

Salamander News

No. 9

September 2014

www.yearofthesalamander.org

Salamander Conservation on Federal and State Lands

By Betsy Howell (PARC/U.S. Forest Service), Jeff Holmes (Amphibian & Reptile Conservancy), and Jen Williams (PARC/National Park Service)

Together, public land designations make up almost 35% of the land area of the United States. By state, the difference in the percentages these designations cover is vast, from 89% of Alaska being managed by state, federal, and tribal governments all the way down to only 0.92% in Kansas. Federal and state lands include such places as national forests and grasslands, state parks, national parks, military lands, national monuments, national wildlife refuges, and state wildlife management areas. Each of these types of ownership has different guiding documents regarding public access, recreation, natural resource management, and funding. Conserving wildlife species on public lands almost always requires partnerships among many different agencies as well as with private groups. In order to implement appropriate conservation measures, it is critical to know, among other things, what species inhabit an area, the areas of habitat they move between, and the time of year when they travel. Inventories are therefore the first necessary step; later comes the work of conserving or restoring occupied sites to their full potential, as well as making them as resilient as possible in the face of expected (and unexpected!) environmental change.

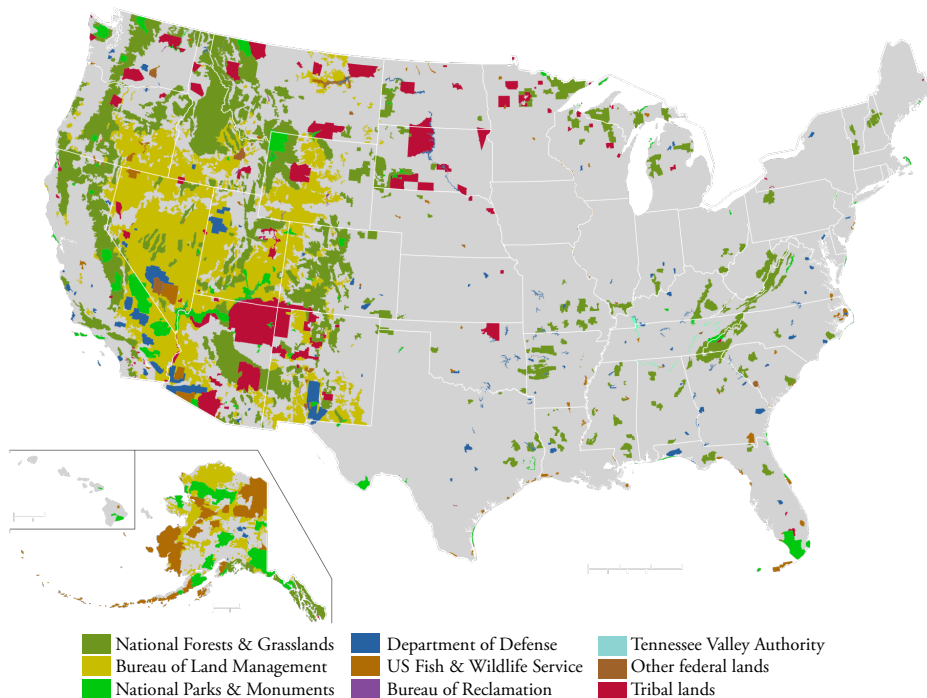
In this issue, several scientists and land managers share their experiences conserving salamanders and salamander habitat across the country. In Florida, The Nature Conservancy (TNC) has been working with the Apalachicola



Salamander habitat on the Olympic National Forest, Washington state. Photo by Betsy Howell.

National Forest to restore habitat for the Frosted Flatwoods Salamander (*Ambystoma cingulatum*), a federally threatened species. This work has

continued on p. 4



Inside:

	page
Year of the Salamander Partners	3
Frosted Flatwoods Salamanders	5
Jemez Mts. Salamander	7
Salamanders on Navy Lands	8
Multi-species Baseline Initiative	10
Ensatinas in California	11
FS + PARC = Projects!	12
Interview with J.D. Kleopfer	14
Art.Science.Gallery. celebrates	16
Family of the Month	17

sponsored by PARC - Partners in Amphibian and Reptile Conservation



Get Your September Photo Contest Calendar - Free!

This month's winning photo ties right in to the newsletter theme: **Mark Watson** participated in surveys for the endangered **Jemez Mountains Salamander**, *Plethodon neomexicanus*, featured in an article on p. 7. To grab your own calendar-size version and see our runner-up, go to <http://www.parcplace.org/images/stories/YOSal/YoSalCalendarSeptember.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>.

Year of the Salamander Podcasts Coming Soon!

Podcasts will soon be posted on the Year of the Salamander webpage (www.yearofthesalamander.org). Check the site for details in September.

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.



September Newsletter Content Coordinator: Betsy Howell, U.S. Forest Service, Olympic National Forest

Design and layout: Kathryn Ronnenberg, U.S. Forest Service, Pacific Northwest Research Station

Salamander News Facilitator: Tom Gorman, Virginia Tech

Year of the Salamander Committee Chair: Mary Beth Kolozsvary, Siena College

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:

Connecticut Department of Energy and Environmental Protection Wildlife Division (CT DEEP)

www.ct.gov/deep/wildlife

CT DEEP Wildlife Division is a state agency that has developed a number of programs to manage wildlife and contribute to diversified and healthy wildlife populations throughout the state. The CT DEEP Wildlife Division is engaged in a comprehensive outreach and education effort to make the public more aware of the wildlife that can be found throughout the state.



Maryland Department of Natural Resources

www.dnr.state.md.us



The Department of Natural Resources leads Maryland in securing a sustainable future for our environment, society, and economy by preserving, protecting, restoring, and enhancing the State's natural resources.

Minnesota Department of Natural Resources – Nongame Wildlife Program

www.mndnr.gov/nongame

[gov/nongame](http://www.mndnr.gov/nongame)

To protect, maintain, enhance, and restore native nongame wildlife resources for their intrinsic values, ecosystem functions, and long term benefits.



New York State Department of Environmental Conservation

www.dec.ny.gov

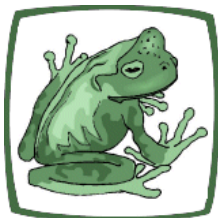
The Mission of NYSDEC is to conserve, improve and protect New York's natural resources and environment and to prevent, abate and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well-being. As part of this mission, NYSDEC manages rare species such as the Eastern Hellbender to keep their populations secure. In addition to population surveys, habitat enhancement and protection, work with hellbenders also includes a successful headstarting program in cooperation with the Buffalo Zoo. The headstarting program, started in 2009 to address decreases in juvenile Hellbenders seen on surveys, has been successful in taking egg masses found in western New York and rearing them into 600 larvae at the Buffalo Zoo and partner facilities the Bronx and Ross Park Zoos. To date, over 100 animals aged 2 years or older have been released back into western New York rivers, where monitoring is ongoing.



Ontario Nature

www.ontarionature.org

Ontario Nature protects wild species and wild spaces through conservation, education and public engagement. It connects thousands of individuals and communities with nature through more than 150 conservation groups across the province of Ontario.



Society for the Study of Amphibians and Reptiles

www.ssarherps.org

SSAR, a not-for-profit organization established to advance research, conservation, and education concerning amphibians and reptiles, was founded in 1958. It is the largest international herpetological society, and is recognized worldwide for having the most diverse program of publications, meetings, and other activities.

We are still recruiting partners! 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>

Salamanders on Fed and State Lands, cont. from p. 1

included using mechanical methods to reduce hardwood encroachment as well as reintroducing fire back into the ecosystem as a regular event. Thirteen hundred miles away in the Jemez Mountains of New Mexico, a coalition of groups is conducting similar management activities against the backdrop of what seems to be the new normal of explosive fire conditions. These stand-replacing events can be particularly devastating to endemic species with small geographic ranges, such as the Jemez Mountains Salamander (*Plethodon neomexicanus*), a species federally listed as endangered in 2013. In addition to traditional survey methods, the many organizations working on the Jemez Mountains Salamander have begun to experimentally use dogs to find salamanders. This seems to be successful and can also be less ground disturbing than some rubble-rousing techniques.

Survey efforts, which are also highlighted in this issue, are being carried out across the country on Navy installations and at numerous sites in Virginia and Idaho. The research from the military sites turned up four federally-listed species, seven state-listed species, and nine at-risk species (NatureServe status G1-G3). In Virginia, work has focused on occupancy modeling and factors affecting the federally endangered Shenandoah Salamander (*Plethodon shenandoah*), habitat modeling and status of salamanders in the Mount Rodgers Natural Area, a multi-scale assessment of Hellbender (*Cryptobranchus alleganiensis*) populations, and comprehensive mapping of Hellbenders using eDNA analysis. In Idaho, although the species of most concern currently is the Eastern Tiger Salamander (*Ambystoma tigrinum*), information is being gathered on all species of amphibians and reptiles, and information on Long-toed Salamander locations (*Ambystoma macrodactylum*) will be used to model future occurrence of the species in the



Shenandoah Salamander from Virginia. Photo by Jonathan Mays.

Coastal Giant Salamander (*Dicamptodon tenebrosus*) found during amphibian survey work on the Density Management and Riparian Buffer Study, conducted on Bureau of Land Management lands in Oregon. Photo: Loretta Ellenburg, USFS.



face of a changing climate. And speaking of climate change, several years of recent work on the Ensatina Salamander (*Ensatina eschscholtzii*) in California have shown the importance of this common woodland denizen to the amount of carbon stored in leaf material on the forest floor. Where the Ensatina is busy doing its job of consuming invertebrates, there is a greater amount of leaf litter storing carbon; where Ensatina do not occupy an area, the invertebrates consume the leaf litter, thereby releasing carbon into the atmosphere. Additionally, in the state of Washington, the US Fish and Wildlife Service is conducting riparian buffer research to determine the best ways to improve habitat for the Coastal Giant Salamander (*Dicamptodon tenebrosus*), Cope's Giant Salamander (*Dicamptodon copei*), Cascade Torrent Salamander (*Rhyacotriton cascadae*) and Columbia Torrent Salamander (*R. kezeri*).

The US Forest Service and the Amphibian and Reptile Conservancy (ARC, the non-profit organization that supports PARC financially and administratively) are partnering to restore Duck Lake on the Williams Ranger District of the Kaibab National Forest in Arizona. A suite of herp species will benefit from the lake restoration, among them the Arizona Tiger Salamander (*Ambystoma mavortium nebulosum*). The restoration will also have exponential effects in the form of capacity building within agencies because it will also be used as a training session for federal biologists; 50 biologists can attend each session. Tom Biebighauser, a Wildlife Biologist and Wetland Ecologist with Wetland Restoration and Training LLC, will be contracted to do the restorations and training. Tom has decades of experience in wetland and stream restoration and has performed work all over the US.

Similarly, ARC is also working with US Fish and Wildlife Service funds to contract with Tom to restore five wetlands in 2015. These restorations, which will

also serve as training sessions for federal biologists, will benefit various salamander species. The 2015 plans include wetland restorations in Moreno Springs (located adjacent to the Mimbres River) in New Mexico in April; Maywoods Environmental and Education Laboratory in Crab Orchard, Kentucky, in May; Massachusetts Audubon's Ashumet Holly Wildlife Sanctuary in Falmouth, Massachusetts, in June; Gifford Pinchot State Park in Lewisberry, Pennsylvania, in August; and Muscatatuck National Wildlife Refuge in Indiana in November. Last year, the USFWS partnered with TNC and the Conserve Wildlife Foundation of New Jersey to restore some vernal pools in New Jersey at TNC's Hand's Landing Preserve in Cape May for the Eastern Tiger Salamander (*Ambystoma tigrinum*). The vernal pools had become so shallow that the salamanders were no longer able to complete their life cycle prior to drying of the pools. This species is state endangered in New Jersey.

At a larger scale, ARC has created the "17 by 17 Campaign," an ambitious endeavor to restore or create 17 wetlands across North America by 2017! They have made substantial progress toward their goal, but anticipate a total cost of \$153,000 and need more funds to continue their work. Please visit www.amphibianreptileconservancy.org for more information on this campaign, including how to donate to the project.

Of course, the projects described in this month's issue reflect only a very small portion of the varied and useful work being done on federal and state lands in the United States. Many dedicated people are working creatively with tight budgets and multiple responsibilities to implement the best conservation practices for salamanders and other wetland-associated species. We offer many thanks to all who contributed their time and energy to share the very important work they are doing!

Restoring Habitat for the Frosted Flatwoods Salamander

By Jana Mott, *The Nature Conservancy*

The southeast coastal plain, stretching from Virginia to northern Florida, was once dominated by over 90 million acres of majestic longleaf pine forests, shaped by frequent fire into an open vista with a highly diverse herbaceous understory. Within this landscape were swamps and wetlands of all sizes and shapes, including isolated, ephemeral wetlands.

Ambystoma cingulatum, the Frosted Flatwoods Salamander, is an inhabitant of the region's mesic flatwoods and is an isolated wetlands obligate breeder. Today, less than 3% of those vast longleaf forests remain, and the US Fish and Wildlife Service estimates that flatwoods salamanders have lost over 80% of their historical habitat. Much of what remains is fragmented and degraded. While the decline of



A beautiful adult Frosted Flatwoods Salamander; photo by Pierson Hill.



A. cingulatum larva; photo by Pierson Hill.

longleaf pine forests is being vigorously addressed by conservationists, few of these initiatives focus on the importance of isolated wetlands or the significant amount of herpetofaunal diversity and biological production they afford the entire ecosystem. A listed species can often serve as an "umbrella species", providing a platform for improving and protecting habitat for myriad other species with similar requirements. *A. cingulatum*, first listed as Federally threatened in 1999 after researchers documented an alarming decline in its range, serves this role in the isolated wetlands of the mesic longleaf pine forests.

One of the largest remaining strongholds of this species occurs on the Apalachicola National Forest (ANF), just west of Tallahassee, Florida. Roughly 40% of remaining known populations and 66% of U.S. Fish and Wildlife Service Designated Critical Habitat for *A. cingulatum* occurs on ANF.

After the original listing in 1999, managers on ANF realized they needed a pro-active approach to protecting this species. They approached The Nature Conservancy (TNC) to help provide the specialized expertise needed. In 2001, TNC hired a cooperatively shared wildlife biologist to locate previously undocumented *A. cingulatum* populations and to assist in determining potential habitat. From 2002 to 2005, nine new populations were discovered on ANF.

Now, ANF and TNC are focusing their efforts on restoration. Initial activity has been concentrated on reducing hardwood encroachment in the breeding wetlands and surrounding ecotones. Like the uplands around them, these isolated wetlands were historically shaped by fire to provide an open overstory and grassy, emergent vegetation in the wetland. These micro-habitat characteristics are critically important to the breeding success of many species, including *A. cingulatum*, and decades of fire suppression during the early and mid-20th century has led to fast-growing hardwood species taking over the wetlands and ecotones. Although ANF now has a robust prescribed fire program, these hardwoods have proven difficult to control with normal fire operations. Instead, managers are turning to mechanical means to “set back” the wetlands to a point from which good fire management in the future can maintain the open structure.



A. cingulatum pond before hardwood removal, July 2011; photo by Jana Mott.



The same pond after hardwood removal, July 2013; photo by Jana Mott.

To accomplish this work, the Florida Fish and Wildlife Conservation Commission (FWC) became a third partner in habitat restoration on the National Forest. The FWC's Aquatic Habitat Restoration and Enhancement program has provided funding for four separate rounds of mechanical treatment on the forest. Using this funding, TNC staff coordinated hardwood removal on 35 sites. To minimize impacts on the sensitive soils in the area, all of the work is completed by hand. Small- to medium-sized shrubs are cleared with chainsaws and brush cutters and hauled into the uplands away from the basin. The stumps are then treated with aquatically labelled herbicide to reduce the chances of re-growth, giving ANF fire managers an opportunity to use prescribed burns to maintain the wetlands.

In most cases, the results have been remarkable, with desirable herbaceous species making a visible comeback. As the restoration progresses, the goal is to see an increase in *A. cingulatum* and other amphibians using these ponds.



Do you hear the Sirens calling?

Learn more about these ancient and fascinating creatures, members of this month's Featured Family, Sirenidae, on p. 17. Left: Northern Dwarf Siren, *Pseudobranchius striatus*. Right: Lesser Siren, *Siren intermedia*. Photos by Kevin Stohlgren.



“Fixing a Forest” for Salamander Habitat

By - Anne Bradley, *The Nature Conservancy, New Mexico Field Office*; Michelle Christman, *U.S. Fish and Wildlife Service*; Will Amy, *U.S. Forest Service, Santa Fe National Forest*; Mark Watson, *New Mexico Department of Game and Fish*; Cindy Ramotnik, *Museum of Southwestern Biology, University of New Mexico*; Robert Parmenter, *Valles Caldera National Preserve (USDA)*



JMS habitat severely altered by wildfire.
(Photo: Craig Allen)

Freed from natural fires for more than a century by overgrazing (fine fuel removal) and direct fire suppression by fire-fighters, forests in New Mexico have steadily increased in tree density and biomass, creating potentially explosive fire conditions across millions of acres of public lands. Recent record-setting, landscape-sized fires, such as the 156,000-acre Las Conchas fire in 2011, and the 298,000-acre Whitewater-Baldy fire in 2012, have inflicted unusually severe fire damage to wildlife habitats in New Mexico. One potential victim of such fires is the Jemez Mountains Salamander (*Plethodon neomexicanus*), a species endemic to a single mountain range in northern New Mexico, and declared as Federally endangered just last year.

A terrestrial woodland species, the Jemez Mountains Salamander is a denizen of mixed-conifer montane forests, preferring cool, moist microhabitats beneath logs and rocks. Infrequently observed aboveground, and then only during the summer monsoon season of July-August, this secretive species has proven difficult to assess in terms of population size, distribution, and reproductive success. However, repeated surveys over 40 years have revealed a disturbing pattern of fewer and fewer observations.

In an effort to restore the salamander’s forest habitat before it is exposed to further high-severity wildfires, public land managers, Native American tribes, non-profit organizations, and forest industry groups have come together to fix the “out-of-whack” forest conditions in the Jemez Mountains of northern New Mexico. With funding from the USDA’s Collaborative Forest Landscape Restoration Program (CFLRP), extensive efforts have been underway since 2011 to mechanically thin the high-density stands of young trees, and reintroduce managed and natural fires to the landscape. Once the forest is thinned, these low-intensity fires work to remove fine fuels (grasses, twigs, and needles) from the forest floor, reducing the risk of high-severity, stand-replacement fires that negatively impact salamander habitat.



Burned forest with unburned edge in background, Valles Caldera National Preserve. (Photo: Bob Parmenter)



The Jemez Mountains Salamander, *Plethodon neomexicanus*, an endangered species endemic to the Jemez Mountains in northern New Mexico. This animal was observed during a training survey in 2013; it had been marked during a study in the mid-1990s (Photo: Mark Watson).



Subcutaneous marks on the 18-year-old salamander (Photo: Mark Watson).



A specially-trained search dog, "Frehley", snuffles through the underbrush and around logs and rocks, and finds an elusive Jemez Mountains Salamander. (Photo: Mark Watson).

In tandem with the CFLRP habitat restoration program, biologists are investigating new ways to monitor salamander populations and estimate their relative abundance. In addition to conducting more traditional and labor-intensive surveys of turning over natural cover objects by wildlife teams, they are also using "artificial cover objects" (easily searchable plywood planks that minimize degradation of natural cover) and a new experimental technique using specially-trained search dogs to find salamanders hidden within or beneath logs and rocks. The dogs are part of the Conservation Canines program sponsored by the University of Washington Conservation Biology Department, and scent either the live animals or their scat. Most dogs in the program are shelter rescues, giving a second chance to canines whose strong play drive makes them poor pets, but perfect candidates for focused searches for rare species.

Finally, suites of micro-meteorological instruments are being deployed to continuously monitor soil temperatures and moisture levels at different depths and distances from logs and rocks in critical habitat microsites during forest restoration (thinning and prescribed burning). Concomitantly, forest-floor invertebrates (ants, beetles, etc.) which constitute the salamander's diet, will be monitored at the instrumented sites. Along

with the salamander survey efforts, these micro-climate and prey species data will allow conservation scientists to assess restoration actions on microhabitat occupancy by salamanders, and adjust restoration methods to optimize long-term survival and, hopefully, accelerate population recovery.

The Jemez Mountains Salamander is so elusive and threats to its habitat so severe, its conservation requires a strong collaborative effort. Conservation partners continue to experiment with new tools and protocols to gather important information that can then be integrated into the ongoing forest restoration efforts.



Mixed conifer burned forest, Valles Caldera National Preserve. (Photo: Bob Parmenter)

Salamanders Count on U.S. Navy Lands

By Paul Block and Chris Petersen, Naval Facilities Engineering Command Atlantic; and Rob Lovich, Naval Facilities Engineering Command Southwest

What, when, where, and how many are all important questions that require answers and are essential for effective management and conservation of natural resources. The U.S. Navy (Navy) is attempting to answer these questions on Navy lands by developing baseline data for use in each installation's Integrated Natural Resource Management Plan (INRMP). This baseline data set is the foundation for the Plan's management and stewardship role on Navy lands in support of the military mission. Recently, a study was undertaken to fill in baseline data gaps for reptiles and amphibians by answering the "what," or in other words, what species are confirmed present or considered potential at Navy installations.

Ensatina (*Ensatina eschschlotzii*) female and her nest on Naval Magazine Indian Island, WA (Photo by Paul Block).





Rough-skinned Newt (*Taricha granulosa*) confirmed on Naval Magazine Indian Island, WA (Photo by Paul Block).

the United States. The data showed that there are a total of 265 confirmed species and an additional 101 potential species of herpetofauna on Navy lands.

Of this total herpetofauna list, salamanders comprised 68 of the species on Navy lands with 44 species confirmed and 24 species considered potential species. These species include four Federally listed species, seven state-listed species, and nine at-risk species (NatureServe status G1-G3). The Federally listed species include the Reticulated Flatwoods Salamander (*Ambystoma bishopi*), Frosted Flatwoods Salamander (*A. cingulatum*), California Tiger Salamander (*A. californiense*), and Striped Newt (*Notophthalmus perstriatus*). The regional ranking from greatest to fewest confirmed and potential salamander species is as follows: Southeast (32), Mid-Atlantic (31), Midwest (20), Washington (16), Southwest (13), and Northwest (8). The top two Navy Installations for confirmed species are NSA Crane (11) near Bloomington, Indiana, and MCB Camp Lejeune (10) in Jacksonville, North Carolina. Salamander species found on Navy lands are typical of those that inhabit coastal plain environments, generally where Navy installations are located.



Mabee's Salamander (*Ambystoma mabeei*) confirmed on Naval Weapons Station, Yorktown, VA (Photo by Chris Petersen).

This study updated and analyzed reptile and amphibian data from 54 major Navy installations within six Navy regions (Mid-Atlantic, Washington, Southeast, Midwest, Northwest, and Southwest) covering the continental United States, with the objective being to tally confirmed and potential herpetofauna species located on Navy lands. The area of Navy land covered in this analysis was 1,787,215 acres. Each Navy region was looked at individually and then in comparison with the other regions across the United States.

Herpetofauna species confirmed or potential at each Navy installation varied greatly among the naval regions and generally followed patterns of species diversity found regionally within



Four-toed Salamander (*Hemidactylium scutatum*) confirmed on seven Navy installations (Photo by Josh Campbell).

By integrating this baseline data into each installation's INRMP, salamanders can be more effectively managed and conserved on Navy lands. By knowing "what" salamanders are present at an installation, natural resource managers can monitor diversity and protect essential habitats. This also allows managers to develop future installation projects and partnerships to answer other important question such as: Where are the important salamander habitats? When do salamanders cross this road? How many egg masses are located in each vernal pool? These are great tools to have in your tool box to manage and conserve this important and unique taxonomic group. For a copy of the Navy report, please contact either Paul Block (paul.block@navy.mil), Chris Petersen (chris.petersen@navy.mil), or Rob Lovich (rob.lovich@navy.mil).

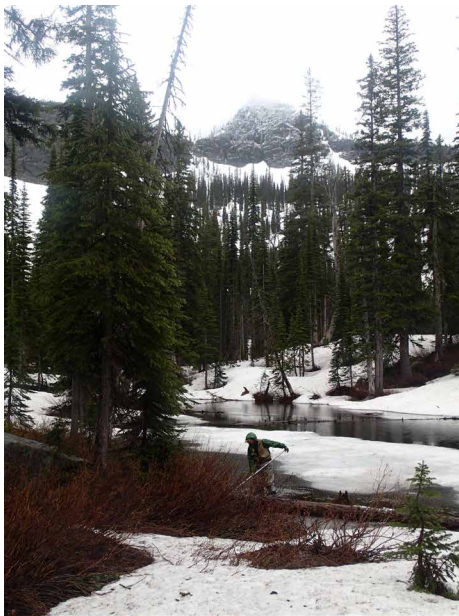
facebook

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



Multi-species Baseline Initiative

The 90-degree valley temperatures seemed a world away as Wildlife Diversity Technician Adam Feust and I waded through chest-deep ice water at a salamander breeding pond in Idaho's Selkirk Mountains this June. We couldn't feel our legs or hands by the time we filled out our data sheet but that was okay; we had made it to the pond before the salamanders! This was one of seven amphibian breeding ponds we were surveying every 21 days this season to assess detection rates of amphibians across a study area that will ultimately include a total of 800 ponds. All of these sites will be surveyed between 2013 and 2014 as part of the Multi-species Baseline Initiative (MBI).



IDFG Wildlife Technician Adam Feust conducts an early-season amphibian survey. (Photo: Michael Lucid)

surveys to collect air temperature, relative humidity, and water temperature data.

Eastern Tiger Salamanders (*Ambystoma tigrinum*) are the only pond-breeding salamander that is in our "top 20 list," and we haven't yet found this species at the time this article went to press. If we were to find them



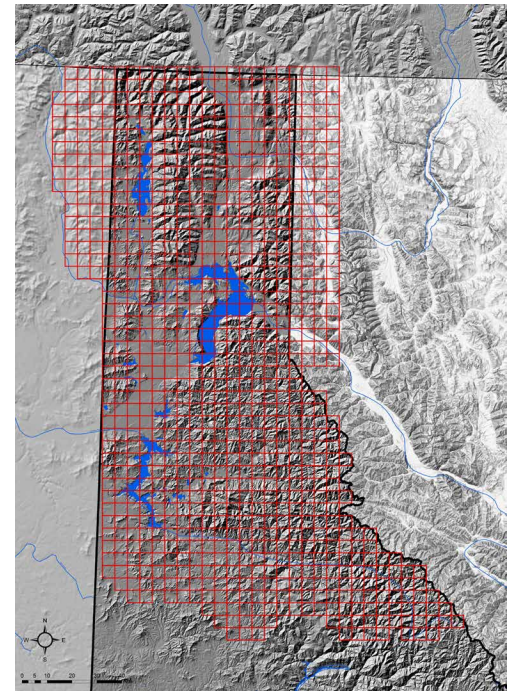
Long-toed Salamander and Western Toad (*Anaxyrus macrodactylum*) larvae. (Photo: Michael Lucid)

MBI is a collaborative of over 15 organizations conducting wildlife and micro-climate surveys across the Idaho Panhandle and adjoining mountain ranges. Our goal is to collect baseline data on 20 Species of Greatest Conservation Need (SGCN) which are listed as "lacking essential information" in Idaho and Washington's State Wildlife Action Plans (SWAP). The range and distribution data we collect on terrestrial gastropods, forest carnivores, and pond-breeding amphibians will help determine if these SGCN are really as rare as we think and, if so, will help to develop more specific conservation actions. We are also co-locating micro-climate data loggers with our wildlife

we would implement the Washington SWAP recommended conservation action, which is to

determine if the colony is native or introduced. The really cool thing about MBI is that we're looking beyond just our funded study species. Although tiger salamanders paid for us to get to the site, we set up our survey technique to collect data on other species, such as Western Painted Turtles, pikas, and noxious weeds. This allows us to develop a landscape-level data set on a wide range of species, including our common pond-breeding Long-toed Salamander (*Ambystoma*

By Michael Lucid - Regional Wildlife Diversity Biologist, Idaho Department of Fish and Game



Multi-species Baseline Initiative study area. We have conducted a wildlife and micro-climate survey in each of the 5x5km² survey cells. We conducted amphibian surveys in each Idaho and Washington cell where we could find a pond.



PVC pipe protects under-water data logger, which collects temperature data every 90 minutes. (Photo: Michael Lucid)

Collecting a large baseline data set on Long-toed Salamander distribution, along with micro-climate data, will allow us to develop models which will help predict if this species is likely to stay common as climate change occurs. Our long-term plan is to reduce our number of survey sites, increase the number of species we survey for, and use our partnerships to morph the baseline MBI survey into a long-term regional biodiversity monitoring program.

The next time Adam and I visited that icy pond in the Selkirk's the Long-toed Salamanders had arrived en masse, and the MBI collaborative hopes to help keep it that way.

Find out more about MBI at <https://fishandgame.idaho.gov/baseline> or find us on Facebook.



Long-toed Salamander. (Photo: Michael Lucid)

Watch Where You Step! By Betsy Howell

As early as the middle of the last century, it was reported in the scientific literature that plethodontid salamanders, in terms of numbers of individuals, dominated the terrestrial environment. Some decades later, in the mid-1970s, scientists working in the Hubbard Brook Experimental Forest of New Hampshire estimated both density and biomass of these animals, and found a density of 2,950 salamanders/ha (combination of five different species) and a biomass of 1770 g/ha. To put this in perspective, a hectare is a bit larger than a football field, and the total biomass of these salamanders was more than 2½ times that of all birds during the peak breeding season and equal to that of small mammals. In other words, there were a lot of salamanders in the woods! This fact alone is fascinating, but the natural follow-up question is what kind of effect do these species have on their environment? For the past eight years, Michael Best has been working on this question with Hartwell Welsh of the U.S. Forest Service Pacific Southwest Research Station, and their research was recently published in *Ecosphere* (February 2014).



A salamander housing unit set up on the ground behind Michael; photo by Jada Howarth.

The focus of Best's study has been the *Ensatina* (*Ensatina escholtzii*), a woodland salamander with an extensive range. Seven morphologically distinct subspecies of *Ensatina* occur from Baja California, Mexico, north to the central coast of British Columbia, Canada. Best studied the *Ensatina* in the King Range of northern California, where mixed hardwood and conifer forests dominate the landscape and the leaves of deciduous trees accumulate every year in great quantities. Best wanted to know what impact, if any, *Ensatina*s, which are terrific predators, were having on the invertebrate community. Additionally, since invertebrates consume leaf litter and leaf litter stores carbon, he also hoped to better understand the relationship between *Ensatina*s, invertebrates, and carbon retention in the forest.

After constructing several "salamander housing units," Best populated some of these units with one salamander and removed all of the animals in the others. Given that terrestrial salamanders can stay underground for long periods of time, he also had to remove some immigrants, including baby *Ensatina*s and



Michael Best and three *Ensatina* salamanders; photo by Jada Howarth.

California Slender Salamanders (*Batrachoseps attenuatus*), which had popped up into the plots part way through the study (these individuals were simply walked over to another part of the forest). Next, Best measured exactly three grams of forest leaf litter and placed this quantity into each plot. Since dry leaf litter is 50% carbon by weight, the amount of leaf litter remaining in the plots would reflect changes in carbon storage in areas with and without salamanders.

Best found, perhaps not surprisingly, that *Ensatina* salamanders have tremendous effects on their environment. Plots with salamanders showed a lower amount of certain types of invertebrates, thus giving rise to a greater amount of leaf litter retained that was working to store carbon. Conversely, plots without salamanders had far more invertebrates and much less leaf litter. This consumption of litter essentially results in more carbon being released into the atmosphere.

The implications of these findings from Michael Best's work are huge, showing that a small species like the *Ensatina*, along with other woodland salamanders, has a great and important role to play in ecosystem management.

*An in-depth article on Michael Best and his research on the *Ensatina* will appear in the October issue of **American Forests** (www.americanforests.org).*



Recording the weight of an *Ensatina* individual; photo by Jada Howarth.

Forest Service Funds PARC Projects

*By Betsy Howell,
U.S. Forest Service*



Above: Bullfrog eradication outing, Drew Lake, Umpqua National Forest, Oregon. Below: Bullfrog tadpole. Photos: Andre Silva, USFS.



The U.S. Forest Service (USFS) and PARC have worked in partnership for a number of years, collaborating on the PARC annual regional meetings, inventory and monitoring trainings, law enforcement workshops, and numerous publications, including the habitat management guidelines for each PARC region. Additionally, this year, the USFS had \$65,000 available to spend on PARC products, specifically wetlands restoration projects and law enforcement training. Each of the USFS regions solicited proposals from district and forest biologists for work that would benefit both amphibians and reptiles. Ideally, each project would not request more than \$10,000, so that the money could then be distributed to a few different projects and would serve more to complement other funds already obtained. In this way, seven projects were funded in six different National Forests: Coronado and Kaibab (both in Arizona); Eldorado (California); Medicine Bow-Routt (Colorado and Wyoming); and the Umpqua and Willowa-Whitman (both in Oregon).

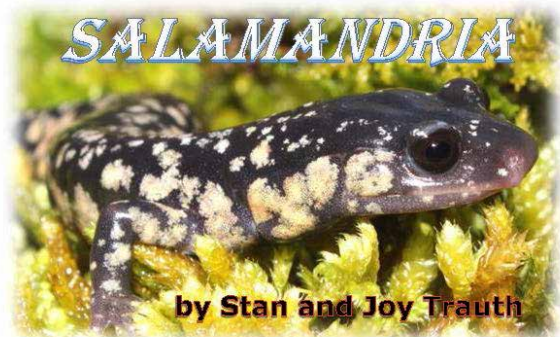
On the Coronado National Forest, funding went to a 2-3 day workshop to train law enforcement personnel on the natural history of native reptiles and amphibians, as well as the laws and regulations governing legal and illegal trade and scientific research, methods used to search for and collect reptiles and amphibians, and what to do with animals caught by poachers. The borderlands of the southwest United States

have the highest diversity of snakes and lizards in the nation, and some of these species are highly sought after by nature enthusiasts, as well as poachers. The remainder of the available funds went to wetlands restoration efforts, including one on the Kaibab that will restore habitat for the Chiricahua Leopard Frog (*Lithobates chiricahuensis*), a Federally threatened species. Tom Biebighauser, a wetlands restoration specialist with the Center for Wetlands and Stream Restoration, will oversee this work at Duck Lake, where a natural ephemeral pond was drained as part of an earlier waterfowl habitat improvement project.

Farther north, in Colorado and Wyoming, two wetland restoration projects were funded on the Medicine Bow-Routt National Forests. In Colorado, native plant materials will be grown in anticipation of the removal of road fill and a culvert from a high-elevation wetland; this work will benefit two Forest Service sensitive species, the Northern Leopard Frog (*Lithobates pipiens*) and the Boreal Toad (*Anaxyrus boreas boreas*). On the Laramie Ranger District in Wyoming, the restoration effort will focus on addressing illegal off-highway vehicle use that has resulted in significant degradation of a wetland complex. In California, Tom Biebighauser will again be contracted to restore riparian zones on the Georgetown Ranger District. This area is adjacent an area of private land where a healthy population of California Red-legged Frogs (*Rana draytonii*), a Federally threatened species, exists. Finally, in Oregon, Western Pond Turtle (*Actinemys marmorata*), a regionally sensitive species and U.S. Fish & Wildlife Species of Concern, is the focus for habitat restoration on the Umpqua National Forest at a wetland complex called Drew Lake. This work will consist of removal of invasive Bullfrogs (*Lithobates catesbeianus*), hand and mechanical removal of brush and blackberries, and the creation of multiple basking log platforms. At the Lick Creek Aquatic Restoration Project on the Wallowa-Whitman National Forest, a dispersed campsite and ford will be closed, and riparian vegetation will be planted along the stream. This work will benefit Rocky Mountain Tailed Frogs (*Ascaphus montanus*) and Columbia Spotted Frogs (*Rana luteiventris*), both sensitive species in Oregon.



Bullhead Catfish (non-native fish) also removed from lake.
Photo: Andre Silva.



SALAMANDRIA
A NATURE ADVENTURE NOVEL
-IN PRESS- LOOK FOR IT IN EARLY
2015.

Mockingbird Lane Press
www.mockingbirdlanepress.com
Sneak preview @ www.salamandria.org

Follow Stan on Twitter @StanTrauth
Get down to earth with salamanders!

Salamandria

The earth rumbled from yet another aftershock. Eleven nervous salamanders huddled together around a black drain hole in the floor of their miserable prison. Their tails swished. They rocked forward and squinted into the musty darkness. They had longed dreamed of fleeing their wretched confinement, but could they survive on the Outside. Could they find new homes or would predators and humans end their dreams?



An Interview with J.D. Kleopfer



J.D. Kleopfer and a Two-toed Amphiuma (*Amphiuma means*). Photo: J.D. Kleopfer.

J.D. Kleopfer has been the state herpetologist with the Virginia Department of Game and Inland Fisheries for the past ten years. Before that he worked for the U.S. Fish & Wildlife Service in Colorado and before that he was the Curator of Herpetology at the Virginia Living Museum. J.D.'s work now involves everything to do with herps in the state of Virginia, including reviewing permits for research on amphibians and reptiles, working on prescribed fire projects, assisting law enforcement where the well-being of herps is involved, surveying for species and involving private landowners, non-profit organizations, and state and federal agencies in such work, and writing regulations for state listed species and collection guidelines. Given Virginia's location on the range boundaries of many northern and southern species of amphibians and reptiles, J.D. has been involved with both SE and NE PARC, and was the co-chair of NE PARC from 2008-2009.

1. How did you become interested in herps?

Just like any other herpetologist, I started out catching turtles, frogs, and snakes as a kid and bringing them home, much to the anxiety of my mother. Never did tell her about the ones that escaped. At the age of 12, I began volunteering at a local nature center where I assisted with the husbandry of the reptile and amphibian collection. Another major influence during my early years was the television show *Mutual of Omaha's Wild Kingdom* with host Marlin Perkins. But it was seeing his co-host Jim Fowler jumping out of a helicopter to capture an anaconda (or some other giant snake) that really put the spark in me. He was the original Crocodile Hunter.

2. Describe your work, past and present, with salamanders.

Over the past 10 years I have been involved with several salamander contracts funded through State Wildlife Grants. These projects include occupancy modeling and factors effecting the federally endangered Shenandoah Salamander, habitat modeling and status of salamanders in the Mount Rodgers Natural Area, multi-scale assessment of Hellbender populations, and comprehensive mapping of Hellbenders using eDNA analysis. In addition to contracted projects, there have been other smaller projects associated with graduate students and citizen biologists.

3. What do you think is the most amazing thing about salamanders? What's your favorite part about working with salamanders? Best salamander story(s)?

I am always amazed at the diversity of colors, patterns, and unique adaptations to their habitats. The abundance of some species is also amazing. In some areas, there may be thousands of red-back salamanders in just one acre. This really makes you wonder about the significance of their role in ecosystem function. The evolution of some of them is as equally intriguing. For example, the closest relative to the Hellbender lives on the other side of the planet in Japan and China.

The best salamander story I have occurred while I was working for the Virginia Living Museum as the Curator of Herpetology in the early 1990s. A woman brought into the museum a large brown salamander in a cup. It was Christmas time and the salamander had fallen out of the Christmas tree while they were setting it up. Based on its appearance, I knew the salamander wasn't from Virginia, so I called the store where she bought the tree to find out where their trees came from. After finding out they received their trees from Oregon, I was



J.D. and a Hellbender (*Cryptobranchus alleganiensis*). Photo: Rex Springston.

able to identify the “hitch-hiker” as a Northwestern Salamander (*Ambystoma gracile*). The local news pick-up the story and so did the Associated Press (http://articles.dailypress.com/1999-12-01/news/9912010078_1_oregon-zoo-amphibians-noble-fir-tree). This article indicated we were going to send the salamander FedEx, but the press coverage assisted us in actually getting Northwest Airlines (no longer in service) to transport it back to Oregon to be put on exhibit at the Oregon Zoo. The salamander didn't just fly First Class; it flew in the cock-pit alongside the pilot.

4. How can biologists get average people, including adults and children, interested in salamanders?

We can do all the research in the world on salamanders, but if we don't have public outreach and support for their cause, we are going to have a long and difficult battle for their conservation. This can be done via citizen biologist programs, educational information, and classroom outreach to engage students. When it comes to the conservation of salamanders, we have come a long way in the past 20 years. Just think about it, 20 years ago hardly anyone paid much attention to reptile and amphibian conservation. Only sea turtles and few other species of herpetofauna received any attention. But with the emergence of chytrid fungus and other environmental issues associated with amphibians, we have paid much more attention to these critters and their role as environmental indicators.

5. What do you believe are the greatest threats to salamanders?

Climate change is by far the greatest threat to salamanders. Virginia is home to 55 species of salamander, including 3 endemics and several range-restricted species. Because these species occupy “islands in the sky”, there is no opportunity for them to emigrate into new habitats. Other significant threats include habitat fragmentation, water quality, and habitat loss. The housing boom of the late 90s and early 2000s saw a significant amount of habitat loss. Some counties and municipalities in Virginia lost nearly half of their hardwood forested areas in this short time period.

6. What is your favorite salamander species?

It's hard to pick just one and it's easy to pick one of the more attractive species such as Green or Yonahlossee Salamanders, or one that is as charismatic as a Hellbender. But for whatever reason, I find the Two-toed Amphiuma (*Amphiuma means*) to be especially interesting. It's hard not to be impressed with a three-foot long salamander. And when you tell folks there is a three-foot long salamander living in the swamp or ditch behind their house, their eyes always seem to get a little wider.



Two-toed Amphiuma. Photo: J.D. Kleopfer.

7. What can someone living in an urban environment do to help with salamander conservation?

Even someone living in the city can help directly or indirectly with salamander conservation. Some things are as simple as recycling. Other actions include making financial contributions to organizations such as The Nature Conservancy (which can acquire and protect significantly valuable natural areas), voicing your opinion to local political representatives to set aside “green space” within your community, or getting directly involved with a local conservation organization. Because local grass-root organizations are usually comprised of members of the local community, they are extremely effective at implementing local conservation actions. “Think Globally, Act Locally” isn't just a bumper sticker.

8. Based on what you've found with your work and research, what advice would you give to natural resource managers and policy makers regarding salamander conservation?

The only advice I would give to natural resources managers is to consider impacts to salamanders when planning and implementing projects. Maintaining suitable forested buffers around breeding sites and streams or other features in the landscape can be of significant value to salamanders. Consult with someone that is knowledgeable about salamander habitat and integrate their recommendations into your programs and projects. PARC has produced some excellent natural resource materials (i.e. Habitat Management Guidelines). Policy makers need to be made aware of the

value of salamanders in the function of ecosystems and as indicators of environmental quality. Most of these folks probably don't know much about salamanders other than that they are used as fish bait. Try to invite them out into the field to see these critters up close. Once they have held or seen these beautiful and amazing animals they will probably have an all new respect for them.

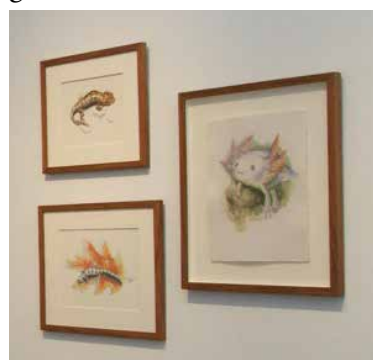
Art.Science.Gallery. Celebrates Salamanders

by Julia Collins (intern / science communicator, Art.Science.Gallery.)

We've been busy at Art.Science.Gallery. this summer! We kicked off the summer months by celebrating the Year of the Salamander here in Austin, Texas. Co-sponsored by PARC, the E.O. Wilson Biodiversity Foundation, Austin Watershed Protection and Treaty Oak Distilling Co., our group exhibition of salamander-inspired artworks featured 22 local and international artists. From the whimsical to the ecological, the pieces celebrated the diversity of salamanders. Some works, such as Tanya Chaly's "The Future Eaters" series, highlighted the peril some species of salamander face by examining the role of parasites and pathogens in the ecosystems. Victoria Harrell's thought-provoking "Red Salamanders", used fading color to convey a sense of loss if the species were to disappear. Other pieces simply displayed the stunning beauty of these awesome amphibians, like Lori Hollifield's gentle watercolor "Axolotl". The exhibition was on view from May 24 through June 21, 2014.



Dr. Hayley Gillespie presenting "Texas Salamander Extravaganza!". Photo: Julia Collins.



Lori Hollifield "Salamander on a Leaf", "Salamander on the Rocks", "Axolotl". Photo: Julia Collins.

Some fun events corresponded with the exhibition to help bring awareness to conservation issues surrounding these amazing amphibians. During the opening reception, a live Barton Springs Salamander from the City of Austin's captive breeding facility graced the gallery. And Dr. Hayley Gillespie (artist, salamander researcher and Art.Science.Gallery. founder) hosted "Texas Salamander Extravaganza", a free public lecture. Art.Science.Gallery. is an art gallery and science communication space dedicated to art-science fusion of all kinds. Located in Austin, Texas, it is one of the nation's first art galleries to feature exclusively science-related artworks. To see pictures of the "Year of the Salamander" exhibition and to learn more about future exhibitions at Art.Science.Gallery., visit

www.artsciencegallery.com or "like" the gallery on Facebook. To view remaining works available for purchase please visit <https://squareup.com/market/art-science-gallery>.



Julia Collins



A traveling exhibition of selected YOTS artwork will be migrating to the City of Austin's Beverly Sheffield Education Center at Barton Springs September 14 – October 19, 2014. This is especially exciting as Barton Springs is home to two endangered salamander species: *Eurycea sosorum* (Barton Springs Salamander) and *Eurycea waterlooensis* (Austin Blind Salamander). An opening reception will be held Sunday, September 14th 4-6pm.

Exterior of Art.Science.Gallery. featuring Erik Wyle "Wisconsin Salamander Key". Photo: Julia Collins.

Family of the Month: Sirenidae

The Greater Siren (*Siren lacertina*) is a member of one only four extant species in the most mysterious of the salamander families, Sirenidae. These aquatic neotenes are elongated, eel-shaped bodies with reduced forelimbs and no hindlimbs. Combined with a long, flat tail, the Greater Siren is built to be an excellent swimmer. Total body length can reach 3 feet (91 cm), which makes this salamander one of the largest in North America. They are called Sirens because of the clicking and yelping sounds they use to communicate and indicate danger. Sirens are the most ancient line of salamanders on the planet (fossils found from the Cretaceous period - more than 130 million years ago) but much about this species is still not known; including their mating habits which have never been observed. One of the possible reasons that this species has been around so long is the natural survival and adaptability techniques. One example of this is that if the pond a Siren is living in dries up, it can survive buried in the mud for extended periods of time, sometimes even years!



Juvenile (above) and adult (below) Greater Sirens. Photos by Kevin Stohlgren.



Family: Sirenidae

Also known as:	Sirens
Number of Species:	4 species in 2 genera, <i>Siren</i> and <i>Pseudobranchius</i>
Region / Habitat:	<ul style="list-style-type: none"> - found in the central and southeastern United States, in the Mississippi River drainage and on the coastal plain east of the Appalachians - disjunct populations in the lower Rio Grande Valley along the Texas/Mexico border - aquatic obligates of ponds, sloughs, and slow-moving rivers
Physical Characteristics:	<ul style="list-style-type: none"> - Elongated and eel-shaped, with a maximum body length of 37 inches (94 cm) - Two short forelimbs and a long flat tail, which helps to propel them through the water - Small, lidless eyes - Possess lungs as well as external gills, and mature as paedomorphs (retaining larval characteristics)
Behavior / Development	<ul style="list-style-type: none"> - they do not hibernate, remaining active as long as their pond stays full, even under ice - if the pond they are living in dries up, they can survive buried in the mud for extended periods of time - fertilization method is still unclear - eggs are attached individually or in small clumps to underwater vegetation
Fun Facts:	<p>Sirens are the most ancient line of salamanders on the planet (fossils found from the Cretaceous period - more than 130 million years ago)</p> <p>Sirens use sound to communicate with each other; clicking and yelping sounds signal whether the coast is clear or there is potential danger.</p>

Upcoming Meetings & Events

Stream & Marsh Exploration, September 13, 10 am, Sessions Woods Conservation Education Center, Burlington, CT. Hillary Clifton will introduce you to the creatures of the Sessions Woods streams and beaver marsh, including salamanders. Pre-register at 860-675-8130. See <link> for more info.

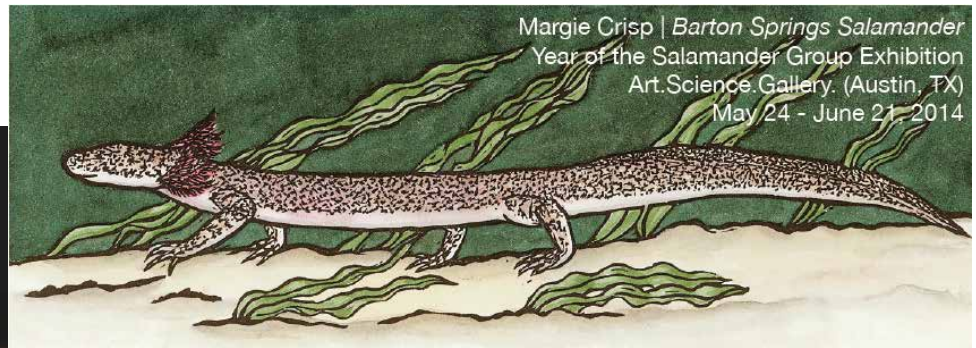
Great Smoky Mountains Salamander Ball, September 13, Knoxville Zoo, Knoxville, TN. More info at www.dlia.org/newsdlia-events

Sabino Canyon Lizard Walk, September 13, 8 am, Sabino Canyon Recreation Area, Tucson, AZ. Meet at the visitors' center.

Traveling Year of the Salamander Art Exhibit, September 14-October 19, City of Austin's Beverly Sheffield Education Center at Barton Springs, Austin, TX. Opening reception September 14, 6 pm.

The Wildlife Society annual meeting, October 25-30, Pittsburgh, PA. Includes PARC symposium "15 and Forward: Reflections on 15 Years of Successes, and the Future of Partners in Amphibian and Reptile Conservation"

Some examples from the Art. Science.Gallery. Year of the Salamander exhibition.



Margie Crisp | Barton Springs Salamander
Year of the Salamander Group Exhibition
Art.Science.Gallery. (Austin, TX)
May 24 - June 21, 2014

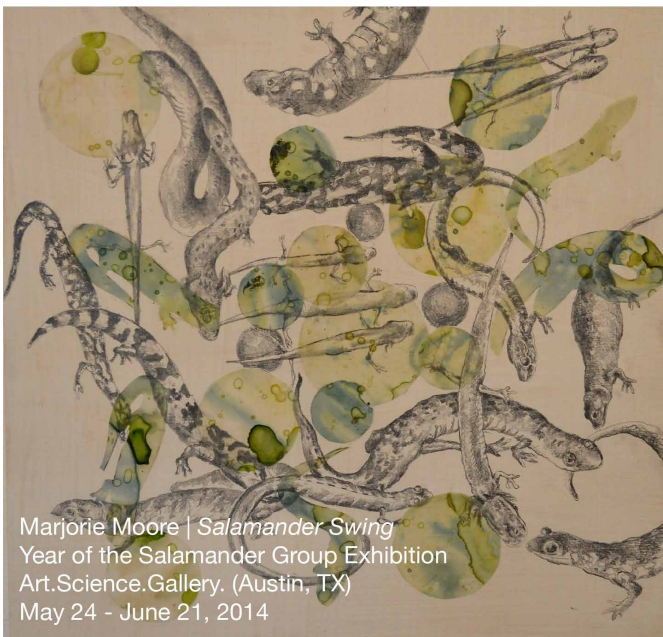


Kira McEntire | Diversity
Year of the Salamander Group Exhibition
Art.Science.Gallery. (Austin, TX)
May 24 - June 21, 2014

Selected works will be on display at Barton Springs, Austin, TX.



Victoria Harrell | Red
Year of the Salamander Group Exhibition
Art.Science.Gallery. (Austin, TX)
May 24 - June 21, 2014



Marjorie Moore | Salamander Swing
Year of the Salamander Group Exhibition
Art.Science.Gallery. (Austin, TX)
May 24 - June 21, 2014



Sergio Santos | Elemental
Year of the Salamander Group Exhibition
Art.Science.Gallery. (Austin, TX)
May 24 - June 21, 2014