In Defense of Winter Weather

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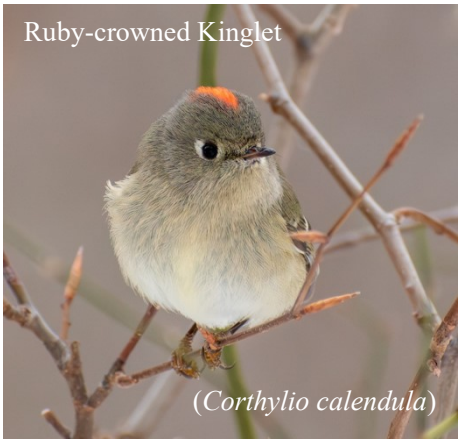
Hermit thrush (*Catharus guttatus*)

Going for a walk is a complex proposition this time of year. It involves layers – which coat, which sweater, which hat or gloves or scarf? – warm enough to fight the chill, but not so warm that you break a sweat. It involves picking shoes to match the depth of the snow, the amount of mud, and slipperiness of the ice (Hiking boots? Snow boots? Snow*shoes*? Crampons?!). To the dismay of my dog, Lily, it also currently involves strapping little black booties on each fluffy paw to protect them from the positive avalanche of salt coating every inch of sidewalk since our last ice storm. In short, it's February, and it is not most people's favorite time of year.

But despite the inconveniences wrought by our long winter months, they serve many critical (and often underappreciated) purposes in the ecological world. The very traits that make winter difficult for taking pleasant strolls outside or getting our cars up steep icy driveways are the traits that maintain a unique and balanced ecosystem outdoors.

Lily, showing off her boots.

I'm always amazed by the number of species that seem perfectly comfortable in the freezing weather. While many of our favorite songbirds are currently vacationing in Central and South America, birdfeeders are still buzzing with activity from chickadees, titmice, juncos, finches, and cardinals. Hermit thrushes, bluebirds, and robins continue foraging through the snowy bushes, and it's been a great year to spot kinglets darting from branch to branch in the flurries. Below the trees, busy squirrels dig up the acorns they


Ruby-crowned Kinglet (*Corthylio calendula*)

stashed back in autumn. Tiny tracks tell me where mice, shrews, and voles tunneled under the snow and bustled between sheltering logs in their ever-pressing quest for more food, while foxes and bobcats try to sniff them out from above.

Winter, with its cold, its dark, and its snow, creates a unique version of the forests we're used to observing under greener leaves and warmer sunshine – and, if you can forgive its discomforts, it's quite an amazing ecosystem to witness.

Snow alone affects the natural world in incredible ways. It completely changes the temperature profile outside, from the global scale – its pale coloration increases the amount of sunlight reflected into the atmosphere, reducing the warming force of the sun (an effect called *albedo*) – to the landscape scale, where it acts as a thick blanket to insulate the ground from the cold air. This reduces the depth that frost permeates down into the soil and provides a warmer layer between snow and soil where small mammals and insects can wait out the winter months in relative comfort. Many of our most important pollinators survive the winter by sheltering in this haven: the layers of leaves and earth beneath the snow hide butterfly eggs, Luna Moth cocoons, firefly larvae, and hibernating bumblebees.

That same snow will provide key services as the season begins to warm, too. Because snow allows water to hang around longer and in greater quantities, snow melt provides an enormous amount of fresh water for drinking and irrigation in many places around the world. We live in a wet enough climate to not be as reliant on snowpack for fresh water, but it still plays a key role in irrigating spring flowers and creating the seasonal vernal pools that most of our salamanders, frogs, and toads rely on for reproduction in March and April.

Beyond the snow itself, the cold temperatures play a key role in the energy budget of overwintering organisms. Most creatures cannot find as much food in the winter as they do during warmer months; there is less sunlight to photosynthesize, and thus fewer palatable plants to munch on, and consequently fewer bugs to eat, and so on up the food chain. Luckily, most organisms also do not require as much energy to stay alive in the cold because their metabolism slows down significantly at cooler temperatures. This means that, rather counterintuitively, colder temperatures are often preferable for those who survive the winter by hibernating.


Golden-crowned Kinglet (*Regulus satrapa*)

A black bear, for example, eats an enormous amount of food in the autumn to build up its fat stores for the approaching winter. As it hibernates, it slowly burns through that fat at a rate determined by the temperature it experiences; the hotter the temperature, the higher the rate, and the earlier it must wake up to start finding food again.

This is one of the reasons that warmer winters are starting to cause bears and other animals to either wake up earlier than they used to from hibernation, or else skip their winter rest altogether. Winter variability has similar negative impacts on overwintering insects, who often spend the season as eggs or cocoons and thus cannot simply choose to wake up early. If higher, more variable temperatures cause them to use too much energy during hibernation (or '*diapause*,' as it's known in insects), they will die before they have a chance to emerge in the spring.

Unexpected consequences like these are why scientists are worried about effects of winter weather become weirder and less predictable. The winter season has, on average, become much warmer, and (to the dismay of the skiing industry) having snowpack at all has become much less reliable. As temperatures grow more variable and less consistently cold, animals have a harder time appropriately preparing for the season. Even small temperature changes affect whether precipitation will fall as snow, ice, or rain, which drastically changes the sort of environment they're living in. For example, as we've all recently witnessed, freezing rain is much more likely to cause broken branches and flooding than snow, and it does not provide the same thermal protection that many animals rely on.

There's another issue, too: our winter weather has historically been so cold that the species living here must be well adapted to it. Cold weather can thus provide a buffer against invasions by plants, pests, and pathogens from warmer climates. Invasive insects, like spongy moths and hemlock wooly adelgids, do much better during warmer winters; invasive plants, like Japanese barberries and Norway maples, tend to hold their leaves later in the fall and leaf out earlier in the spring than native plants, capitalizing on warm temperatures that our forests just aren't adapted to. Altogether, warmer winters are making our forests more vulnerable to species invasives and more susceptible to invasive pests.


Ozark Witch Hazel (*Hamamelis vernalis)*

With all that said, I hope this helps you feel a bit better about tramping through snow and shivering through the cold this winter. Winter weather may be inconvenient, but it's also vital to maintaining our wild spaces – so enjoy the snow while it lasts!

And if you just can't quite convince yourself to revel in this winter's chill, fear not: the cardinals have started singing, the blackbirds are back from migration, and the Ozark witch hazels are in full bloom. Spring is on its way!