

Conservation Design for Rare Birds in the Upper Midwestern United States

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Introduction

Bird habitat conservation has for decades largely been opportunistic and single-species focused with treatments typically considered and implemented at fine scales by local managers. Although most habitat work must be completed at local scales, avian conservationists are increasingly recognizing the need to integrate continental and regional migratory bird priorities into local habitat actions. Such integration requires conservation planning.

Development of biologically-based, spatially explicit, landscape-oriented habitat objectives to sustain regional bird populations at levels set by particular plans is difficult given the paucity of information required to translate bird population goals at a regional level down to habitat actions at the local level. Through conservation design, however, explicit, science-based recommendations can be developed to efficiently implement habitat protection, enhancement, or management to achieve regional conservation objectives. The key is linking population targets to habitat area and availability – and that requires a number of challenging steps, including:

The Five Elements Process (Will et al. 2005)

1. Landscape Characterization and Assessment
2. Bird Population Response Modeling
3. Conservation Opportunities Assessment
4. Optimal Landscape Design
5. Monitoring and Evaluation

Study Area

Upper Midwestern United States
 The **Prairie Hardwood Transition**
 Bird Conservation Region 23

Transitions from boreal hardwood to the north to what was once prairie in the south but is now largely row crop agriculture

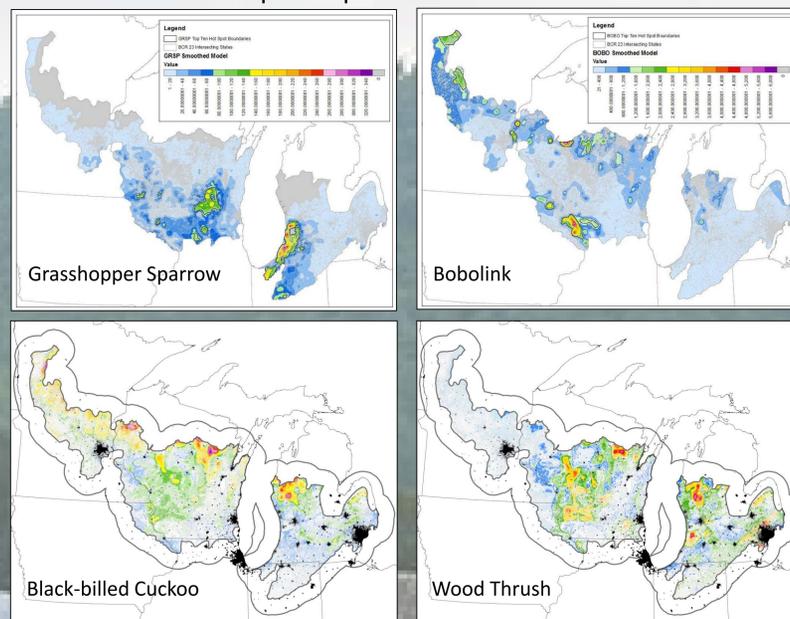


Bird Population Response Modeling

Relate indices of abundance to environmental characteristics

- 1) **North American Breeding Bird Survey** route counts as response.
- 2) Fixed effects associated with environmental characteristics (land use, climate, etc.).
- 3) **Hierarchical Bayesian spatial count models** fitted with Markov chain Monte Carlo methods in WinBUGS. These models accommodated random effects associated with observer differences, year effects, and spatially correlated survey effects.

Four Example Maps of Predicted Abundance

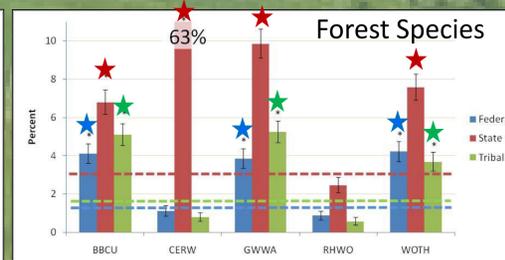
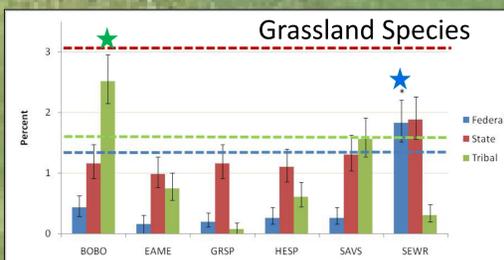
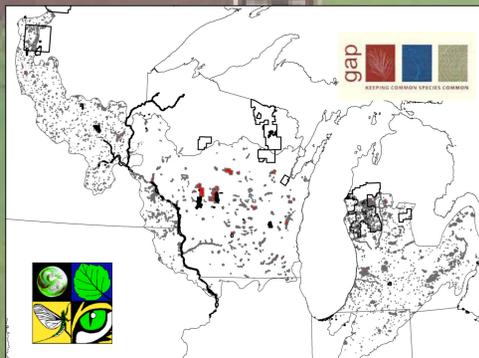


Conservation Opportunities Assessment

Relate patterns in predicted species abundance to the conservation estate.

- 1) **Protected Areas Database (PAD4)** from the Conservation Biology Institute
- 2) State **GAP**

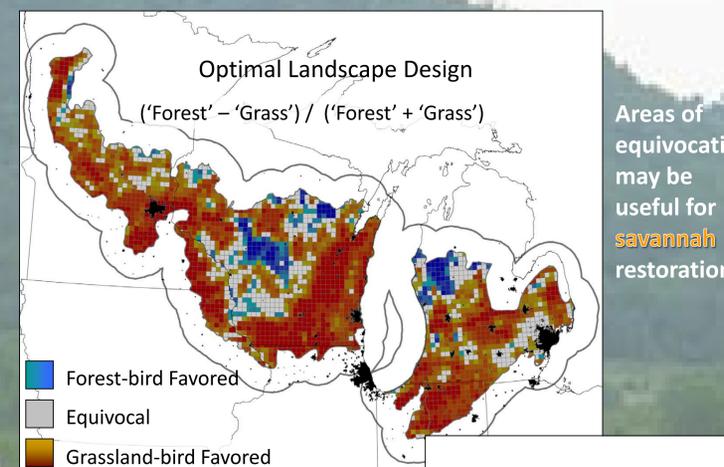
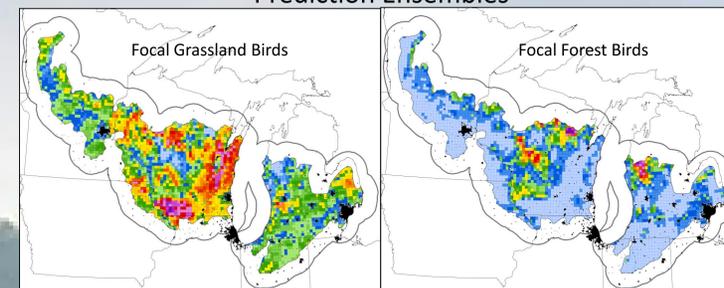
Considerably more of forest bird populations are in a conserved state



Optimal Landscape Design

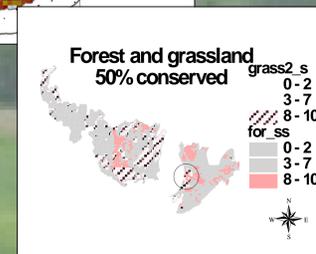
Species abundances re-scaled (0-100), summed, and mean index attributed to townships. **MARXAN** was also used to identify an **optimal solution** for conserving both grassland and forest species.

Prediction Ensembles



Areas of equivocation may be useful for **savannah** restoration

Eastern shore of Lake Michigan is an **area of contention** between grass and forest bird conservation priorities



Management Implications

- State lands provide 2-4 times the management opportunities **State >> Tribal > Federal**
- Managed lands favor the conservation of **forest** birds
- Grassland** birds left largely outside of the conservation estate
- Management on private lands is essential for successful conservation of both forest and grass species.

Acknowledgments

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