



## Rare Fish Monitoring

### Affected Parks

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



**Endangered tuxedo darter (*Etheostoma lemniscatum*) – only 4 populations remain in existence**  
(Photo: Conservation Fisheries Inc.)

### Importance / Issues

The tuxedo darter (*Etheostoma lemniscatum*), is a Federally-listed Endangered species, which occurs entirely within the Big South Fork National River and Recreation Area. The tuxedo darter population is one of four populations of the previously named duskytail darter (*Etheostoma percnurum*) described in the USFWS Recovery Plan. These populations are all geographically isolated and relatively restricted in size, and all except the tuxedo darter are located in the Tennessee River drainage. NPS-contracted surveys of the park's rivers have expanded the known range of the Big South Fork population to a dozen shoals along the most pristine and inaccessible portions of the river.

The spotfin chub (*Erimonax monachus*), a federally-listed Threatened species, is restricted to clear upland streams in the Tennessee River drainage. In recent decades, it has disappeared from much of its former range, and some of its best remaining habitat occurs in the Obed-Emory watershed.



**Threatened spotfin chub (*Erimonax monachus*) – OBRI's population is one of 4 that survive, and is the only one protected** (Photo: Tennessee Tech University)

### Monitoring Objectives

Specific objectives are to:

1. Determine long-term trends in the abundance of tuxedo darter populations at selected index sites at BISO.
2. Determine long-term trends in the abundance of spotfin chub populations at selected index sites at OBRI.
3. Correlate changes in physical and chemical habitat measures with changes in the distribution and abundance of these fish.

### Protocol Development and Status

Monitoring protocols for both species are currently being developed. For tuxedo darter, Appalachian Highlands I&M Network (APHN) crews completed pilot snorkeling surveys in 2012. The draft protocol calls for random sampling along underwater transects at selected index sites where the species is known to have healthy populations. Fish are counted as we encounter them in their natural habitat. We record data on abundance,

density and catch per unit effort (because we don't handle the fish, we're not able to determine year class or sex). From the three years of data collected to date, meaningful annual increases or declines in abundance cannot yet be determined, however, within a few years, our ability to detect quantitative trends will improve. The tuxedo darter protocol will be finalized in early 2014.

In 2012, APHN quantitatively sampled spotfin chub at four index sites in the Obed/Emory system, three of which had four previous years of data . Our sampling techniques are similar to those used for tuxedo darter, except we use a variation of random sampling called "adaptive cluster sampling" (ACS). This kind of sampling is more efficient with species which have a clustered distribution throughout a site. With spotfin chub, we're collecting data on abundance, density, and catch per unit effort, but also distinguishing among adults, juveniles and males in breeding color. We also did a qualitative search of four upstream sites in 2012, places where the chub was known to occur a decade ago, but where their numbers appear to have declined. Preliminary results from 2012 indicate that spotfin chub numbers seem to be relatively stable at our quantitative sites where repeated sampling has occurred. Reports containing annual sampling results will be published for both species.

### **Management Applications**

Severe water quality problems exist at BISO. The Big South Fork system has been, and continues to be, heavily impacted by coal mining activities due mainly to acid mine drainage and siltation, particularly in the New River watershed. Some headwater streams in these drainages are completely devoid of life; others are habitat for only the most pollution-tolerant organisms. The Big South Fork and its major tributaries are impacted by forestry practices, municipal and domestic

waste, agricultural runoff, and oil and gas operations, as well as by water withdrawal.

The water resources of the Obed Wild and Scenic River drainage have historically been impacted by pollution associated with agriculture, forestry, and coal mining. In recent years, urban development in the upper reaches of the system has created greater pressures on water quality and quantity in the park, which could directly impact the Obed River and its two largest tributaries - Clear Creek and Daddy's Creek.

Because of the significance of the tuxedo darter and spotfin chub populations protected by these parks, and the multitude of potential upstream threats, long-term trend data are needed to monitor changes in these populations. Tracking rare fish population trends through time, in combination with our other aquatic-related long-term monitoring projects (water quality/quantity, aquatic macroinvertebrates and freshwater mussels), will provide park managers with the level of information they need to determine whether changes in management are warranted.

### **Contact Information**

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