



Freshwater Mussel Monitoring

Affected Parks

Big South Fork NRR (BISO)
Obed Wild and Scenic River (OBRI)

Importance / Issues

Both BISO and OBRI protect nationally significant aquatic resources. The habitat protected by BISO is believed to be the best remaining freshwater mussel refugium in the Cumberland River system. The Big South Fork NRR is home to six federally-listed Endangered and Candidate freshwater mussel species, and is the site for a mussel reintroduction effort which could potentially add four currently extirpated federally listed species to six listed species which already occur there. Along with many other significant aquatic resources, the Obed Wild and Scenic River protects one of four remaining populations of the federally-listed Endangered purple bean (*Villosa perpurpurea*).

Large declines in the mussel fauna since the turn of the twentieth century illustrate how rapidly changes can occur. Roughly 55 species were known from the Big South Fork at the turn of the century. Prior to the reintroduction effort currently underway, only 26 of these species remained in the river, 7 having gone extinct, vanishing entirely from their historic range. Both parks are subject to a variety of potential upstream threats, including urban development, water withdrawal, agricultural activity and logging. The northern Cumberland Plateau, where BISO and OBRI are situated, produces more coal and oil than any other region in Tennessee, much of it coming from the parks' watersheds. Mining can cause contaminated mine drainage, sedimentation, and pollution from brine and other contaminants employed during mineral extraction operations. Because of the significance of the mussel fauna in these two river systems, the uncertainty of the outcome of reintroduction efforts, and the multitude of potential threats upstream from the parks, long-term trend data are needed to monitor changes in mussel populations.



Sorting and measuring mussels during a survey at BISO.

Preliminary Monitoring Objectives

Our specific objectives are to:

- 1) Determine long-term trends in species composition and age class structure of freshwater mussel populations in the mainstem rivers and major tributaries of BISO and OBRI.
- 2) Determine long-term trends in the distribution and relative abundance of freshwater mussels at BISO and OBRI.
- 3) Improve our understanding of the relationships between freshwater mussel communities and their habitats by correlating physical and chemical habitat measures with changes in mussel distribution, abundance and age class structure.

Protocol Development and Status

Mussel surveys have been completed at both BISO and OBRI (Ahlstedt et al. 2001, Ahlstedt et al. 2002). Steve Ahlstedt (USGS, retired) and Monte McGregor (KDFWR) have contributed to the development of a long-term monitoring protocol which will incorporate the findings of these surveys, as well as the design of the mussel reintroduction project at BISO. It is likely the protocol will include a combination of timed searches as well as fixed transects for measuring



population parameters. An important metric will be numbers of individuals within size classes, as a measure of recruitment and an indicator of population health. Timed searches for rare mussels will likely be undertaken because many of the listed mussels are so rare, and so widely scattered, that conventional transect methods are not adequate to detect trends. In addition, a more comprehensive survey of the rivers and main tributaries will be periodically undertaken (every 5 to 10 years) to determine whether colonization is occurring in previously unoccupied sites.

Contact Information

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