

Salamander News

No. 3

March 2014

www.yearofthesalamander.org

Challenges and Opportunities in Salamander Conservation

by Jaime García Moreno



© Jaime García Moreno

Urban Mexico City now covers most of what was once the habitat of the Mexican Axolotl (*Ambystoma mexicanum*). This is an extreme example of the kind of threats salamanders face across their range.

“An animal shaped like a lizard and with a body starred all over. It only comes out during heavy showers and can never be seen when it is dry. It is so cold that, just like ice, it can extinguish fire on contact...” So began Pliny the Elder’s description of the salamander two thousand years ago. Since then, many more legends have developed around salamanders, including many related to fire. In some places people still look at salamanders with awe, and even throw them into the fire, afraid of their magic powers.

Our knowledge of salamanders has improved since the times of Pliny, and we currently count some 670 described species of salamanders. This means that about every 11th amphibian species is a salamander. Unlike frogs and caecilians, the highest species richness of salamanders is not in the tropics: they are pretty much absent from Africa, Oceania, much of tropical Asia, and most of South America. Salamanders are a mostly temperate group that can be found in North America, Europe, and northern

Asia, with the Appalachian Mountains forming a real diversity hotspot. The countries with most species are the US (174 species) and Mexico (135 species); the Central American countries together are home to 160 species, and there are more species in Guatemala (63 species) or Costa Rica (49 species) than in all of Europe, where 36 species can be found. In Asia, China (64 species) and Japan (27 species) are the most diverse countries.

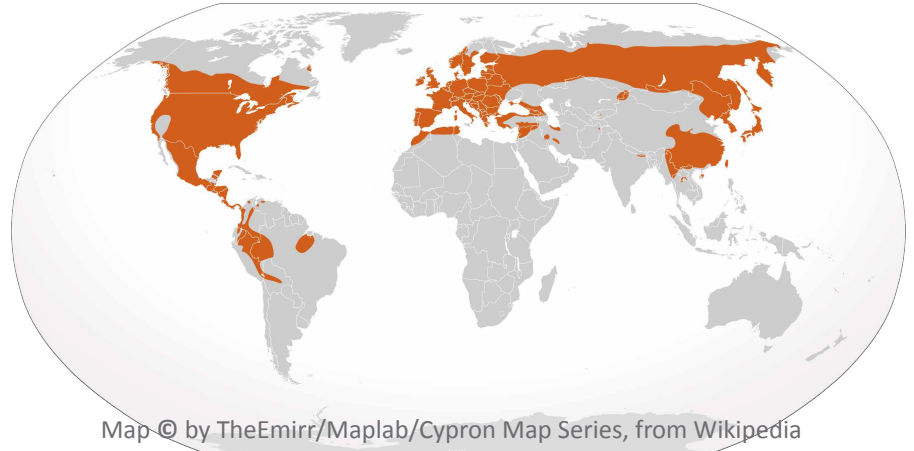
Sadly, salamanders are in trouble all across their range. Nearly one of every two salamander species in the world falls under one of the threat categories of the the IUCN Red List of Threatened Species. Moreover, because there are

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World Distribution of Salamanders (Order Caudata)



Map © by TheEmirr/Maplab/Cypron Map Series, from Wikipedia

sponsored by PARC - Partners in Amphibian and Reptile Conservation



Get Your March Photo Contest Calendar - Free!

Who's looking at you? It's a female Green Salamander (*Aneides aeneus*) on guard over her eggs, keeping a wary eye on photographer Alan Cameron. Download the March calendar to get the big picture and see the fleet, feathery runner-up at <http://www.parcplace.org/images/stories/YOSal/YoSalCalendarMarch.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>.

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!

facebook

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



Salamander Art Exhibit Seeks Artists!

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.



March Newsletter Content Coordinator: Lynn Bogan
Design and layout: Kathryn Ronnenberg

Salamander News Facilitator: Tom Gorman
Year of the Salamander Committee Chair: Mary Beth Kolozsvary

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:



Amphibian Specialist Group

www.Amphibians.org

The Amphibian Specialist Group is a global network of dedicated experts who donate their time and expertise to create a community from where practical amphibian conservation can be advanced based on a solid foundation of science. This global network consists of over 300 members in over 40 Regions/Countries enabling the ASG to act on a global scale. The ASG strives to conserve biological diversity by stimulating, developing, and executing practical programs to conserve amphibians and their habitats around the world.

Amphibian Ark

www.amphibiaark.org



The AArk is a joint effort of three principal partners: the World Association of Zoos and Aquariums, the IUCN SSC Conservation Breeding Specialist Group, and the Amphibian Survival Alliance. We were formed to address the captive (ex situ) components of the Amphibian Conservation Action Plan. Our vision is the world's amphibians safe in nature, and our mission is ensuring the global survival of amphibians, focusing on those that cannot currently be safeguarded in nature. We coordinate amphibian conservation programs implemented by partners (zoos, aquariums, museums, universities and private conservationists) around the world, with our primary emphasis on programs within the range countries of the species, and with a constant attention to our obligation to couple captive conservation measures with necessary efforts to protect or restore species in their natural habitats.



AmphibiaWeb

www.amphibiaweb.org

AmphibiaWeb is an online system enabling anyone online to search and retrieve information relating to amphibian biology and conservation. This site was inspired by the global declines of amphibians, the study of which has been hindered by the lack of multidisciplinary studies and a lack of coordination in monitoring, in field studies, and in lab studies. We hope AmphibiaWeb will encourage a shared vision for the study of global amphibian declines and the conservation of remaining amphibians.

Wake County Parks Recreation and Open Space

www.wakegov.com/parks/Pages/default.aspx

Wake County Parks Recreation and Open Space's (PROS) mission is to provide outdoor recreation and educational opportunities while promoting environmental and cultural stewardship. PROS manages eight park facilities comprising approximately 2,000 acres in Raleigh, NC and surrounding areas. We also manage nearly 5,000 acres of permanent open space. To celebrate the Year of the Salamander, participating locations will provide opportunities to learn about salamanders through themed programs and activities during the month of March - see www.wakegov.com/parks/events/Pages/themes.aspx



**Parks, Recreation
and Open Space**

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>

Challenges & Opportunities, continued from p. 1

also a number of species about which little is known, only one out of three salamander species is really considered to be in a healthy situation. In some countries the situation is really alarming: in Mexico, only 15 of the species that live in the country are considered to be healthy or, in other words, nine out of ten salamander species that occur in Mexico face some problems, with a full 96 species classified as Threatened. In Guatemala the figures are similar, with seven out of every eight species living in Guatemala facing conservation problems. It is very likely that some species in Mexico and Guatemala could already be extinct, at the same time that new species are still being discovered in both countries. Earlier this year researchers in Mexico City announced they had failed to find a single Mexican Axolotl (*Ambystoma mexicanum*); unfortunately it is not the only *Ambystoma* species on the brink of extinction in Mexico. Habitat destruction and degradation are the biggest problems encountered by salamanders in the New World. For many terrestrial species with very small distributions, cutting down the patches of forest where they occur can quickly lead to extinction. For the more aquatic species, habitat degradation is an enormous challenge, as water is managed for human consumption and the watersheds are often polluted and filled with invasive species like Nile Perch (*Tilapia* spp.) that do not seem to coexist well with the salamanders.

In Europe, one in three species is classified as Threatened. Some European salamanders have been declining since the 1980s due to reduction and fragmentation of habitat caused by the diversion of water for agricultural purposes, pollution, and the introduction of fishes—conditions not too different from what we find in the Americas. In addition, some species like the Sardinian Newt (*Euproctopus platycephalus*) are known to be having problems with *Batrachochytrium dendrobatidis* (*Bd*), which is also known to affect some species in the Americas and could be involved in some of the declines seen in Mexico and Central America. Of great concern in Europe is the recent detection of a new species of fungus (*B. salamdrivorans*) that seems to be responsible for the sudden dramatic population declines seen in the Fire Salamanders (*Salamandra salamandra*) of the Netherlands; last January it was announced that the new fungus has now been detected in Belgium.



Forests like this one in Veracruz state, Mexico, are critical and fast-disappearing habitat for many salamanders with small species ranges.



Chiropterotriton magnipes, rediscovered in 2010 after 10 years with no sightings; its sister species, *C. mosaueri*, the Cave Splayfoot Salamander, rediscovered in the same cave, had been on the missing list for 70 years. Photo: Thomas Bille, Year of the Salamander Photo Contest.

The picture for salamanders in Asia is not much better. Half of Chinese salamanders are considered Threatened (23 out of 44 species), and in Japan the situation is similar (10 out of 23 species). All four salamanders known from Taiwan are considered Threatened, with one already locally extinct on the island.

While things look difficult for many salamanders, there are some positive developments that could be replicated. For example, based on a combination of niche modelling and careful study of collected specimens from different museums, Mexican scientists have discovered populations of some highly threatened species in Veracruz state. In addition to that, two “lost salamanders” of the genus *Chiropterotriton* were rediscovered in 2010, after being missing for 70 years. Other studies in that region have shown that some salamanders can persist in shade-grown coffee plantations. In Guatemala, the recently established Sierra Caral reserve protects several salamanders and frogs. In Europe, in



© Jaime García-Moreno

Specialized forest habitats like bromeliads are used by many salamander species in Mexico, Central America, and South America. These forests are only beginning to be protected in a few areas such as the Sierra Caral of Guatemala.

the conservation status of herpetofauna and urges conservation measures from its Member States, and through the implementation of its complementary Water Framework Directive, it is expected that it will help secure the conditions needed by water-dependent amphibians.

These examples demonstrate that in spite of the difficulties faced by these fantastic creatures, we cannot give up. Thanks to these and other efforts some salamanders have a brighter future today than they did yesterday. Other encouraging case studies are presented in more detail in an accompanying article in this volume. Education seems to be, as often is the case, an area that deserves more attention. In this regard, perhaps we need to imitate the Japanese, who have fully embraced the giant salamander as an iconic creature that deserves attention. We need to learn how to inspire similar feelings in the different communities that share their mountains with these amazing creatures, and since many of them are restricted to very small areas, we need to involve them and turn them into the guardians of these unique and wonderful creatures.

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.



Saving Salamanders: Approaches as Diverse as the Animals Themselves

By Candace M Hansen, Jaime García-Moreno, Robin Moore, Ben Tapley, Carly Waterman, Karla Pelz Serrano, JJ Apodaca, and James P Lewis

Introduction

As we move further into the Year of the Salamander we wanted to celebrate some of the great efforts underway around the world to help save these incredible creatures. Here we showcase a number of projects that use different, and sometimes innovative, approaches to address conservation challenges. In all these cases the success is dependent upon a collaborative effort, an approach that is the foundation of the Amphibian Survival Alliance. During the Year of the Salamander, the ASA is committed to helping highlight the plight of Salamanders around the world and through the Alliance implement action to address some of these challenges. It is hoped that when the next Year of the Salamander comes around we will have an even longer list of salamander success stories to showcase.

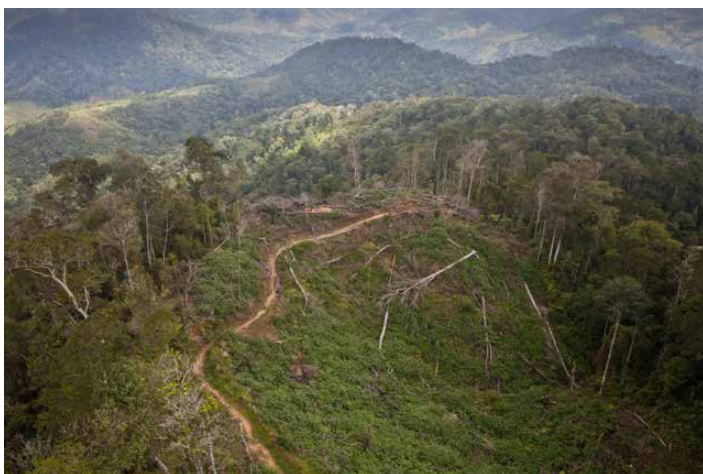
Case Study 1 - Sierra Caral – Saving habitat and species through partnerships

Focal Species: Moss Salamander, *Nototriton brodei* (Critically Endangered) and Wake's Hidden Salamander, *Cryptotriton wakei* (Critically Endangered).

The Challenge: Habitat fragmentation - One of the richest concentrations of salamanders in Central America occurs in the Sierra Caral, an isolated massif that rises from Caribbean coast of Guatemala to 1,100 meters above sea level just a stone's throw from the border with Honduras. The wet forests are home to one of the world's largest arboreal salamanders, Dofflein's Salamander, *Bolitoglossa dofleini*, which grows to an impressive 11.5 cm from snout to vent and is classified as Near Threatened. This salamander lives alongside the Moss Salamander, *Nototriton brodei* (Critically Endangered), Wake's Hidden Salamander, *Cryptotriton wakei* (Critically Endangered), Mushroom Tongue Salamander, *Bolitoglossa odonnelli* (Endangered) and Dunn's Climbing Salamander, *Bolitoglossa dunnii* (Endangered) and the newly discovered *B. nymphe*. Despite the importance of this area there has historically been a lack of any real protection, and the forests of the Sierra Caral were becoming increasingly fragmented from increased cattle ranching.



Arboreal Salamander, *Bolitoglossa dofleini* © Robin Moore.



Deforestation in Guatemala. © Robin Moore.

What was done to address the challenge: In 2010, when 2,400 hectares of forest came up for sale, it presented a challenge and an opportunity to acquire and protect a critical tract of salamander habitat. In an effort led by local NGO FUNDAECO and supported by numerous international conservation groups, the area was successfully purchased, registered as a private nature reserve, and set aside for protection and management.

Next steps: FUNDAECO continues to urge National Congress to declare a broader Protected Area in the Sierra Caral, and it is hoped that this success story will provide a model that can be replicated in other important habitat for threatened salamanders in Guatemala and beyond.

Case Study 2 - Chinese Giant Salamander – saving a species from overharvesting

Focal Species: Chinese Giant Salamander, *Andrias davidianus* (Critically Endangered).

The Challenge: Overharvesting - The Chinese Giant Salamander is the world's largest living amphibian, reaching lengths of over 1.8 m. It belongs to a small and ancient group of salamanders that diverged from their closest relatives during the Jurassic period over 170 million years ago. Although revered by the Chinese for thousands of years, Chinese Giant Salamanders are threatened today by overharvesting for human consumption. They are taken from the wild and farmed as both a luxury food item and an important source of Chinese traditional medicines. Overharvesting has had a catastrophic effect on the wild population, which is estimated to have declined by 80% since 1960. Disease and the destruction and degradation of the streams and pools it inhabits are also having a negative impact.



Chinese Giant Salamander, *Andrias davidianus*. © Ben Tapley/ZSL

What was done to address the challenge: The Chinese Giant Salamander is ranked 2nd on the Zoological Society of London's EDGE amphibians list, which prioritizes Evolutionarily Distinct and Globally Endangered (EDGE) species for conservation attention. ZSL brought local and international stakeholders together in 2010, to develop a strategy for saving wild populations of Chinese Giant Salamanders. This strategy is now being implemented by ZSL and partner organizations, the Kunming Institute of Zoology, Shaanxi Normal University, and Guiyang University with support from the Darwin Initiative.

Next steps: As the project develops the following will be undertaken to ensure the long-term survival of the species: range-wide ecological and community interview surveys to establish the current distribution and threats facing wild Chinese Giant Salamanders and build an evidence base for long-term monitoring; genetic analysis to understand the relationship between salamanders in different river systems; identifying disease threats and working with farmers to improve biosecurity in farms; establishing a conservation breeding facility in China; raising awareness among key stakeholders and the general public; and strengthening capacity of partner organizations to undertake long-term conservation of this iconic species.

Case Study 3 - Lake Lerma Salamander - Saving a species through conservation action plans

Focal Species: Lake Lerma Salamander, *Ambystoma lermaense* (Critically Endangered).

The Challenge: Habitat loss and degradation - In the last 100 years, what was once the largest wetland in central Mexico has disappeared. The Cienegas de Lerma now consists of three independent water bodies covering about 3,000 ha on the outskirts of the city of Toluca, at 2600 m asl. This is what is left of the once huge wetlands in central Mexico: it is estimated that wetlands occupied over 100,000 ha in Mexico and over 30,000 ha in Toluca, west of Mexico City. The area of Lerma is itself of interest because it is one of the last examples of high elevation



Lake Lerma Salamander, *Ambystoma lermaense*. © Karla Pelz Serrano

wetlands along the central Mexican highlands. It is not only the last habitat for the Lerma Salamander, but also for several other species including endemic fish, birds, mammals, and plants, and is an important stopover area for waterfowl which number up to 100,000 individuals at peak time. One bird endemic to the area, the Slender-billed Grackle (*Quiscalus palustris*), went extinct in the early 20th century. This

area is also important to recharge the water level of the region and also protects surrounding areas against flooding. In the past, *A. lermaense* and other amphibians from the area were part of the diet of the local people. Today, the Cienegas de Lerma face pressures from urban and agricultural development, water exploitation, and pollution.

What was done to address the challenge: Fortunately, since 1991 the Mexican authorities have been working toward the conservation and recovery of the area. A 1400-ha National Park was established in 1999, and the same year the area was recognized by CONABIO (National Commission on Biodiversity) as a priority for biodiversity conservation. BirdLife recognizes the area as an Important Bird Area, and in 2002 the area was recognized as a Federal Natural Protected Area. A decree by the authorities has forbidden any discharges into the system or the diversion of water, and a management plan is being developed by the CONANP (National Commission of Natural Protected Areas). Since 2004 the area has been recognized as a Ramsar site by the Convention on Wetlands.

Next steps: Karla Pelz Serrano, a conservation biologist and EDGE Fellow, is currently working on a restoration project on what remains of the once largest wetland in central Mexico, which provides habitat for many endemic species such as the Lake Lerma Salamander. Karla's focus is on research projects that evaluate the conservation status of some species of the wetland in order to generate Conservation Action Plans to ensure the survival of the species. She will also be using conservation genetics to assess the conservation status of endangered species. As part of her EDGE Fellowship she will be working on the development of the conservation strategy for the Lake Lerma Salamander.



Lake Lerma Salamander, *Ambystoma lermaense*. © Karla Pelz Serrano

Case Study 4 - The Red Hills Salamander - Working with industry to save a species

Focal Species: the Red Hills Salamander, *Phaeognathus hubrichti* (IUCN Endangered, USFWS Threatened).



Red Hills Salamander, *Phaeognathus hubrichti*. © JJ Apodaca

The Challenge: Restricted habitat and economic pressures

The southeastern United States is home to a staggering variety of salamander species. Unfortunately, it is also home to some of the most imperiled salamanders on the planet. One such species is the Red Hills Salamander, which is considered to be Endangered by the IUCN and threatened by the USFWS. The Red Hills Salamander is one of the largest lungless salamanders (Family Plethodontidae) in the world, reaching nearly 1 ft (0.3 m) in length. Despite this incredible size, the Red Hills Salamander was not discovered until 1960, most likely due to the fact that they spend the vast majority of their lives within an intricate burrow system. They are so dependent on their burrows that they have evolved numerous interesting

adaptations to life underground, such as a prehensile tail, reduced legs, modified eyelids and ears, extra vertebrae, a reinforced skull, and an efficient system of feeding only at their burrow entrances. Creating and living in these burrows make them dependent on a small band of silt and clay stone in Alabama's Red Hills region. Like many specialist species, their dependence on a distinctive habitat subjects them to a high level of risk. In the case of the Red Hills Salamander, the region that encompasses their small geographic range has experienced a great deal of habitat modification by timber operations.

What was done to address the challenge: Despite having federal protection under the Endangered Species Act since 1976, populations of the Red Hills Salamander have continued to decline, and in several cases have even been extirpated. Those habitat patches that received short-term protection in the form of USFWS Habitat Conservation Plans (HCPs) are heavily fragmented, as HCPs generally tend to mitigate losses rather than foster recoveries. Until relatively recently, the Red Hills Salamander lacked any long-term protection. Thanks to a combined effort from the State of Alabama's Forever Wild Program and The Nature Conservancy (TNC) around 4,000 acres were purchased in 2010 and have now been placed into permanent protection.



Red Hills Salamander, *Phaeognathus hubrichti*. © JJ Apodaca

Next steps: The relatively high price of land in the region makes the acquisition of large tracts of habitat unlikely. However, current partnerships between conservation organizations, governmental agencies, and local landowners are creating the potential for large amounts of habitat to be placed into long-term protection via conservation easements. This effort will require a robust educational outreach effort and continued collaboration between stakeholders.

Case Study 5 - The Dutch Fire Salamander - the importance of monitoring



Fire Salamander, *Salamandra salamandra*. © Robin Moore

Focal Species: The Fire Salamander (*Salamandra salamandra*) is considered a common species (Least Concern) at a global level. Though common throughout much of Europe, in the Netherlands it can only be found in Limburg, the southernmost part of the country. It was considered locally threatened in the Netherlands, and now is at risk of local extinction.

The Challenge: a new fungus - The Dutch organization RAVON, through its large network of volunteers, monitors regularly the status of populations of amphibian species in the Netherlands (and also of reptiles and fish), following a monitoring scheme that was jointly developed with the Dutch Central Office of Statistics. Thanks to this very well structured protocol, RAVON

detected that the population of Fire Salamanders in Limburg had collapsed by over 95% since 2004, and particularly in 2011 and 2012. In 2008 three dead animals were found, but alarms really started ringing when 15 dead animals were collected in the 2010 field season. Up until 2012, the causes for the decline were unclear and enigmatic, as no such declines were seen in the nearby Belgian or German populations. After some intensive research it is now clear that the salamanders were the victims of a fungal disease, caused by the newly described *Batrachochytrium salamandrivorans*, which kills the animals after a few weeks of infection.

What was done to address the challenge: First, a very intense and focused research program was set up to understand what was behind the declines. Attention was paid not just to potential diseases, but also water and soil quality, potential inbreeding, the possibility that animals were being illegally captured, and the effect of pesticide residues. In late October 2012, it even looked as if animal diseases were going to be ruled out, and RAVON, following a precautionary principle, captured nearly 40 of the remaining animals to establish a captive breeding program. When some of the captured animals started to die, they were brought under close surveillance at the University of Ghent. Half of the animals died in captivity, but this provided the necessary clues for researchers to identify the cause.

Next steps: Monitoring by RAVON was an essential step for discovering the fungus. In 2013 several living salamanders were detected in different forest patches in the Netherlands. Unfortunately the fungus has been detected

in Belgium, as was announced in January 2014. As for the captive animals, after a quarantine period the surviving animals were brought to two separate captive breeding facilities in the Netherlands, in Nijmegen and Born Castle, where they have already reproduced successfully. Some of the 120 young animals in Nijmegen will be moved to the DoeZoe in Leens in the northern province of Groningen. With the new fungus in the Dutch forests, there is a need to educate the forest visitors about the salamanders and the fungus, and the measures they can take to minimize the spread of the disease.

Deforestation Threatens Salamanders World-Wide

Globally, one of the largest threats to salamander species is loss of their natural habitat. Land cleared for agriculture and developments has greatly altered areas that were once suitable for salamanders. Deforestation can affect salamanders through both the physical disturbances of harvest and the changes to the forest floor habitat, such as reduced cover resulting in increased sunlight and temperatures. Fragmentation of habitats is a secondary effect of this change in land use and disconnects populations with barriers like roads, agricultural lands, and other developments.



The Giant Palm Salamander (*Bolitoglossa dofleini*) is endemic to Belize, Guatemala, and Honduras and is threatened by habitat loss. This unique species relies on wet montane forest habitats such as the Sierra Caral.



Deforestation in the Sierra Caral in Guatemala for cattle ranching, the loss of rainforest habitat is lethal to arboreal (or tree dwelling) salamanders like the Giant Palm Salamander (*Bolitoglossa dofleini*).

The Sierra Caral mountain range in Guatemala, near the border of Honduras, is a top priority for conservation as it is home to 12 Threatened amphibian species, five of which are Critically Endangered and five are endemic to Guatemala. This highly biodiverse forest remnant is a hot spot for endemic wildlife in northern Central America, and is at risk from increasing land clearing for cattle grazing.

The **Amphibian Survival Alliance** along with other partners are working to secure funding that is necessary to protect this site in perpetuity. For more information please visit <http://www.amphibians.org/aboutus/partnering-for-success/>.

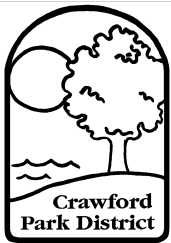
Outreach and Education Materials – NOW AVAILABLE!

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.

Still looking for Year of the Salamander partners!

Our partners are key to the success of the Year of the Salamander campaign. We continue to look for partners, so if you or your organization are implementing salamander conservation efforts or just plain love salamanders and want to help spread the word, we want to hear about it at yearofthesalamander@gmail.com! A special shout out to **Josh Dyer** and his colleagues at the **Crawford Park District** (north-central Ohio) that held their first Year of the Salamander kick-off event on January 11th. Check out our Partners Page on our website, www.yearofthesalamander.org - we're looking to add more energy to this campaign!



Josh Dyer introduces some grade-school children to a Spotted Salamander (*Ambystoma maculatum*).

Upcoming Meetings & Events

Homeschool/Trackout Series: Year of the Salamander program, March 18, 1-3 pm, Lake Crabtree County Park, Morrisville, NC. See [<link>](#) for details.

Salamanders hike, American Tobacco Trail, March 20, 2-3 pm, New Hill, NC. See [<link>](#) for details.

Salamander Search, March 22, 10-11:30 am, Harris Lake County Park, New Hill, NC. See [<link>](#) for details & registration info.

North Carolina PARC (NCPARC) annual meeting, March 26-27, NC Forest Service Mountain Training Facility near Crossnore, NC. See www.ncparc.org.

Eye of Newt! Family Wildlife Series, March 29, 2-3:30 pm, Blue Jay Point County Park, Raleigh, NC. See [<link>](#) for details & registration info.

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.

6th Conference on the Biology of Plethodontid Salamanders, May 18-20, Tulsa, OK. Abstract deadline: **March 1**. 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.

Tunnels May (or May Not) Be the Answer

Scott Jackson, University of Massachusetts Amherst

I was aware there was a local band named Salamander Crossing, but I wasn't very interested in learning more about it. In the years following the installation of two tunnels for Spotted Salamanders (*Ambystoma maculatum*) in North Amherst, MA, I was tired of all the attention and getting a bit cynical. The press and the public greeted the salamander tunnels with a great deal of interest, but had a hard time taking the project seriously.

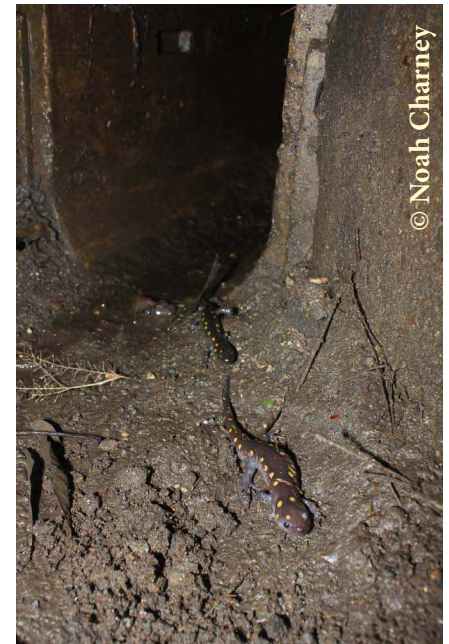
In fact, the Henry Street tunnel project was an effort to save a population of Spotted Salamanders significantly affected by roadkill and to investigate underpass systems as a potential amphibian conservation tool. The tunnels were installed in 1987 and first opened for business in the spring of 1988. When the first warm rains of spring set the salamanders migrating from their forest habitat to a marshy wetland to breed there were approximately 200 spectators present to observe the tunnels in action. Now, after 25 seasons, the tunnels are still in place and helping salamanders to safely cross the road.

When I first saw salamanders emerge from the tunnels, I was delighted. When I observed that Wood Frogs (*Lithobates sylvaticus*) found it difficult to follow the guide fencing to the tunnels, I was dismayed. Later, when it became obvious that the tunnels were too small to pass adult Snapping Turtles (*Chelydra serpentina*), I was embarrassed to have fallen into the trap of single-species thinking. Because guide fencing is needed for underpass systems to work, what might facilitate passage for one species could also represent a barrier to passage for other species.

If underpass and barrier systems are not effective at allowing passage for all the species that need to cross roads, it is possible that tunnels could do more harm than good. It is therefore important to do a careful analysis to determine whether the potential benefits of tunnels are greater than their risks. Salamander movements typically occur at night, and if traffic volumes after dark tend to be low, perhaps tunnels are not necessary. If traffic volumes are high enough to cause mortality at a level that threatens populations, then tunnels might be a good option. However, make sure to consider all the species (e.g., frogs, turtles, snakes and small mammals) that might also need to use the underpasses, because the barrier fencing will likely block their ability to cross over the road surface.



Tunnel for Spotted Salamanders in Princeton, MA. Note the grated top to allow rain to keep the inside of the tunnel wet during migration.



Spotted Salamanders emerging from one of the Henry Street tunnels.

© Noah Charney

Despite all the press attention and need for crowd management, we did learn a lot about tunnels as a conservation tool. For example, I would never have guessed that a tunnel could be too dark for nocturnal salamanders, but it's true. Many more projects have been built for salamanders and other small vertebrates, and we are learning more all the time. Many of these lessons learned will be available soon in a book edited by Kimberly Andrews, Priya Nanjappa, and Seth Riley. The book, titled "*Road and Ecological Infrastructure: Concepts and Applications for Small Animals*," is being published by Johns Hopkins University Press and is due out in early 2015.

Attitudes are changing, and the public and the press are now treating amphibian conservation as a serious concern and tunnel projects as important conservation. I did eventually see Salamander Crossing in concert and loved the music. Thank goodness attitudes can change.

Conservation Issues Surrounding Japanese Giant Salamanders

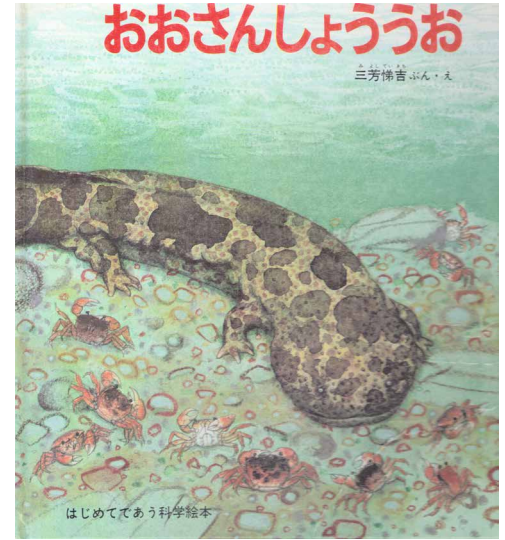
Mizuki Takahashi, Department of Biology, Bucknell University

The first amphibian book that I read as a child was called “*Oosanshouo*”, or Japanese Giant Salamander (*Andrias japonicus*). I could not believe there is a salamander, not an alligator, as big as me existing in my own country. The book was first published in 1974, and despite being 40 years old, it still included conservation issues such as pollution and artificial modification of rivers that threatened the livelihood of the Japanese Giant Salamander. The Giant Salamander is a nationally protected natural treasure, as designated by the Agency for Cultural Affairs. The designation was due to their cultural value (probably their unusual size for amphibians), not their ecological role or endangerment. Because of what is most likely this lack of ecological appreciation, the Japanese government has never established any monitoring programs for the Japanese Giant Salamander. As a result, their habitats and populations have most likely deteriorated even further since 1974, for two major reasons.

First, construction of dams and concrete banks has been promoted as public works projects throughout Japan. As a result, it is no exaggeration to say that there are no Japanese rivers without dams. Because the Japanese Giant Salamander is fully aquatic, dams have likely prevented their migration, leading to population fragmentation. However, there is no published study that tests the effects of dams on the species’ migration patterns. In addition, concrete banks have deprived giant salamanders of nesting sites in many streams. To date, no standardized conservation efforts have been developed to cope with these issues. In some Prefectures, such as Tottori and Mie, salamander passages and artificial nests have been installed. Some other Prefectures and boroughs do not have any conservation considerations. Although the species and some of the conservation issues are nationally recognized via a few influential TV programs, habitat conservation has been insufficient and ineffective due to a lack of government leadership.

Another serious problem is competition and hybridization with Chinese Giant Salamanders (*Andrias davidianus*). It has been suggested that introduced Chinese Giant Salamanders were released and naturalized in the Yodo River Basin that runs through Shiga, Osaka, and Kyoto Prefectures. A recent genetic study confirmed the existence of the Chinese counterparts in Japanese rivers. Moreover, morphological data suggest that they have gone through hybridization and backcrossing with Japanese Giant Salamanders and the proportion of Chinese descendants has recently increased. Facilities such as zoos and aquariums accept Chinese descendants, yet space is limited. Euthanasia is not an option, because Chinese Giant Salamander also receives special protection by the Chinese government and is listed as “Critically Endangered” by the IUCN. There is a growing concern about the conservation of the Japanese Giant Salamander among scientists, educators, and some conscientious citizens.

A few years ago when I went back to Japan, I found the *Oosanshouo* book on my book shelf. I brought it back to the United States to read it to my six-year-old son. I also wanted to show it to my students taking an upper-level Amphibian Biology course at Bucknell University in order to illustrate how I started my career. The book reminds me of the importance of intrinsic curiosity and love for nature. Seeding such passion and desire for conservation among the younger generations is critical for the future of Japanese Giant Salamanders and many other amphibians experiencing population declines.



Front cover of the *Oosanshouo* book that the author brought back to the United States from his home in Japan (photographed by Mizuki Takahashi).



The author inserting a PIT tag into a giant salamander captured in Tottori, Japan (July 2012, photographed by Yukiko Takahashi). A Japanese collaborator and the author are currently studying parental care behavior and migration patterns of the Japanese Giant Salamander.

Family of the Month: Ambystomatidae

Members of the family Ambystomatidae are more commonly known as “Mole Salamanders” due to their primarily subterranean lifestyle, spending most of their lives in burrows or beneath rocks or logs. Many ambystomatid species migrate to ephemeral wetlands or other water bodies to breed, and the larvae are aquatic. Larvae of some species go through metamorphosis and transform into terrestrial adults; others may go through paedomorphosis, in which they retain some larval characteristics such as gills and become aquatic adults. The Eastern Tiger Salamander is one of the most wide-spread salamander species in North America, ranging from southern Canada all the way to northern Mexico, and from North Dakota to Florida and Long Island, New York, although it does not occur in the Appalachians. This species is one of the largest land-dwelling salamanders in the world, growing as long as 14 inches (36 cm), from snout to tip of the tail.



Eastern Tiger Salamander, *Ambystoma tigrinum*. Note the stocky body and strong legs, adaptations for burrowing.



A close relative of the tiger salamander, the Mexican Axolotl, differs from other family members in that it is fully aquatic for all life stages. Axolotls were found only Lakes Xochimilco and Chalco and their surrounding canals in Mexico City, but no animals were found in a recent survey. This rare species is now protected and listed as critically endangered in the wild, due to habitat loss, pollution, harvest for food, and population declines.

An albino form of Mexican Axolotl (*Ambystoma mexicanum*) - wild Axolotls are usually dark in color. Axolotls become neotenic adults, retaining the gills characteristic of aquatic larvae. Photo © Jaime García-Moreno

Family: Ambystomatidae

Featured species: Eastern Tiger Salamander (*Ambystoma tigrinum* - formerly *Ambystoma tigrinum tigrinum*. Other former subspecies are now placed in *Ambystoma mavortium*, the Western Tiger Salamander); Mexican Axolotl (*Ambystoma mexicanum*).

Also known as:	Mole Salamanders
Number of Species:	Over 32 species in 1 genus, <i>Ambystoma</i>
Region / Habitat:	- Occur only in North America - Found in burrows (excavated by other animals), and under rocks and logs
Physical Characteristics:	- Possess lungs - In some species, the body is robust and stocky; in others it is slender - 4 toes on front feet and 5 toes on back feet - Presence of palatine teeth arranged in lateral rows on the roof of the mouth
Behavior / Development	- Primarily terrestrial salamanders - Spend most of the year underground, only moving to water for breeding - Develop through an aquatic larval stage, with gills that they lose as adults - Some species can develop into aquatic paedomorphs, retaining their larval form
Fun Fact:	In the eastern U.S., Spotted Salamanders (<i>A. maculatum</i>) make their migrations on warm, rainy nights to woodland vernal pools where they congregate in large numbers to breed.

An Interview with Jim Petranka

by Dede Olson



Dr. Jim Petranka

Jim Petranka received an undergraduate degree from Auburn University and a PhD from the University of Kentucky, where he worked with Roger Barbour. He did a 3-year post-doc with Andy Sih at the University of Kentucky and an additional 2-year post-doc with Nelson Hairston at UNC-Chapel Hill before taking a position at UNC-Asheville. He has been a professor at UNC-Asheville since 1988. UNC-Asheville is a small school that is dedicated to undergraduate education (no MS or PHD programs in the sciences), so he has spent the last 25 years working entirely with undergraduates on research projects.

How did you become interested in salamanders, and at what age?

I grew up in central Alabama (Montgomery) and spent a lot of time fishing as a teenager. One of my favorite places to fish and explore was Hatchet Creek in Alabama. During my freshman year at Auburn University my buddies and I were camping at Hatchet Creek when I turned a rock and found my first salamander (a Southern Two-lined Salamander, *Eurycea cirrigera*). Dr. Bob Mount at Auburn identified it for me. I went back to Hatchet Creek the next week, caught more salamanders, and immediately became hooked on herpetology. It's funny, but if I had not turned that rock, I might have followed a different pathway in life.

What is your current role in salamander research and conservation?

This summer I completed a study with an undergraduate that examined the importance of Spotted Salamander (*Ambystoma maculatum*) larvae in controlling mosquitoes that spread West Nile virus. Because I am nearing the end of my academic career,

I will likely not be directly involved in research in the future. I have more than 40 years of experience working with amphibians and hope to use the knowledge gained to continue to serve in an advisory role for conservation organizations and resource managers. I also hope to do more volunteer work for conservation groups.

Do you have a favorite salamander or group of salamanders?

I have always been most fond of ambystomatid salamanders, perhaps because I really enjoy studying the ecology of seasonal ponds. My first research project involved the Marbled Salamander (*Ambystoma opacum*) and I have conducted research on ambystomatid salamanders throughout my career. I have explored hundreds of vernal ponds and other seasonal wetlands throughout the eastern US during my lifetime and I found every one to be unique and special.



Marbled Salamander, *Ambystoma opacum*. Photo by John Parke, Year of the Salamander Photo Contest.

How would you describe a defining moment or favorite memory of working with salamanders?

Many years ago I was visiting my brother John who was attending Auburn University when we found Marbled Salamanders that were nesting in a vernal pond. We decided to conduct a study on their natural history and to determine whether females preferred to nest at intermediate elevations in pond beds. We raked the entire pond bed, found nesting females, and gathered data on their clutch size, nest placement, and larval ecology that eventually led to two publications. More importantly, we did this work entirely on our own and without any guidance from a biology professor or seasoned herpetologist. That was the great joy – just

*The views and opinions of interviewees are not necessarily shared by all members of PARC or other Year of the Salamander Partners

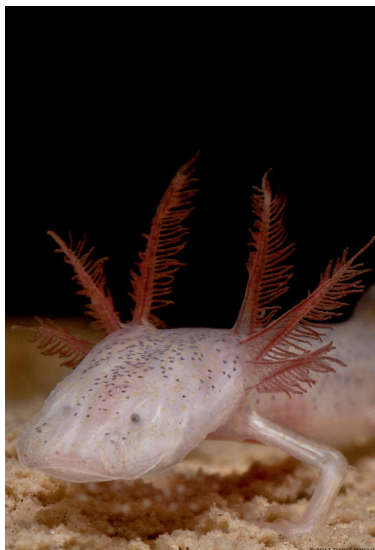
a couple of college students who were intellectually curious and wanted to find the answers to some questions that concerned Marbled Salamanders. Not only was working with my brother on nesting Marbled Salamanders a blast, but it was a defining moment in my career when I became an independent researcher.

What do you believe is the biggest threat facing salamanders in the 21st century?

Global climate change may be the biggest threat, particularly for species that are highly vulnerable to changes in annual rainfall, temperature and hydrology. Salamanders have a greater proportion of species that are narrow endemics than any other group of North American vertebrates. I am particularly worried about the species that have very small ranges and rather specialized habitat requirements. Examples include the Edwards Plateau *Eurycea*, the Georgia Blind Salamander (*Haideotriton wallacei*), *Plethodon* species that inhabit mountaintops or specialized habitats in the Appalachians (e.g., *P. hubrichti*; *P. shenandoah*) and certain members of the *Batrachoseps* species complex in California that have very restricted ranges. Many species of plethodontids that inhabit montane forests in Central America also are at risk.

What are some of the ways that the public can help in the conservation of salamanders?

Salamanders are just one facet of the global biodiversity crisis that is leading to the decline of almost all major groups of organisms on Earth. It is a simple case of a planet that is grossly overpopulated with humans who are consuming natural resources at an unsustainable rate. Unfortunately, both the size of the human population and the rate of resource consumption will continue to grow in the future. There are many ways that the public can help to protect salamanders. These vary from local projects such as volunteering with amphibian monitoring projects, to more global efforts such as helping to reduce greenhouse gas emissions.



A Georgia Blind Salamander, *Haideotriton (Eurycea) wallacei*. Photo © Danté Fenolio, Year of the Salamander Photo Contest.

A major issue that we have in our modern society is that so many children grow up in urban environments and are detached from nature. The public is much more likely to embrace conservation efforts when there is a feeling of ownership, and that feeling of ownership is best developed when individuals can observe species and their habitats in the wild. So, spend as much time as possible with young people outdoors and educate them about the remarkable biodiversity on this planet. Take them to watch frogs chorusing on a warm spring day or to catch salamanders in a local headwater stream.

As voters, the public can help by supporting candidates that have strong environmental records. Finally, since most lands are privately owned, the public can play a major role in amphibian conservation by protecting wetlands and forests on their property.

What guidance would you give to natural resource managers and policy makers regarding salamander conservation?

One major issue we have is the creation of laws and policies that are not based on the best available scientific information. We have many experts in academia and government who have an excellent understanding of the natural history and ecology of amphibians and other non-game species, as well as the environmental stressors that can contribute to their decline. Unfortunately, most environmental and regulatory legislation that is passed to protect our natural heritage is often compromised because of political influences from special interest groups. My advice is to try your best to use sound science in making decisions and policy, and to keep politics out of decision-making as much as possible. With respect to management, keep in mind that woodland and streamside plethodontids in eastern North America are unusual among the major vertebrate taxa in that there are no species that prefer early successional stages. These species thrive in mature and old-growth forests. When managing land for timber production, use selective cutting and long-rotation cycles. And, remember that species that breed in seasonal ponds need extensive forest buffers around ponds that provide habitat for the terrestrial juveniles and adults. Many stream-breeders also need forest buffers along streams that provide habitat for the terrestrial stages of the life cycle.

What advice would you give to young people (or adults) who love salamanders and want to work with them?

What's stopping you? You don't have to be part of an organized group or organized effort to study nature. In many ways you will enjoy nature more if you explore on your own or with a couple of good friends. There is always a need for volunteers to help with projects that involve natural resource management, amphibian monitoring and environmental education.

Is there anything else you would like to add? Any questions that you're burning to answer?

To most of the public, salamanders are non-glamorous species that are largely off their radar. One of the biggest issues that we face with respect to having an educated public is getting folks to appreciate all living organisms and to understand that we are ultimately dependent

on the myriad of seemingly insignificant life forms on Earth. It is unfortunate that we all-too-often are asked to justify the existence of a species based on whether it has monetary value to humans. I hope that one day our society will reach the point where aesthetics alone is a sufficient justification for maintaining biodiversity. I have watched the faces of many individuals light up with joy when they caught their first Spotted Salamander, or chased a wiggling Black-bellied Salamander in a headwater stream as it dashed between stones. I only hope that 150 or 200 years from now we have not driven any salamander species extinct and people can still have the experience of holding a salamander in their hands and enjoy the beauty and glory of one small but significant facet of life on Earth.

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.



The typical coloration of a fire salamander, black with yellow spots and stripes, displayed in this specimen of *Salamandra salamandra*, the Fire Salamander. Photo by Tobias Eisenberg, Year of the Salamander Photo Contest.



Last month's Photo Contest winner was another species of fire salamander, the Tendi & Marea Valley Fire Salamander, from the Iberian Peninsula, is neither black nor spotted. Photo by Thomas Bille.

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>