

## Altamaha Spiny mussel (*Elliptio spinosa*)

Jennifer Johnson<sup>1</sup>

### Introduction

The Altamaha spiny mussel is a freshwater mussel found only in the Altamaha River basin and entirely in Georgia. It was first named near the town of Darien in 1836.

### Taxonomy

Family *Unionidae*  
Genus *Elliptio*  
Species *spinosa*

There are nearly 300 species of freshwater mussels in North America. The southeastern portion of the United States has the highest diversity with 269 historic mussel species. There are 8 species known to occur only in Georgia, one of which is the Altamaha spiny mussel.

### Status

The current population and range of the Altamaha spiny mussel has significantly declined in the past few decades. As a result, the Altamaha spiny mussel is listed as endangered in Georgia and in 2002 was made an official candidate for federal listing under the United States Endangered Species Act. Its historic range was located in the Altamaha River and its three major tributaries: the Oconee, Ochopee, and Ocmulgee Rivers.

### Description

The most distinguishing features of this species are the prominent spines that can reach lengths up to 1.1 inches. As young mussels, their color is greenish yellow with rays along the shell. Once fully



Photo By: Altamaha Riverkeepers

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<sup>1</sup> Graduate Student, Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA 30602

grown, the spiny mussel is rather large for a mussel species. It can reach lengths up to 4.3 inches and is deep brown in color. The inside of the shell (called the nacre) is pink or purple.

## Form and Function

It has been hypothesized that the conspicuous spikes help secure the mussel into the sandy sediments where they are most often found. The spikes could also be a deterrent for predators such as muskrats or raccoons.

## Ecology

**Reproduction:** Freshwater mussels are bivalves and are long-lived filter feeders that remain in the same stream area for their entire lives - which can be over 100 years! They also have a very unique life cycle. The male mussel releases his sperm into the water column towards the female. The female then uses her incurrent aperture (siphon) to obtain the sperm which then fertilize the eggs that are held in modified gills.

The female mussel then can hold her larval mussels, known as glochidia, for a few weeks or even over the winter. However, in order for the glochidia to complete their life cycle and become adult mussels, they need to attach to a fish host to transform into juvenile

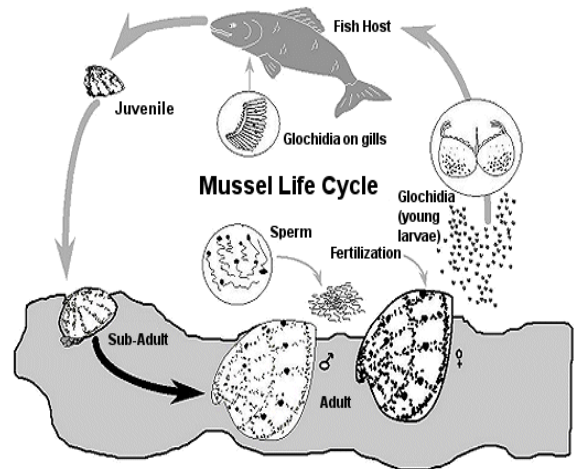
Some mussels, such as the spiny mussel, release glochidia in packets that resemble aquatic insect larvae that are ingested by fish. Other types of mussels have built in “lures” to attract a potential fish host. The lures usually look like something the fish would likely prey upon such as a minnow or crayfish. When a fish attempts to eat the lure, it gets a mouthful of glochidia.

Regardless of the strategy for getting into the fish’s mouth, once there the glochidia attach to the fish’s gills where they are encysted for 2-4 weeks before transforming into juvenile mussels. Soon after transformation, they detach from the fish and settle into the sediment where they will remain throughout their lives.

The Altamaha spiny mussel is thought to reproduce in late spring. By May or June, the female is ready to release her glochidia. Unfortunately, scientists currently do not know which fish species serve as a host for spiny mussel glochidia. However, the Georgia Department of Natural Resources has recently funded a study at the University of Georgia that will hopefully determine the host fish species for this severely imperiled mussel.

**Feeding:** Freshwater mussels are filter feeders and an adult can filter 40 liters of water per day! Adults filter certain types of algae, bacteria and other microorganisms from the water.

**Behavior:** Mussels have limited mobility, meaning they generally do not move more than a few dozen meters throughout their lives. When they do move, it is usually in the summer to avoid drought



USFWS Photos. Above is the mussel life cycle



conditions. During the winter, they tend to burrow and remain inactive until the water temperatures begin to warm.

**Habitat:** Spiny mussels are typically found in stable, coarse to fine sandy sediments. They are generally restricted to sandbar areas with high water velocities. Spiny mussels are usually found burrowed approximately 2 to 4 inches within the sand.

**Enemies:** Raccoons, otter, and muskrat are known predators of all freshwater mussel species. The Altamaha spiny mussel can be vulnerable to predation but given their preferred habitat in swift-moving water, it is unlikely. Human activities pose more of a threat to spiny mussels through habitat degradation and certain poor land use practices, such as logging and agriculture.

**Populations:** The population of spiny mussels was not systematically assessed until the late 1960's. Since that time, surveys have shown a steady decline in the spiny mussel in the Altamaha and its tributaries. In fact, recent surveys in 2001 did not find any spiny mussels in the Ochopee River and they now are thought to be extirpated from that river. In the Ocmulgee River, since 1993 only 10 of 90 sites surveyed had spiny mussels present. Fewer surveys have been conducted in the Oconee River, with only 10 sites surveyed since 1993, but it is thought the spiny mussel is extirpated from this river as well.

The majority of surveys have been conducted in the Altamaha River. Since 1993, spiny mussel populations have been found but in far less numbers when compared to historical records. For example, in 1963 one site found 60 individuals. In the 1990's and 2000's the greatest number of individuals found at one site was nine.

## **Disease**

There is little information on diseases that affect adult freshwater mussels. However, juvenile mussels are highly susceptible to predation by parasites such as nematodes.

## **Economic Value**

There is no known economic value for this species but historically many mussel species were commercially harvested for use of their shells to make buttons. Currently many mussels are harvested so their shells can be ground up for use as 'seed' material for making pearls in oysters.

## **Damage**

There is no known damage caused by this species.

## **Medicinal Value**

There is no known medicinal value for this species.

## **Legal Aspects**

In October 2006, Georgia listed the Altamaha spiny mussel as State Endangered. The Georgia Wildlife Action Plan soon followed, listing it as one of the high priority species in need of conservation. Both of these listings are beneficial because there is now a greater likelihood of future funding to study this particular species. The International Union for the Conservation of Nature (IUCN) also has the

Altamaha spiny mussel listed as Endangered. In 2007, the USFWS determined that threats to the mussel had increased dramatically. Therefore, the danger to this mussel was increased from non-imminent to imminent. This means that the Altamaha Spiny mussel will likely be officially added to the US Endangered Species List within the next few years.

## Control to Reduce

There are no current efforts to reduce the population of this species.

## Other Threats

When the Altamaha spiny mussel was listed as a candidate for the Endangered Species Act, the US Fish and Wildlife Service needed to assess what was causing the populations to decline so dramatically. Threats were considered and were published in the Federal Register for public viewing.

The first threat considered was the “destruction, modification, or curtailment of its habitat or range”. Sedimentation from certain land use practices, such as logging and farming, has been shown to be devastating to mussels. It results in less food availability and respiratory problems. If severe enough, an increase in sediments to a stream could literally suffocate the mussel to death. Preferred habitat of the spiny mussel is coarse to fine grain sandbars. Since sediment accumulates on or near sandbars, the problem is compounded for the spiny mussel and eventually suitable habitat disappears. Sources of sedimentation have been identified as construction activities, dirt roads, mines, farming, and urban sprawl.

Another threat to the mussels’ habitat is industrial effluent (wastewater). Effluent from industrial sources commonly contains toxic substances but also may cause “thermal” pollution. Coal-fired and nuclear power plants use large volumes of river water for cooling purposes, then discharge the warmed water back into the river thereby increasing the downstream water temperature resulting in increased frequency and intensity of algal blooms and lower dissolved oxygen levels.

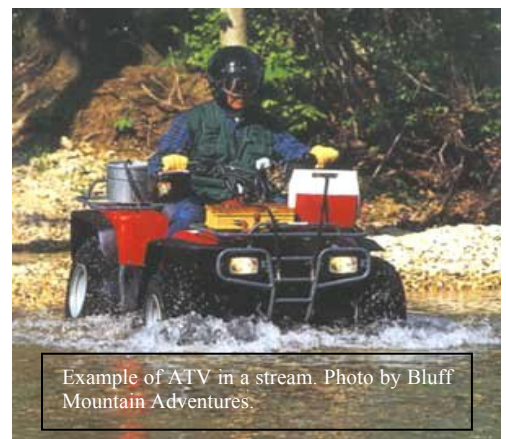
Under Georgia’s Endangered Wildlife Act, the Altamaha spiny mussel is listed as Endangered. It is therefore illegal to “harm, disturb, or sell a protected animal”. However, there are no repercussions in land use changes that have negative effects on mussels.

Non-point sources of pollution (a non-distinct area) such as urbanization, agriculture or logging can ultimately destroy mussel habitat. However, there are no legal ramifications for these pollutants. If there are local ordinances in place, they are often poorly enforced.

According to the Altamaha Riverkeepers, an environmental group concerned with the river’s health, point source pollution (piping directly into the water) is degrading the water quality of the river and little is being done about it.

There are several sawmills along the river that dump their waste directly into the river. There are limits as to how much effluent the companies can release, but monitoring is inadequate for the compliance of those regulations.

Invasive species, such as the flathead catfish and the Asian clam are also thought to be negatively affecting mussel populations as well. Although the fish host is currently unknown for the Altamaha spiny mussel, their host may have been outcompeted by the flathead catfish or a food item for it. And unlike the freshwater mussels, Asian clams do not need a host fish in order to complete



their life cycle. This makes the invasive species much more reproductively prolific and competitive in regards to acquiring food and habitat.

Lastly, the recent drought conditions in Georgia have made survival difficult for mussels. Typically, mussels are adapted to survive periods of droughts by burrowing deep into the sediment. However, with a decrease in water and an increase in exposed shoreline, ATVs have been wreaking havoc on the newly formed stream edges. Two consequences of this activity are: the machines crush the buried mussel or they loosen the sediment, causing sand to fall into the stream and leave the mussel exposed to the elements.

## **Management to Enhance**

The lack of knowledge of the life history of the spiny mussel is a major impediment in conservation efforts. As a result, in 2004 researchers at the Tennessee Aquarium attempted to determine which species of fish is essential to the survival of this mussel. Unfortunately, these efforts were not successful because there were no females that carried mature glochidia. Currently, biologists at the University of Georgia are in the preliminary stages of the second attempt to identify the fish host for the spiny mussel. If successful, it would provide essential life history information for the future conservation efforts of this species.

The good news is that there are many groups that are focused on the habitat and aquatic integrity of the Altamaha River. Groups such as the Altamaha Riverkeepers and The Nature Conservancy are working with the Georgia DNR and the USFWS to restore and preserve areas that are considered unique ecological units. The Altamaha River Cooperative for Stewardship and Research is an organization comprised of interest groups that have a common goal of identifying areas of needed research and conservation. Plum Creek, International Paper, Georgia Power, and Georgia DNR are some of the participants in this cooperative effort who have also contributed funding for identifying the host species of fish required by the spiny mussel.

## **Human Use**

**Native Americans** - Native Americans utilized freshwater mussel shells to make hand tools, but their importance for food is unclear. However, Native Americans highly valued freshwater pearls. It is not known if they specifically used the Altamaha spiny mussel.

**Colonists** - There are no known uses.

## **Further Readings**

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## **Editor**

Michael T. Mengak, Associate Professor – Wildlife Specialist

Warnell School of Forestry and Natural Resources  
Athens, Georgia 30602-2152  
Telephone 706.542.2686 Fax 706.542.8356

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