Bird and Bat Migration along Great Lakes Coastlines: Progress Report, March 2012

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Primary Partners: US Fish and Wildlife Service and US Geological Survey

Introduction. Every autumn millions of birds from the forests of Alaska, Canada, and the Great Lakes region participate in one of the largest southbound migrations on Earth. Whether it be avoiding the un-forested prairies of central Canada and the U.S., utilizing westerly winds, or following an evolutionary instinct, many of these forest birds begin their fall migration by heading in a southeasterly direction rather than due south (Fig 1). In addition, birds in eastern Canada follow a line that parallels the Atlantic coast. As a result of these trajectories, many migratory birds encounter the Great Lakes region. In addition to birds, thousands of forest-roosting bats also participate in this seasonal migration through the Great Lakes region.

Fig. 1. Fall bird migration trajectories in relation to the Great Lakes

Migrating birds and bats often follow migration corridors (similar to our highway system). This migration corridor system is not well understood, but it is likely that areas near Great Lakes coastlines host concentrated movements of birds and bats. The Great Lakes act as "barriers" to migrating birds and bats because they are devoid of safe places to land and require substantial energy to cross. As the human need for communication technology, renewable energy, and living space expands, so does fragmentation of airspace within these migration corridors. Birds and bats emit sounds as they migrate during the night-time hours. Using monitors to record low-altitude nighttime calls of birds and bats during migration is one way the U.S. Fish and Wildlife Service is gaining information about bird and bat migration corridors in the Great Lakes region. This information is part of a larger study (using radars and historical data) aimed at better understanding when and where birds and bats are moving. This information will aid thoughtful decision making regarding developments such as wind turbines, communication towers, and high-rise buildings.

Methods. During fall 2011, twenty-two bird and bat monitors were placed along the shorelines of Lake Michigan, Lake Erie, and Lake Ontario to collect bird and bat sounds during migration (Fig 2). The monitor unit (Wildlife Acoustics' SM2 acoustic/ultrasonic detector*) had both acoustic (bird calls) and ultrasonic (bat calls) microphones attached to a weatherproof recorder. Data was recorded from dusk until dawn when nocturnally migrating birds and bats were most active. To improve overhead recording quality in high-wind and high insect areas, bat microphones were located at approximately ground level and fitted

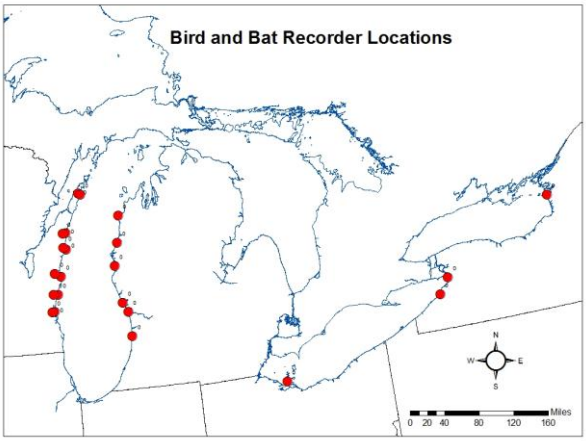

Fig. 2. Fall bird and bat recorder locations along Lakes Michigan, Erie and Ontario, 2011.

*Use of trade names does not imply endorsement by U.S. Government or University of Minnesota

with wind blockers made from PVC pipe and wind-dampening fabric (Fig. 3b). Bird microphones were attached to a plate at the top of a 15 foot pole (Fig. 3a) when attached to the ground. Rooftops were also utilized when available. Batteries and data collection cards were changed at approximately 10-day intervals (Fig. 3b). Each series of bat (high frequency, Fig. 7a) or bird sounds (lower frequency, Fig. 7b) within a single recording time frame was recorded as one individual "call".

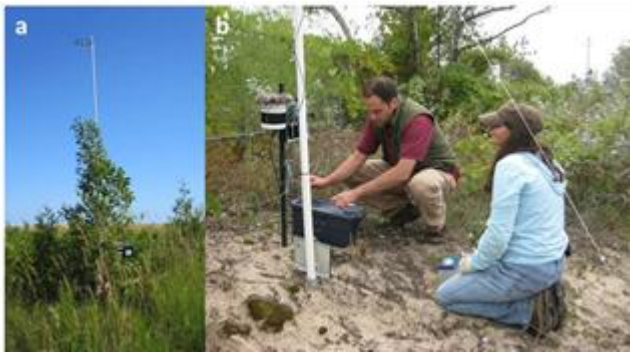

Fig. 3a. Monitor setup at Bailey's Harbor SNA, Wisconsin. 3b. USFWS biologists changing batteries, Point Betsie monitor, Michigan.
Photos by Jill Utrup and Jennifer Sianai, respectively.

Preliminary Results (subject to change). Monitors recorded a total of 160,739 bat calls and 72,838 bird calls during the fall migration, between mid-August and early November, 2011. The highest nightly bat counts occurred at TNC Property, Door Co. Wisconsin, on August 24 and Evangola State Park, New York, on September 12 (2919 and 2322 bat calls, respectively). The highest nightly bird counts occurred at Evangola State Park, New York, on October 5 and at Muskegon State Park, on August 13 (536 and 533 bird calls, respectively, Appendix A). Coastlines hosting the highest average bat calls per night included the south shore of Lake Erie and the western shore of Lake Michigan (Fig. 4). Coastlines hosting the highest average bird calls per night included all shorelines in this study (Fig. 5). Monitoring will continue during spring migration, 2012. This effort is funded in part through the Great Lakes Restoration Initiative in partnership with the U.S. Fish and Wildlife Service, U.S. Geological Survey, and the University of Minnesota.

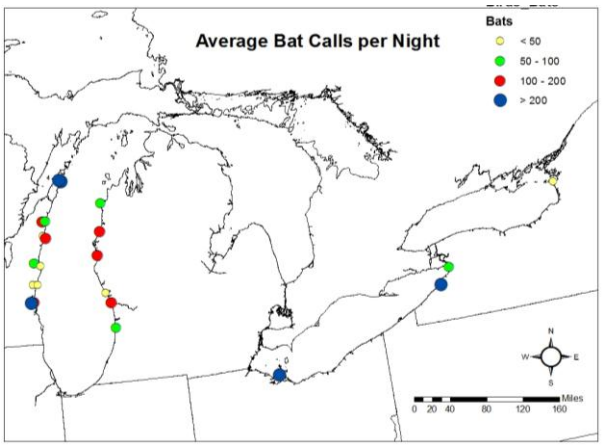

Fig. 4. Average bat calls detected per night at each monitor location by broad categories: <50, 50-100, 100-200, and >200.

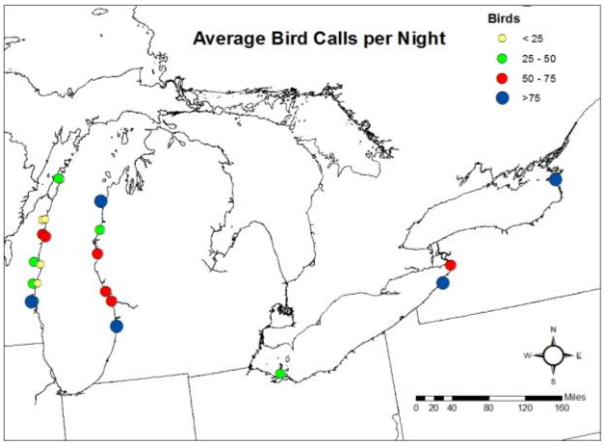

Fig. 5. Average bird calls detected per night at each monitor location by broad categories: <50, 50-100, 100-200, and >200.

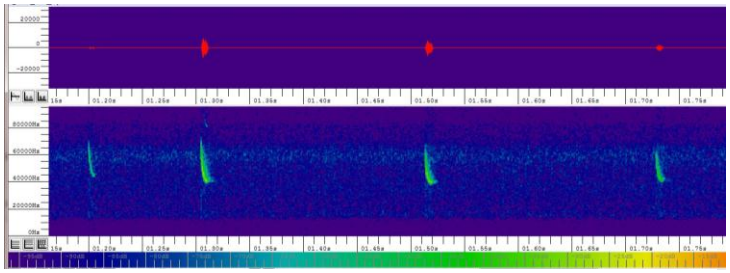

Fig. 7a. Bat spectrograph, fall migration, 2011

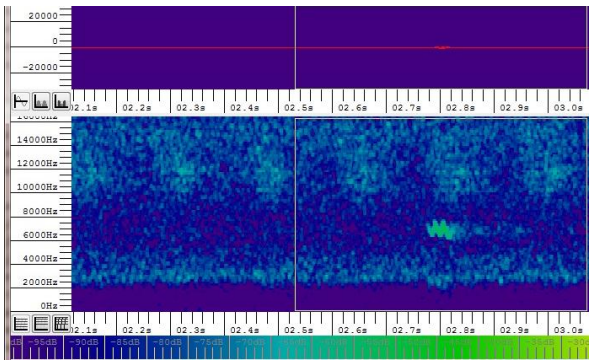

Fig. 7b. Bird spectrograph, fall migration, 2011

Appendix A. Bird and bat monitor locations, corresponding shorelines, preliminary bird and bat totals (not adjusted for the number of nights monitors were operating) and peak passage dates. 'X' indicates data needing further analysis. This information is not suited or intended for commercial (wind farms, radio towers, etc.) siting decisions.

Recorder Location	Shoreline	Bat Total	Peak Bat Date	Bird Total	Peak Bird Date
The Nature Conservancy, Door Co.	Lake Michigan west	20537	8/24	1508	10/11
Bailey's Harbor Boreal Forest SWA	Lake Michigan west	12295	8/15	X	X
Bruemmer Park	Lake Michigan west	10187	8/9	3602	10/27
City of Kewaunee	Lake Michigan west	4932	9/13	X	X
Nuclear Road Site	Lake Michigan west	X	X	3986	10/9
Manitowoc School Forest	Lake Michigan west	9696	8/24	3606	10/11
Maywood Environmental Park	Lake Michigan west	5531	8/11	4106	10/12
Sheboygan Water Utility	Lake Michigan west	15844	9/3	1700	10/15
Belgium WPA	Lake Michigan west	1753	9/13	2937	10/22
Forest Beach Migratory Preserve	Lake Michigan west	1817	9/14	X	X
Urban Ecology Center	Lake Michigan west	5207	8/24	7108	8/19
Lake Shore State Park	Lake Michigan west	11265	9/1	2973	9/21
Point Betsie	Lake Michigan east	5948	9/2	6094	10/10
Orchard Beach State Park	Lake Michigan east	7329	8/24	3459	10/26
Charles Mears State Park	Lake Michigan east	9661	8/26	4765	10/9
Muskegon State Park	Lake Michigan east	2752	8/13	4140	9/22
North Beach Park	Lake Michigan east	8157	8/26	4439	11/3
Holland Beach State Park	Lake Michigan east	4189	8/27	7730	8/21
Cedar Meadow Nat. Wildlife Ref.	Lake Erie west	10189	10/21	1769	10/24
Evangola State Park	Lake Erie east	11963	9/12	4504	10/5
Tifft Nature Preserve	Lake Erie east	X	X	2135	9/17
Robert G. Wehle State Park	Lake Ontario east	X	X	1794	9/25