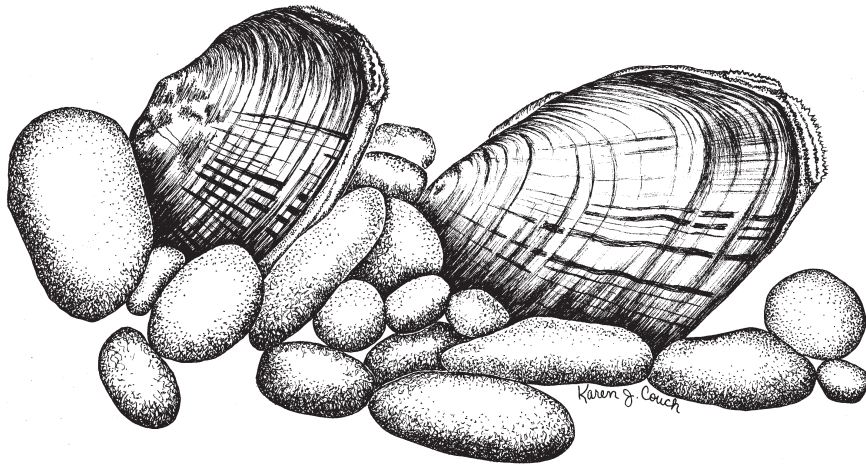




Appalachian Elktoe



The Federal Endangered Species Act

The Endangered Species Act of 1973 (Act) recognizes that many of our nation's valuable plant and animal resources have been lost and that other species are close to extinction. The Act provides a means to help preserve these species and their habitats for future generations. The Appalachian elktoe (*Alasmidonta raveneliana*) is presently known to exist in scattered locations in western North Carolina and eastern Tennessee. Suitable habitat for the species is extremely limited. The U.S. Fish and Wildlife Service added this freshwater mussel, as an endangered species, to the Federal List of Endangered and Threatened Wildlife and Plants on November 23, 1994.

Description, Habitat, and Biology

The Appalachian elktoe has a thin shell, reaching up to about 3 inches in length, 1.5 inches in height, and 1 inch in width. The outer shell surface (periostracum) is generally yellowish brown in juvenile mussels, while the adult periostracum is usually dark brown to greenish black. Although rays are prominent on some shells, many mussels have only obscure greenish rays. The inside surface of the shell (nacre) is shiny, often white to bluish white, changing to a salmon pinkish or brownish color.

The Appalachian elktoe is known only from the mountain streams of western North Carolina and eastern Tennessee. Although the complete historic range of the Appalachian elktoe is unknown, available information suggests that the species once lived in most of the rivers and larger creeks of the upper Tennessee

River system in North Carolina. In Tennessee, the species is known only from its present range in the main stem of the Nolichucky River.

Today, the Appalachian elktoe survives only in scattered pockets of suitable habitat in the Little Tennessee River, Swain and Macon Counties, North Carolina; Tuckasegee River, Jackson and Swain Counties, North Carolina; Pigeon and West Fork Pigeon River, Haywood County, North Carolina; Mills River, Henderson County, North Carolina; Little River, Transylvania County, North Carolina; Cheoah River, Graham County, North Carolina; and the Nolichucky River system, including the South Toe River, Yancey County, North Carolina; the North Toe River, Mitchell and Yancey Counties, North Carolina; the Cane River, Yancey County, North Carolina; and the Nolichucky River in Yancey County, North Carolina downstream into Unicoi County, Tennessee. Many of these surviving populations are extremely small and in some cases appear to consist of only a few, mostly old, individuals.

The Appalachian elktoe requires clean, well-oxygenated water that flows at a moderate to fast pace. Stable, relatively silt-free, gravelly or rocky stream bottoms appear to be critical to the species. Typically, stable streams occur where the stream banks are well vegetated with trees and shrubs. Like other mussels, the Appalachian elktoe feeds by pulling water through its siphon and filtering tiny food particles, such as plankton, from the water.

The reproductive cycle of the species is similar to other native mussels. Males release sperm into the water; the eggs are fertilized when the sperm are taken in by the females through their siphons during feeding and respiration. The females retain the fertilized eggs in their gills until the larvae (glochidia) fully develop. Once developed, the glochidia (glo-ki-dee-a) are released into the water and must attach to the gills of the appropriate "fish host" species. They remain attached to their fish host for several weeks, drawing nourishment from the fish while they develop into juvenile mussels. They do not harm their fish host. The juvenile mussels then detach from the fish host and drop to the bottom of the stream, where they continue to develop, provided they land in a suitable place with good water conditions. This dependence on a certain species of fish increases the mussels' vulnerability. If the fish host is driven off or eliminated because of habitat or water quality problems, the mussels cannot reproduce and will eventually die out. So far, only sculpins (small bottom-dwelling fish) have been identified as suitable fish hosts for the Appalachian elktoe.

Why Is The Appalachian Elktoe So Rare?

Because populations of the Appalachian elktoe are small and isolated, they are extremely vulnerable to being wiped out by a single catastrophic event or the cumulative effects of many other seemingly insignificant activities. Poor water quality and habitat conditions have led to the decline and loss of populations of the Appalachian elktoe. Studies have shown that freshwater mussels, especially in their early development, are extremely sensitive to many pollutants commonly found in municipal and industrial waste-water releases. Impoundments (dams), channelization projects, and in-stream dredging operations directly eliminate habitat. These activities also alter the quality and stability of the remaining stream reaches by affecting the water flow, temperature, and chemistry. Agriculture (both crop and livestock) and forestry operations, roads, residential areas, golf courses, and other land-disturbing activities that do not adequately control soil erosion and storm-water run-off contribute excessive amounts of silt, pesticides, fertilizers, heavy metals, and other pollutants that suffocate and poison freshwater mussels.

The alteration of flood plains or the removal of forested stream buffers can be especially detrimental because these areas help maintain good water quality and the stability of streams by absorbing, filtering, and slowly releasing rainwater. Flood plains and forested stream buffers also help recharge ground water levels and maintain flows during dry months.

Why Should We Be Concerned About The Loss Of Species?

The Web of Life

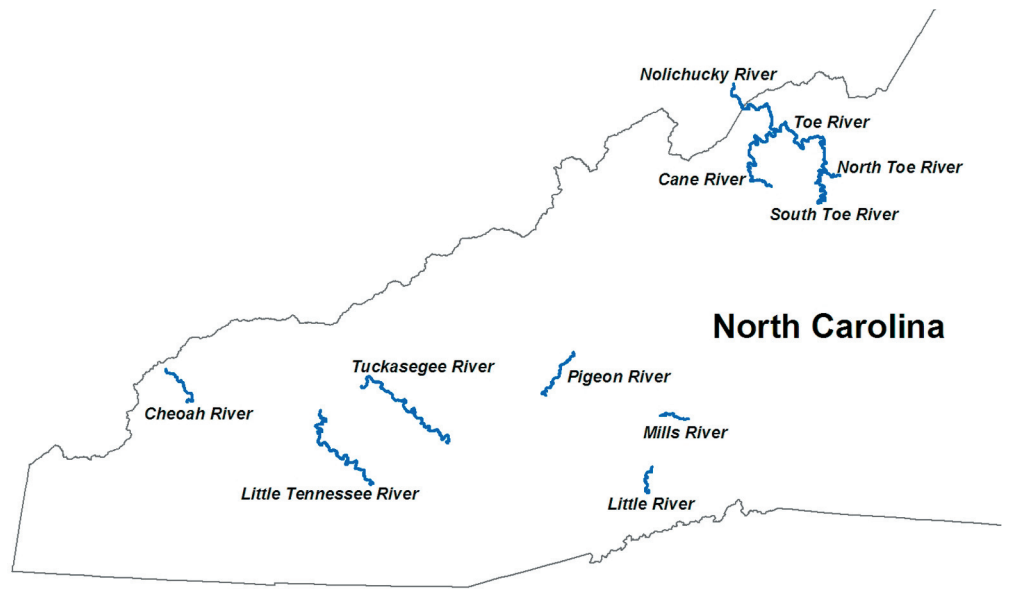
All creatures, including humans, are interconnected in the web of life. Native mussels rely on certain fish species in order to reproduce. In turn, these mussels provide numerous benefits to fish and other aquatic organisms. Mussels continuously filter the water for food and oxygen; as they do so they are cleaning the water of pollutants and large quantities of organic particles, much like a tiny water purifying system. They play an important role in the aquatic food chain as a food source for wildlife, including river otters, muskrats, great blue herons, and numerous species of fish and turtles. Their shells provide cover and nesting habitat for aquatic insects, crayfish, and bottom-dwelling fish species like darters, sculpins, and madtoms (major prey items for many game fish species).

Environmental Barometers

Endangered species are indicators of the health of our environment. The loss of these plants and animals is a sign that the quality of our environment--air, land, and water--is declining. Gradual freshwater mussel die-offs, such as the declining Appalachian elktoe, and sudden mussel kills are reliable indicators of water pollution problems. Stable, diverse mussel populations generally indicate clean water and a healthy aquatic environment.

A Biological Treasure Trove

We depend on the diversity of plant and animal life for our recreation, nourishment, and many of our lifesaving medicines and the ecological functions they provide. Each time a species disappears, we lose not only those benefits we know it provided but other benefits that we have yet to realize. For instance, individuals of some mussel species are believed to have lived for more than a hundred years, yet researchers have never detected any evidence of tumors in mussels. The treatment for certain types of cancer or some other human affliction may lie in a species like the Appalachian elktoe, but once it is gone, its values and benefits are gone forever.



Today, freshwater mussels are considered the most endangered group of animals in the United States. There are more species of mussels in the Southeastern United States than any other place in the country, even more than any other place in the world! If we lose our freshwater mussels, we lose more than a biological legacy. We lose a part of our cultural heritage, an economic resource, and an environmental health maintenance and warning system. There are solutions to reverse this trend in which we can all play a role.

What You Can Do To Help

- Establish and maintain forested stream-side buffers. Several Federal, state, and private programs are available to assist landowners, both technically and financially, with restoring and protecting stream-side buffers and eroding streams.
- Implement and maintain measures for controlling erosion and storm water during and after land-clearing and disturbance activities. Excess soil in our streams from erosion is one of the greatest water pollution problems we have today.
- Be careful with the use and disposal of fertilizers, pesticides, and other chemicals. Remember, what you put on your land or dump down the drain may eventually wind up in nearby waters.
- Support local, state, and national clean water legislation.

- Report illegal dumping activities, erosion, and sedimentation problems. These activities affect the quality of our water, for drinking, fishing, and swimming.

Remember, we all drink the same water and breathe the same air; we are connected. By saving these species we will indeed be saving ourselves.

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