



Aquatic Invertebrate Community Monitoring at Pipestone National Monument

Importance: The canary in the mine and the bugs in the creek

The National Park Service monitors water quality and aquatic invertebrates, the insect larvae and nymphs, worms, and other animals without backbones that live in water, in prairie streams at several Midwestern parks. Monitoring began in Pipestone Creek at Pipestone NM (Monument) in 1989. Trends in invertebrate abundance and diversity, particularly for three insect orders that are intolerant of stream disturbance, can indicate trends in water quality within the creek. Coupling invertebrate community data with measurements of physical characteristics of the creek tells Monument managers about stream conditions. Agricultural practices and urbanization have affected Pipestone Creek's water quality and have caused Monument managers concern about creek conditions.



Long Term Monitoring: Using indices to determine conditions¹

The Heartland Network Inventory and Monitoring Program uses established methods to monitor aquatic invertebrate communities and water quality parameters in Pipestone Creek. The objectives of monitoring are to: (1) determine the status and trends of invertebrate diversity and abundance and related community indices of condition, and (2) relate the invertebrate community conditions to overall water quality and habitat conditions. Summary results for invertebrate community indices include EPT (orders of Ephemeroptera, Plecoptera, Trichoptera) Richness (Figure 1). The EPT Richness tells Monument managers about species diversity and abundance for orders that are intolerant of habitat disturbance. Generally the greater the EPT Richness value, the less pollution and perturbation occurring in the stream.

Status and Trends: Improvements followed by stability in a heavily impacted stream

Measures of invertebrate community integrity and water quality in Pipestone Creek within the Monument have remained fairly consistent over 13 years of sampling. With the exception of turbidity and *E. coli* levels, water quality is generally good. Scientists attribute any impairment of creek resources to activities upstream and outside of the Monument

Additionally, scientists observed:

1. Low index scores in 1998 probably reflect sampling errors and not real conditions; and
2. None of the values calculated for indices of condition currently exceed the warning thresholds that trigger management action.

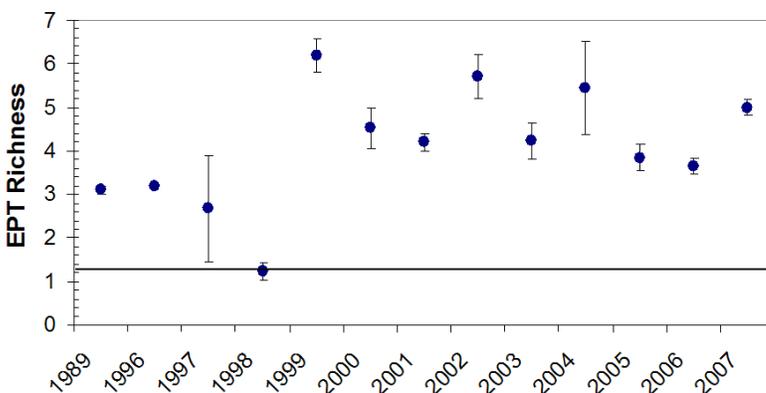


Figure 1: Control chart for EPT richness for Pipestone Creek. Points are means for a given sampling date and the vertical bars are standard errors. The horizontal line represents the warning threshold for management action.

Heartland Network Inventory and Monitoring Program of the National Park Service. Visit www.nps.gov/im/units/htln/index.htm

... protecting the habitat of our heritage



¹Bowles, D. E. 2009. Aquatic invertebrate monitoring at Pipestone National Monument: 2005-2007 trend report. Natural Resource Technical Report NPS/HTLN/NRTR—2009/241. National Park Service, Fort Collins, Colorado.