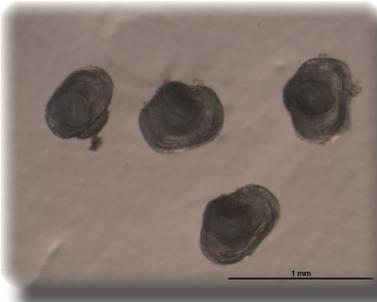


Agricultural Chemicals and Stormwater Runoff: Impacts on Rare and Threatened Aquatic Species



- **The Challenge:** Until recently, the Upper Conasauga River in northern Georgia was considered to have one of the most diverse communities of freshwater species in North America including numerous rare, endangered, and threatened species of fish and mussels. However, the occurrence of these species has declined significantly over the past decade coinciding with substantial increases in the use of glyphosate-resistant crops and the use of poultry litter (often elevated in heavy metals, hormones and vitamins) as a soil amendment within the watershed. With the introduction and use of glyphosate-resistant wheat along with resistant corn and soybeans, the utilization of glyphosate herbicides will increase substantially across the nation as farmers use multiple applications during the growing season. The use of chicken litter as an organic fertilizer will continue to increase nationally as the popularity of poultry production and consumption increases with the concomitant disposal of production waste as agricultural fertilizer. Both issues may pose serious threats to aquatic ecosystems nationwide with regard to the loss of endangered and threatened species and significant decreases in diversity.



- **The Science:** In order to determine possible causes for the disappearance of aquatic species, a combination of chemical surveys of sediments and surface waters along with field and laboratory toxicity assessments are being employed. This study will provide a survey of sediment chemistry (i.e. nutrients, hormones, vitamins, metals, glyphosate) in the affected area as means of identifying potential contaminants, locating potential sources, and assessing effects on native biota. Surface waters will be sampled from multiple sites during baseflow and after rain events to determine these contaminant concentrations along with chronic toxicity to the freshwater cladoceran, *Ceriodaphnia dubia*. Juvenile unionid mussels are being used for in-stream cage exposures along with laboratory sediment and water exposures. Bioassays using a native fish species, (*Cyprinella trichroistia*) which are still abundant in some tributaries are being conducted to determine effects of glyphosate and selected hormones on their reproduction.



- **The Future:** To date, chronic sediment toxicity was measured in the summer of 2010 below two tributaries draining agricultural areas. Laboratory exposures of fish and mussels are underway with additional field work in the years to come. This is one of several studies currently investigating habitat quality in this stretch of river including assessments of fish, invertebrate, and plant communities, nutrient loads, dissolved-oxygen profiles, and land-use practices.