

# THE EFFECTS OF FISH PREDATION AND THERMAL REGIME ON AN AQUATIC MACROARTHROPOD COMMUNITY

---

Author: Gary Allen Wellborn

The effects of vertebrate predation and thermal regime on a littoral macroarthropod community were evaluated during a one year study of Fairfield Reservoir, Freestone County, Texas. Twelve sample sites were established, with each consisting of two 2 x 4 m plots. One plot was inaccessible to fish predators, the other plot was freely accessible to fish. Artificial substrates which mimicked natural vegetation were placed in each plot to allow quantitative sampling of macrophyte-dwelling invertebrates. This design allowed assessment of the impact of vertebrate predation on invertebrate species. Half of the sample stations were located in a warm water cooling pond receiving a thermal discharge from a steam electric generating facility. The remaining stations were located in a main reservoir cove sufficiently distant from the thermal discharge to be minimally affected. Comparison of macroarthropod samples from these areas of disparate thermal conditions allowed an evaluation of the role of thermal regime in the determination of community structure.

In the main reservoir, total invertebrate abundance was significantly higher in predator exclusion plots than plots accessible to fish predators. When taxa were examined individually, *Hyaella azteca* and *Orthotrichia* sp. had significantly greater abundance in the absence of fish predation. These taxa were major components of the main reservoir fauna. Zygopteran abundance was significantly reduced in fish exclusion plots. In addition to species-specific predator susceptibility, macroarthropod response to predator density manipulation often exhibited significant spatial heterogeneity and temporal inconstancy. In contrast to results obtained under a natural thermal regime, predator exclusion plots in the cooling pond had significantly lower invertebrate abundance than predator accessible plots.

Thermal regime had a major influence on invertebrate abundance and community structure. The heated waters of the cooling pond usually supported fewer invertebrates than main reservoir locations. High water temperatures during summer months eliminated all macroarthropods in the cooling pond. As cooling pond temperatures declined in late fall, macroarthropod abundance temporarily increased to very high levels, perhaps due to an accrual of nutrients throughout the uninhabitable summer months. A further effect of the elevated thermal regime was a reduction of diversity. Chironomidae, *Hyaella*, and, to a lesser extent, *Orthotrichia* constituted the fauna of the cooling pond, while main reservoir sites supported several additional common taxa.

*Masters Thesis*  
*Department of Biology*  
*The University of Texas at Arlington*  
*Arlington, Texas 76019*