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MAKING HAY WHILE THE SUN SHINES: HOW CLIMATE CAN AFFECT FARMLAND BIRD POPULATIONS BY INFLUENCING FARMER DECISIONS

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Integrated models of climate, farming, and wildlife populations can inform agricultural resilience and improve our understanding of existing conservation incentive programs.

Farming depends on the weather. How the resulting annual fluctuations in farmland management affect wildlife populations is less clear. Detailed study of these factors together (known as 'integrated social-environmental modelling') can benefit both farmers and wildlife by informing agricultural responses to climate change, as well as suggesting conservation needs to be addressed by federal incentive programs. Grassland birds have experienced steep population declines in recent decades, and frequently nest in agricultural grasslands such as hayfields and pasturelands. These species benefit from multiple incentive programs that pay farmers to adjust management practices for conservation. We used public data from six Mid-Atlantic states to create a model that integrates the effects of climate, conservation spending, profit, agriculture management, and the annual population changes in a grassland bird, the Grasshopper Sparrow (Ammodramus savannarum). We found that per-acre yield of hay was higher in years of higher rainfall, while the timing of hay harvests averaged later during colder springs. Sparrow populations, in turn, grew slower or declined following years of higher hay yield (possibly indicating higher harvest frequencies) and later harvests. Similar models can be applied to other species and regions to identify farming practices that are most responsive to climate, and most impactful to bird or other wildlife populations.

META-MODEL OF THE GRASSLAND BIRD-FARMING SYSTEM

The diagram shows hypothesized interrelationships between climate, vegetation, economics, farmer decisions, and bird populations, with arrows representing effects. It was the basis for a statistical ('structural equation') model describing the system. Icons: Noun Project (Anton, G. Furtado, Hamish, S. Demushkin)

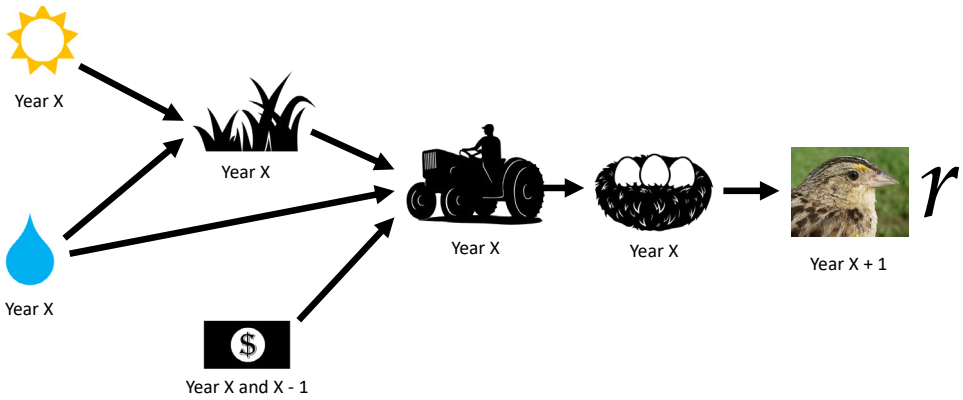

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Photo: young Grasshopper Sparrows in New Jersey hayfield by Michael Allen | USDA is an equal opportunity provider, employer, and lender