



Do Midwestern National Parks Provide Good Bird Habitat?

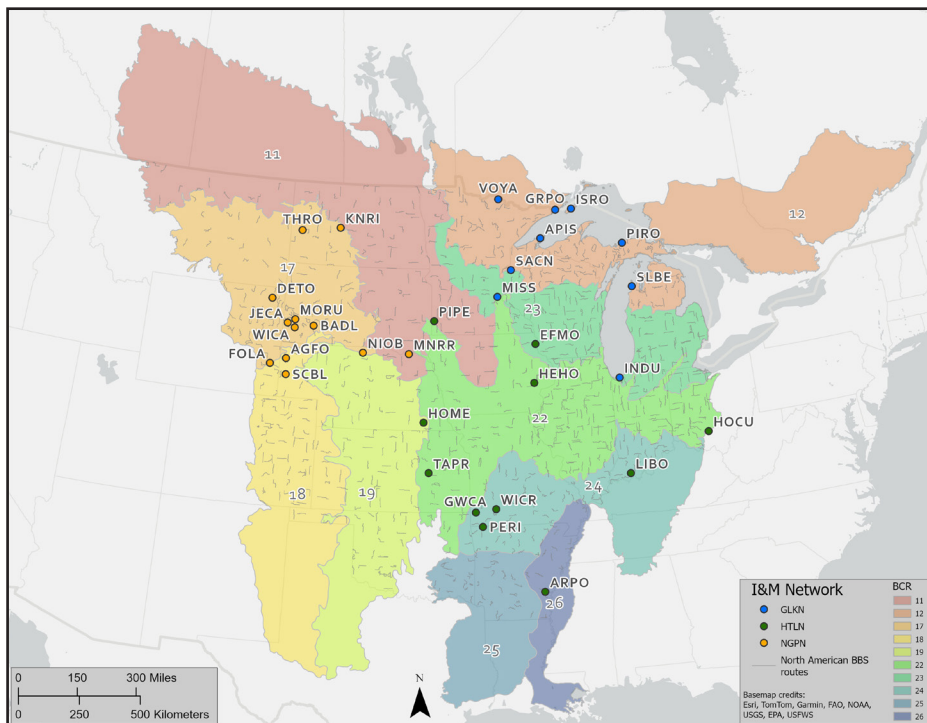
The value of midwestern national parks to breeding birds depends on habitat conditions inside and outside of park boundaries. These influences on birds vary by species, and neither they nor the trends in land cover change have been studied for national park units in the Midwest Region (*MWR*; also known as Interior Region 3, 4, 5). This despite evidence of ongoing habitat loss exacerbated by human population growth.

We sought to determine if there was a difference in bird species abundance between parks and the areas with similar land cover outside of them. We also wanted to see if we could infer how the habitat available within and around park borders may affect any difference in bird populations.

The MWR contains 64 national park units in 13 states. The National Park Service's (NPS) Inventory and Monitoring Division is made up of 32 networks nationwide, three of which are in the MWR. Network scientists conduct long-term monitoring in 37 of the MWR's 64 national park units: nine parks in the Great Lakes Network (*GLKN*), 15 parks in the Heartland Network (*HTLN*), and 13 parks in the Northern Great Plains Network (*NGPN*). We also identified the [Bird Conservation Region](#) (*BCR*) associated with each park.

What We Did

1. Gathered bird monitoring data collected on [North American Breeding Bird Survey](#) (*BBS*) routes near each park.
2. Selected a total of 45 bird species of interest based on conservation priority status in each of the BCRs.



National park units in the Midwest Region's three inventory and monitoring networks: Great Lakes Network (*GLKN*; blue dots), Heartland Network (*HTLN*; green dots), and Northern Great Plains Network (*NGPN*; orange dots). Gray lines indicate North American Breeding Bird Survey (*BBS*) routes. Colored and numbered polygons indicate Bird Conservation Regions (*BCRs*). Four-letter codes on the map indicate park names. In the *GLKN*, those are *APIS* (Apostle Islands), *GRPO* (Grand Portage), *INDU* (Indiana Dunes), *ISRO* (Isle Royale), *MISS* (Mississippi National River), *PIRO* (Pictured Rocks), *SACN* (St. Croix Riverway), *SLBE* (Sleeping Bear Dunes), and *VOYA* (Voyageurs).

3. Analyzed the *BBS* data to come up with predictions for the presence of each bird species of interest inside each park based on its relative abundance outside the park.
4. Compared our predictions with bird survey data collected in each national park unit to determine if the same bird species were more or less prevalent in parks than expected.
5. Gathered information from the National Land Cover Database (*NLCD*) and identify land cover types in each park and at distances of 3 and 6 miles (5 and 10 kilometers) around each park boundary.
6. Used broad categories of agriculture, developed, forest, herbaceous, and wetland cover types to analyze change over time.

What We Found

As expected, we found that over the entire region, statistically significant change in land cover occurred outside the parks more often than inside. Developed land showed the largest number of significant trends followed by agriculture, forest, herbaceous, and wetland classes. Landscape changes were most numerous in the Badlands and Prairies (BCR 17), where most of the Northern Great Plains Network parks are located, and in the *Boreal Hardwood Transition* (BCR 12), where most Great Lakes Network parks are located. Together, these two BCRs accounted for 48% of the significant landscape changes.

In the Great Lakes Parks

Bird species of interest for BCR 12 were found in the Great Lakes Network parks at comparable rates to the BBS routes outside the parks (*Figure*

1). Landscapes around all these parks—and inside some of them—showed significant changes in the agricultural and developed classes, while wetlands increased significantly both inside and outside Voyageurs National Park.

Two GLKN parks—Mississippi River and Indiana Dunes—and the southern half of the St. Croix Riverway are in the *Prairie Hardwood Transition* (BCR 23). Like the parks in the north, occupancy by bird species of concern in these parks also was comparable to that found on BBS routes outside the park (*Figure 2*). However, only two of the nine priority species were detected at Indiana Dunes (Wood Thrush and Red-headed Woodpecker). The parks in this BCR lie within a matrix of agricultural, developed, and forested cover types, and all parks in this BCR experienced significant changes at varying scales in all three cover types.

In seven of the nine Great Lakes Network parks,

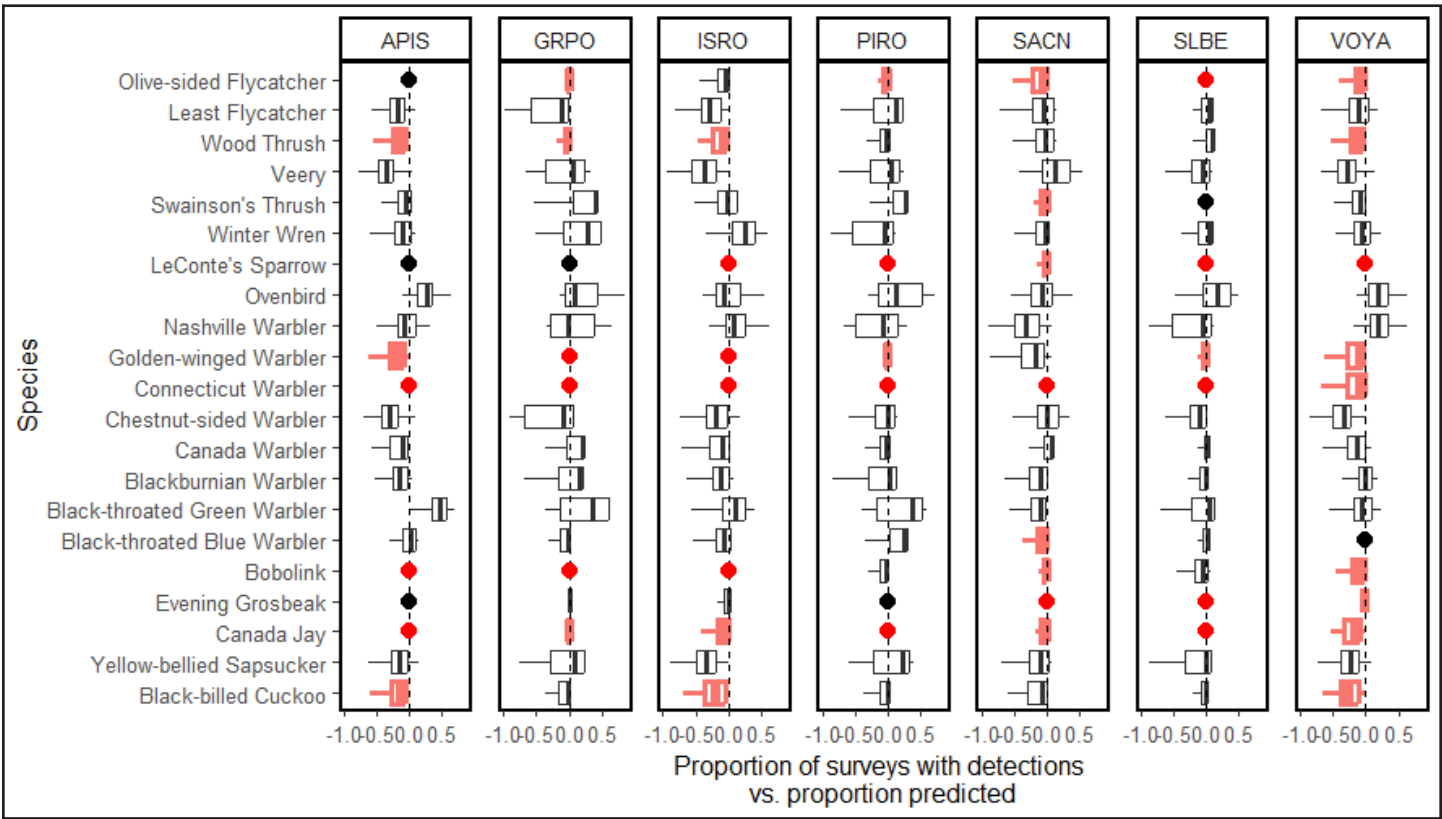


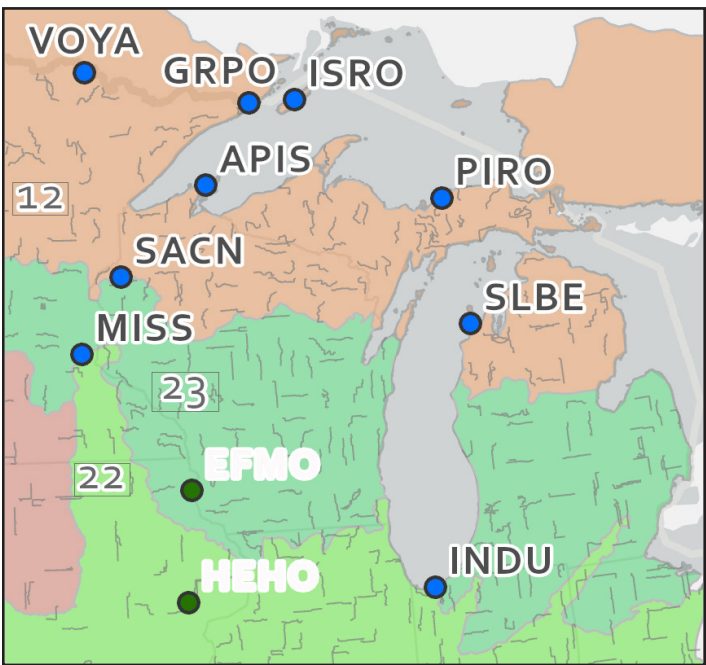
Figure 1. Proportion of predicted versus actual detections of bird species of concern at seven Great Lakes Network park units in Bird Conservation Region (BCR) 12: Apostle Islands National Lakeshore (APIS), Grand Portage National Monument (GRPO), Isle Royale National Park (ISRO), Pictured Rocks National Lakeshore (PIRO), the northern half of the Saint Croix National Scenic Riverway (SACN), Sleeping Bear Dunes National Lakeshore (SLBE), and Voyageurs National Park (VOYA). Dashed vertical line at the central 0 point on the x-axis represents no difference in occupancy inside vs. outside the parks. Boxplots are shown for species detected in, or whose breeding ranges include, these parks. Boxplots to the left of the line represent birds that are less frequently found in parks compared to outside of them, and boxplots to the right of the line indicate species that are more frequently found inside parks compared to outside. Red boxplots indicate species not detected in park surveys. Dots represent species for which the park is outside of their normal range but that were still detected during park surveys (black dot) or were absent from the park (red dot).

50% or more of the bird species of concern were detected inside and outside of parks in equal measure (Figure 3). At Indiana Dunes and Voyageurs, 66% and 60% of the species, respectively, were more frequently detected outside the parks than inside. Apostle Islands was the only park with a species of concern that was detected inside the park at higher rates than outside the park (Black-throated Green Warbler).

What’s Around Parks Affects What’s In Them

Birds seem to be faring better in Great Lakes Network parks than in the other MWR networks, where the general tendency was for birds to be detected more frequently outside the parks than inside them. But we must remain vigilant.

A 2011 study of two Great Lakes region national park units found that creating a national park helped to improve habitat within the park by reducing and stopping development, but the creation of more visitor amenities led to enhanced development around both parks. Another study in 2015 found that housing density at the boundary of protected



Great Lakes Network parks occur in Bird Conservation Regions 12 and 23, but two parks—MISS and INDU—are also on the border of BCR 22 (Eastern Tallgrass Prairie). EFMO (Effigy Mounds National Monument) and HEHO (Herbert Hoover National Historic Site) are in the Heartland Network.

areas tended to have a strong negative influence on abundance and richness of bird species. We saw this in our analysis of land use around INDU and MISS, where less development occurred in the parks than

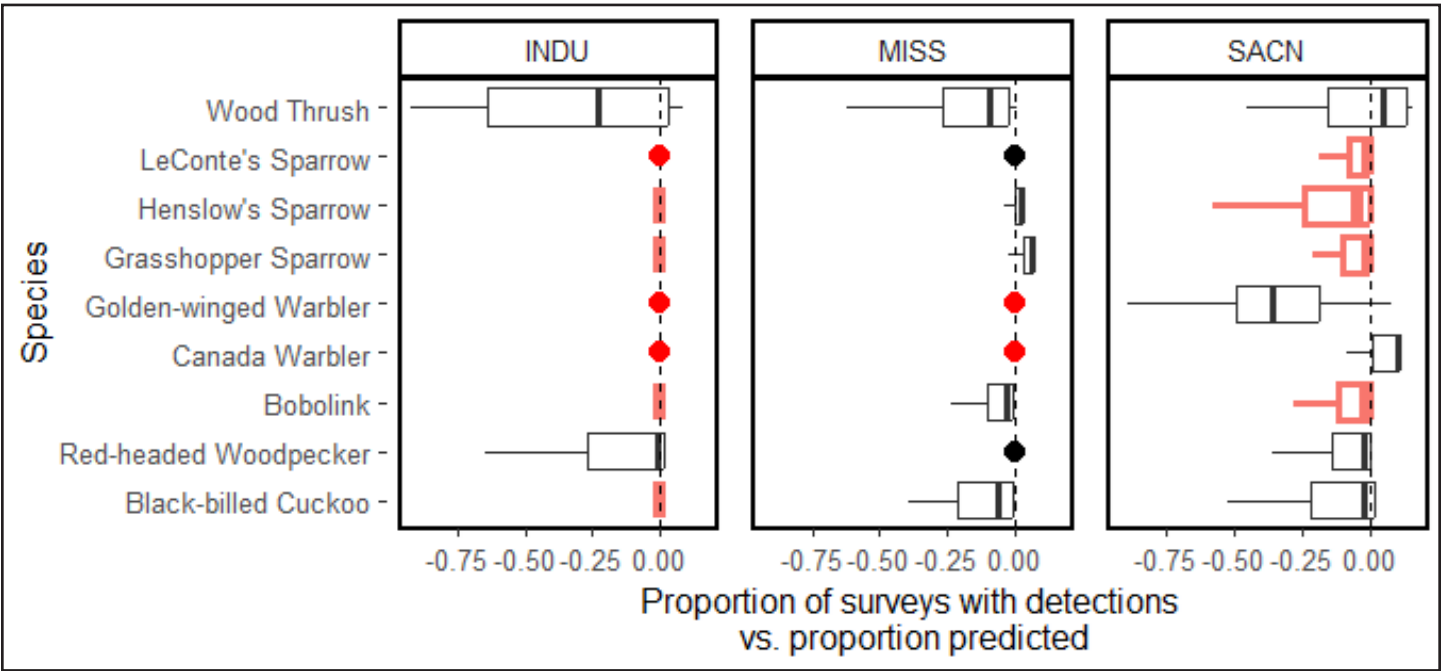


Figure 2. Proportion of predicted versus actual detections of bird species of concern at three Great Lakes Network parks in Bird Conservation Region (BCR) 23: Indiana Dunes National Park (INDU), Mississippi National River and Recreation Area (MISS), and the southern half of the St. Croix National Scenic Riverway (SACN). Dashed vertical line at the 0 point on the x-axis represents no difference in occupancy inside or outside the parks. Boxplots are shown for species detected in or whose breeding ranges include these parks. Boxplots to the left of the line represent birds that are less frequently found in parks compared to outside of them, and boxplots to the right of the line indicate species that are more frequently found inside parks compared to outside. Red boxplots indicate species not detected in park surveys. Dots represent species for which the park is outside of their normal range but were still detected during park surveys (black dot) or were absent from the park (red dot).

outside and forested lands were more common, but there is a trend toward increasing development in and around the parks and decreasing forested land. Still, a little more than 70% of bird species of concern at MISS occupied habitats inside and outside the park equally (*Figure 3*).

The coarse nature of land cover data did not allow us to consider fine-scale habitat requirements.

For example, we did not distinguish between coniferous vs. deciduous forest types and we only analyzed total land cover within a given area. Nevertheless, [NLCD land cover classes are known to be good predictors](#) of bird species richness and abundance. Perhaps as land cover data continue to improve we can refine our analyses and identify finer details of the relationship between bird populations and habitats in parks.

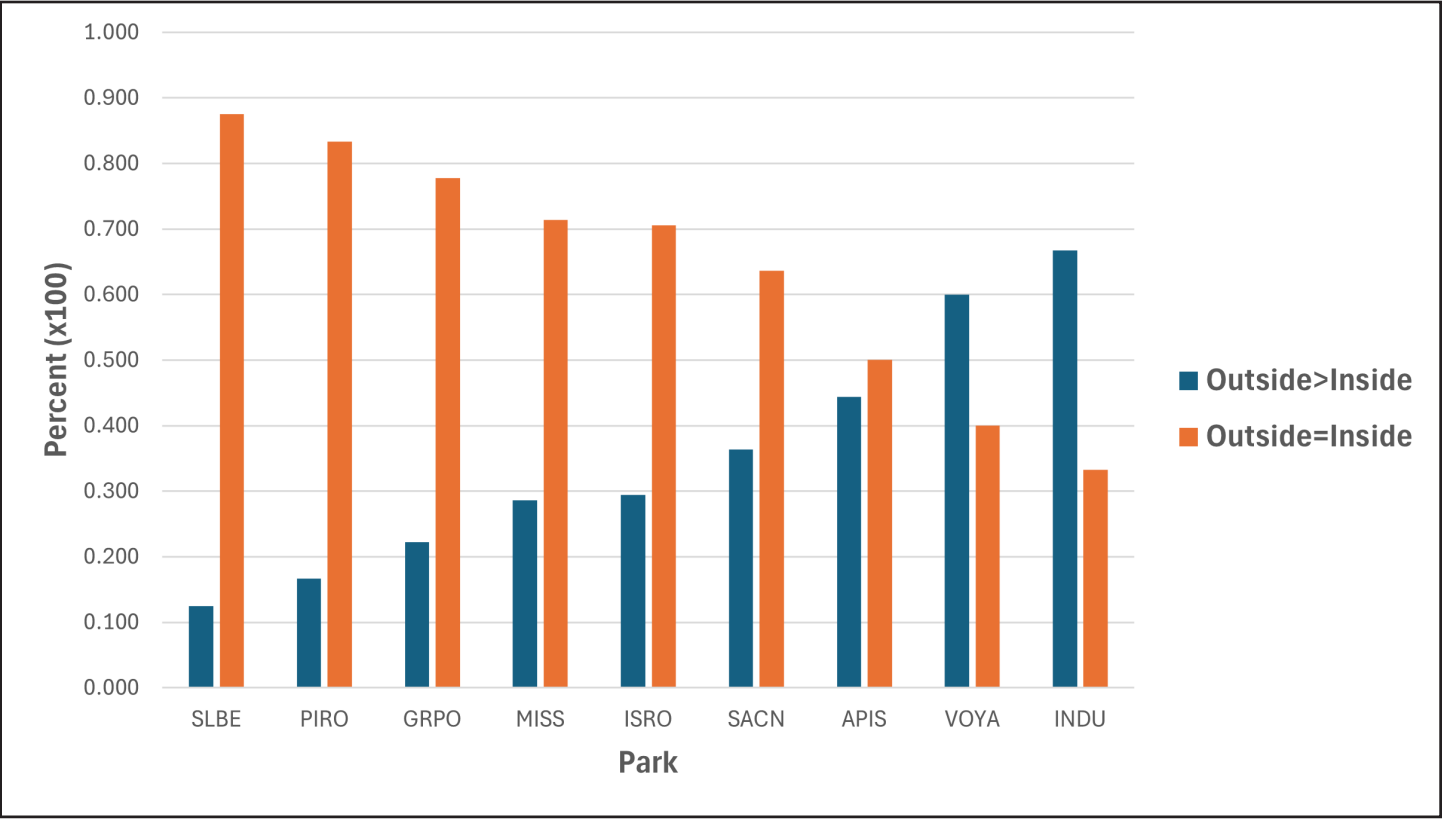


Figure 3. Proportion of bird species of concern, by park, occupying habitats outside parks more than inside parks (blue) or at equal levels (orange) (one-sided 95% confidence interval). Does not include out-of-range species. SLBE=Sleeping Bear Dunes, PIRO=Pictured Rocks, GRPO=Grand Portage, MISS=Mississippi River, ISRO=Isle Royale, SACN=St. Croix Riverway, APIS=Apostle Islands, VOYA=Voyageurs, INDU=Indiana Dunes.



This study was a collaborative project between the National Park Service and the U.S. Geological Survey with funding support from the USGS Natural Resource Preservation Program. A journal article was produced from an initial analysis to determine if the North American Breeding Bird Survey could be used to make predictions about bird populations in the parks. That can be found at:

Burner, R.C., A. Kirschbaum, J.A. Hostetler, D.J. Ziolkowski Jr., N.M. Anich, D. Turek, E.D. Striegel, and N.D. Niemuth. 2024. Informative priors can account for location uncertainty in stop-level analyses of the North American Breeding Bird Survey (BBS), allowing fine-scale ecological analyses. *Ornithological Applications* 126:1–17 (<https://doi.org/10.1093/ornithapp/duae041>).

The full report from this study can be found at:

Burner, R.C., A.A. Kirschbaum, T. Gostomski, and D.G. Peitz. 2025. US national park units as breeding bird habitat: A comparison of species prevalence and land cover across the midwestern and central United States. *Science Report NPS/SR—2025/317*. National Park Service, Fort Collins, Colorado (<https://doi.org/10.36967/2312602>).