

## COWPASTURE RIVER SURFACE WATERS HAVE ANCIENT HISTORY

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*Editor's note: The following essay is the second 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 groundwater resources, and to stimulate interest in progressive stewardship.*

### **Mountain Formation In the Highlands**

The Cowpasture River watershed we see today is the product of geological and climatic events that started about 300 million years ago. Many of the ridges and valleys that make our area the natural wonderland

that we all love were formed during the Alleghanian Orogeny, the most recent mountain building period that occurred from 260 to 300 million years ago. During that time the tectonic plate with the African continent was situated off what is now the Atlantic Coast of North America and was pushing into the



North American plate resulting in the formation of “wrinkles” in the Earth’s crust. As these wrinkles increased in height over millions of years, they formed the Appalachian Mountains. Evidence suggests that these mountains were much higher right after the Alleghanian Orogeny, probably over 20,000 feet high. What we see today is the result of hundreds of millions of years of erosion. At the top of Shenandoah Mountain one can park and see a series of alternating mountain ridges and valleys to the west – the Shaws Fork Valley, Shaws Ridge, the Cowpasture River Valley, Bullpasture Mountain, the Bullpasture River Valley and Jack Mountain. In this beautiful, tree-covered landscape are the sources of the Cowpasture River. When the Alleghanian Orogeny was over, the Mid-Atlantic Coast of North America was near the equator. In this tropical environment it is thought that rainfall amounts were significantly higher than they are today. This would have produced higher rates of erosion. That erosion shaped the ridges and valleys that dominate Highland and Bath Counties.

### **Plant Evolution**

The landscape was very different millions of years ago. When our ridges and valleys first formed, plant life on land was dominated by ferns, horsetails and club mosses – plants that grew

in moist habitats and therefore would have been found mostly in valleys. Primitive conifers were present as well and would have colonized the lower slopes of the ridges. For the first 130 million years of their existence, the upper parts of these ridges would have had little or no tree cover. The first flowering plants did not evolve until about 135 million years ago and hardwood trees were not common until the end of the Cretaceous Period, about 65 million years ago. Grasses were not common until less than 35 million years ago.

#### **Many Different Species of Animals and Plants**

These ridges and valleys are characterized by a great diversity of habitats, from dry high-elevation areas to low moist riparian and cove environments. Habitat diversity drove evolution to develop a very high number of different plant and animal species in our area. The central Appalachians, even today, have a very large number of different plant and animal species, many more than most areas of North America.

#### **Physical Course of the Waterways**

Mountain building, uplift and erosion produced the physical features of the Cowpasture River watershed that we see today. The main stem of the upper Cowpasture River begins at an elevation of about 3000 feet above sea level on the eastern slope of Bullpasture Mountain and flows south through the eastern part of Highland County over a distance of about 21 miles to the confluence with the Bullpasture River just south of Williamsville. The two major tributaries of the upper Cowpasture are the Bullpasture River and Shaws Fork. The source of the Bullpasture is at an elevation of about 3400 feet on Jack Mountain in Pendleton County, West Virginia. The Bullpasture River flows south about 23 miles from its source, down the Bullpasture Valley through the village of McDowell and then continues south through the Bullpasture Gorge and the village of Williamsville where the elevation drops to about 1650 feet. Shaws Fork begins at the upper end of the Shaws Fork Valley in the George Washington National Forest, at an elevation of about 2750 feet. Shaws Fork flows about 12 miles down the valley, through the village of Headwaters before joining the Cowpasture at Liberty which is at an elevation of about 2100 feet. From Williamsville heading south, the Cowpasture meanders through a broad valley dominated by easily eroded shale and continues about 31 miles to the Alleghany County Line. This stretch of the river has numerous wide loops and undoubtedly gave rise to the Native American name for the river, "Wallawhatoola," meaning "the river that bends." An additional 14 miles of the lower Cowpasture River loops its way through the far eastern part of Alleghany County, then passes into the northernmost part of Botetourt County for an additional one mile before joining the Jackson River to form the James River at an elevation of about 1200 feet just southeast of the city of Iron Gate.

#### **Caves and Springs**

Millions of gallons of groundwater flowing through the layers of limestone in the Cowpasture River watershed dissolved rock away resulting in numerous caves. Our area is literally honeycombed with caves, many of which still contain underground streams. Where these underground streams break through into surface streams are the numerous springs in the watershed. About 4 miles north of Williamsville, most of the water in the Cowpasture River goes underground running through an extensive cave system. The water eventually comes out one mile south of Williamsville at Coursey Springs, one of the largest springs in Virginia.

## **Water Quality**

In addition to its great natural beauty, the Cowpasture River watershed is thought to be one of the cleanest waterways in Virginia. The low population density and lack of industry help keep the water clean. Water quality data collected by the Cowpasture River Preservation Association's river monitoring program over a number of years show that all areas that are sampled typically have *E. coli* levels well below the state limit for safe swimming, with the exception of the Bullpasture River in the McDowell area where *E. coli* levels commonly exceed the safe limit. The good news about that situation is that by the time the water reaches the Clover Creek sampling site, about 6 miles south of McDowell, the *E. coli* levels have dropped below the limit for safe swimming. Phosphorus and nitrogen concentrations in the Cowpasture watershed are typically very low. Conductivity (a measure of particles in the water) is also quite low at the CRPA's 7 sampling stations. Landowners can take advantage of numerous federal, state and privately funded programs to help improve and maintain the water quality on their land.

## **Fish in the Cowpasture**

This clean water provides a great habitat for fish. Recent sampling by the Virginia Department of Game and Inland Fisheries found 24 species of fish in the Cowpasture River, undoubtedly there are many more species that were not sampled. Of particular note was the presence of brook trout, rainbow trout, smallmouth, largemouth and rock bass, sunfish, bluegill, and muskellunge. According to Steve Reeser, District Fish Biologist, for the Department of Game and Inland Fisheries, "currently DGIF only stocks rainbow and brown trout in the Cowpasture and Bullpasture Rivers. I'm sure that in the past brook trout were probably also stocked in the Bullpasture by DGIF and that brook trout escaped into the Cowpasture from Coursey Springs Hatchery via Spring Run during flood events. I also know that private landowners have been issued stocking authorizations to stock rainbow and brown trout in the Cowpasture and Bullpasture over the years. Some brook trout were also probably stocked by private landowners in the watershed. The streams listed below host wild brook trout populations. Some of the streams listed below are tributaries of other streams flowing into the Cowpasture." Trout streams from south to north along the Cowpasture include County Line Run, Lick Run, Mill Creek, Spring Branch, Jordan Run, Mare Run, Thompson Creek, Little Wilson Creek, Porters Mill Creek, Panther Run, Barney Run, Dry Run, Cub Run, Bear Hole Run, Laurel Run, Pheasanty Run, Benson Run, Locust Fork. Along the Bullpasture River, tributaries with trout include Mill Run, Clover Creek, Davis Run, Crab Run, Jack Mountain Run and Horse Hollow.

There are tens of thousands of acres of national forest and wildlife management areas open to the public in the Cowpasture watershed. Get out and enjoy one of our greatest local natural treasures!

## **Additional Reading on the Web and in Print**

Search Wikipedia for the following topics: Geology of Virginia – the Ridge and Valley Province; Continental Drift; Evolution of Plants

A very useful print reference is Keith Frye's *Roadside Geology of Virginia*, Mountain Press Publishing Company, 1995.

## ***Essays in Water Resources Stewardship***

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