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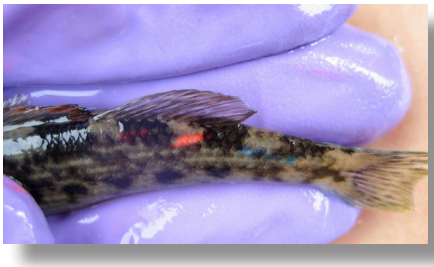
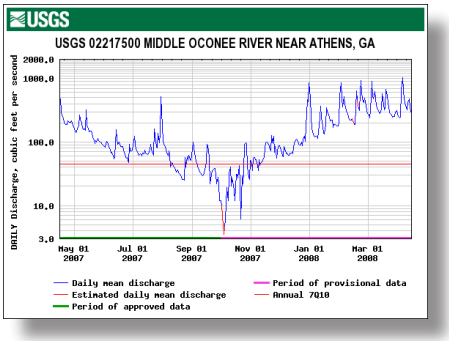
Patuxent Wildlife Research Center

Quantifying Effects of Flow Variability on Riverine Biota

The Challenge: Streamflow variability influences multiple ecological processes in streams and rivers, including plant and animal growth, reproduction, survival and dispersal. For this reason, many beneficial human activities that also alter streamflow patterns, such as water diversion and dam operations, can lower the capacity of streams and rivers to deliver ecosystem services including support of fish and wildlife. To avoid undesirable changes in stream-dependent plant and animal communities, managers and other stakeholders require the best-possible understanding of how ecological processes are likely to be affected by a given change in streamflow patterns. For example, managers and regulators of municipal water intakes would benefit from science that allows prediction of changes in stream fish populations for alternative water diversion scenarios.



The Science: Developing quantitative relations between changes in streamflow patterns and responses by stream organisms entails an iterative process of using current knowledge to predict outcomes and field study to test and refine those predictions. Collaborating scientists from the USGS Patuxent Wildlife Research Center, the University of Georgia, the US Fish and Wildlife Service, and other partners are studying effects of variation in streamflow on fishes, invertebrates and macrophytes in southeastern US rivers affected by water withdrawal and by dam regulation. Research includes a multi-year study of survival and recruitment by shoal-dwelling fishes during low- and high-flow years in a river used for municipal water supply, and quantifying fish species assemblages in relation to expected species composition downstream from hydropower dams that have differing water release patterns.



The Future: Results of these studies are being used to develop predictive relations for how ecosystem components – riverine plants, invertebrates and fishes – may respond to future changes in streamflow patterns. Next steps will involve testing predictions in these rivers and in other systems and landscape contexts, to narrow uncertainty in information provided to resource managers.

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