The Impact of Urbanization Across a Rural to Urban Gradient Throughout the Milwaukee Area

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Introduction

The process of urbanization results in changes in the natural habitat. These changes are reflected in the physical characteristics of the landscape. A rural to urban gradient consists of a pristine area which has minimal disruption and has not changed over a long period of time. As you move further along the gradient, disruption increases until it reaches a maximum at an urban core where the habitat has been continually changed over a long period of time.

The rural to urban gradient concept is important because it shows how habitats and the species within them change as environment changes.

We have used the studies of McKinney and Blair as a background for our research. McKinney summarized that as urbanization increases, species diversity decreases. Blair summarized that there is no definite pattern of an increase or decrease in species pattern along a rural to urban gradient. We wanted to test their findings along our gradient to compare any similarities.

Hypothesis: As urbanization increases from a pristine habitat to an urban core species diversity, evenness, and richness will decrease.
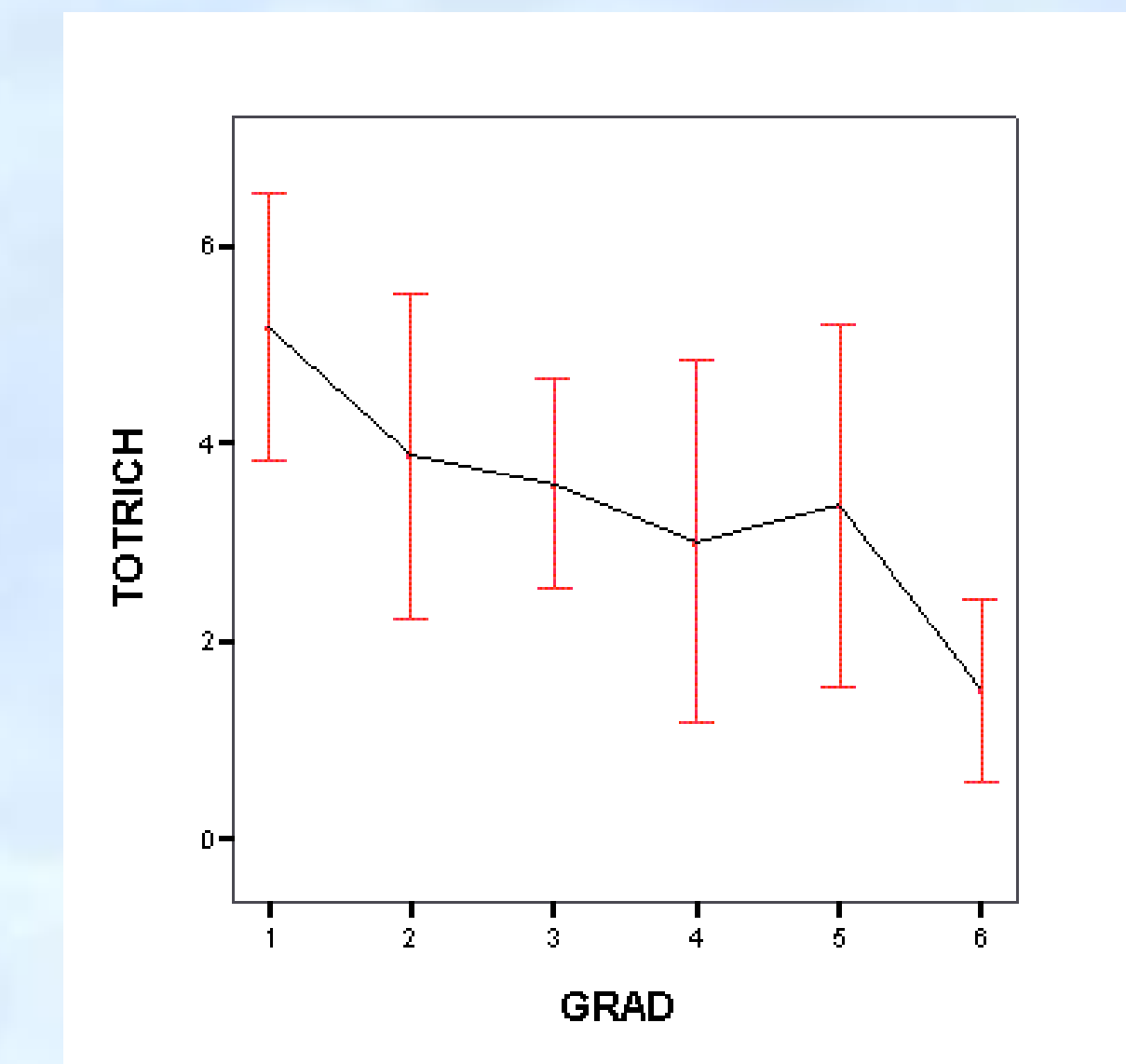
Methods

- Seven sites were chosen to collect data: University of Wisconsin Milwaukee Field Station (UWMFS), River Edge Park (Milwaukee River), the Urban Ecology Center (UEC), Hubbard Park (Milwaukee River), Lake Park Golf Course, a Milwaukee residential area, and the University of Wisconsin Milwaukee campus (UWM).

- At each site, the date, location, time of day, and temperature (C) were collected, as well as wind and sky conditions using the Beaufort Scale.

- Bird data was collected using 10 minute point counts following BBIRD standards, and identified.

- Tree data was collected by creating a 10m x 10m plot. The number, species, and circumference of the trees was recorded in that area.

- Aquatic macro-invertebrate data was collected using the kick-net method. The aquatic macro invertebrates were identified and counted in the laboratory.
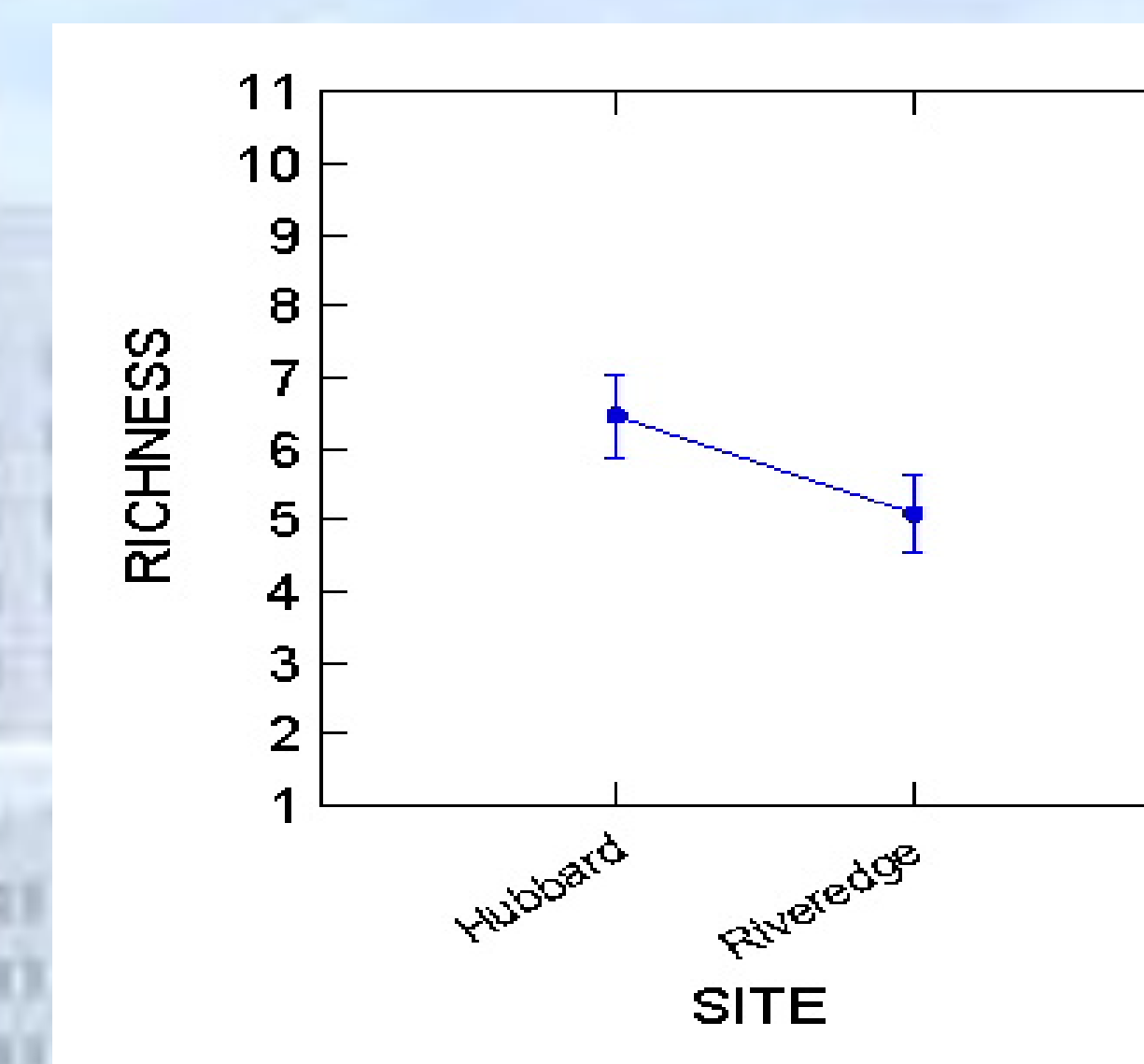
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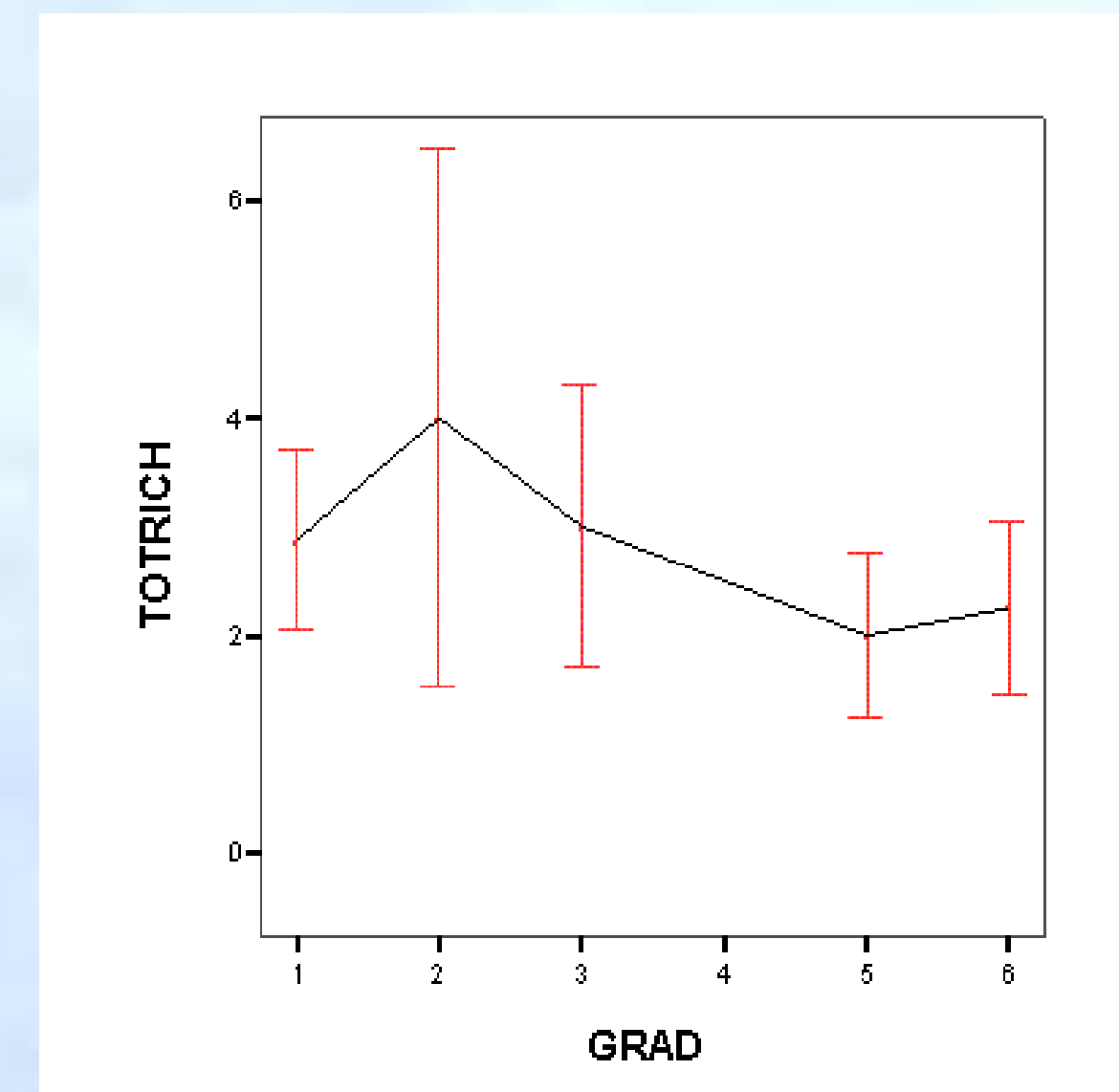
Graph showing the relationship of total richness of tree species along the gradient from rural pristine (1) to urban core (6).

Graph showing the relationship of total richness of aquatic macro-invertebrate species at the two locations sampled.

Graph showing a relative decrease in total richness of bird species along the gradient from rural pristine (1) to urban core (6).

Conclusions

- We found that for species richness and diversity for trees, stability occurred in the rural pristine areas and decreased as the areas became more urban. Evenness in trees was found to fluctuate across the gradient with no particular pattern.

- Richness, evenness, and diversity for birds decreased as the gradient moved towards an urban area which was what our hypothesis predicted.

- Richness, diversity, and evenness for aquatic macro-invertebrates sampled, showed no major differences between the two locations.

Literature Cited

Blair, Robert B. 1996. Land Use and Avian Species Diversity along and Urban Gradient. Ecological Applications **6(2)**: 506-519.

KcKinney, Michael L. 2002. Urbanization, Biodiversity, and Conservation. BioScience **52(10)**:883-890