



The ubiquitous Green Frog, a consummate aquatic generalist, can be found in virtually every type of wetland in Michigan. "If there is water, there are Green Frogs."

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Thank You!

Vote/Eat to Fight Climate Change

**The New Normal
for Vernal Ponds
& Amphibians?**

For the fourth consecutive year as we head into winter Green Frog tadpoles thrive in our vernal ponds. Most would view this news kindly. Tadpoles are a good thing, right? In *these* ponds, in November, no...

To find them here in June, July or August, is always as it should be. As we enter our thirtieth year here, each one has found us in regular, intimate contact with the seasonal dynamics and impressive biodiversity of these small wetlands (It's a mini-jungle in there!). Our first twenty years wading through them, observing, recording and sampling-collecting gave us a stable reference, a baseline perspective, a handle on what we could come to deem as "normal." We had no inkling that these experiences would ultimately set the stage for alarm over what we were to witness over the next ten years to the present. The circannual rhythms of the ponds are spinning out-of-kilter, and it is most evident in the frogs.

In our January 2016 newsletter I wrote a lengthy column entitled, *Hey, They're Indicating!* (<http://www.naturediscovery.net/pdf/WILD%20TIMES%20Jan16.pdf>). The title is based on the cliché, various versions of which acknowledge frogs as good indicators of environmental health; but if they are, in fact, indicating something is awry who among us is paying attention? For starts, if you are clueless about what frog species exist in habitats around you, much less are unable to differentiate between them you are in no position to notice. *We're* noticing! Based on what we've witnessed not just on our ponds, but around our entire rural neighborhood over the past ten years, species diversity and overall abundance have experienced significant declines. How significant? We conservatively estimate that frog abundance on our property alone has crashed by well over fifty percent in this relatively short amount of time. What will be left in another ten years?

Extreme weather events that are increasing in frequency and overall intensity appear to be driving it. Severe heat and drought can dry these shallow ponds in some summers before tadpoles that hatched in the spring have enough time to grow and metamorphose into frog form. Yet, counterintuitively, we've found that increasing episodes of copious precipitation are responsible for a chain of events that is causing reproductive failures in most of the seven species that breed here.

The Green Frog is an example of a consummate habitat-generalist. Basically, if there is water there are Green Frogs. Three attributes allow it to attain reproductive success, where, in a world with increasing habitat disturbance at the hand of man, other species falter: 1) It can occupy and thrive in a wide range of water qualities. 2) It has a longer breeding window (three months) than any other Michigan species. 3) It will attempt to lay eggs in waters of almost any size and depth. Additionally, it bears mentioning that the Green Frog and the larger Bull Frog are the only species in the Lower Peninsula in which the tadpole routinely overwinters on permanent lakes and ponds.

Historically, vernal ponds (also called temporary ponds) are supposed to dry out as summer approaches fall, but Green Frogs manage to have success breeding on them despite the fact that it takes a tadpole three months or more to mature into frog form. In a “normal weather” year tadpoles hatching from eggs laid in May can mature and disperse before the pond dries at summer’s end. However, Green Frog tadpoles hatching from eggs laid in the summer months - sometimes as late as mid-August - would have no chance to mature before succumbing for lack of water. This guarantees that when snow and ice thaw in March and the depression fills with water, early-breeders like Spring Peepers, Chorus Frogs, Wood Frogs and Leopard Frogs can oviposit in waters devoid of Green Frog tadpoles.

What happens when, due to regular deluges of precipitation in late-summer and fall, these ponds remain full and Green Frog tadpoles survive the winter? We first witnessed it here in 2009, then again in 2011. Green Frog tadpoles present in the early spring water devoured the eggs of all early-breeding frogs!

In 2012 the record heat resulted in complete reproductive failure of all species, including the Green Frog on our ponds. Mercifully, the following two years saw conditions revert back to “normal.” The Green Frog tadpoles perished before winter and the early breeders returned to reproductive success.



However, in 2015, for the third time in seven years Green Frog tadpoles survived the winter on both ponds. In 2016 and 2017 we witnessed their winter survival on the larger, deeper back pond, yet, they failed to make it on the shallower front one. In those two springs we could wade through the front pond and find countless tadpoles of the early breeders, then step over a short isthmus of overgrowth into the back pond and not find a single tadpole of these species among the many, large Green Frog tadpoles that fled from our disturbance.



Summer, 2018. After a very droughty June and July, Carol and I watched the ponds steadily shrink, such that by early August the back pond was almost dry. We felt increasingly confident that the Green Frog tadpoles would not survive *this* year... Then the torrents came. The ponds steadily filled..., and filled. The wet weather has persisted throughout the fall to the present day. In conversation we both agree: The ponds are deeper for this time of year than we’ve ever seen them.

To summarize our thirty years of observation, here is the chronology of Green Frog tadpole winter survival (and the associated reproductive failure of other species): No survival in our first twenty years of observation; followed by survival of Green Frog tadpoles over the winters of 2009, 2011, 2015, 2016, 2017, and most certainly 2018. As if this trend isn’t unsettling enough a big, fat asterisk should be added to note the year 2012, the only one of which all species’ reproductive efforts, including that of the hearty Green Frog, were completely dashed by intense heat and drought.

No amount of lemonade made from a mountain of lemons of this magnitude can mitigate this climate change-driven disaster, but, since they're there why not take advantage of the tadpoles? Our minnow trap, by design is also a tadpole trap. I tied a long rope to it so as to heave it out and into the water without having to get my feet wet.

Every week I sink it into the pond, then pull it to shore a day or two later and dispense ten or twenty large fat tadpoles into a bucket. They are free, ready and natural food for our garter snakes, water snakes, turtles and Bull Frog.

We are feeding tadpoles regularly to any of these animals in front of our weekly students at Montessori Children's House, Stepping Stones Montessori and Okemos Nursery School. We are also feeding them in front of audiences at other schools, at library programs, at birthday parties, here at our open Sundays, and in other venues.



Children are fascinated by the simple concept of the minnow trap - that a small creature can approach a funnel from one direction, find itself easily steered into the cage, then, once inside, approach the same funnel from the opposite direction and be completely unable to find its way out, as if lost in a maze.

Surrounding a garter snake they excitedly watch as it devours the flopping tadpole. Eventually a comment, like "poor thing," almost always arises. We use it as a spring board to discussion about food chains and predator-prey relationships, including the need to accept these interactions as a natural way of life on our planet.

Depending on the grade level and our time allowance we delve into many of the aspects mentioned in this column and beyond. We explain why we refrain from capturing and feeding any species other than the Green Frog to the amphibian-eating portion of our menagerie. We expand the scope to discuss the dynamics of natural communities and the complexity of ecosystems, as well as how human activities can have unforeseen impacts on these systems and cause them to spiral out of control. The students understand, express concern and want to learn more. Most importantly, now more than ever, they attain another avenue of impetus to live thoughtfully and sustainably on the only planet they have.

-Jim McGrath



Catch Jim on Coffee Break ***Friday, November 9***

Jim is scheduled to appear on Friday, November 9 at 9:45am, discussing owls and more. The show airs weekdays from 9 to 10am on 89.7 FM. Listen live online at lcc.edu/radio/onair/ or watch it live (or later in the day at 6pm) online at lcc.edu/tv/watch. We'll post a reminder on our Facebook page.



© Steve Sage
Long-eared Owl. Photo © Steve Sage

Open Hours

***Sunday, November 11
1 to 5pm; \$5 admission***

2pm Presentation

Finding Owls in Winter

Did you know there are more owls to be seen in Lower Michigan during the winter months than at any other time of the year? In addition to our permanent resident Great-horned, Barred and Screech owls, a number of northern species like Snowy, Short-eared, Long-eared, Saw-whet owls wander southward from Canada. While viewing beautiful Powerpoint images, learn about the identification, behavior and vocalizations of each, as well as where and how to find them.

Before, during or after the presentation interact with our huge zoo of Michigan-native reptiles & amphibians. Children and adults can enjoy up close, hands-on encounters with snakes, turtles, frogs and salamanders and watch them be fed, too! Knowledgeable staff is always on hand to share information about each species and to help visitors of all ages make the most of their visit. Photo ops, galore!

COME HUNGRY! Enjoy a bowlful of Carol's Two-Bean Butternut Squash Chili (Donations welcome! Read more about it on Page 6.).



Thanksgiving Eve

Michigan Wildlife Day Camp

Wednesday, November 21 9am-3pm

For K thru middle school. If your children have the day before Thanksgiving off school (or even a half day – we'll pro-rate it!) enroll them in a day of in-your-face Michigan wildlife. All students will spend time learning about, holding and feeding cold-blooded occupants of our huge zoo of Michigan snakes, turtles, frogs and salamanders. We'll also spend time engaged in outside activities. A hot lunch is provided.

COST: \$65/student, includes hot lunch. Contact us to enroll.



***Visit Our Interactive
Michigan Reptiles & Amphibians Exhibit
at Glencairn Elementary's Science Night***

*Plus many more hands-on science displays and activities
open to the public.*

Thursday, November 29; 6-7:30pm.

*The school has been temporarily relocated to
Red Cedar Elementary, 1110 Narcissus Drive, E. Lansing.*

***Muskegon Area
Birding Day***

***Wednesday, November 28
6:30am to 4:30pm***



Long-tailed Duck.

Photo © Steve Sage

On Wednesday, November 28 join us on a guided trip to the Muskegon area for some great, late-fall birding. Jim will lead and drive a maximum of five adult participants on this full-day odyssey to tally as many species as possible through habitats that harbor thousands of birds.

Wastewater treatment facilities are typically hot birding locales. The expansive Muskegon Wastewater Facility, several miles from Lake Michigan, allows birders to acquire a special permit to access their facility. Jim has one! Vast holding ponds of various depths are waterfowl magnets. The water birds in turn, attract predatory hawks, eagles and owls.

Miles of dikes surround the ponds crammed with thousands of ducks of over a dozen species, plus geese, swans, grebes and more. Open area north and south of the ponds offer a slew of other species, including eagles, Rough-legged Hawks, kestrels, shrikes, Snow Buntings and lots more.

We'll head to Lake Michigan to pick up more birds from the shore and on the breakwater. Diving ducks, loons, grebes and more, forage here. The uncommon Purple Sandpiper migrates along Lake Michigan in late fall. With luck, we may find one foraging on the rocky breakwater.

Weather-permitting, we should tally nearly 50 species. The only extended walking will be on the breakwater. Participants will receive a Michigan Birds checklist to tally the day's finds.

COST: Only \$70/person, includes transportation. Meet at Nature Discovery. With notice, we can also arrange to pick you up at another more convenient location. Contact us to reserve a spot.

Thank you...

To Marlene Epley and Leo Sheets of Flower Essence. Once again they donated to the Eastern Ingham Farmers Market in Williamston to completely fund our small monthly exhibits over the summer.

To Katherine Alstrom for her dedicated volunteer work here.

*Vote & Eat Like
You're Serious
About Action on
Climate Change*



Photo from <https://www.worldwildlife.org/pages/living-planet-report-2018> (c) WWF-Aus/Chris Johnson

We wholly support the tireless reporting of the free press and recognize its indispensable function, as our founders intended, as a watchdog to protect the country's citizens against potential despotic tendencies (i.e., lying, deceit) by those who may rise to power. That being said, we're apt to deliver an F to the press for inadequate coverage in regard to the most pressing issue to the planet, to our country, to each one of us, and especially, to our children. No wonder it barely registers a blip on list of most pressing issues to voters. The top issues to voters fall in step with the relative amount of media coverage they receive.

Case in point, the latest report from the International Panel on Climate Change released in early October is the most dire yet, but, it was cycled in and out of the mainstream media wheel of consciousness in a relative blink of an eye. You can count on climate change action being regularly discussed in this newsletter, though!

Below is a list of links from sources we've perused and listened to lately that dig into the grave effects and action required to combat man-made climate change. We hope you can make time to check them out.

Here is the November 1 installment of NPR's *On Point*, entitled *The Cost of Climate Change Across the Animal Kingdom*:

<http://www.wbur.org/onpoint/2018/11/01/the-cost-of-climate-change-across-the-animal-kingdom>

Check out this column that reviews the IPCC's report as well as recommendations for consumer action, including changes you can incorporate into your transportation habits, building energy efficiency and diet that will make the most impact on shrinking your carbon footprint.

<https://www.cnn.com/2018/10/08/world/ipcc-climate-change-consumer-actions-intl/index.html>

According to this column in *The Atlantic* you and I can make the biggest impact on our carbon output by diet change alone. If you've been averse to trying it, it's easier to prepare and infinitely more tasty and satisfying than most lifelong beef-eaters can imagine:

https://www.theatlantic.com/health/archive/2017/08/if-everyone-ate-beans-instead-of-beef/535536/?utm_source=newsletter&utm_medium=email&utm_campaign=atlantic-daily-newsletter&utm_content=20181022&silverid-ref=MzI4Njc1NDk5NTIxS0

This column has inspired Carol to prepare a potful of her own meat-free chili to serve to visitors during our open hours next Sunday. It's only one of countless single-bowl meatless creations in her repertoire, and so good it's hard to stop eating! Want to try it yourself? Here is her recipe...

Two-Bean Butternut Squash Chili

28 oz can Organic Crushed Tomatoes
½ Organic Butternut Squash, diced small
½ Onion, diced small
1/3 Red Pepper, diced small
¾ cup Organic Corn, fresh or frozen
15 oz can Organic Garbanzo Beans
15 oz can Organic Black Beans
Chili Powder and Chipotle Pepper Hot Sauce
Extra Sharp Cheddar Cheese and Light Sour Cream

Place diced butternut squash in a 2 ½ quart (or larger) pot, cover with water and boil for 5 minutes. Drain, add all vegetables and drained garbanzo and black beans to pot. Add chili powder and chipotle pepper hot sauce to taste. Cover pot, bring to boil over medium heat, then reduce heat and simmer, stirring occasionally. Adjust seasoning to taste after 20-30 minutes. Top each bowl with cheese and sour cream if desired. Makes about 7 cups of chili.

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Concerned Scientists**
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