



Green SALAMANDER

by Rob Criswell *photos by the author*

Folks enjoying the Keystone State's outdoor environs frequently encounter one or more of our many salamanders. Some are sighted in and along springs, streams and damp woods by anglers, hikers and explorers. Others are found crossing roads, sidewalks, lawns and parking lots in the darkness after a spring or early summer rain shower. A few, like Mudpuppies and Eastern Hellbenders, occasionally startle anglers when inadvertently caught on hook and line or exposed by rock-flipping bait collectors. But, one salamander lives in isolation so complete that it is only seen by those searching for it.

This amphibian hermit dwells in forested settings, where it is at ease in the dark and narrow interconnecting cracks of sandstone outcrops and giant boulders. It is primarily nocturnal, rarely showing itself during daylight hours. A homebody, it seldom ventures more than a few yards from its lair. When it does leave its subterranean sanctuary, it wears a camouflage outfit that makes it nearly indistinguishable from its surroundings.

Welcome to the world of the Green Salamander, a species so reclusive that it wasn't known in Pennsylvania until recently.

First detected in 1951, it was known only from a single colony adjacent to the West Virginia state line until the 1980s.

A glance at its life history, habits and habitat reveals why it is so easily overlooked. The crevices it utilizes for hiding and resting provide near-perfect protection—they are a mere $\frac{1}{4}$ to less than $\frac{3}{4}$ of an inch from floor to ceiling.

The Green Salamander is one of our most attractively-colored amphibians. It sports irregular bright green and/or yellowish-green blotches that contrast boldly with its brownish-black background. This pattern extends from the back and tail to the animal's sides and legs. Although this coloration may seem showy, it is really cryptic, mimicking the lichens that encrust its sandstone surroundings and irregularities in the surface of the rocks.

Pennsylvania's Green Salamanders average about 4½ inches in length, half of which is tail. Their bodies are dorsoventrally compressed. In other words, they're flattened, an obvious necessity for getting around in ¼-inch crevices. This gives the eyes a more prominent appearance, and coupled with their coloration makes for a Kermit the Frog-like head.

Since all crevices are not created horizontal, Green Salamanders have innovated with expanded, squarish pads on the tips of their four fingers and five toes. These pads, along with a nearly prehensile (capable of grasping) tail allow them to crawl sideways and even upside down, if necessary.

These rock dwellers emerge from hibernation in March and April. Most breeding occurs in May and June (but some may also occur in autumn). After a courtship that resembles an amphibian ring-around-the-rosy, the female "lays" 10 to 20 eggs by dangling them from the ceiling of a crevice by a thin cable. The eggs hatch in September, and the youngsters are miniature versions of the adults. Hibernation resumes by the beginning of November.

Green Salamanders will not adopt just any rock outcrop or boulder complex. They demand a rather precise microhabitat that includes moderately warm temperatures, shade and specific humidity requirements. Crevices will not be utilized if the sun penetrates them, and they must be moist but not wet. Ideally, they should be about 5 degrees cooler than the outside air during the summer. And, they must lead to chambers beyond the frost zone.

Obviously, these exacting requirements cannot be met just anywhere and contribute to the Green Salamander's scarcity in Pennsylvania. In addition, it is a more southern species that reaches the northern limit of its range in the southwestern part of the state, primarily in Fayette County.

Based on this very limited extent of suitable habitat and only a handful of known populations, and considering the threats and pressures facing them, the Pennsylvania Fish & Boat Commission (PFBC) listed the Green Salamander as a threatened species.

Some herpetologists believe that Green Salamanders were once much more common throughout their range from here to northern Alabama, Georgia and Mississippi than they are today. A few populations are found away from rock outcrops living under the bark of downed and standing dead timber. Such habitat was widely available in the extensive old growth forests of American Chestnut before its demise, and even if the salamanders didn't use it as primary habitat here, it is likely it at least served to



Green Salamanders have a flattened body, giving their eyes a more prominent appearance.

permit travel, and therefore the important exchange of genetic material, between isolated populations.

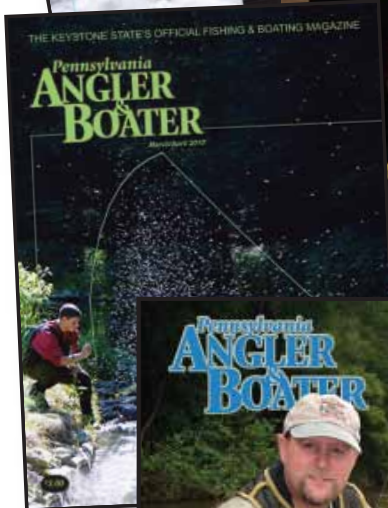
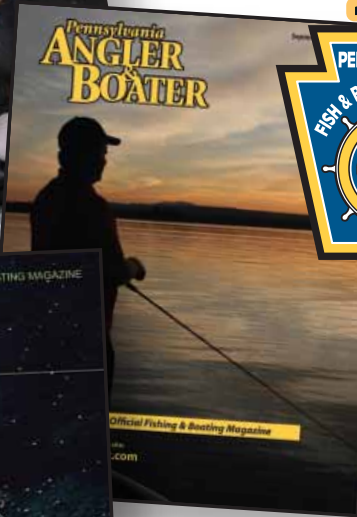
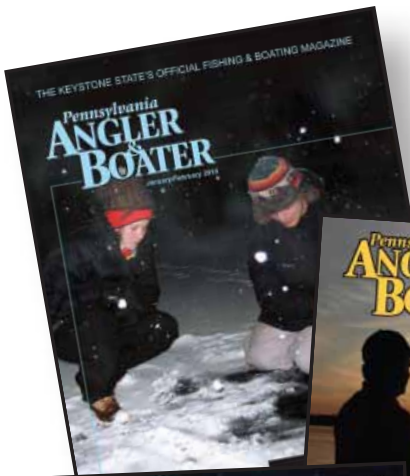
Charles Bier, the Western Pennsylvania Conservancy's Director of Conservation Science, began conducting surveys for Green Salamanders in the 1980s and has been monitoring populations he has discovered. He recently noted what may be potential declines at a few locations and is hoping these are just natural fluctuations. He cites the development of mines, pipelines and wind turbines as potential threats to several existing populations.

Chris Urban, Chief of PFBC's Natural Diversity Section, has similar concerns relating to the development and movement of fossil fuels. He notes that Green Salamanders live within the Marcellus and Utica shale gas region and the state's coal belt. Mines, well pads and pipelines all contribute to forest fragmentation. These activities may directly threaten the cliffs and outcrops and impede salamander movement and dispersal.

Another serious concern is timbering. Urban notes that Green Salamanders are basically forest interior species that rely on the shade of mature trees. Removal of this overstory changes the microclimate essential to their survival and may wipe out an entire colony.

Urban considers Pennsylvania's Green Salamander population to be relatively stable at present, and most colonies appear to be holding their own. Fortunately, a number of active sites are on protected public land—state game lands and state forests. He summarizes that "if we can keep these places where they live intact, I believe they can maintain into the future."

If we protect these critical monolithic outcrops and cliffs, and the forest surrounding them, and they can weather the uncertain specter of climate change, we may continue not to see our Green Salamanders well into the future. What reclusive salamander could ask for more? ☐



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