USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: Effects of Sedimentation on Biodiversity in Rivers and Streams of the Southeastern United States.

Duration: September 1997 - August 1998

Fiscal year 1997 Federal funds: Total $26,000; Direct $26,000; Indirect $0

Non-federal funds allocated: Total $52,025; Direct $35,707; Indirect $16,318

Principal Investigators: Dr. Judy L. Meyer and Dr. Byron J. Freeman, Institute of Ecology,
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Congressional District: 10th

Need for Proposed Research:

Rivers and streams of the U.S. are threatened by soil erosion and sedimentation. Sedimentation is the single largest contributor to pollution of our nation's rivers CEPA, 1987). The accelerated accumulation of sediments in aquatic ecosystems leads to a decline in surface water quality and biodiversity (Waters, 1995). The southeastern U.S. is particularly vulnerable because it has one of the richest freshwater fish faunas in the world. Many of the fish species in this region are sensitive to habitat degradation and are imperiled. These species act as "indicators" of the overall health of the system. By protecting sensitive fish species, we protect not only an important and unique biological resource, but also our own source of clean freshwater.

Adverse impacts on aquatic ecosystems result from excessive sedimentation and turbidity (Waters, 1995). Sediments fill the interstices of gravel and cobble stream bottoms, greatly decreasing the spawning areas for many fish species and the habitat for macroinvertebrates, which serve as food for many fish species (National Technical Advisory Committee, 1968). Many Southeastern fishes are particularly sensitive to this type of habitat degradation (Burkhead et al., 1995).

There is controversy and lack of consistency in existing turbidity standards in southeastern
states. The determination of acceptable Nephelometric Turbidity Unit (NTU) standards in Georgia
is currently under debate. States adjacent to Georgia vary in their standards (Georgia Board of

Regents Scientific Panel, 1995). Some states, such as Alabama, Florida and North Carolina, specify that NTU readings cannot exceed a specific constant number above natural background turbidity. South Carolina allows an increase of 10% above background readings and Tennessee uses a standard that does not allow any adverse effects on aquatic life. This lack of consistency in standards impacts river systems that drain several states. It also underscores the need for more information on the effects of sedimentation on Southeastern fishes so that effective standards can be implemented in the region.

Adequate data addressing the effects of sedimentation on aquatic biodiversity in Georgia are not available (Georgia Board of Regents Scientific Panel, 1995). Barnes et al. (1996) examined turbidity data gathered by USGS in Georgia and analyzed existing fish collection databases for several river basins. Existing sediment data and fish collections are rarely from sites close together (Barnes, et al., 1996); yet it is essential to look at comparisons of native fishes and levels of sedimentation at the same locales in order to understand the effects of elevated sediment levels on aquatic systems and then recommend science-based turbidity standards. A field study is presented in this proposal to investigate effects of sedimentation on native fish communities by determining relationships between in-stream sediment and benthic fish species in two representative Southeastern river systems, the Etowah River in Georgia and the Little Tennessee River in North Carolina.

Expected benefits of proposed research:

Understanding the relationships between fish bio-diversity and suspended sediments is the primary goal of this project. A better understanding of this relationship is needed in order to provide specific guidance to decision makers on what sediment standards would be protective of aquatic life in southeastern streams and rivers. Through contemporaneous sampling of turbidity, sediment dynamics, and fishes in streams representing a gradient of sedimentation regimes, we will examine the relationship between the unique fish fauna of this region and excessive sedimentation. This research is essential in linking conservation biology and sustainable development through regulation in order to reduce the amount of sediment entering southeastern waterways.