

Salamanderings



BEEC

Crossing Brigade News

May 3, 2007

Issue 2.2

Welcome to the Bonnyvale Environmental Education Center's seasonal Salamander Crossing Newsletter. Each issue includes reports of amphibian activity, natural history information, and advice for amphibian crossing guards. Please send your photos, accounts of your activities, and hot tips for inclusion in future issues. If you would like to receive this e-newsletter, please contact Patti Smith at: grayfox@svcable.net.



What Hoppind?

Who were those other strangers out there in raincoats? Find out what they look like in the daylight!

Please Come to a
Salamander Social

Thursday, May 17

5:30 p.m.

at BEEC

Celebrate the community effort to save salamanders! We'll provide pizza and a variety of beverages. Feel free to bring a potluck dessert, salad, or beverage. Amphibian themes are encouraged. You don't need to bring a thing! Meet your fellow amphibian enthusiasts, share news of the season, and find out more about what the amphibians are up to now. Please RSVP at 257-5785 or send an e mail to grayfox@svcable.net.

Send your photos, reports and comments to: Patti Smith at grayfox@svcable.net or to the Bonnyvale Environmental Education Center: P.O. Box 2318, W. Brattleboro, VT 05303.

Once again, it has been a strange salamander crossing year. We had a few marginal days in early April, damp and hovering near 40°F, but with the ground still frozen and pools iced up. No amphibian activity was noted at that time. Then winter returned and we had a couple of weeks of unseasonably cold weather that ended with a Northeaster that brought us snow and then cold rain April 15 - 16. Temperatures leaped into the very welcome 60s and 70s and even warmer at the end of that storm, and one could imagine all of those salamanders eager to move, but we had no rain. The wood frogs decided not to wait and took to the roads on dry nights that followed. Rain fell, though not much in the early morning hours of Thursday, April 26 and throughout the day on Friday the 27. For volunteers who were patient, that was the night that we saw the most amphibians, though the salamanders didn't show up at most sites until after 9 p.m. The little bit of rain that followed at the end of April and the beginning of May arrived too late at night for volunteers to be needed.

So, though fewer amphibians needed escorts this year than some years, hundreds of frogs and salamanders were delivered in safety to the other sides of roads.

Thanks to all who helped!

Call Patti Smith at 387-5384 or BEEC at 257-5785

If Anyone Asks You Why . . . A Road Mortality Study

It may seem obvious that if enough salamanders are flattened by cars on their way to a given pool, that population of amphibians is in jeopardy. But is that true? Even if one hundred salamanders are killed moving to or from a pool each year, those females that survive will each lay many eggs, usually more than 150. In fact some amphibian populations can fluctuate dramatically from one year to the next with no great cause for alarm. In the case of our long-lived Spotted Salamander, however, it is important to consider that very few of those eggs will lead to a successfully metamorphosed salamander. Furthermore, it takes another two to three years for males to reach breeding age, and females wait until they are three to five years old. The population of adult breeding salamanders usually remains quite stable from year to year. While survivorship varies dramatically from place to place and pool to pool, consensus from the many studies seems to be that the chances of surviving from embryo to admission to the breeding population are pretty darn slim.

Given these qualities of Spotted Salamander lives, can we predict whether roads jeopardize these animals? As you might imagine, this is a tricky question to answer, but James Gibbs and W. Gregory Shriver, a research team from the State University of New York, have attempted to quantify this impact. Their study, "Can road mortality limit populations of pool-breeding amphibians?" was published in *Wetlands Ecology and Management* in 2005.

This research focused on Spotted Salamanders in a study area that encompassed western Massachusetts from the Berkshires to the Connecticut River Valley. Using an equation adapted from a Danish study, and tested for validity on Spotted Salamanders at a road crossing site, they were able to determine the probability that a salamander would be killed based on the speed of salamander travel, the width of the "kill zone" (those sections of the road

that tires are likely to pass over), and the number and speed of cars that use the road at night.

They used a demographic model based on other vernal pool research. In this model vernal pool, a population equilibrium is achieved in about twenty years after the formation and population of a new pool. The number of larval salamanders that can mature in a given pool is the typical limiting factor. According to their model, if road mortality of 10% is added to the natural deaths, then the population is reduced, but achieves a new equilibrium. At 20-30% road mortality, however, the population has a date with disappearance within twenty-five years. As an adult population declines, there will be an initial increase in the percentage of larval salamanders that survive, masking the loss of adults, but once the number of eggs drops below the "larval saturation" of the pool, the entire population declines.

The team randomly selected 500 pools from the study region, plotted the percentage of salamanders that would likely need to cross a road to reach a pool, and the likely percentage to be killed crossing those roads. They found that the median road mortality for these pools was 17% for salamanders that migrated 100 meters, and 37% for those that moved 500 meters.

If their calculations accurately represent the situation on the ground, then in fact Spotted Salamander population for the entire region of western Massachusetts could be in decline. The researchers do not express this as a certainty, there are still many questions about how salamander populations might respond to the situation, but their research illustrates that road mortality might be a significant factor in the long-term survival of populations of these salamanders.

They concluded that in areas with a road density of 2.5 kilometers of road per square kilometer of land, and traffic of 500 cars per day, road induced sala-

mander mortality was likely to exceed the critical 20%. In their final paragraph Gibbs and Shriver state, "Moreover, if efforts are successful in limiting rates of traffic-caused mortality to <10% of all individuals attempting to cross roads during migration circuit to a particular pond, e.g., by tunnel construction, road closure, or physically transporting individuals, then those efforts are likely warranted to stave off local population extirpation."

Fortunately, our roads do not reach the density of 2.5 km/sq. km. Dummerston is typical of many towns in our region, and has an average density of 1.3 km/sq.km of land. The traffic on our roads, however, is certainly significant enough to impact amphibians where they do need to cross, especially at breeding pools where many of the amphibians must cross a road to reach them.

Here are some sample cars per day for some local roads from the Department of Transportation website:

Dummerston, Route 5 from Brattleboro to Middle Road: **6,900**

Dummerston, Route 5 from Middle Road to East West Road: **4,500**

Dummerston, I-91: **16,500**

Dummerston, Route 30 From Upper Dummerston Road to the Covered Bridge: **6,800**

Marlboro, Route 9 from Auger Hole to South Road: **4,700**

Dover, Dover Hill Road: **1,800**

Guilford, Bonnyvale Road: **340**

Putney, Westminster West Road: **2,600**

Westminster West, Westminster West Road: **800**

Newfane, Depot Road: **1,500**

While for many of us, the lives of individual frogs and salamanders are significant, we can now argue that our crossing activities could be critical to salamander survival in our region in the long term.

Volunteer Visibility

A friend recently confided that he nearly hit a salamander crossing guard on his way home one night. He said that both signs and volunteers were difficult to see and had some suggestions for improving the situation next year. He suggested reflective tape and flashing lights to draw attention to signs, and flashing lights attached to each volunteer. He even offered to procure lights for us—an offer I intend to accept.

His caution was a sobering reminder. Just because we see cars approaching perfectly well, we need to be sure we're as visible as possible to drivers.

Next year we'll put together a Volunteer Visibility special at one of the local hardware stores, or offer a kit ourselves, so each of you can have a reflective vest and a flashing light or two to go with your extra bright flashlight. In the meantime, keep a lookout for good deals on reflective clothing.

Species Spotlight: *Blue-spotted Salamander*

Jim Andrews is the Chair of the Vermont Reptile and Amphibian Scientific Advisory group, and it is to him we turn for advice on all things amphibian. He tells me he selected his field of expertise because there are so few species. Compared with birds, grasses, mosses, or fungi, he's right. Vermont has 10 salamander species, 11 frogs, 7 turtles, 1 lizard, and 11 snakes. This should be a manageable group for any of us to learn to identify, even me.

I thought I had the species of Windham County pretty well mastered. There are very few tricky ones. So what was this salamander Matthew brought me from our garden? It sure was speckled like a Blue-Spotted, one of the three mole salamanders that breed in local vernal pools, but after a night of crossing hefty Spotted Salamanders, this one seemed too delicate. I had only seen one Blue-Spotted before, and it was so long ago that I had begun to convince myself that it had been misidentified.

This salamander seemed more the size and shape of the common Red-Backed salamander. I knew that Red-Backs come in a variety of color phases, including lead-backed, a solid dark gray with varying amounts of white speckles. Even though I'd never seen a Red-Backed Salamander hold still like this one was, I persuaded myself that's what I had. I sent a couple of pictures to Jim Andrews, joking that we had a Red-Backed/Blue-Spotted hybrid. His judgement was, "immature Blue-Spot," and he's seen enough of them in the Champlain Valley to know.

Blue-Spotteds *are* significantly smaller than Spotteds, measuring only 4 - 5 inches in length, and a Windham County rarity (so perhaps I can be excused). They have bright blue to white freckles on a bluish-gray to black background. These spots are sprinkled liberally and randomly over the whole salamander. The pale flecks on a Jefferson's tend to be concentrated on the sides and belly.

In our last issue of this newsletter we featured the Jefferson's Salamander, the other party of the local the mole salamander threesome. I also mentioned the difficulty

of differentiating Jefferson's and Blue-Spotteds because of the abundance of hybrid individuals. These species ranges overlap, and where they do hybrids are often more common than either pure species.

These two species and their hybrids form a group we call Jefferson's Complex. Most sensible sexually reproducing species have chromosomes in most of their cells that are arranged in matching pairs—a condition called diploidy. Eggs and sperm each contain one set of chromosomes (haploid). These chromosomes merge when an egg is fertilized and a new diploid life begins. Many of the hybrids, however, are triploid, tetraploid, or even pentaploid. The variety of combinations of chromosomes runs the full spectrum. Where the story becomes most interesting, however, is that most of the hybrids are females. Many of these unisexual hybrids reproduce by gynogenesis. This means that the egg requires a male sex cell to become activated, but it does not fertilize the egg. When the female produces eggs, the numbers of chromosomes are not reduced. The egg develops into a clone of the mother.

However, some research indicates that gynogenesis in these salamanders is temperature dependent. When temperatures are 60°F or warmer, the egg will be fertilized, and the male chromosome will be added to the female's (making the offspring of a diploid female a triploid, etc.) If water temperatures are cooler than 41°F, reproduction will be through gynogenesis.

So, what do we call those speckled salamanders that don't have yellow spots? Nearly all of them in our region look more like Jefferson's than Blue-Spotteds, and since we can't tell without checking the DNA, we consider them Jefferson's Complex. If you find one speckled like the one in the picture above, though, it might be the less common Blue-Spotted, or a hybrid in which those genes are more numerous. Note such salamanders as Blue-Spotted, and please take a picture!





David Lewis took these pictures of spotted at the East West Road crossing in Dummerston.



Olivia finds a salamander



Hallie and Olivia working at the Rice Farm Road site

Jack has a contender for the Largest Salamander Contest



Haiku by an inspired crosser of frogs this spring:

Rustling down hill
Hopping through crunchy old leaves
One frog at a time

Hopping to the road
Hoping to get across quick
The frog march is on

Some frogs hop quick
Some get stuck in the middle
Others take their time
One lone volunteer

Trying to get frogs across
Too many to count

One salamander
In the dark of the warm night
Forty-five wood frogs

In darkness of night
Quarter moon radiating
Upon chirping frogs

One lone peeper peeps
Among hundreds of wood frogs
Who will be his mate

Salamanders creep
Below the water's surface
Through the tangled reeds

Hundreds of clumped eggs
Gathering 'round water's edge
Bullfrogs quietly wait