



DAVID BRISLANCE

A gray fox pants to stay cool on a summer day.

Mouth Magic

If you've ever watched a dog try to cool off on a hot day, you know its secret to success: panting. When a dog takes fast, shallow breaths with its mouth open and tongue hanging out, it pulls air past lots of damp surfaces. The air draws water molecules from the surfaces, turning them from liquid to gas. As the molecules *evaporate*—turn from liquid to gas—they absorb heat from the dog's mouth, lowering the temperature and helping the dog stay cool.

Doglike animals such as coyotes and wolves also pant. But you might be surprised to learn that many birds pant, too. Tree swallows, crows, and gold-

finches are among the many Minnesota birds that pant to stay comfortable in the summer's heat.

Some birds, including great blue herons, pelicans, quail, and nighthawks, have an even more interesting cooling trick up their sleeve—or rather, down their throat. These birds open their mouths and rapidly move the muscles and bones in their neck and mouth in a motion known as a *gular flutter*. Like panting, the movement forces air over wet surfaces, increasing evaporation. Some birds have been recorded performing up to 735 gular flutters per minute. That's more than 10 flutters per second!



SPARKY STENSAAS

Birds such as the American goldfinch (top) pant. Other birds including the great blue heron (middle) have a special response to heat called a gular flutter, which is like very rapid panting. Sweating helps keep humans cool. Horses, gorillas, and monkeys sweat too. But most animals, including dogs (bottom), have very few sweat glands, so they pant.



JANA FREIBAND



JOE ROSSI



The large ears of a white-tailed jackrabbit (left) and a white-tailed deer fawn (right) help both animals stay cool. A moose (middle) seeks relief from the summer heat in a lake.

Radiators and Conductors

White-tailed jackrabbits live in some of the hottest places in Minnesota—wide-open prairies and grasslands, where temperatures can reach 100 degrees or more and shade is scarce. A hot day is when rabbit ears really come in handy! The ears are laced with blood vessels, which are like tiny pipes. As the jackrabbit heats up, hot blood pumps through its ears. Because the ears are so big, the heat can move easily from the blood into the surrounding air through a process called *radiation*. The cooled-down blood then continues pumping through the rabbit's body, keeping its temperature down.

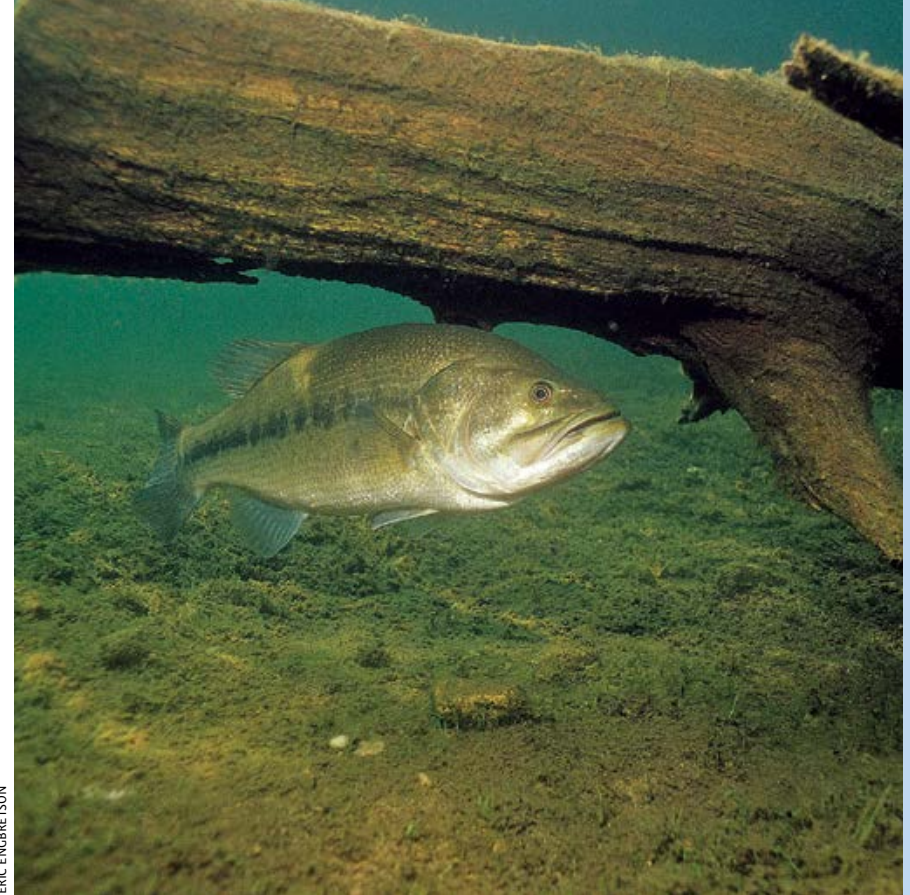
Mice, moose, deer, coyotes, foxes, bats, and squirrels also radiate heat through

their ears. You do, too—that's why it feels so good to wear a hat in winter.

Birds don't have big ears—but they do have big wings, and they know how to use them in a similar way. Great blue herons spread their wings in hot weather, allowing the heat they hold to dissipate. Other birds that do this include cormorants, pelicans, owls, and doves.

Moose can cool off by standing in the breeze and letting their body heat move into the surrounding air. But when they really need to chill, they lie on the ground in a damp forest or wade into a shallow lake or wetland. The cool earth or water draws the heat from their legs and bellies in a process called *conduction*.

LEFT TO RIGHT: MICHAEL FURTMAN, RYAN PENNIES, MICHAEL FURTMAN



ERIC ENGBRETSON

Largemouth bass like water that is about 80 degrees, but if the water gets too warm for bass or other fish species, they need to swim to a deeper, cooler part of a lake.

Depth Charge

Like snakes, lizards, and turtles, fish are cold-blooded animals, which means they can't internally regulate their body temperature. The body temperature of a fish is close to the same as the temperature of the water. Different fish prefer different temperatures. Lake trout like it cold—around 50 degrees. Largemouth bass, on the other hand, are happiest when the

water temperature is about 80 degrees.

Fish often can move around to find a water temperature that suits them. Fish in streams will gather in the shade of an overhanging tree or a submerged rock to avoid overheating on a sunny day. In lakes, fish move deeper, where the water is cooler. If a lake or stream gets too warm, some fish species may no longer be able to live there.



When things get too hot, the American toad slows down its body to conserve energy.

Checking Out

You've probably heard how some animals *hibernate* in winter. They slow their bodies' workings way down so they can get by without food. A similar process happens for some animals that go *dormant* in hot, dry weather.

Toads, worms, snails, and some butterflies are among animals that *estivate*—slow their bodies when conditions are super dry or super hot. When the weather cools, they wake up again and carry on where they left off.

TEACHERS RESOURCES

Find a Teachers Guide and other resources for this and other Young Naturalists stories at mndnr.gov/young_naturalists.



Clockwise from top left: moose, white-tailed deer, merlins, and house sparrows take baths to stay cool.

Waders and Bathers

Many animals—you included—cool off by getting wet and then letting the water evaporate. This works much like sweating, so even animals that don't sweat can enjoy a cooldown from a bath.

If you've seen songbirds splashing in a birdbath or puddle, you've seen animals using this water-cooler trick. The water has the added benefit of helping them clean their feathers and shake off any parasites they might have picked up.

Herons or egrets don't splash in bird-

baths, but in summer you can often see them standing in cool water at the edge of a pond or wetland, where they hang out to eat fish and frogs and other water creatures. The water helps remove heat from their bodies through their legs.

Turkey vultures have perhaps the most unusual way to use evaporation to keep their cool. In hot weather they release a stream of the bird equivalent of pee and poop right on their own legs. As the waste evaporates, it absorbs heat. 🌱