

Development of an Invertebrate-based Terrestrial Index of Biotic Integrity

Principal Investigator: Diane M. Debinski
Student Investigator: Jessica Orlofske (M.S.)
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Goals and Objectives:

- Design an effective, reliable, consistent and non-technical sampling protocol for a diverse set of prairie invertebrates.
 - Broaden the number of invertebrate groups that can be used in biotic integrity indices.
 - Develop an efficient method of analyzing the data to determine site quality.
 - Test the proposed index on a variety of prairie sites.
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Introduction:

Biotic integrity, the capacity of an area to support and maintain the appropriate diversity of organisms that allow for a functional, adaptive system comparable to natural habitat of the same type, is difficult to measure directly. Invertebrate assessment as part of an index of biotic integrity, a measurement of the quality of the system based on the resident organisms, has been used extensively and productively in aquatic ecosystems. Yet, terrestrial invertebrates used as bioindicators may be just as useful as their aquatic counterparts. Terrestrial invertebrates possess many of the same character traits that enabled scientists to develop the indices for aquatic systems. Invertebrates compose a significant proportion of all terrestrial life and perform critical ecosystem services: pollination and decomposition which contributes to soil fertility and plant productivity. Invertebrates possess sensitivity to environmental alterations and can respond in abundance and distribution because of short generation times and high fecundity. The scientific and professional communities have demonstrated a need for a non-technical, inexpensive, and effective tool for environmental monitoring and assessment. In Iowa the greatest need for the development of such an index is for prairies and prairie restorations. However, such methodology for community indices remains underdeveloped, and that which has been proposed remains untested.

The purpose of this research is to overcome the sampling and taxonomic obstacles and make critical progress toward a terrestrial index of biotic integrity for Iowa's vital and disappearing tall grass prairie ecosystem. The results will include effective sampling protocols, identification of important invertebrate bioindicators, a standardized method of analysis and a preliminary tool for private and public landowners and managers.

Progress:

Thirty federal, state, county, and private prairies are being used for this research. The prairies were divided into 3 categories: remnant, restored and integrated reconstruction. Invertebrates were sampled with 3 collection methods: sweep nets, pitfall traps, and Berlese-tullgren soil samples. Sampling took place each month (June, July and August) during the summer of 2006. Five hundred and forty sweep net samples, 1350 pitfall samples and 90 soil samples were successfully collected. The invertebrates in the samples are being identified to family and to lower taxonomic levels, if possible, and statistical analysis will follow.

Future Plans:

Additional, but more targeted invertebrate collections may be conducted next season (2007), to test the effectiveness of the sampling, identification and statistical methods.