



WHEN A FROG SAYS, "I'M FREEZING", HE MEANS IT

by Emily Burke

While most animals do everything they can to avoid freezing in the wintertime, the land-hibernating frogs of GRNA – including wood frogs (pictured below), spring peepers, gray tree frogs, and chorus frogs – **freeze themselves solid on purpose**. In autumn, these frogs find a relatively sheltered spot to spend the winter, perhaps under a thin piece of tree bark or beneath the uppermost leaf layer. As the temperatures drop, the very first ice crystals forming on a frog's skin set off an alarm reaction. This is the familiar fight-or-flight response that many animals (humans included) possess, involving the release of adrenaline and glucose into the bloodstream so the body has access to a quick source of energy to escape danger. In these frogs, however, this response has been modified so that a massive amount of glucose is released; in fact, the relative amount is enough to put us humans into a coma and kill us several times over.



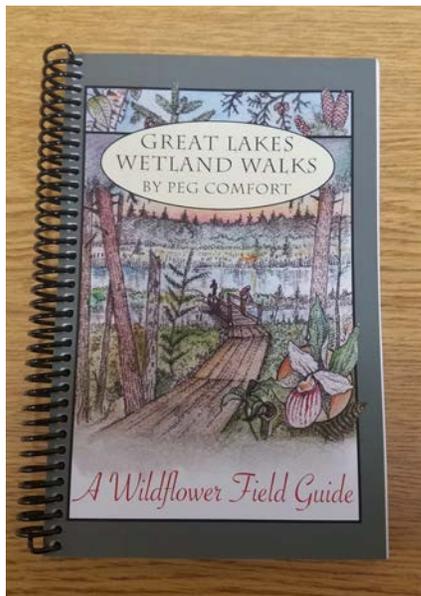
But these frogs are somehow able to survive this massive influx of glucose into their cells and in fact use it to their advantage; the glucose, which is just a form of sugar, turns the water in the frogs' cells into a thick syrup that acts like antifreeze. At the same time, special proteins are released into the space between cells. These proteins serve as ice-nucleation sites, promoting ice crystal formation outside the cells and drawing water out of the

cells through osmosis. (It's essential that ice crystal formation happen outside the cells, as ice crystals inside cells act like lots of little knives, shredding organelles and cell membranes and causing death).

Just 15 hours after the process starts, a given frog's transformation is complete: up to 65% of the water in the frog's body can be ice, with the rest turned into antifreeze-like syrup. By all appearances and definitions, the frog is dead; there is no heartbeat, breathing, or blood flow. But amazingly, come spring, the frog will thaw right out and pick up right where it left off, broadcasting its plunking calls across the woods and wetlands of GRNA just in time for mating season.

Editor's Note: *You may have heard the warnings in Florida about iguanas falling from trees during the state's record cold snap. This phenomena is occurring because iguana are also land hibernators who freeze themselves on purpose.*

GREAT LAKES WETLAND WALKS BY PEG COMFORT NOW AVAILABLE

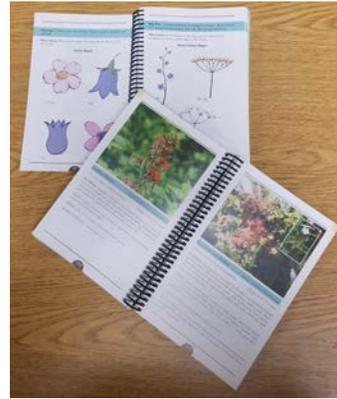


Peg Comfort's long awaited book has arrived at Grass River Natural Area. It is worth the wait. The beautiful color design by Glenn Wolff, interior photographs by James Dake, plant diagrams by Heather Shaw, and the text written by Peg make this book visually appealing as well as an educational necessity. It is spiral bound for easy use on the trails and there is plenty of space for note taking. There are even checklists throughout so you won't miss a single wildflower or fern species.

The price of *Great Lakes Wetland Walks* is \$22.64 plus tax and shipping if applicable. You can order online by

[clicking here](#), stopping in at the Grass River Center or the GRNA offices for an in person purchase, or visit Horizon Books in Traverse City to pick up your copy.

Grass River Natural Area is extremely grateful to Peg Comfort for allowing us the opportunity to publish her wildflower field guide.



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Whooo's
Out
There?



Winter Owl Prowl

Friday, January 24, 2020,

7:00pm – 8:30pm, \$5 per person

The Great Horned and Barred Owls are beginning to nest at Grass River Natural Area. Do you know which owl you're hearing when they "hoot" at night? Learn about their calls and habits and take an evening hike in the woods. We recommend snowshoes if the snow is deep. Snowshoes may be rented at the Grass River Center for the program for an additional \$5. A flashlight will be useful. Meet at the Grass River Center. Please pre-register.

Winter Homeschool Programs

Friday, January 31, 2020 and Friday, February 28, 2020

10am – 12pm, \$7 per student/adults are free

Join us for a morning of our woodland and wetland curriculum designed for homeschool families. We will have class rotations focusing on winter ecology - looking at how animals survive winter. Students may be divided into groups by age. You must **preregister** for this program.

[Click here for a full list of upcoming programs](#)

On a final note...

The email header this month is significant for two reasons. The photo is from our first ever lantern-lit snowshoe walk. Over 50 people came out on a beautiful, snowy Friday night for a guided walk on our trails. Thank you to our naturalist Franny Bluhm for organizing everyone and showing them another side of GRNA. Thanks also to Ellen Whitehead for the photograph. You may also note that the E News has a new name. Let us know what you think of *In Otter News*. We would love to hear your thoughts on the name and the new content which includes a lead story about nature each month.

Grass River Natural Area is a nonprofit organization that has flourished for fifty years because of the generous support of people who value our mission "to manage the Grass River Natural Area, conserve and protect its watershed, and provide opportunities that increase knowledge, appreciation and community-wide stewardship of the natural environment".

If you believe in our mission and want to help us fulfill it for many years to come. Please click on the Donate button below. Your support is greatly appreciated.

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Our mailing address is:

PO Box 231

Bellaire, MI 49615

Natural area address:

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