

FISH ASSEMBLAGE STRUCTURE AND ASSOCIATIONS WITH ENVIRONMENTAL CONDITIONS IN A TEXAS SPRING-FED RIVER

TCAFS members at Texas State University – San Marcos sampled the Devils River bimonthly from September 2007 through October 2008 to quantify parapatric fish assemblages within the Devils River.

Abstract for talk presented at 2009 Texas Chapter AFS meeting in Fort Worth, TX:

Numerous spring systems in the Edwards Plateau and Trans-Pecos regions of Texas support parapatric fish assemblages, spring-associated species and riverine species. Previous studies have identified constant water temperature as the segregating factor but have lacked the ability to effectively distinguish temperature from headwater influence. Multiple spring sources along a 64 km course of the Devils River, Texas allowed an opportunity to assess the influence of temperature and other variables (i.e., current velocity, depth, and substrate) on spatial and temporal patterns in the fish assemblage. Physical parameters (10.6%), site (4.9%), and season (1.6%) explained 19.6% (CCA, $P < 0.01$) of the Devils River fish assemblage. Current velocity, depth, and vegetation were among the strongest factors explaining fish segregation. *Astyanax mexicanus* and *Cyprinella proserpina* were generally found in riffle habitats, *Etheostoma grahmi*, and *Notropis amabilis* were found in runs with moderate current velocities and depths, and *Micropterus salmoides*, *Lepomis macrochirus*, and *Dionda diaboli* were more associated with deeper, vegetated pools. Water temperature influenced seasonal movement of spring associated species (i.e., *A. mexicanus*, *N. amabilis*, *C. Proserpina*, *Dionda argentosa*, and *E. grahmi*) into spring outflow habitats during summer and winter and resulted in a segregated assemblage. Surprisingly, the abundance and distribution of the federally threatened *Dionda diaboli*, a species listed as a spring-associate, did not correlate with spring outflows and was present throughout the Devils River. This study suggests spring flow (i.e., current velocity and depth) and constant water temperature are segregating factors and important for maintaining parapatric assemblages.

Contact Information for the project:

Tim Bonner (Associate Professor)
Texas State University – San Marcos
Tbonner@txstate.edu

Kristy Kollaus (Graduate Student)
Texas State University – San Marcos
kkollaus@hotmail.com



TCAFS Figure 1

Texas State University – San Marcos students sampling at Finnegan Springs on the Devils River (August 2008). Left to right: Josh Perkin, Kristy Kollaus, and Jessica Strickland.



TCAFS Figure 2

TCAFS members identifying fish species collected from a spring outflow on the Devils River. Left to right: Josh Perkin, Tim Bonner, and Kristy Kollaus.



TCAFS Figure 3

The federally threatened Devils River minnow *Dionda diaboli* collected 1.5 km upstream of Finnegan Springs in the Devils River.