

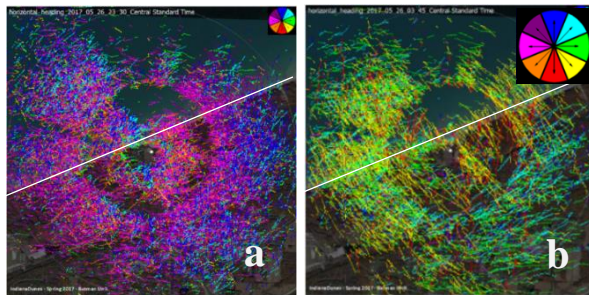
The Great Lakes Avian Radar Project and Great Lakes Airspace Map Decision Support Tool

The Great Lakes Restoration Initiative (GLRI) was launched in 2010 to accelerate protection and restoration efforts of the largest fresh-water system in the world. One of the goals of this initiative is to identify and protect habitats that support important Great Lakes species and to increase their resiliency through approaches that complement on-the-ground habitat restoration and protection. The U.S. Fish and Wildlife Service (Service) with funding from GLRI pursued these goals through the Avian Radar Project. To better understand bird and bat activity throughout the Great Lakes Basin the Service collected radar and bat acoustic data during spring and fall from 2011 - 2018, identifying areas that are predicted to have high migratory bird and bat use. This data was used to create predicted activity maps that have been incorporated into a decision support tool (DST). The Great Lakes Airspace Map DST allows users to overlay bird and bat activity maps with other publically available or project maps to help resource managers, agencies, and funders make on-the-ground natural resource decisions.



A Merlin radar system, with horizontal and vertical antennas, used to track migration movements.

Radar Identifies Airspace Habitat for Migratory Birds



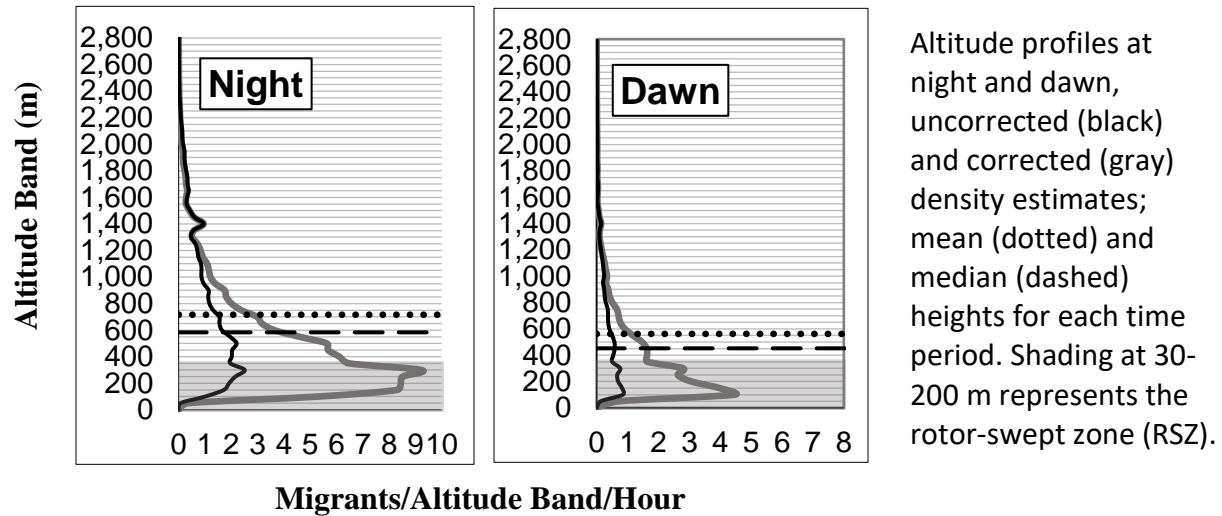
Migrant Trackplots from May 26, 2017, Indiana Dunes, Indiana. The color wheel shows the cardinal direction of flight (blue is north). The shore is indicated by a white line with Lake Michigan to the north, the white central dot is the radar location.

The radar units identified patterns of airspace use during migration both directionally (across 3.7 km radius around each radar location) and altitudinally (up to 2.8 km altitude). The images (left) show flight direction for spring migration (a) and landing at dawn (b). Migration direction depends on season, i.e., generally north in spring and south in fall, and can vary with weather and other factors. This example of peak nighttime migration shows targets flying primarily north/northwest (blue/purple lines, 11:30 pm). At dawn migrants begin to turn southeast towards shore to land (yellow lines, 3:45 am). Migrants moving over open water show a turn to shore at dawn, landing to avoid predation during daylight hours and to rest and

refuel at stopover sites.

Migrant densities reach their peak at night, and despite the increased density at all altitudes, the greatest density at night is still within 300 m of the ground. This also is the area

where migrants may encounter and collide with structures like buildings, cell towers, and wind turbines, where blades can span 30-200 m in height, known as the rotor-swept zone (RSZ).



Radar and Acoustic Data Identify Regionally Important Areas for Birds and Bats

These maps show high activity areas for birds and bats based on radar and acoustic data respectively; darker blue areas represent greater numbers detected of each taxa. Note that for migrating birds in spring relative numbers are greater along the west/central edge of the Great Lakes Basin and lesser at the interior of the basin (e.g. Upper Peninsula/northern Michigan). Bats have high activity areas in northern Wisconsin and the Upper Peninsula of Michigan as well as along the southern shore of Lake Erie.



Conserving Habitat in the Air and on the Ground

- Airspace should be considered as a component of habitat for migrating birds and bats.
- Protect the airspace by reducing artificial-light-at-night which disorients migrating birds, and by minimizing collisions with structures that cause bird and bat mortality.
- Create and protect high-quality migratory stopover habitat on the ground in areas of relatively greater use of the airspace. Native hardwood trees and fruiting shrubs provide cover and host abundant insects for birds and bats and high quality fruit for migratory birds. Forest diversity (e.g. tree age, snags, and stand density) and a fresh water source are beneficial to bats.
- For more information visit the [Avian Radar Website](#)