

Patuxent Wildlife Research Center

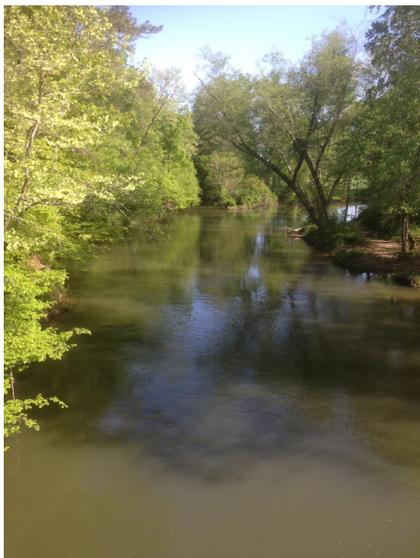
Assessment of Endocrine Disrupting Chemicals in the Upper Conasauga River, Georgia



The Challenge: The Upper Conasauga River is critical habitat for numerous rare, endangered, and threatened species of freshwater fish and mussels. However, their populations have significantly declined over the past decade. Previous research found elevated levels of nitrate in surface waters and hormones in sediments. Sexual development was significantly altered in western mosquitofish (*Gambusia affinis*) and a survey of fish from the river found that 22% of centrarchid males sampled had testicular oocytes (intersex), but we suspect a greater rate of intersex due to sampling limitations in the original survey.



The Science: Proposed research includes a multi-year assessment of intersex in multiple fish species throughout the study area complemented by bi-monthly monitoring of nitrate, total nitrogen, and total phosphorus levels in surface waters and estrogenic activities in surface waters and sediments. A fish short-term reproduction assay with fathead minnows (*Pimephales promelas*) will be used in exposures to nitrate, estradiol, and a mixture of the two to assess effects of nitrate and its interaction with estradiol to reproductive endpoints including behavior, secondary sex characteristics, fecundity, plasma chemistry, and gonadal histology. Larval stages of tricolor shiner (*Cyprinella trichroistia*), a species declining in the Conasauga River, will be compared to model species (fathead minnow, Japanese medaka; *Oryzias latipes*) in exposures to estradiol to determine its relative sensitivity and potential causes for its decline. Exposures will occur during the initial 10% of average life span to cover the period of sexual differentiation, then fish will be cultured in clean water until maturity for assessment of endpoints such as apical characteristics including survival, growth, condition, gonadosomatic index, and hepatosomatic index along with gonadal histology, secondary sex characteristics, plasma hormone concentrations, and blood chemistry.



The Future: Field and laboratory work will continue through FY18.