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## **How Birds survive winter**

Peering from the warmth of my car at a flock of chickadees flying about on a cold winter day, I'm always struck by how they manage to survive. How can such small creatures continue to go about their business, seemingly as active and healthy as in mid-summer, when faced with scarce food supplies, intense cold, driving snow, howling wind and 15 hour nights? Like other animals that have opted to remain in the Kawarthas instead of departing for fairer climes, winter birds have developed a host of strategies to endure most everything this cruelest of seasons can throw at them.

Feathers play the principal role in keeping birds warm and conserving energy. Some species will almost double their feather mass in winter. The typical chickadee or goldfinch will go from about 1000 feathers in summer to nearly 2000 in winter. Birds also fluff up their feathers to trap air which further reduces heat loss. It's not uncommon to see chickadees looking like chubby puffballs on cold days. In order to minimize heat loss through the uninsulated bill and eyes, birds tuck their head into their back feathers. Feathers alone, however, are not enough to usher a bird through a cold winter night.

Because a great deal of heat could be lost from a bird's legs, there are special adaptations in the circulatory system to help the legs and feet cope with cold temperatures. Warm arterial blood moving towards the bird's feet passes through a network of small passages in close proximity to the cold venous blood returning to the heart. The system acts like a radiator. Heat is exchanged from the warm arterial blood to the cold venous blood in such a way that heat loss is minimal. The lower parts of the feet are warmed just enough to stop them from freezing. There is also no shock of cold blood returning to the body.

Thermogenesis, a technical term for shivering, is another key survival strategy. Unless they are generating heat through flight, birds must continuously shiver to keep warm in cold conditions. Opposing sets of muscles tug at each other causing the entire body to quiver, even while the bird sleeps. Shivering produces heat at an amazing five times the bird's basal rate, thereby allowing it to stay warm at even the most frigid temperatures. However, when you consider that a small bird needs to maintain its core body temperature at about 42C, and that the surrounding air temperature may be more than 70C colder, a great deal of fat must be burned to fuel the shivering process. Therefore, the most important line of defence for a small bird is to get enough to eat during the day in order to maintain fat reserves. A chickadee, for example, only has enough fuel to get through a single night. If it is not able to feed the following day, it will die.

Because small birds cannot store large amounts of fat, additional ways of conserving energy have evolved. Some birds have the ability to drastically lower their internal body temperature at night in order to use up fat reserves at a lower rate. This process is called heterothermy. A chickadee, for instance, can lower its core temperature from 42C to 30C during a long winter night. The bird actually enters a state of torpor and becomes temporarily unconscious. Both breathing and heart rate drop considerably. However, even by using this self-induced hypothermia, fat reserves are usually insufficient to last through another day and night. A typical chickadee has about 16 to 24 hours of energy reserves after a day of feeding. Being able to replenish its fat reserves each and every day is central to its survival. Bird feeders probably play an important role in this regard, especially during periods of intensely cold weather.

In an effort to increase winter food availability, birds will also store food. Chickadees spend a lot of time in October and November doing just this. They are referred to as

“scatter-hoarders” because they hoard their food in scattered sites, rather than all together. By doing so, they minimize the chances of other birds or mammals finding it all. Chickadees also have the amazing ability to remember where they put the seeds. Researchers have even shown that the part of a chickadee’s brain that deals with spatial memory actually becomes larger in the fall.

Gray jays, too, are expert hoarders. They spend most of the summer stashing away enough food to assure winter survival. Their storage strategy is unique. Using special mucous-secreting glands in the side of the beak, food items like seeds, berries, spiders and insects are covered in a glue-like saliva and transformed into marble-sized spitballs. These are then pasted by the birds to the trunks and branches of conifers to form the core of their winter food supply. The saliva may also help to preserve the food. As with chickadees, it has been demonstrated that gray jays actually remember where each of their thousands of food items is stashed.

Gray jay numbers appear to be decreasing, especially in the southern parts of their range such as Algonquin Park. Research carried out in the park is showing that climate change may be the main cause. The warmer winters and repeated occurrences of freezing and thawing may be causing the stored food to rot. When the birds do not get enough to eat during the winter, they produce fewer young. A reduction in brood size has indeed been noted in recent years. Locally, you can still find gray jays in Petroglyph Provincial Park (near the glyph site, usually) and on the Kawartha Nordic Ski Trails at Haultain.

Finally, appropriate shelter is yet another factor in winter survival. Chickadees, nuthatches and bluebirds, for instance, are known to take shelter in tree cavities and nesting boxes at night. They will sometimes huddle together, thereby sharing their own body heat. On several occasions, I have even seen a chickadee whose tail is still crimped from a night spent squeezed in some tight hollow. Many species of birds also spend the night sheltered from the wind in the boughs of an evergreen. It has even been shown that the dominant birds in the flock roost in the deepest, most sheltered parts of the tree, while the least dominant birds are relegated to areas more exposed to the wind. The ultimate shelter seeker, however, is the ruffed grouse. These birds will actually hurdle themselves into snow drifts for the night, becoming completely enveloped by the snow.

Much about winter bird survival still remains a mystery. One particularly confounding species is the golden-crowned kinglet. Much smaller than even a chickadee, the fact it can survive frigid winter temperatures at all defies the laws of physics and physiology. Its fat reserves are seemingly too small to get it through the long winter night. Mechanisms we do not yet understand would appear to be at play.

What to watch for this week:

With courtship in full swing, December and January are peak calling periods for great horned and screech owls. Listen for them on still nights. The great horned produces a deep, muffled hooting, while the screech makes both a descending whinny and a long, whistled trill on one pitch. Keep an eye open during the day for great grays. They are turning up all over central Ontario.

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