INVERTEBRATE COMMUNITY DYNAMICS DURING A STREAM REHABILITATION EXERCISE

Charles M. Cooper and Sam Testa, III*

ABSTRACT: Little Topashaw Creek (LTC) is typical of streams in north-central Mississippi that are adversely affected by channel incision processes due to regional geomorphic instability and disturbance. Stream conditions resulting from channel incision at LTC have included bed degradation, massive bank failure, channel widening, loss of stable aquatic habitat structures, and loss of water depth and pool habitats resulting in a generally uniformly shallow water column over shifting sand substrate. As part of an attempt to stabilize a 2-kilometer portion of LTC, 72 large woody debris (LWD) structures were placed strategically within the channel. Constructed from over 1,100 trees, these structures theoretically would provide stream bank stabilization, increase average water depth, serve as a source of organic matter, and provide more stable habitat to the system with the overall intent of restoring better ecological condition. Structures were inserted during August and September, 2000. An on-going drought in the region prevented substantial interaction of the stream with the LWD structures during 2000. Large flow events during the spring of 2001 caused notable alteration of stream conditions to occur in the treatment sub-reaches before the second invertebrate sampling event, including increases in local water depths (~2x) adjacent to treatment structures. Collections of invertebrates were made twice annually in five 150-meter-long sub-reaches during years 1999, 2000 and 2001. Sampling sites included one site upstream of treatment, two within the treatment area, and two sites downstream of treatment. Invertebrate samples were taken in June and October of each year using a variety of techniques, including; large woody debris brushings, coarse particulate organic matter (leafpack) grabs, quantitative streambed (Surber) samples, and aquatic net sweepings representing all major habitats. Conditions associated with treatment structures significantly decreased numbers of individuals collected, especially for chironomid midges (Diptera: Chironomidae). Invertebrate taxa richness was not substantially affected by treatment. Community measures (Simpson index, Shannon index and Evenness) showed positive response to stream treatment, both within the treatment reach, and, to some extent, the two downstream sub-reaches. Most notable changes observed after treatment were increases in abundance of Baetis (Ephemeroptera: Baetidae) mayflies, physid snails (Mollusca: Physidae), and annelid worms (Annelida: Oligochaeta) in the treatment and downstream sub-reaches. Largest decreases in abundance of invertebrates in the treatment and downstream sub-reaches were observed for Chironomidae, Cheumatopsyche (Trichoptera: Hydropsychidae) caddisflies, Heptageniidae (Ephemeroptera) mayflies, Prosimulium (Diptera: Simuliidae) blackflies, Bezzia (Diptera: Ceratopogonidae) biting midges, and Stenelmis (Coleoptera: Elmidae) beetles.

Submitted to Proceedings of the 2002 Annual Conference of the American Water Resources Association, AWRA, Middleburg, VA.

*Respectively, USDA, Agricultural Research Service, National Sedimentation Laboratory, P.O. Box 1157, Oxford, MS 38655 (662-232-2900; E-Mail: ccooper@ars.usda.gov; stesta@ars.usda.gov).