

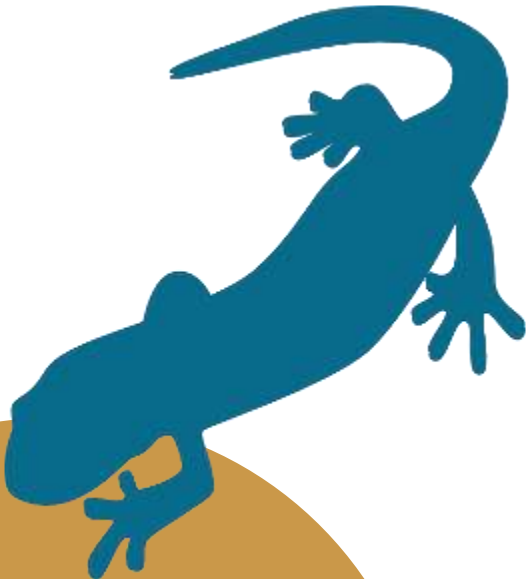


Secret Lives of Salamanders

Jamie Van, Woods and Water Director

Jamie@discoverycenter.net

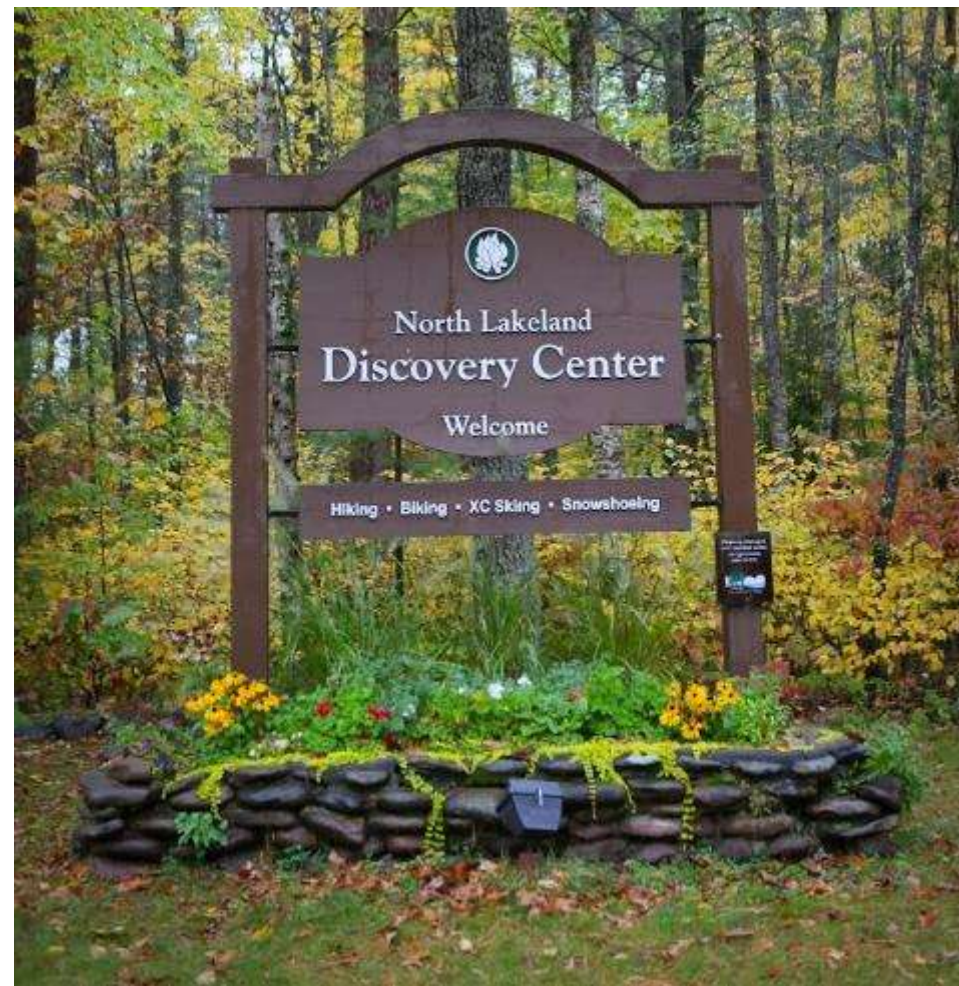
715-543-2085





OUR MISSION:

Enriching lives and inspiring an ethic of care for Wisconsin's Northwoods through the facilitation of connection among people, nature and community.





Thank you for supporting NLDC!

We are a non-profit, community-focused, environmental education center.

Our values include community, experience, lifelong learning, partnership, and sustainability.





About Us

- » **Trails:** Free to all, open dawn to dusk, free guided nature hikes
- » **Education Programs:** Kids, Family, Adult Enrichment
- » **Woods and Water Program:** Protecting our Northwoods through invasive species management, monitoring, and stewardship
- » **Facilities Rentals:** Conferences, retreats, youth groups, weddings



About Me

- » **Plant Enthusiast:** Restoration ecologist, aquatic biologist, life-long gardener
- » **Career of Field Work:** Salamanders, fisheries, river and lake systems, Asian carp, invasive species, erosion control and stabilization, land stewardship, green infrastructure, native landscaping
- » **Community of Life:** Integrating human-nature relationships, evolution of people with plants
- » **Mother:** Raising children to have an ethic of care of our natural world



- » All about salamanders
- » Amazing adaptations
- » Highlight Wisconsin salamanders
- » Why the Appalachians mountains are so diverse



Salamanders

Order: Caudata

- » Caudata includes salamanders and newts
- » 4 legs, and long laterally compressed tails
- » Moist, sensitive skin
 - **Bioindicators**
 - Need cool and moist habitats to survive
- » Nearly 600 species worldwide
- » 10 species across MN, MI, and WI
- » Most diversity in the eastern states
 - 7 out of 9 salamander families are found in the US
 - Cryptobranchidae, **Plethodontidae**, **Ambystomidae**, Amphimua, Sirenidae, **Salamandridae**, and **Proteidae**
 - 4 of these families are found in Wisconsin



Blue-spotted Salamander
(*Ambystoma laterale*)
Native to Wisconsin

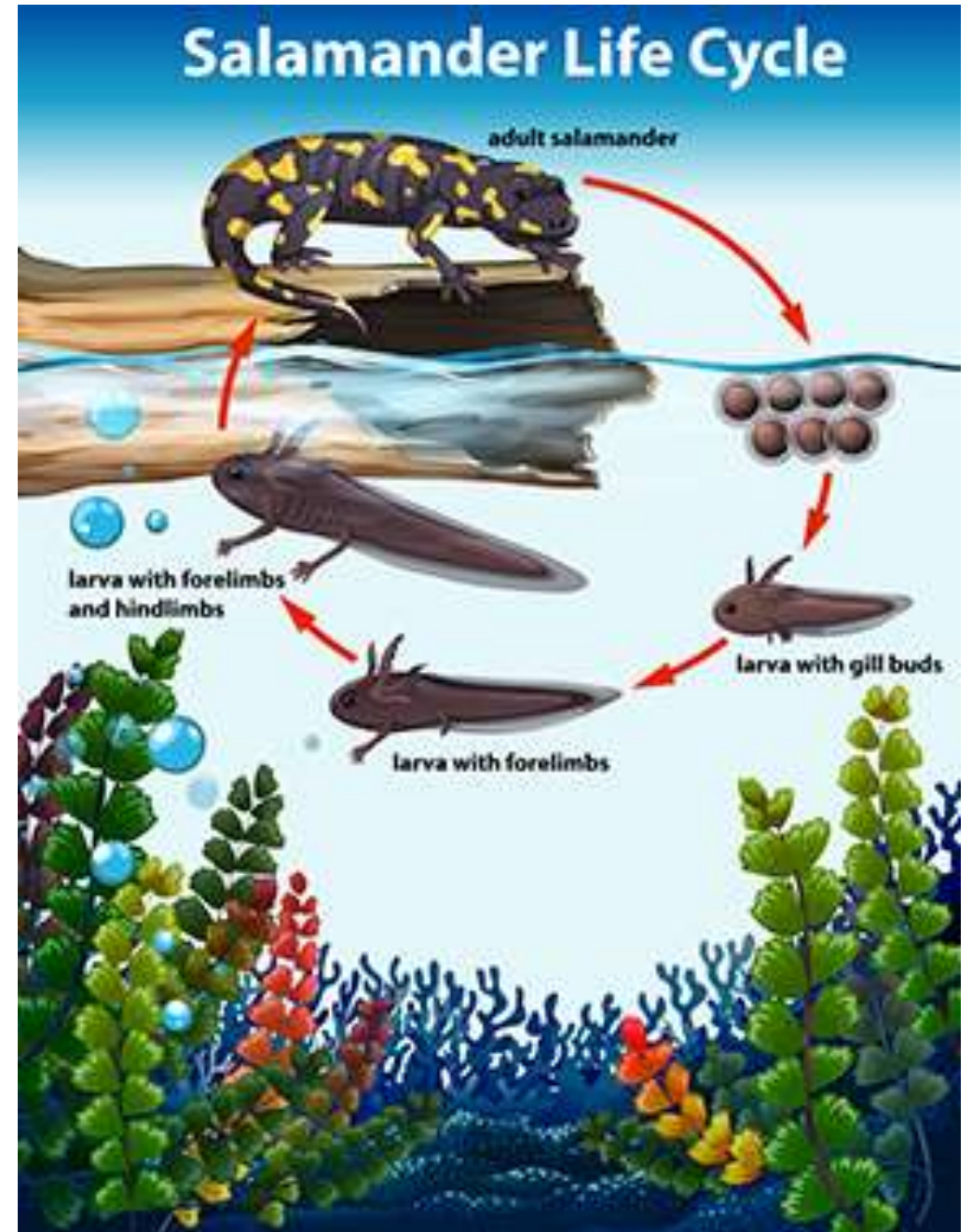
7 Species of Salamanders are found in Wisconsin

- » Blue-spotted Salamander (*Ambystoma laterale*)
- » Eastern Newt (*Notophthalmus viridescens*)
- » Eastern Red-backed Salamander (*Plethodon cinereus*)
- » Eastern Tiger Salamander (*Ambystoma tigrinum*)
- » Four-toed Salamander (*Hemidactylium scutatum*)
- » Mudpuppy (*Necturus maculosus*)
- » Spotted Salamander (*Ambystoma maculatum*)



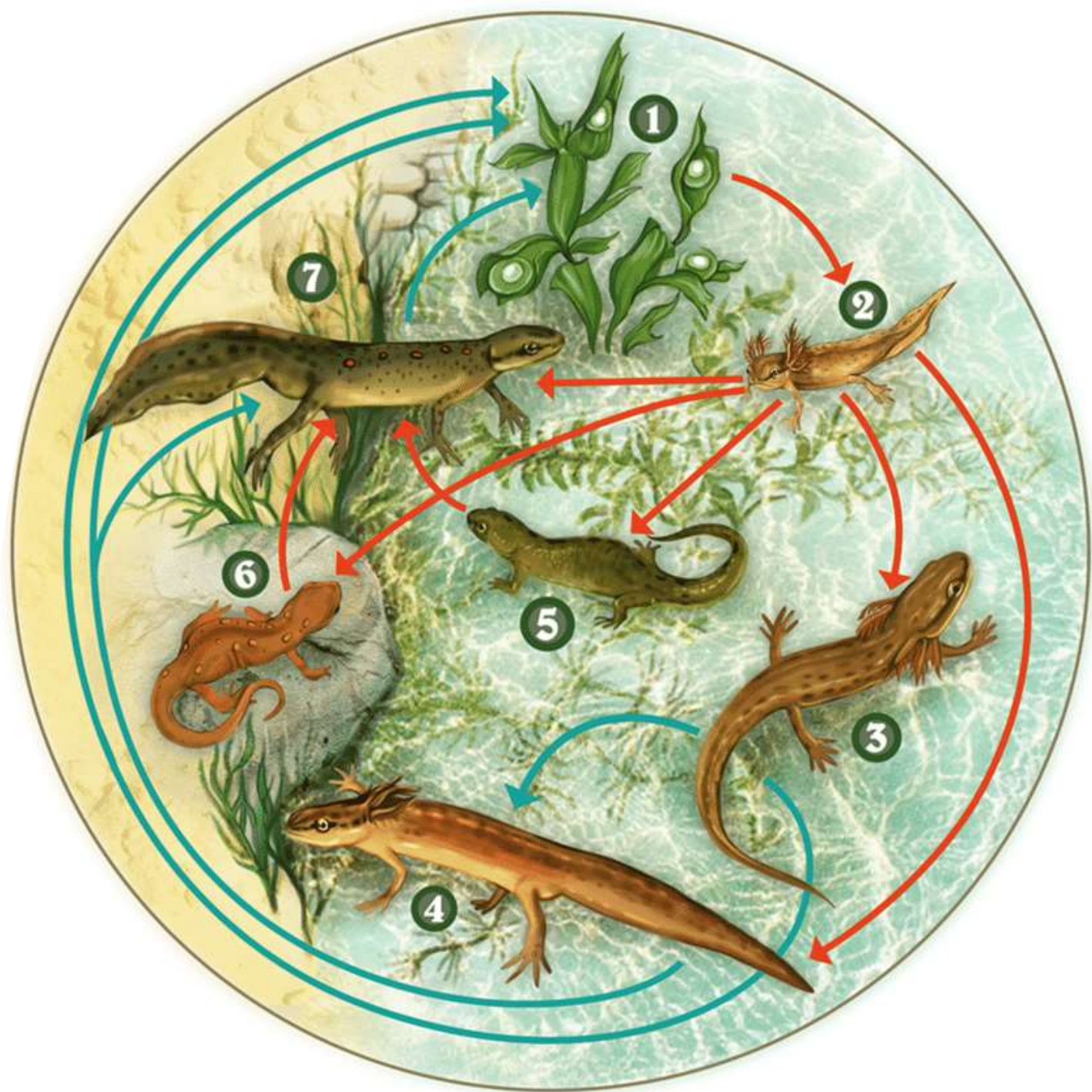
Reproduction

- » Vernal pools
- » Moist woodlands
- » Often the female stays to protect the eggs until hatch
- » Most species have a 2-part life cycle that includes larval and adult
 - Some species lack the larval stage and hatch looking like an adult



What the Eft???

Neoteny – the retention of juvenile features in the adult animal



How do Salamanders breathe?

» Gills

- Aquatic salamanders (Proteidae)
- Breathe through external gills
- 1 species in WI - Mudpuppy

» Skin

- Lungless Salamanders (Plethodontidae)
- Named because they do not have lungs
- Breathe exclusively through their skin
- 2 species in WI – both found in Northwoods
- **Four-toed Salamanders**
 - Lay eggs on moss overhanging a pond/stream
- **Red-backed Salamanders**
 - Exclusively terrestrial and does not lay eggs in water

» Lungs

- Mole Salamanders (Ambystomidae)
- Adults have fully developed lungs
- **Spotted Salamander, Blue Spotted Salamander, Eastern Tiger Salamander**



What do salamanders eat?

Crayfish, insects, worms, molluscs, tadpoles

Canibalistic

Salamanders will only feed between certain temperatures



Autotomy

- » Ability to drop their own tail as a defense mechanism
- » Most salamanders must be bitten off, or pulled off
- » Tail will grow back
- » Four-toed Salamander has a “pinch-me-here mark”, and can self-amputate their tail





Homing Behavior

- » Salamanders are territorial
- » Salamanders will move back to their home if they are displaced
- » One species of newt (*Taricha rivularis*) homes readily following extirpation of the eyes, but fails to home following severance of the olfactory nerves. However, homing is completed in some cases when the olfactory nerves have regenerated.

Threats to Salamanders

- Climate Change
 - Many rely on vernal pools for reproduction which are affected by droughts
 - More extreme temperatures affect niche climates of species that are only found in small geographical areas
- Habitat Destruction
 - Open a forest and it is drier, more arid, warmer, decrease connectivity between suitable habitat
- Current and Future Pathogens
 - Bsal – a fungus that whipped out fire salamanders in Europe

More than 50% of salamander species are imperiled



02/10/2010 21

Four-Toed Salamander

Status: Special Concern

- » Upland forests, migrate to fishless wetlands to deposit eggs in spring.
- » Only females migrate—having mated the previous fall
- » Females lay their eggs in specialized nests on land adjacent to wetland pools.
- » Larvae drop into the water where they develop until metamorphosis.
- » Specialized nesting habitat is the presence of sphagnum moss.
- » Typically, females construct crude cavities within moss mats where they deposit 20-50 eggs
- » Often, several females will share moss clumps, depositing up to 800 eggs in a single communal nest, which is then guarded by just one or two females.
 - A recent study by a group of scientists from James Madison University and California State University, found that females tending communal nests were more likely to have antifungal skin bacteria that inhibited the growth of a deadly embryo fungus. The presence of these skin bacteria correlated with higher embryonic survival and lower rates of catastrophic nest failure for communal nests compared to solitary nests.



Mud Puppy

- » Maintains its juvenile state and is fully aquatic
- » Opportunist feeds – generally mollusks, worms, and insects
- » Lives in cool, freshwater lakes and rivers in Wisconsin
 - Prefers rocky substrate
- » Breathes through its external gills
- » Largest salamander in Wisconsin



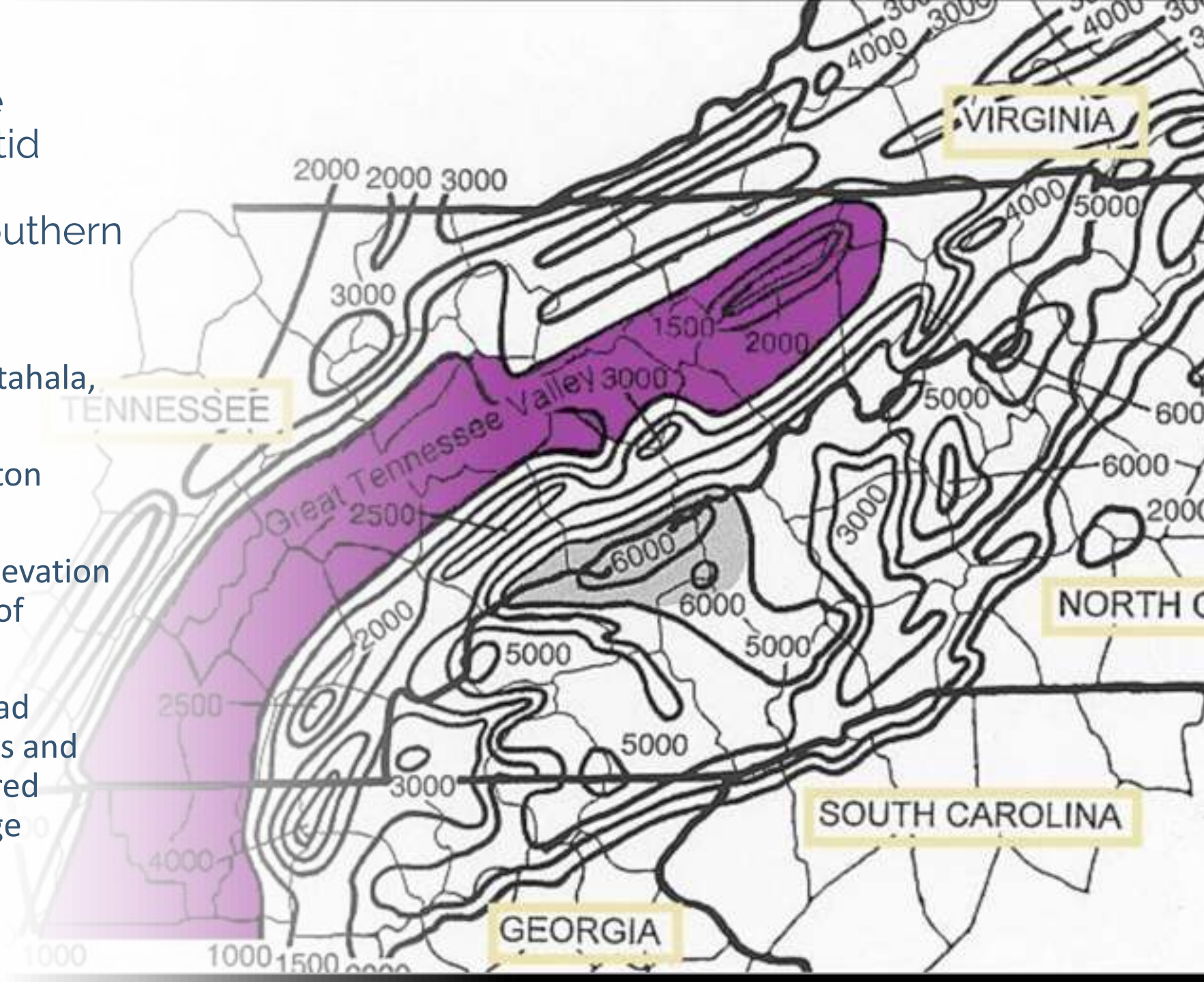
The Southern Appalachians have the highest biodiversity of salamanders than any other place in the world.



- » North Carolina has 65 identified species of salamanders
 - More than any other place in the *world!*

Recent elevational range expansions in plethodontid salamanders (Amphibia: Plethodontidae) in the southern Appalachian Mountains

- » I walked the Back, Balsam, Nantahala, Smokey, Jocassee Gorges
- » Retraced the transects of Hairston 1951
- » Identified highest and lowest elevation presence of difference species of salamanders
- » Generally the foothill species had lowered their elevational ranges and mountaintop species had lowered their minimum elevational range



Tagging Salamanders

» Use of Visual Implant Elastomer (VIE)

- Injected beneath skin
- Available in many colors
- Easily identifiable with a black light
- Can mark multiple patterns on hind area of limbs to identify specific individuals





Hellbender
(*Cryptobranchus
alleganiensis*)

- » Largest salamander in North America, 12-30 inches long
- » Has working lungs, but retains functional gill slits
- » Absorbs oxygen from the water through capillaries of its side frills
- » Suction feet
- » Most states list as a species of special concern or threatened





Secret Lives of Salamanders

Jamie Van, Woods and Water Director

Jamie@discoverycenter.net

715-543-2085

