

January/February 2022

Notes of a Naturalist

A newsletter bringing you the species, landscape, history, and happenings of the Taft-Nicholson Center

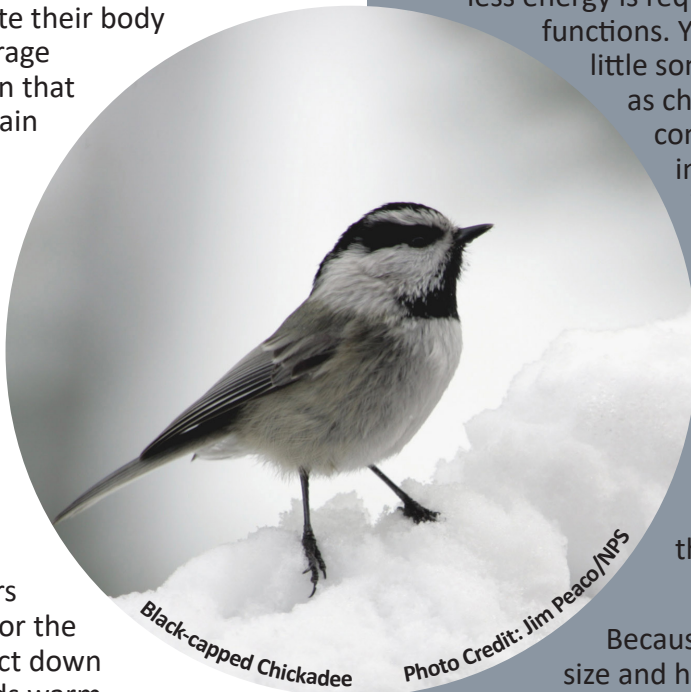
Birds of Winter

Centennial Valley is a hotspot for birds of all sorts during the spring and summer months, with early mornings filled with bird songs. Winter is a much different story. Many of these bird species are now long gone, driven to warmer climates by the threat of frigid temperatures and snow. Those who stay behind must rely on a variety of physiological and behavioral tactics to survive harsh winters.

Birds, like mammals, are endotherms – they regulate their body temperature by producing their own heat. The average body temperature for birds is quite a bit higher than that of mammals, and more energy is required to maintain that temperature. Good insulation can help keep these energy costs down. For birds, this comes in the form of down feathers. These soft feathers lack the rigid structure seen in more typical feathers. Barbs, the smaller projections that make up a feather, are loose and soft on down feathers. They form a tangled net that traps warm air around a bird's body. Some birds like waterfowl grow extra down in preparation for the winter. Small birds will frequently fluff their feathers to trap air for even more insulation, resulting in a very warm, puffball of a bird.

As anyone with a down jacket knows, down feathers are only effective if they are dry. Contour feathers, or the feathers that cover most of a bird's body and protect down feathers, also play an important role in keeping birds warm. Their barbs zip together, creating a tight structure with minuscule air spaces in between which causes water to form droplets that then roll right off the bird's body. Preening is essential for maintaining this waterproofness by keeping feather barbs "zipped up". Preening birds also spread oil from their uropygial gland across their feathers, making them even more waterproof.

Another challenge is keeping bare legs and beaks warm. Many birds will simply tuck them under their feathers. It's common to see birds balancing on one leg or tucking beaks under their wings during cold weather. Some that are especially well adapted to winter conditions, such as grouse, have feathers covering their legs. Counter-current heat exchange further reduces heat lost through these extremities. Veins traveling back to the heart from the feet carry cold blood. Arteries transporting blood from the heart to the rest of the body carry warm blood. With counter-current heat exchange, these blood vessels run right next to each other, allowing for heat to be exchanged from the warm arterial blood to the cold blood in the veins. This allows warm blood to be brought right back to the body, preventing cold blood from circulating around vital organs. Because arterial blood is cooled as it reaches extremities, less heat is lost to the environment through the feet. This process is particularly important for waterfowl and other birds who spend a lot of time in frigid water. Birds don't have nearly as many muscles or nerves in their feet and legs as humans, and they can endure these cold temperatures for longer periods of time without much damage.



Small, but tough

Large birds generally have an advantage when it comes to tolerating cold weather. As size increases, relative surface area and metabolic rate generally decrease. This means the larger the bird, the less heat is lost to the environment, and less energy is required for basic functions. Yet some tough little songbirds such as chickadees are commonly spotted in the winter. They may make small migrations to lower elevations, but they don't embark on long journeys to warmer climates, opting instead to brave the cold.

Because of their small size and high metabolic rates, chickadees require a lot of food, eating up to 35% of their body weight in a day. To manage this in the winter when their main food source is in short supply, their insect-heavy diets switch to mostly consisting of seeds and berries. They will also eat animal fat, in the form of a carcass or suet in a bird feeder. Chickadees will prepare for the winter by stashing food while it is still plentiful in the fall. They have the incredible ability to remember where their food caches are months later, with a relatively large hippocampus, which is used for memory storage. Studies have shown that Black-capped Chickadees regenerate neurons every autumn, which allows old information to be replaced by the new locations of their food caches.

Apply for our Faculty Fellow Program

Don't forget to apply for our faculty fellow residency! Residencies are available to tenure-line faculty in all disciplines for 1-3 weeks of dedicated writing time for scholarly pursuits or creative projects. Fellowships are available July 1 through July 31.

Applications are accepted until March 31st. Click [here](#) for applications and more information.

Built for winter

In many ways, grouse seem built for winter. In addition to their feather-covered legs, they also grow pectinations (small comb-like projections) on their toes which act like snowshoes. Their unique diets also help them thrive in winter climates. Grouse are some of the few bird species that eat leaves, twigs, and buds, which is key to their winter survival. Sage-grouse rely on sagebrush year-round, comprising more than half their food supply, but in the winter it's mostly all they eat. Energy-packed aspen buds help ruffed grouse get through these colder months. Dusky grouse switch to mainly conifer needles and buds, a meal that is plentiful but not palatable to many other animals. These unusual diets are made possible by a grouse's ability to break down and digest cellulose, a feat that is rarely seen in birds.

Roosting strategies are also important for winter survival. Sage-grouse often leave to lower elevations, particularly when the snow gets too deep for access to sagebrush – not only is this their source of food, these shrubs shelter them from the snow. Ruffed Grouse, on the other hand, will dive right into the soft, powdery snow to hunker down for the night. Their snow burrows are surprisingly insulating, with temperatures generally between 20-32 degrees Fahrenheit. This may not be toasty by our standards, but it's warm enough to allow these birds to conserve precious energy at night.

