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Abstracts

IMPROVED METHOD FOR UTILIZING NITROGEN AS A GREEN ALTERNATIVE FOR INSECT CONTROL IN MAINTAINING SMALL HERBARIUM COLLECTIONS

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A PROTECTIVE ROLE FOR AVIAN DIVERSITY IN THE UNITED STATES WEST NILE VIRUS EPIDEMIC

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West Nile Virus (WNV) is a mosquito-borne flavivirus that is carried by birds and transmitted by mosquitoes. Since the introduction of an especially virulent strain to New York City, U.S.A. in 1999, WNV has spread across much of North America, causing over 16,000 reported human cases in the U.S. alone, including more than 650 deaths. WNV is widely believed to occur at higher incidence in urban areas, presumably due to the urban distributions of the most competent vector mosquitoes, which may lead to greater amplification of WNV within bird communities and exposure of humans to the disease. However, it is possible that the reported urban distribution in incidence might be due to urbanization-induced changes in bird communities. Recent ecological theory suggests that variation in host diversity can impact human disease risk—a hypothesis known as the dilution effect—whereby a diverse assemblage of hosts is expected to dilute pathogen transmission by deflecting vector blood meals onto less reservoir-competent hosts. Experimental evidence, while still incomplete, indicates that reservoir-competence for the transmission of WNV to uninfected mosquitoes varies among bird species, with only a few North American species being highly competent. Thus, the 'dilution effect' may be operating in WNV transmission, and we expect to find a negative association between bird diversity and WNV incidence in mosquitoes and humans. In the summer of 2004 we organized a large-scale study in the Saint Louis, Missouri region to determine if the incidence of WNV was more closely related to the abundance of vector mosquitoes or the diversity of bird communities along urban-to-rural gradients. Our results indicated that only low bird diversity was an important predictor of high WNV incidence in vector mosquitoes. Further investigations using county-level data from across the U.S. also supported the dilution effect hypothesis but indicated a negative relationship between human *per capita* incidence of WNV and human population density, directly

contradicting the urban paradigm in WNV research. We suggest that future efforts to control WNV should combine existing vector control programs with efforts to conserve bird diversity, for instance via habitat conservation in urban and agricultural landscapes.

Keywords: *West Nile Virus, disease ecology, urbanization, dilution effect*

COMPARING FLORISTIC QUALITY OF NATIVE VERSUS PLANTED GRASSLANDS IN NORTHEAST KANSAS

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We undertook floristic studies of 104 grasslands in the tallgrass prairie region of Kansas to examine differences in the floristic quality of five common grassland systems. The different grassland systems were warm-season prairie hay meadows, warm-season native pastures, cool-season planted hay fields, cool-season planted pastures, and Conservation Reserve Program fields. We recorded a total of 383 vascular plant taxa of which 79% were native and 21% were non-native. Our results show that warm-season hay meadows exhibit highest species richness (256 taxa) and are habitats for highly conservative native taxa, while planted grasslands have a higher number of alien taxa and lower species richness. Our study shows that warm-season hay meadows form important islands of plant biodiversity with the capability of supporting threatened and endangered plants.
We computed Floristic Quality Assessment Index (FQI) values, which ranged from 0.3 for a cool-season pasture to 41 for warm-season prairie hay meadows while modified FQI ranged from 0.09 for a cool-season pasture to 4.48 for a warm-season prairie hay meadow. We conclude that warm-season prairie hay meadows are the few remaining reservoirs of native prairie species and need to be protected in perpetuity. These results have significant implications for future management practices.

Keywords: *Kansas, prairies, floristic quality assessment, grasslands*

TEMPORAL AND SPATIAL VARIATION OF FLORAL RESOURCES FOR PRAIRIE POLLINATORS IN FRAGMENTED LANDSCAPES

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The tallgrass prairie ecosystem in Iowa has been extremely fragmented, with 99.9% of the prairie converted to agricultural uses. Many prairie plant species are now found in small and isolated populations, which can shorten their long-term population viability. Smaller remnant areas are thought to support less diversity than the larger prairie preserves, and fragmentation is also thought to decrease pollinator diversity. I examined the abundance and diversity of floral resources available to pollinators at prairie preserves and railroad remnants in the northwestern _ of Iowa to determine variation in their spatial and temporal characteristics. I measured floral resources at the sites by directly counting the number of ramets of each species in flower in 5m X 100m strip transects each month from May until August in 2003 and 2004. The diversity in flowering ramets per unit area showed significant variation between large preserves and small

railroad remnants in May and July, but not June and August in 2004. The direction of higher diversity was also variable, with railroads having higher diversity than preserves in May, but preserves having higher diversity in July. In 2003 diversity did not differ significantly between preserves and remnants in any month. Species richness did not differ significantly between the site types (railroad remnants vs. preserves), although some months had marginal differences. Using a related study on wild bees at the same field sites, relationships between bee abundance and diversity and the availability of floral resources are underway.

Keywords*: floral resources, fragmentation, Iowa prairie, plant diversity.*

MACROINVERTEBRATE DIVERSITY, FUNCTIONAL STRUCTURE, AND HABITAT ASSOCIATIONS IN A RESTORED LARGE RIVER FLOODPLAIN SYSTEM

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Macroinvertebrates are fundamental components of aquatic ecosystem structure and function and are a vital conduit for energy flow between primary producers and higher trophic levels. Aquatic macroinvertebrate productivity is linked to habitat quality and dynamics of hydrology in large river floodplain systems; therefore, it is essential to understand and protect these systems. Conceptual models such as the River Continuum Concept (RCC) and the Flood Pulse Concept (FPC) are used to explain patterns in stream energetics, macroinvertebrate functional groups, and habitat diversity of typical river ecosystems. These models stress the important influence of gradients in physical habitat conditions and energetic resources in determining aquatic macroinvertebrate functional structure in lotic ecosystems. I will describe aquatic macroinvertebrate assemblages and functional structure in various habitats in a restored Illinois River floodplain backwater located in Calhoun County, Illinois. Results will be examined in the context of models such as the RCC and FPC. An experimental project in which different vegetated backwater habitats were manipulated to determine the effects macrophyte presence and density on aquatic macroinvertebrate abundance, biomass, and diversity will also be presented.

Keywords: *Macroinvertebrate, Large River, Floodplain, Wetland*