

Evaluating the Effects of Ecosystem Management: A Case Study in a Missouri Ozark Forest

Wendy K. Gram^a, Victoria L. Sork^b, Robert J. Marquis^b, Rochelle B. Renken^d, Richard L. Clawson^d, John Faaborg^e, Debra K. Fantz^d, Josiane Le Corff^e, John Lill^b, Paul A. Porneluzi^f

Abstract.—Many federal and state management agencies have shifted from commodity-based management systems to multiple resource-based management systems that emphasize sustainable ecosystem management. Long-term sustainability of ecosystem functions and processes is at the core of ecosystem management, but a blueprint for assessing sustainability under different management strategies does not exist. Using the Missouri Ozark Forest Ecosystem Project (MOFEP) as a case study, we present one approach to evaluating the landscape-scale, short-term (1 and 2 years post-treatment) consequences of even-aged and uneven-aged forest management treatments on community-level biological diversity. We chose changes in density of ecological species groups, representing groups of species with similar resource requirements, as our response variable. Changes in density are detectable before species completely disappear from an area and these changes may be an early indicator of significant alterations to community structure and ecosystem function. Meta-analysis was used to statistically combine changes in densities across multiple species groups and assess the overall impacts of management treatments on the animal community. We also examined changes in density for each ecological species group separately. Our findings demonstrated that, in the short-term, even-aged and uneven-aged forest management treatments caused changes in animal community density in Missouri Ozark forests. Even-aged management sites showed greater changes than uneven-aged management sites after harvesting, and changes in species' densities were larger two years post-treatment (1998) than one year post-treatment (1997). Evaluation of treatment effects on individual ecological groups revealed that toads, forest interior birds, and edge/early successional birds were significantly affected by management treatments. We did not expect most species' groups to exhibit treatment effects because relatively little forest biomass was removed per experimental site (only 10%), forest cover at the regional landscape level did not change and was generally high during the study, and the time scale was relatively short. The challenges facing ecosystem management evaluation parallel the challenges of ecological science in general: identifying appropriate variables, spatial and temporal scales, and experimental/management treatments. The integrative approach demonstrated in this paper is a first step towards the analysis of the effects of management treatments on multiple organisms within an ecosystem.

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Citation

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^a Department of Biology, University of Missouri – St. Louis, St. Louis, MO 63121-4499; Current Address: Sam Noble Oklahoma Museum of Natural History, University of Oklahoma, Norman, OK 73072-7029; e-mail: wgram@ou.edu.

^b Department of Biology, University of Missouri – St. Louis, St. Louis, MO 63121-4499.

^c Department of Biology, University of Missouri – St. Louis, St. Louis, MO 63121-4499; Current Address: I.N.S.H.P., 2 rue Le Notre, 49045 Angers Cedex 01, FRANCE.

^d Missouri Department of Conservation, Columbia, MO 65201.

^e Division of Biological Sciences, University of Missouri, Columbia, MO 65211.

^f Central Methodist College, Fayette, MO 65248.