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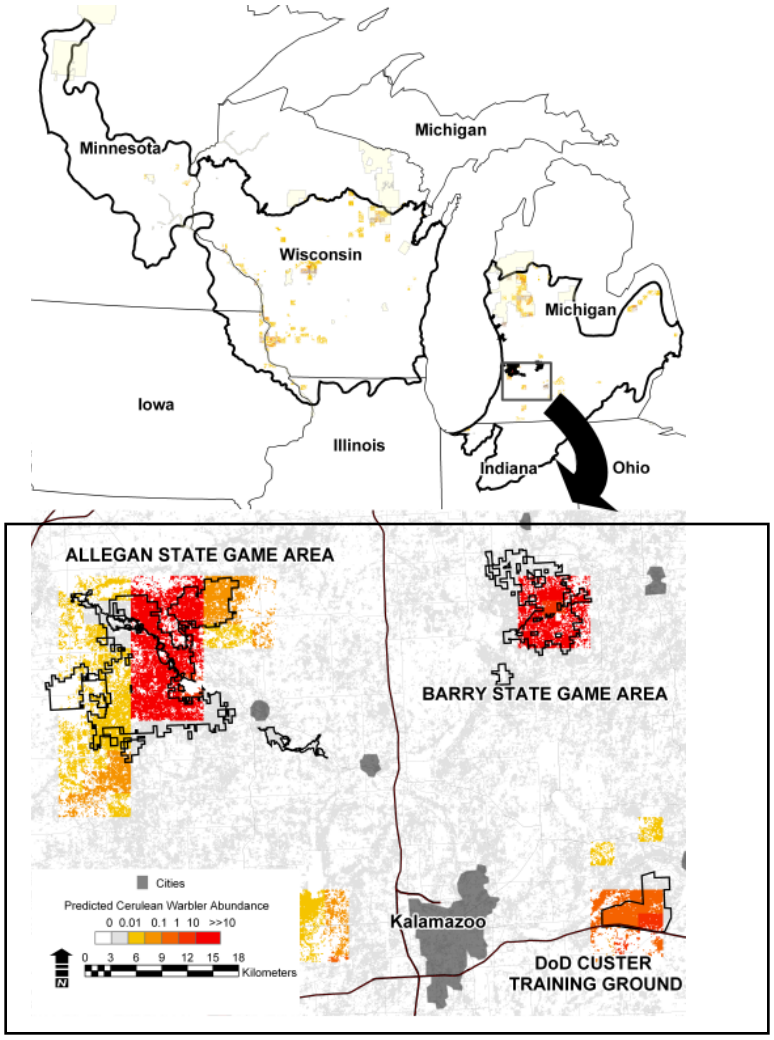
Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Predicting and Mapping Bird Abundances

History

Bird enthusiasts and ornithologists are working together to conserve the diversity of birds across North America by focusing on habitat conservation. To identify the best locations for conservation action, scientists are interested in predicting where bird species of conservation concern can be found. These species have been identified by the U.S. Fish and Wildlife Service (FWS) as being at risk of population declines. The benefits of research addressing regional and national migratory bird conservation are compelling and are among the core research responsibilities of USGS. Some of the most common questions that managers ask include the following:

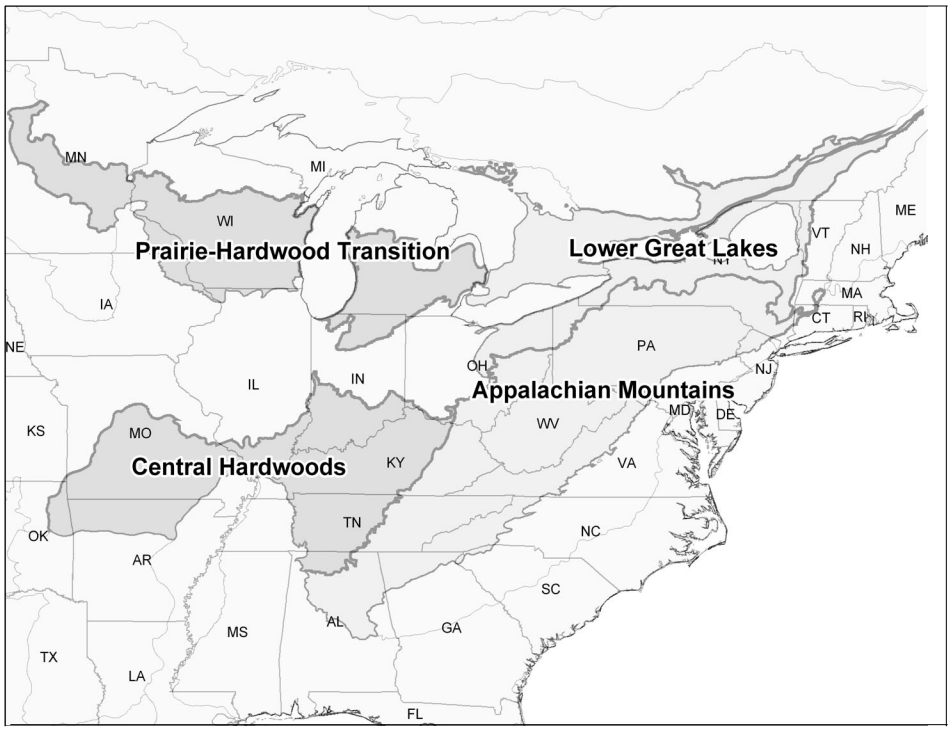
- Where on the landscape can we expect to find species of conservation concern?
- How many individuals of the species exist and where are the population "hot spots" or areas where the population is greatest?
- What conservation actions will benefit the species?
- How will threats such as urban sprawl, timber harvest, mineral extraction, or climate change affect bird populations?



Predicted relative abundance of cerulean warblers in the Prairie Hardwood Transition Ecoregion, a conservation region identified for bird management, are shown above. The model predicts that Allegan and Barry State Game Areas and the Department of Defense Custer Reserve Forces Training Area in Michigan have high abundances of cerulean warblers. Managers can use this information to monitor cerulean warbler populations and develop forest bird conservation partnerships for this region.

What USGS has done

Scientists at the USGS Upper Midwest Environmental Sciences Center (UMESC) have developed statistical models for predicting and mapping habitat associations across entire ecoregions for species at risk like the cerulean warbler (*Dendroica cerulea*). To build the models, we use data from the North American Breeding Bird Survey, a continental USGS program for monitoring the status and trends of North American

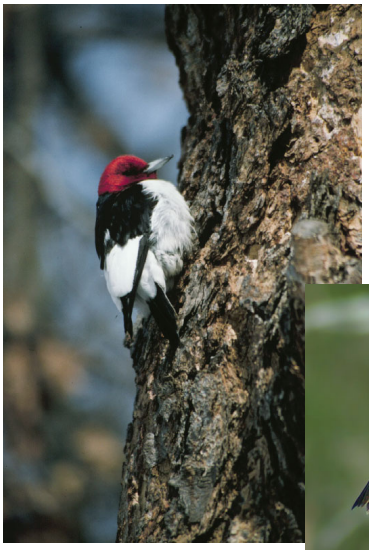


The Upper Midwest Environmental Sciences Center is developing maps of bird distribution and abundance for four bird conservation regions in eastern North America. These bird conservation regions were defined on the basis of similar topography, vegetation, and climate, which determine the bird species found in a region.

bird populations. We link the Breeding Bird Survey data with digital maps of land cover, elevation, soil, moisture, and climate and then derive bird-habitat models. These models describe the complex set of environmental conditions that support populations of a particular species. Finally, from these models we create maps that depict where a species is likely to be found within a state or region and estimates of how many individuals are likely to be there.

Result

Resource managers can use the models and maps to identify and prioritize habitats for conservation actions and future monitoring. For example, the maps help identify potential high-quality habitats in proximity to existing U.S. Fish and Wildlife Service (FWS) refuges and other wildlife management areas. Conservation partners can focus on these areas to restore habitats or protect important species. The models are also used to identify new potential management areas.



Red-head woodpecker photo by Brian Collins.

Grasshopper sparrow photo by Mike McDowell.

Wood thrush.

Statistical models are used to predict and map the relative abundance of species like the red-head woodpecker (*Melanerpes erythrocephalus*), grasshopper sparrow (*Ammodramus savannarum*) and the wood thrush (*Hylocichla mustelina*) across large areas such as Bird Conservation Regions. This work is described at the following Web site: **http://www.umesc.usgs.gov/terrestrial/migratory_birds/5004911_bird_conservation.html**

Resource managers may use future extensions of this habitat modeling as a basis for evaluating threats to breeding habitats. Any threats that can be mapped (e.g., urban sprawl, timber harvest, mineral extraction, acid rain, climate change) can be compared with maps depicting locations of bird concentrations to judge the magnitude of threats to the species. We are currently exploring ways to use the models and maps as a basis for estimating total population size for bird species of conservation concern.

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