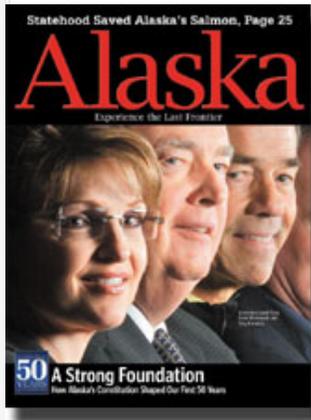




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Smarter in Alaska- Natural Alaska

Written by Ned Rozell

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Bigger is better when one's goal is to keep from freezing to death in the dark. To stay warm, for example, a fox uses much more energy relative to its body size than does a moose, which can weigh as much as a small car (which is a miracle when you consider it survives on frozen tree buds all winter).

On the other end of the scale is the black-capped chickadee, which weighs as much as a handful of paper clips, a bag of airline peanuts, or two graham crackers. I've never weighed a chickadee, but my friend Susan Sharbaugh has. Susan is a biologist who knows a great deal about two subjects: the Seattle Mariners and Alaska chickadees. She listens to every Mariners game online and she studied the black-capped chickadee's adaptations for life in the cold to earn her doctorate degree. She knows a lot about many birds, and the chickadee is her favorite.

A few winters ago, she installed roosting boxes all over town, on hillsides warmed by Fairbanks' temperature inversions, and also in the low, frozen boglands that can be 30 degrees colder. Before she started the project, no one knew where Alaska chickadees spent their 18-hour nights. Susan and her undergraduate students at the University of Alaska Fairbanks captured a few of the birds and fitted them with tiny transmitters—each the size of an M&M—which they attached to the birds with tiny backpacks.

At dusk, when the birds flew away from a feeder near the UAF ski hut after a day of pecking at sunflower seeds, Susan walked into the woods with a handheld receiver and listened for the ping of the signal from a chickadee's transmitter.

After a few failed attempts to track a bird's scattered movements at dusk, Susan began waiting until after dark. She'd go out with a headlamp and follow the signal to where the chickadee had settled for the night.

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She found a signal coming from a grove of birch trees. By the increasing volume of the electronic beeps, she traced the bird to a tree. This tree had a hole the size of a quarter, and it appeared the bird had wedged itself inside.

She returned to the spot the next morning, before sunrise. As the woods brightened, she focused on the hole in the birch. Just as daylight flowed in, the chickadee darted out. Success. A small but significant mystery had been solved: black-capped chickadees in Interior Alaska can survive the nights by jamming their little bodies into tight spaces.

And, rather than sharing body heat, they spend their nights alone. As Susan watched other roosting sites, she saw no more than one chickadee blasting from a roost each morning. That result surprised others, but not someone so familiar with the character of Alaska's smallest winter songbird.

"There's folklore out there that chickadees huddle together to survive the night, but if you think about these birds, they're so feisty, it hard for me to imagine them cozying up together at night," Susan said.

Susan's current experiment is to install various types of roost boxes around town. One is a section of birch log into which she's drilled a small hole. Another—and surprisingly the most popular with the chickadees—is a plastic PVC pipe filled with wood chips that seem to satisfy a chickadee's desire to excavate.

Inside these homemade roosts, Susan has installed temperature probes that tell her the thermal benefits a chickadee gets from roosting in an enclosed area instead of sitting on a branch all night.

"On a night when it's 30 below," she said, "if a chickadee can warm up that box to minus 20, there's going to be a significant decrease in the energy they need to survive the night."

Chickadees are little balls of heat. When it's 40 below, their tiny bodies are 146 degrees warmer than the air one inch away from them. Preserving that heat is a coat of downy feathers that stand erect to trap air. It's such an effective jacket that the birds apparently choose it over snuggling close to a mate.

While researching her thesis, Susan also found that black-caps pull off another trick to survive the night; they turn down their thermostats to save energy. From a normal body temperature of about 106 degrees, chickadees cool down to about 90 degrees when roosting. Some birds heat back up to 106 in the roost before blasting off; others charge out of the roost and into the day with the lower body temperature and ramp it up as they fly to their feeding sites.

The black-capped chickadee has yet another trait that separates it from other birds—its ability to stuff itself.

"Birds up here have an increased ability to lay down fat," Susan said. "There's a tremendous selection pressure. If you don't put down fat stores and don't find a roost, you're dead."

Unlike the common redpoll, another tiny songbird that winters in Alaska (where redpolls spend the night remains a mystery), chickadees don't have an internal bag for storing food, called a

crop. Instead, chickadees must eat small meals, digest them, and then eat again. To compensate, they eat as much as they can, adding fat each day that amounts to 10 percent of their body weight. They burn all of that new fat at night. It's like a 150-pound person eating enough to weigh 165 by day's end, then using enough energy at night to be back to 150 by the morning.

"It's a huge physiological feat," Susan says.

To stay warm day and night in the winter, chickadees constantly flex their chest muscles to generate warmth. Black-caps are shivering almost all the time in Alaska. The only break they get is when the air temperature is above 60 degrees, meaning there are few times even in summer when a chickadee goes an entire day without shivering.

As if this plucky little creature was not impressive enough, it has another adaptation unique to the far north. Beginning in late July in the Interior, chickadees begin wedging seeds, insects and other bits of food into tree bark and other pinch points. During this hoarding phase, chickadees leave thousands of seeds and bits of insects cached in the half-mile circle in which they spend their entire lives. Later in winter, they find the stashed food.

Researchers have found that a chickadee's hippocampus, the area of the brain dealing with memory, expands in the fall and winter when they are hiding and retrieving food, and shrinks again in the spring. A Colorado scientist once compared chickadees from Anchorage with black-caps in Windsor, Colo. The Alaska chickadees cached twice as many sunflower seeds as the Colorado chickadees, and found the seeds quicker when they later searched for them. The scientist, Vladimir Pravosudov of the University of California Davis, also found that the Alaska chickadees had more neurons in their brains than their Colorado cousins.

Alaska's winters probably favor birds that have good memories, Susan said.

"It's a great example of natural selection" she said. "Tough winters winnow out the ones that can't remember where their caches are. In the Lower 48, if a chickadee has a good memory, it's fine. Up here, you have to have a great memory."

Chickadees usually live five to six years, but biologist Tom Pogson once banded a chickadee in Fairbanks that returned to his feeders for 13 straight years.

"That bird did a lot of things right in the winter for a lot of years," Susan said.

A lot of birds aren't as genetically gifted. Susan remembers a recent cold January in Fairbanks after which she noticed fewer black-caps coming to her feeders.

"We lost a pile of chickadees in that 40-below weather, maybe ones that weren't so good at caching," Susan said.

It's sad to think of the fate of the black-and-white puffballs that don't return to the feeder after a cold month, but such is survival on the edge, and in a climate that perhaps selects for a super chickadee—brainier and more resilient than those farther south.

-Ned Rozell is author of Alaska Tracks: Footprints in the Big Country from Attu to Ambler. Read his blog at alaskatracks.com

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