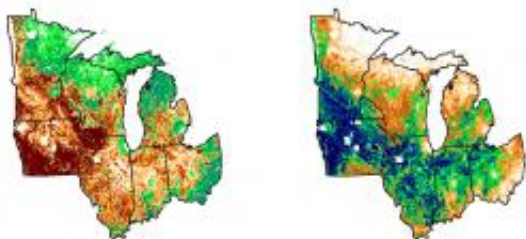


Bioenergy choices could dramatically change Midwest bird diversity

October 4 2010, by David Tenenbaum



In a 2010 article published in PNAS, Claudio Gratton and Tim Meehan of the University of Wisconsin-Madison calculated the impact on bird biodiversity of planting millions of acres of marginal land with biofuel feedstock. Left: Brown shows areas with species declines of up to 50 percent on marginal land planted with corn for biofuels. Right: Blue shows species increases of up to 200 percent if marginal lands are planted with diverse grasslands as biofuel feedstocks.

Photo: courtesy Claudio Gratton and Tim Meehan, University of Wisconsin-Madison

(PhysOrg.com) -- Ambitious plans to expand acreage of bioenergy crops could have a major impact on birds in the Upper Midwest, according to a study published today (Oct. 4) in the online edition of the *Proceedings of the National Academy of Sciences (PNAS)*. Combining data from bird surveys and land usage, two University of Wisconsin-Madison researchers calculated changes in the number of bird species after widespread planting of bioenergy crops.

The study compared two approaches to bioenergy feedstocks:

monocultures of annuals, such as corn, or perennial cultures of prairie plants and grasses.

Because diverse plantings are more conducive to a diversity of animals, the researchers were not surprised to find that a large-scale increase in [row crops](#) would decrease bird biodiversity, says co-author Claudio Gratton, an associate professor of entomology. The study showed that planting almost 23 million acres of corn or similar crops on marginal lands in the Upper Midwest could reduce the number of bird species by 7 percent to 65 percent in much of the region.

The decrease was especially acute in the diverse, hilly landscapes of southwest Wisconsin, where row crops are relatively rare.

Gratton and Tim Meehan, a postdoctoral fellow at the Great Lakes Bioenergy Research Center on campus, wanted to know how changes in biofuel production would affect wildlife, particularly birds, which have historically been well studied by amateurs.

To examine how many birds live on various landscapes today, they relied on the annual breeding bird survey, in which birdwatchers record every species they see or hear along preset routes.

The [computer model](#) that Meehan and Gratton developed showed that planting almost 21 million acres of perennial crops for bioenergy could increase bird biodiversity by 25 percent to 100 percent in some locales. The increase would be especially high in places like central Illinois and Iowa, where row crops are now dominant.

Today, almost all biofuel comes in the form of ethanol, used as a gasoline additive, but further increases in ethanol production could have widespread environmental effects, says Gratton, a landscape ecologist. "You can look at ethanol and make a calculation about how much energy

you can get out of the landscape, but what other effects will follow if you plant so much acreage in biofuel crops?"

Crops can store carbon in the soil, tempering global warming, or affect the runoff of water, fertilizer or pesticide, Gratton notes. "As biofuels continue to gain traction, these are going to be real environmental questions to consider."

The researchers focused on plantings on marginal lands rather than top-grade cropland, says Gratton, because of concerns that expanded biofuel production will take a further bite from food production. According to the June edition of *Ethanol Producer*, 34 percent of total U.S. corn production was devoted to ethanol this year.

Although scientists have debated how corn ethanol will affect the supply and price of food, and whether it delivers a net global warming benefit, the study was the first to look at the biological impact of different strategies for growing bioenergy crops.

Today, most biofuel ethanol is made from corn, but the Great Lakes Bioenergy Research Center, housed at UW-Madison and Michigan State University, is focusing on techniques for extracting biofuels from cellulose, which would expand the possible sources of biofuels to include crops such as switchgrass and many types of inedible biomass. At that point, says Gratton, farmers and society as a whole will face a decision about what crops best serve social needs.

"The center had the foresight to devote considerable effort to exploring the sustainability aspects of biofuels," says Gratton. "At some point, you've got to take these crops out and put them on the landscape, and that can affect wildlife for good or bad."

Land-use decisions are typically made based on a single factor such as

crop productivity or profitability, Gratton says, but in fact, changing how land is used usually has multiple impacts. As a result, he says, "People are starting to think about bundles of effects, on water quality, greenhouse gas emissions, or on beneficial insects that need certain habitats to survive."

Insect pollinators, for example, need flowers for food, and habitat for nesting, and converting more acreage to row crops will further decrease their numbers. "Altering the landscape can eliminate a free ecosystem service," Gratton says. "By increasing yield through monocultures, you might lose water quality, or lose pollinators, and you may have to pay a price to compensate for those losses."

Insects may be helpful, but birds are easier to study, because they have attracted so much attention from amateurs over the years, Gratton says. "The results were really striking: the more corn you have, the fewer [bird species](#) you are going to get. And the rarest species, which often tend to be grassland species, will take a particular hit. But when you increase the proportion of grasslands, you see a big increase in species richness, because the threatened species that require grasslands, like the bobolink, tend to increase the most."

Provided by University of Wisconsin-Madison

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