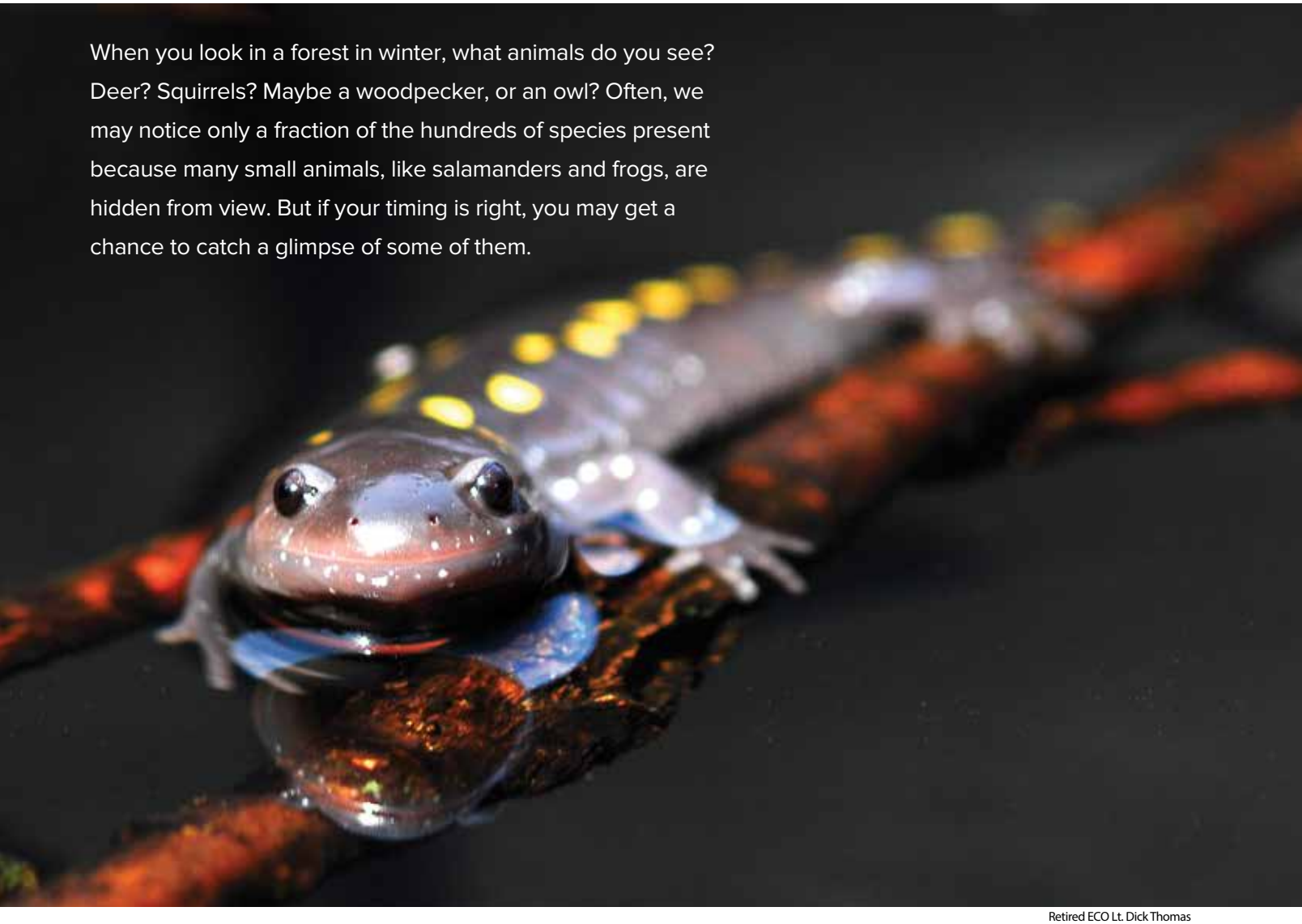
WHY DID THE SALAMANDER CROSS THE ROAD?

By Karen Schneller-McDonald
Photos by author unless otherwise noted

When you look in a forest in winter, what animals do you see? Deer? Squirrels? Maybe a woodpecker, or an owl? Often, we may notice only a fraction of the hundreds of species present because many small animals, like salamanders and frogs, are hidden from view. But if your timing is right, you may get a chance to catch a glimpse of some of them.



Retired ECO Lt. Dick Thomas

Chilly rains in late winter or early spring bring several salamander species forth from their underground winter hibernacula in the forest duff to begin their annual migration to small wetland pools where they breed. These shallow wetlands (preferably without fish) include intermittent woodland pools (called vernal pools) that may be dry much of the year.

This migration—400 feet or more to the pool—is a formidable cross-country journey for creatures that are only several inches long and have short legs. They must trek through leaf litter, up and down steep slopes, and sometimes through a snowdrift, but every spring they are drawn back to the pool where they were hatched. With a lifespan of up to 20 years or more, some of these salamanders have been making the same journey to the same pool for a long time.

The largest number of these migrators are spotted salamanders—striking black salamanders with many bright yellow spots. Other species, such as the less common blue-spotted and Jefferson salamanders (listed by New York State as Species of Conservation Concern) also breed in wetland pools. Both are related to the spotted salamander and have similar life cycles that include an aquatic larval stage.

Problems arise, however, when migrating salamanders must cross roads that separate their forest burrows from wetland pools. Depending on where you are in New York, the spring migration can occur anytime from late February into early April. At well-travelled crossings on a migration "big night" when conditions are just right, large groups of several salamander species (as well as frogs which also use vernal pools to breed in) may cross in the same place at the same time. There can be 10, 20, or even 100 individuals squirming, hopping and walking; determined to reach that breeding pool. At big crossings, death on the road can take a large toll on local populations.

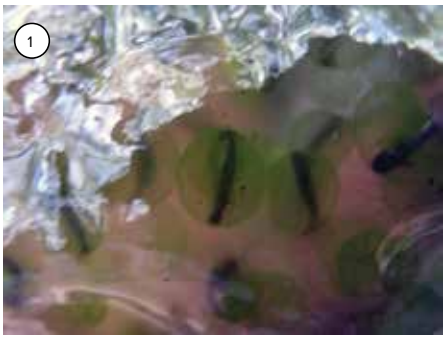
In the Hudson Valley where I live, DEC's Hudson River Estuary Program organized the Woodland Pool Project. This program brings together volunteers of all ages in the late-March drizzle, flashlights trained on salamanders that must be carried safely across the road, one at a time. On small country roads, volunteers equipped with safety vests and traffic cones quickly move the amphibians to safety. At each crossing they record the salamanders' species, size, their direction of travel, and the weather conditions. Wildlife managers use this information to identify which wetlands are important breeding sites, and to plan future crossing assistance. It's become a popular event.

But protecting salamanders requires much more than helping them across the road. What happens after they lay their eggs in wetland pools? Where do they go? And what happens to the aquatic larvae after the eggs hatch?

During the 2014 breeding season, I regularly visited a vernal pool in Ulster County's Town of Esopus to track salamander development. I took some photos and recorded the following notes.

May 12—Water in the pool appears shallow, but my knee-high boots sink in almost to the top in watery muck. Adult salamanders have already laid eggs and left the pools, returning to the surrounding woodlands. (Note: Females lay 100-300 eggs in several jelly-like masses. These masses are often attached to underwater plants or branches. Some pools can contain hundreds of egg masses. Depending on the water temperature, eggs will hatch in four to seven weeks.) Many egg masses here have already hatched or are now hatching. Some egg masses are tinted green from algae; this doesn't harm the eggs or salamander larvae. The larvae are aquatic, measure approximately ⅝-inch, and have large heads, gills, small weak legs and

Salamanders breed in vernal pools created by snow melt and rain.



It can take salamanders several months to develop from eggs (1) through the larval stage (2, 3).

vertically flattened tails for swimming. They disperse into the leaves and plant debris at the bottom of the pool. Only about ten percent will survive to leave the pool.

June 23—Warm weather and little rain have caused the pool to shrink in size; open water is surrounded by wide muddy edges with a deep mucky layer of leaves. The larval salamanders continue to hide in the thick leaf cover at the bottom of the pool, along with fingernail clams and an array of aquatic insects like damselfly larvae. The larvae are now about double their size at hatching—1⅛″ to 1⅜″ long. They have developed very large feathery gills and larger legs. Voracious predators, they feed on small crustaceans and insects, including mosquito larvae. In turn they are preyed upon by large aquatic insects, adult newts, crayfish, turtles, frogs, snakes and wading birds.

Only about 10% of the salamander larvae will survive to leave the pool.

Young salamanders leave the water to move into the surrounding woods.

July 10—The pool has expanded after extensive rains. Larvae are more active and some rest on top of leaves at the bottom of the pool; others are found near logs and woody debris in the water. They are now 1¾″ to 2⅛″ long, with stronger back legs and a head that is more proportional to body size. Gills are still large.

July 25—Dry weather caused the pool to shrink again, with open water fringed by a wide area of deep leaf litter and black mud. Bright green moss decorates some of the fallen branches and logs in the muck. Larvae in the pool were similar in size and appearance to those I saw on the 10th; one was further along the path to metamorphosis, with much stronger legs and a chunkier body. They are hard to find, as they seek sheltered areas around stumps and woody debris in the water, hiding from predators. The pool is alive with frogs, including green frogs, wood frogs and peepers.

I discovered some recently metamorphosed salamanders (just over two inches long) hiding beneath logs in the deep, damp, muddy leaf litter at the pool's edge. Checking the nearby area, I found one young salamander beneath a log in the woods. It had already travelled about 50 feet from the edge of the pool. I know more young salamanders will emerge from the water throughout the next few weeks, and continue to move into the surrounding woods.

August 29—The vernal pool contains no more standing water. A thin layer of silt coats the deep layer of leaves that retain the moisture of the still-mucky mud at the bottom of the pool. I found newly emerged spotted salamanders under logs

Spotted salamanders average 6 – 9 ¾" in length

within 25 feet of the pool's former high-water line. The surrounding woods are dry, so the salamanders have sought out cool, moist cover beneath leaf litter, rocks, logs, and in underground tunnels. The tunnels are usually within a few inches of the surface, though they may be several feet below ground. On damp or rainy nights, the salamanders may emerge to hunt for food.

Like most amphibians, salamanders are sensitive to water contamination. This makes them good indicators of the ecosystem's health: if their population is stable, the ecosystem is likely doing well; if their numbers decrease, it could indicate there's a problem. As salamanders utilize both woodlands (where the adults spend most of their time) and wetlands (for breeding and larvae development), their population trends in these areas can help scientists determine how these habitats are doing. Additionally, since both habitats are important for watershed health, when we protect salamander habitat, we also protect watersheds.

Trees in our woodlands provide shade that keeps wetland pools and the forest floor cool, which in turn helps maintain ground moisture. Trees also stabilize soil, controlling erosion and providing areas for groundwater recharge. Salamander breeding pools are part of the mosaic of small wetlands that store water throughout a watershed, connect groundwater and surface water, maintain stream flow during drought, and reduce the effects of flooding. If wetland pools are contaminated (for example from pesticides or road salt in stormwater runoff), salamander eggs and larvae may not survive. Likewise, when we fill in vernal pools and other small wetlands, we lose valuable salamander habitat and also diminish the watershed's capacity to store water.

Whether or not we see them, salamanders that breed in vernal pools need our protection. Our best reminder is the annual migration, when we can see them firsthand, if we know when and where to look. Helping a salamander cross a road leaves a lasting impression on volunteers of all ages, and it's a great way to involve kids.

Give your children and grandchildren the opportunity for an unforgettable experience of discovering a migration crossing, finding a salamander in the beam of a flashlight, and personally escorting it to safety in darkness and drizzle. And if you're like me, you may return home damp and chilly, but exhilarated by the adventure, to wonder over a hot chocolate: How do they know where to go? How do they find their way?

But that's another story.

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Note: See "Lend a Helping Hand" for how to get involved with a salamander migration. And for more information on salamanders, see *Conservationist's* "Woodland & Vernal Pool Salamanders" at **www.dec.ny.gov/pubs/4791.html**.

Lend a Helping Hand

DEC photo

Helping salamanders safely cross the road during their spring migration to breeding pools can be a rewarding experience. If you'd like to find out if there's a local program that identifies and monitors salamander road crossings, or if you'd like to start a program, contact your regional DEC wildlife office. For a list of DEC offices, visit DEC's website at **www.dec.ny.gov/about/50230.html**.

Protection of salamander breeding pools and surrounding woodland is as important as rescuing individuals from death on the road. You can take action to protect salamanders at any time of the year. The first step is to understand the importance of small wetlands and salamander natural history, followed by a year-round effort to protect their habitat (wetlands and adjacent woodland). This requires action at the community level, including:

- Protecting wetland pools from filling and grading, and adjacent woodlands from tree clearing;
- Protecting water quality throughout the watershed (groundwater as well as wetlands and streams);
- Promoting local understanding of the importance of small wetlands to watershed health;
- Creating local inventories of breeding pools and salamander activity;
- Promoting stormwater management "best practices" that allow stormwater runoff to be slowed down, stored, and purified by natural systems like vernal pools and other wetlands;
- Crafting and supporting local water resource protection laws and ordinances to ensure the survival of wetland systems and salamanders into the future.