

Salamander News

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www.yearofthesalamander.org

The Southern Appalachians: Salamanders Galore!

Patrick Brannon, Highlands Biological Station, Highlands NC



Red Salamander (*Pseudotriton ruber*); photo by Steve Tilley.

The southern Appalachian Mountains boast some of the highest levels of biological diversity in the temperate world, and one of the most diverse groups is salamanders. More salamander species exist here than perhaps anywhere else in the world, and nowhere are they more abundant (see map below). More than 45 species of salamanders representing five families occur in western North Carolina alone.

Salamanders are often the most abundant group of forest-floor vertebrates, and play significant ecological roles as predators on a variety of invertebrates, and also as prey for snakes, shrews, birds, and even each other.

Salamander biomass in the southern Appalachians can exceed that of all other vertebrate predators combined, with densities as high as 2 salamanders per square meter!

Environmental moisture is essential for the survival of salamanders because most species lack lungs and respire directly through their skin. The region is considered to be a temperate rainforest, and its cool, wet climate provides an ideal environment in which salamanders may live and reproduce. Salamanders are most abundant in old-growth forests, where large amounts of rotting logs and moisture-conserving leaf litter provide optimal microhabitats for terrestrial species.

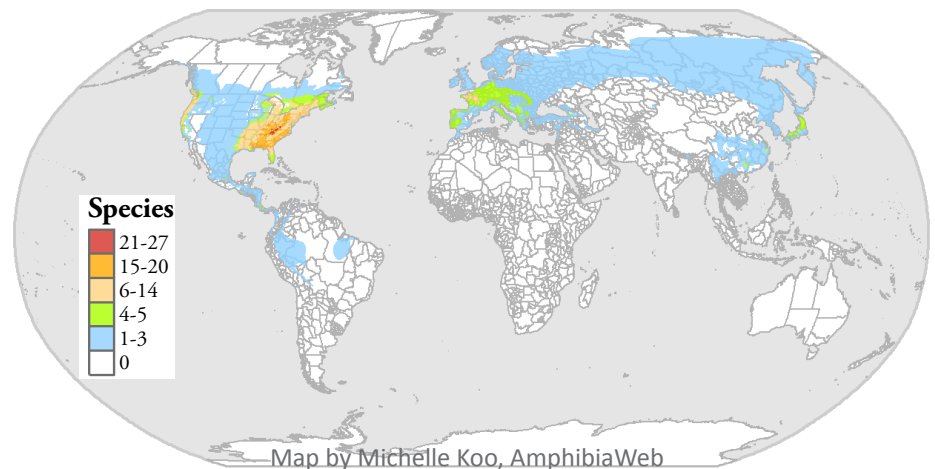
Part of the reason why there are so many kinds of salamanders in the southern Appalachian region is the wide range of elevations (around 1000 to 6000 feet, 600–1800 m). This altitudinal variability mimics the latitudinal changes you would experience traveling north to Canada, only over a much shorter geographic distance. Animals common to the southeastern U.S. thrive in the foothills, while species common to northern states find suitable

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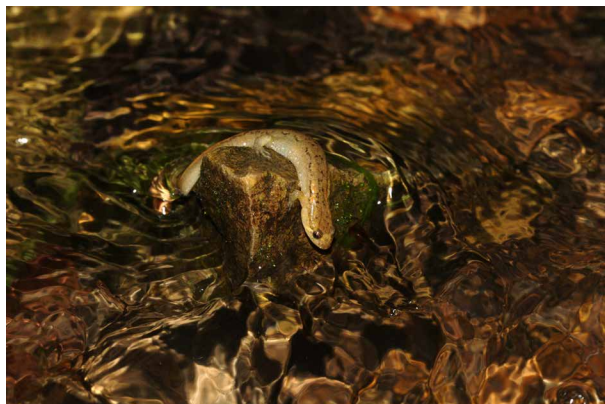
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Global Salamander Species Richness



sponsored by **PARC - Partners in Amphibian and Reptile Conservation**



Get Your April Photo Contest Calendar - Free!

Keeping a Northern Dusky Salamander (*Desmognathus fuscus*) like this one happy requires cool, clear water. Photographer Noah Charney captured the essence of both salamander and habitat in this month's winning photo. Download the March calendar to get the big picture and see the gorgeous runner-up at <http://www.parcplace.org/images/stories/YOSal/YoSalCalendarApril.pdf>.

Call for Photos for the 2014 Year of the Salamander Calendar Photo Contest

We are seeking close-up, digital photos of salamanders, preferably in their natural habitats or within an educational or conservation context. One winner will be selected each month to be the featured photo as part of the Year of the Salamander online calendar. Runner-up photos will also be included in the calendar. In addition, all submitted images will be considered for use in the Year of the Salamander monthly newsletter and website as well as other Year of the Salamander-related conservation, outreach, and educational efforts. Give us your best shot! For more information and for entry details, please visit <http://www.parcplace.org/images/stories/YOSal/YOSphotocontest.pdf>.



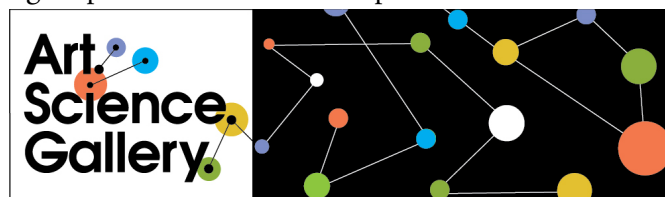
Yet another beautiful Appalachian Salamander from the Photo Contest: the White-spotted Slimy Salamander (*Plethodon cylindraceus*), by Marty Silver.

Are Sirens calling you?

We especially need photos of some of our more elusive salamanders, the sirens, mudpuppies, amphiumas, and torrent salamanders, as well as species in the family Hynobiidae, and *Triturus* newts. If you have a good shot of any of these species that you're willing to enter in the photo contest, send them on in!

Salamander Art Exhibit Seeks Artists! - Deadline April 13

Partners in Amphibian and Reptile Conservation (PARC) has designated 2014 the Year of the Salamander to bring awareness to conservation issues surrounding these amazing amphibians. As an official partner of PARC, **Art.Science.Gallery.** (Austin, TX) is pleased to announce our *open call for a group exhibition of artworks inspired by salamanders!* We are seeking original artworks about salamanders, including, but not limited to works that address the role of salamanders in the natural and changing world, including aesthetic, cultural, economic, educational and scientific aspects of their biology and natural history. Works may also explore data sets about salamander populations, species relationships or biogeography. This exhibition will be held May 24 - June 22, 2014, and is intended to enhance public understanding of salamanders, their diversity, and the importance of science and conservation. Please visit www.ArtScienceGallery.com for details; the submission deadline is **April 13, 2014.**



April Newsletter Content Coordinator: Kirsten Hecht
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Announcing two Year of the Salamander video contests!

Here's how you can participate!

Partners in Amphibian and Reptile Conservation and conservation groups from around the world have designated 2014 as the Year of the Salamander. Through this unprecedented partnership, organizations and individuals will work together to raise awareness of salamanders as well as scale up global salamander conservation, education and research efforts.

Here's your chance to get involved with the Year of the Salamander through **two new video contests**:

Contest 1: "Salamanders Matter" video campaign! Make a video that will help raise awareness to the general public about salamanders around the world!

You may want to make a video on:

- Why salamanders are important to people and natural systems;
- What people can do to conserve salamanders;
- Why salamanders are important to you; or
- "Public service announcements" (e.g., watching out for salamanders on the roads during migration).

But you are not limited to just these ideas!

We're looking for videos that not only convey salamander conservation messages, but that also reflect your passion for these amazing species. They can be edited and polished videos, or rough cuts shot from your phone out in the field.

Whether it is animation, live action, an original song, or something completely different, be sure to tell your story in a clear and creative way. Be sure to also come up with a unique and creative name for your video entry.

Deadline for the "Salamanders matter" contest is **July 31, 2014**.

Contest 2: "Salamanders are ..." video campaign! Make a video that will reflect your passion for these amazing species and help get others around the world excited about salamanders!

So what do you have to do?

1. Grab your cell phone or camera.
2. Record a very short clip (no more than 10 seconds in length) of you saying, "Salamanders are ..." and then fill in the blank with whatever you think salamanders are!
3. Then email us your clip for a chance to be featured in the official Year of the Salamander "Salamanders are ..." compilation video to be released on July 1, 2014!

Deadline for the "Salamanders are ..." is **May 1, 2014**.

Complete guidelines and contest details are posted on the Year of the Salamander webpage (www.yearofthesalamander.org). If you have any questions, please email us at: yearofthesalamander@gmail.com.



Salamanders Matter

...to aquatic, riparian, and terrestrial ecosystems, and the interconnections among them. Blue Ridge Two-lined Salamander, *Eurycea wilderae*, by Mark Spangler, Year of the Salamander Photo Contest.



Salamanders are...watching you!

Spotted Salamander, *Ambystoma maculatum*, by Marty Silver, Year of the Salamander Photo Contest.

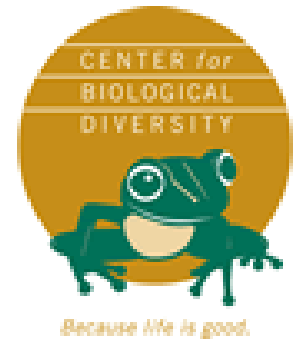
Year of the Salamander Collaborating Partners

The Year of the Salamander Planning Team is pleased to welcome the following organizations to our growing list of collaborating partners:

Center for Biological Diversity

www.biologicaldiversity.org

At the Center for Biological Diversity, we believe that the welfare of human beings is deeply linked to nature—to the existence in our world of a vast diversity of wild animals and plants. Because diversity has intrinsic value, and because its loss impoverishes society, we work to secure a future for all species, great and small, hovering on the brink of extinction. We do so through science, law and creative media, with a focus on protecting the lands, waters and climate that species need to survive. We want those who come after us to inherit a world where the wild is still alive.



Great Smoky Mountains Institute at



Great Smoky Mountains Institute at Tremont

www.gsmit.org

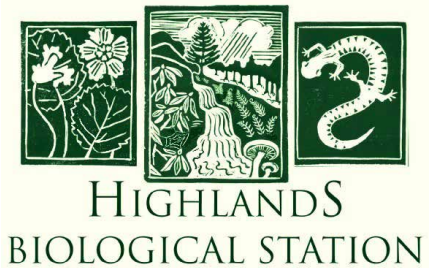
Great Smoky Mountains Institute at Tremont provides in-depth experiences through education programs that celebrate ecological and cultural diversity, foster stewardship, and nurture appreciation of Great Smoky Mountains National Park. “Connecting people and nature” summarizes our mission, which we accomplish by providing hands-on learning experiences in the

National Park, helping people develop: a greater sense of place; a deepened appreciation and awe for the diversity of life and people; and an ethic of stewardship that follows them home.

Highlands Biological Station

www.highlandsbiological.org

More species of salamanders exist in the southern Appalachian Mountains than anywhere else in the world, and nowhere are they more abundant. For more than 85 years the Highlands Biological Station, located in Highlands, North Carolina has served as a world-renowned facility for salamander research. Throughout the years, many classic studies of have been conducted by numerous researchers through HBS and in the surrounding Nantahala National Forest. Dr. Richard Bruce, director of the Station from 1972-1999, published prolifically during and after his tenure at HBS on various aspects of salamander biology. For decades, Highlands Biological Station has also offered the popular summer field courses “Biology of Plethodontid Salamanders” and “Conservation Biology of Amphibians,” and continues to serve as an important base of operations for the work of many graduate students and visiting scientists.



THE BIODIVERSITY GROUP
focusing on life overlooked



The Biodiversity Group

www.biodiversitygroup.org

The Biodiversity Group is an international team of wildlife biologists, educators, and photographers dedicated to preserving the smaller majority of animal life on Earth. Rooted in the science of ecology, we illuminate little known communities of animals in shrinking wild places. Salamanders embody the kind of poorly known but ecologically and scientifically important organisms that we study. At our study sites in Ecuador, we are in the process of documenting the diversity of terrestrial salamanders (family Plethodontidae), which is only beginning to be understood. The ultimate goal is to help manage and protect important habitats across the landscape, ensuring the continued survival of the diversity of salamanders and other organisms that form the ecosystems.

If you are interested in contributing to the Year of the Salamander efforts, please send an email to yearofthesalamander@gmail.com with a brief description of your organization and its efforts. Our full list of partners can be found at <http://www.parcplace.org/news-a-events/2014-year-of-the-salamander/68-uncategorised/281-year-of-the-salamander-partners.html>

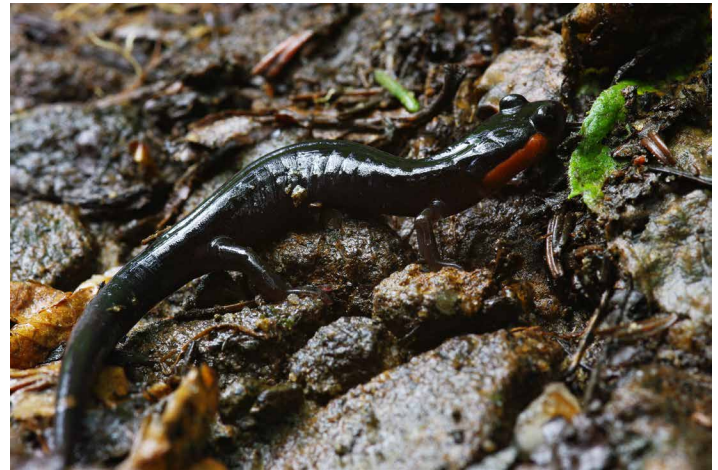
Southern Appalachians, continued from p. 1

environments at higher elevations.

The southern Appalachians are also very old, giving plenty of time for a variety of salamanders to emerge. During the Pleistocene (about 10,000 years ago), when glaciers covered much of North America, this region served as a refuge for many organisms. When the glaciers finally retreated, many species remained within habitat “islands” on different mountain peaks. The longer populations remained geographically isolated, the more they diverged genetically and morphologically to become distinct species.

A good example of species diversification is the Jordan’s Salamander (*Plethodon jordani*), a common species that once occurred as one continuously distributed population, but later became fragmented along different mountain ranges as the region’s climate began to change. Subsequently, it diverged into three distinct species with unique physical characteristics. In parts of the southern Blue Ridge it became the solid-black Gray-cheeked Salamander (*P. metcalfi*), while in extreme western NC the Red-legged Salamander (*P. shermani*) occurs. True Jordan’s Salamanders are currently found only in Great Smoky Mountains National Park, and have red cheek patches.

Additional species may also arise if two previously isolated, but closely related, groups come back into contact and interbreed. At a few isolated locations in the southern Appalachians we find narrow “hybrid zones.”



Above, top: A Jordan’s Salamander, *Plethodon jordani*, the base species, (photo by Marty Silver, Year of the Salamander Photo Contest), and below, one of its offshoot species, the Red-legged Salamander, *P. shermani* (photo by Madelyn Messner, Year of the Salamander Photo Contest).



Black-bellied Salamander (*Desmognathus quadramaculatus*); photo by Patrick Brannon.

Hybrid salamanders possess genetic and physical traits of both species, but there is usually a gradient between the distributions of the two parent populations, usually associated with elevation.

The number of species of salamanders in the southern Appalachians continues to grow, as modern DNA testing has allowed biologists to distinguish identical-looking populations into separate species. Discoveries of previously unknown salamanders are very rare, but in 2009 a never-before-seen species, the Patch-nosed Salamander (*Urspeleperpes brucei*), was described. It is the smallest species of salamander in the United States, and is the first new genus of four-legged creature discovered in more than 50 years!

facebook

Follow all of the Year of the Salamander news and happenings on Facebook (<https://www.facebook.com/YearOfTheSalamander2014>) and Twitter (@YOSal2014).



Helping Cheat Mountain Salamanders in West Virginia's Canaan Valley

by Thomas Barnes

The Cheat Mountain Salamander (*Plethodon nettingi*), a federally threatened species that is unique to West Virginia, may have a shot at recovery, thanks to conservation efforts that are underway at the U.S. Fish and Wildlife Service's Canaan Valley National Wildlife Refuge.

One of two vertebrates native only to the Mountain State, Cheat Mountain salamanders are found only on Cheat Mountain and nearby mountaintops with mixed spruce stands. One of the primary threats to the species is the loss and degradation of its high elevation Red Spruce (*Picea rubens*) and northern hardwood forest habitat. The salamander was listed as threatened under the Endangered Species Act in 1989 after many of the Red Spruce forest stands that this species depends on was lost to logging and forest fire.

"Originally, the Canaan Valley National Wildlife Refuge was covered in Red Spruce and Balsam Fir," says Marquette Crockett, a wildlife biologist at the refuge. "After most of the conifer forest was logged, the organic soils burned. This changed the entire ecosystem, and mostly hardwoods came back."

The four-inch-long salamanders are primarily active on humid evenings, when they forage for invertebrates. Despite living for approximately 20 years, the salamanders rarely venture outside their territories, which are around 48 square feet. Perhaps the biggest threat to Cheat Mountain Salamanders is competition from Eastern Red-backed Salamanders (*Plethodon cinereus*), which can tolerate the drier and warmer conditions found in hardwood forests.

Efforts are underway to preserve the cool and damp conditions these salamanders depend on. The Canaan Valley National Wildlife Refuge is working with the Central Appalachian Spruce Restoration Initiative (CASRI) to connect pockets of spruce forest.

"We plant spruce trees to enlarge and connect existing stands of spruce in hopes that the habitat will be more conducive for salamander populations to expand," says Crockett.

In 2013, CASRI planted more than 53,000 seedlings—8,000 on the refuge alone. Habitat management also includes cutting of hardwood trees that compete with Red Spruce. One example is the American Beech (*Fagus grandifolia*), which now has a disease that causes it to sprout thickly and outcompete spruce seedlings.

These conservation measures are paying off. Since 2001, Service biologists have monitored at least three salamander populations on the refuge. According to these surveying efforts, populations of these rare salamanders have remained stable over the last 10 years. Biologists survey transects in the rocky red spruce habitat, while counting salamanders, weighing and measuring them, and determining if they are juveniles or adults. They also collect tissue samples for a DNA analysis to determine the genetic differences among the populations of Cheat Mountain salamanders.

The salamander joins other regionally rare wildlife making their homes in mountain spruce forests, from the recently recovered West Virginia Northern Flying Squirrel (*Glaucomys sabrinus fuscus*), to the Snowshoe Hare (*Lepus americanus*), to the Saw-whet Owl (*Aegolius acadicus*). With efforts underway to conserve the high-elevation spruce habitat and expand salamander population monitoring, things are looking up for the amphibian.

"This has been really encouraging work," says Crockett. "So far, our refuge populations have remained stable and we even found one new population no one knew was there."

Thomas Barnes is a communication intern in the U.S. Fish and Wildlife Service's Northeast Regional Office in Hadley, Massachusetts.



Cheat Mountain Salamanders, less than 5 inches (12.7 cm) long, can be found during the day under rocks and logs, or in rock crevices below the ground. At night, especially during rainy weather, they forage on the forest floor and occasionally climb trees or plants. (Photo: Kent Mason)

Vernal Pools, Constructed Wetlands, and Salamander Conservation

by Chelsea Kross, Eastern Kentucky University

A vernal pool is a temporary water source that provides distinctive habitat for plants and animals. Vernal pools are important habitat for salamanders because they are fishless and contain fewer predators than permanent water sources, offering adult salamanders a relatively safe place to lay eggs and for larvae to develop. For example, Jefferson, Spotted, Marbled, and Four-toed salamanders often use vernal pools. In the late fall, Marbled Salamanders (*Ambystoma opacum*) lay eggs in the dry bed of the pool and guard them until the eggs hatch when the pool fills with water from winter rains. Spotted and Jefferson salamanders (*A. maculatum* and *A. jeffersonianum*) migrate to vernal pools during early spring to lay eggs, which are often attached to sticks or leaves. Four-toed Salamanders (*Hemidactylium scutatum*) lay eggs under moss along the edge of a vernal pool and the female guards the eggs until they hatch and fall into the water.



Marbled Salamander. (Rob Denton)

The loss of vernal pools can have negative impacts on salamander diversity and persistence in an ecosystem. Because of land-use change and historic wetland loss, wetland construction has become an important tool for the conservation of amphibians. On the Daniel Boone National Forest in eastern Kentucky, hundreds of wetlands have been constructed along ridge tops. However, most of the constructed wetlands serve as permanent water sources in an ecosystem where permanent water was once absent, and many have been constructed near vernal pools. The proximity of the two wetland habitat types allows for a comparison of which amphibians use the wetlands and whether the constructed wetlands are functioning similar to the vernal pools. Master's students in the Richter lab at Eastern Kentucky University conducted minnow trap and dip-net surveys in both habitats and found that two fairly distinct amphibian communities occupy the different wetland types. The constructed wetland community contained amphibians that require a more permanent water source and are top amphibian predators, e.g., Eastern Newts (*Notophthalmus viridescens*), Bullfrogs (*Lithobates catesbeianus*), Green Frogs (*L. clamitans*); the vernal community contained amphibians that do not require permanent water, e.g., Marbled Salamanders, Four-toed Salamanders). The close proximity of the two habitats and the abundance of constructed wetlands have led to increased interactions (such as predation) between the different communities, which might be negatively affecting the vernal community. Altering the constructed wetlands to mimic the hydrology of the vernal pools would benefit the natural amphibian community. A reduction in the number of permanent wetlands could reduce interactions between the two communities and lower the abundance of amphibian predators along the ridge tops. Understanding the historic landscape and hydrology of wetlands is important for the conservation of wetland species, and such knowledge should be used in wetland design and construction. Although the constructed wetlands are not suitable for the natural amphibian community, land managers and scientists are currently working together to refine construction techniques to further amphibian conservation.



Bowl-shaped constructed wetland. (Stephen Richter)



A vernal pool with minnow trap array. (Chelsea Kross)

Tremont's Citizen Scientists answering the Park Service's Call to Action

by *Tiffany Beachy, Citizen Science Coordinator,
Great Smoky Mountains Institute*

Great Smoky Mountains Institute at Tremont is located in one of the best outdoor classrooms EVER...a national park! We get to work, learn, and play in a campus that encompasses more than 500,000 acres. As a partner to the National Park Service here in the Smokies, our mission of connecting people with nature melds well with their mission to preserve and protect this great natural area, its historic resources and wildlife for the enjoyment of future generations. One way we get people involved is through our citizen science programs.

Tremont has a number of programs involving amphibians, birds, butterflies, phenology, lichens, and now otters. Children's eyes widen when we describe the project they are about to experience firsthand. They really get to be scientists for a day; they really get to contribute to a big project. It suddenly morphs from just another class activity to an important scientific mission—and they are invited to participate! We collect data, review our results, discuss implications, and make connections.

Our salamander programs include both aquatic and terrestrial habitat projects. Using leaf litter traps, volunteers and visiting school children collect data on salamanders and environmental variables in six streams. Over 3700 captures of stream salamanders were recorded over a ten-year period. In 2006, we also started a terrestrial salamander monitoring program. This study not only generates long-term salamander and habitat data at four sites, but has also been used to compare the effectiveness of different types of cover objects for attracting salamanders. In addition, we monitor Spotted Salamanders at seven ephemeral wetlands.

"My volunteer experiences have strengthened my connections with science and nature," says Keane, who has been citizen science volunteer with his family since 2002. "I am currently pursuing a career in environmental science." After volunteering on various projects for several years, Keane worked as a citizen science intern for two summers. His experiences have prepared him for a successful future in conservation.

Keane's dad Richard has enthusiastically headed up 'Team Pigpen,' an ad hoc group of volunteers who have monitored Pigpen Branch, one of our aquatic salamander transects, for about 10 years. "The experiences of our family and friends at our stream has undoubtedly been an influence in my sons' choices of scientific career paths.



Students at the Institute weigh a salamander as part of their field experience.



Students examine a leaf litter trap for salamander and invertebrates in one of the study streams.

I am thankful for the kind of opportunities Tremont's citizen science program has afforded our family."

While not all of our participants will become professional scientists or conservationists, we hope that the connections they made at Tremont will leave a lasting impression on their hearts and minds, instilling in them a conservation ethic and a renewed desire to play outside.



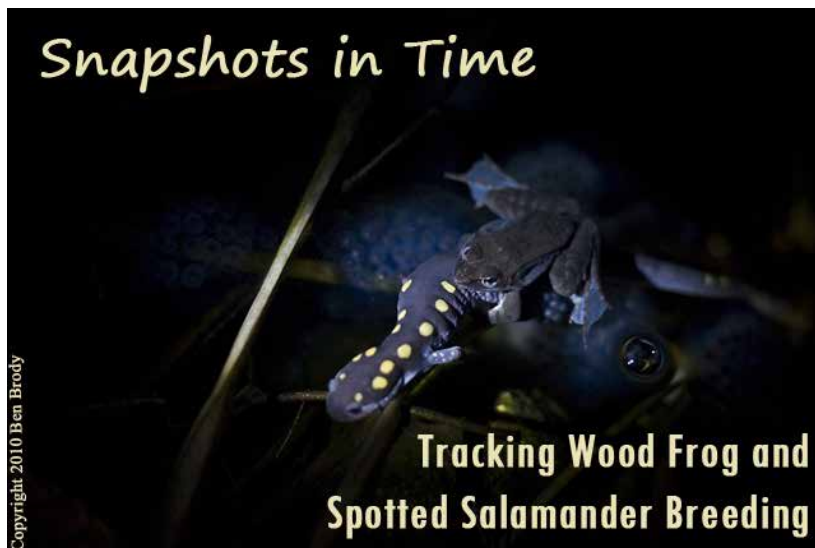
Orianne Asks Citizens to Help Create “Snapshot” of Amphibian Breeding Times

The Orianne Society is asking for help to gather information on the timing of Wood Frog and Spotted Salamander breeding through a citizen science project “**Snapshots in Time**”, which launched in early 2014.

“Scientists recognize that many species are changing their yearly patterns because of changes in climate,” says Dr. Stephen Spear, Associate Conservation Scientist with The Orianne Society. “However, scientists can’t be everywhere at once to monitor these changes – but Citizen Scientists can. Through them, this project will help us figure out if these changes are occurring with two widespread amphibians, and what that means for their ability to continue to survive and reproduce under changing conditions.”

But why is this information important? According to Dr. Spear, pinpointing locations where the timing of breeding is changing due to climate change could someday help protect these species, as well as others.

“If we discover that these two amphibians are not reproducing successfully due to faster pond drying times, we can look at ways to improve these wetlands to maintain habitat for not only our focal species, but the rarer amphibians that occur there as well,” says Spear.



What Dr. Spear is describing is using private citizens from all walks of life to complete what is commonly referred to as a “phenology” research project. Phenology, by definition, is the study of cyclic and seasonal natural phenomena, especially in relation to climate and plant and animal life. What Dr. Spear and The Orianne Society are trying to accomplish is to determine what changes may be occurring in the timing of breeding for the Wood Frog and Spotted Salamander.

Dirk Stevenson, Assistant Conservation Scientist with The Orianne Society relates “Encountering Wood Frogs and Spotted Salamanders or evidence of these species in

the field is always exciting. Rolling a pond-side log to see the bright orange spots of a plump Spotted Salamander, or hearing the duck-like chuckling sounds of a sizeable Wood Frog chorus, are always memorable natural history experiences.”

Both of these amphibians breed following heavy rains during winter–spring that flood woodland depressions and various other types of short-lived, “wet-weather” ponds that lack fish. The Orianne Society hopes to recruit citizens to monitor these areas and report when they observe signs of Wood Frog or Spotted Salamander breeding.

While scientists are encouraged to submit observation data, The Orianne Society hopes to entice people of all ages and backgrounds to participate, not just those who are enthusiastic about reptiles and amphibians, but everyone who enjoys the outdoors and wants to learn more about the ecology of these species. With this study, you can make your observations count toward a scientific review of these species’ breeding patterns. This will benefit our knowledge of these animals, and also provide you an opportunity to better acquaint yourself with the amphibian life in your own backyard.

To learn more about this project, log on to www.oriannesociety.org, and download datasheets, range maps for the species, and species identification guides so that you can participate and provide valuable data for your region!



Clearcuts Can't Keep Cinereus Down

by Carola A. Haas,
Virginia Tech

Two or three decades ago, studies raised the concern that clearcutting was responsible for dramatic declines in populations of plethodontid salamanders in the eastern US. Based on what is known about these animals, this explanation seemed reasonable. Salamanders in the family Plethodontidae are lungless, and because they rely primarily on respiration through their skin, they require habitats that are consistently moist. Their digestive efficiency peaks at relatively cool temperatures (around 15°C), and their metabolic demands increase with temperature, so they suffer from a negative energy balance at high temperatures. The cool, moist environment of a forest floor with extensive leaf litter is the ideal habitat for Eastern Red-backed Salamanders (*Plethodon cinereus*) and many other members of this family.

Concerns about tropical deforestation and large-scale logging of old-growth forest in the Pacific Northwest led several national conservation groups to begin anti-clearcutting campaigns. This sentiment had major effects on Appalachian forest management, resulting in passage of the Maine Forest Practices Act, and severely reducing the use of clearcuts on many National Forests. Although it seemed clear that clearcuts did reduce populations of terrestrial salamanders, there was very little known about how shifts to other forestry practices would affect salamanders.



Examining the effects of a range of silvicultural treatments on terrestrial salamanders has been ongoing since 1994.

In 1993, we began collaborating with Dave Smith and Shep Zedaker, from Virginia Tech's Forestry Department, who had initiated an experimental study comparing alternative management techniques. Conducting replicated, randomized experiments at the scale of a forest stand is not easy, so we jumped on the opportunity. We applied seven management alternatives to forest stands on Jefferson National Forest (VA) and MeadWestvaco's Wildlife and Ecosystem Research Forest in West Virginia, now owned by Penn Virginia. Our goal was to follow them through a rotation (80-100 years), to examine the effects on salamanders, understory plants, and timber regeneration. Funding was provided by the US Forest Service's Ecosystem Management Program, the USDA National Research Initiative Grants, and MeadWestvaco.

In order to fund such a large-scale and long-term project we have sampled in intermittent bursts, bringing on graduate students for 2-3 years of sampling every 5 years or so. Undergraduate volunteers at Virginia Tech have allowed us to collect continuous data (for over twenty years) on salamander populations at the sites close to campus. Our results have sometimes been counter-intuitive. While we expected that salamander populations would be less disturbed under forest management practices that retained most of the tree canopy (such as a group-selection harvest and high-leave shelterwood harvests), we found that in the first ten years after harvest, salamander populations declined just as rapidly on sites with "partial harvests" as they did on clearcuts. Our colleagues in forestry estimated that soil erosion rates were lowest on the clearcut plots because they required fewer skid trails to access the timber and there was only one entry in 100 years, whereas shelterwood and group selection harvests require more. This has implications for stream salamanders that may be affected by sedimentation. By 15-20 years after harvest, salamander populations had still not recovered to

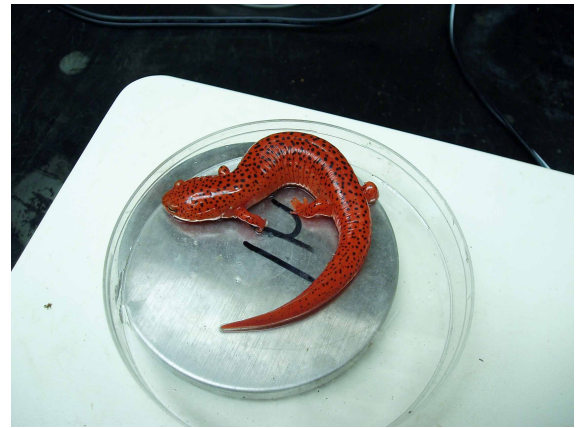


Northern Dusky Salamanders (*Desmognathus fuscus*) are common plethodontid species observed in the Appalachian region.



Eastern Red-backed Salamanders were the most common salamander captured.

pre-harvest levels in most treatments, but they had reached an indistinguishable level in the group-selection harvest treatments. However, re-entering the shelterwood stand for scheduled management operations caused salamander populations to decline drastically, similarly to the decline after a clearcut. Public pressure against any timber harvest on National Forest land, and the loss of local timber operators, has made it increasingly hard for us to get the forest management treatments applied to continue this research. We are currently in one of our unfunded phases, but hope to be able to continue the research through a stand re-entry of the group selection treatments, and to learn more about the effects of stand re-entry on erosion and soil compaction.



Salamanders such as this northern Red Salamander, *Pseudotriton ruber*, were brought to the lab for measurements and released at the point of capture.

Get your Year of the Salamander 2014 Gear!

Go online to the PARCStore (<http://www.cafepress.com/parcstore>).

Ready to gear up for Year of the Salamander? We've got you covered!

At the Café Press PARCStore, you can find just about any style of t-shirt, sweatshirt, or hoodie, for men, women, or children. But don't stop there - you'll find a messenger bag, field bag, aluminum water bottle, even a beach towel (in case you want to join the salamanders crawling out of that primeval sea).



And take a look at the beautiful **Year of the Salamander Wall Calendar**, full of fantastic salamander photos for every month of your year!

Proceeds from sales go to the Year of the Salamander Conservation grant, managed by Amphibian and Reptile Conservancy, a not-for-profit organization that helps support PARC activities, such as public education, publications, and research.



Outreach and Education Materials – NOW AVAILABLE!

For educators and naturalists, we now have outreach and education products that were created specifically for the Year of the Salamander on our website (www.yearofthesalamander.org)! We have **face painting templates and notecards, a slide show and script, posters, and an educational packet** for naturalists and teachers. We will continue to update the page with additional materials, as well as links to other educational resources. **Please check it out!**

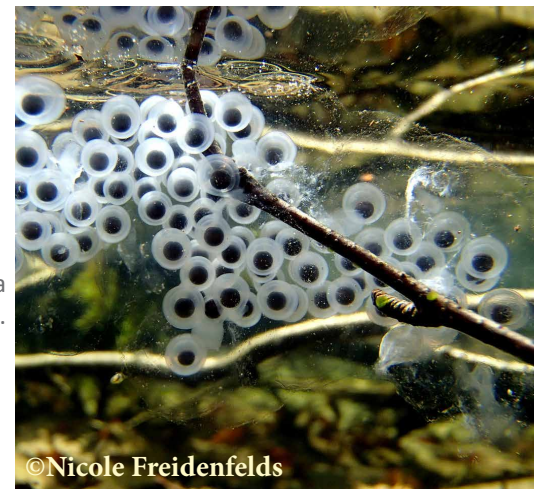
If you have unit materials, educational program information, or PowerPoint presentations you are willing to share them, please send them to yearofthesalamander@gmail.com. We are also hoping to include videos! Please provide your name, the name of your school/nature center or organization, and location. If you did not create the materials, please be sure to tell us where you found them.

Migration Tracker - Join Us this Spring!

Each year our lab in the Ecology and Evolutionary Biology department at the University of Connecticut collects amphibian observation data from researchers and citizen scientists throughout the eastern United States. We are particularly interested in the spring breeding migration of Spotted Salamanders (*Ambystoma maculatum*), in addition to Wood Frogs (*Lithobates sylvaticus*) and Spring Peepers (*Pseudacris crucifer*). Spotted Salamanders migrate to their breeding ponds in large numbers during warm, rainy nights. This is usually the only time of year that these secretive, fossorial species are seen. There are a number of programs in various states that encourage people to not only witness the migration, but also help salamanders and other amphibians safely cross roads. We ask folks who see salamanders in their community to share their observations with us via **email** at urban.lab.uconn@gmail.com or through the form on our **website**. The data we collect 1) is uploaded to a **Google map** and color-coded by date to show overall trends in the timing of migration, and 2) allows us to examine what environmental factors might trigger migration events—for example, temperature and precipitation.



Adult Spotted Salamander in Connecticut.



Spotted Salamander eggs in a Connecticut vernal pond.

Email: urban.lab.uconn@gmail.com

Website: <http://hydrodictyon.eeb.uconn.edu/people/urban/tracker.html>

Google Map: [https://maps.google.com/maps/ms?msid=21](https://maps.google.com/maps/ms?msid=214851865952293876825.0004eefde6632301e7528&msa=0)

[4851865952293876825.0004eefde6632301e7528&msa=0](https://maps.google.com/maps/ms?msid=214851865952293876825.0004eefde6632301e7528&msa=0)

[&ll=37.439974,-82.353516&spn=28.236708,30.27832&dg=feature](https://maps.google.com/maps/ms?msid=214851865952293876825.0004eefde6632301e7528&msa=0&ll=37.439974,-82.353516&spn=28.236708,30.27832&dg=feature)

Upcoming Meetings & Events

Salamanders of Connecticut, April 9, 6:30 pm, Blackstone Library, Branford, CT. Menunkatuck Audubon Society. See <**DEEP link**> for details.

Salamander Art exhibit deadline, April 13. Submissions of original art about salamanders for an exhibit at Art.Science.Gallery, Austin, TX. See www.ArtScienceGallery.com for details.

Earth Day Exploration, April 19, 10 am-3 pm, with salamanders! Florida Museum of Natural History, Gainesville, FL.

Year of the Salamander Education Celebration, April 22, 11:00 am-2:30 pm, Siena College, Loudonville, NY. Live salamanders, hands-on activities, interactive displays, and Ask the Experts. More info: mkolozsvary@siena.edu

Search For Salamanders, April 25 & May 23, 6-8 pm, Horseman's Shelter, Edison Woods MetroParks, Erie County, OH. www.activityreg.com

1er Festival Oaxaqueño de los Anfibios, April 25-28, Oaxaca City, Oaxaca, Mexico. See Facebook <**link**> for more info.

6th Conference on the Biology of Plethodontid Salamanders, May 18-20, Tulsa, OK. More info at <http://plethodontids2014.weebly.com/>

Salamander Open Center Day, May 24, 9 am-3pm, Sessions Woods Conservation Education Center, Burlington, CT. See <**DEEP link**> for details.

Salamander Art Exhibit, May 24 – June 22, Art. Science.Gallery, Austin, TX. An informal class, Herpetology 101, will be given as part of the exhibition.

EuryceAlliance Scientific Working Group 3rd meeting, May 30, hosted by Art.Science.Gallery, Austin, TX.

Biology of Plethodontid Salamanders course, June 9-21, Highlands Biological Station, Highlands, NC. More info at www.highlandsbiological.org

2014 Year of the Salamander & 50th Anniversary of the Wilderness Act—A short story from a Wilderness Ranger



I was working the Wilderness Ranger ‘beat’ at the beautiful but highly used Alpine Lake in the Sawtooth Wilderness. I came upon a particularly nasty campfire ring and sighed at the human-created disturbance that I would soon be cleaning up and naturalizing. Ugh.

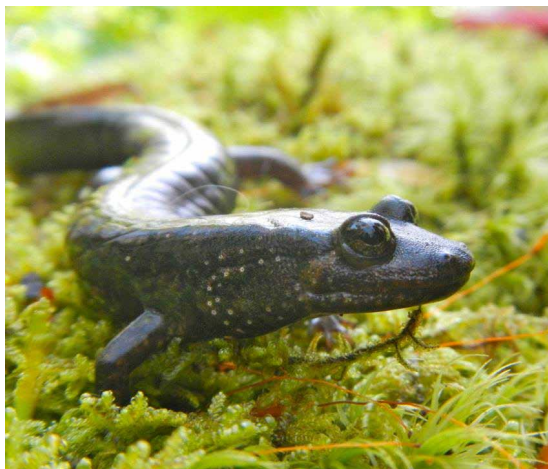
I began the clean-up process, disappointed at the careless mess someone had left in such a beautiful place. However, my attitude quickly turned to awe as I overturned one of the rocks lining the illegal campfire ring. There, in the disturbed, charred aftermath of the fire ring was a creature of pure beauty: a shiny Long-toed Salamander (*Ambystoma macrodactylum*).

I realized that what I was seeing was a nasty fire-pit, but this perfect little life form saw it as a respite. How quickly my perspective changed! I whispered, “Sorry little one,” and “thanks” as I carefully returned the rock to shelter the tiny inhabitant of the Alpine Lake drainage.

Photos and story by Katy Nelson, Wilderness Ranger, Sawtooth National Recreation Area, Stanley, ID. Submitted by Barbara Garcia, Deputy Area Ranger



More Appalachian Salamanders from the Year of the Salamander Photo Contest



Above: Black-bellied Salamanders, *Desmognathus quadramaculatus*, which range from the mountains of Georgia to West Virginia, are highly aquatic and sometimes eat other salamanders. Photo: Madelyn Messner. **Right:** The Cave Salamander, *Eurycea lucifuga*, is not unique to the Appalachians, but is common in its required habitat, limestone caves, within the region. Photo: Matt Hamilton.



Family of the Month: Plethodontidae

The Plethodontidae, the Lungless or Woodland Salamanders, are the most diverse family of salamanders, and one of the most wide-spread, with species in the Americas, southern Europe, Sardinia, and South Korea. They are lungless, so all gas exchange (respiration) takes place through its moist skin or mouth; consequently they need a moist environment to breathe, such as under logs and leaves. Well-known members of this family include the Eastern Red-backed Salamander (*Plethodon cinereus*), which is 3–4 inches (8–10 cm) long and is native to northeastern North America. The similar-looking Western Red-backed Salamander (*Plethodon vehiculum*) occurs on the Pacific Coast of North America and is slightly larger, growing to over 4 inches (10 cm). Both the Eastern and Western Red-backed Salamanders are completely terrestrial. Unlike these two species, the Northern Dusky Salamander (*Desmognathus fuscus*) is semi-aquatic; its larvae develop in the water and adults and juveniles live within a few feet of streams and springs.



Despite their name, Eastern Red-backed Salamanders do not always have red or orangish stripes on their backs. The dorsal stripe may be tan or yellowish, or missing altogether, as in the unstriped “lead-backed” morph shown above.



A Northern Dusky Salamander (*Desmognathus fuscus*).

Family: Plethodontidae

Featured species: Eastern Red-backed Salamander (*Plethodon cinereus*), Northern Dusky Salamander (*Desmognathus fuscus*).

Also known as:	Lungless or Woodland Salamanders
Number of Species:	The largest and most diverse family, with over 440 species in 27 genera.
Region / Habitat:	<ul style="list-style-type: none"> - Species occur in the Americas, southern Europe, Sardinia, and South Korea - In 2005, the discovery of a new species, Korean Crevice Salamander (<i>Karsenia koreana</i>), in Asia came as a big surprise, because until this discovery members of this family were thought to not occur in this region. - Members of this family use a wide range of habitats: some species are strictly aquatic, some live in caves or underground springs (many <i>Eurycea</i> spp.), some are riparian associates, some are strictly terrestrial (<i>Ensatina</i>, <i>Batrachoseps</i>, <i>Hydromantes</i>, and many <i>Plethodon</i> spp.), and some species are even arboreal (<i>Aneides lugubris</i>) and may live in bromeliads (<i>Bolitoglossa</i> spp.).
Physical Characteristics:	<ul style="list-style-type: none"> - all gas exchange takes place through skin or mouth-cavity respiration - generally have elongated bodies and short limbs - body length can range from 1 inch to over 10 inches (2.5 to 25.5 cm) - their long tails can be regenerated
Behavior / Development	<ul style="list-style-type: none"> - development varies by species; some have an aquatic larval stage while others have direct development - females usually practice brood care or the protection of young
Fun Fact:	The Eastern Red-backed Salamander is the most abundant forest vertebrate in some areas, with the biomass (or weight) of all Red-backed Salamanders combined being greater than any other vertebrate!

Great Smoky Mountains Salamander Ball

Presented by Discover Life in America
Saturday, September 13, 2104, 7 – 10 pm
Knoxville Zoo, Knoxville, TN

Come one, come all to the Salamander Ball!

The Great Smoky Mountains Salamander Ball is a masquerade ball and fundraising event based on the children's book of the same name by Lisa Hortsman. Attendees are encouraged to dress in costumes emulating Smoky Mountain wildlife. Entertainment will feature:

- A Smokies Salamander beauty pageant
- Hors d'oeuvres and beverages
- Live band and dancing
- A display of beautiful, Smoky Mountain salamanders
- A unique silent and live auction
- A very special visit from "Big Red" the salamander
- Kids' area
- Fun for the whole family

This event benefits Discover Life in America and the Smokies' All Taxa Biodiversity Inventory. DLIA's mission is to discover and understand America's species through science and education for conservation. DLIA's flagship project, the ATBI, is a joint effort with the NPS to identify and record every single species within Great Smoky Mountains National Park. To date DLIA has assisted in adding 7,636 new species to the park's records.

—*Todd P. Witcher, DLIA*



Big Red, the Salamander Ambassador, entertains attendees at last year's ball in April, 2013.



Fire Salamander Photo Book Project

Fire salamanders: they show the most diverse and exotic color patterns of any West Palearctic amphibian. The six currently recognized species are characterized by a black ground color and yellow, orange and/or red spots and stripes. The completely black alpine salamanders are part of these species, although they lack the charismatic yellow spots. Surprisingly, the causes of this enormous variation in color patterns are not well understood.

Fire salamanders are threatened. Populations in the Netherlands and Belgium are disappearing due to a recently-identified fungal disease. We currently do not know how far this fungus will spread, and the impact it will have on salamander populations. Throughout the distribution of most fire salamander species, unfortunately other threats can be observed, too, often related to land use change or loss of breeding streams or ponds. Disappearance of these iconic amphibians would be catastrophic; they not only present intrinsic value, but also form a significant part of local food chains. On the verge of these potential changes it is extremely important to document these animals in an extensive way.

Wouter Beukema and Monne Tuinhout, a herpetologist and a professional photographer, have taken on the task of creating a photo book about fire salamanders throughout their distribution, in collaboration with the RAVON Foundation (Reptile, Amphibian and Fish Conservation Netherlands). Childhood friends, they team up again to portray fire salamander diversity, habitats, and the scientists and conservationists who work with these species in an innovative and comprehensive way. To achieve this goal, they have started a crowd funding campaign. While support for the campaign is increasing, they still need every bit of help they can get to realize this initiative!

Check out the Indiegogo crowd funding campaign and Facebook page of the project:

<http://www.indiegogo.com/projects/fire-salamander-photo-book>

<https://www.facebook.com/firesalamanderbook>