

Frigid Feathers

The ingenious ways birds stay warm through Montana's long, cold winters. **By Ellen Horowitz**



On a crisp November morning, a flock of snow geese glistens in the sunlight against the bright blue sky. My husband and I stop to watch the dazzling spectacle from a ridgetop along the Rocky Mountain Front. By the time the birds disappear, I'm ready to resume our hike and shake off the chill. As we walk, Frank recalls the fable an old-timer told us decades ago: People once believed that hummingbirds rode on the backs of geese during migration. Because how else could those tiny birds travel thousands of miles twice each year?

The endearing image of a tiny, long-billed passenger nestled into the protective warmth of goose down made me smile. It also made me wonder: How do birds that don't migrate actually stay warm during Montana's longest and coldest season?

DOWN COATS

Birds are warm-blooded animals that must maintain a constant body temperature of 105 to 108 degrees F. To make and retain enough heat when outside temperatures can fall more than 100 degrees below their body temperature, they've devised a wide range of strategies.

Feathers provide the first line of defense. Birds fluff their feathers to retain body heat. The more fluff, the better the insulation. That's because it's the air within feathers that traps warmth.

To keep feathers fluffy and functioning, birds spend a lot of time preening. Using their beak, they take oil from their preen gland, located near the tail base, and spread it onto their plumage. Contrary to popular belief, the preen oil alone is not responsible for water rolling off a bird's back. "It's the microstructure of the feathers that makes them water repellent," says Jeff Marks, co-founder of Montana Bird Advocacy and co-author of *Birds of Montana*. When a bird preens, it adds a conditioner while realigning feathers and reconnecting the Velcro-like feather barbules that may have separated.

Not only do birds plump their plumage in winter, they carry more of it. In June, American goldfinches are covered with roughly 1,500 feathers, while in winter they grow another 500—the equivalent of you putting on an extra down jacket. American dippers—small, stout aquatic songbirds known for their swimming and underwater walking skills in swift-flowing streams—grow extra-dense contour feathers and down during winter. While passerines (songbirds) of similar size

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GOOSE GET DOWN As a single sentry watches for predators, a flock of Canada geese huddles in a snowstorm on a frozen lake. Congregating tightly either outside or in shelters is one strategy birds use to survive cold weather.



CLOCKWISE FROM TOP LEFT: JAY CROSS; KEN ARCHER; ERIN BRAATEN; DICK WALKER



CLOCKWISE FROM LEFT: STEVE OEHLENSCHLAGER; SHARON DEWARTHANSEN; GARY KRAMER

SURVIVAL STRATEGIES Top left: Clark's nutcrackers survive winter by feeding on whitebark pine seeds they hid in the ground months earlier; a single bird can recall thousands of cache sites. Top right: A regular winter visitor from northern Canada, the common redpoll burrows into snowbanks, where the temperatures can remain much warmer than outside. Above right: Mountain chickadees and red-breasted nuthatches will join crows and magpies to feed on the carcasses of deer and elk killed by hunters, predators, and vehicle collisions. Above left: American dippers seem oblivious to winter, feeding on underwater insects year round by walking along the stream bottom, water beading off their dense plumage.

STAYING PUT Top left: Redheads stay in Montana well into November. Like other waterfowl, they can stand for hours on snow and ice thanks to a heat exchange system that keeps warm blood flowing to the extremities. Top right: The lapland longspur is an Arctic breeder that winters in eastern and central Montana, where large flocks feed in windswept grain fields. Above right: Like many birds, white-tailed ptarmigan burrow in snow to stay warm. Their feathered feet work like snowshoes, enabling the birds to walk across deep snow. Other species with feather-covered feet include rough-legged hawks, sharp-tailed grouse, and several owl species.

average fewer than 3,000 feathers, dippers average about 4,200. Their ability to shed water is unmatched, says Marks: "Dippers are the poster child for water beading."

Birds also lessen heat loss by tucking their head into their shoulder feathers, similar to when you pull a neck scarf up and over your mouth and nose.

SHELTERS FROM THE STORMS

For many birds, small ones especially, feathers alone aren't sufficient for surviving frigid nights that can last for 15 hours. To survive, Marks says, birds spend winter nights in microsites warmer than their surroundings. Chickadees, red-breasted

nuthatches, and woodpeckers roost in tree cavities at night and during days of freezing temperatures and high winds. Pygmy nuthatches, gregarious little birds known for roosting in family groups year round, share space with multiple family groups during winter. Often dozens of birds will huddle together to maintain their warmth within a tree cavity. Inside, they stack up like little acrobats forming pyramids, squares, rectangles, oblongs, or other geometric configurations. Groupings of 100 or more pygmy nuthatches have been recorded in single roosts in Colorado and Arizona. Such tightly packed quarters provide plenty of warmth, but come with

the risk of suffocation from overcrowding.

Paul Hendricks, Montana Bird Advocacy's senior scientist, says some birds use snow-covered shelters for thermal protection. To escape howling, heat-sucking wind, birds seek dense thickets and brush piles or move to the lee side of a tree or shrub. Golden-crowned kinglets, Montana's smallest year-round resident birds, stay cozy by huddling shoulder to shoulder in small groups among inner branches of conifers.

White-tailed ptarmigan and ruffed grouse commonly use deep, powdery snow for thermal cover. Hiking through an aspen forest in winter, you can occasionally see holes in the snow with wing prints on either

side where a ruffed grouse has burst out after spending the night. Temperatures in a snow roost range from 32 to 20 degrees, far warmer than the much colder conditions outside. Common redpolls and snow buntings—two of Montana's winter visitors from the far north—also burrow into snow in extreme weather.

Hendricks says that in late fall, gray-crowned rosy-finches migrate from rocky alpine slopes to lower elevations where they huddle together in small, shallow caves and abandoned cliff swallow nests. The ornithologist documented a group of about 60 rosy-finches near Virginia City that roosted in an old mine shaft 30 feet underground. On a

cold February day, he recorded the outside air temperature at -19 degrees F while the microclimate inside the mine shaft registered a balmy 49 degrees.

Just as birds work on escaping the cold, they also soak up any warmth they can find, particularly from the sun. On calm days with blue skies, sharp-tailed grouse and other birds perch in trees for hours with their backs to the sun, even if air temperatures are below zero.

Another strategy is to slow the body's metabolism to burn fewer calories. Black-capped chickadees, for example, lower their body temperature at night by 12 to 15 degrees in a process called regulated hypothermia.

FOOD = WARMTH

While birds try to keep from burning too many calories, at the same time they spend all their waking hours looking for food to replace calories lost to the cold. That's a challenge when seeds and other foods are buried under snow. Chickadees, nuthatches, and redpolls hang upside down to reach food beneath tree branches and in nooks most birds can't reach. Many species form flocks to increase the number of eyes looking for edible items. Even though food must be shared among the group, even a modest portion of something is better than nothing.

Another strategy is food caching. Crows, ravens, jays, nutcrackers, and magpies stow

food in summer for later use. Clark's nutcrackers, well-known for caching whitebark pine seeds in the ground, possess the remarkable ability to recall thousands of cache sites. Gray jays slather their food items with sticky saliva and hide them in tree bark, twigs, foliage, and lichens for later consumption. Steller's jays are scatter hoarders, stashing seeds or other edibles in dispersed, concealed locations. If a jay suspects that another bird has seen it storing food, it will wait until the suspect flies off and then re-cache it.

Chickadees also stockpile. The next time you see one at your feeder, note how often it flies away with seeds rather than staying and eating them as most other birds do. Though they cache food year round, in the fall they increase the number of food items they stash each day. Scientists have found that the hippocampus of a chickadee's brain grows by 30 percent during the fall to help it recall those hundreds of locations. As spring approaches and fresh food is more readily available, the bird's brain shrinks.

Rather than relying on food caches, redpolls, crossbills, and grosbeaks gather as many seeds as possible each day and fill up expandable throat pouches before roosting for the night. Seeds stored in these built-in grocery sacks become available for midnight

snacking. Scientists have found that common redpolls can hold up to 15 percent of their body mass in seeds.

Some birds change their diet during winter. "Ruffed grouse and dusky grouse undergo physiological changes that help their digestive organs switch from energy-rich insects and flowers of summer to the conifer needles and buds they consume all winter," says Marks.

SNOWSHOES AND TOE WARMERS

Lacking fat and, for most species, feathers, a bird's feet are particularly vulnerable to winter's worst. Many birds tuck a foot into their belly feathers and alternate from one foot to the other. Some, like gray jays, squat while perched, covering their feet with their thick, fluffed-up plumage.

Hendricks notes that owls, rough-legged hawks, white-tailed ptarmigan, and sharp-tailed grouse all have feathered feet, which no doubt makes standing in snow more comfortable. "Feathered feet can also act like snowshoes by increasing surface area and distributing weight while a bird walks on snow," he says.

Hendricks adds that each fall, ruffed, spruce, and dusky grouse grow skinlike fringes, called pectinations, along either side of their toes. The scaly growths

increase the foot's surface area while also acting as crampons to help the birds walk and stand on icy tree branches.

What about birds that stand on ice all day? Many mallards and Canada geese remain in Montana all winter, often spending hours on frozen lakes. Jim Hansen, FWP Central Flyway migratory bird coordinator in Billings, says the birds' webbed feet won't stick to the ice, a common myth. He explains that the upper legs of ducks, geese, and other species contain a countercurrent heat exchange system made up of an intricate, netlike pattern of arteries and veins. Warm arterial blood traveling down from the bird's heart intertwines with colder venous blood traveling up from the feet. Tissues in the feet receive just enough warm blood to prevent them from freezing—or sticking to ice—while the returning venous blood warms the body enough to prevent hypothermia.

It's hard to believe that a duck can stand on ice without freezing its feet off. Harder still to fathom a tiny chickadee surviving Montana blizzards. Yet they and other birds somehow manage to survive even the coldest conditions. While bracing for another long winter, we humans might want to keep those hardy, resourceful birds in mind. If they can make it to spring, we can, too. 🐾

Does winter feeding help or hurt?

More than 50 million Americans put up backyard bird feeding stations, according to a U.S. Fish & Wildlife Service report. But does feeding birds in winter help?

"Yes and no," says Allison Begley, avian conservation biologist for Montana Fish, Wildlife & Parks. "It helps during times of difficult weather and food shortages." But it also can be harmful, she adds, because disease transmission increases whenever wildlife is artificially concentrated. "If you choose to feed birds, you do them the biggest favor by regularly cleaning your feeders," Begley says.

Feeders can also increase fatalities from window strikes and predators—particularly cats, which pounce on ground feeders like dark-eyed juncos that congregate below feeders.

FWP regulations allow "recreational feeding of birds" as long as it does not "attract cloven-hoofed ungulates, bears, or wild turkeys."



Steller's jay with backyard peanut

Begley notes that backyard birds obtain only a small portion of their food from feeders. Approximately 75 to 80 percent of their diet comes from natural sources. Feeding doesn't affect bird populations one way or another, she says.

It also doesn't alter birds' migratory habits, says Jeff Marks, executive director of Montana Bird Advocacy. Longer or shorter day length is the cue for most birds to migrate, not the length of time a backyard feeder remains stocked: "Most birds are calendar migrants. Changes in daylight hours trigger a strong cascade of physiological changes that cause them to migrate regardless of food availability."

Perhaps the greatest benefit of feeding, Begley says, is the enjoyment, appreciation, and connection to nature derived from watching and learning about birds: "You don't see as many different species in winter, but the ones you do see are real active for much of the time." ■

LEFT TO RIGHT: FRANCIS AND JANICE BERGQUIST; DONALD M. JONES

WELCOME BACK Snowy owls appear in Montana every several years when numbers of lemmings, their preferred prey, decline from natural population fluctuations. The birds arrive from the Arctic tundra in what's called an "irruption," or influx of a species into an area.