



Blue Tit – © Andy Rouse/naturepl.com

Ever wondered why birds don't hibernate?

As Graham Appleton explains, the question as to why birds do not hibernate hints at a wider range of behaviours that enable small birds to cope with the cold conditions of a northern winter.



Graham Appleton
Director of Communications

When we talk of hibernation we invariably think of mammals like badgers, hedgehogs and dormice.



I am sure that many people have been watching *Frozen Planet* and marvelling at how animals cope with the harsh winter conditions, from the caterpillar that freezes every year, and amazingly takes fourteen years to grow to a size when it can pupate, to the Polar Bears tucked away in snow-holes. The fact that birds can fly away from these conditions each northern autumn and return in the spring, to take advantage of a summer glut of food, means that they have not had to develop survival strategies which include hibernation.

LIFE IS SEASONAL

For most bird species, life is seasonal. Unless an individual spends all of its time near the equator, the number of hours each day in which to feed itself and its youngsters varies, with breeding timed to coincide with peak food availability and maximum

foraging period. The closer that a Northern Temperate Zone bird lives to the polar region the more seasonal life becomes and the bigger the migration challenge it faces if it is to take advantage of local pulses in food production. At the extreme is the Arctic Tern, which spends its summer in the far north and winters in the waters of the Antarctic, but some of the strategies used by less mobile species are just as fascinating.

Britain is a really interesting place to study migratory behaviour, as we provide both summer breeding sites and relatively frost-free wintering areas. In similar latitudes in Europe and North America, migration is largely a one-way process with birds arriving from the south each spring and departing in the autumn. Here, there are birds on the move in every month of the year and there are probably as many birds moving east-west as there are moving north-

Badger, by John Harding

south. It's a unique situation, providing us with an insight into the range of options that birds use to survive - whether they leave to find insects in Africa, move on as the ground freezes or adopt a variety of hoarding, fattening and roosting behaviours, just to get through the winter.

For some species, the focus is on making sure that food is available whenever it is needed. This explains why Mistle Thrushes defend Holly trees, why Robins and Tawny Owls have winter territories that they know well and why Nuthatches, Jays and Coal Tits cache food for later use. Other birds are more mobile, with tit flocks cruising around a neighbourhood and wading birds moving from patch to patch on a mud-flat, as the tides come in and recede twice each day, just as two examples.

THE ENERGY BALANCE

One of the great things about working for the BTO is that I am always learning. A visiting physiologist opened my eyes when we were talking about new bird foods. He explained that, as a bird stops standing and starts flying, there is an almost instantaneous need to use eight times as much oxygen, just because flying is such an energetic process. With that fact in mind, the daily pattern for birds in the wintertime becomes easier to understand. Not only does each individual need to minimise the energy that is burned over-night, it also

needs to conserve its energy during the short winter day, especially by not flying more than is necessary. The House Sparrow, for instance, is one of the species which is least well adapted to migration and most sedentary; flocks feed in frenzied bursts and then fly short distances into the cover of bushes, where food is digested and energy use is minimised.

Many BTO Garden BirdWatchers will have spotted that, at this time of year, feeders are busiest in the early morning and in the late afternoon, with a brief lunch-time rush too. These periods of activity give clues to the fact that surviving from one day to the next is very much something that needs 24 hour planning. As has been shown for Great Tits, birds cannot carry too much extra fat or they become more prone to predation. They are using time, temperature and food-availability clues to decide when to feed, with one of the key periods being just before they go off to roost, putting on enough fat to cope with a 10% or even 15% drop in weight over-night.

FAT IS FIT

For humans, fat is a long-term reserve and it seems strange to us that birds can put on the equivalent of a stone or more each short, winter day and then burn it off again before morning. Birds store fats as an energy reserve for over-night metabolism, with oil-rich food, such as sunflower seed,

While Dunnocks conserve energy by hardly flying at all on a winter's day, Wrens establish winter feeding territories and may move to habitats (especially waterside ones) where insects are more active.

Wren and Dunnock, both by John Harding



being more efficiently changed into these fats than carbohydrates, such as bread. In humans a lot of our fat synthesis takes place in the adipose tissue (a type of connective tissue) but in birds the liver is the principal site for this operation. Fats are created much more efficiently in the liver and a lot of fat is stored nearby and around other organs, making it readily available for conversion into the heat energy the bird needs overnight.

BIRDS OF A FEATHER, ROOST TOGETHER

There are many different ways to roost, with some birds choosing to gather together and others spending the night alone. More and more Garden BirdWatchers are observing the roosting behaviour of our garden tits using nest-box cameras. An individual arrives before dusk, presumably at the point when the cost of searching for food becomes greater than the energy it can provide, and then settles down for up to sixteen hours.

On a camera, you can see just how spherical the body becomes, as feathers are fluffed up and the surface-area to volume ratio is reduced, and how the bill and head are tucked away, these being the parts of the body which lose most heat. What you cannot see is that the bird also drops its temperature by as much as ten degrees to further minimise heat loss. This is called nocturnal hypothermia; by reducing the difference between body temperature and outside temperature the flow of heat from the body drops. Our wintering birds do not

use torpor, which also involves reducing the metabolic rate and only the Common Poorwill (an American Nightjar) is known to actually hibernate for long periods.

It may seem surprising that most birds don't get up at first light, even on a cold morning, when days are at their shortest. When one considers that waking up and leaving a roost involves 'turning off' the heat-loss systems by increasing the body temperature, and is followed by a massive increase in energy use for the first flight, each bird has got to be fairly sure that it can find an early meal. If it's touch and go, I guess it's better for a Blue Tit to stay snuggled up in its own personal duvet for an extra few minutes. ■

A number of bird species may undertake cold weather movements, moving away from areas affected by hard weather to find more favourable conditions. Short-distance movements may see Fieldfares leave frost-bound fields to visit larger gardens and the windfall apples they offer.

Fieldfare, by John Harding

Coping strategies in freezing conditions

In cold weather, the conservation of energy is a matter of life and death. There is a popular theory that anxious birds fly away and that, by observing how easily they are disturbed, it is possible to measure the stress that dog-walkers, boats or birdwatchers are applying. The opposite may well be the case; if there is nowhere else with suitable resources, cold birds may well remain where they are. Those that fly away could just be the ones with a choice of somewhere else to go and the energy to get there. It's usually better to measure available food resources and their use if we are to understand birds' perceptions of danger, as we see when Blackbirds start by eating the cotoneaster berries at the top of a bush, where there is good all-round visibility.

Last year's series of reports of Robins tolerating the presence of other Robins at feeding stations is another example of how behaviour can be misleading. The urgent need to survive for the next few hours became more important than the medium-term strategy of maintaining a territory for the rest of the winter. Once conditions improve, there are sufficient resources available for the fighting to begin again!

