

The Southern Appalachians: Salamanders Galore!

Posted by Dave Tabler | April 4, 2014

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



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

Salamanders are often the most abundant group of forest-floor vertebrates, and play significant ecological roles as predators on a variety of invertebrates, and also as prey for snakes, shrews, birds, and even each other. Salamander biomass in the southern Appalachians can exceed that of all other vertebrate predators combined, with densities as high as 2 salamanders per square meter!

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

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

The southern Appalachians are also very old, giving plenty of time for a variety of salamanders to emerge. During the Pleistocene (about 10,000 years ago), when glaciers covered much of North

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

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

Additional species may also arise if two previously isolated, but closely related, groups come back into contact and interbreed. At a few isolated locations in the southern Appalachians we find narrow “hybrid zones.” Hybrid salamanders possess genetic and physical traits of both species, but there is usually a gradient between the distributions of the two parent populations, usually associated with elevation.

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



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