

What's Living in Your Cave?

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Photos by Matt Niemiller and Wil Orndorff*

When people think of life in caves, invariably three things come to mind: bats, bears, and snakes. Of these three, only bats are regularly encountered in Virginia caves, where they can occur as single individuals or in clusters of a thousand or more. Bears do not typically hibernate in caves in Virginia. Snakes are rare except near rocky, south-facing cave entrances or when accidentally washed into a cave by floodwaters.

Eight bat species use caves in Virginia during all or part of the year. Three of the most common of these eight species, the little brown bat (*Myotis lucifugus*), the tricolored bat (*Perimyotis subflavus*, shown at right), and the Northern bat (*Myotis septentrionalis*), have suffered over 95 percent declines in population since 2008 as a result of White-Nose Syndrome (WNS), a bat-specific fungal disease thought to have been introduced from abroad by human activity, resulting in one of the most aggressive wildlife epidemics in history. Other species have suffered as well, but to a lesser extent. Fortunately, we still see small numbers of even the most affected species in caves and on the landscape, and there is hope that their populations will recover, albeit slowly since most bat species only give birth to a single “pup” per year. More details on Virginia’s bats and WNS can be found online at:

www.dcr.virginia.gov/natural-heritage/karst-bats

www.dgif.virginia.gov/wildlife/bats/facts/

www.whitenosesyndrome.org.



A few other mammals are found in caves in Virginia, including Alleghany wood rats, raccoons, mice, coyotes, and occasionally bobcats. None of these species depend exclusively on caves, and are generally termed troglonexes or “cave guests.” Of these species, Alleghany wood rats (at left) are probably the most strongly associated with caves, establishing elaborate nesting areas and food storage caches that have led folks to refer to them as “pack rats.” Unfortunately, diseases carried by raccoons are deadly to wood rats, and their numbers have declined as a result.

Birds will commonly nest near cave entrances, and it’s hard to find a cave entrance in Virginia that doesn’t have an Eastern phoebe nest tucked in a nook on the wall or ceiling. While less common, barn owls will set up shop in rocky cave entrances, sometimes

decimating local bat populations.

Though snakes and other reptiles have little use for limestone caves, the same cannot be said of amphibians, especially salamanders. Slimy, spring, seal, dusky, long-tailed, and cave salamanders (at right) are all common in Virginia caves, and several other species may be encountered near cave entrances. However, salamander species known from Virginia are neither limited to caves nor particularly adapted for cave life. But since many will spend their whole life cycle (or most of it) within the cave, biologists refer to them as troglophiles or “cave lovers.” (This term could probably apply as well to several members of the Virginia Cave Board!)



Fish are commonly found in cave streams in Virginia, but only surface species that wash in from sinking streams or swim upstream from springheads. The closest populations of blind cave fish occur in central Tennessee and Kentucky.

When it comes to number of species (one way ecologists measure biodiversity), invertebrate species such as insects, millipedes, spiders, and crustaceans rule in the subterranean realm. Dozens of surface-dwelling species like cave crickets, red-headed flies, spiders, and daddy longlegs congregate near cave entrances, but the true biodiversity lies deeper within. A recent publication by former Virginia Cave Board members Dr. John Holsinger, Dave Hubbard, and Dr. Dave Culver; DCR staff Chris Hobson; and this author catalogs 121 cave-limited terrestrial and 47 cave-limited aquatic invertebrate species known from Virginia’s caves. Most of these species lack both

eyes and pigment, and have a variety of other adaptations for life in a dark environment with limited energy resources. Most of these species are known from a very small area and typically one or a handful of caves; the majority are known only from caves in Virginia. And the list does not even include several dozen species new to science that have yet to be assigned formal names! Some groups are particularly diverse. For example, 31 different described species, as well as several undescribed species, of cave-adapted beetle are known from Virginia caves.

Ironically, the most well-known cave adapted invertebrates—cave crayfishes—are not known from Virginia. Although crayfishes are common in Virginia cave streams, they are all surface-dwelling species that happen to also use caves. However, other cave-adapted crustaceans, especially amphipods (a.k.a. scuds, at right) and isopods (sow bugs, shown below) account for the majority of aquatic biodiversity among Virginia’s cave-limited animals.



A great place to learn more about the biodiversity of caves in the Appalachian region, including Virginia, is the website of the US Fish and Wildlife Service’s Appalachian Landscape Conservation Cooperative, which recently completed a study of cave and karst biodiversity region-wide. Visit <http://applcc.org/research/applcc-funded-projects> and click on “Classification and Mapping of Cave and Karst Resources.” Here, you will be able to learn more about spelean biodiversity through videos and reports that can be viewed or downloaded to your computer. This project was led by long-time Virginia Cave Board member, Dr. Dave Culver, and current Cave Board member, Dr. Dan Doctor, was a critical part of the research team.

What is likely to have even higher species diversity than the invertebrates are the microbes that live in caves, and that most likely form the base of many aquatic and terrestrial food chains. Pioneering scientists from the western United States, including Dr. Penny Boston of New Mexico Tech, Diana Northrup of the

University of New Mexico, and Hazel Barton of the University of Akron are providing some early glimpses into the exciting and exceptionally diverse world of subterranean microorganisms. In Virginia caves, green-yellow and white bacterial “mats” are common on cave walls, and someday soon we hope to better understand the species that comprise them as well as the basis for their symbiotic relationships.

So, back to the question at hand: What’s living in your cave? Well, the short answer is “We don’t know, but probably a lot.” The specifics depend on where the cave is and how closely connected it is to surface water and other nutrients, such as leaves, sticks, et cetera. Also, the nature and extent of cave passages may exert some influences. Different types of animals are found in pools, streams, and deep lakes, for example. Most caves in Virginia have never had a biologist set foot in them, and even those that were visited have not been studied thoroughly. If you’re interested in knowing more about the biology of your cave or caves, please contact me at Wil.Orndorff@dcr.virginia.gov or leave your name and phone number with the Virginia Natural Heritage Program at 804-786-7951. I can let you know the contents of any biological records we have for your cave, and if you wish, we can set up a time for me to come and investigate what’s living in your cave.