

ECOSYSTEM ECOLOGY
Abstracts

THE EFFECTS OF BURNING AND MOWING ON DETRITUS AND SOIL FAUNA OF A TALLGRASS
PRAIRIE

Larimer, A., Mitros, C., Wang, H., and Brown, J.

Grinnell College, Grinnell, Iowa 50112

Prescribed burning and mowing are commonly applied management techniques in tallgrass prairie restorations, as they are thought to mimic historical impacts of wildfires and migratory grazers. These practices alter biotic and abiotic conditions influencing both the floral and faunal composition of the prairie, although few studies have examined their impact on the invertebrate community. We investigated the effects of eight years of spring burning and five years of mid-summer mowing on the plant and soil invertebrate community in experimental plots within a 17 year-old reconstructed tallgrass prairie in central Iowa. We quantified the responses of three distinct invertebrate groups: litter arthropods caught in pitfall traps, soil microarthropods, and soil nematodes. These groups exhibit important interactions with other biota as well as sensitivity to changes in soil and environmental conditions. The abundance of litter Collembola, specifically Isotomidae, decreased as a result of burning, while ant abundance increased. Burning also significantly reduced nematode abundance in plots. Herbivorous nematodes were found to be the most fire-resistant of the five nematode feeding groups. In contrast, mowing explained the greatest variation in the soil microarthropod community, with a significantly higher number of individuals found in unmowed plots. Mowed plots had significantly lower ANPP and stem density of Asteraceae, while burned plots had significantly higher stem density of the dominant grass, *Andropogon gerardii*, and the legume *Lespedeza capitata*. Therefore, this study reveals the influences of these management practices on both native prairie plants and invertebrates. The opposite effects of burning on different aboveground taxa points to the need for future studies seeking to understand interspecific interactions within the detritus layer. Along with the immediate physical responses of the plots to burning and mowing, more gradual alterations in the underground chemical composition, especially the C:N ratio of soil and roots, may be accountable for variation witnessed within soil invertebrates.

Keywords: prairie restoration, invertebrates, nematodes

BOREAL PEATLAND INITIATION IN WESTERN CANADA

Bloise R.E.

Department of Plant Biology, Southern Illinois University, Carbondale, IL 62901

Peatlands, wetlands that form peat, the build up of poorly decayed organic material, cover approximately 20% of the landscape in Canada. Peatlands in boreal Western Canada began developing in the mid-Holocene period, approximately 8000 to 4000 years Before Present, after the Laurentide ice sheet retreated. Peatlands then spread across boreal Canada by one of two

methods: paludification or terrestrialization. Peatland development and spread are affected by external (allogenic) and internal (autogenic) factors, including: climate, precipitation/evapotranspiration, hydrology, substrate, and vegetation development. Exhaustive studies have been done on the vegetation and chemistry of Canada's boreal peatlands, but few studies have compared initial substrate to peatland initiation.

Key Words: peatland, paludification, terrestrialization, wetland

VARIATION AMONG FISH SPECIES IN THE STOICHIOMETRY OF NUTRIENT EXCRETION

Torres, L.E. and Vanni, M.J.

Department of Zoology, Miami University, Oxford, OH 45056

Ecological stoichiometry theory could provide a conceptual framework for how species vary in mediating ecosystem processes and therefore shed new light on how the loss of biodiversity can affect ecosystem functioning. This study investigates how nutrient cycling rates and ratios vary among different fish species and with body size, and how rates and ratios are related to body nutrient contents. Nutrient excretion rates and body nutrient contents of seven fish species in four families were estimated in a eutrophic reservoir. Per capita nitrogen and phosphorus excretion rates increased, and mass-specific excretion rates decreased, with increasing mass. Body phosphorus content varied among species and was correlated with body mass, but this relationship varied significantly among species. In accordance with predictions of stoichiometry theory, species with low body phosphorus content tended to have high phosphorus excretion rates while those with high body phosphorus tended to have low phosphorus excretion rates. These results suggest that ecological stoichiometry can provide a conceptual framework for variation among species in nutrient cycling, and thus for evaluating the ecosystem consequences of biodiversity loss.

Keywords: stoichiometry, nutrient cycling, species identity, reservoir

BENTHIC FORAMINIFERAL ASSEMBLAGE DATA: TOWARD A PREDICTIVE MODEL OF ECOSYSTEM CHANGE, BISCAYNE BAY, FLORIDA

Williams, C.P. and Ishman, S.E.

Department of Geology, Southern Illinois University, Carbondale, IL 62901

Ecosystem restoration requires understanding of natural variability within a system so that comparison to and contrast with anthropogenic-induced change is possible. Restoration must account for anthropogenic effects, which are irreversible based upon current patterns of land use for sustainability and cost-effectiveness of any proposed transformation of land use. The goals of the Comprehensive Everglades Restoration Program are to restore natural conditions of freshwater input to the Biscayne Bay and Florida Bay ecosystems. The goals of the foraminiferal research are to identify assemblage variability between modern environments related to salinity and nutrient conditions, and in shallow (<2m) cores from Biscayne Bay, to show temporal changes in these conditions at particular sites. Changes in the assemblage data are interpreted to reveal changes in Biscayne Bay. Featherbed Bank core, central Biscayne Bay, was analyzed for foraminiferal assemblages. The core assemblage data compared to modern foraminiferal assemblage data from Biscayne Bay is used to characterize down core environmental changes. The site revealed an overall shift to more marine salinities, as indicated by significant recent influxes of *Archaias* and *Articulina*, and an inverse decline in *Criboelphidium* and *Elphidium*.

Furthermore, an increase in *Bolivina* is indicative of enriched nutrient conditions in central Biscayne Bay. Interestingly, the species diversity at this site has increased during the period of increasing nutrients and salinity. This is not surprising as foraminifera are only found in marine environments, but the data reveal that it is important to recognize that not all increases of species diversity necessarily imply ecosystem health. Low salinity environments are dominated by the presence of *Ammonia* and *Elphidium* with several samples having nearly 100% representation by these two genera alone. More marine assemblages have increased diversities with the presence of the genera *Miliolinella*, *Quinqueloculina* and *Triloculina*. The application of non-parametric trend analyses to the down core foraminiferal data is used to identify trends in the data toward specific environmental conditions. Successful results from these analyses provide a useful technique in utilizing foraminiferal data as indicators to monitor the success of restoration efforts, as well as help to develop a predictive model of ecosystem change.

Keywords: Foraminifera, Ecosystem History, Biscayne Bay, Ecosystem Restoration

NATURAL NITROGEN ABUNDANCE AND POTENTIAL IMPACTS OF INCREASING N
DEPOSITION ON BOREAL PEAT BOGS IN THE OIL SAND REGION OF ALBERTA, CANADA

Xu, Bin