Title: Alternative Scenarios of Increased Bioenergy Production in Southern Wisconsin and Implications for Bird Communities

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ABSTRACT
Demand for bioenergy is increasing in the United States, and increased allocation of agricultural lands to bioenergy crops would alter current landscape patterns. Understanding the consequences of alternative land-use patterns would provide guidance for optimizing multiple benefits, and scenarios offer a means to explore such alternatives. We developed spatially-explicit scenarios of increased bioenergy production in an 80-km radius landscape centered on a potential biomass processing plant in southern Wisconsin, and evaluated the consequences of each scenario for bird communities. We varied the percent of land cover type conversion (10%, 20%, or 30%), grassland bioenergy crop types (grass monocultures, grass-dominated fields, or forb-dominated fields), and the spatial aggregation of bioenergy crop fields (random, clustered near similar field types, or closest to the processing plant), yielding 36 scenarios. Effects on bird species richness, total bird density, and the density of Species of Greatest Conservation Need [SGCN] were evaluated using empirical relationships. Bird population metrics consistently increased with the amount of bioenergy grasslands in the landscape. Spatial aggregation was important; clustering bioenergy crops closer to similar field types resulted in greater increases in bird metrics. Certain bioenergy landscape designs had greater positive influences on the bird community. For example, a 30% conversion of current rowcrops to grass-dominated bioenergy crop fields clustered near other grasslands increased SGCN density in the study landscape by 137%. This study indicates that increasing bioenergy grasslands would benefit grassland bird populations, and that bioenergy landscapes can be designed strategically to maximize biodiversity benefits while meeting targets for biomass production.