theoretical framework of plant community ecology. This approach is still used extensively today and divides landscapes into response units that differ in their potential vegetation, response to management, spatial position relative to facilities and ownership boundaries. Aerial photographs, with overlays of each variable, have always been central to the approach resembling many current GIS-based land management practices. This approach is one of the first attempts to manage human-defined landscapes, however, rarely are landscape-level patterns or processes considered. Focus was almost entirely on maximizing livestock production, which frequently led to homogeneous landscapes. Over the past 20 years, rangeland management has become more complex with increased focus on multiple objectives, including wildlife management, endangered species habitat, water quality and quantity, rural/urban interface, aesthetics and recreation. In addition, recently many studies have suggested that some landscapes should be managed for heterogeneity suggesting limitations in traditional approaches. We will evaluate the traditional approach and identify barriers and advantages to integrating landscape ecology principles into the current management framework considering factors such as multiple land use objectives, flows between patches, ownership boundaries and inherent heterogeneity common to rangelands.

Gage, Stuart H.*, and Manuel Colunga-G. Weather and crop productivity in the Corn Belt: spatial and temporal interactions. Department of Entomology, Michigan State University, East Lansing, MI.

Environmental problems associated with agriculture have been the result of our inability to recognize the importance of the ecological principles that govern crop productivity. The lack of an adequate ecological characterization of agricultural regions can cause crops to be grown in alien environments with the subsequent need for infrastructure support. Our key hypothesis is that at regional scales, ecosystem processes drive crop productivity patterns. We used an array of temporal and spatial analysis technologies to analyze twenty years of agricultural yield and production data for corn and soybean and climate records to quantify the temporal dynamics of crop productivity and weather in the North Central Region. Results showed that crop productivity patterns corresponded to temporal and spatial patterns of temperature, precipitation, and soil water holding capacity. High yield patterns were observed under non-optimal ecological conditions when irrigation was used to substitute for ecological limitations. It is clear that if new crops are going to be introduced into the region, they must be preceded by knowledge of the fit of crop characteristics with the existent climate, soil, and other ecosystem features. Forcing ecosystems to respond through technological substitutes will require massive energy subsidies and will damage ecosystem integrity.

* Garman, Steven L. A forest succession metamodel for large scale, forest management assessments. Department of Forest Science, Oregon State University, Corvallis, OR.

Management objectives of forested lands in the Pacific Northwest advocate enhancing structural diversity of harvested stands, longer rotations, and greater consideration of landscape pattern effects on ecosystem properties. I developed a landscape simulation system specifically to assess alternative management strategies designed around these concepts. The system integrates vegetative dynamics and disturbance models with GIS data models. Required data layers include a vegetative patch map and environmental layers (e.g., precipitation, temperature). Initial structure and composition for each vegetative patch is derived from field plots and remote sensing. The vegetative dynamics model is a unique non-linear, stage class variant of the ZELIG.PNW gap model. It simulates transition among 3 cm size classes for individual tree species based on size class, stem crown ratio, leaf area index, and environmental conditions. Transition probabilities are derived from Monte Carlo simulations with the gap model. Disturbances include windthrow, wildfire, and

flooding. I applied the system to a proposed 200 yr landscape management plan in central Oregon. Due to retention levels, predicted timber volumes were lower than originally estimated by managers. Predicted landscape pattern deviated from desired future conditions due to differences in rates of stand development across environmental gradients. Results indicate the utility and needed refinements of this system.

Gergel, Sarah E.*[1], and Monica G. Turner[2]. The influence of levees on floodplain vegetation composition and structure along the Wisconsin River. [1]Department of Zoology and Center for Limnology, University of Wisconsin, Madison, WI and [2]Department of Zoology, University of Wisconsin, Madison, WI.

Along the Wisconsin River, century-old levees have altered the hydrologic disturbance regime, and these alterations may have affected the composition and structure of forested floodplain communities. This study examined several aspects of floodplain community composition and structure to determine: Does the diversity or relative abundances of tree species, density of invasive shrubs or the amount of coarse woody debris differ in leveed and unleveed areas? Ten variable-length transects (0.5-1.5 km) were established perpendicular to the river's edge, each containing approximately 10 plots (10 x 20m) established at random intervals. A total of 90 plots were evenly distributed along unleveed portions of the floodplain, areas inside levees, and areas outside levees. Data were analyzed using Discriminant Analysis. Areas outside levees have been flooded less frequently, and forest composition and structure may be similar to upland communities. Areas inside levees may be flooded for longer periods than areas at a similar elevation and distance from the river in unleveed areas, and may contain more hydric species. This portion of the Wisconsin River floodplain is under consideration for a unique large-scale floodplain restoration in which levees may be removed. Because restoration of natural flow regimes in large river systems has been extremely rare, our ability to understand or predict the success of large river restorations is limited. Thus, a basic understanding of the influence of levees on the pattern of floodplain vegetation is necessary for restoration to proceed.

Golubiewski, Nancy E. Implications of land-use legacies in Duke Forest: assessing changes in land cover and forest productivity in the southeastern United States. Nicholas School of the Environment, Duke University, Durham, NC.

The legacies of antecedent human activities inform both explanatory and predictive models about land cover change and can be used in practical land management applications. The Duke Forest, located in Durham, North Carolina, offers a prime locale for studying the type and duration of influence of land-use history upon current forest structure, function, and productivity in the Piedmont of the southeastern United States. Seven decades of mapped stem data from permanent sample plots were used to examine trajectories of change on old fields and woodlots. Ordinations, including nonmetric multidimensional scaling, revealed the underlying pattern in Duke Forest vegetation through time. These ordination spaces provided a template upon which to study forest dynamics as change vectors, regulated either by past land use or physical site factors. The results of these change vectors answer the research questions about what role past land use plays in current forest composition, structure and productivity; how various land uses induce differential forest trajectories; and how long anthropogenic impacts persist upon the landscape. Historical effects, confounded by initial site conditions, have strongly influenced the Duke Forest. This information, in turn, can offer land managers information about factors driving current forest composition and productivity.

Gomez-Aiza, Laura, and Nuri Trigo*. Site index estimations for conifers in the southwestern forests of the

Tom Spies

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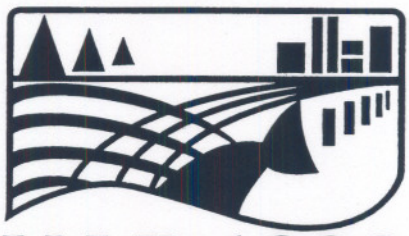

IALE 1998

Kellogg Center
Michigan State University
East Lansing, Michigan
March 17-21, 1998