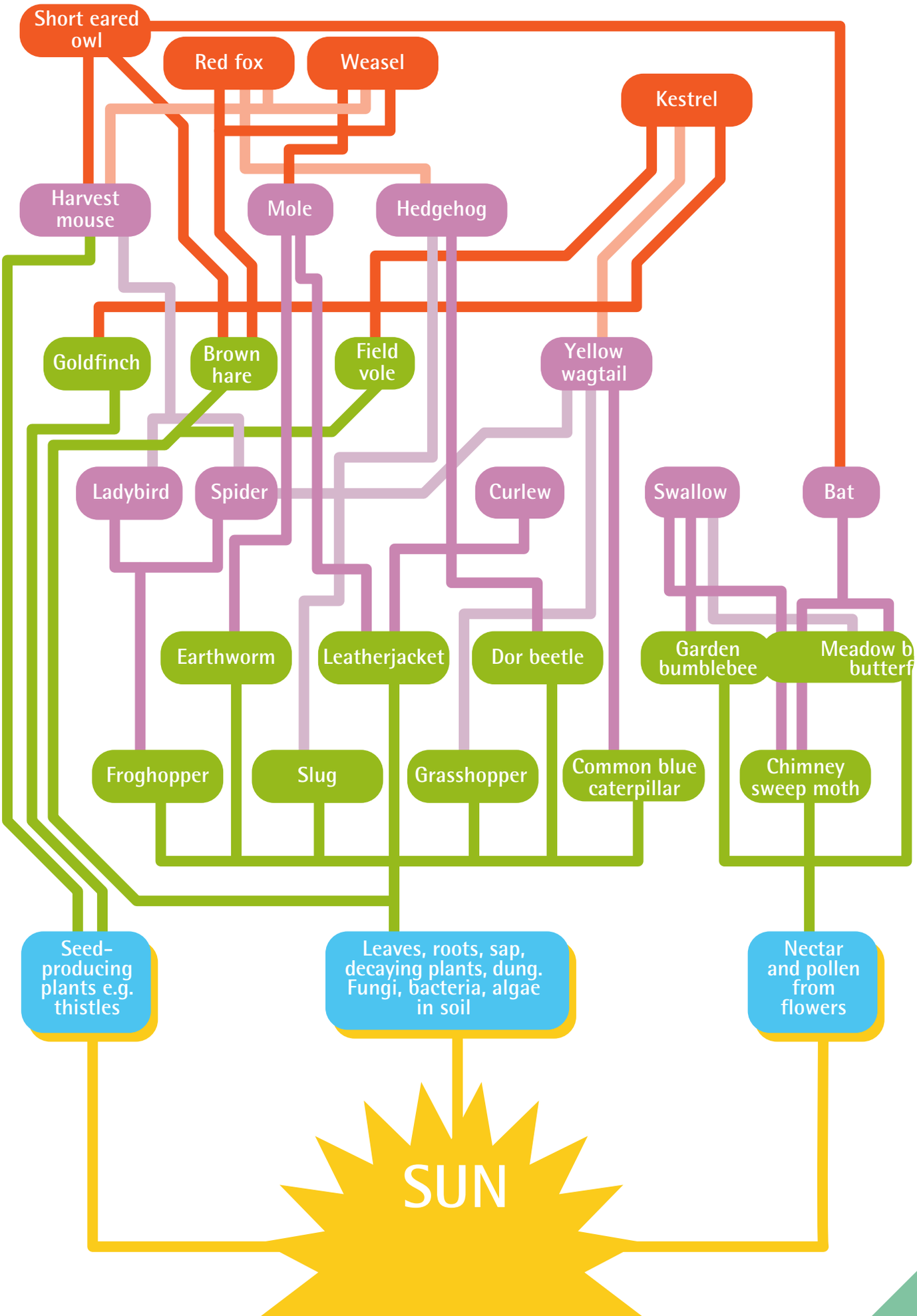
Do: Give each child a role to play in the food web: either one of the species included in the cards e.g. worm, goldfinch etc, or the 'the sun', 'leaves and shoots', 'flowers' and 'seed-producing plants'. The children write their role onto their sticky label and stick the label onto themselves. Depending on the number of children in the class, you can either include all of the species, or leave some out (e.g. mole, bat or weasel), or leave out some species of flying insects. Ask the children to link themselves to their food source(s) using the lengths of wool. Alternatively pass the ball of wool back and forth through the class, while discussing the links in the food web. Suggest that the children wrap the wool around the palm of one hand and use the other hand to pass the wool to their food source. The children should hold on tight to the wool, which should be kept taut and which eventually should cross over several times to make the food web.

Variations: Whilst they are still in their web, the following scenarios can be acted out:

- The farmer sprays herbicide to get rid of the thistles growing in his meadow. Tell the seed-producing plants to sit down ('die'). All those who feel a tug also die as their source of food dies, and so on through the chain. Discuss which animals are affected.
- The farmer gives worming treatment to his sheep. Some treatments contain chemicals that are toxic to dor beetles, which eat animal dung, and so they die. Tell the dor beetle to sit down.
- Some plants and animals that live in a hay meadow are expected to be adversely affected by climate change. The weather in the Yorkshire Dales is predicted to become warmer and wetter in the future. Tell the flowers and the hedgehog to sit down. Ask how this affects the food web. Suggest other plants/animals may move in whilst those affected by climate change may face extinction.
- The meadow is ploughed and re-seeded as a silage field. Tell the flowers, seeds, plants, leaves, roots, soil fungi, decaying plants etc. to sit down. All those who feel a tug then also 'die' if their source of food dies, and so on through the chain. For predators at the top of the food chain, ask if they would stay in the same place or would they move elsewhere to find more food. Ask if this is always possible.

Analyse and evaluate: In each of the scenarios consider how this affects the animals involved and the hay meadow ecosystem as a whole. What or who is the main cause of damage to the ecosystem. What actions can be taken to safeguard the hay meadow ecosystem? Other issues that can be explored using the food web are the persecution of a particular species or the over-abundance of another species e.g. deer, resulting in overgrazing and habitat loss. Remind the children of the importance of all ecosystems as they help to support biodiversity.

Hay meadow food web



Topic 3: Soil essentials

Earthworm investigation

KS2

Earthworms are brilliant at recycling dead and decaying plant material into the soil. To encourage children to see this for themselves, create an earthworm tank within the school grounds.

Prepare: You will need:
- Old fish tank or clear container which the children can see through
- Sand, such as sharp sand or silver sand (enough to fill half of the tank)
- Potting compost (enough to fill half of the tank)
- Dead leaves (handfuls to cover the surface of the soil)
- Patience - although this activity enables children to see for themselves how earthworms decompose dead organic matter such as leaves, it may take a few months!

Discuss: Read to the class the ***Soil essentials*** sheet (page 80) and discuss the role and importance of decomposers.

Do: Fill the bottom half of the tank with sand and the top half with moist potting compost. Collect and add some dead leaves for the worms to eat. Leave the tank in a sheltered, shaded spot. It should take five earthworms several months to thoroughly mix 1 litre of sand/compost mix. Encourage the class to look closely every day at the glass container as the investigation progresses. Get the children to make a record of how many worms are in the tank and how long it takes for them to mix the sand and compost. Make sure the content of the tank is kept moist and that there are enough leaves for the worms to eat.

Topic 4: The corncrake

Corncrakes in the Dales

KS1 KS2

The corncrake was once a very common bird of hay meadows in the Yorkshire Dales. As they were secretive birds that hid in the long meadow grass, corncrakes were more often heard than seen. However, once they were here, you knew summer had arrived and haytime would soon start. Their call, which sounded like a comb being dragged over a matchbox, was repeated once a second and went on all night long throughout the summer.

Prepare: Print ***The Corncrake*** factsheet (page 81) for pairs or small groups. Print ***The corncrake, harbinger of summer*** worksheet (page 82) for each child.

Discuss: As a class or in pairs read the factsheet. Ask the children:
- How do you feel about corncrakes not being seen in the Dales meadows anymore?
- Would you like to see them back in the meadows again?

If possible, listen to the corncrake's call (on the RSPB website, see page 162). Ask the children:
- How would you feel about being kept awake at night by the corncrakes call?
- Do you hear other bird songs or calls at night or during the day?

Ask the children to share their experiences, discuss if they hear birds singing at a certain time of year, do they associate this with a season e.g. blackbirds singing in early spring or the curlew calling in summer. Ask the children what other signs or signals do they associate with the summer, write these down as a list on the board. When they hear this sound or see the signal, how does this make them feel?

Do: Get the children to complete the worksheet activity, using dictionaries to help them choose the correct word.

Correct order of missing words in ***The corncrake, harbinger of summer*** worksheet: camouflage, wildflowers, reluctant, nimbly, heard, unmistakable, moorhen, Africa, grow, haytime, farming, declined, conservation, practise

Extension: Ask the children to explain in their own words what 'harbinger' means. Can they think of their own example of a harbinger and explain why.

1: Leatherjacket
2: Earthworm
3: Dor beetle
4: Land snail
5: Froghopper
6: Garden spider
7: Slug
8: Common grasshopper
9: Six-spot burnet moth
10: Garden bumblebee
11: Moss carder bee
12: Ladybird
13: Common blue butterfly
14: Common blue caterpillar
15: Chimney sweeper moth
16: Meadow brown butterfly
17: Harvest mouse
18: Field vole
19: Brown hare
20: Roe deer
21: Mole
22: Hedgehog
23: Weasel
24: Red fox
25: Pipistrelle bat
26: Curlew
27: Yellow wagtail
28: Goldfinch
29: Swallow
30: Twite
31: Kestrel
32: Short-eared owl

You are the roots of plants in the soil  You are eaten by a leatherjacket	You are a leatherjacket  You are eaten by a curlew	You are a curlew 
You are a froghopper  You are eaten by a ladybird	You are a ladybird  You are eaten by a harvest mouse	You are a harvest mouse  You are eaten by a short-eared owl
You are the seeds of a thistle  You are eaten by a goldfinch	You are a goldfinch  You are eaten by a kestrel	You are a kestrel 
You are a decaying leaf of a flower  You are eaten by a worm	You are a worm  You are eaten by a mole	You are a mole  You are eaten by a fox

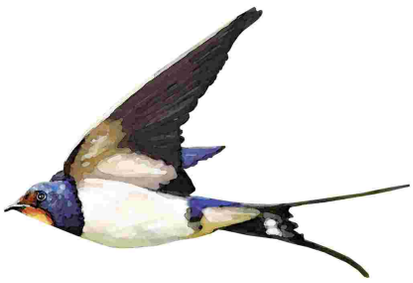
You are a red clover flower

Your nectar is eaten by a bumblebee

You are a bumblebee

You are eaten by a swallow

You are a swallow



You are a short-eared owl

Who ate harvest mouse for dinner last night

You are a short-eared owl

Who ate bat for breakfast

You are a human

You are a pignut flower

Your nectar is eaten by a moth

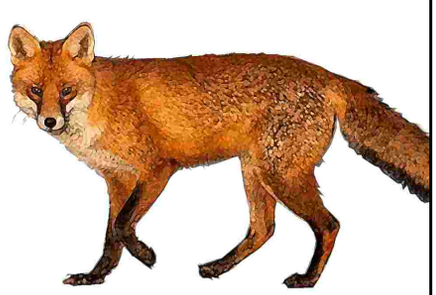
You are a moth

You are eaten by a bat

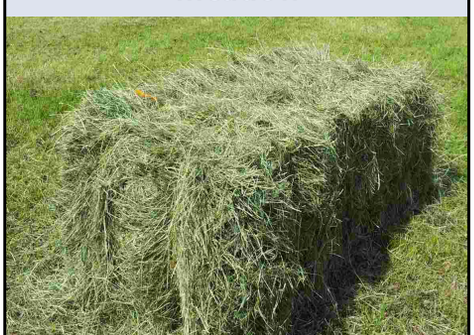
You are a bat

You are eaten by a short-eared owl

You are a fox



You are hay from the meadow



You are eaten by a sheep

You are a sheep

You are eaten by a human

1. Leatherjacket – invertebrate
Group:
Insects (cranefly larvae)
Herbivore:
eats roots of plants
Food source for:
curlew, mole
(also eaten by hedgehogs)

2. Earthworm – invertebrate
Group:
Annelids
Herbivore:
eats bacteria, fungi and algae in soil
Food source for:
moles (also eaten by hedgehog, curlew)

3.Dor beetle – invertebrate
Group:
Insects
Herbivore:
eats dung of cattle and sheep
Food source for:
hedgehog (also eaten by some bats, curlews)

4. Land snail – invertebrate
Group:
Molluscs
Herbivore:
eats plant leaves, shoots and fruits and decaying matter
Food source for: hedgehog (also eaten by foxes, weasel)

5. Froghopper – invertebrate
Group:
Insects
Herbivore:
sucks sap from stems and leaves
Fact:
young protected in frothy 'cuckoo spit'
Food source for: ladybird, spider (also eaten by yellow wagtail, curlew)

6. Garden spider – invertebrate
Group:
Arachnids
Carnivore:
eats small insects e.g. froghopper
Food source for:
harvest mouse, yellow wagtail (also eaten by curlew, weasel)

7. Slug – invertebrate
Group:
Molluscs
Herbivore:
eats decaying matter, plant leaves, shoots and fruits
Food source for:
hedgehog (also eaten by curlew, weasel, fox)

8. Common grasshopper – invertebrate
Group:
Insects
Herbivore:
eats plant leaves, shoots and fruits
Food source for:
yellow wagtail (also eaten by harvest mouse, spider, harvest mouse)

9. Six-spot burnet moth – invertebrate
Group:
Insects
Herbivore:
feeds on nectar and pollen from flowers, especially knapweed and scabious flowers
Food source for:
bats, swallows

10. Garden bumblebee – invertebrate
Group:
Insects
Herbivore:
feeds on nectar and pollen from flowers, especially red clover and yellow rattle
Food source for:
bats, swallows

11. Moss carder bee – invertebrate
Group:
Insects - RARE
Herbivore:
feeds on nectar and pollen from flowers, especially red clover and yellow rattle
Food source for:
bats, swallows

12. Ladybird – invertebrate
Group:
Insects
Carnivore:
eats froghoppers, aphids, greenfly, blackfly
Food source for:
harvest mouse (also eaten by yellow wagtail)

13. Common blue butterfly – invertebrate
Group:
Insects
Herbivore:
feeds on nectar and pollen from flowers especially ribwort plantain, birds foot trefoil
Food source for:
swallow, bat

14. Common blue caterpillar – invertebrate
Group:
Insects (butterfly larvae)
Herbivore:
feeds on leaves of plants
Food source for:
yellow wagtail, curlew (also eaten by hedgehog, weasel)

15. Chimney sweeper moth – invertebrate
RARE
Group:
Insects
Herbivore:
feeds on nectar and pollen from flowers especially pignut
Food source for:
swallow, bat

16. Meadow brown butterfly – invertebrate
Group:
Insects
Herbivore:
feeds on nectar and pollen from flowers especially
Food source for:
swallow, bat (also eaten by yellow wagtail)

17. Harvest mouse – vertebrate
Group:
Mammals
Omnivore: seeds, fruits, bulbs, small insects e.g. ladybird, spider, grasshopper
Food source for:
kestrel, fox (also eaten by owl, weasel)

18. Field vole – vertebrate
Group:
Mammals
Herbivore:
eats grass roots, fungi, bark
Food source for:
kestrel, owl (also eaten by fox, weasel)

19. Brown hare – vertebrate
Group:
Mammals
Herbivore:
eats grasses, herbs, shrubs, bark
Food source for:
weasel, fox (also eaten by kestrel, owl)

20. Roe deer – vertebrate
Group:
Mammals
Herbivore:
eats grasses, herbs, shrubs
Food source for: foxes may take young
Fact: very common, can become a pest as it has no predators to keep numbers down

21. Common mole – vertebrate
Group:
Mammals
Carnivore:
eats earthworms, leather jackets (also eats slugs and other insect larvae)
Food source for:
weasel (also eaten by fox)

22. Hedgehog – vertebrate
Group:
Mammals
Omnivore:
eats slugs, beetles (also eats earthworms, insect larvae, small insects, eggs and young birds)
Food source for:
fox (also eaten by badgers)

23. Weasel – vertebrate
Group:
Mammals
Carnivore:
eats harvest mouse, hare, mole (also eats eggs and young, rabbits and voles
Food source for: none
(may be eaten by fox, kestrel, owl)

24. Red fox – vertebrate
Group:
Mammals
Carnivore:
eats hare, harvest mouse, hedgehog (also eats vowels, birds eggs and young, rabbits)
Food source for:
none (often persecuted by man)

25. Pipistrelle bat – vertebrate
Group:
Mammals
Carnivore:
eats flying insects e.g. moths, butterflies
Food source for:
owls

26. Curlew – vertebrate
Group:
Birds
Carnivore:
leather jackets, caterpillars (also eats worms, small insect)
Food source for:
none (eggs and young taken by fox, weasel, hedgehogs)

27. Yellow wagtail – vertebrate
Group:
Birds
Herbivore:
eats ladybirds, spiders, caterpillars (also eats flies, moths and butterflies)
Food source for:
kestrel (also eaten by owl, fox, weasel)

28. Goldfinch – vertebrate
Group:
Birds
Herbivore:
eats seeds especially from thistle heads and knapweeds
Food source for:
kestrel (eggs and young taken by fox, weasel, hedgehogs, owl)

29. Swallow – vertebrate
Group:
Birds
Carnivore:
eats flying insects e.g. bees, butterflies, flies, moths
Food source for:
nestlings and eggs taken by owl, weasel.

30. Twite – vertebrate
Group:
Birds
Herbivore:
eats seeds especially from meadow grass and buttercup
Food source for:
kestrel (eggs and young taken by fox, weasel, hedgehogs, owl)

31. Kestrel – vertebrate
Group:
Birds
Carnivore:
eats field vole, yellow wagtail (also eats, mice and smaller birds e.g. twite)
Food source for:
none (eggs may be taken by weasel, owl)

32. Short-eared owl – vertebrate
Group:
Birds
Carnivore:
eats harvest mouse, field vole, bat
Food source for:
none (eggs may be taken by weasel, owl)

Soil essentials

Some of the ingredients essential for a healthy soil

One of the most important natural resources in the world is soil

Most of the life on Earth depends upon soil for food, as plants gain their nutrients from it and many animals eat the plants.

Lots of activity goes on in the ground to create soil. There are living organisms at different depths in the soil, with most species living in the top 10 cm. These organisms need each other to survive and make good soil.

Organic matter is made up of dead and living things. The dead things include the remains of plants and animals which decompose and become mixed with rock particles to create soil. The living things are the fungi and bacteria which play an important role in keeping soil healthy. The living organisms either use chemicals in the soil themselves or help to release them into the atmosphere, where they can be used again to enable plants to grow. This activity is the ultimate in recycling!

There are billions of microscopic organisms in every gram of soil. This includes a huge range of bacteria which are crucial for turning organic matter and chemicals such as carbon, oxygen, hydrogen and nitrogen into food that can be used by plants. This helps to create a living or 'biotic' soil.

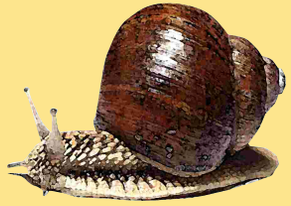
Healthy soil contains lots of fungi. Some decompose dead organic matter, some feed on living matter, and some attach themselves to plants for the mutual benefit of the fungi and the plants.

Animals such as earthworms, small mammals, slugs and insects make tunnels and airspaces in the soil that allow water to drain away and for air to enter the soil, as well as mixing the different soil ingredients.

Soils and hay meadows

Species-rich hay meadows need a healthy, balanced soil to grow. The soil mustn't be too rich in nutrients as this would encourage some species to grow more than others. By taking an annual crop of hay from the meadow, the farmer removes plant material that would have otherwise rotted down and added nutrients back into the soil.

In spring 'muck' and lime is added to the land. This helps replace just enough of the lost nutrients and makes the land less acidic, providing the best conditions for meadow plants to grow. High concentrations of nitrogen or other artificial fertiliser can upset the balance of life within soil itself. This is why traditional, low intensity farming is best for a species-rich hay meadow.



The corncrake

The corncrake was once a very common bird of hay meadows in the Yorkshire Dales. Now, though, they're only found mainly in the Western Isles of Scotland. They migrate all the way from Africa and arrive in May and June, eager to set up territory and find a mate. They are a very secretive bird and spend most of their time hidden in tall grass, so the only way you know they are there is by their rasping, buzzing call, which consists of two notes 'crake-crake' repeated frequently, like a comb being dragged over a matchbox. Sometimes the call goes on for hours on end, starting at dusk and going all through the night till early in the morning.

"*There used to be corncrakes in the meadows around here. I can't remember them but my dad can. When he was younger, in his 30s or 40s, he can remember getting up in the middle of the night and throwing something out of the bedroom window at a calling corncrake because it was making such a lot of noise! I wouldn't mind being woken up by one now!*" Kathleen Raw, Swaledale

Corncrakes are very reluctant to fly even when disturbed and parent birds will sit tight on their nest. In the days when hay meadows were mown by scythe, adult corncrakes and their young could run to safety ahead of the mower, and the mower could choose to avoid damaging the nest and its eggs. However, with mechanical mowers and tractors, corncrakes are unable to outrun them and they are reluctant to escape across parts of the field that are already cut, so many birds and nests are destroyed. The number of corncrakes in the UK and Europe has now declined so much that the corncrake is of high conservation concern.

A pair of corncrakes was heard in the Dales in 2002, and a site near York has a large proportion of England's breeding corncrakes. The reason that corncrakes are still found in the Western Isles is because farmers are encouraged to delay mowing hay and silage until August, when eggs will have hatched and chicks have grown large enough to run, and to mow from the inside of the field outwards (rather than from the outside in), which allows birds to get to safety and increases the proportion of chicks that survive mowing. These methods are termed Corncrake Friendly Mowing (CFM).

Name:

The corncrake, harbinger of summer

Can you choose the correct word from the box below to fill each blank space and complete the sentences? Use a dictionary to help you.

wildflowers unmistakable camouflage practise conservation nimbly grow reluctant moorhen Africa haytime farming declined heard

A master of _____, the corncrake is capable of hiding in the tall jungle of grasses and _____ of a hay meadow, remaining undetected. When disturbed, the corncrake is extremely _____ to fly and instead runs _____ through dense vegetation at high speed.

Once a common bird of hay meadows in the Yorkshire Dales, the corncrake was often more _____ than seen. Its rasping repetitive 'crake - crake' call was _____ and sometimes continued throughout the night.

A close relative of the _____, the corncrake was the harbinger of summer, flying all the way from _____ to arrive in May just in time to find a mate and nest as the grass was beginning to _____ tall. Once it was here you knew summer had arrived and _____ would soon start.

Sadly, modern day _____ practices and the corncrake's reluctance to fly spelt disaster, and corncrake numbers have _____ so much that the corncrake is now of high _____ concern throughout Europe. However, corncrakes are still found in the Western Isles of Scotland where farmers _____ Corncrake Friendly Mowing.

Section 4: Making hay

This section highlights how haymaking was an integral part of life on a Yorkshire Dales farm. The photographs date from the 1930s through to 2013 and they show that, although haytiming equipment and machinery has changed, the processes involved have remained the same. A Haytime resource box full of artefacts and resources is available from the Dales Countryside Museum in Hawes (see further details on page 162). Also the National Trust has a traditional barn in Malham where visits can be arranged (see further details on page 115).

Some of the activities in Topics 3, 4 and 5 in Section 7 can be carried out alongside or after the activities in this section.

Topic 1: Managing the meadows

Gathering the hay

KS1

Prepare: Print (enlarged to A3) the double-sided *Photocards* (pages 85-98).

Discuss: Read to the class the *Memories from haytimes past* factsheet (page 99). Then, showing the children the Photocards, explain the activities that went on during haytime.

Do: Whilst explaining the activities on the photocards get the children to mime the actions for each card e.g. scything, raking up the hay, making pikes, leading the horse, fetching (and eating) the 'drinkings'. Children can even pretend to be corncrakes hiding in the long grass (see page 81 for information). Use the questions on the factsheet to find out what experiences the children may have themselves and can share with others. Create a word bank of new words for the children to remember. If you are doing the *Haytime Hero* activity (see below), get the children to think of questions they might ask their haytime visitor.

Haytime Detectives

KS2

Prepare: Print the double-sided *Photocards* (pages 85-98), one card per pair or small group. Print the *Be a Haytime Detective!* worksheet (page 100) for each child.

Do: Read to the class the *Memories from haytimes past* factsheet (page 99). Then get the children into pairs or small groups sat at a table and hand out one card to each group. Ask the children to read through the information on their photocard and then jot down the key points. Then rotate the groups around the different tables, getting each group to explain to another group(s) what is happening in their photograph (without showing them the text). To test out how much they have learnt, ask a group what they have found out about another group's photograph. Discuss any photocards that have been left out. Once completed return to the worksheet and get the children to prepare some questions to ask relatives or friends about haytime (this can be completed as a homework task/investigation). If the children don't have anyone to ask then they could prepare the questions for *Haytime Hero* activity (see below).

Haytime Hero

KS1 KS2

Do: Nothing beats hearing about experiences first hand so if possible invite someone from the local community, ideally a farmer, who remembers haytime from when they were young and is happy to share their experiences with the children. An ideal time to do this is after the children have seen the *Photocards*, as they will have hopefully gained more of an understanding about the haytime activities and terminology. Before the guest arrives, get the children to think about questions and write them down, ensuring that they have different questions to each other.

Topic 2: Field barns and dry stone walls

Field barns and dry stone walls played important roles in meadow management.

These two creative activities can either stand alone or complement each other, allowing children to make their own barn or dry stone wall, or collectively their own farm area with barn, dry stone wall and other farm features of their choice e.g. meadow, which they could then name and write about. All sorts of modelling material could be used to make the model farm area as realistic as possible, including making bales of hay!

Making a model of a field barn

KS1 KS2

Prepare: Print the double-sided *Field barns* factsheet (pages 101-102) for pairs or small groups, and print (single-sided) the *Making a model of a field barn* sheets (pages 105-107) onto mid-weight card for each child. Provide each pair or small group with glue sticks or double-sided sticky tape, a variety of coloured pencils, and a few pairs of scissors.

Discuss: Read through the factsheet and discuss the various features of a field barn and their uses.

Do: Use the internet to investigate different styles of traditional barns in the Yorkshire Dales and how they were built. Ask the children to carefully follow the instructions on the first of the model sheets to construct their own barn (KS1 children may require the templates to be cut out ready for construction). Encourage the children to follow a simple design-make-evaluate process:

- **Design**
  - Find out what features are required to make a field barn strong and stable
  - Decide on the colours of the walls and roof for their barn
  - Decide on the number and positions of doors and windows
  - Plan a sequence of actions to make the barn
- **Make**
  - Make the barn model using the model sheets and following the instructions
- **Evaluate**
  - Discuss how well the finished product meets the design criteria
- **Technical knowledge**
  - Consider and explain how the finished product could be improved

Building a mini dry stone wall

KS1 KS2

Prepare: Print the double-sided *Dry stone wall* factsheet (pages 103-104) for pairs or small groups. Each child will need a tennis ball-sized block of modelling clay (or larger) and a plastic knife.

Discuss: Read through the factsheet. If possible visit a few dry stone walls and allow the children to take note of their design features (take care not to disturb any stones in the wall).

Do: Use the internet to investigate different styles of dry stone walls in the Yorkshire Dales and around the country. Ask the children to divide their clay into pea-sized pieces and then form them into stone shapes. Then, using the information on the factsheet or from the internet, use the stones to construct a model dry stone wall. Remind the children to sort the stones so that the largest stones go at the base and the smallest stones go at the top and to include through stones and coping stones. Encourage the children to follow a simple design-make-evaluate process (as above). The design stage should include:

- Find out what features are required to make a dry stone wall strong and stable enough to last for decades, for instance a wide base makes it more stable
- Decide upon the design features of the dry stone wall, making simple sketches/drawings to include height, width and length of wall (taking into account corners or curves)
- Decide upon materials and tools
- Plan a sequence of actions to make the dry stone wall (in the correct order)

You could also contact the Dry Stone Walling Association or the Yorkshire Dales National Park Authority to see if a walling demonstration is going on in your local area (see pages 161-162 for details).

Photocard 1

Hiring Irish workers

Photocard 2

Mowing using a scythe

Photocard 1

Hiring Irish workers

Before the invention of tractors, haymaking needed as many helping hands as possible, so extra men would be often hired to help. Many Irish workers came to the Yorkshire Dales to work on farms and help with haymaking, sheep clipping and harvesting, before returning home again. Men were hired at hiring fairs, like the one taking place in Hawes in the 1930s shown in the photograph.

"At the beginning of haytime, the first job was to go to the hirings and land home with a couple of Irishmen. They earned from £8 to £11 a month plus board and lodgings. They lived out, in a little loft. It was my job before they came to clean it out, whitewash and then t'farmer's wife used to come and make the bed up. They just had a chair or two and a bed, possibly a chest of drawers, that's all. So they lived out and just came into the farmhouse-end for their meals."
William Mason, who farmed in Wharfedale in the 1920s

As haytiming became more mechanised, the need for extra workers who could do the manual labour declined and hirings were brought to an end.

Photocard 2

Mowing using a scythe

The first step to haymaking is to cut or mow the meadow. Up until late Victorian times all hay was hand-mown by scythe. Traditionally the scythe was a man's tool. Keeping his arms straight and the blade close to the ground, the mower would turn his body in a wide semi-circle from right to left, slicing the grass as he walked along.

Usually it took a day for one man to mow an acre. Mowing started as soon as possible in the morning, as mowing by scythe is easier while there's still dew on the grass. An early start also left time in the day to complete other haytime tasks. Meadows were usually cut by a team of mowers. Mowing was a very skilled job: cut too high and you would waste some of the hay crop, crop too low and you would quickly blunt the blade.

A blunt scythe made the job even harder, so the blade was kept sharp by regularly whetting (sharpening) it with a strickle.

"He used to take his strickle, sharpen his scythe, put his strickle in the back of his leather belt, spit on his hands, start whistling and away he would go."
Barbara Buckingham

What is a scythe?
A scythe is a long-handled tool used to cut hay. Scythes are generally made from a 2m long willow pole, which is either straight or slightly curved. A long, curved iron blade (about 1.5m long) was fixed to the lower end. In the middle of the pole was a slightly curved handle (bent nib) whilst further up the pole there was another handle (straight nib). These handles allowed the mower to hold the scythe firmly while he cut the hay.

What is a strickle?
A strickle is a four-sided, slightly wedge-shaped piece of oak with a handle. Each side of the strickle would be smeared with grease and then dusted with sand, making the sides rough like sandpaper and good for sharpening the scythe blade.

Photocard 3

Turning the hay by hand

Photocard 4

Using hay forks to make pikes

Photocard 3

Turning the hay by hand

Once the hay meadow had been mown, the cut grass had to be repeatedly turned and spread by hand to make sure it dried thoroughly. This was known as strewing. Depending on the weather, it could take several days or even weeks to dry the hay. The men in the photograph are strewing the hay with long, wooden hay rakes, specially designed for the job of turning and gathering up the dried hay. It's likely that the men were hired to help with haymaking and they worked very hard to get the hay in.

Once it was dry, hay was gathered into heaps or haycocks, also known as stooks. The haycocks could then be collected together to make a larger pike. Pikes could also be made by simply raking the strewn hay together and piling it up with a pitch fork, also known as a hay fork. The general rule was the drier the hay, the larger the heaps. Haymaking could be quite a lengthy process!

When horse-drawn hay sweeps were used, the dried hay was first raked into windrows (rows) so it could be gathered easily.

Photocard 4

Using hay forks to make pikes

In this photograph, taken in 1934, J. Redvers Hopper, Jean Lambert and her son David, who is three years old, are all working together using hay forks to make pikes. Haytiming was truly a family affair and everyone pitched in to lend a hand!

"I can definitely remember haytiming when I was six or seven onward...it was a great way to keep fit you know, a seven year old piking hay."
Jeremy Morrogh-Ryan

If rain threatened, sacking was often put over the tops of the pikes and was weighed down with stones. This was to make the rainwater run down the sides of the heap rather than into the heap, keeping the pike drier. Pikes might stand in the field for weeks until the hay was completely dry or while other meadows were being mown.

Photocard 5

Snagging a pike to the barn

Photocard 6

Using a 'Tumblin' Paddy' to gather up the hay

Photograph 4: Snagging a pike to the barn

Photocard 5

Once the hay was completely dried it was ready to be collected from the meadows.

If the barn was close by and the meadow fairly level, pikes could be snagged or snigged (pulled) by ropes and chains attached to a horse. Sometimes the hay was piled onto a sledge first.

The boy riding the horse in the photograph is said to be 'leading the hay'. It was his job to get the horse and its load of hay safely to the barn without losing any of his cargo on the way!

"We kids took great delight in leading the hay. The hay was put on a sledge and roped from corner to corner."
Bert Terry

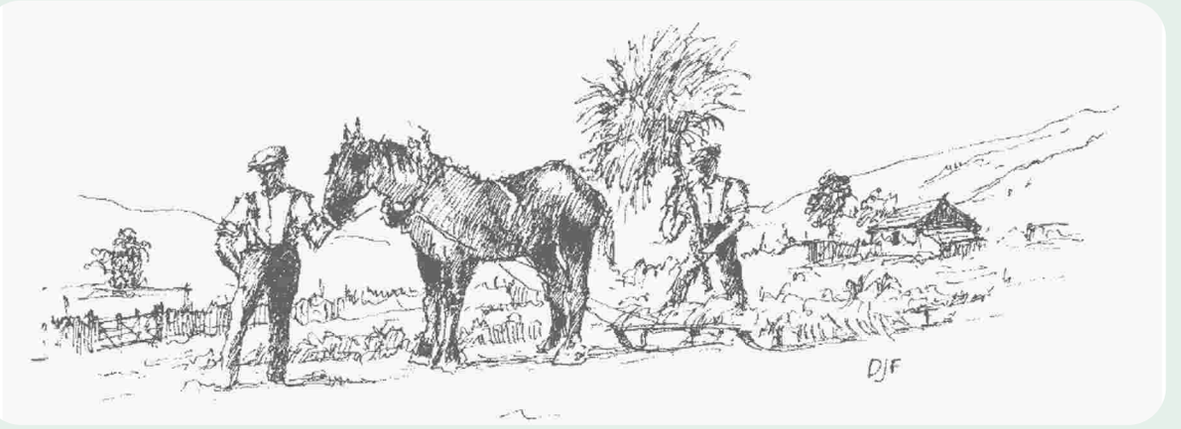
Can you see the large pikes of hay in the background of the photograph?

Using a 'Tumblin' Paddy' to gather up the hay

Photocard 6

A good way to gather up rows of hay (windrows) was to use a simple but effective piece of machinery known as a 'Tumblin' Paddy'. This consisted of a wooden beam with five or six wooden prongs and two curved handles which was pulled along the ground by a horse to rake or 'sweep' up the hay. When a full load of hay had been gathered, the farmer lifted up the handles to make the tips of the prongs stick into the ground, causing the sweep to tumble over, leaving the hay in a big pile. The photograph shows a Tumblin' Paddy being used in Wensleydale.

Sometimes the hay was gathered onto a hay sledge; this would take a lot of effort as the hay would have to be forked onto the sledge by hand. Can you see the man in the picture below forking the hay?



Photocard 7

The 'drinkings'

Photocard 8

Mowing the meadows using a horse-drawn mower

Photocard 7

The 'drinkings'

Haymaking under a summer's sun was thirsty work and days were long. The farmer's wife knew the men working in the meadows would be famished, so the regular provision of food and drink was an important part of the day.

The mid-morning meal served in the hayfield was known as the drinkings. Wicker baskets with lids held the food, mainly in the form of sandwiches. The lids kept the dogs and flies away from the food if the baskets were left in the field.

The main meals would be eaten indoors but tea was usually served in the open in a large metal can called a billycan. At other times the men refreshed themselves with cold drinks such as elderflower cordial and ginger beer.

"At that time a great treat was joining the hayfield tea brought out in a large wicker basket with hot sweet tea in a billycan and delicious homemade buttered scones."
Jeremy Morrogh-Ryan

Photocard 8

Mowing the meadows using a horse-drawn mower

By the end of the 19th century the scythe had been replaced by the horse-drawn mower. The operator was able to sit above machinery that had very sharp blades and cut the hay like shears as it was pulled along by horse. In the photograph can you see the man sitting on top of the mower?

Farmers said that a good horse could mow an acre in an hour. However, to work this hard they needed looking after: *"I remember my father getting up at five [in the morning] so that you could get as much mowing done before the sun got too hot. It was 'specially for the horses because it was such hard work cutting the grass."*
Ann Holubecki

While mechanical mowers made cutting a meadow much faster, scythes continued to be used for many years to 'open up the meadow', which meant clearing enough space to allow the horses and machinery to start their work. Scythes would also be used to cut close to the walls and elsewhere where the horse-drawn mower couldn't get to.

"The workers mowed a way into t'field using scythes. Now our mowers could go in. Well, then they would cut the field and while it were drying they would check around the edges and such like."
William Mason, who farmed in Wharfedale in the 1920s

Photocard 9

Using horse-drawn machinery to make windrows

Photocard 10

Storing the hay in the barn

Photocard 9

Using horse-drawn machinery to make windrows

Horse-drawn machinery to make the dry hay into windrows was also invented. The photograph shows a lady operating a side-delivery rake gathering up the hay into a windrow. The seat is made of iron, so can't have been very comfortable!

Besides feeding the hungry workers, women were also busy during hay time helping to turn the hay and work the machinery.

'As horses went out and tractors came in, me dad said to me mam, if you could learn to drive the tractor you could sweep the hay...and I would give you the money...my mother was absolutely overjoyed because she got with that money a Kenwood food mixer and she thought that was great.'
Eleanor Scarr

Photocard 10

Storing the hay in the barn

The hay had to be kept safe from wet weather and livestock, so in the Dales farmers stored hay in field barns. Once all the hay was collected from the field and taken to the barn, it was forked into the hay mew (where the hay was kept). This was a very tiring job! The photograph shows Norman Brown forking hay into a barn near Fremington in Swaledale.

Once inside the barn, the loose hay was trampled down to pack in as much as possible. In years when good weather had meant a large hay crop had grown, the hay could reach right up to the roof. This could lead to all sorts of problems...

In the Yorkshire Dales there's an old story about a farmer who put his horse in the hay mew to trample down the hay. All day long the farmer forked hay in through the forking hole while his neighbour, who'd come to help, led the horse around the hay mew trampling the hay and getting higher and higher off the ground. At the end of their hard day's work the farmer was very pleased with how much hay they had brought into the barn. Then suddenly he realised they'd gone so far up into the roof of the barn that the horse and his neighbour couldn't get out!

Photocard 11

Making a haystack

Photocard 12

Mowing using a 'little grey fergie' tractor

Photocard 11

Making a haystack

Hay could also be stored as a haystack. The hay would be carefully stacked higher and higher. People would use a ladder to climb on top and trample it down to keep the stack compressed. Some farmers used donkeys to do this! Once it was finished, a hay rake was used to comb down the sides of the haystack. This was to make rainwater run straight down the sides of the haystack to stop it getting inside and making the hay rot and lose its nutritional value. Sometimes a large square sheet was thrown over the top of the haystack and weighted down with stones tied to each corner. This was even better at keeping the hay nice and dry.

Damp hay can heat up and if it got too hot it would catch fire. Many haystacks and even field barns were burnt down, so this was another good reason to make sure the hay was well-dried and stayed dry.

Photocard 12

Mowing using a 'little grey fergie' tractor

Tractors gradually replaced horses in mowing, turning and gathering the hay, making haytime less hard work. First of all, many farmers adapted their horse-drawn machinery to be pulled by a tractor, but in 1946 the first 'modern' tractors appeared and haymaking machinery was designed specifically to be used by them. Ferguson tractors, or 'little grey fergies' as they were commonly known, were one of the first modern tractors to appear and were soon in use by many farmers across the land.

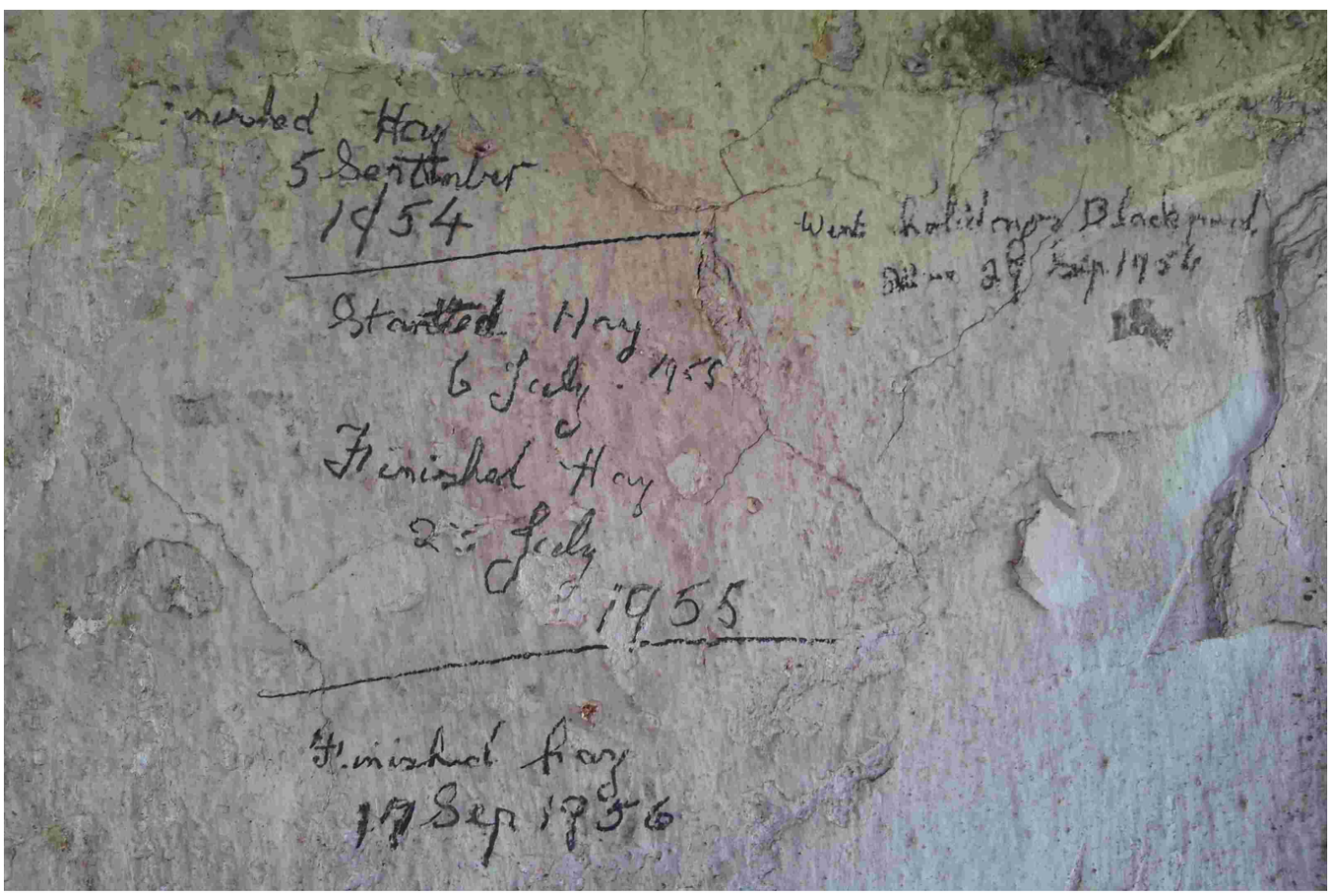
Today's tractors are often fitted with computers, air conditioning systems, CD players and global positioning systems. Some of them are so big that new sheds have to be built to store them in and many of the old field gateways have had to be widened. The photo opposite is of a modern tractor mowing a meadow.

Photocard 13

Using a hay lift to get bales into the barn

Photocard 14

A haytime diary



Photocard 13

Using a hay lift to get bales into the barn

Hay balers were invented in the 1950s. This machine compresses loose hay into blocks which are more easily stacked and stored and taken out to the field to feed livestock. The photograph, taken in the 1990s in Buckden in Wharfedale, shows a hay lift, a conveyer belt that lifts hay bales up to the forking hole where they are pulled into the barn.

Photocard 14

A haytime diary

This writing is on the wall of a derelict barn in Swaledale. It's written in pencil and dates from the mid-1950s, so it's survived for nearly 60 years and gives a fascinating glimpse into the past.

From the top left it says: Finished hay 5 September 1954
Started hay 6 July 1955
Finished hay 23 July 1955
Finished hay 17 September 1956

To the right it says: Went holidays Blackpool 29 September 1954

1955 must have been a good summer that allowed the farmer to make all of their hay in less than three weeks. They must have been very pleased. We don't know when haymaking started in 1954 or 1956 but in both these years it didn't finish till September, so these years must have had wet summers. It might have been that the farmer started haymaking in July but the weather was so unsettled that it took several weeks to finish, or that the summer was so wet that the farmer didn't start haymaking until late summer. We can investigate what the weather was like by downloading historical UK weather reports from www.metoffice.gov.uk/archive/monthly-weather-report-1950s. For instance, the weather report for August 1954 says: "Over most of England...there was considerably more than the average rainfall." This would explain the late finish to haymaking in that year. What do the reports say for the summer months of 1955 and 1956?

From the writing we know that the farmer went on a well-earned holiday to Blackpool - let's hope the weather was good! Maybe you can find out.

Memories from haytimes past

Haymaking or haytiming is the key event in the meadow year and was once the most important summer job on farms all over the Yorkshire Dales. Usually the meadow vegetation is at its best, tall and full of nutrients, around July or August. This is when it had to be saved and stored in a field barn, ready to feed livestock over winter.

Weather was always of chief concern at haytime. Sometimes if the weather was really poor the hay wasn't gathered until harvest time in October. Farmers simply just had to get it done as soon as they could and fit it in with clipping the sheep.

In summer, farmers would start work when the sun rose at 4am and not stop until it set after 10pm. That's a long day's work, but at least in days gone by men who worked with horses got some rest when it went dark - nowadays tractors have headlights that allow them to work all through the night!

It wasn't just men who worked in the hayfield: besides feeding hungry workers, the women and children were also busy helping to turn the hay, lead the horse to the barn with its heavy load of hay, and work the machinery. In fact you've got haytime to thank for your long summer holiday - children were needed to work on the farm so schools were closed during this busy time.

Once all the hay was gathered in, many farms and communities celebrated with a haytime dance and feast, known as the 'mell'.

Neighbouring farmers would help each other after their own haymaking was done, but on many farms extra hands were hired - and in the days before tractors, extra horses too. Haymaking under a summer's sun was thirsty work and days were long, so the regular provision of food and drink for the workers in the meadow was very important.

With lots of hungry mouths to feed, the kitchen got very busy, as women prepared meals and children helped fetch the 'drinkings' to the meadow to refresh the workers.

Do you know someone who used to help make hay on a farm near you? What are their experiences? Did they enjoy it? Was it hard work? How different is it to their work today?

Name:

Be a Haytime Detective!

Do you know someone who used to help make hay on a farm near you? What are their experiences?
Did they enjoy it? Was it hard work?
How different is it to their work today?

Task: Your job is to become a haytime detective and find out as many facts as you can about what happened during haytime in the past in your area. Sometimes the best way to do this is to interview people about their experiences.

Choose who you are going to interview:
a) Grandparent
b) Parent, auntie/uncle
c) Family friend

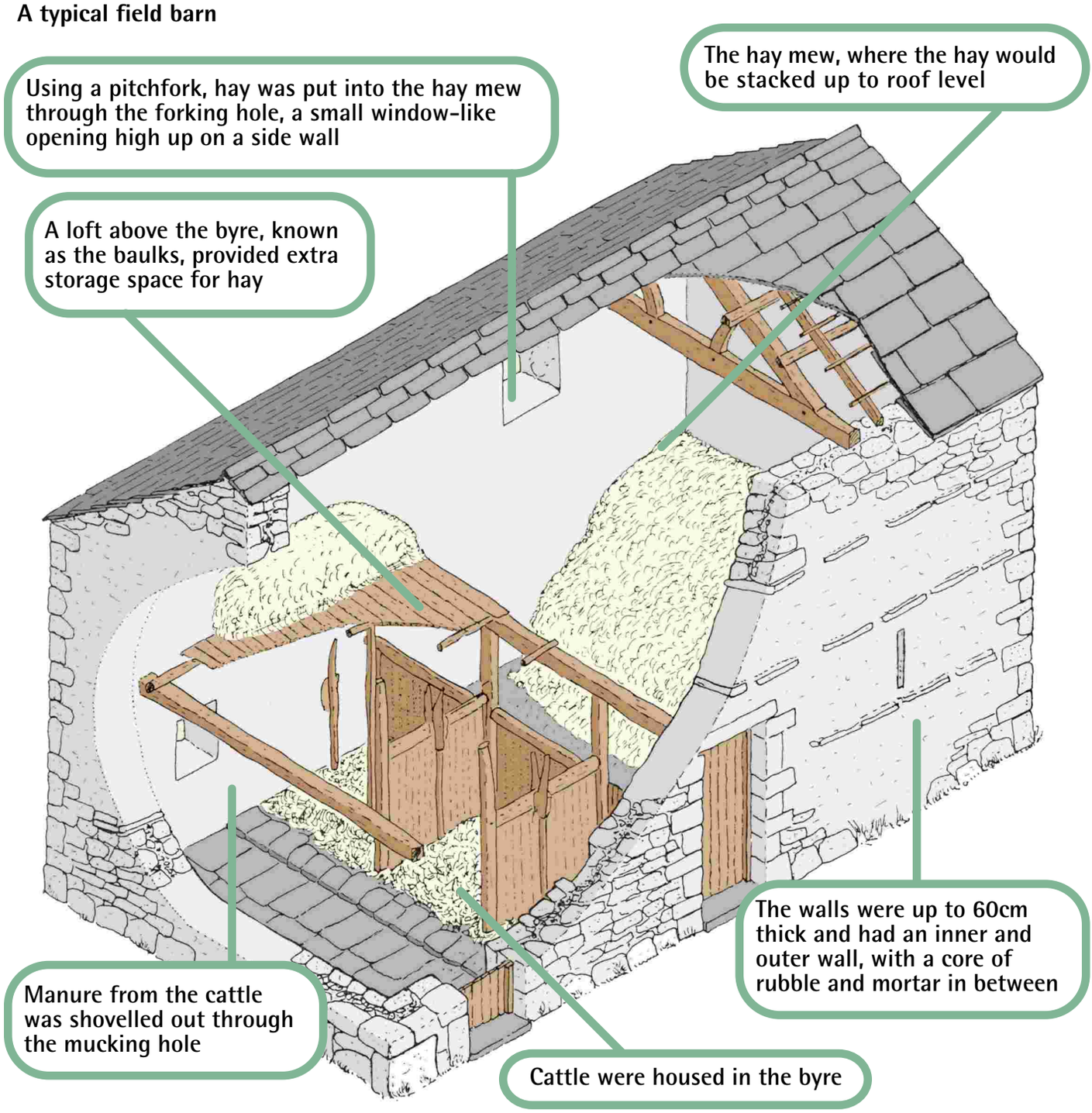
Now think of some really good questions to ask them about their haytime memories.
Write your questions below. You might need some spare paper to record the answers you get.

Field barns (1 of 2)

There are more than 4,000 stone-built field barns scattered throughout the Yorkshire Dales. Most of them were built between 1750 and 1850. Once very important for haymaking, these traditional farm buildings are one of the most distinctive features of our local landscape today. Field barn is the general term used for these buildings but other names included cowhouse, hay barn, laithe and outbarn. Whatever their name, these barns were designed to withstand the harsh climate of an upland landscape.

Traditionally, cattle would be housed in the barns from the end of October to the beginning of May, sheltering them and preventing wet fields from becoming muddy and damaged by their hooves. The barns were situated close to hay meadows, reducing the time and effort required to transport the hay to the barn. Hay was stored safely in the dry barn, ready to feed the cattle or sheep in the winter. Manure produced by the cattle could also be quickly transported to nearby meadows, to help fertilise them ready for the next season's hay crop.

A typical field barn



Field barns in Swaledale, showing different designs.

Dry stone walls (1 of 2)

Dry stone walls form the largest man-made feature in the Yorkshire Dales - if all of the walls were laid end to end it would make a wall more than 8,000 kilometres long, nearly as long as the Great Wall of China, which is 8,851 km! The network of walls that stitch fields together creates a patchwork pattern that, along with traditional field barns, adds character and definition to our landscape.

Dry stone walls play an essential role in hay making as they make excellent boundaries that keep livestock and other animals out of meadows, preventing them from eating the valuable hay crop while it's growing. They also provide livestock with shelter from wind, rain and sun.

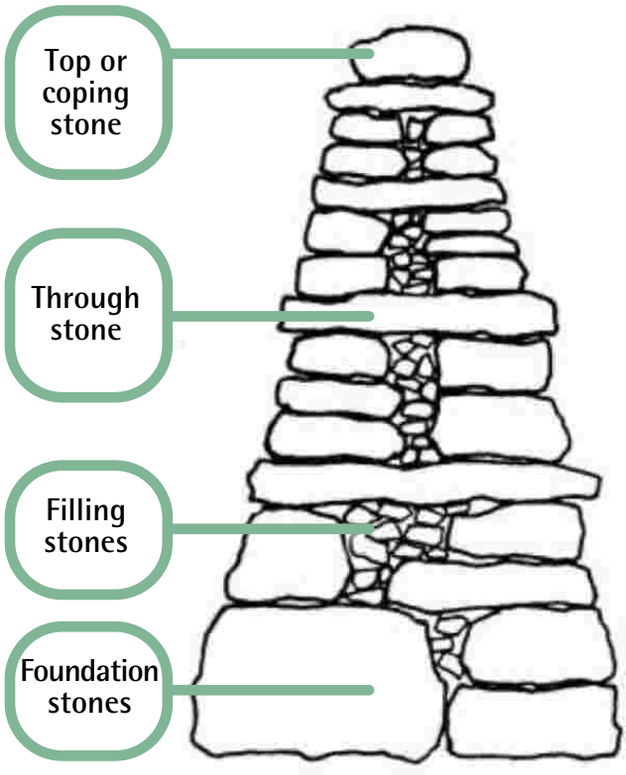
Many of the dry stone walls you see in the Dales today are around 200 years old, though some date back to the Bronze Age (4,000 years ago). As stone is readily available it was the ideal building material. Depending on what the underlying rock is, dry stone walls in the Dales are mostly made from limestone rock or gritstone.

Dry stone walling is a traditional building skill which is harder than you might think. A good waller can build 6-7 metres of wall in a day, lifting about 7 tonnes of stone by hand in the process. No stone should have to be picked up twice, as the waller should instinctively be able to choose the right stone to place on the wall every time. A well-built dry stone wall should last many years before needing repair.

Dry stone walls are called dry because no cement or other bonding material is used to 'glue' the stone together. The wall is skilfully constructed so that the stones are locked together like a jigsaw, and held in place by the weight of each other.

Besides being of practical importance, dry stone walls can also support a range of unusual mosses and lichens such as the crinkled jelly lichen. Dry stone walls also offer safe shelter for hibernating toads and homes for voles, mice and insects, which in turn provides a rich hunting ground for weasels and shrews.

Dry stone walls are costly to repair. Many are located in areas which are very difficult to get to. Rather than being rebuilt, many dry stone walls are replaced with galvanised metal fencing which is quick and often cheaper to erect. However, because of their historic and conservation value, farmers can apply for grants to repair and maintain dry stone walls on their land.



Building a dry stone wall

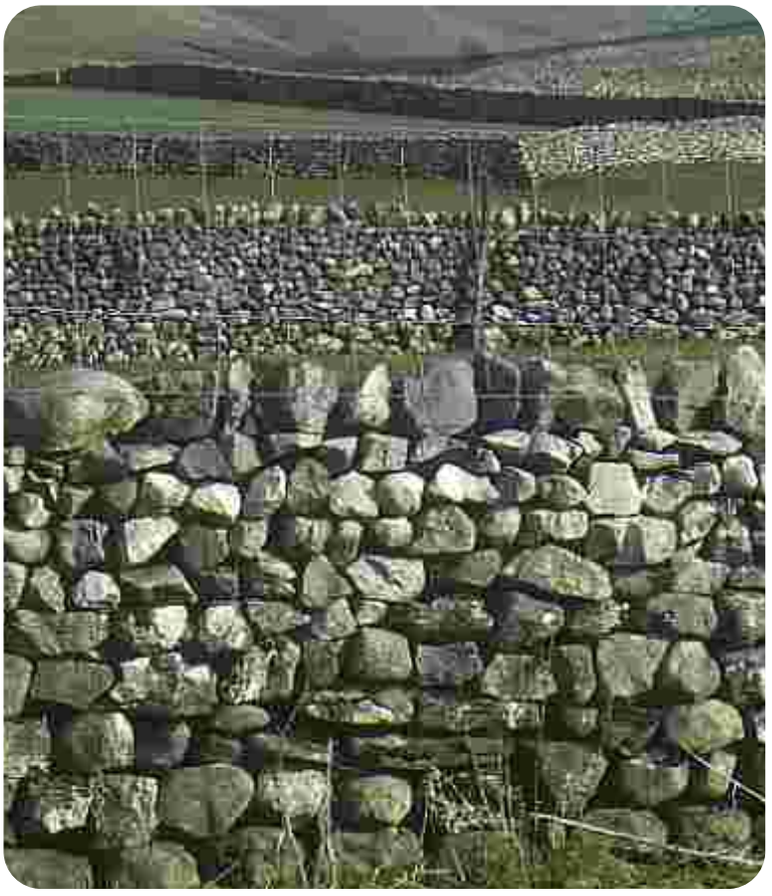
After measuring out the line for the dry stone wall, the first job for the waller is to lay the foundation stones. These are the biggest stones and have to be put in nice and level if the wall is to stay upright. They are often dug into the ground and fit snugly together.

Once a stretch of foundation stones has been laid, the waller builds upwards, one row (or course) at a time, making sure that a stone is laid across the join between the stones below. Each stone is placed with its longest edge facing into the wall, and tight against its neighbours.

The wall is built so that it is wider at the bottom than the top, like a narrow triangle. Small stones known as filler are placed in the middle of the wall and through stones help lock both sides of the wall together, creating a very strong solid structure.

The top of the wall is finished off with coping stones, which are generally semi-circular. These stones add extra strength to the wall, protecting it from being knocked by cattle or sheep.

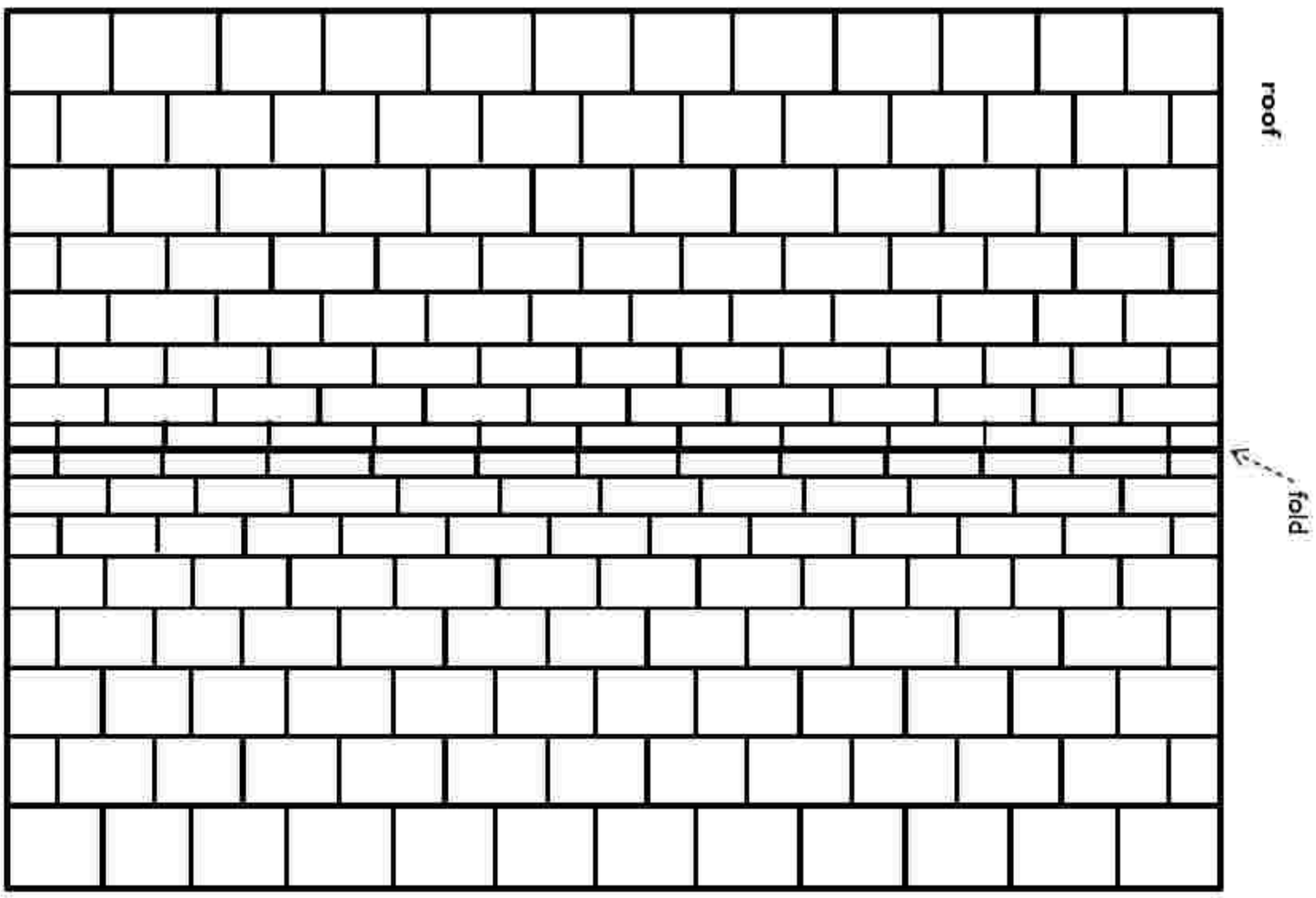
Dry stone walls (2 of 2)



Dry stone walls in the Yorkshire Dales.

Making a model of a field barn (1 of 3)

1. Carefully cut out the walls, gable ends and roof (don't cut along any dotted lines).
2. Write your name on the base where shown.
3. Colour in the walls, gable ends and roof. You don't need to colour in the tabs but it doesn't matter if you do. Barn walls were built out of limestone (grey) or sandstone (yellowy brown). Roofs were made of sandstone (light and dark brown) or slate (dark grey).
4. Barns have different numbers of doors and windows and in different positions, depending on how the inside of the barn was laid out (look at the ***Field barns*** factsheet). Windows didn't have glass in them – they either had wooden shutters or were just open holes. Decide how many doors and windows you want your barn to have and where they are going to be positioned.
5. Colour in the doors and shuttered windows (use the same colour, either brown, green or red). If your barn has an open window colour it dark grey. Carefully cut out the doors and windows and glue them on to the coloured sides of the walls and gable ends.
6. Place both gable ends coloured-side down and fold the tabs flat.
7. Place the walls coloured-side down and fold the tabs flat. Fold along the dotted lines so the walls are standing straight up (at 90°, a right angle).
8. Take one of the gable ends and put glue (or double-sided sticky tape) on the two wall tabs. Make sure that you glue the correct side and that the glue is right up to the edges. Open the tabs out and fix the gable end to one end of the barn. This can be a bit tricky so take your time.
9. Repeat this for the other gable end.
10. Put glue on the six roof tabs along the top of the walls and gable ends.
11. Place the roof coloured-side down, fold it in half and then open it up to the angle of the gable end point. Fix the roof to the walls.
12. Congratulations, you've built your first barn!



Making a model of a field barn (2 of 3)

roof tab (put glue on the other side)

(fold here)

(wall tab is glued on here)

wall
(colour in the other side)

(wall tab is glued on here)

(fold here)

base
(write your name on the other side)

(fold here)

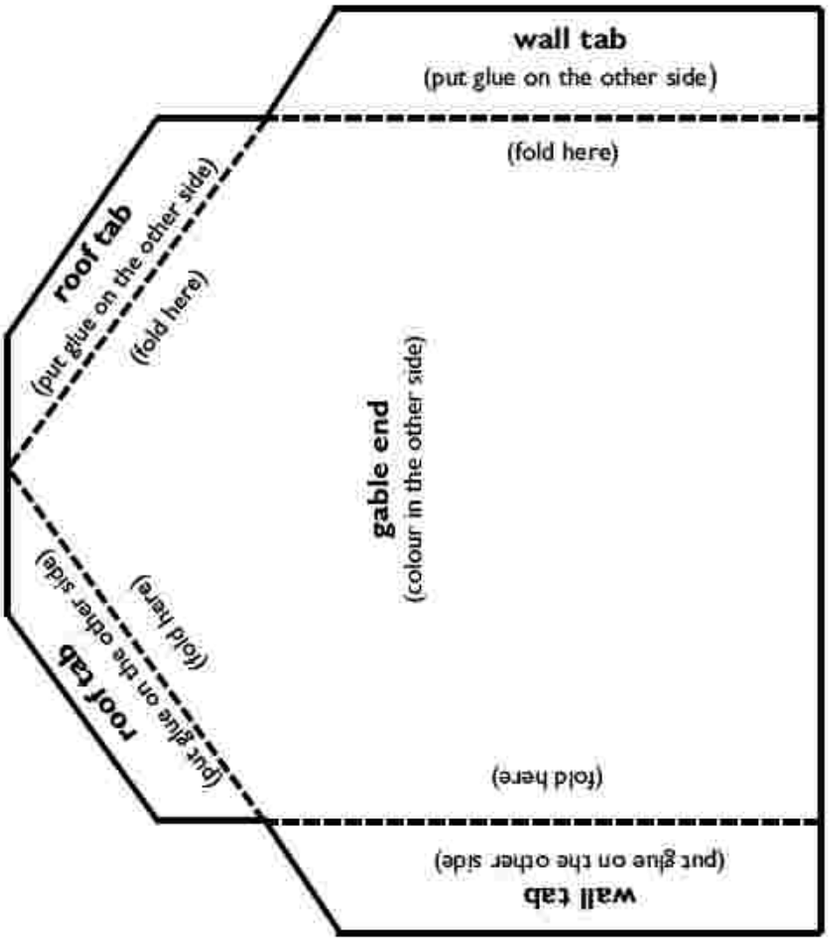
(wall tab is glued on here)

wall
(colour in the other side)

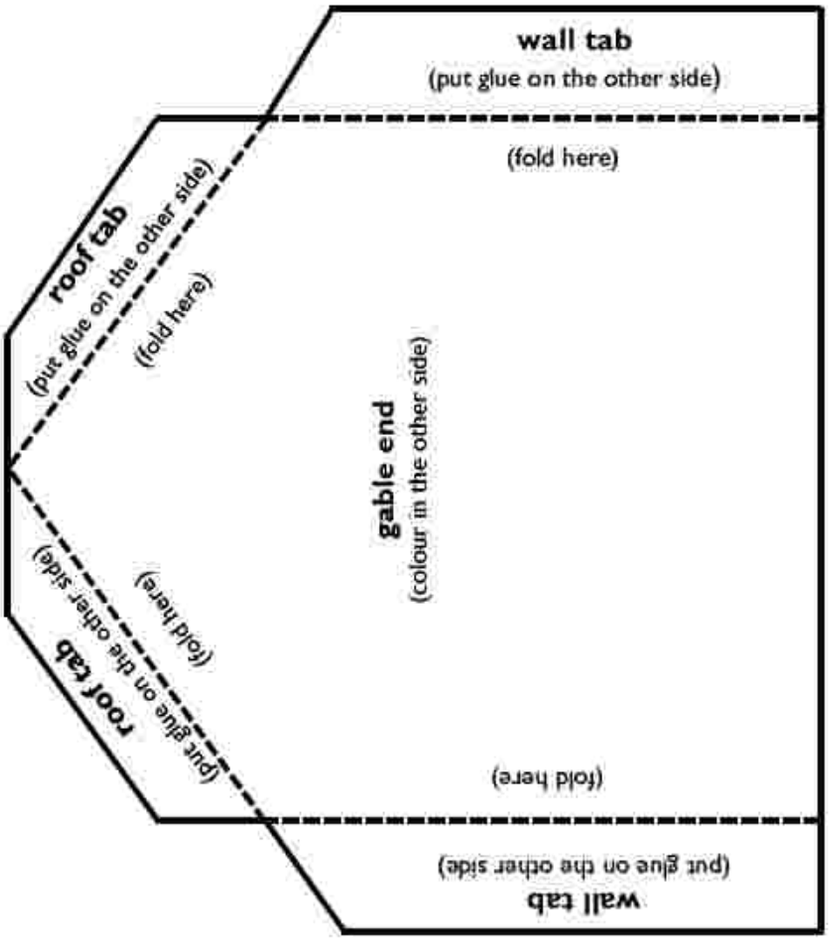
(wall tab is glued on here)

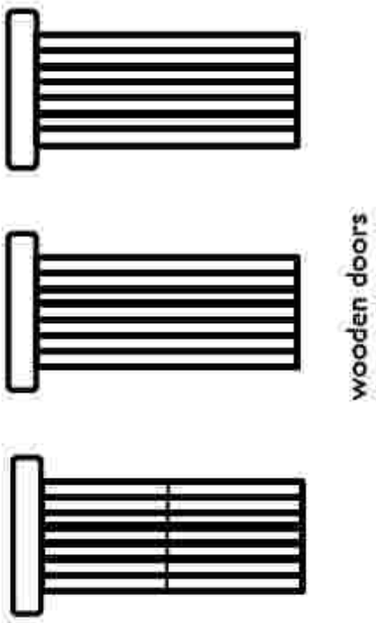
(fold here)

roof tab (put glue on the other side)


wall tab
(put glue on the other side)
(fold here)
roof tab
(put glue on the other side)
(fold here)
gable end
(colour in the other side)
(fold here)
(put glue on the other side)
roof tab
(fold here)
(fold here)
(put glue on the other side)
wall tab


open windows
shuttered windows


wall tab
(put glue on the other side)
(fold here)
roof tab
(put glue on the other side)
(fold here)
gable end
(colour in the other side)
(fold here)
(put glue on the other side)
roof tab
(fold here)
(fold here)
(put glue on the other side)
wall tab


wooden doors

Section 5: Planning a meadow visit

The activities outlined in this section are designed to prepare children for their visit and get them thinking about different considerations such as the Countryside Code and how others enjoy hay meadows in the Yorkshire Dales.

Details about species-rich meadows to visit in the Yorkshire Dales are on pages 112-115. A *Safe fieldwork guide* and *Meadow risk assessment* are on pages 116 and117-118 respectively.

Topic 1: My perfect meadow

Meadow drama

KS1 KS2

This role play activity is designed to get children thinking about the importance of hay meadows from the perspective of different 'users' – be it the farmer, botanists or other people who visit hay meadows. It also makes children aware of a variety of considerations when visiting a meadow e.g. that different people visit meadows for different reasons and that, if we don't act responsibly, our behaviour may affect the enjoyment of others or may be detrimental to the landscape. This activity also highlights how meadows have changed over time. A school hall or gym is ideal for this activity. The activity can be simplified for KS1.

Prepare: Using either the children's A4 illustrations of hay meadow flowers (completed in Section 2, Topic 1: *Drawing a meadow plant*) or photocopied and enlarged illustrations of the hay meadow plants (see pages 49-52), create your own hay meadow pop-ups. This can be done using plastic double-sided sign holders. The more the better but around 10-15 different pop-ups are good (for better effect, illustrate the flower/grass on both sides). It's also worth including a few species of birds and mammals for extra effect, especially the corncrake which has suffered dramatic losses since the 1950s. You will also need three sheets of paper marked with the following dates: 1950, 1980 and Present day. Ability for role play by the teacher is also required – to be an angry farmer whose meadow is being trampled by all the users!

Practicalities and considerations of visiting a hay meadow

The best time to visit hay meadows is between mid-June and mid-July when the meadows are at their prime and before the hay crop is cut.

For large groups, ideal meadows to visit are those with educational access, as landowners are set up to accommodate groups and usually have on-site toilets and facilities where you can shelter and have lunch. See pages 112-114 for details about meadows with educational access.

If you wish to visit a local meadow close to your school, many have public footpaths running through them and landowners are often very supportive of local school activities. However, we strongly recommend that you contact the landowner first and seek permission.

Trampling the hay crop is a major concern, the best way to avoid this is to ensure children stay on paths and do all activities from the edge of the path or track. Any flattened grass should be carefully raked upright again with hands.

None of the activities require children to pick flowers or damage the meadow in any way.

A range of props is very useful: a blanket for the picnickers to sit on, binoculars, bird identification books, clipboards, magnifying glasses, and a farmer's flat cap and crook (if available).

Warm up: Tell the children that they are going to do some activities based around hay meadows, including hay timing and the wildlife in a meadow, and do a quick recap on what they remember e.g. scything, throwing bales onto the hay cart and also the wildlife you see in a meadow. Depending on the time you have, choose some or all of the following three activities:

What we know about haytime (circle game). Gather the children around in a large circle and give a ball to one of the children. Explain that the child has to pass the ball to any other child and while doing this s/he has to say one word about anything to do with meadows e.g. plants, animals, features, farms etc. The game finishes when all of the children have had a go.

Here I am (circle game). Demonstrate this game by going into the middle of the circle and saying your name, followed by an action that is linked to hay meadows – this could be a haytime action or it could be an action of an animal e.g. bird flapping its wings or a hare jumping. No words are allowed to accompany the action. Ask the children to guess what you are. The child who guesses gets to go in the middle and the game continues until all of the children have had a go.

Main activity: Ask the children "What is a hay meadow?" As the children provide answers, discreetly choose other children to quietly place the pop-ups randomly around the hall, without distracting the other children as far as possible. If you are using the children's illustrations this is also a good time for the children to talk about their work and why they chose their flower or grass. Alternatively you could get them to see if they can recognise the different flowers, grasses and wildlife, before you hand out the pop-ups. Once the meadow is laid out, turn around and notice the meadow – "oh look, we created a meadow!"

Get the children into small groups (ideally five or six per group) then ask them to decide why they might be in a meadow. Let them make a short list (do not include farmers at this stage):

- Botanists
- Picnickers
- Dog walkers
- Children playing a ball game
- Entomologists (moths and butterflies specialists)
- Flower-pickers
- Children on a school trip
- House builder
- Photographer
- Any others that the children suggest – some children might like to dress up as the animals and bumblebees

Number the groups and get the children to discuss in their group these three questions:

- Who are you?
- Why have you come here?
- Where have you come from today?

Go around each group and assist where necessary by asking leading questions. While you are doing this also place the 1950 date sheet in a prominent location on a wall.

Then every minute or so, get each group to go into the meadow (selecting the most confident group to go first), they then improvise. During the improvisation they should be encouraged to interact with the other groups.

While the children are improvising, change the date sheet to 1980 and as you do so remove some of the species. Then after a few minutes change the date to Present day and remove more than half of the species, leaving only the common species in the meadow.

Let it develop until it becomes too chaotic. When you decide the time is right, stop the improvisation and ask the children to look around them and discuss what has happened.

No meadow – why? Often children think it's because they have damaged the meadow through trampling. Show the children the sheets with the different dates on them e.g. 1950, 1980 and Present day. Explain that since 1950 we have lost 98% of our hay meadows in the UK and one in five of our wildflower species are threatened. Suggest "We could end like this or we could restore the meadow, because there are people doing just that. So can you help me to put the meadow back?"

Get the children to return to what they were doing (for about two minutes) and then bring in the farmer character: "Oi, what are you doing in my meadow? What d'yer think yer doing trampling my fodder. This'll not feed my animals come winter, it'll not be worth owt!" etc etc.

Stop the action and discuss the farmer's point of view. What was happening to the meadow while you were in it? Were other users showing consideration to each other, the farmer and the meadow?

Get the children back in to their groups, assign a few children to form a new 'farmers group' and ask each group to decide why the meadow is important to them and what makes it so special for their purpose. Then get the children to discuss their viewpoints and raise the question "Who is the meadow the most important for?"

Final discussion:
- Have you enjoyed it?
- Meadows are important to different people for different reasons.
- What have you learnt that you didn't know before?
- How important are meadows to you?
- What can we do to help look after them, individually and as a group?
- What things should we think about when visiting a hay meadow?

A short story book suitable for KS1/KS2 that has a similar message is *The Wonderful Meadow* (see page 161 for details). This can either be used instead of this activity or to complement it.

Topic 2: The Countryside Code

Hay Meadow Code poster

KS1 KS2

This activity can be used as either a follow-up exercise to complement the *My perfect meadow* drama activity or as a stand-alone activity.

Prepare: Print *The Countryside Code* factsheets (page 119-120) for pairs or small groups.

Do: Discuss the messages on the factsheets and the importance of the Countryside Code e.g. what might happen to the countryside if we don't follow the Countryside Code?

What other points might the children add? Get the children to design a poster for their own Hay Meadow Code, using their own messages.

Here is a selection of flower-rich meadows found in the Yorkshire Dales that may be suitable for your school to visit. Some are considered so important that they are designated a Site of Special Scientific Interest (SSSI) or a National Nature Reserve (NNR). All are accessible on foot by reasonably fit, able-bodied people. Those sites that are accessible to wheelchair users and the less able-bodied are indicated.

The best time generally to visit meadows is in June, as most of the wildflowers will be flowering by then. All of the meadows listed are in agri-environment schemes and so the farmer will start haymaking any time after 15 July (weather permitting). Please note that Muker Meadows SSSI is the exception, as the meadows there can be cut at the end of June.

For each meadow, details of its location including grid reference and the relevant Ordnance Survey map are provided (OL2 = Ordnance Survey Explorer OL2, Yorkshire Dales Southern and Western; OL30 = Ordnance Survey Explorer OL30, Yorkshire Dales Northern and Central). See the map on page 115 which shows the approximate location of each site.

Sites with educational and/or permissive access

Some farms have educational access agreements with Natural England to help them host educational and care farming visits. These farms are used as outdoor learning resources to provide visitors with the opportunity to understand and experience the links between farming, conservation and food production.

Some landowners provide permissive access to their land, which means access is given by permission of the landowner rather than as a public right.

Access to educational and permissive access sites is strictly by arrangement only, so please contact the landowner to arrange your visit.

1 Hazel Brow, Low Row, near Reeth

OL30, SD982979
Hazel Brow is a traditional farm in the heart of Swaledale and within the Yorkshire Dales National Park. It farms approximately 100 acres of species-rich grassland plus extensive grazing on the moor and common. Habitats include flower-rich grassland, dry stone walls and heathland.
Farm activities: According to season this can include feeding animals, milking goats, handling poultry, gathering eggs, and making butter or cheese by arrangement.
Facilities: Toilets, wet-shelter, picnic area, and teachers' information pack.
Contact: 01748 886224.

2 Keasden Head Farm, near Settle

OL2, SD724647
Keasden Head Farm, located close to the Yorkshire Dales National Park, is a diverse farm environment with woodlands, wildflower pastures and hay meadows. (The meadows are at Austwick.)
Facilities: Covered area, toilets and hand washing facilities, teachers' information pack.
Contact: Sheila Mason on 015242 51336.

3 Heber Farm, Buckden

OL30, SD942771
Heber Farm is a traditional upland farm situated within the Yorkshire Dales National Park. The farm features include upland hay meadows, outlying field barns, small farm woodlands and dry stone walls.
Farm activities: Walks, talks, chores, food chains, habitats, the farming year, question and answer session with the farmer, quizzes, demonstrations, nature conservation-focused sessions.
Facilities: Toilets, hard surface parking, wet-shelter, teachers' information pack.
Contact: National Trust, Malham Tarn Estate on 01729 830416.

4 Lower Winskill Farm, Langcliffe, near Settle

OL2, SD826664

Historic upland farm on the high limestone ground overlooking Settle and Ribblesdale, with traditional upland hay meadow, species-rich limestone pasture and woodland.

Farm activities: Access to species-rich grasslands, historic walls and field patterns, historic farm buildings, limestone landscape and glacial features.

Facilities: Toilets, disabled toilet, hard surface parking, wet-shelter, surfaced paths, picnic area, teachers' information pack, and farm facts leaflet.

Contact: Tom Lord on 01729 822694. www.lowerwinskill.co.uk

5 Manor Farm, near Buckden

OL30, SD942792

Manor Farm is a traditional upland farm situated within the Yorkshire Dales National Park. The farm is approximately 1000 hectares and the land includes high level meadows, rising through limestone pastures and scars to rough grazing up onto Cray Moss and Buckden Pike.

Farm activities: Walks, talks, chores, food chains, habitats, the farming year, Question and answer session with the farmer, quizzes, demonstrations, nature conservation-focused sessions.

Facilities: Toilets, hard surface parking, wet-shelter, teachers' information pack, and farm facts leaflet.

Contact: National Trust, Malham Tarn Estate on 01729 830416.

6 New House Farm, near Malham

OL2, SD933643

New House Farm is a National Trust-owned farm situated within the Yorkshire Dales National Park. The farm consists of superb hay meadows, grazing pastures and limestone cliff on and around the farm and is so rich in flora that it was declared a National Nature Reserve in 2000. The hay meadows are considered to be some of the finest in the Yorkshire Dales and as such the farm is of considerable importance to nature conservation.

Farm activities: Walks, talks, chores, food chains, habitats, the farming year, question and answer session with the farmer, quizzes and demonstrations.

Facilities: Toilets, hard surface parking, wet-shelter, picnic area, teachers' information pack, and farm facts leaflet.

Contact: National Trust, Malham Tarn Estate on 01729 830416.

7 Swarthghyll Farm, Oughtershaw, near Buckden

OL30, SD847825

Swarthghyll is a hill farm located on the Dales Way within the Yorkshire Dales National Park. The farm is stocked with sheep and traditional native breed cattle. Habitats include flower-rich grassland, wetlands, dry stone walls and woodlands.

Farm activities: It is possible for school parties of up to 40 to stay on the farm. Please ring to discuss.

Facilities: Toilets, hard surface parking, wet-shelter, surfaced paths, picnic area, and teachers' information pack.

Contact: Freya Hart on 01756 760466 or email fmillerman@aol.com www.swarthghyll-farm.co.uk

8 West Mill, Askrigg

OL30, SD943912

Mill Gill House is a privately-owned smallholding and comprises a number of appealing historical, cultural and agricultural features and habitats. There is a small hay meadow, maintained using traditional management techniques, as well as a gill pasture, both of which are grazed by sheep and cattle.

Farm activities: Wildflower identification (subject to season), pond dipping, tour of the Mill.

Facilities: Toilets, wet-shelter, picnic area, teachers' information pack, and farm facts leaflet.

Contact: David Blake on 01969 650364.

9 Nethergill Farm, Oughtershaw, near Buckden

OL30, SD862822

Nethergill Farm is a mixed hill farm with native sheep breeds, rare White Shorthorn cows and calves, a working native Dales pony and multi-coloured chickens. Nethergill Field Centre is located onsite and welcomes small school groups or societies to the farm by prior arrangement. School activities aim to show the relationship between food, farming and the environment.

Facilities: Self-contained field centre with a conference area to seat up to 25, small commercial kitchen, toilet facilities and a wood burning stove.

Contact: Fiona Clark on 01756 761126. www.nethergill.co.uk

Meadows with public access

These meadows all have a public footpath running through them, are reasonably accessible (although some walking may be required from nearby car parks) and most of them have toilet facilities close by.

Even though there is public access, you should get the landowner's permission before a visit if you wish to undertake any field studies within these meadows, and if you need to park a mini-bus or arrange a drop off with a coach. Contact YDMT on 01524 251002 to request permission. Please respect the farmer's privacy and their need to have easy access in and out of their farms and fields.

10 Askrigg Bottoms SSSI, near Askrigg

OL30, SD958903, about half a mile south of Askrigg

This is one of the best examples in the Yorkshire Dales of a northern hay meadow community. Wood crane's-bill, great burnet, ox-eye daisy, melancholy thistle and Lady's mantle are all abundant in this very diverse meadow. A footpath runs through the meadow, and this and the footpaths to reach it are all level, with a few wall stiles. The footpath from Askrigg passes through some improved meadows, enabling the children to compare these fields with the species-rich meadows. Askrigg has cafés, shops and toilets. Parking is available in Askrigg or there's a lay-by at Worton Bridge.

11 Colt Park Meadows NNR, Ribblesdale

OL2, SD774772, about a mile south east of Ribblehead

Here a series of meadows get progressively richer as you head south along the track, away from the farm buildings that are used by Natural England as an office. In the first meadow are experimental plots which have been part of the long-term investigations into meadow management and restoration. Although there is public access through the meadows, you may also be able to arrange special educational visits through Natural England. The site is in easy walking distance (1.5 mile) from Ribblehead Station through the Nature Reserve. Coach drop-offs and pick-ups can be arranged at a site nearby.

Contact: Natural England on 015242 42021 for further information.

12 Muker Meadows SSSI, Swaledale

OL30, SE911982, just north of Muker

These twelve traditionally managed meadows contain a very wide range of wildflowers and grasses including wood crane's-bill, melancholy thistle, pignut, Lady's mantles, rough hawkbit, cat's-ear and sweet vernal grass. A flagged footpath runs through some of the meadows, and the first stretch of footpath is suitable for wheelchairs. Muker has shops, café, toilets and pay and display car park.

13 Shoolbred, Dent

OL2, SD710874, less than half a mile north east of Dent

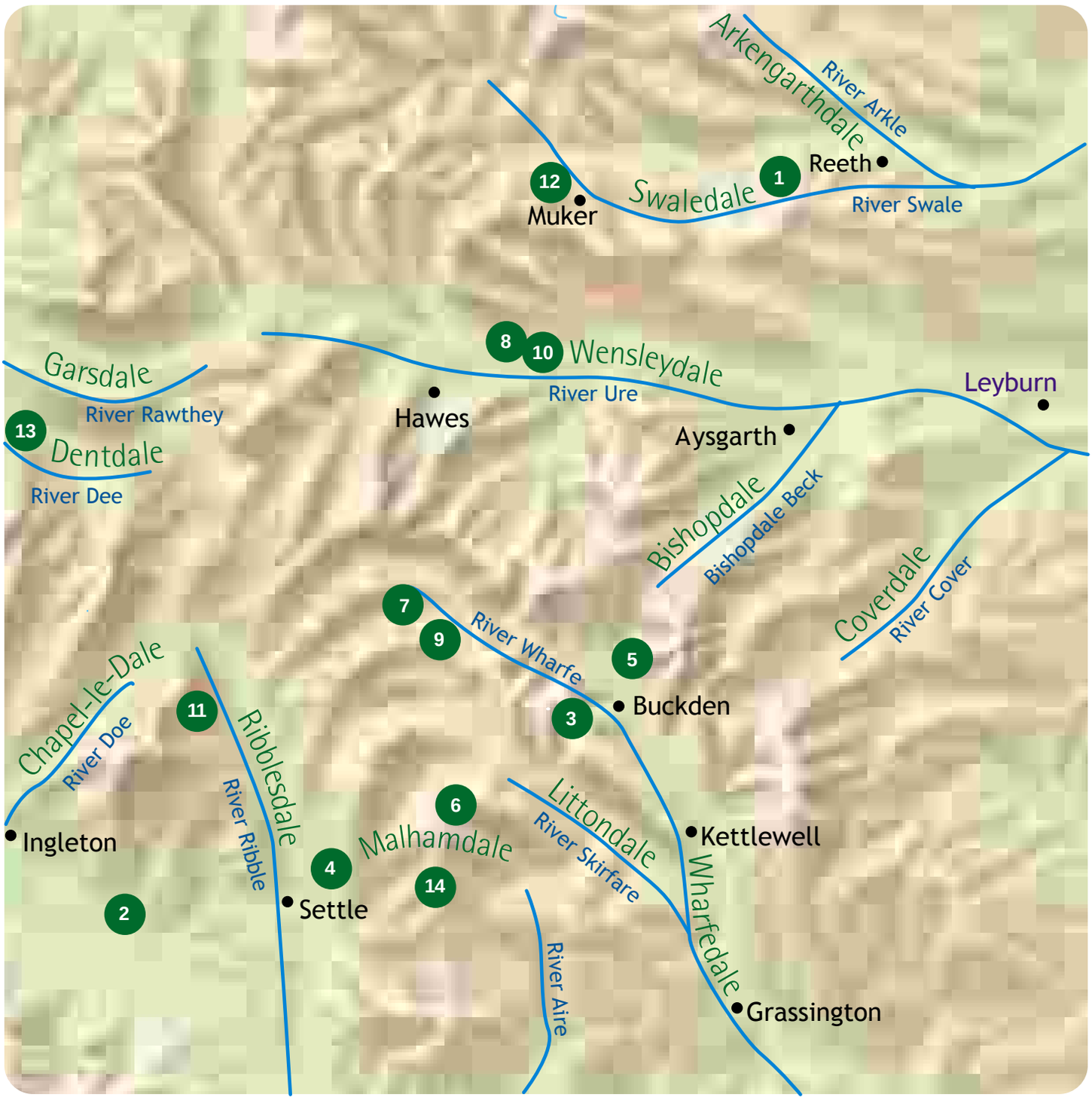
A footpath runs through the northern end of this lovely meadow, sticking close to a dry stone wall. Great burnet, selfheal, common sorrel and knapweed all add various shades of pink and red to the meadows while marsh marigold, yellow rattle, meadow buttercup and the dandelion-like hawkbits bring a splash of yellow. At the western end you could pick up another footpath and return through the adjoining, equally lovely meadow to the north. Dent has cafés, shops, toilets and pay and display parking.

Other site of interest

14 Townhead Barn, Malham

OL2, SD898632

Townhead Barn is a National Trust exhibition barn that shows the interior of a traditional Dales barn and has an exhibition on farming practices through the years related to the Dales. It is open daily 10am-4pm in summer except Mondays (and Sundays only in winter). From the village centre take the Cove Road north for 400 metres and the barn is on the right hand side of road. Note that the road is quite narrow and can be busy with traffic.



Information for teachers and group leaders

Hay meadows provide an important fodder crop for the farmer's livestock. There is no 'right to roam' through meadows so, unless you have the farmer's permission, please stay on public rights of way and walk in single file to avoid trampling the plants. Please don't let the children pick any wildflowers. It is a criminal offence to intentionally uproot any wild plant without the landowner's permission, and some plants are now so rare that they are legally protected, with heavy fines for those caught picking them.

Follow the Countryside Code: be safe, plan ahead and follow any signs; leave gates and property as you find them; protect plants and animals and take your litter home; keep dogs under close control, preferably on a lead, and clean up after them; and consider other people. For further information visit www.naturalengland.org.uk/ourwork/enjoying/countrysidecode/default.aspx

Staying safe in the meadow

- Take a first aid kit and mobile phone with you.
- Make sure that children are adequately supervised at all times.
- Share the risk assessment with any group helpers and advise them of any potential hazards.
- Give the group a safety talk on arrival and ensure they know what to look out for, what to avoid, and how to behave safely and responsibly.
- Ensure group members cover any open cuts and that they wash their hands thoroughly after the visit.
- Look out for and avoid stinging nettles, prickles and thorns.
- Look out for and avoid sharp objects e.g. broken glass.
- Look out for and avoid animal excrement.
- If hunting for mini-beasts, only turn over logs or stones that you can easily lift. Always put them back the way you found them.
- Ensure group helpers know what to do in an emergency.
- Bees and wasps occasionally sting in self-defence. If you see a lot of bees or wasps there may be a nest nearby so survey in a different area. While most stings only result in minor pain and swelling, sometimes it can be much more severe. Seek medical advice if stung near the eyes, nose, throat or if stung multiple times.
- Don't survey near a road.

Wildflowers and grasses

- Demonstrate to children how to carefully handle wildflowers without damaging them.
- Remind children not to pick any wildflowers or grasses.
- To reduce trampling, ensure the group keeps to public footpaths and walks in single file through the meadow.
- If an area of grass becomes accidently flattened, gentle rake it through with your fingers so that it stands upright again.

Mini-beasts

- Encourage children to handle mini-beasts gently and remind them the insects are delicate and to only pick them up if necessary. If children put a mini-beast in a jar to study it, ensure they don't keep it in the jar for too long or leave it in the sun.
- If using sweep nets, carefully release any bumblebees, wasps and bees, allowing them to fly away.
- Remind children to always put the mini-beasts back where they found them.

Things to consider before your meadow visit

Prior to making a school visit to a meadow, YDMT strongly advises that teachers recce the meadow first. Landowners who have Educational Access sites normally have risk assessments for activities on their farm and will be happy to provide information about access and facilities. However, it is still a good idea to see the meadow for yourself and agree with the landowner what activities are suitable and where they can take place. For publicly-accessible meadows or meadows with permissible access, you will need to carry out your own risk assessment. A generic meadow risk assessment outlining some potential hazards is on page 118, however this risk assessment is only an example and must be tailored to suit the specific risks present at your meadow site.

Listed below are some considerations when planning your meadow visit:

Consideration	Check/Action	Done ✔
Permission	Has permission been granted from the landowner for undertaking meadow activities with a group?	
Access	Is the site easy to access for your group i.e. how far will you need to walk to the meadow? Are there any stiles to consider? If travelling by vehicle, check with the landowner where suitable drop-off and pick-up points are located.	
Facilities	Where are the nearest facilities located? e.g. toilets, hand-washing facilities, public phone box (if no mobile signal).	
Risks and hazards	Check that the meadow is suitable and safe for your group. Identify any hazards present and carry out a risk assessment.	
Mobile phone signal reception	Many areas within the Yorkshire Dales have poor signal reception so it's worth checking signal reception at the meadow you're visiting.	
Suitability	Check what species are in flower and select suitable areas for your meadow studies.	
Equipment	Gather equipment together in advance and ensure there is enough equipment for everyone in the group and that it's easy to carry to the site.	
Weather	The weather can be very changeable in the Yorkshire Dales so it is advisable to bring group shelters or ensure that there is somewhere to shelter nearby if the weather turns inclement.	
Group welfare	Ask your group in advance if any of them are allergic to insect stings or have hay fever and ensure they have the correct medication with them.	
Clothing	Ensure the group dresses appropriately for the weather and the activities. Children will probably want to kneel down and/or walk through long grass which may contain thistles or stinging nettles, therefore long trousers are more appropriate than shorts and skirts. Carry extra layers, waterproofs and sunscreen. In adverse weather conditions, it's advisable to cancel the session.	

Potential hazards	Who might be harmed and how?	What precautions are you already taking?	What further actions are necessary?	Level of risk
Traffic on way to and return from meadow	Group members, volunteers and staff - hit by traffic or chippings flying up	High-visibility jackets recommended for group members, volunteers and staff	Ensure staff supervise children on and off transport safely and accompany group to meadow	High/medium
Tripping/slipping on uneven ground, loose scree or wet ground	Group members, volunteers and staff - twisted ankle, injury	Advise groups beforehand and request that group members wear sturdy shoes	Inform group members, volunteers and staff of hazards. Tell children to walk not run, and keep to designated path	Medium
Stinging/prickly or poisonous plants e.g. stinging nettles	Group members, volunteers and staff - adverse reaction to sting, poisoning	Check site prior to visit, plan to avoid areas with nettles	Tell children not to eat/pick any plants, have first aid kit available, request group medical information	Medium
Biting insects/midges	Group members, volunteers and staff - adverse reaction to stings and bites, anaphalactic shock	Check site prior to visit. Request group information of allergies	First aid kit available. Warn group of dangers, check for allergies	Medium
Livestock - sheep, cattle, horses	Group members, volunteers and staff - injury from trampling, biting, kicking by livestock	Check site prior to visit	Warn children of dangers, keep group away from livestock	Medium
Animal excrement, soil and waterborne diseases	Group members, volunteers and staff - diseases or viruses passed from excrement or soil	Survey the area prior to visit to ensure the area is suitable. Avoid areas where livestock congregate	Warn group of dangers. Group members to cover any cuts before survey work. Ensure group wash and dry hands using soap and paper towels after activity	Medium
Inclement weather	Group members, volunteers and staff - hyperthermia, sunburn, sunstroke, hypothermia	Pre-visit letter advising group to bring appropriate clothing and drinks. Cancel visit if weather conditions are unsuitable	Take group shelter, spare warm clothes and sun cream. Make use of shelter/shade and check group for signs of hypothermia/dehydration/sunstroke	Medium
Sharp objects e.g. broken glass or sharp litter in soil or meadow	Group members, volunteers and staff - cuts, scratches	Check area for potential dangers and avoid areas of high risk	Alert staff and volunteers of risks and ensure all activities are supervised	Medium
Dry stone walls, fences and barbed wire	Group members, volunteers and staff - injury by falling rock, cuts, scratches	Always use gates and waymarked paths	Warn group of dangers, group members to be supervised at all times	Medium
General public/ stranger danger	Participants under the age of 18 (and vulnerable adults)	Plan an appropriate ratio of supervision by staff and volunteers for group members. Ensure staff and volunteers have CRB checks in place	Ensure the group is supervised at all times, ensure all staff and volunteers are aware of what to do in the event of an incident/ suspicious behaviour. Explain to group members how to stay safe by not wandering off alone. Always accompany children to public conveniences and check area for dangers	Low

The Countryside Code

The idea for a Countryside Code for England and Wales first came about in the 1930s as more and more people visited the countryside for recreation. When the first National Park in England and Wales, the Peak District National Park, was opened in 1951, the first national Country Code was also published. The National Parks Commission stated:

"We regard the Country Code as a core around which will grow a body of information about the countryside. As knowledge spreads, there should be much less of the damage often done by sheer thoughtlessness in well-intentioned people. By all these means we hope there will be a deepening respect and friendliness between countryman and townsman."

In 2000 the Countryside Rights of Way Act was passed, allowing greater public access known as 'open access' to the countryside. The Countryside Code was rewritten in 2004 to allow for these changes.

The Countryside Code

Respect. Protect . Enjoy

Respect **other people**

- Consider the local community and other people enjoying the outdoors
- Leave gates and property as you find them and follow paths unless wider access is available

Protect **the natural environment**

- Leave no trace of your visit and take your litter home
- Keep dogs under effective control

Enjoy **the outdoors**

- Plan ahead and be prepared
- Follow advice and local signs

The poems below were used on posters in the 1950s to explain to visitors how to behave in the countryside.

What message would you have for people wishing to visit a hay meadow?

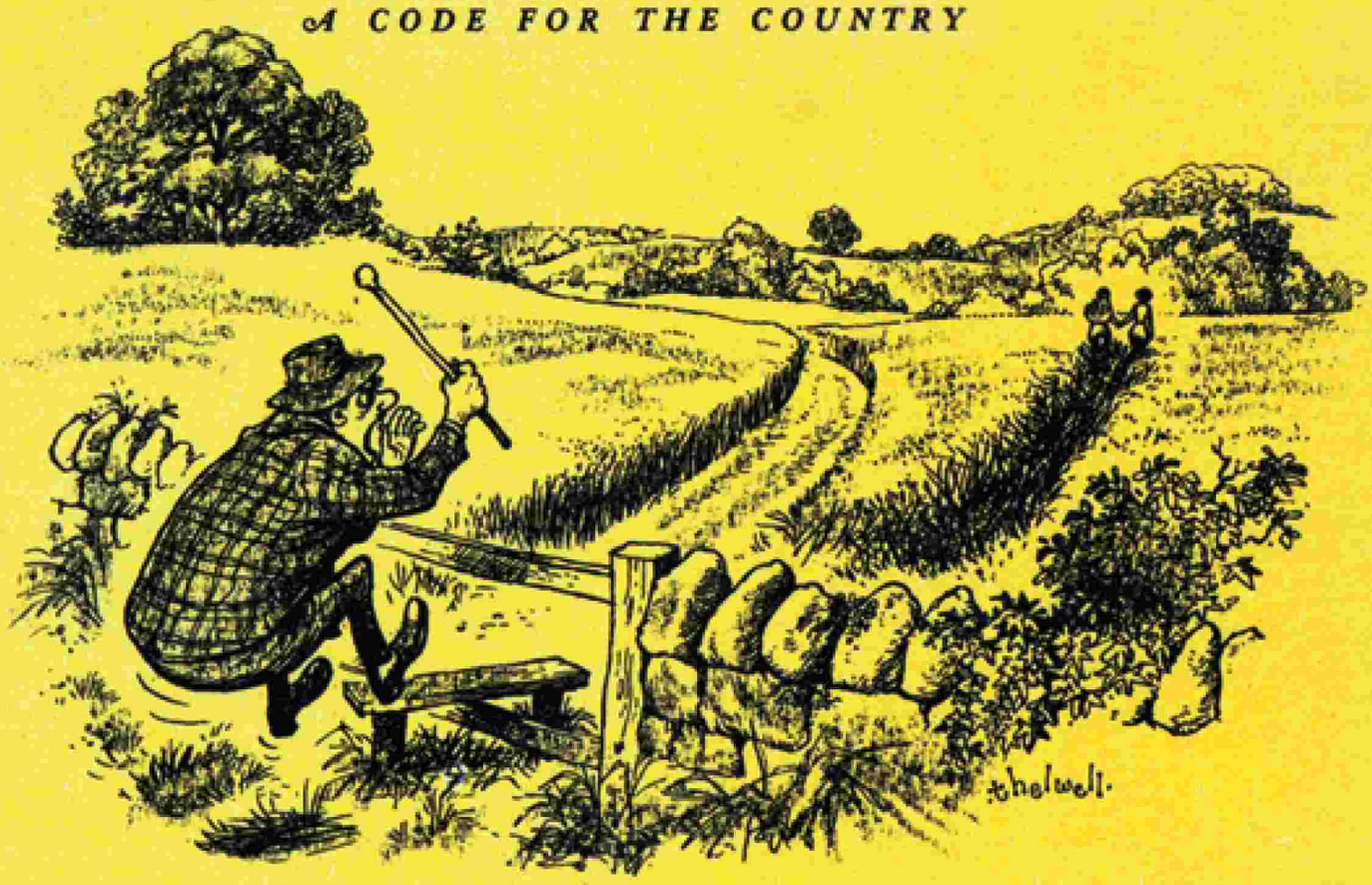
Make up your own Hay Meadow Code or short poem like the ones on this page, encouraging people to behave responsibly.

"A farmer does not love at all
The folk who force hedge,
fence and wall;
To save his sorrow and his expense,
Respect his wall, and hedge, and fence."

Once walls become unstable they soon fall down, and where people have got through, an animal can follow.

"Those living things
that pleasure give,
Give pleasure only
while they live.
Then let things live,
that live to please;
Protect wildlife, wild plants
and trees."

If flowers are uprooted they will soon become rare. Trees can be damaged by breaking branches. Birds will desert their nests if frightened.



The farmer frowns on lad or lass
Who treads his crops, or tramples grass;
So single file (not hand in hand)
Keep to the paths across farm land.

Hay is a valuable crop and cannot be cut by machine when flattened.

Section 6: Hay meadow activities

Species-rich hay meadows are truly spectacular and are one of the most iconic heritage features in the Yorkshire Dales. This section provides a variety of activities to enable children to experience these special places first hand, to help them learn how to identify species, to collect and analyse data, and simply watch, enjoy and learn about the many plants and animals that live in meadows and that depend on the meadow habitat for their survival.

When bringing a group to a meadow, introduce them to their environment: get them to think about what's special about it, who it belongs to etc. Where possible involve the farmer/landowner and ask them to talk about the meadow and why it's important to them.

Remind the children of the 'angry farmer' in the previous drama activities (in Section 5) or ask the children to think about the Countryside Code and get them to decide the rules that should apply to working in the meadow. Remind the children of how to work safely in a meadow (refer to the *Safe fieldwork guide* on page 116 and the *Meadow risk assessment* on pages 117-118). None of the activities require children to pick flowers or damage the meadow in any way.

Topic 1: Plant investigations

'Sense'-ational!

KS1 KS2

Ask the children to close their eyes and sit quietly and listen. Can they hear anything? Can they smell anything? Ask the children to open their eyes, look around and describe what makes the place special, then look down and describe what they see. Ask them to say what they think is the most important thing about the meadow and, working through a food web, ask them to suggest the plants and animals they would find in the meadow. Ask them how the meadow would look when the hay is cut or in winter. Finally, ask how the place makes them feel and what it makes them think of, using different describing words.

Hay meadow palette

KS1 KS2

Prepare: Print the *My meadow palette* worksheet (page 126) for each child, and the *Flowers and grasses of hay meadows* guide (pages 49-52).

Do: Ask the children to record the different colours in the meadow and the name of the wildflower. Alternatively ask the children to take photographs of the different colours and kinds of flowers to paint or make a collage with when back in school.

Meadow treasure hunt

KS1

This activity works well for a walk through a meadow along a footpath. Alternatively children can work in small groups to find species in a hoop.

Prepare: Print (double-sided) the *Meadow treasure hunt* worksheet (pages 127-128) for each child, and the *Flowers and grasses of hay meadows* guide (pages 49-52). Hoops are also useful, as this allows pairs or groups to search for flowers and grasses within a small area.

Do: Ask the children to record the wildflowers and grasses they see.

Investigating plants – random sampling along a path

KS2

Discuss: Look around you, does the meadow have lots of different wildflowers and grasses in it i.e. is it species-rich? How abundant is each species? How do we know? How can we find out? Discuss different methods – you could count all the plants in the meadow but that would take a very long time. Explain that one method that many botanists or scientists use is to make an estimate of the numbers present by sampling part of the habitat. This is often done using quadrats. To make a reliable estimate of the number of plants within a meadow, you will need to count the plants in around 10 quadrats. Depending upon class size, this can be achieved if each group surveys two or more quadrats each.

Prepare: Print the double-sided *Hay meadow recording sheet* (pages 129-130), two copies for each small group (or more if you wish groups to compare more than two areas in the meadow). Each group will need:

- clipboard and pencil
- rulers
- *Hay meadow recording sheet*
- *Flowers and grasses of hay meadows* guide (pages 49-52).
- magnifying glass (1 or more)
- a hoop (or quadrat)
- two small canes (optional)

Demonstrate: Show the children how to gently handle a wildflower so as not to damage it. Talk about the different parts of a wildflower or grass, reminding them about leaf shapes and flower structure. Discuss tips on identification e.g. height of plant, flowering time etc and how to use the *Flowers and grasses of hay meadows* guide. Carefully lay down a hoop near to the path and explain to the children to only count plants that are inside the hoop or that are at least half way in. If a plant is less than half way in, don't count it. Remind the children that many plants have more than one flowerhead, so children need to carefully trace the flowerhead back to the plant and stem to ensure that only whole plants are counted rather than individual flowerheads. When choosing locations for the hoops, see if children can select two different areas of the meadow e.g. shaded/non-shaded, wet/drier, on a slope/flat ground.

Do: Ask the children to record the wildflowers and grasses by counting the number of each within the hoop, recording what they find onto the sheet. When recording they need to think about:

- Identifying plants accurately – leaf shape, size
- Measuring – height
- Recording plant species and number

The quadrat can be divided into four quarters by placing two small canes over it, providing four children with their own small area to investigate, while one child records the answers. Allow 15-20 minutes per quadrat.

Discuss:

- **Variation:** What was the total number of plants you counted in each quadrat? Did some quadrats have more plants than others, or different species than others? Why might this be? Get the children to think about the different environmental factors that may vary across the meadow e.g. aspect, light/shade, wind exposure, underlying rock/soil.
- **Species richness:** How many different species did you record? Make a list of all of the species recorded by all groups (listing each species only once) to calculate the total sum of species for all the quadrats. A species-rich hay meadow can have up to 30 species in one square metre and 120 species within a field. How does your meadow compare?
- **Abundance:** What was the most abundant species in your quadrat? Why do you think this is?
- Get the children to imagine the density and variety of plants within the whole meadow i.e. they only counted a small part of the meadow, how can we use this information to estimate the total number of plants within the whole meadow? Or the total number of one species?

Explain: Often just looking at a meadow is not enough. Recording the number and variety of species in a meadow is very important. It tells us the abundance of each species, whether the meadow is species-rich or species-poor, or if it's missing a few important species. On-going monitoring and recording is also very useful as it tells us of any changes that are happening over time, such as the number of species reducing or increasing. This can be important when determining if factors such as climate change, pollution or different management by the farmer is affecting the meadow composition. The Yorkshire Dales Millennium Trust records and monitors meadows in the Yorkshire Dales. Using this information they work with farmers to make a field more species-rich by adding seed of missing species.

Follow-up: Using Excel or other software, get the children to create bar charts illustrating the abundance of different species. Compare and contrast results from different quadrats and explain possible reasons for any variation.

Wildflower variation

This activity requires the children to investigate the different shapes and colours of wildflowers and look at ways wildflowers can be grouped by their features.

Prepare: Print the double-sided *Wildflower variation* worksheet (pages 131-132) for each child.

Discuss: Read through the worksheet.

Do: In pairs or small groups, ask the children to record the shapes and colours of wildflowers within the meadow. Get the children to go to different parts of the meadow. Compare results.

Discuss: We can group wildflowers by their shape and colour. Many wildflower books and guides have keys to the wildflowers based on their shape and colour which can help us to identify them.

Follow-up activity: Look at different wildflower keys e.g. Wildflowers of Britain & Northern Europe (see page 161 for details) and make up a simple key for meadow wildflowers.

Plant hunter

Prepare: Print the *Plant hunter* worksheet (pages 133) for each child.

Do: Using the *Flowers and grasses of hay meadows* guide as an aid, get the children to sketch different wildflowers and grasses within the meadow, adding as much detail as possible.

Snapshot meadow

Ask the children to visit the meadow at different times of the year, photographing the stages of the hay meadow year. Where possible, build relations with the farmer/landowner so children know what is happening to the meadow in terms of how it is managed. See if the school can 'adopt' a local meadow so that the children can learn more about a specific meadow and put regular updates on the school website. Educational access farms may be keen to do this with local schools.

Topic 2: Mini-beasts

Mini-beasts of hay meadows

KS1 KS2

96% of all known animals are invertebrates and meadows support vast numbers of them. A simple bug hunt is an ideal activity that allows children to observe nature first-hand. By encouraging children to discover a variety of different mini-beasts, children will be able to see for themselves why a hay meadow is a valuable wildlife habitat.

A *Safe fieldwork guide* is on page 116. Please refer to this for advice and ensure that children are properly briefed on safety. Remind the children to handle bugs gently as they are very delicate, to not leave bugs in jars for too long, and to put all bugs back where they were found.

Prepare: Print the double-sided *What mini-beasts can you see?* recording sheet (pages 134-135) for each child. Alternatively the Natural History Museum provides national surveys on a variety of different habitats and species including bugs. The OPAL Bug Survey is an ideal meadow activity for children and a field notebook, pocket I.D. guide, species quest and an identification app can all be downloaded from www.opalexplorenature.org/bugscount, along with useful information about safe field working and identifying and recording the different species within a variety of habitats including grassland areas. Records can be entered onto a national database via the website.

Each pair or small group will need:
- pencil, clipboard and *What mini-beasts can you see?* recording sheet
- a small plastic spoon for scooping insects
- magnifying lens or jar
- collection pot
- white tray
- sweep net, if possible (these are ideal for surveying the upper layer of a meadow)
- desirable: camera, iPad or similar, insect guide (see page 161 for suggestions, there are also many apps available to download that may be useful)

Do: Ask the children to spend 2-3 minutes sitting quietly looking within an area of the meadow. Very carefully children can work their way down from the flowerheads past the stems to the soil level, recording what they see. By gently turning small stones over, the children can discover all sorts of mini-beasts lurking in the dark. Sweep nets are ideal for tall, grassy meadows and can easily be shared amongst the group. Encourage the children to practice with their nets first. Let the group spread out so they will not hit each other. By swishing the sweep nets in a figure-of-eight motion through the grass they will catch any insects living and resting on the plants. As soon as they have stopped moving the net, gather it together at the neck so none of the insects escape. Check for bees and wasps by listening for buzzing – if any have been caught then just open the net again and let them fly off. Empty the contents of the net out onto the white tray. You need to be quick with this as most creatures you have caught will fly off immediately!

Allow 20 minutes for this activity, by which time the children should hopefully have a full recording sheet. However, they may not want to tear themselves away!

Do different mini-beasts live in different parts of a meadow?

KS1

Prepare: Print the double-sided *What mini-beasts can you see?* recording sheet (pages 134-135) for each child or pair of children.

Do: Ask the children to carefully look for different mini-beasts within a meadow. Encourage the children to search in different places e.g. at soil level, on the plant, or in the air. Remind the children to work along the path edge to avoid trampling the meadow. After their search, ask the children where they saw their mini-beasts, were they in the air, on the plant or in the soil? How are the mini-beasts they found in the air different from the mini-beasts they found in the soil? Discuss why the mini-beasts are different and how this helps them to feed and live in their environment. Why do mini-beasts live in the meadow? Do the children think that the hay meadow is a good or bad place for mini-beasts to live? Why?

Adaptation within a meadow

KS2

Prepare: Print the double-sided *Mini-beast recording sheet* (pages 136-137) for each child.

Explain: In a hay meadow in summer, the grasses and wildflowers provide a structure to the hay meadow habitat and within this there are different layers. The wildflowers, grasses and seeds provide the upper layer, lower down the leaves and stems provide a middle layer, while the bottom layer is made up of leaf litter and soil. Ask the children:

- Do you think different creatures live in different layers of the meadow?
- How can we find out? Get the children to discuss various ideas.

Explain: Many animals adapt to their environment e.g. an owl has excellent night vision and sharp claws to help hunt its prey, the garden bumblebee has a long tongue allowing it to feed from deep-throated flowers such as foxglove, and the harvest mouse has a prehensile tail (capable of gripping) which is used to help them climb up tall grass so they can eat seeds.

- If different animals live in these different layers, how have they adapted to their environment?
- How can we find out? Get the children to discuss ideas.

Explain that through observation and recording, scientists can learn much about the numerous animal species on this planet, and this is what the children are going to do today.

Do: In pairs or small groups, get the children to select an area of the meadow and carefully explore the three different layers of the meadow and record their findings on the sheet.

Discuss: After the activity discuss the children's findings. What did they find and where? How do they think the mini-beasts have adapted to their environment? Is the meadow a good habitat for mini-beasts? Why?

Explain: One hectare of hay meadow contains up to 250 million insects, which in total weighs half a tonne, or as much as ten sheep! This is because within a meadow there are lots of micro-habits which support different species e.g. the different layers within the meadow structure – soil layer, leaf and stem layer and the upper layer with the wildflowers, grasses and seeds. Different species may also inhabit shady areas or sunny areas, damp areas or dry areas. All these insects in turn provide food for vertebrate predators such as mammals and birds.

Follow-up: Back at school, get the children to research their favourite mini-beast using reference books and the internet (see page 162 for details). Encourage the children to write about the mini-beast, where it lives in the meadow, how it has adapted to its environment, plus any interesting facts they can share with others.

Name:

My meadow palette

What colours can you see in the meadow today?

Put a tick on the colours you see and write down the name of the plant, if you know it.

Name:

Meadow treasure hunt (1 of 2)

Can you find these wildflowers and grasses in the meadow?

Put a tick in the box if you find the plant.

Meadow buttercup

Red clover

Crested dog's-tail

Yellow rattle

Sweet vernal grass

Selfheal

Ribwort plantain

Eyebright

Common sorrel

Can you find three other wildflowers or grasses in the meadow?

Without picking them or damaging them, can you draw them and then describe how they feel, smell and look?

Draw it here	Describe it here

Draw it here	Describe it here

Draw it here	Describe it here

Hay meadow recording sheet (1 of 2)

Name of meadow: Area number:

Recorders' names:

Meadow buttercup

Tally

Total

Meadowsweet

Tally

Total

Selfheal

Tally

Total

Betony

Tally

Total

Red clover

Tally

Total

Lady's mantle

Tally

Total

Rough hawkbit

Tally

Total

Bird's-foot trefoil

Tally

Total

Pignut

Tally

Total

Great burnet

Tally

Total

Eyebright

Tally

Total

Ox-eye daisy

Tally

Total

Wood crane's-bill

Tally

Total

Yellow rattle

Tally

Total

Common knapweed

Tally

Total

Ribwort plantain

Tally

Total

Hay meadow recording sheet (2 of 2)

In the boxes below draw and record numbers of any other meadow plants you find.

Tally

Total

Tally

Total

Tally

Total

Tally

Total

Tally

Total

Tally

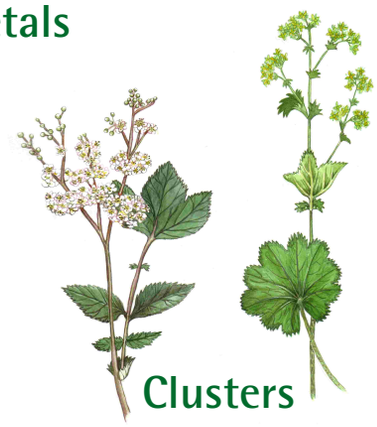
Total

Why don't all flowers look the same?

You might have noticed that wildflowers come in all shapes and sizes. Besides producing nectar, some plants use scent, flower colour and flower shape to attract different pollinating insects.

Because flowers come in so many different shapes, it's hard to group them. Here are some of their basic shapes to help us record them more easily:

Number of petals



Clusters

Composite (tight heads of small flowers)

Spiked

Lipped/ toothed

Umbel (flat heads of small flowers)

Bell or cup shaped

Globular (round)

Using the chart overleaf, your task is to investigate how many different kinds of wildflowers there are in the meadow and record their shapes and colours. Can you see what kinds of insects visit them too?

Some insects are better at pollinating plants than others, so many plants have evolved to cater for the needs of their best pollinator.

Unlike humans, many insects see in ultraviolet, so some flowers have dazzling ultraviolet colours allowing their insect to spot them from miles off!

Other wildflowers have different features such as 'landing pads' or lines on the petals to guide their insects in.

Some flowers aren't so fussy about which insect pollinates them but they still have to put on a show to compete with the other flowers.

This is why we see so many different kinds of flowers and insects in a hay meadow.

Name:

Wildflower variation (2 of 2)

Using the chart below, classify the different flowers you find in the meadow by colour and shape. Enter a tally in the correct box to show how many different plants you see (i.e. if you see two different blue flowers with five petals, put two tally marks in the right place). Also, in a separate notebook, record whether the flower is scented or not and which insects visit it.

Colour / **Shape**	White	Yellow	Orange	Red	Pink	Purple	Blue	Green
Four petals								
Five petals								
Six petals								
Lipped/ toothed								
Bell or cup shaped								
Globular (round)								
Umbel (flat heads)								
Clusters								
Spiked								
Composite								

Which shape is the most common?

What kinds of insects did you see?

Do any of the flowers smell?

What colour is the most common?

How many insects did you see?

Name:

Plant hunter

Use this sheet to make a sketch of the flower and leaf of each plant as you find it.

Use the *Flowers and grasses of hay meadows* guide to help you. If the plant is not in the guide, look it up when you get back to school.

Add details such as height, colour of flowers, unusual features and the name of the plant if known.

My plant sketch (remember to include flower and leaf)

My plant sketch (remember to include flower and leaf)

My plant sketch (remember to include flower and leaf)

My plant sketch (remember to include flower and leaf)

Name:

What mini-beasts can you see? (1 of 2)

Remember: bugs are delicate so only pick them up if necessary and handle them very gently. Always put the bugs back where you found them. If you put a bug in a jar to study it, keep it out of direct sunlight and release it as soon as you can afterwards.


Froghopper


Beetle


Caterpillar


Spider


Snail


Slug


Ladybird


Butterfly


Moth


Bumblebee


Fly


Grasshopper


Earwig


Worm


Woodlouse

What mini-beasts can you see? (2 of 2)


Leatherjacket


Click beetle


Meadow brown butterfly


Hoverfly


Dor beetle


Six-spot burnet moth


Common blue butterfly


Chimney sweep moth


Millipede


Centipede


Cranefly


Soldier beetle


Shield bug


Damselfly


Garden spider

Remember: bugs are delicate so only pick them up if necessary and handle them very gently. Always put the bugs back where you found them. If you put a bug in a jar to study it, keep it out of direct sunlight and release it as soon as you can afterwards.

Name:

Mini-beast recording sheet (1 of 2)

Remember: bugs are delicate so only pick them up if necessary and handle them very gently. Always put the bugs back where you found them. If you put a bug in a jar to study it, keep it out of direct sunlight and release it as soon as you can afterwards.

Mini-beast name:

Where did you see it? Tick one box

Soil layer ☐
Stem and leaf layer ☐
On flower, seeds or in the air ☐

How has the mini-beast adapted to its environment?
E.g. how does it move? What colour is it?

Sketch your mini-beast here:

Mini-beast name:

Where did you see it? Tick one box

Soil layer ☐
Stem and leaf layer ☐
On flower, seeds or in the air ☐

How has the mini-beast adapted to its environment?
E.g. how does it move? What colour is it?

Sketch your mini-beast here:

Overleaf list other mini-beasts that you find and record where you found them.

Mini-beast recording sheet (2 of 2)

List other mini-beasts that you find and record where you found them.

Mini-beast name:	Soil layer	Stem and leaf layer	On flowers, seeds or in the air

Section 7: Meadow reflections and celebrations

This section helps the children to reflect on their meadow visit, on what's being done to protect the meadows and their barns and walls, and on practical things they can do to help. It then moves onto a variety of haytime songs, poems and recipes that allow the children to experience what life might have been like on a Dales farm around haytime in the past and to celebrate haytime and meadows generally. These activities and previous work could lead to the 'mell' - the haytime feast and celebration. Finally there are some puzzles which help to consolidate learning from previous sections.

Some activities in Topics 3, 4, 5 and 7 can be carried out before the meadow visit if you wish.

Topic 1: My meadow experience

Meadow visit press release

KS1 KS2

Do: Ask the children to recount their meadow visit experience as a press release for a local newspaper or the school magazine or website. Encourage the children to explain the purpose of the visit, what was learnt by the experience, and what conclusions can be drawn or what happens next i.e. what are the children doing back at school as a result of their visit. Encourage the children to use photographs or drawings to illustrate the day's activities. Ask the children to interview others about their viewpoints, experiences and what they learnt, and use these comments within their text.

Extension: As newspaper reporters, do they have a special message about hay meadows they wish to convey? Encourage the children to use persuasive text to influence others.

Design a 'My Local Meadow' leaflet

KS2

Do: Ask the children to design a leaflet (or school webpage), either individually or as a class. The leaflet could include a map, directions, interesting features, details about the flora or fauna to look out for at different times of the year, plus any historical information. The children could also provide self-guided walk information for a 'My Local Meadow' app.

Topic 2: Looking after meadows, barns and walls

Our very own meadow!

KS1 KS2

Making a meadow in the school grounds is an excellent activity to help children learn how plants grow and it also provides a safe study area for children to investigate flora and fauna in future years. Making a meadow with wildflowers and grasses that grow locally also helps to benefit a wide variety of wildlife as well as supporting the local seed bank. Often children (and adults) feel powerless to do anything about adverse changes to the countryside and the effects on nature, but by caring for a wildflower meadow area within the school grounds children can do something positive and make a real difference for wildlife in their area.

North Yorkshire County Council provides some excellent information about planting within school grounds (see page 162 for website details).

Do: Read to the class the ***Our very own meadow!*** sheet (page 145). Within the pack you'll find a Wildflower Seeds packet containing the seed of several species collected from meadows in northern England: Rough hawkbit, Bird's-foot trefoil, Cowslip, Selfheal, Meadow buttercup, Lady's bedstraw, Ox-eye daisy, Common sorrel and Red clover. Ask the children to find these species in the ***Flowers and grasses of hay meadows*** guide (pages 49-52. Note that two species aren't included in the guide). Did they see any of the species during their meadow visit? Use the information on the sheet to plan, make and manage a meadow area within your school grounds.

The Hay Time project

KS2

Do: Read to the class *The Hay Time project* sheet (page 146). Ask the children whether they think the project is a good idea. What other ideas do the children have for helping hay meadows, wildflowers and wildlife in their area? What can they do to help?

The Hay Time game

KS1 KS2

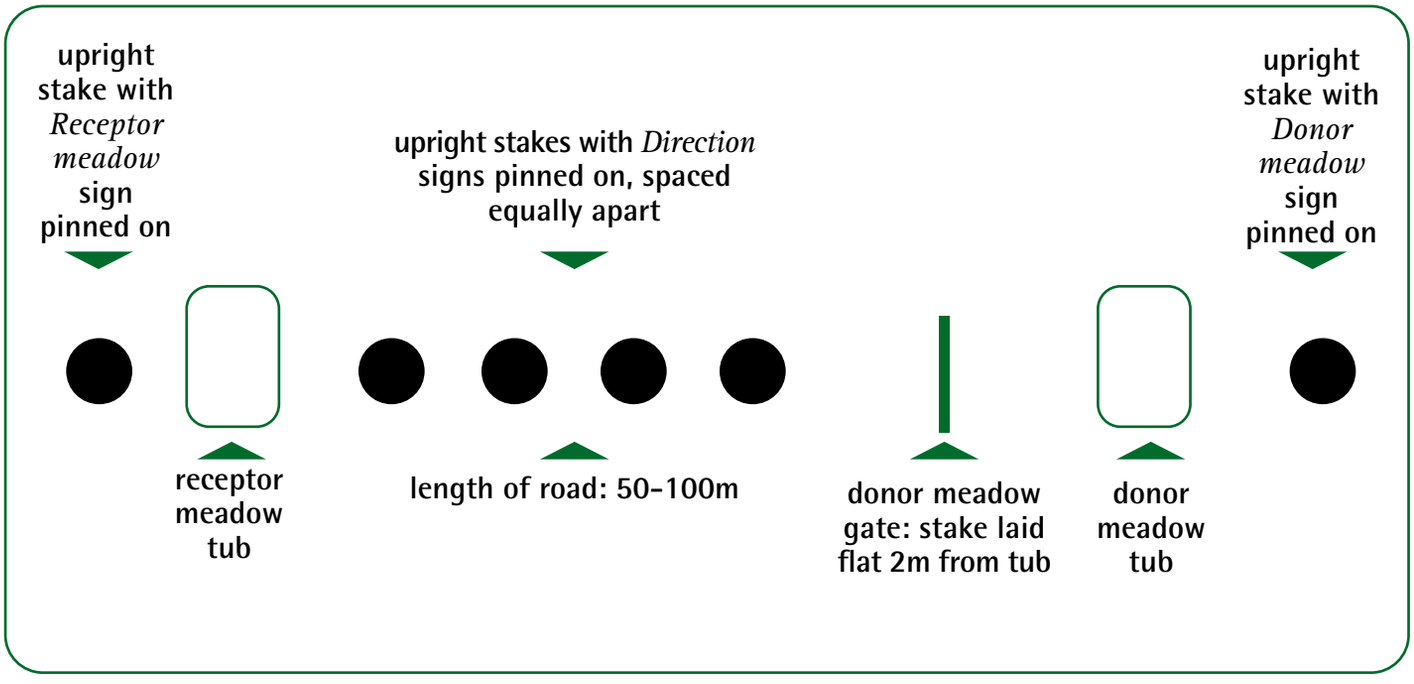
This game is loosely based on how the Hay Time project works to restore meadows: harvesting seed from a species-rich 'donor' meadow and spreading it on a species-poor 'receptor' meadow to re-introduce wildflowers and grasses. Each team needs to harvest seed from the donor meadow (collect dried pulses from a tub), transport it to the receptor meadow (run with the seed along a 'road'), and spread it (put the seed in a tub). The game should be played on a playing field and could be included in the school's sports day.

Prepare: There is a bit of printing and laminating to do the first time the game is played, but these resources can be kept in the pack for future use. The game is played by 2-6 teams, with each team having 4-6 team members. Some team members may need to play twice to make the numbers appear equal. Teams are named after one of six dales (see page 5 for a list of dales you could use). Decide how many teams there will be and set up the game accordingly. Each team needs:

- At least four 'seeds' per team member e.g. red lentils, green lentils, peas or beans (don't forget that some team members may be playing twice). Alternatively use coloured counters
- Two margarine tubs
- A yoghurt pot
- Seven stakes or bamboo canes
- Drawing pins
- A *Donor meadow* sign and a *Receptor meadow* sign (page 147), with the name of the same dale written on each, cut out, laminated and pinned to a stake
- Four *Direction* signs (page 148), cut out around the outline of the arrow, laminated and pinned to stakes

The teacher will need a whistle to start, pause and finish the game.

Each team needs a 'course' set up like this:



The Direction signs should point left and right alternately, to simulate a winding Dales road.

Playing the game:

1. Read to the class the following (possibly while showing the children a course):
The Hay Time project harvests seed from a meadow with lots of wildflowers in it, called the donor meadow, and spreads the seed on a meadow that has lost some of its wildflowers, called the receptor meadow. This helps to make the receptor meadow full of wildflowers again, making it better for wildlife and people. The class will be split into teams and each team will be named after a different dale. Each team will have a course with a donor meadow, a winding road, and a receptor meadow. In the donor meadow there is a tub with wildflower seed in it. For the game, we're pretending that [dried lentils etc] are the seeds. Team members take turns to find four seeds in the tub, which you put in a yoghurt pot and then run to the receptor meadow, following the direction arrows in the road. When you get to the receptor meadow, put the seeds into another tub and run back to the donor meadow, again following the direction arrows in the road. Hand the yoghurt pot to the next team member and then stand near the Donor meadow sign. The game carries on until all team members have had a go and got [total number of seeds] seeds to the receptor meadow and all team members are back at the donor meadow. When the first team finishes I'll blow the whistle to pause the game. Everyone should stay exactly where they are. I'll check to see that all of the team's seed has got to the receptor meadow. If it has, they've won the game. I'll then re-start the game to find the runners-up.

2. Now read out the rules of the game:
- You have to stay behind the Donor meadow gate until it's your turn to run.
- You can only look for seeds when you've got hold of the yoghurt pot.
- If you drop a seed or if you don't realise you've dropped a seed until you get to the receptor meadow, you have to run back to the donor meadow and get another seed and then run to the receptor meadow again. If all of your team's seeds aren't in the receptor meadow tub at the end of the game, your team is disqualified.
- The Direction signs on the road always have to be followed, and if a sign is knocked over, you have to put it upright again straightaway (teachers can help if necessary).

3. Split the class into teams of 4-6 team members. Some team members may need to play twice to make the numbers appear equal. Name each team after one of the dales that the courses are named after. Get the children to decide the order in which they'll play in their teams and give the first player a yoghurt pot.

4. Send the teams to their course. All team members should be stood behind their Donor meadow gate.

5. Start the game by blowing the whistle.

Variations:
- Change the number of seeds each player has to get.
- Use a large spoon instead of the yoghurt pot.
- Change the length of the 'road' or the number of direction changes or introduce other obstacles.
- Use a bucket as the donor meadow tub, half fill it with sand and mix the seeds in with the sand. You will probably want to increase the number of seeds to make it easier for the children to find them.
- Introduce 'Hay Time hazards' that affect one team at a time. Mentally give each team a number from 1 to 6 and throw a dice to randomly choose a team. Blow the whistle to pause the game and read out one of the hazards in the box opposite. To make it fairer, if a team is chosen more than once, keep throwing the dice until another team is chosen.

Hay Time hazards

- The seed harvester in [name of team] has broken down. When I blow the whistle again the other teams can continue but [name of team] team members have to stay still for ten seconds. Wait for my signal to continue.
- There is a lot of slow-moving traffic on the [name of team] road. When I blow the whistle again the other teams can continue but [name of team] team members have to stay still for ten seconds. Wait for my signal to continue.
- There is heavy rain in [name of team] which means that the seed harvester can't work properly. When I blow the whistle again the other teams can continue but [name of team] team members have to stay still for ten seconds. Wait for my signal to continue.
- A [name of team] farmer is moving his sheep and traffic has to wait until the road is clear. When I blow the whistle again the other teams can continue but [name of team] team members have to stay still for ten seconds. Wait for my signal to continue.

Field barns and dry stone walls

KS1 KS2

Prepare: Print the double-sided *The future of field barns and dry stone walls* sheet (pages 149-150) for pairs or small groups.

Do: Ask the children why they think the barn and walls have fallen down? How do the children feel about this? Do they care about what happens to the barns and walls? What would the Yorkshire Dales landscape look like if all the barns and walls disappeared? Turn the sheet over and read the different viewpoints. What opinions do the children have? What would they do?

The Yorkshire Dales National Park Authority is currently developing long-term strategies for managing traditional farm buildings including the potential for converting buildings to other uses, maintaining them in agricultural use, and even accepting that some barns will fall into disrepair and that some might be used for building materials.

Topic 3: Songs and poems

Songs and poems

KS1 KS2

This activity can be carried out before the meadow visit if you wish.

Discuss: Read to the class the *Songs and poems* sheet (page 151). Can the children decipher what they mean? Discuss local dialect and how words used to be written as they were spoken. Look at other poems about meadows (see page 161 for details). Build up a word bank of describing words used by different poets. This can be used in later poetry writing activities.

My meadow poem

KS2

Prepare: Print the *Meadow poems* sheet (page 152) for pairs or small groups. You may also wish to print the *Songs and poems* sheet (page 151).

Do: Read to the class the poems. You may also wish to refer back to any work you've already done. Get the children to respond to each poem and encourage them to think about:

- What type of poem is it (sonnet, ballad, haiku, acrostic, shape, lyric, ode, etc)?
- What is the poem about?
- Are metaphors/similes used to explain ideas?
- Are the five senses used to arouse certain reactions in the reader?
- How is the poem organised (lines, verses, layout and shape)?
- Does the poem rhyme?
- Think about the choice of words and the sound of the poem
- What message, if any, is the poet trying to convey to the reader?
- What is your response to the poem? How does it make you feel?

Do: Brainstorm the children's thoughts and experiences about their meadow experiences and knowledge about hay time. Ask the children to decide on the type of poem for their meadow poem (eg acrostic, sensory poem, haiku or shape). Get them to think about what they want to describe and what similes or metaphors they can use to add meaning to their poems.

The Meadowlands

KS2

Discuss: Read to the class *The Meadowlands* poem (page 153). What do the children think of the poem? What message is the poet trying to convey? Why should we save the meadows? Write a list of reasons for and reasons against keeping hay meadows in the Yorkshire Dales, while getting the children to think about the importance of species-rich hay meadows for:

- Farming (is hay still an important fodder crop?)
- Wildlife (importance as both a habitat and an ecosystem)
- The local economy (visitor numbers to the National Park)
- Historical and cultural value
- Our enjoyment (escape from cities and busy working lives, a place where we can see and enjoy nature)

Grants are currently available to support farmers who manage species-rich hay meadows but in the future this might stop. How do the children think this might affect hay meadows? What would the children like to see happen to hay meadows in the future? How would they like their Yorkshire Dales to look?

Do: Imagine that the government is going to let local people to decide upon the future of the countryside and meadows. Ask the children to write persuasive text or poem about how they feel about hay meadows and what they want to see happen to them in the future.

Topic 4: Haytime recipes

Haytime recipes

KS1 KS2

The recipes on pages 154-155 are mostly typical recipes that were used during haytime but are here adapted for the children to make in the classroom or kitchen. The recipes could be made just before your meadow visit and the children could take them on their visit. You could even re-enact the 'drinkings' (see page 92) and encourage the children to dress up in 1940s-style clothing. Try to make it as authentic as possible by bringing drinks out in pitchers and food in wicker baskets.

Topic 5: Celebrating haytime

The mell

KS1 KS2

The end of a busy summer's haytiming was often celebrated with the mell, an indoor feast which included whatever food was available at the time, such as ham, eggs, curds tarts, scones, cakes, and fruit pies. The feast not only celebrated the end of haytime and gathering a good crop of hay, it was also a way to thank all of the farm workers, especially those such as the Irish workers who faced a long journey home or were off to harvest other crops once haytime was over. Sometimes the mell went on late into the evening, the fiddle would be picked up and a little dancing done.

Do: The mell can be an ideal end of term or end of theme party. It can be linked to the My Perfect Meadow drama activity (pages 109-111) which can be turned into a play for parents to watch. The children could also learn traditional barn dances to perform in front of parents, or decorate hay bales which parents or other classes could judge.

Topic 6: Haytime fun

Haytime quizzes

KS1 KS2

These fun activities aim to consolidate the children's learning, especially about meadow wildflowers and grasses (Section 2) and traditional haytiming (Section 4). The quizzes are on pages 156-158, while the answers are on pages 159-160.

Our very own meadow!

Wildflower meadows in your school grounds can provide a fantastic haven for wildlife and a great study area for all sorts of fun and educational activities for years to come.

Things to think about when planning your meadow area

- To ensure plants don't get trampled or damaged, choose a quieter area of the school grounds away from football pitches or areas of high use.
- Place the meadow within view of the school so that it can be best appreciated.
- The meadow should be in a sunny location, as most meadow species don't do well in the shade.
- The size and shape of the meadow is not important, it can be simply a square metre left un-mown. If you create a larger area, you may wish to mow a path through it to make access easier for studying.
- Most meadow plants require the soil pH to be between 5.5 and 6.5. Test kits are readily available from garden centres if you wish to check the pH. Add ground limestone to raise the pH (raise it to 5.5 or above) or ferrous sulphate to lower the pH (reduce it to 6.5 or lower).
- The Wildflower Seeds packet included in the pack is sufficient for two square metres. If the seed has already been used (or if you are making a larger meadow) you can buy British or regionally-sourced meadow seed and plug plants from a seed company. The *Into the Meadows: Flora* sheet (page 53) lists the species found in hay meadows in the Yorkshire Dales. Visit Flora locale's website (details on page 162) for a list of seed companies.
- Your meadow will need on-going management if the wildflowers are to get established and flourish.

Making your meadow

1. Decide in early spring where your meadow will be located and mark it out.
2. Let the vegetation grow during spring and summer to see what plants come up naturally.
3. In September cut and rake off all the vegetation (which can be composted).
4. Rake the ground to create areas of bare soil.
5. Sow the seed at a rate of 3 grams per square metre. A flour shaker can be used to do this. For areas bigger than a few square metres you might want to mix the seed with sand, as this helps you to spread the seed evenly and you can see where seed has already been sown.
6. Don't rake the seed into the soil - it needs to lie on the surface.
7. Ask the children to pretend to be sheep and cattle walking over the meadow! This will press the seed firmly onto the soil.
8. Water the area regularly during dry weather.

Managing your meadow

From September until the grass stops growing the meadow should be mown regularly to a height of 2-4cm, otherwise the seedlings will be shaded out. Start mowing again in early spring but stop in mid-April to allow the wildflowers to grow (bearing in mind that many species take a couple of years before they flower). In mid-July (or September, when the school re-opens) mow the meadow to a height of 5cm. Leave the cuttings for a day or two to allow any wildflower seeds to be shed and then rake the cuttings off and compost them.

In the second and subsequent years, mow whenever the vegetation grows to 10-15cm tall but don't cut it shorter than 5cm and stop mowing between mid-April and mid-July (or September). Always rake the cuttings off, but after the summer cut leave the cuttings for a day or two before raking them off. Never add fertiliser, as this will only help the grasses to out-compete the wildflowers.

After a few years, once the wildflowers are fairly established, following the summer cut you could try leaving part of the meadow uncut until early spring, so that birds can feed on the seed heads and insects can hibernate in the long grass.

The Hay Time project

In the Yorkshire Dales we're lucky enough to have some of the best hay meadows in Britain. This is because many farmers are in special schemes, such as Higher Level Stewardship, which supports them to manage their land in ways that are good for the environment. Schemes also enable farmers to restore meadows, but this can be difficult to do.

To help farmers restore their meadows, the Yorkshire Dales Millennium Trust and the Yorkshire Dales National Park Authority set up the Hay Time project in 2006. We survey meadows and use special machinery to harvest wildflower seed from species-rich meadows. The seed is then spread on nearby fields to re-introduce wildflowers and grasses. This gives nature a helping hand in dispersing seed from meadow plants.

Restoration can take many years, though. Some species, like yellow rattle, can quickly become established in a year or two, whereas other species, such as wood crane's-bill, can take several years and only very slowly spread through the meadow. By re-surveying meadows after seed has been added we can see what effect the work is having, and the good news is that the meadows are becoming more species-rich - the wildflowers are coming back!

More than 200 meadows (almost 400 hectares) on 74 farms have had seed added to them, and in time they'll become better for wildlife, the landscape, and for people.

Harvesting seed from a species-rich meadow

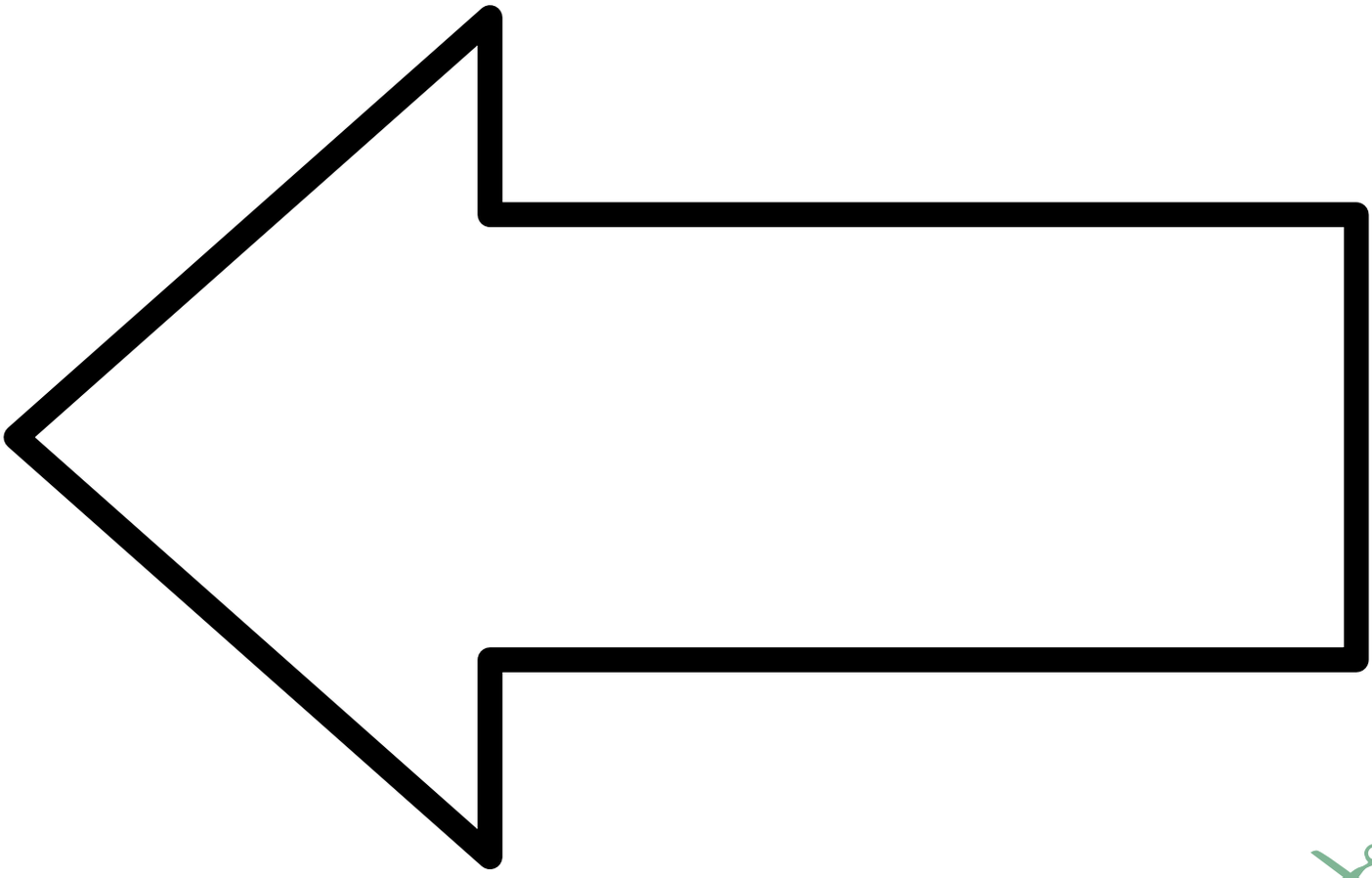
and spreading it on a meadow that's being restored.

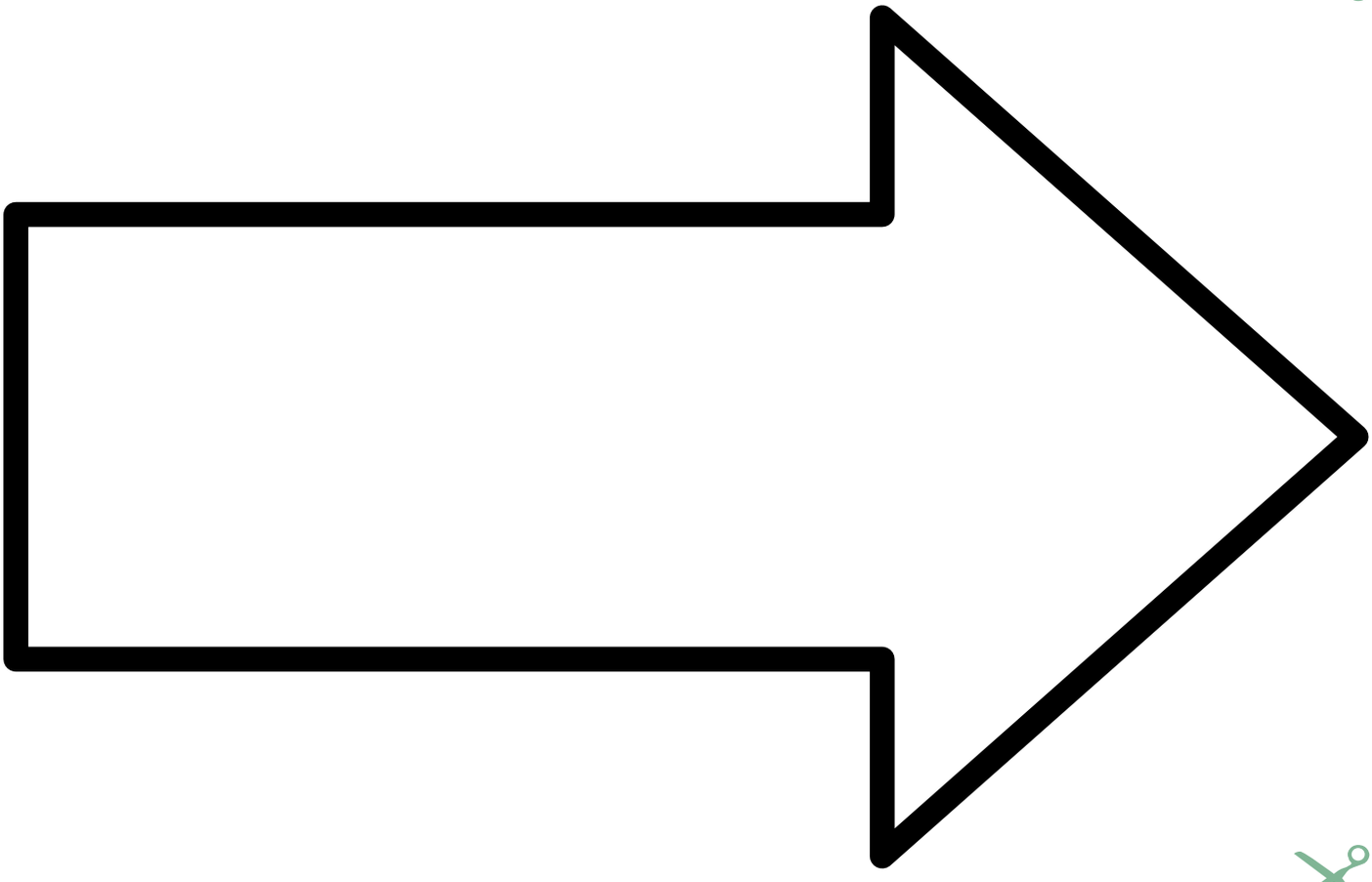
.....dale

donor meadow

.....dale

receptor meadow





The future of field barns and dry stone walls (1 of 2)

Traditional field barns and dry stone walls help to make the Yorkshire Dales National Park special. Many barns have remained unchanged for centuries, providing important historical evidence of farming practices, while others are of significant archaeological importance in their own right. Along with dry stone walls, field barns make a major contribution to our wider landscape character and scenic beauty, encouraging visitors from far and wide, who in turn help boost our local economy.

Despite their importance, many field barns face an uncertain future. Modern-day farming has little use for them, and many dry stone walls aren't needed any more to manage the movements of livestock between fields. Without a purpose farmers have little incentive to maintain them. Increasingly, many field barns and walls are falling into disrepair, but many people believe something needs to be done to ensure that they are not lost from the landscape altogether. Grants to help pay for the restoration of barns and walls have helped slow down the decline, while some barns have found new uses which fit into planning regulations so that their unique character is not altered.

The Yorkshire Dales National Park Authority has the difficult job of deciding what to do about traditional farm buildings, for the good of the National Park area and everyone who lives in it. However, it's often hard to strike a balance between keeping the distinctive qualities that makes the Dales a special place and the present and future needs of people.

A neglected barn with wrapped silage outside.

A barn being re-roofed and restored.

A tumbled-down wall replaced with a post and wire fence.

A skilled waller rebuilding a section of wall.

The future of field barns and dry stone walls (2 of 2)

Different view points, what's yours?

I could turn barns into houses or apartments and make lots of money - and give people a place to live.
Patricia Turner, property developer

If all the barns were turned into houses we would lose the peace and quiet of the countryside.
Mary Jackson, local resident

I want to live on my mum and dad's farm but there's no space, we do have lots of disused barns though.
Jack Middleton, age18, local resident

I want to adapt my barn so I can fit my big tractor in it.
George Dent, farmer

I could sell the stone from old barns and walls and make money.
John Andrews, local builder

If barns were converted into houses what would happen to the wildlife such as bats that make use of them? They're disturbed enough as it is by humans and will have even less space to live in.
Colin Dinsdale, local resident and nature lover

Yuk, if barns were converted to houses think of all the extra sewage draining onto the land, let alone the eyesore of extra tracks and roads and cars going back and forth.
Betty Hill, conservationist

Let them all fall down, we don't need them anyway.
Ben Bransby, local resident

I've lived in the dales all my life and it's a shame to see the barns and walls fall down. They're part of our heritage, but we need to put them to a use to save them.
Kathleen Kirkland, farmer's wife

I live in Leeds and it's great to escape city life and come to the Dales. I really appreciate the wild, open space and beautiful landscape. It would lose its natural charm if it got more built up, I'd probably go somewhere else if it did.
Nick Appleton, postman, Leeds

Irish lament
(author unknown)

The weather's wet and stormy
And the hay is going black
The fog is growing rapidly
We cannot keep it back
But are we downhearted?
No, we live on beans and pork
And ready for the sunshine
That we can use the fork

Ballad
(written by John Clare, 1793-1864)

We'll walk among the tedded hay,
That smells as sweet as flowers;
While the meadow water winds its way
Beneath the hawthorn bowers.
And when the bright green haycocks throw
Their shadows from the sun,
When thou art weary there we'll go,
And rest, the heat to shun.

We'll to the hawthorn shades retire,
Where blooms the wild dog rose;
And smell the sweetly scented briar,
Where the shining river flows.
We'll talk o'er joys we once could prove,
And blithely spend the day,
For those pleasant dreams of early youth
Can never pass away.

I's farming up i'Swodill
(lyrics written by William H Calvert during a winter storm in Swaledale in 1947)

I's farming up i'Swodill and I's gitten short of hay;
This storm it's made a mess o' me in ivvery sort of way,
For when I started winter I thowt I'd hev hay to spar,
But now it's nearly finished and I'll hetta late some mar.

(Chorus)
I've fothered me yows and I've fothered me cows but this weant last si lang,
Me neighbours keep on asen me and mi wife she fairly talks,
But to tell you t'truth all'd hay I've left is a lile bit on a boax [hay loft].

Now when I go to sleep at neet I dream of nowt but hay,
And oft I luke at'd almanac and count up t'days till May,
But it'll be a bit afore I see the grass begin to sprout,
Oh how I wish that I could sit and hear the cuckoo shout.

Oh what a brawl the cows all give when I turn out each day,
Their tongues are hanging from their mouths all waitin' for their hay,
I've put 'em all on rations now, but that'll sune be done,
I give 'em all a nice lile bit then shut the duer and run.

Write your own poem about hay time, meadow flowers, or a particular creature that lives in a hay meadow. Think about the different colours, smells and sounds that you find in a hay meadow. Use these poems to give you some ideas.

Gathering the Goodness

by Maggie Norton

This field's hayed in late July.
We lets it lie and turns it over
next day we turns again to dry

and sets in rows. Led by clover
all the flowers have dropped their seeds
and now the baling machine recovers

the rainblest leavings from fragrant weeds
and we bales into warm blocks of hay,
cold winter's precious feeds

from the untroubled exuberance of May.
Our stock show the power of dolly mixture
weeds to upload the deepest nutrients

by sleek coats of healthy texture.
We'll have fewer bills from vets
during winter's coming fixture.

Until late autumn the meadow rests
while wind and weather determine its days
then our stock come in to graze again
on new grass grown in healing rain.

Clock's Ticking Farmer!

by Maggie Norton

I'm open-mouthed
and purple-toothed,
I'm yellow rattle,
hear my pepperpot
seed-head prattle
in the breeze when
I tittle-tattle.

'Time to get up, get
cracking on the hay
grown tall from the
seedlings quickened
in May
wheel out the machines
on a July day!'

I push my suckers into
grasses' roots
and steal their minerals
as I raise my shoots
clear of trampling hooves
or boots.

I fetch up iron, I fetch up zinc
so I'll keep your wintering beasts
in the pink
yellow rattle, yellow rattle,
tink, tink, tink.

Meadow Acrostic Poem

Blade-like leaves spear the air
Each one in an opposing pair,
Tooth-shaped petals bright purply-pink,
Outshine other flowers, so you might think.
Noblest of all, in all its glory
Yet scares off ghosts, well that's the story!

The Meadowlands

by Alan Hartley

Keep safe the meadowlands; find them in May,
June or July when you may catch
Their fragrant breath on summer breeze, and see
Their fragile blooms wave in the restless green,
The Cowslip, Heartsease, Sorrel and Selfheal,
Speedwell and Meadowsweet, Clover and Vetch.

Keep safe the meadowlands, the ancient ground,
The founding soil of settled ways,
The land our ancestors reclaimed from bog
And bracken scrub for Fescue and Field Brome,
Ryegrass and Meadow Oat, Cocksfoot and Bent,
Vernal and Darnel and soft Yorkshire Fog.

Keep safe the meadowlands, a gift from heaven,
A bounty that is double given.
In summertime enjoy their beauty, free,
And hold that precious memory in store,
That you may gladden dull, cold, winter days
Walking the sunlit meadowlands once more.

Keep safe the meadowlands, the quiet calm;
Treasure their humble flowerings
And guard their innocent, unworldly ways,
For all they ask is rain on a poor soil
And time to set their seed before
The reaper takes his yearly toll.

Keep safe the meadowlands, if they should go,
Our children's children may not ever know
To care about
The loss.

Elderflower cordial

Working with hay could tickle your throat, elderflower cordial was a refreshing drink to take out to the workers in the field at haytime.

This recipe makes about a litre of cordial. A lot of sugar is used so the cordial should last for several months even if you don't add the citric acid. It also freezes well. Pick the elderflower heads when the elder trees are in flower in June.

Ingredients
2 lemons
15 heads of elderflower (checked for insects but unwashed)
1kg sugar
750ml water
35g citric acid (optional)

Method
1. Use a fork to remove the elderflowers from the stalks.
2. Carefully grate the zest from the lemons and then squeeze them and put the zest and the juice in a large bowl.
3. Now put the elderflowers in the bowl.
4. Bring the water to the boil in a saucepan, turn off the heat and add the sugar, stirring until it's dissolved.
5. Allow to cool for 10 minutes.
6. Pour the warm syrup over the elderflowers and stir in the citric acid if you are using it.
7. Cover the bowl with cling film and leave it in a cool place for 24 hours.
8. After this time, stir the mixture and strain it through a sieve lined with sterilised muslin into sterilised bottles.

Haytime trifle in a jam jar

Traditionally eaten in the hay meadows of the Yorkshire Dales during haytime, this sweet treat would have been very refreshing. It makes a great addition to any modern picnic too.

Makes 8-10 jars depending on the size of your jam jars.

Ingredients and materials
8-10 clean jam jars with lids
8-10 slices of white bread
1/2 jar (or more to taste) of raspberry jam
1 raspberry jelly made up to 1 pint
1 pint of custard

Method
1. Wash the jam jars and lids in hot water and dry.
2. Make up the jelly in a jug according to the instructions on the packet.
3. Make the custard in a jug according to the instructions.
4. Remove the crusts from a slice of bread, spread it with jam, cut it into 4-6 pieces and drop them into the bottom of a jam jar. Do this for each slice.
5. Half fill each jar with the warm liquid jelly.
6. Leave the jelly to cool and set (put the jars in a fridge to speed up the process if you can) and then top them up with custard.
7. When the custard is cool put the lids on the jam jars.

Fruit scones

At a traditional Yorkshire Dales 'drinkings', these scones were served warm (just out of the oven) with butter and homemade raspberry or rhubarb jam. This recipe makes 12 scones.

Ingredients
250g self-raising flour
40g butter or margarine
125ml milk
25g sugar
75g of currants or sultanas
Equipment
Weighing scales, baking tray, sieve, mixing bowl, measuring jug, palette knife, flour dredger, rolling pin, round scone cutters, pastry brush, oven gloves and cooling rack.

Method
1. Preheat the oven to 220^{o}C (gas mark 7).
2. Grease a baking tray.
3. Sift the flour into a bowl.
4. Using your fingertips, rub the butter or margarine into the flour until it resembles fine breadcrumbs.
5. Add 25g sugar and 75g currants or sultanas.
6. Pour in the milk a bit at a time and mix to make a soft dough. Save a little of the milk.
7. Place the dough on a floured working surface and knead lightly.
8. Roll out the dough until 1.5cm thick.
9. Shape into scones using a cutter.
10. Place the scones on the baking tray, brush the tops with a little milk and bake for 12 - 15 minutes until golden brown.
11. After baking, place the scones on a cooling rack.

Handy hints
When rubbing the butter or margarine into the flour, lift your hands to help get air into the mixture. Shake the bowl to encourage large lumps to the surface.

Into the Meadows buns

Although not a traditional haytime recipe, this is a fun activity for the children to do. Each child decorates a bun with a wildflower or mini-beast, using the Flowers and grasses of hay meadows guide (pages 49-52) and the Mini-beast sheets (pages 134-135) to help with ideas and design. This activity could be carried out after the meadow visit and the children can decorate their bun with a wildflower or mini-beast that they saw in the meadow.

Ingredients
Plain bread buns (one per child)
Icing sugar
Various food colourings
Sprinkles and other edible decorations (optional)

Method
1. Make up the coloured icing sugar.
2. Give each child one of the buns.
3. Provide each pair of children or small group with various colours (and sprinkles etc if used) so they can decorate their buns with a wildflower or mini-beast.
4. When finished, set the buns aside to let the icing sugar set.

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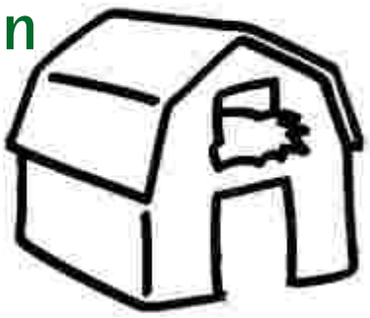

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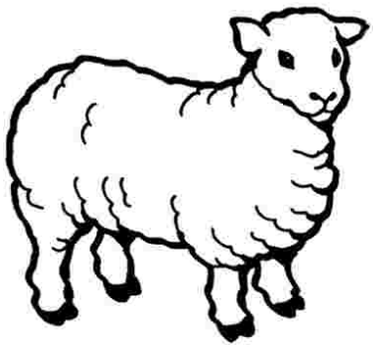

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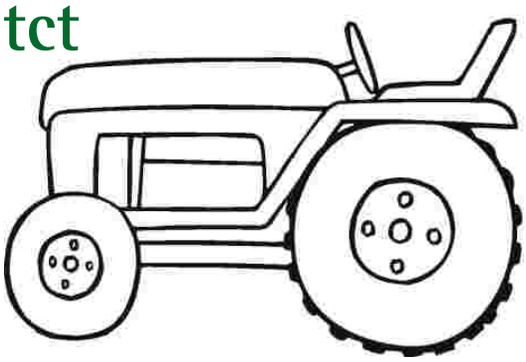

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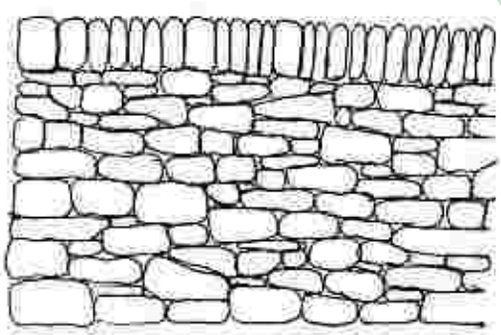

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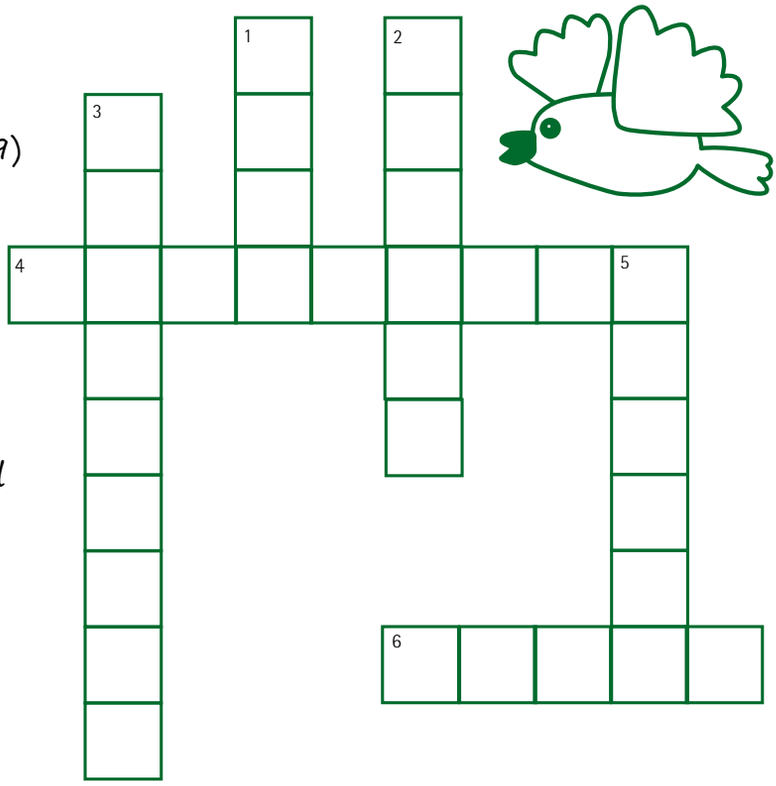
Haytime crossword

Across

4. Morning treat for haytime workers (9)
6. Little haystacks (5)

Down

1. Where hay is stored (4)
2. Cutting hay (6)
3. This noisy bird used to be heard at haytime (9)
5. Sharp hand tool that used to be used to mow hay (6)

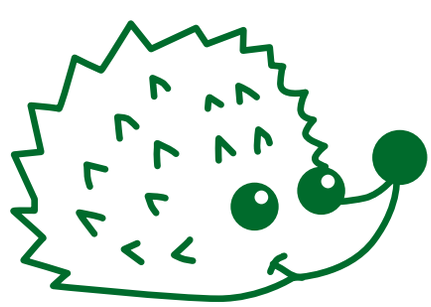


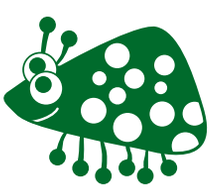
Haytime wordsearch

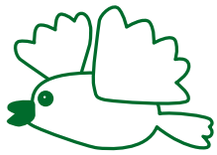
Can you find these haytime words? The answers run in all directions.

D	I	R	I	A	B	M	C	W	P	T
D	R	R	O	A	O	E	I	I	I	E
W	E	I	R	W	K	N	U	N	T	G
E	A	N	N	A	E	E	G	D	C	D
M	A	I	R	K	L	N	R	R	H	E
E	C	Y	I	A	I	O	N	O	F	L
E	A	P	B	W	T	N	D	W	O	S
H	R	Y	E	C	R	S	G	S	R	M
A	A	R	A	T	N	L	R	S	K	H
H	T	R	O	S	W	E	E	P	P	E
S	T	E	K	A	R	C	N	R	O	C

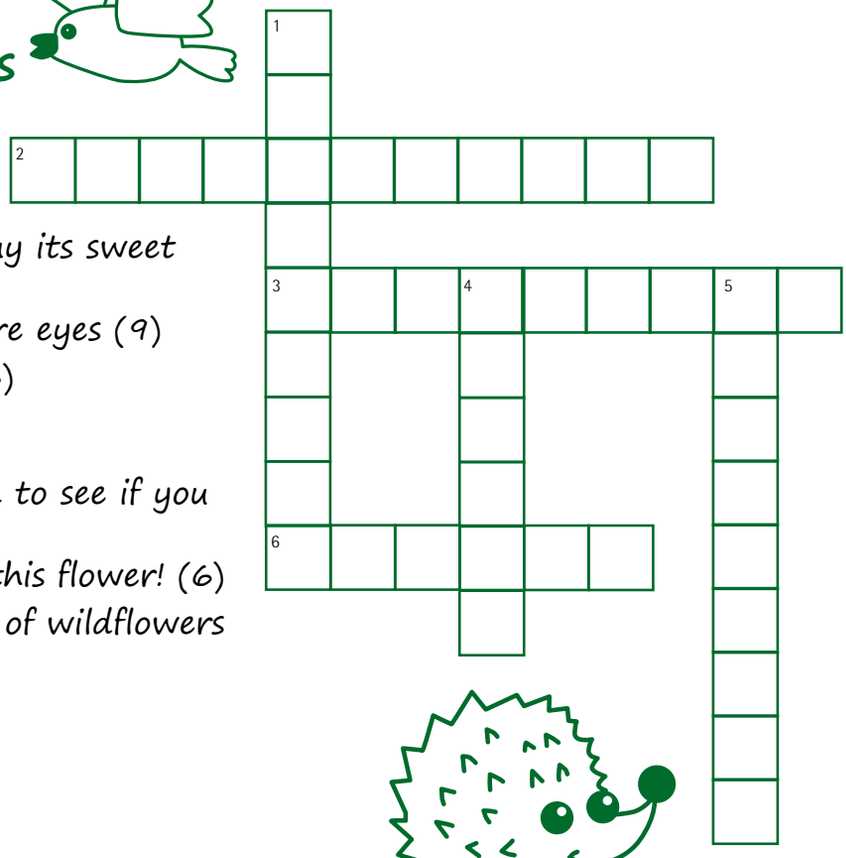
BARN
CORNCRAKE
DRINKINGS
HAYBALE
HAYRAKE
MEW
MOW
PIKE
PITCHFORK
SLEDGE
STREWING
SWEEP
TRACTOR
WINDROWS







Wildflowers and grasses crossword

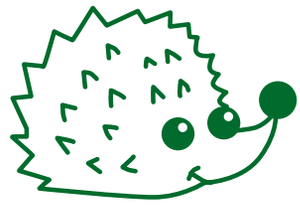


Across

2. This grass gives newly mown hay its sweet smell (5,6)
3. This plant was used to treat sore eyes (9)
6. Pigs love to dig this plant up (6)

Down

1. Hold this plant under your chin to see if you like a dairy product (9)
4. Ghosts are said to be scared of this flower! (6)
5. A place where you will find lots of wildflowers and grasses (3,6)

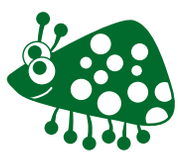


Wildflowers and grasses wordsearch

Can you find these wildflowers and grasses? The answers run in all directions. None of the answers have spaces between the words.

S	Y	E	L	L	O	W	R	A	T	T	L	E	T	V	B
Z	W	R	L	A	D	Y	S	M	A	N	T	L	E	I	C
G	R	E	A	T	B	U	R	N	E	T	P	M	R	S	O
G	S	D	E	L	A	E	H	F	L	E	S	D	I	L	M
U	S	C	F	T	B	T	R	R	E	N	S	K	V	T	M
H	S	L	J	J	V	Q	I	T	T	F	J	T	R	R	O
A	R	O	N	Z	C	E	H	R	O	K	A	R	G	A	N
W	T	V	R	S	M	G	R	O	U	Y	N	O	T	E	B
K	Q	E	I	R	I	T	T	N	R	T	S	T	A	T	E
B	N	R	L	R	E	T	U	A	A	L	Y	S	U	J	N
I	B	T	B	K	R	L	L	N	N	L	G	J	P	S	T
T	R	E	R	E	J	L	T	N	G	E	G	B	O	C	J
T	Y	S	F	R	R	E	L	D	A	I	L	R	C	T	A
E	J	O	N	T	R	O	T	S	I	B	P	T	A	D	G
V	I	R	T	E	E	W	S	W	O	D	A	E	M	S	V
L	W	O	O	D	C	R	A	N	E	S	B	I	L	L	S

BETONY
BIRDS FOOT TREFOIL
BISTORT
COMMON BENT
EYEBRIGHT
GREAT BURNET
HAWKBIT
LADYS MANTLE
MEADOWSWEET
PIGNUT
RED CLOVER
SELFHEAL
SORREL
SWEET VERNAL GRASS
WOOD CRANESBILL
YELLOW RATTLE



Haytime crossword

Across

4. Drinkings
6. Pikes

Down

1. Barn
2. Mowing
3. Corncrake
5. Scythe

Haytime wordsearch

Wildflowers and grasses crossword

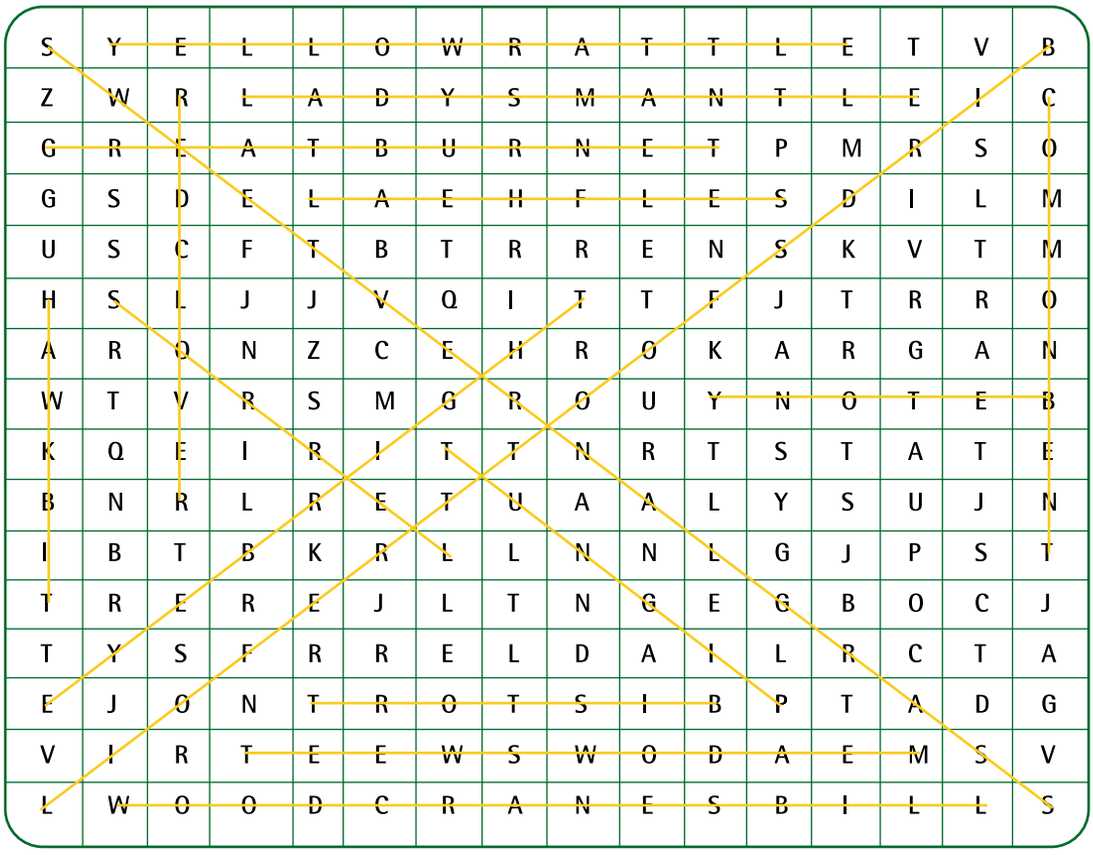
Across

2. Sweet vernal
3. Eyebright
6. Pignut

Down

1. Buttercup
4. Betony
5. Hay meadow

Wildflowers and grasses wordsearch



Section 8: Reference material and resources

Children's story books

KS1/Lower KS2:
In my Meadow by Sara Gillingham and Lorena Siminovich, Chronicle Books, ISBN-13: 978-0811873383
Over in the Meadow a sing-along book by Jill McDonald and Susan Reed, Barefoot Books, ISBN-13: 978-1846867477
KS2:
The Wonderful Meadow by Wolf Harrant and Josef Palacek, Dennison Dobson Ltd, ISBN 0234721464
A Secret Place by Julia Draper, Scholastic Hippo, ISBN-13: 978-0590552707
Window by Jeannie Baker, Walker Books Ltd, ISBN-13: 978-0744594867
Farm Boy by Michael Morpurgo, HarperCollins Children's Books, ISBN-13: 978-0007450657 (about farming in Devon)

Poetry

Field Days: An Anthology of Poetry edited by Angela King and Susan Clifford for Common Ground, Green Books, ISBN-13: 978-1890132255, available from www.england-in-particular.info/cg/fielddays/f-fdays.html
Onions and Other Intentions by Maggie Norton, Indigo Dreams Publishing, ISBN-13: 978-1907401565
The Meadowlands and Other Poems by Alan Hartley, Maggie Hunt Associates, ISBN-13: 978-0953893010
www.hayinart.com/001413.html a website by Alan Ritch devoted to hay-related poetry and art

Miscellaneous reference books and websites

Hay Time in the Yorkshire Dales edited by Don Gamble and Tanya St. Pierre, Scotforth Books, ISBN-13: 978-1904244592 available from www.ydmt.org/shop
Life and Tradition in the Yorkshire Dales by Marie Hartley and Joan Ingilby, Dalesman Publishing Co Ltd, ISBN-13: 978-1858250847
No five o'clock on our calendars: A history of hay time in the North Pennines edited by Rebecca Barrett and Neil Diment, ISBN 978-0956516121, available from www.northpennines.org.uk/Pages/PublicationItem.aspx?DocRef=168
Field Days: Ideas for Investigations & Celebrations by Common Ground, ISBN-13: 978-1870364188
www.dswa.org.uk Dry Stone Walling Association
www.naturalengland.org.uk/countrysidecode

Wildflowers and grasses field guides

A5 waterproof fold-out charts:
Flowers and grasses of hay meadows in the Yorkshire Dales on pages 49-52. A hard copy is included in this pack, further copies available from www.ydmt.org/shop
The following charts are available from the Field Studies Council www.field-studies-council.org/publications/fold-out-charts.aspx:
Grasses
Guide to grassland plants 1
Guide to grassland plants 2 (chalk and limestone)
Playing field plants
Describing flowers
Fruits and seed dispersal

Books:
Wild Flowers, RSPB Pocket Nature, Dorling Kindersley, ISBN-13: 978-1405350006
Wild Flowers by Martin Walters, Collins Gem, ISBN-13: 978-0007178544
Wild Flowers of Britain and Northern Europe by Richard Fitter, Alistair Fitter and Marjorie Blamey, Collins, ISBN-13: 978-0002200622
Wild Flowers by Colour: The Easy Way to Flower Identification by Marjorie Blamey, A & C Black Publishers Ltd, ISBN-13: 978-0713672374

Wildlife and insect field guides

The following A5 waterproof fold-out charts are available from the Field Studies Council www.field-studies-council.org/publications/fold-out-charts.aspx:
Caterpillars of butterflies of Britain and Ireland
Bugs on bushes
Guide to bees of Britain
Butterflies of Britain: British butterfly identification guide
British grasshoppers and allied insects

Books:
British Wildlife: A photographic guide to every common species by Paul Sterry, Collins, ISBN-13: 978-0007236831
British Insects: A photographic guide to every common species by Michael Chinery, Collins, ISBN-13: 978-0007298990
Butterflies and Moths, RSPB Pocket Nature, Dorling Kindersley, ISBN-13: 978-1405349956

Useful websites for information and teaching resources:

Hay meadows, flora and fauna:
www.ydmt.org/programme-details-hay-time-14609 the Hay Time project in the Yorkshire Dales
www.yorkshiredales.org.uk/natureinthedales/habitats/dales/haymeadows information about upland hay meadows on Nature in the Dales, the Biodiversity Action Plan for the Yorkshire Dales National Park
www.forestofbowland.com/haytimeproject the Hay Time project in the Forest of Bowland AONB
www.northpennines.org.uk/Pages/UplandHayMeadows.aspx the Hay Time project in the North Pennines AONB
www.opalexplorenature.org lots of information and resources, including survey materials, a Powerpoint quiz about identifying invertebrates, and soil and earthworm studies
www.amentsoc.org/insects
www.bumblebeeconservation.org
www.buglife.org.uk/discoverbugs
www.british-wild-flowers.co.uk a large selection of photographs to aid identification of wild flowers and grasses
www.plantlife.org.uk information about wildflower habitats and activities to get involved in
www.saps.org.uk the website of Science and Plants for Schools
www.nuffieldfoundation.org/primary-science-and-space curriculum materials developed by the Nuffield Foundation
www.rspb.org.uk/ourwork/teaching/catalogue RSPB teaching resources
www.rspb.org.uk/wildlife/birdguide/name/C/corncrake/index.aspx to listen to the call of the corncrake
www.bbc.co.uk/learningzone/clips/an-introduction-to-seed-germination-and-growth/63.html BBC video clip of seed germination
www.wildlifetrusts.org/learning Wildlife Trust education resources

Farming and food:
www.foodafactoflife.org.uk resources relating to food and farming
www.face-online.org.uk Farming and Countryside Education
school.asda.com/downloads/curriculumpacks/KS2_curriculum_pack.pdf KS2 curriculum download
www.soilassociation.org/schoolfood/primaryresources/downonthefarm

Wildlife gardening:
www.northyorks.gov.uk/index.aspx?articleid=22917 information and downloads about North Yorkshire County Council's Enhance your grounds for biodiversity - schools bees project
www.floralocale.org information about meadow creation and seed suppliers

Yorkshire Dales National Park:
www.yorkshiredales.org.uk Yorkshire Dales National Park Authority
www.outofoblivion.org.uk the Historic Environment Record for the Yorkshire Dales
www.dalescountrysidemuseum.org.uk

Resource boxes

Meadow seed propagating kit for loan to schools and organisations wanting to make a small meadow area that they have access to and can manage. The kit contains gardening tools, seed propagators, packets of meadow seed, instructions on seed sowing, care and transplanting, and making and managing a meadow area. Kits are available through the Yorkshire Dales Millennium Trust, telephone 01524 251002, email info@ydmt.org
Haytime resource box for loan to schools. This contains a range of artefacts relating to haytime in the Yorkshire Dales. Available from the Dales Countryside Museum in Hawes, telephone 01969 666210, email dcm@yorkshiredales.org.uk

Yorkshire Dales Millennium Trust
Old Post Office, Main Street, Clapham, LA2 8DP
015242 51002
info@ydmt.org
www.ydmt.org

YORKSHIRE DALES
MILLENNIUM TRUST

Into the Meadows