Kali Gates

Frogs & Toads

Voices of Spring

By Scott A. Smith

For some folks the first herald of approaching spring is hearing the song of a robin or red-winged blackbird. For others it's seeing those first crocus blossoms pushing up through the soil. For amphibian enthusiasts, of which I am a devout member, spring comes a little early and it comes in the form of a chorus of frogs.

Spring comes early

By early I mean it often comes in February or early March after some warm rainy days and humid nights. From my field notebook:

Feb. 23, 2007: cold & windy, water is high in Carolina bays, most ice-covered. Phrag Pond near Bridgetown, Caroline County, ~1430 hours, 3-5 male New Jersey Chorus Frogs calling tentatively in southeast-facing corner of pond out of wind. Here it is sunny in the low 40s, a little ice on edges of pond. These are the first I have heard this year.

March 11, 2007: We finally get some warm sunny weather after 4-5 weeks of real winter with snow and sub-freezing temperatures. New Jersey Chorus Frogs and Spring Peepers calling from drainage ditch across street from house. Reports of both species calling on 3/9, as well as Wood Frogs and breeding assembly of Spotted Salamanders.

My family is fortunate that in the late winter and early spring of most years about a third of one of our pastures floods, as does the adjacent wood land and a small run-in shed. While this minor inconvenience often requires us to move livestock to another pasture, and makes the shed seasonally unusable, it also means that we are serenaded by a host of calling frogs and toads on those nights (and some days) when temperatures are warm enough. We have recorded 7 frog and toad species calling and breeding in this flooded pasture over the past 15 years.

We first became aware of this spectacle shortly after we purchased the property in Caroline County]. One night in late March after a few days of torrential rains, our evening television viewing was abruptly interrupted by a loud chorus of coarse explosive grunts: "GEEOO". It sounded like young crows or what you would expect to hear if you accidentally stepped on a toad. My wife and I immediately ran out the door, grabbing flashlights and boots, to find the amazing spectacle of breeding Eastern spadefoots.

A yellow patch on its side is one of many features distinguishing the pickerel frog, pictured here, from the southern leopard frog.

Spadefoots are a rather bizarre looking type of toad: olive yellow skin, two wavy stripes down the center of its back resembling a lyre [a medieval stringed instrument] and small orange-red warts along the sides. Most peculiar of all are its eyes, luminous yellow with black vertically slit iris and black indentations at the midpoints.

This night the spadefoots hopped in profusion along the wet lawn, their strange eyes gleaming in the light from our hand torches, all headed towards the same sound that we were.

Males floated in the shin-deep water, heads arched back, inflating their vocal sacs, and releasing, letting out their sharp call. Nearby, one had grabbed the waist of a receptive female, and proceeded to fertilize the

ABOVE: ***The Great Worcester Herp Search ia an annual event where kids of all ages can get their feet wet.***

BELOW: ***A breeding pair of American Toads (Anaxyrus americanus)***

string of eggs issuing from her vent. We were ecstatic, inviting friends over to witness the show with us.

To this day we are considered "strange" by some neighbors. We continue to add to our notoriety as we can often be observed on dark rainy nights out in the flooded pasture with flashlights and hipboots, occasionally even accompanied by a film crew or other equally unsavory characters.

When is a toad a toad?

To a herpetologist – one who studies amphibians and reptiles -- a toad is a frog but a frog is never a toad. For the rest of us, toads generally have warty skin and short legs for moving by short hops, while frogs generally have smooth skin and long legs for moving by long leaps. Of course there are exceptions: Our own Eastern Cricket Frog has wart-like bumps and the state endangered Eastern Narrow-mouthed Toad has neither warts nor smooth skin, but a granular knobby epidermis instead.

Both frogs and toads belong to the same Order, *Anura*, and are considered to be tailless amphibians. They lose their tails during metamorphosis [when they change from an aquatic tadpole to a terrestrial adult], compared to our other native amphibians, the salamanders, which retain there tails as adults. Frogs and toads also have relatively short bodies and no discernible neck compared to salamanders.

The word "amphibian" itself points to something special about these animals. It derives from the Greek "amphi" meaning "double" or "both" and "bios" meaning life. So amphibians have a "double life", living alternately on land and water.

Eggs are laid in water, hatching out aquatic "tadpoles". Frog and toad tadpoles are generally vegetarian though some individuals will feed on other tadpoles. Over time the tadpoles develop limbs, the tail is reabsorbed and they move up onto land, "metamorphosing" into miniature versions of the adults. Now their diet changes to carnivorous, feeding on insects, other amphibians and an occasional fish. Some larger species, such as the American bullfrog will also feed on small mammals and even birds. The cycle is completed when these animals return to the water as adults to reproduce and lay eggs.

Because of the "double life" of amphibians, they are considered excellent indicators of the ecological health of both aquatic and terrestrial systems, being exposed to potential pollutants and diseases in both mediums. They are the veritable canary in a coal mine.

Give me some skin

The most essential and in many ways the most amazing part of its anatomy is the amphibian's skin. Besides having lungs, frogs and toads also absorb oxygen through their highly permeable skin. Because of this the skin typically needs to be moist or else they will desiccate (the exceptions being two of our toads which have dry, warty skin). Some of our salamanders are actually lungless, so their dependence on moist skin is absolute.

An amphibian's skin has very important glands of three types. Mucus glands help retain moisture, have antibiotic properties and make the animal slippery -- a great aid in escaping predators. Poison glands produce toxins that make amphibians unpalatable or toxic to many predators. Nuptial glands appear seasonally

in males of some species and are related to reproductive activity. Additionally, the American toad and Fowler's toad have the paratoid gland, a kidney-shaped lump located immediately behind each eye. This gland produces alkaloids that make predators sick, irritating mucus membranes. (For those who've ever had a puppy try to eat a toad and begin foaming at the mouth, that's the paratoid gland in action.)

It is recommended that amphibians only be handled sparingly and with pre-moistened hands to avoid damaging the critical mucus layer. Washing hands immediately after handling them is also important due to the potential effects toxins may have on humans.

Another reason frog and toad skin is so amazing is that many species will change color to match the background (for camouflage); color can also be dependent on body temperature and reproductive condition of the animal. Hormones from the pituitary gland act on melanophores in the skin to alter coloration. The green treefrog and gray treefrog are exceptional at this disappearing act.

How many frogs do we have?

Depending on the source, there are about 3,500 to 4,300 species of frogs and toads worldwide. The discrepancy has to do with a plethora of recent discoveries from expeditions to remote areas of the earth, advanced molecular genetic techniques that have been able to split apart look-alike species, and ongoing debate among taxonomists, who it seems are always changing species names and coming up with new ones. Frogs and toads are found on every continent except for Antarctica, with the greatest species diversity in tropical and sub-tropical areas.

Maryland has 19 native species of frogs and toads and one introduced species, the Northern leopard frog (see table). Many of our species are rarely observed or heard except at breeding times.

A great example of this are the previously mentioned Eastern spadefoots. They spend most of their time underground, using the "spade" on the bottom of their hind feet (their namesake), to dig deep tunnels into the sandy soils they crave. They emerge only on warm humid nights to feed and only breed for a few days a year, typically during and after extremely heavy rains, particularly from nor'easters, tropical storms and hurricanes. I call them the "storm toads". They can be quite common in an area yet never observed.

TOP: ***Seasonal woodland ponds or vernal pools are critical habitat for many amphibians because they lack fish, major predators of amphibian eggs, larvae and adults. The surrounding upland is also important to protect because it is the "life zone" where amphibians spend most of their life.*** BOTTOM: ***The Northern Green Frog (Lithobates clamitans melanota) is one of the most common frogs in Maryland.***

Are Frogs Declining?

In many places of the world, even in pristine habitats, amphibian populations are declining, some to the point of extinction. These declines have alarmed and perplexed scientists worldwide and much research has recently been devoted to determine their causes.

A variety of factors have been noted in these declines, including alteration and loss of wetlands, introduction of predatory fish into previously fish-less wetlands, introduction of non-native species (such as bullfrogs in western U.S. and Canada), acidification from acid rain and mine drainage, adverse weather patterns due to global warming, pesticide release and increased UV-B radiation from ozone depletion.

Maryland's Frogs & Toads

Common Name	Scientific Name	State Status
Eastern Spadefoot	*Scaphiopus holbrookii*	
American Toad	*Anaxyrus a. americanus*	
Fowler's Toad	*Anaxyrus fowleri*	
Eastern Narrow-mouthed Toad	*Gastrophryne carolinensis*	Endangered
Mountain Chorus Frog	*Pseudacris brachyphona*	Endangered
Northern Spring Peeper	*Pseudacris crucifer*	
Upland Chorus Frog	*Pseudacris feriarum*	
New Jersey Chorus Frog	*Pseudacris kalmi*	
Eastern Cricket Frog	*Acris c. crepitans*	
Green Treefrog	*Hyla cinerea*	
Gray Treefrog	*Hyla versicolor*	
Copeís Gray Treefrog	*Hyla chrysoscelis*	
Barking Treefrog	*Hyla gratiosa*	Endangered
Carpenter Frog	*Lithobates virgatipes*	Watchlist
Wood Frog	*Lithobates sylvaticus*	
Northern Leopard Frog	*Lithobates pipiens*	Introduced
Southern Leopard Frog	*Lithobates sphenocephalus utricularius*	
Pickerel Frog	*Lithobates palustris*	
Northern Green Frog	*Lithobates clamitans melanota*	
American Bullfrog	*Lithobates catesbeiana*	

A male Eastern Spadefoot (Scaphiopus holbrookii) floats between calls.

A number of emerging infectious diseases have recently been implicated in amphibian declines, including ranaviruses, iridoviruses, and amphibian chytrid fungus disease. Extinctions or mass die-offs have repeatedly been linked to the latter two. These diseases may be able to become established in populations already stressed by other factors, but much is still to be learned to combat these threats.

A male New Jersey Chorus Frog (Pseudacris Kalmi) with inflated vocal sac calls, one of the first sounds of spring.

A wood frog (Lithobates sylvaticus) gelatinous egg mass laid in March in a Caroline County vernal pool. The white spots are a fungus attacking embryos exposed to the air.

In Maryland, no quantitative evidence exists for declining amphibians on the scale observed in some other states and around the world, though populations have declined from historic levels due to habitat loss and alteration. Long-term population monitoring of calling frogs and toads began in Maryland in the early 1990s with the establishment of statewide sampling sites by DNR. In the mid-1990s this sampling effort was replaced by the North American Amphibian Monitoring Program, coordinated by the federal government out of Patuxent Wildlife Research Center in Laurel.

A nationwide effort to sample for chytrid and other emerging diseases is being championed by Partners in Amphibian and Reptile Conservation, however it is still in the planning stages. Chytrid fungus has recently been documented in Maryland, but the distribution and effect on our native amphibians has not been determined, nor a cure found. We currently have three endangered frog species in Maryland and one Watchlist species. Only time and effort will determine what effects, if any, these emerging diseases will have on our native amphibians.

First Exposure

Frogs and toads are some of the first animals children are exposed to. They can be locally abundant and easily captured. Getting children interested in them is a great way to foster a connection to nature, helping them realize that they also can be good stewards of the natural resources in their own backyards and neighborhoods.

I recommend everyone take the time to go exploring the next spring night calling frogs and toads make themselves heard. It'll give the neighbors something to talk about! ❖

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