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# Large-scale Climate and Land Cover Influences on Blackbird Populations in the Prairie Pothole Region of the United States and Canada

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## Introduction

Blackbirds are ubiquitous members of the avian fauna in the Prairie Pothole Region of the United States and Canada. Their abundance combined with their food habitats make blackbirds significant agricultural pests on sunflower. Cost estimates for blackbird damage to sunflower in the northern Great Plains range from 4-11 million dollars per year. Because of their economic impact on agriculture, it is imperative to understand the environmental factors that influence their abundance. This study attempts to quantify the effects of landscape-level climatic and land use patterns on blackbird population dynamics in the Prairie Pothole Region of the United States and Canada.

Male Red-winged Blackbird and
Yellow-headed Blackbird Among Cattail

Blackbird Depredation to a Sunflower Head

## Study Area

Our study area is the Prairie Pothole Region (PPR) of the United States and Canada which covers over 715,000 km$^2$ across five states and three Canadian provinces. The landscape of the PPR was formed approximately 12,000 years ago when the last glaciers melted and left behind a landscape of small wetlands or sloughs. Because blackbirds show an affinity for wetland habitats, the PPR provides an ideal study area to examine land use and climatic effects on blackbird populations.


Prairie Pothole Region of the United States and Canada

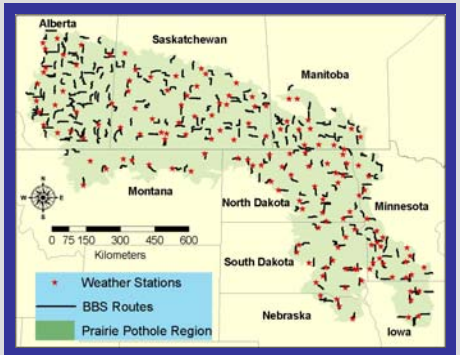

Typical Wetland Habitat Within the Prairie Pothole Region

## Methods

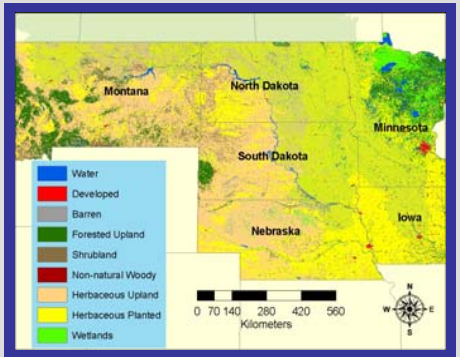
We will analyze landscape-level influences on blackbird populations using data from several large scale, long-term datasets. Bird data were obtained from the North American Breeding Bird Survey (BBS), climatic data were acquired from the National Climatic Data Center and the National Climate Data and Information Archive, and land use data were gathered from the USGS National Land Cover Data Set and the North Dakota State University Agricultural Extension Service. Climate and land use data will be related to bird abundance information using ArcInfo v8.3 and SAS v8.2. We will summarize weather variables across each breeding season by averaging temperature data and summing precipitation data over the same period. In addition, the effects of weather over the entire year as well as from the previous season will be examined because past weather might affect vegetation the following year thereby influencing blackbird abundance. Landscape-level habitat variables will be quantified in a 10-km buffer area surrounding each BBS route using land cover spatial data. Each grid cell within the 10-km buffer will be classified into one of nine general land cover types likely to be found in the PPR.

## Methods (cont.)

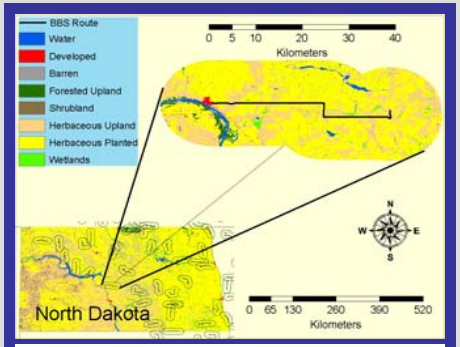
Because habitat area per se has not been an adequate predictor of bird abundance changes, other landscape-level factors such as habitat diversity and edge effects also will be examined. Spatial organization of features will be incorporated into landscape analyses by measuring contagion of land use types (the degree which land types are found within continuous patches), landscape dominance (the degree which one or a few land cover types dominate the landscape), fractal dimensions (an index of land use shape complexity in the landscape), and diversity/evenness measures of landscape pattern. Models incorporating landscape-level habitat variables to estimate blackbird abundance within the PPR will be developed *a priori* before analyses begin. Model-selection with maximum likelihood estimation and AIC will be used to select the best model from the candidate set for each blackbird species.




Breeding Bird Survey Routes and Selected
Weather Stations in the Prairie Pothole Region




Land Use Data for States Within the Prairie Pothole Region




Land Use Within a 10-km Buffer
Surrounding a Breeding Bird Survey Route

## Management Implications

Blackbird populations in the northern Great Plains account for millions of dollars in damage to annual sunflower production. Research is needed to better understand the effects of the landscape-level habitat and environmental variables which influence breeding blackbirds in the PPR. Knowledge in this area will allow more informed decisions to be made regarding blackbird management that ultimately will reduce damage to sunflower.

## Acknowledgements

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USDA National Wildlife Research Center
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