

Wildlife in winter - Adaptations for Survival



If an animal or plant is to survive it must be able to fit in with the environmental conditions which occur in its habitat. This fitting in is called adaptation. Every living thing is adapted to enable it to cope with a particular habitat's environmental factors such as the air, water, soil, light and temperature. For example, cacti plants are adapted specially to be able to withstand the dry conditions of a desert, whereas seaweeds are designed specially to live in salty water – neither would survive if they changed places

Depending on what sort of habitat it lives in, an animal or plant may have to adjust itself to changes in its environment. The most obvious changes are those of lengthening and shortening of daylight hours, and increasing and decreasing temperature. This is what happens when autumn turns into winter.

Many plants and animals live in climates where the temperature never drops too low (as in Britain), so they don't have to worry about surviving extreme cold. Some animals avoid the cold of winter by migrating to warmer climates. Those animals and plants that live in permanently cold areas (such as polar regions) however, need special adaptations which allow them to survive in their harsh environment. We will now look at some of the ways in which wildlife survives in the polar regions.

[Survival at the Poles](#)

[Winter in Britain](#)

[Helping Garden Wildlife Survive the Winter](#)

SURVIVAL AT THE POLES

Polar bears and penguins never bump into each other! Why is this? The answer, of course, is simple; polar bears live only in the Arctic (the North Pole) and many species of penguins are found only in the Antarctic (the South Pole). Both animals are highly adapted for living in the coldest places in the world.



Arctic Land Mammals

It is vital for a mammal, being a ‘warm-blooded’ vertebrate, to keep warm in order to maintain its body at a constant temperature. If it cannot do this it will die. The Arctic is the coldest place inhabited by land mammals and these have very thick fur, which insulates the body by trapping air. They also have a layer of stored fat under the skin which gives additional insulation.

Like many Arctic mammals, the polar bear has white fur made of hollow hairs, which traps and warms air. Ultra-violet light is funnelled from the sun down the hairs to the bear’s black skin, changing it into warmth. The dense undercoat is covered with an outer coat of long guard hairs. These help to keep the polar bear dry and warm while it is swimming. To find out more about the life of polar bears visit our [Polar Bear](#) factsheet.

The body shape and size of many cold climate mammals differ quite a lot from similar species living in warmer areas. Generally an animal becomes rounder and bulkier when its environment is very cold. Also its legs, ears and tail are shorter. These adaptations help to conserve heat. In short, a football-shaped animal would be warmest of all.

The Arctic fox, although certainly not as round as a football, does differ in shape from our red fox in Britain. It has a rounder, plumper body, shorter legs and tail, as well as a shorter muzzle and ears than the red fox. The thick fur turns white in the winter and the soles of the feet are covered in fur. All these adaptations allow the Arctic fox to cope with an outside temperature as low as -40°C .

Arctic hares show similar physical adaptations to the cold. They have shorter ears and shorter, stockier legs than the brown hare of Britain. The snowshoe hare has similar sized ears and legs to the Arctic hare, but in addition it has its own built-in snowshoes i.e. enlarged hind feet, which help it when crossing soft snow.

Antarctic Survivor – the Emperor Penguin



The land mass surrounding the South pole, the Antarctic, is the coldest place in the world! The temperature has been known to fall as low as -83.3°C . Like all Antarctic penguins, the largest of them all, the emperor penguin, has a thick layer of densely packed feathers (about 12 to the square centimetre), and tufts of down at the base of each feather which act like a thermal vest, trapping air to keep the bird warm. The tips of the outer feathers are broad and curved, overlapping like roof tiles – this makes the bird waterproof. A thick layer of blubber (fat) also helps to keep the penguin warm when swimming in the icy ocean. To help it adapt even more to the intense cold of its habitat, this penguin has special nasal passages so that it loses very little heat when breathing out. Its flippers and legs are also specially adapted to reduce heat loss.

Winter in the Antarctic begins in March and whereas other animals sensibly make their way to the warmer parts of north Antarctic, the colonies of emperor penguins march across the pack-ice about 200 miles in the opposite direction, to breed in the coldest place on Earth! The breeding sites, called ‘rookeries’, may be many miles from the sea and number up to 25,000 birds. The parents do not make a nest. To begin with they both take it in turns to protect the egg from the ice by resting it on their feet, raising their toes to keep it well off the ground. The female then returns to the sea to feed, leaving the male to incubate the egg for nearly three months. He uses a fold of skin, which hangs over the egg, to keep it warm. The male eats nothing, relying on his reserves of blubber to keep him alive. Hundreds of incubating males may huddle together for warmth. They will have lost almost half of their original body weight by the time the egg hatches.

The female returns to the rookery when the chick is ready to hatch and takes over the brooding of the down-covered baby, feeding it with regurgitated food. The hungry, exhausted male trudges back to sea to feed.

As many as 6,000 emperor penguins may huddle together to form a ‘tortoise’. They take it in turns to move into the middle where it is warm.

For more information visit our factsheet about [Emperor Penguins](#).

Keeping Warm in Water



Marine mammals, such as seals and whales, live around both the North and South Poles. The heat from a warm-blooded animal is absorbed by cold water faster than it is by air. A human being would survive for only a few minutes in the freezing polar seas but the bodies of seals and whales are adapted so that they can keep warm. As with the land mammals their shape is rounded but a fur coat would not be much good for trapping heat underwater; instead they have a very thick layer of blubber to keep body heat from escaping.

Frozen fish?

Fish, like reptiles and amphibians, are 'cold-blooded' vertebrates. This means that their body temperature varies according to the temperature of their surroundings, unlike mammals and birds which can control their body temperature so that it remains steady. So, how do fish in polar waters manage to avoid freezing to death? Some Antarctic fish stay deep in the sea, where although the temperature may be -1.8°C , it is a fraction warmer than the freezing point of sea water, so no ice forms inside their body. Most Antarctic fish even have their own 'antifreeze'.

Keeping Warm Under a White Blanket



Another adaptation for many plants and animals is to make the most of a blanket of snow. Air is trapped amongst the snow flakes as they fall and this provides good insulation. The temperature under a layer of snow does not usually fall below freezing. The heat from any animals or plants under the snow is trapped in a warm 'igloo'. Small mammals such as mice, voles and lemmings can remain active throughout the winter, searching for plant food in a network of tunnels under the snow. The polar bear digs out a den on snowy slopes to give birth or shelter during blizzards. It curls up and lets the snow drift around its body to form an insulating layer.

Many plants also survive in warm pockets under the snow, waiting for the snow to melt so they

can then burst into growth. If winds blow the snow away they may become frozen.

A local name for the familiar snowdrop is the 'snow-piercer'. The tip of the flowering stem is covered by a special protective leaf and this allows the snowdrop flower to force its way up through the snow.

Back to [top](#)

WINTER IN BRITAIN

Even though our British winter is not nearly so cold and severe as polar winters, plants and animals still have to be able to adapt to low temperatures and a shortage of food. The cold causes living things all sorts of problems. Freezing temperatures turn water into ice so that animals cannot drink, and plants cannot take up water through their roots to enable them to make food (the process known as photosynthesis).

Some animals, particularly insectivores such as hedgehogs and some birds, cannot find enough food during the winter months. Autumn is the time when wildlife prepares itself for the cold weather ahead.

Here are a few ways in which plants and animals manage to survive the British winter...

Plant Preparation



Land plants lose water through their leaves by a process called transpiration. Apart from the problem of a shortage of available water during the winter, photosynthesis in the leaves would also be difficult because there are only a few hours of very weak sunlight. Many plants therefore, overcome these problems by 'shutting down' almost completely.

Perennials, plants which continue growing for several years, may lose all their leaves and stems, relying on the food stored in their underground roots to get them through the winter. Annuals are plants which flower in the summer and then die off completely, leaving only their seeds to survive the winter and germinate the following spring. Some plants produce seeds which actually need to be frozen in the winter before they are ready to germinate. This ensures that they do not germinate during a spell of warm autumn weather.

Falling Leaves



Evergreen trees, such as many conifers, often have narrow, needle-like leaves and a thick waxy coating and these adaptations help them to conserve water during winter.

Deciduous trees, such as oak, ash and beech, shed their leaves in the autumn. On frosty winter days, the water in the soil is frozen, so it cannot be taken up by the roots; the air temperature may be quite warm if the sun is shining, so if leaves were still on the trees they would lose a lot of water and wilt. This would result in the death of the tree. So dropping the leaves before winter sets in is the most sensible thing a deciduous tree can do! They can 'tick over' during the winter months using stored energy in their roots.

In the autumn a corky layer forms at the base of deciduous leaves, cutting off water supplies. This causes the green colour (chlorophyll) to fade, revealing shades of yellow, orange or red beneath.

Bird Migration



Birds are lucky in being able to fly and at the end of the summer, when the days are getting shorter and food more scarce, some species fly off to a warmer climate. The swallow is perhaps the best known of all migrant bird species. Flocks of swallows arrive in Britain in late spring, having flown all the way from southern Africa. They then spend the summer here, raising two or three broods, and then flock together for the return journey. Like its close relative, the house martin, the swallow is well-adapted for long-distance flight, having a streamlined body and narrow, curved wings.

Many birds stay in Britain during the winter, some of them having flown in from their northern breeding grounds (perhaps Russia, Greenland, Scandinavia or the Arctic) to avoid the extremely cold conditions of those places. Although some blackbirds, song thrushes and starlings are resident birds, i.e. they spend the whole year in Britain, others flock into the country from northern climes to enjoy our comparatively mild winter. Other winter migrants include redwings, fieldfares and bramblings. Wild fruits and seeds of all kinds are an important source of food for all these birds, and they fluff out their features on cold days to help keep themselves warm. Many species of water fowl and waders also flock to our shores to find ice-free water and mud-flats.

To download our free magazine on Migration click [here](#).

How do 'Cold-blooded' Animals Cope in the Winter?



Invertebrates (animals without backbones) and vertebrate fish, amphibians and reptiles, are said to be 'cold-blooded' because their body

temperature changes with that of their surroundings. Low temperatures make it difficult for these creatures to remain active in winter – so what happens to them?

Snakes, lizards, frogs, toads and newts slow down all their body processes almost to a stop in very cold weather. This is known as diapause and in this state the animals use up just a small amount of their store of body fat and can survive for some weeks, barely alive. They hide away in the winter under stones, logs, in compost heaps, old mouse burrows – all sorts of places where they may be safe from hungry predators.

Many invertebrates hide themselves away too. Some adult minibeasts die at the end of the summer but their eggs, larvae or pupae spend the winter hidden away, ready to continue their life-cycle when the spring arrives. Most female spiders for example, die after laying eggs in the autumn, leaving their eggs in a fluffy, whitish cocoon, tucked away under a log or in a corner of a building. Thousands of tiny spiders are released from the cocoon in the spring.

Some species of invertebrates overwinter, often as adults, in a state called torpor. They find somewhere secluded, perhaps under a log, stone or in a hole, and stay there throughout the cold months. Special chemicals are released into their body fluids to prevent them from freezing, in the way that anti-freeze works in the radiator of a car. Many caterpillars, some butterflies, slugs, snails, queen wasps and bumblebees spend the winter in this way.

Ladybirds often overwinter in colonies in thick hollow stems, amongst leaf litter, around window and door edges, under logs and many other sheltered corners such as the corner of a garden shed. Take care not to disturb sleeping ladybirds if you find them when tidying up the garden; in the spring they will wake up and begin eating aphid pests which will also have reappeared.

Mammals and Hibernation



You may have noticed that your pet cat, dog or rabbit begins to grow a thicker coat as the days become shorter in the autumn. This, of course, happens with wild mammals too, such as foxes, badgers and squirrels and the extra fur helps them to keep their body temperature constant during very cold weather.

Autumn is a time of preparation for mammals. They fatten themselves up by eating as much as possible. Squirrels, voles and mice take advantage of the autumn harvest of fruits and nuts, storing some of these away in various places, ready for eating on winter days when food is

scarce.

Smaller mammals lose heat more quickly than larger ones and so they must burn up their fat fast to keep warm. This is why mice and voles make themselves cosy, underground nests during the winter, and sleep there on the coldest days. In this way, they save energy by being inactive. Squirrels and badgers also save energy by sleeping through spells of bad weather. Foxes and deer can remain active throughout the winter because of their larger size.

The mammals which find it most difficult of all to cope in the winter are those which rely mainly on invertebrates for their food. Most invertebrates, as we have seen, are hard to find during the winter. The only way the insectivorous mammals can survive is to slow their body processes to almost a standstill – and they do this by hibernating.

The hedgehog is perhaps the most well known hibernator in Britain. It fattens up on slugs, snails and other minibeasts in the autumn, and spends the cold months curled up in a cosy nest of leaves and dry grass. Bats, which rely entirely on insects, also hibernate, wrapped in their wings deep in a cave, tree or attic somewhere. During its deep sleep, a hibernating mammal's body temperature drops well below the normal 37C (it feels very cold to the touch), its heart beat slows to as little as three or four per minute, and it breathes only every two minutes or so. Hedgehogs and bats do not stay asleep for the whole winter. They will wake up on warmer days and look for food or water. If the temperature drops too low, they will also wake up and start shivering in order to keep the body temperature above freezing. Physical disturbance will also awake a hibernating hedgehog or bat. Every time they wake up a great deal of energy is used up, so a long, cold winter is better for these animals than a winter with lots of warm spells.

The dormouse is the only hibernating rodent in Britain. Both the common dormouse and the introduced edible dormouse are known as true hibernators because they sleep from October to April without waking up at all. Both species fatten themselves up in the autumn with extra food, often doubling their summer weight. The common dormouse (not now thought to be as common as it used to be) eats pollen, flowers, insects and fruits – but in the autumn its most important fattening-up food is hazel nuts. A winter nest is built on or near the ground, among tree roots or beneath a hedge. Here the dormouse curls up, its fluffy tail wrapped over its head for warmth, and 'switches off' to such an extent that it can be picked up without being woken!

For more information on hibernation visit the [Hibernation Factsheet](#).

Back to [top](#)

HELPING GARDEN WILDLIFE SURVIVE THE WINTER

Many wild animals perish during a long hard winter. It may be difficult to help the wildlife in the countryside but there is quite a lot you can do to lend a hand to those creatures living in your garden. After all, it is worth remembering that many garden animals are actually a great help to you in the spring and summer, protecting your plants from pests. Birds, hedgehogs, wasps, spiders, ladybirds, frogs and toads are just a few of the beneficial creatures inhabiting your garden.

Here are a few practical ways in which you can help them:

Making Winter Habitats



Overwintering sites are very important to a whole range of animals and an undisturbed corner of the garden will be sought out by wildlife in need of a winter home. Although the traditional autumn bonfire is a good way of tidying up the garden for the winter, burning piles of garden prunings and fallen leaves can be a disaster for wildlife! Every year thousands of hedgehogs and other small animals climb into woody piles thinking they have found the ideal place to spend the winter, only to perish in the flames. Burning plant material is a waste of potential overwintering sites, so try to resist being too tidy in the garden!

It's easy to create winter homes for garden wildlife – either at home or in your school's garden. Just find a quiet corner or two, behind a shed is often a good place, and make one or more of the following mini-habitats -

- A pile of logs – ideal for minibeasts, hedgehogs, wood mice, wrens and even foxes.
- A pile of rocks and stones – ideal for minibeasts, slow worms, frogs and toads. Also a good idea is to dig shallow holes, about 10cm deep, and cover almost completely with paving slabs. Excellent for frogs and toads.
- A loose pile of tree leaves, grass clippings or straw – ideal for minibeasts, wood mice and shrews.
- A sheet of corrugated iron – the 'tunnels' are ideal for reptiles, amphibians, wood mice and voles.

- With all the plant prunings around, autumn is a good time to start a compost heap. Apart from being an ideal way to recycle plant 'waste' and provide excellent compost for your garden, a compost heap is an additional winter habitat for wildlife.

Feeding the Birds

Our resident birds and those visitors from Arctic regions find it difficult to find natural food during a hard winter. By December autumn fruits will have been used up and insects are hiding away. The ground may be frozen and water iced over. We can save the lives of our garden birds by putting out food and water on a regular basis.