Nature Discovery WILD TIMES

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THIS ISSUE

Vernal Ponds and Coal Mines

The opening essay in this issue is an exceptionally lengthy one. We hope this doesn't deter readers from spending the extra few minutes to read it. As always, we welcome and encourage any feedback. -JM

We've decided to launch our own Youtube channel! On March 16, I shot a 9-minute video of the breeding Wood Frogs on our vernal pond with real-time narration. To see the Wood Frog video and a few more, go to www.youtube.com, then enter our channel's name, Wild Williamston, in the search box. Before or after you do that, please take the time to read the troubling account below of the ensuing collapse of the Wood Frogs' breeding attempt this spring. For clarity, instructional paragraphs about vernal ponds, frog diversity and ecology are inserted. Ultimately, the essay wraps up with some unsettling implications about the state of our environment that need to be addressed.

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Carol and I often tell audiences – and we're not kidding – that we bought our house not for the house (borderline 'handyman special') but for the vernal pond behind it. We've now lived here and had an intimate relationship with the pond out back for over 23 years. How intimate? We've waded through it hundreds of times, day and night. Each year, we guide visitors into the living soup, but most of the time, we are there to collect specimens to be used educationally in schools and other venues.

What's a vernal pond? In rural areas, you can hear one this time of year. It may be deafening with Spring Peepers on an early spring night. Aliases include 'ephemeral,' 'temporary,' 'intermittent' and 'palustrine.' You'll hear few or no peepers on a permanent lake, pond or river. They and many other amphibians are limited to using vernal ponds as their breeding sites, very basically, because these wetlands are inhospitable to fish, in the presence of which many amphibians fail to breed effectively.

Experience the dizzying array of life harbored within, and it becomes easy to understand why the vernal pond is considered the most biologically rich habitat type in temperate climates. A critical process must occur annually or almost annually, for the vernal pond to maintain its uber-bioproductivity. It needs to dry out. When this happens near the end of most summers, a huge sector of the life it nurtures dies. Fittingly, however, within the life cycle, the behavior, or the dispersal mechanism of each species, there exists a means to ensure that its numbers will rebound when the pond returns the following spring.

There is a chronological order, or phenology, that exists within the vernal pond's circannual pulse. For instance, bizarre, beautiful fairy shrimp can be found swimming the vernal waters for only four or five weeks of the year. They hatch from eggs as soon as the ice melts, grow rapidly in the frigid water, mate,

The back pool of Nature Discovery's vernal pond.

lay eggs, and are completely gone by late April. The eggs lie dormant for most of the year. They need to dry, then rehydrate in order to hatch. This is why the fairy shrimp is a crustacean found only in unpolluted vernal ponds, and it thrives in cold water that was ice a week or two before.

Regarding amphibian reproduction in our particular pond, the Wood Frog is one of seven frog species we've chronicled breeding here, in addition to two species of salamanders. Each species takes its turn breeding through the spring and early summer, starting with Spring Peepers, Wood Frogs and Tiger Salamanders, and finishing with only semi-successful Green Frogs.

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It's common knowledge that frogs are considered good indicators of environmental quality. The statement would hold true for salamanders, as well, if they weren't so difficult to observe. However, if your knowledge about frogs is limited to information attained in a single lesson you received in first grade, you will not be in a position to notice their environmentally indicative powers. The knowledge base of most adults could probably be summed up in a handful of short sentences: A frog is green. A frog says 'ribbit.' A frog lives in a pond. A frog eats bugs. A baby frog is a tadpole.

In our lessons to kindergarten-aged students, they assimilate far more. They know there isn't just 'the frog,' but a diversity of frog species in Michigan and throughout the world. The simple sentences above can be expanded into a paragraph that reveals much more about frogs in the environment.

Each species is colored to match its natural surroundings, sometimes green, but often some shade of brown or gray. Each species has its own unique breeding call and can be identified effectively 'by ear.' Most frogs only go to a pond to breed. The rest of the year they occupy habitats that surround the pond. The quality of the pond and adjacent habitat determines what species will breed there. The vernal pond is the best 'nursery' pond for tadpoles of the most species. A frog will eat a variety of invertebrates, not just 'bugs.' In fact, a frog will attempt to eat anything moving that can fit in its mouth. For a large Bull Frog, small vertebrates, like smaller frogs, easily fit.

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Although April 1 is closer to the average date that Wood Frogs begin to breed in lower Michigan, March 12 this year was not the earliest date since we've lived here. One year in the 90s, we experienced a blip of warm weather over a few days in the first week of the month that topped out in the low 70s. Wood Frogs bred heavily through these days, then winter returned. But this March's two weeks of 'July' was unprecedented in all of our life times. We found it all the more unsettling having occurred on the back end of one of our wimpiest winters on record.

How can this not cause repercussions on the dynamics of a vernal pond? We've always known our shallow pond to freeze, then remain frozen through the winter. This past winter, the surface froze and thawed many times. In fact, it may not have gone more than two weeks in a frozen state the entire stretch.

On my first wade of the year a few days before shooting the video, my heart sank when I noticed one large Green Frog tadpole after another dart away from my moving legs and into the cover of the submerged brown grasses. Only one other time had I seen tadpoles of this species make it through the winter on our pond – the spring of 2010. In every other year, they were winter-killed.

At first glance, the sight of cute tadpoles dying by the thousands in a pond may seem like a bad thing, but populations, in general, are genetically inclined to expand into borderline, inhospitable habitats at the expense of individuals. If a thousand must die for every handful that survive, so be it. The handful pass their genes on to a next generation that is a bit more genetically-suited to the local conditions than the previous one. Evolution takes another baby step.

The Green Frog is found on virtually all waters.

The Green Frog is the second largest frog in the state. We often refer to it as the 'default frog.' In a rural setting, if a pool of fresh water exists long enough Greens will move in and attempt to breed. This frog can tolerate the widest range of water qualities of any Michigan frog. In short, if there is water, there are Green Frogs, so don't get excited over seeing them on any body of water. It's a given.

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Any pond has, or used to have, the ability to support the breeding effort of a diversity of frogs. If frog diversity is lacking, this is usually an indication that the pond's water quality has suffered, whereby other species which used to breed there can no longer do so. Usually, embryo or tadpole development is affected, although adults of the species will return every spring to try again. Eventually, over several years, the adult frogs live out their lives and die with no generations produced to take their place. Another scenario for species decline involves destruction of foraging areas which surround the pond. A given pond may be protected by state, county or township ordinances, but the majority of Michigan frogs forage in habitats beyond the breeding pond. For Wood Frogs and Spring Peepers, wooded or brushy habitat adjacent to the breeding pond is critical for foraging. For Leopard Frogs and Chorus Frogs, overgrown meadow habitat.

If you'd like to witness a currently dense, but ultimately doomed, local population of Chorus Frogs that is threatened by both aspects outlined above, drive through Central Park Estates, across the street from Kohl's, in Okemos. A grassy vernal pond, resonates with the low, mechanical 'creeks' of these tiny frogs early in the spring. No doubt, the pond is protected by township ordinance, but it has been nearly completely surrounded by new home construction. The majority of the foraging habitat has been destroyed. Additionally, the requisite weed-free standard set for subdivision lawns everywhere will require regular applications of herbicides, insecticides, fertilizer and other chemicals that make TruGreen the ultimate name in corporate "green-washing." The ring of chemical soup has no where to run but downhill and into the vernal pond. The ordinance may protect the space occupied by the wetland, but does little to protect its health and biological integrity.

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Beginning in early May and extending into August, the Green Frog has the longest breeding window of any Michigan frog. In the lower portion of the state, it takes three months of warm conditions for the tadpole to grow and mature into a 'metamorph' or 'froglet.' Thus, eggs laid in May and June are producing metamorphs in August and September, but eggs laid later in the summer result in tadpoles having to overwinter under the ice. Not a problem on a deeper, permanent body of water, but certain death for late tadpoles on a shallow vernal pond.

August of 2009 was unusually cool and very wet. As a result, our pond's water level was deeper than we had ever seen it at winter's onset. Despite a good cap of ice over the surface through the winter, the

tadpoles did not die. When ice melted the following spring, it was strange to see large Green Frog tadpoles sharing the water space among the breeding mix of wood frogs and other species.

Another 'first' awaited us weeks later. Where in past years, only two weeks after the eggs were laid, we would wade into the water to see thousands of tiny tadpoles from the early-breeding species, in the spring of 2010 we had to search long and hard to come up with one. Once again, where in past years, we'd come to expect our lawn and surrounding shrubbery to be hopping with countless tiny metamorphs of these species by mid-June, during the summer of 2010 we noted their absence with a sense of unease. We felt certain that in one way or another, the phenomenon of large Green Frog tadpoles occupying the early spring pond was negatively affecting the reproductive success of the smaller frogs, but we hadn't pinpointed why.

Green Frog tadpoles appear to have completely consumed this spring's Wood Frog eggs. Have the eggs of other amphibians met the same fate?

More normal rainfall and temperatures occurred over the transitional months between 2010 and 2011. Green Frog tadpoles were once again absent from the freshly-thawed water. The Wood Frogs and other species bred successfully, and the yard was hopping with tiny metamorphs by early summer.

Having observed the reproductive failure of the other species in the presence of early spring Green Frog tadpoles the year before last, and discovering the large tadpoles back again this March, we were prepared to be more vigilant to determine how the Green Frog tadpoles might be playing a role. A few nights after I shot the video of the breeding Wood Frogs, I waded to the same spot in the pond. The flashlight beam revealed the egg masses completely engulfed with the wiggling bodies of Green Frog tadpoles. Startled by the light, they quickly disappeared into the grass jungle beneath the eggs.

A few days later, I visited the site again. It was as if the eggs never existed. Weeks later now, we have yet to see a single Wood Frog tadpole. Had the Green Frog tadpoles eaten all the eggs?

I emailed MSU herpetologist, Dr. Jim Harding, about the incident. He agreed that, despite their generally herbivorous nature, the Green Frog tadpoles may very well have taken advantage of such a readily available source of protein.

Wood Frog egg masses are easy to find because each one may contain up to several hundred eggs. The species also has a tendency to lay masses in close proximity to one another, as seen in the video. Those of other amphibians are less observable. Spring Peepers lay their tiny eggs individually or in clusters of only a few, and so, they are much harder to locate. Salamander egg deposition occurs silently under the cover of darkness.

By extension, we suspect that the eggs of these species are also consumed heavily by the abundant and voracious Green Frog tadpoles. Small frogs have life spans of only a few years. Given a scenario whereby increasingly mild winters less often allow a vernal pond to winter-kill its Green Frog tadpoles, how can we expect any other result than population declines in other amphibians, in general? Would a stretch of, say, six consecutive years of no winter-kill in a specific pond result in the local extinction of Wood Frogs, Spring Peepers and other early breeders?

Oh, getting back to those fairy shrimp… In 23 years here, another first – there are none. Once again, we are led to ask 'What's going on?' A look at the conditions we'd come to know as 'normal' in the fairy shrimp's breeding cycle through the first 22 years versus what's changed this year finds us nodding in

unison. A wade through the fairy shrimp-laden waters is supposed to be a numbing experience – almost painfully so! This year? The water temperature rose rapidly through day after day of unprecedented 70s and 80s. Carol, Reed and I agreed that by March 20, we could have donned swim wear and comfortably dove right in.

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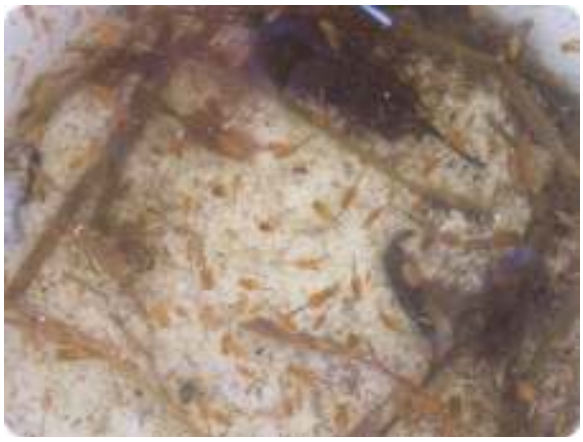

Fairy shrimp, common-to-abundant early spring crustaceans on Nature Discovery's vernal pond, were conspicuously M.I.A. this year.

Frogs and fairy shrimp are just drops in a growing pool of environmental indicators pointing to climatic trends that are drifting awry – trends that are increasingly altering the face of the planet in troubling ways. Main stream media are failing to give it straight to the people. Here's a case in point from our own Lansing State Journal.

On March 22, the LSJ provided front page coverage of the good and the bad generated by the unprecedented heat wave. Through its duration, the column managed to sidestep any hint of speculation regarding 'global warming' or 'climate change'. The concerns of farmers and fruit growers were reported, then the readership was treated to these simplistic observations. Good: Ice cream! Sprinklers! Cold beer on the patio! Bad: Mosquitoes!

A week later, buried on page 11 in a USA Today side bar, two short paragraphs were devoted to the release of a 594-page report by a Nobel-prize winning panel of climate scientists warning that manmade climate change "is leading to such severe storms, droughts and heat waves that nations should prepare for an unprecedented onslaught of deadly and costly weather disasters…" How can one trivialize that?

Society has been living the good life in its self-made coal mine for so long, it has become more self-absorbed today than ever. It's as if we've become so rapt in our Twitters, X Factors, portfolio performances, and party allegiances, we've tuned out the guy who just checked the canary. That's the most unsettling realization of all.

-Jim McGrath

Enroll for Summer Day Camps Now

Go to our website and click on the 2012 Summer Day Camps link for all the details. All weeks still have openings. Here is a list of the weeks, topics and recommended age ranges.

June 18-21	Michigan Birds & Birding (9 yrs & up) Nature Discovery (7-9 yrs)
June 25-28	Birding for Visually Impaired (10 yrs & up)
July 9-12	Nature Discovery (7-9 yrs)
July 16-19	Budding Naturalists (5-6 yrs)*
July 23-26	Free-Range Naturalist (11 yrs & up)
Jul 30-Aug 2	Okemos Nursery School Week*
Aug 6-9	MI Reptiles & Amphibians (9 yrs & up)
Aug 20-23	Insect Collecting (9 yrs & up)
Aug 27-30	Insect Collecting for MS & HS Students

* Budding Naturalists and Okemos Nursery School weeks are half-days, however, Budding Naturalists also offers a full-day option.

Elena Forman holds a leech caught in the vernal pond at a recent spring break camp. Leeches lack any instinct to bite defensively.

Open Hours

Sunday, April 15

1 to 5pm; $5 admission

2pm Presentation

Michigan Frogs UP CLOSE

What frogs must use vernal ponds in order to breed? What two species look so identical, you can only tell them apart by their calls? How many species can be found around the Lansing area? Which species are in most serious decline? How is our warming climate affecting some species' survival? Get to know Michigan frogs like you've never known them before. At 2pm, we will present the Powerpoint presentation, *Michigan Frogs Up Close*, featuring usable identification, habitat, and behavioral information of all 13 species found in the state, as well as audio recordings of their calls from Nature Discovery's own instructional and environmental CD, *Frogs of the Great Lakes Region.* Live specimens of 11 Michigan species will be passed around the audience for especially up-close viewing. Any participants this day may purchase a CD at $2 off the regular price of $14.

- Before, during or after the presentation, our staff is always ready to help visitors of all ages make the most of their visit.
- We'll feed some frogs inside their tanks, and, weather-permitting, take the big bull frog onto the patio to watch it leap around and gobble up worms.
- A sampling of the abundant invertebrate life in our vernal pond will be available for viewing in large pans, in addition to lots of green frog tadpoles, which have uncharacteristically survived the winter in the shallow water.
- Watch garter snakes and turtles feast on tadpoles.
- Hand-feed a box turtle.
- Hold a big black rat snake. See a clutch of incubating rat snake eggs, due to hatch in late May.
- On the trail, let our staff help you identify three invasive species of plants that are decimating native wildflowers and trees in many area woodlots.
- On the trail, ask a staff personal to help you identify singing birds "by ear."
- Photo ops galore! After the presentation, visitors with cameras are encouraged to photograph any of the reptiles and amphibians on hand. We may even be able to take some outside for photos in a more natural state.
- Hot dogs and pop available, too, at a-dollar-a-dog, a-dollar-a-pop!

A ribbon snake eats a green frog tadpole in front of an audience. *Photo by Linda Urban*

Around the State in April

- ***Wednesday, April 11*: 6-7:30pm. MI Turtles Presentation; Straits Area Audubon, Cheboygan Public Library. Public is welcome.**
- ***6-7:30pm. MI Reptiles & Amphibians Exhibit; Fairview Elementary School Science Night, Lansing. Public is welcome.***
- ***Saturday, April 14*: 10am-3pm. MI Reptiles & Amphibians Exhibit; University of Michigan, Flint. Public is welcome.**
- ***12-4pm. MI Reptiles & Amphibians Exhibit; Benzie Conservation District Water Festival, Frankfort. Public is welcome.***
- ***10am & 1pm. MI Reptiles & Amphibians Presentation; Saginaw Conservation District Fish Festival. Public is welcome.***
- ***Thursday, April 19*: 9am-2pm. MI Reptiles & Amphibians Exhibit; MDEQ Earth Day Celebration.**
- ***Saturday, April 21*: 10am-3pm. MI Reptiles & Amphibians Exhibit; Embrace Our Earth Festival, Bad Axe. Public is welcome.**
- ***11am-12:30pm. MI Reptiles & Amphibians Presentation; Mason County District Library, Ludington. Public is welcome.***
- ***Sunday, April 22*: 2-3pm. MI Reptiles & Amphibians presentation; Middlebury Park, Elkhart, Indiana. Public is welcome.**
- ***Saturday, April 28*: 9:30-11:30am. MI Reptiles & Amphibians Exhibit; Cannon Township Waterfest, Cannonsburg. Public is welcome.**
- ***1pm & 3pm. MI Turtles Presentations; DeGraaf Nature Center; Holland. Public is welcome.***
- ***Sunday, April 29*: 2-3:30pm. MI Reptiles & Amphibians Presentation; Sarett Nature Center, Benton Harbor. Public is welcome.**

Photographers, Marilyn Keigley and Linda Urban, spent over two hours recently at Nature Discovery photographing many of our native Michigan reptiles & amphibians inside and outside. Jim helped pose not-always-cooperative turtles and snakes. Contact us to arrange a special photo session of your own. In this photo, the ladies shoot a ribbon snake.

"Breeding Birds of the U.P." Tour, June 12-16, 2012

Join our 5-day guided tour in Michigan's Upper Peninsula with an intimate group of only 4 adults. Our goal is to experience as many species as possible, emphasizing locations to tally specific U.P. gems, like Connecticut Warbler, LeConte's Sparrow and the endangered Yellow Rail. COST: $650 ($250 deposit), includes all transportation, 4 breakfasts and 4 lunches. Contact us to enroll or for more information.

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NATURE DISCOVERY 5900 N. Williamston Road Williamston, MI 48895

(517) 655-5349 naturedisc@cablespeed.com www.naturediscovery.net