

## **BIODIVERSITY OF THE COWPASTURE RIVER WATERSHED**

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*Editor's note: The following essay is the seventh in a five-year series on water resources stewardship in the Cowpasture River Watershed, sponsored by the Cowpasture River Preservation Association and published by The Recorder. The goal of the series is to create awareness among students, citizens and officials of the critical need to protect our surface and ground-water resources, and to stimulate interest in progressive stewardship.*

More than 250 million years ago, as ancestral Africa ground against North America, layers of rock were thrust up, folded and shuffled to create a jagged mountain chain likely rivaling the Himalayas. Over eons, erosion and weathering wore down these great mountains, only to be uplifted yet again nearly two millennia later. This geologic dance has led to the undulating ridges we see today and spawned a natural diversity that few temperate places on Earth can rival. The Central Appalachians in particular, having escaped the scouring of glaciers in the most recent ice age, serve as an ecological crossroads – hospitable to many species at the northern or southern limits of their range. Nestled in the heart of this region, long recognized as a global center of biological richness, lies our own Cowpasture River and its 464 square mile watershed.

Unbroken Forests – Atop almost any mountain adjacent to the Cowpasture River valley, one gazes across a sea of forested ridges rolling to the horizon. Broadly defined as temperate broadleaf forest, we recognize ridgetop communities of chestnut oak, pitch pine and various species of blueberry and mountain laurel intergrading with oak-hickory forests on crests and saddles. Richer cove forests of sugar maple, hickories, red oak, and basswood or hemlock and birches are often connected to the more calcareous forests and woodlands found on lower, limestone slopes – both having diverse herb layers beneath their understories.

Embedded within this relatively unfragmented forest matrix are more than a few rare plant communities. The Cowpasture River watershed is considered the global epicenter of shale barrens, many of which are populated with plants that are endemic – found nowhere else on Earth - including shale-barren rock-cress and Millboro leatherflower. Globally rare variable sedge, a non-descript, grass-like plant often associated with openings in oak-hickory canopies and fire maintained oak-heath woodlands, also occurs sporadically in the landscape with several healthy populations found on Warm Springs Mountain. For wildflower aficionados, over thirty species of orchids can be found in the watershed. Finicky species requiring just the right soil conditions and often possessing unique relationships with mycorrhizal fungi, these include the globally imperiled Bentley's coral root, discovered in only five counties in the Virginias.

If the orange, red and yellow hues of our forest's autumn leaf colors were not enough to showcase their diversity alone, each spring and summer these forests brighten up with the songs and colors of neotropical migratory songbirds. Returning to nest in the Appalachians or migrating through to parts farther north, this group of avian species has become synonymous with large, intact forests. Hundreds of species nest or migrate through the Cowpasture River valley each year, but two in particular are worth noting – the cerulean warbler and golden-winged warbler. The presence of these two species is the primary reason the watershed is part of the Allegheny Highlands Important Bird Area, designated as globally significant by the National Audubon Society. Both species have experienced dramatic population declines over the past three decades and have been considered for listing under the federal Endangered Species Act. Ceruleans are known for their affinity to mature hardwood forests, often along ridgetops and convex slopes, while golden-winged warblers exploit forest gaps and open areas with a complex mixture of grasses, forbs and shrubs. Neither species, however, is found outside of regions with significant (>70%) forest cover.

This expansive and well-connected network of forests also provide crucial habitat for wide-ranging mammals such as black bear and bobcat. Numerous other mid-sized mammal species are common throughout the watershed including red and gray foxes, northern raccoon, Virginia opossum, striped skunk, and four squirrel species – eastern gray, eastern fox, southern flying and red squirrel. A relative newcomer to eastern forests, the coyote is now ubiquitous in the region. Even the rare, diminutive eastern spotted skunk finds refuge in the watershed's pine woodlands and rock outcrops.

Pristine Waters – Sheltered by the watershed's expansive forests, cold and highly oxygenated headwater streams and tributaries support healthy populations of the official Virginia state fish – brook trout. And like other rivers in the Upper James River basin, the Cowpasture harbors several endemic species, such as the roughhead shiner – a globally rare fish that thrives in the river's clear, rocky pools – and other more common James River endemics such as stripeback darter and longfin darter. Overall fish diversity is good, for a river less alkaline and productive than others in the Ridge and Valley Province, with up to 28 different species having been collected from the watershed and game fish such as largemouth bass, smallmouth bass, rock bass, redbreast sunfish and even the rarer muskellunge are well represented.

The presence of mussels, often overlooked aquatic species that settle into the substrate of rivers and streams and work as filter feeders, is a strong indicator of a clean and healthy freshwater system. Among the mussel species found in the Cowpasture watershed is the James spinymussel, a federally endangered species and the subject of ongoing restoration and augmentation work by the Virginia Department of Game and Inland Fisheries and the US Fish and Wildlife Service. The relatively small, less than 3" in length, mussel acquired its name from the unusual short spines occasionally found along its shell. Historical records also exist for the green floater, another rare species, however recent surveys have not found existing populations

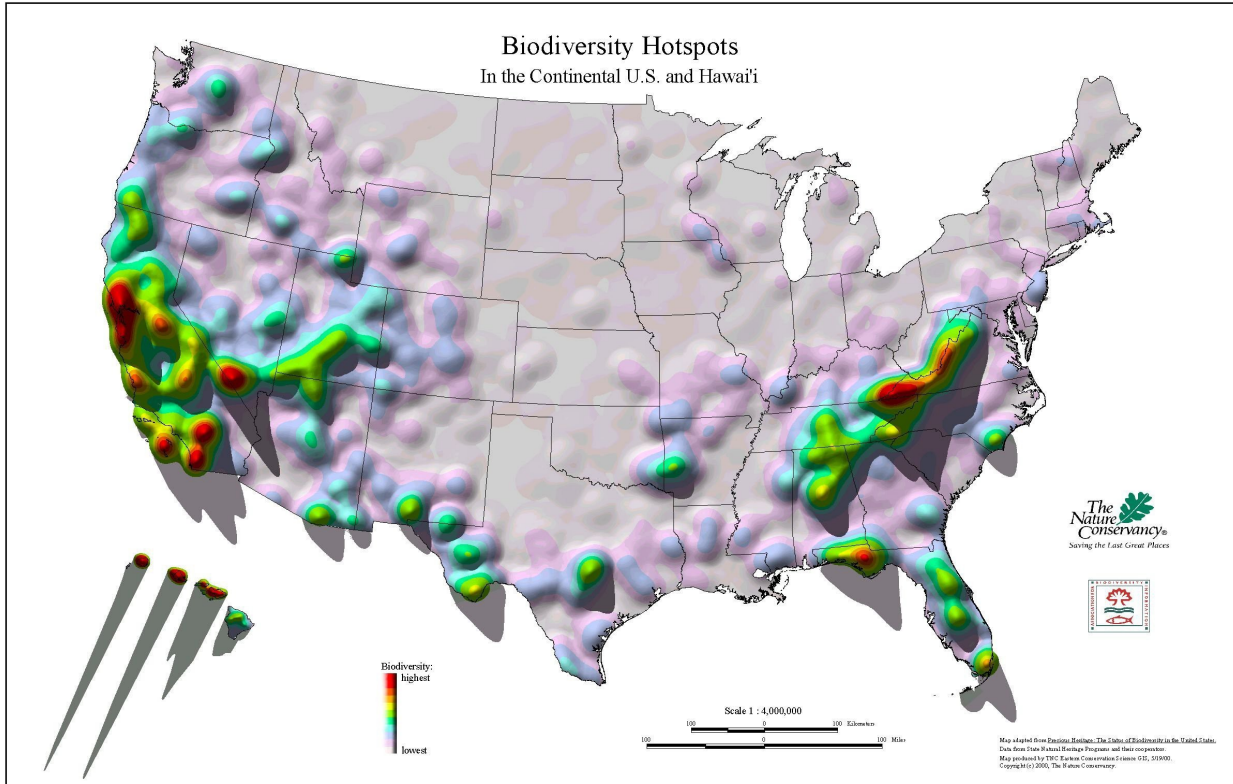
of this mussel species. More common species such as the creeper mussel, the notched rainbow, and the triangle floater have healthy, viable populations in the lower watershed.

Taking advantage of these abundant aquatic faunal resources are some more charismatic furry and feathery creatures. Once a rarity outside of the Chesapeake Bay region, bald eagles, no longer listed on the federal endangered or threatened species list, can now be found nesting and wintering in several locations throughout the watershed. Rivers otters are a common sight playing and foraging along the banks of the Cowpasture, yet they too suffered significant population declines during the mid-twentieth century. And common mink, a solitary and unsocial species, are widespread throughout the watershed.

Underground World – With over 400 caves recorded in Bath and Highland Counties, arguably the richest site of biological diversity literally lies beneath our feet. It is within these caves, 41 of which have been designated as significant by the Virginia Cave Board, where we find some of the most unusual and exceptionally rare species within the watershed. Many are invertebrates whose survival, like our own, depends upon the purity of the groundwater. For example, Vandel's cave isopod, a tiny crustacean, is only known to occur in Blowing Cave near Windy Cove and another cave close to Falling Springs in the adjacent Jackson River watershed. Crossroads cave beetle is only found in a cave near the village of McClung and nowhere else in the world.

Another group of animals are perhaps better known for their use of caves – bats. Species such as little brown and big brown bats, tricolored bat (formerly eastern pipistrelle), eastern small-footed bat and the federally endangered Indiana bat, use caves in the Cowpasture River Watershed for wintering habitat or hibernacula. Before the devastating fungal disease white-nose syndrome starting impacting bat species in Virginia around 2009, a significant hibernacula in Highland County, Hupman's Saltpeter Cave, had among the highest winter counts in the watershed with over 4,000 bats recorded and the largest winter count in the state for the eastern small-footed bat.

The Cowpasture River Valley of Virginia, within the Allegheny Highlands, is a special place for animals and plants. Within the continental United States, the Allegheny Highlands are a rare biological hotspot – one of just two such special places east of the Mississippi River. See the map below on “Biodiversity Hotspots”.



Internet Research URLs:

Bats: <http://www.dgif.virginia.gov/wildlife/bats/>

Fish: [http://www.cowpastureriver.org/sites/default/files/attachments/cowpasture\\_river\\_fish\\_community\\_assessment\\_2013\\_report.pdf](http://www.cowpastureriver.org/sites/default/files/attachments/cowpasture_river_fish_community_assessment_2013_report.pdf)

Conservation: [http://www.cowpastureriver.org/sites/default/files/attachments/warm\\_springs\\_cowpasture\\_river\\_cap\\_march\\_2003\\_1\\_1\\_0.pdf](http://www.cowpastureriver.org/sites/default/files/attachments/warm_springs_cowpasture_river_cap_march_2003_1_1_0.pdf)