Appalachian elktoe

Alamidonta raveneliana

Appalachian elktoe, USFWS

Status: Endangered

Description: The Appalachian elktoe has a thin, kidney-shaped shell, extending to about 10 centimeters (4 inches). Juveniles generally have a yellowish-brown periostracum (outer shell surface), while the periostracum of the adults is usually dark brown to greenish-black in color. Although rays are prominent on some shells, particularly in the posterior portion of the shell, many individuals have only obscure greenish rays. The shell nacre (inside shell surface) is shiny, often white to bluish-white, changing to a salmon, pinkish, or brownish color in the central and beak cavity portions of the shell; some specimens may be marked with irregular brownish blotches.

The reproductive cycle of the species is similar to other native mussels. Males release sperm into the water, and the eggs are fertilized when the sperm are taken in by the females through their siphons during feeding and respiration. Females retain the fertilized eggs in their gills until the larvae (glochidia) fully develop. The glochidia are released into the water and must attach to the gills or fins of the appropriate fish 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 hurt 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 to habitat disturbances. If the fish host is driven off or eliminated because of habitat or water quality problems, the mussels can't reproduce and will eventually die out.

Habitat: The species has been reported from relatively shallow, medium-sized creeks and rivers with cool, clean, well-oxygenated, moderate- to fast-flowing water. The species is most often found in riffles, runs, and shallow flowing pools with stable, relatively silt-free, coarse sand and gravel substrate associated with cobble, boulders, and/or bedrock. Stability of the substrate appears to be critical to the Appalachian elktoe, and the species is seldom found in stream reaches with accumulations of silt or shifting sand, gravel, or cobble. Individuals that have been encountered in these areas are believed to have been scoured out of upstream areas during periods of heavy rain, and have not been found on subsequent surveys.

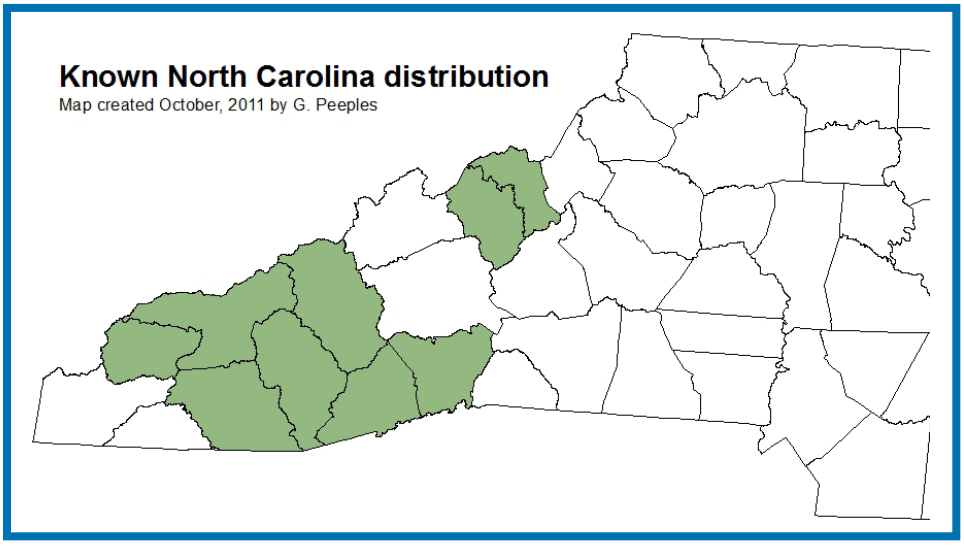
Range: The Appalachian elktoe is known only from the mountain streams of western North Carolina and eastern Tennessee. Although the complete historical range of the Appalachian elktoe is unknown, available information suggests that the species once lived in the majority of the rivers and larger creeks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

Currently, the Appalachian elktoe has a very fragmented, relict distribution. The species still survives in scattered pockets of suitable habitat in portions of the Little Tennessee River system, Pigeon River system, Mills River, and Little River in North Carolina, and the Nolichucky River system in North Carolina and Tennessee.

Listing: *Federal Register*, November 23, 1994. 59 FR 60324 60334

Critical Habitat: *Federal Register*, September 27, 2002. 67 FR 61016 61040

Threats: Available information indicates that several factors adversely affect water and habitat quality of our creeks and rivers and have contributed to the decline and loss of populations of the Appalachian elktoe and threaten the remaining populations. These



factors include pollutants in wastewater discharges (sewage treatment plants and industrial discharges); habitat loss and alteration associated with impoundments, channelization, and dredging operations; and the run-off of silt, fertilizers, pesticides, and other pollutants from poorly implemented land-use activities.

Freshwater mussels, especially in their early life stages, are extremely sensitive to many pollutants (chlorine, ammonia, heavy metals, high concentrations of nutrients, etc.) commonly found in municipal and industrial wastewater effluents. Activities such as impoundments, channelization projects, and in-stream dredging operations eliminate mussel habitat. These activities can also alter the quality and stability of the remaining stream reaches by affecting the flow regimes, water velocities, and water temperature and chemistry.

Agriculture (both crop and livestock) and forestry operations, mining activities, highway and road construction, residential and industrial developments, and other construction and land-clearing 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. These pollutants suffocate and poison freshwater mussels.

The run-off of storm water from cleared areas, roads, rooftops, parking lots, and other developed areas, which is often ditched or piped directly into streams, not only results in stream pollution but also results in increased water volume and velocity during heavy rains. The high volume and velocity cause channel and stream-bank scouring that leads to the degradation and elimination of mussel habitat. Construction and land-clearing operations are particularly detrimental when they result in the alteration of flood plains or the removal of forested stream buffers that ordinarily would help maintain water quality and the stability of stream banks and channels by absorbing, filtering, and slowly releasing rainwater. When storm water run-off increases from land-clearing activities, less water is absorbed to recharge ground water levels. Therefore, flows during dry months can decrease and adversely affect mussels and other aquatic organisms.

Why should we be concerned about the loss of species? Extinction is a natural process that has been occurring since long before the appearance of humans. Normally, new species develop, through a process known as speciation, at about the same rate other species become extinct. However, because of air and water pollutions, forest clearing, loss of wetlands, and other man-induced environmental changes, extinctions are now occurring at a rate that far exceeds the speciation rate.

All living things are part of a complex and interconnected network. The removal of a single species cans set off a chain reaction that could affect many other species. For example, the loss of a single plant species can result in the disappearance of up to 30 other species of animals and plants. Each extinction diminishes the diversity and complexity of life on earth.

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 Tar spinymussel, and sudden mussels kills are reliable indicators of water pollution problems. Stable, divers mussel populations generally indicate clean water and a healthy aquatic environment. While poor environmental quality may first manifest itself in the health of our plant and animals populations, if untreated, it eventually affects humans directly, as we breathe polluted air, loose valuable topsoil to erosion, or get sick from swimming in contaminated water.

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. One-quarter of all the prescriptions written in the United States today contain chemicals that were originally discovered in plants and animals. Industry and agriculture are increasingly making use of wild plants, seeking out the remaining wild strain of many common crops, such as wheat and corn, to produce new hybrids that are more resistant to disease, pests, and marginal climatic conditions. Our food crops depend on insects and other animals for pollination. Healthy forests clean the air and provide oxygen for us to breathe. Wetlands clean water and help minimize the impacts of floods. These services are the foundation of life and depend on a diversity of plants and animals working in concert. Each time a species disappears, we lose not only those benefits we know it provided but other benefits that we have yet to realize.

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 water.

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.

Participate in the protection of our remaining wild lands and the restoration of damaged ecosystems.

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November, 2011