

## **Emory River Watershed Biological Assessment**

### **Quarterly Report April 2005**

The overall objective of the Emory River Watershed Biological Assessment Project is to determine the current diversity and habitat condition for fish, mussels, and macroinvertebrates within the Emory River Watershed. Specific attention is being given to federally-listed endangered and threatened species, including the spotfin chub (*Erimonax monachus*) and the Purple Bean Mussel (*Villosa perpurpurea*). To help accomplish this objective, historical water quality, fish, mussel, and macroinvertebrate data have been gathered and entered into a database that is GIS-linked to assess associated land use influences.

As stated in the previous quarterly report, the entire Emory River Watershed has been visited and sampling locations have been identified after consultation with Tennessee Wildlife Resources Agency (TWRA), Tennessee Valley Authority (TVA), United States Geological Survey (USGS), Tennessee Department of Environment and Conservation (TDEC), and National Park Service (NPS) personnel. To date, 22 electrofishing sites and eight seasonal snorkeling sites have been sampled. Habitat parameters have been measured at all sites and include: percent composition of habitat units (i.e., riffle, run, pool, cascade), percent composition of substrate, gradient, width, depth, water temperature, conductivity, dissolved oxygen, pH, turbidity, and flow. Additionally, at seasonal snorkel sites, lab water quality parameters (Ammonia, Total Nitrogen, Total Phosphorus, and Sediment) have been measured.

To assess seasonal habitat use by spotfin chubs, eight sample sites were snorkeled during Spring, Summer, and Fall 2004, and Winter 2005 (Table 1). The three sites within

the Emory River (Nemo, Deermont, and Oakdale) contained more spotfin chubs than sites in Obed River (Obed Junction), Daddys Creek (Devils Breakfast Table and Daddys Junction), and Clear Creek (Lilly Bridge and Jett Bridge). Adult and young-of-the-year chubs were common in Emory River sites. Digital underwater photos were obtained of fish while snorkeling. The site at Deermont had the greatest numbers of fish during summer and fall samples. The majority of spotfin chubs were found in run habitats over firm (bedrock or boulder) substrates; however, a sample from Oakdale in November 2004 found approximately 50% of fish in pools. Also, 17% of spotfin chubs observed in this sample were found over fines. These observations are the first indication that spotfin chubs in the Emory River Watershed may occupy different habitats during high flow, low water temperature conditions. During winter sampling in January 2005, spotfin chubs were located at two of the eight sites. Twenty individuals were found at Deermont on the Emory River, and all fish were found in side-channel eddies over fine substrates. Four fish were located at Jett Bridge on Clear Creek and these fish occupied pools with a boulder substrate. Spring snorkel samples will begin in May 2005.

Fish communities have been sampled using electrofishing gear in Obed River and Daddys Creek (22 sample sites; 12 within Daddys Creek Watershed and 10 in the Obed River Watershed; Table 2). Some samples were collected with assistance from TVA, TWRA, TDEC, and Conservation Fisheries, Inc. All fish collected were identified, enumerated, and released. To date, only three spotfin chubs have been collected while electrofishing, all from the Daddys Junction site in the Daddys Creek Watershed. Species richness in the Daddys Creek Watershed varied from six species (Lick Creek and Upper Daddys Creek sites) to 18 species (Hebbertsburg site); the Daddys Junction site

had 17 species. In the Obed River Watershed, species richness ranged from two species (Fox Creek) to 17 species (Potters Ford site). Electrofishing of Clear Creek and Emory River sites will be conducted in summer and fall 2005.

Benthic macroinvertebrates have been sampled from all sample sites where electrofishing has been performed, and from the eight seasonal sites during Fall 2004 and Winter 2005. Qualitative samples were obtained using a 1.0 square meter kick screen. Processing of macroinvertebrate samples is continuing and results from the seasonal sites are included in this report. Sampling will continue during 2005, with samples from electrofishing sites in Clear Creek and Emory River, in addition to continued seasonal sampling of the eight snorkeling sites.

Seasonal benthic macroinvertebrate samples were analyzed using TDEC's (2002) standard operating procedure. Metric values were compared to standards established for Ecoregion 68A in Tennessee to obtain a biotic index score for each sample. Taxa Richness (TR) varied between the two seasons within benthic communities (Appendix); however, highest values were found during Winter 2005. Devil's Breakfast Table (DBT) on Daddys Creek had the highest TR value during Winter 2005 with 36 taxa present, followed by 34 taxa at the Emory River Deermont site during the same season. The DBT site yielded the second lowest TR of 17 during Fall 2004. The Oakdale site on the Emory River had the lowest TR with 16 taxa collected during November 2004; however, 31 taxa were collected from this site during Winter 2005. Maximum EPT (Ephemeroptera, Plecoptera, Trichoptera) Richness values were found during Winter 2005 at the Devil's Breakfast Table site on Daddys Creek and at the Obed Junction site on the Obed River; both sites had EPT values of 17. The lowest EPT value was recorded from Fall 2004

samples at Jett Bridge on Clear Creek (EPT = 8). Percent EPT (%EPT) varied from a low of 14.22% at the Deermont site on the Emory River to a high of 89.11% at the Oakdale site on the Emory River. Both values were obtained from Fall 2004 samples. Oligochaetes and chironomids were not common at any site and therefore % Oligochaete/Chironomid (%OC) values were low. Values ranged from 0% at Jett Bridge (Clear Creek) during fall and winter and at Deermont (Emory River) during Fall 2004 to 17.37% during winter at Nemo (Emory River). North Carolina Biotic Index (NCBI) scores were low indicating that the organisms collected were adapted to good water quality. The lowest score was obtained during Winter 2005 at Jett Bridge on Clear Creek (NCBI = 2.44) and the highest score (NCBI = 3.87) was obtained during Fall 2004 at both Nemo and Oakdale on the Emory River. No benthic organisms were found to be excessively dominant in any samples, and the percentage of dominant organisms (% Dominant) ranged from a low of 11.97% at Nemo on the Emory River during Winter 2005 to a high of 44.60% at Oakdale on the Emory River during Fall 2004. Low percentages of dominant organisms are indicative of diverse and healthy benthic macroinvertebrate communities. Clinger organisms (% Clingers) were relatively abundant in the samples. The best value for this metric was obtained from the fall sample at Jett Bridge on Clear Creek (% Dominant = 94.20%), while the lowest value was from the Winter 2005 sample collected at Lily Bridge on Clear Creek (% Dominant = 36.84%). High percentages of clingers are indicative of healthy benthic communities.

Benthic macroinvertebrate samples from the seasonal sites resulted in all Winter 2005 samples having biotic index scores indicative of a non-impaired condition (Table 3). Two of the Fall 2004 samples (Jett Bridge on Clear Creek and Deermont on the

Emory River) had biotic index scores indicative of slight impairment. However, Winter 2005 biotic index scores for these sites improved.

To date, six mussel species have been observed while snorkeling, including one freshly dead Purple Bean mussel on the Obed River. On March 23, 2005, a verified extant *Villosa perpurpurea*, (purple bean mussel), was found while snorkeling the Emory River at Deermont. Dr. Jim Layzer (TTU) confirmed the identity of this specimen. The exact location was 36013N, 0843438W. To our knowledge, the last extant Purple Bean Mussel was found in the Obed River above the confluence with the Emory River on August 8, 2001. Also, through communication with Steve Bakaletz (National Park Service, Big South Fork) the Purple Bean Mussel has never been found this far downstream on the Emory River.

#### References Cited

Tennessee Department of Environment and Conservation. 2002. Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys. Division of Water Pollution Control, Nashville, Tennessee.

## Appendix