

“Building Bird-friendly Landscapes in the Midwest”

Midwest Bird Conservation and Monitoring Workshop

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ABSTRACTS

PLENARY SESSION

Building bird-friendly landscapes in the Midwest: a Joint Venture regional perspective for landscape habitat conservation – Benjamin Kahler and Rachael Pierce

The Upper Midwest Region is one of the most highly altered landscapes in North America. Forest clearing followed by land conversion for agriculture, development for industrial production, and human population growth have all driven landscape change and resulted in loss of vast grasslands, wetlands, and forests. We continue to lose ground with some cover types critical to birds despite our collective efforts and conservation successes over the last century (e. g. , over 1 million acres of land were converted to urban cover between 2001 and 2011 in the Midwest). In light of this, we must be strategic in planning and committing resources to make landscapes more bird-friendly. This involves identifying factors most limiting populations during the whole annual cycle and increasing bird survival and productivity by focusing on protecting and restoring high quality habitats. The Upper Mississippi River and Great Lakes Region Joint Venture (JV) is a dynamic bird habitat partnership and strives for sustainable populations of waterfowl, waterbirds, shorebirds, and landbirds through regionally coordinated conservation actions based on the best scientific information available. JV bird habitat objectives were established in 2007 for focal species (representing guilds) by “stepping down” continental bird population objectives and using biological models to estimate required area of habitat by cover types. To evaluate achievability of these habitat objectives, the JV recently completed “bottom-up” assessments of landscape condition, land cover change, and “conservation estate” in the JV region. We share major themes of what we discovered through the assessments and identify areas where bird habitat conservation planning and delivery may be improved. We also highlight other recent efforts that improve our understanding of future change likely to influence regional bird populations. Finally, we present a positive outlook for how the JV and others can continue to make at least some landscapes more bird-friendly in the Midwest.

Human-caused bird mortality in the US: A comparison of data-driven estimates and identification of future directions for research – Scott R. Loss; Tom Will; Peter P. Marra

A tremendous number of birds are directly killed by accidental human-related causes. However, there is great uncertainty about the magnitude of this unregulated harvest, the relative importance of different threats, and the impacts on bird populations. As part of a project funded by the U. S. Fish and Wildlife Service (through the Smithsonian’s Conservation Biology Institute), we took a quantitative, data-driven approach to estimate bird mortality for different threats, to identify key research needs, and to provide information to inform an effective targeting of mortality reduction efforts. We estimate highly variable amounts of mortality, with cats estimated to cause the greatest number of annual U. S. bird deaths

(billions of birds), followed by collisions with buildings (hundreds of millions to one billion), automobiles (hundreds of millions), and power lines (tens of millions), electrocutions at power lines (one to ten million), and collisions with wind turbines (hundreds of thousands). For most mortality sources (except building collisions), data limitations prevented estimation of species-specific vulnerability. Based on our comprehensive reviews, we have identified several over-arching research needs, including: (1) random selection of study sites and structures (as opposed to focusing solely on known mortality “hotspots”), (2) sampling and reporting of all species killed (as opposed to focusing solely on particular species or species groups), (3) sampling throughout year (as opposed to focusing only on periods thought experience the greatest mortality), (4) quantification of biases that affect mortality estimates (including searcher detection and scavenger removal probabilities), and (5) standardization of sampling protocols to increase comparability of data among locations, seasons, and time periods. Although our estimates provide an approximation of the relative magnitude of threats to birds, further work is needed to identify where, when, and which species are disproportionately impacted and to understand cumulative impacts of multiple threats on bird populations.

Assessing climate change vulnerability using demographically informed species distribution models – Lisa A. McCauley; Benjamin Zuckerberg; Christine A. Ribic

Grassland ecosystems originally dominated central North America, but have been extensively altered by agriculture, fire suppression, and urbanization. These land use changes are not occurring in isolation, and many lowland areas are experiencing rapid changes in temperature and precipitation, a result of climate change. Modern land use and climate change represent critical threats to many grassland-dependent fauna, but little is known as to why these species are sensitive to climate variability and which populations are most vulnerable to future environmental change. Henslow’s Sparrow (*Ammodramus henslowii*) is an obligate grassland bird that historically bred in tallgrass prairie, but due to widespread habitat loss, is now dependent on “surrogate” grassland habitats (e. g. , hayfield and pastures). We developed a Climate Change Vulnerability Assessment approach to evaluate demographic sensitivities of Henslow’s Sparrow to climate variability and the potential impacts of future land use and climate change scenarios on populations throughout the species’ range. To do so, we created a database of published nest success rates for Henslow’s Sparrow and linked those rates to environmental parameters in a spatially and temporally explicit manner. We used these estimates along with other demographic components (e. g. , survival estimates, territory size, density, site fidelity) to build spatially explicit population models within HexSim, a cell-based population modeling framework, to incorporate climate data to simulate historic and future population projections. Using this approach, we can produce demographically informed species distribution models projecting the relative impact of future climate change on Henslow’s Sparrow populations and distribution. This approach will also allow us to incorporate management scenarios into the models to provide guidance on the future management of grassland birds and selection of grassland conservation areas.

Extinction Risk and Probability of Decline as Metrics for Ranking Conservation Priority Species - Jessica C. Stanton and Wayne E. Thogmartin

Efficient and effective species conservation and management includes not only reversing trends for species that are already imperiled but also the ability to identify and protect species before they become imperiled. Whether a species declines to extinction is a function of current abundance, long-term trends in abundance, and short term variation or fluctuations in abundance. However, this short-term variation is often ignored in species risk assessments. Here we use North American Breeding Bird Survey data (BBS) to analyze population trends and variability within Bird Conservation Regions (BCR) in a multivariate auto-regressive state-spaced modeling framework. We forecast the probability of species declining to 50% of current abundance (half-life) or becoming rare within each BCR in the near future.

This approach identifies several species with high probabilities of decline within each BCR that are not currently recognized as species of concern at regional or federal management levels.

Full life cycle bird friendly landscapes – Tom Will

Long-distance migratory birds spend only a few months of their annual cycle on the breeding grounds. During the remainder of the year, they fly often thousands of miles to and from the tropical habitats where they spend most of their lives. Recent advances in tracking technology and innovative studies in wintering ecology make it very clear that these annual phases—breeding, migration, and non-breeding residency—are not isolated segments in a bird's life. Events occurring in different locales are inextricably linked in determining lifetime avian reproductive success. If we allow the birds themselves to deliver insight, it also becomes clear that there are many kinds of cycles and loops that need to be closed in order for our conservation actions to be significant— cycles in research, monitoring, sustainable landscape design, sustainable economies, and human capacity-building that cross and bind together habitats, nations, market systems, and human generations. For example, an integrated full life cycle conservation strategy might include international partner teams implementing internationally developed survey protocols and research projects. Single commodity certification systems (e. g. , shade-grown coffee) can include native forest reserves (integrated open canopy coffee) and other crops grown in a sustainable bird-compatible manner to extend certification from the crop to the farm scale. Innovations like solar-powered dryers that substantially reduce forest cutting for fuel wood expand the bird-friendly concept to the community level. The brilliant, imaginative outreach and education expertise of our Latin American partners leverages the power of birds and bird art to transfer environmentally empowering knowledge across generations. To complete the economic and educational full life conservation cycle, however, requires comparable and compatible linked organic and bird-friendly North American and neotropical landscapes and a vision that includes markets that offer a full and varied suite of bird-friendly commodities to an expanded citizenry of conservation actors.

Long-term monitoring of forest breeding birds of the Western Great Lakes Region – Edmund Zlonis; Gerald Niemi; A. Grinde; Robert Howe; Nick Walton; Erin Giese; Linda Parker; and Nick Danz

Over the past twenty-five years (1988-2013), breeding bird communities have been sampled in the western Great Lakes region (primarily MN and WI) using standard 10-minute, unlimited distance point counts. The comprehensive data includes 450 stands and 3500-point counts from the forested regions of MN and WI with long-term data from the Chequamegon, Chippewa, Nicolet, and Superior National Forests (NFs) and annual data from a variety of short-term studies in MN, WI, and MI. We will summarize 1) results of breeding bird trend estimates from the four NFs and regional estimates from 1995-2013 and 2) selected examples of indicator species analyses. The most recent trend estimates are from the Chippewa and Superior NFs for 73 breeding bird species. Over 90 % of species tested in the Chippewa and Superior NFs sampled from 1995-2013 were either stable or increasing, while three species in the Chippewa NF and six species in the Superior NF significantly declined. With the two NFs combined, 13 species increased in both forests and only one, the Connecticut Warbler, had a declining trend. These trends are likely related to many interacting factors including changes in forest cover, forest composition, and climate change. Besides calculating trends, these data can be used for habitat and landscape modeling that is essential for effective conservation and management of these species.

ORAL PRESENTATIONS

Aerial Insectivores

Declines of aerial insectivorous birds in the Northeast: A call to action - Pamela Hunt

Aerial insectivores are those birds which capture insect prey on the wing, and in the Northeast include nightjars, swifts, flycatchers, and swallows. Over the last 5-10 years, it has become increasingly recognized that many birds in this foraging guild are declining at alarming rates – often higher than those of other species identified as conservation priorities. Canada has already listed three species [*Chordeiles minor* (Common Nighthawk), *Chaetura pelagica* (Chimney Swift), and *Contopus cooperi* (Olive-sided Flycatcher)] as threatened or endangered, and further listings are likely. A recent revision of priority species lists for the northeastern United States added several still common species [e. g., Chimney Swift, *Riparia riparia* (Bank Swallow), *Hirundo rustica* (Barn Swallow), and *Petrochelidon pyrrhonota* (Cliff Swallow)] in addition to species already recognized as state or regional “Species of Greatest Conservation Need.” In this presentation, I will provide an overview of the declines and potential threats, a summary of work going on in the Northeast, and issue a call to action for collaborative and coordinated monitoring, research, and outreach to agencies and organizations working in this region.

Post-fledgling movements of Purple Martin populations from Minnesota – Michael R. North and Kelly Applegate

We used colored leg bands, radio-telemetry and weather radar to track Purple Martin fledglings and adults from natal colonies to late-summer roost sites in Minnesota, and geolocators to track adult martins to their winter migrations to Brazil and back. Weather radar indicated approximate locations and dates of major roosting concentrations of Purple Martins in Minnesota. We found four major roost sites and 3-5 minor roost sites that attract post-fledgling martins from across the state. Major roosts were in emergent vegetation beds in Lakes Osakis, Big Spunk and Big Swan, and a cornfield near Willmar. Major roosts shifted locations from year-to-year, and bands and radios indicated individual birds utilize multiple roosts. Minor roosts occurred in emergent vegetation at Lakes Sissabagamah, Bald Eagle, and Swan, and in a cornfield near Parkers Prairie. The Willmar roost was usually not the primary roost in Minnesota in any given year, but is the only roost site we know of that is important every year. By the end of 2012, we had 233 observations of 162 unique bands at the Willmar roost. Hatch-year birds arrived significantly later (18 August) than second-year (10 August) and after-second-year (7 August) birds ($p < .0001$). Adult males arrived 1.6 days earlier than adult females. Birds of local origin arrived at, and departed from, the Willmar roost earlier in the season than did birds from more distant colonies. Average minimum duration of stay for birds seen multiple times was 10 days (range 2-26 days). Band readings and geocator recoveries indicated birds from Alberta, Canada migrate through or near Minnesota regularly. The unique location of the Willmar roost in proximity to one of the natal colonies we banded at allowed for enhanced survival and site fidelity estimates through mark-recapture techniques. Geolocators provided data on migration routes and stopover sites between Minnesota and Brazil.

Importance of lake-derived emergent insects and lake landscape pattern to forest breeding birds in Northern Wisconsin – P. R. Schilke, M. Bartrons, M. J. Vander Zanden, R. W. Howe, A. M. Pidgeon

Emergent aquatic insects from streams are an important food resource for forest-breeding songbirds; however, whether lake-derived insect inputs are similarly important has not been investigated. We

used a large dataset of bird point counts from northern Wisconsin with model-derived estimates of aquatic insect biomass inputs from lakes into surrounding forests to ask whether two avian foraging guilds, aerial insectivores, a guild of conservation interest, and gleaners responded to increased emergent aquatic insect biomass near lakeshores and to the pattern of lakes on the landscape at three spatial scales (100-m, 200-m, 500-m). Aerial insectivore guild abundance and richness responded positively to aquatic insect inputs at all scales. The strongest response was for insect inputs within a 200-m radius of avian survey points ($R^2=0.19$, p -value <0.01). Gleaner guild abundance and richness responded negatively or insignificantly to emergent insect biomass. Aerial insectivore abundance and richness was significantly greater at sites with aquatic insect inputs than at sites with no inputs (p -value <0.01), while gleaner abundance was lower or the same. The best model for aerial insectivore abundance included percent forest cover and lake-edge density within 200-m. Our results suggest that emergent aquatic insect biomass is important to aerial insectivores but not to gleaners, which is different from studies that have looked at streams, and that these guilds respond differently to lakes on the landscape. The importance of emergent aquatic insects from lakes as a food resource should be considered when managing landscapes for aerial insectivores.

Population trends and status of breeding swallows in the Great Lakes Region – Richard A. Wolinski

Most species of swallows have shown a long-term decline in population levels since the 1970s based upon Breeding Bird Survey (BBS) route trend data. Breeding bird atlas projects in Great Lakes states that map breeding distributions also tend to support the BBS results. Most species of swallows have benefited directly by human induced changes to the pre-settlement condition and a review of their basic breeding biology, interaction with human infrastructure and activities will be reviewed in light of their basic needs. The presentation is meant to provide an overview of all breeding swallow species and possible factors that may contribute to observed declines. The presentation should serve as a primer on swallow biology and as a foundation for discussions regarding the observed long-term trends and potential approaches for setting target population goals and approaches to management.

Grassland Birds

Linking wildlife, water, and agriculture: A systematic approach to multi-benefit conservation in the Prairie Pothole Region of Minnesota and Iowa – Ryan G. Drum

The notion of a “functional landscape”—often vaguely defined—implies a wide array of desired ecosystem services. Sustaining or increasing grassland bird populations is one objective amongst many other objectives, some of which are likely to be complementary while others, like maximizing agricultural productivity, may be in direct competition with grassland bird priorities. An innovative partnership in the Prairie Pothole Region of Minnesota and Iowa has been working to develop an integrated conservation strategy—a framework for incorporating multiple conservation objectives using a combination of spatial prioritization, optimization techniques, outcome-based spatial models (for wildlife, water quality, flood reduction, and agricultural productivity), and GIS-based scenario modeling. Working across disciplinary and bureaucratic boundaries at multiple scales poses both unique challenges and profound opportunities; new data and modeling techniques empower a systematic vision for integrated conservation that can help guide strategic priorities for grassland bird conservation and inform population objectives at multiple scales. Preliminary results suggest that grassland bird conservation could benefit by aligning strategies that complement other ecosystem service objectives while simultaneously minimizing negative impacts to agricultural productivity.

Habitat-specific scale dependencies influence patch occupancy: defining neighborhoods to optimize the effectiveness of landscape-scale grassland bird conservation – Michael R. Guttery, Christine A. Ribic, David Sample, Chris Trosen, Andy Paulios, John Dadisman, Daniel Schneider, and Josephine Horton

Real-estate agents have long recognized that home values are dependent upon characteristics of a property as well as the neighborhood in which the property is located. In recent years, ecologists have discovered that many species of wildlife, including many grassland bird species, judge the value of a habitat patch in relation to the properties of the patch and the landscape (i.e. neighborhood) in which it is located. While much is known about the specific patch-level habitat requirements for most grassland bird species, far less is known about how birds respond to landscape composition, and particularly, the scales at which various species respond to different aspects of the landscape surrounding a patch. To evaluate scale-dependencies in the response of four grassland bird species to landscape composition, we used data from 283 point counts conducted in native and managed grasslands across Wisconsin. Landscapes were classified using LandSat8 imagery processed through ENVI. Each sampled habitat patch was buffered in increments of 50 meters from 50 to 3000 meters and the proportion forest, cropland, pasture, idle grass, and all grass (pasture plus idle) was calculated for each buffer. Single-season patch occupancy models were used to evaluate the relationship between patch occupancy and patch size and landscape composition at each scale. MARS models were then used to evaluate patterns in landscape composition across scales. Results indicate that each of the four species is influenced by different landscape scales. Response of eastern meadowlarks to idle grass was constant across scales whereas bobolink and grasshopper sparrows respond most strongly to idle grass at the largest scale considered and Henslow's sparrows respond most strongly to the smallest scale. Effects of cropland were always negative and tended to increase with scale. Our findings provide important insights into effective landscape conservation planning for grassland birds.

Building a Midwest Grassland Network to support implementation of state and regional conservation plans – Dan Lambert, Rosalind Renfrew, Tom Will, and Katie Koch

Grassland bird populations are decreasing faster than any other group of breeding birds in North America, with especially pronounced declines occurring in the Midwest. Throughout the region, many organizations have developed plans to address the problem, including state agencies, Joint Ventures, Landscape Conservation Cooperatives, and single-species partnerships. The Migratory Bird Program of the US Fish and Wildlife Service (FWS) is leading a new effort to create a network of grassland landscapes in the Midwest to support implementation of these state and regional conservation plans. The project will generate spatial information, strategic guidance, and cross-sector collaborations that uphold the many ecological and societal values of grasslands. The Midwest Grassland Network will serve the Upper Mississippi River/Great Lakes, Central Hardwoods, and eastern Prairie Pothole regions. During the first phase of the initiative, we will work with collaborators to:

- integrate spatial information about grasslands and grassland birds into a Midwest Grassland Bird Conservation Areas (GBCA) map;
- evaluate strategic options for promoting grassland landscapes;
- highlight innovative, cross-sector partnerships that work to conserve or restore grasslands; and
- provide a foundation for continued coordination of grassland bird conservation in the region.

The Midwest Grassland Network represents the next step in the progression of the GBCA idea, which has been implemented, modified, and evaluated at different spatial scales since it was first proposed in 1996. A common system for delineating and categorizing GBCAs will better equip bird conservationists to coordinate activities across the region and to forge productive partnerships with other grassland interest groups. In the face of ongoing agricultural intensification and land-use change, such alliances are vital to achieving habitat gains at the scale needed to stem long-term population declines.

Brokering relationships between non-farming landowners and livestock producers to provide high quality habitat for grassland birds in the Upper Midwest – Laura Paine, Travis Anderson, Cara Carper, Erin Holmes, Brian Loeffelholz, Eric Mark, and Gene Schrieffer

The Southwest Wisconsin Grassland and Stream Conservation Area is a 500,000 acre island of grassland-dominated habitat in an agricultural landscape. Conservation partners have nurtured this grassland using tools such as land and easement purchases, set-aside programs, landowner education, and cost-sharing of conservation practices. Currently, we are exploring market drivers as a tool to preserve grasslands. Pasture raised meat and dairy products are in high demand among consumers, but grasslands for grazing livestock are often unavailable to farmers wishing to access this market. This project targets non-farming landowners who control an estimated 60% of the land in the region. These landowners are diverse, and given a range of possibilities, may choose land management options that balance economic and environmental goals. The goal of the Grazing Broker project is to make those options accessible and at the same time, provide livestock producer's access to pasture. The Grazing Broker is modeled after the private consulting forester, brokering relationships between the landowner and the 'resource harvester,' in this case, farmers. The broker works to create a mutually beneficial partnership to manage the grassland for its conservation value as well as to produce an income for both parties. The broker shepherds the relationship by developing a grazing plan, connecting landowner and producer with resources and cost sharing to develop fencing and watering, and facilitating lease agreements. This presentation will share the successes and challenges of the Grazing Broker project to date. Our goal is to create a model that can be replicated throughout the region.

Engaging multiple partners in grassland bird conservation in an urbanized area- Judy Pollock, Justin Schuetz, and Chad Wilsey

Embedded in one of North America's largest metropolitan regions and stretching from southern Wisconsin, through northern Illinois, into northwestern Indiana and southwestern Michigan, Chicago Wilderness is a network of natural areas that includes nearly 370,000 acres of protected lands and waters - and a consortium of over 250 organizations that work to conserve local biodiversity. Although state and federal properties are included within Chicago Wilderness (CW), the primary owners of natural lands are the counties. The region's natural areas contain a notable diversity of habitats and the greatest number of endangered and threatened species in the state. The grassland bird population is sizeable, and increasing it has always been one of the highest priorities of CW partners. Many have done significant grassland restorations since the inception of Chicago Wilderness 15 years ago. Inspired by the work of the Midwest Coordinated Bird Monitoring Partnership, a group of CW partners came together to form the Chicago Wilderness Grassland Bird Task Force in order to apply regional, landscape-level thinking to grassland bird populations. The objectives of the Task Force are to bring Chicago Wilderness partners together around a set of common population and acreage goals, and to monitor progress toward those goals. These goals take the Grassland Bird Conservation Area (GBCA) model as their framework. In this presentation, we will discuss the process of getting multiple partners involved in meeting conservation targets, share our citizen-science fueled species habitat modeling process, and will share our progress on identifying GBCAs in an urban/suburban matrix.

Landbird Migration

On a wing and a (GIS) layer: prioritizing migratory bird stopover habitat along Great Lakes shorelines

– David N. Ewert, Patrick J. Doran, Kimberly R. Hall, August Froehlich, John Cannon, James B. Cole, Kristin E. France, and George T. Raber

For migratory birds, stopover sites provide essential food resources during a part of the life-cycle when mortality may be high. Stopover habitat has been neglected in many conservation efforts, in part because habitats are used for a short time and use can vary depending on many factors. The Great Lakes coastal aquatic and terrestrial landscape supports hundreds of millions of migrants during both spring and fall migration. We identified and scored attributes of areas within 25 km (15 miles) of the shorelines of Lakes Michigan, Huron, Erie, and Ontario, and connecting water bodies, US and Canada, as potential stopover sites for landbirds (songbirds and raptors), waterfowl, and shorebirds. Criteria used to predict locations of stopover sites are based on a literature review, and unpublished information from reports and regional stopover experts. Regionally available GIS data layers were used to develop scores and create maps based on these scores to indicate the relative importance of stopover sites in our study area. The results are presented in an interactive web portal. The Upper Midwest and Great Lakes Landscape Conservation Cooperative supported development of the predictive model and the website. Our analysis suggests that areas close to the Great Lakes shorelines are important stopover sites for all groups of birds, including landbirds, shorebirds and waterfowl. Additional research on the distribution and ecology of migrants is needed to test our models, especially around Lake Superior.

Bird and bat migration patterns along the Great Lakes as observed by avian radar – Jeff Gosse, Tim Bowden, Rebecca Horton, David Larson, Dan Nolfi, Erik Olson and Nathan Rathbun

Each year, millions of birds and bats migrate through the Great Lakes basin while traveling to their breeding grounds. Understanding how birds and bats migrate through the area can assist researchers, managers, and developers in determining the risk to these migrants from wind turbines, communication towers, and other development. To gain a better understanding of how birds and bats use the Great Lakes for migration, the U. S. Fish and Wildlife Service has stationed two mobile avian radar units at over 25 locations along the Great Lakes. By surveying these locations over the past 3.5 years (Spring 2011 – Spring 2014), a variety of patterns and phenomena have been observed. Some of these patterns have been hypothesized or observed in other studies but our study has demonstrated these at the majority of the locations we have surveyed so far around the Great Lakes. Examples include the pulsed nature of migration, movement into shoreline at dawn, variation in the direction of movement during nocturnal migration including reverse migration, and shifting of direction of movement from crossing the lakes early in the night to following along the shorelines late in the night. We have also observed birds and bats heading out to cross the Great Lakes at different widths of the crossing. From our experience with these seven migration seasons, we have gained an understanding of how to visualize these patterns and phenomena, both qualitatively and quantitatively, and will present these observations and examine how migration patterns differ between north/south lakeshores versus east/west lakeshores. By surveying over a long period of time and at a variety of locations along the many shorelines of the Great Lakes, we can evaluate what types of activity are site and regionally specific and what phenomena are present among all of the sites that we surveyed.

Nocturnal Birds

Identifying factors associated with detection probability and occupancy of nocturnal birds:

implications for coordinated monitoring in the Midwest - Thomas J. Benson and Tara A. Beveroth

Bird monitoring is critical for improving conservation and management decisions, but nocturnal species, such as nightjars and owls, may not be effectively monitored by existing programs. Nonetheless, some data and anecdotal reports suggest that nightjar and some owl populations are declining, and several nocturnal species are recognized as species of conservation concern. To provide reliable data for these species, several states, including Illinois, Michigan, Minnesota, and Wisconsin, have developed nocturnal bird monitoring programs. These programs supply us with information, but we do not know whether the current survey design is most appropriate for monitoring these species. To provide useful information for future coordinated monitoring efforts in the Midwest, we used existing data to examine factors influencing detection probability and occupancy of Eastern Whip-poor-wills (EWPW), Barred Owls (BDOW), Great Horned Owls (GHOW), and Eastern Screech-Owls (EASO). The results suggest that current monitoring programs for Whip-poor-wills and owls are adequately designed to detect landscape level patterns of occupancy, and likely coarse population trends for some species. Six-minute counts were adequate for all species except EASO; shorter counts would likely suffice for EWPW. The per-visit detection probability for EWPW and BDOW were within an acceptable range assuming that analysis methods appropriately account for imperfect detection. However, for GHOW and EASO, exceeding 3 visits per season produced few benefits for cumulative detection probability, except for EASO when playbacks are used. For 3 of 4 species, we detected landscape-level drivers of presence at 2 different scales (5 km, and 800 m). Landscape factors associated with occupancy differed between the 2 scales for all 3 species. At the large scale, forest cover was most important for EWPW and GHOW, positively associated with EWPW and negatively with GHOW occupancy. Developed land was negatively associated with occupancy of EWPW, BDOW, and GHOW. Overall, these analyses suggest that current programs designed to monitor nocturnal birds in the Midwest are providing useful information that is not available from other large-scale monitoring programs.

Habitat use by the Eastern Whip-poor-will (*Caprimulgus vociferus*) in managed forest landscapes – Pamela Hunt

Habitat loss has been proposed as an important factor behind rangewide population declines in the Eastern Whip-poor-will (*Caprimulgus vociferus*). This species has long been recognized as typical of early successional or edge habitats, including pine barrens, open woodlands, and areas where forest is adjacent to fields or other cleared areas. We mapped whip-poor-will home ranges at two sites in New Hampshire using a modified spot-mapping technique and supplemented by radio telemetry. In a forest characterized by a long history of varied management, edge and early successional habitats were represented disproportionately highly in whip-poor-will home ranges relative to the site as a whole. Home ranges tended to be centered on features such as powerline rights-of-way, regenerating wildlife openings, and field edges. Response to ongoing management varied, with birds colonizing a recently harvested area one year after harvest, but not moving into an area treated less intensively. In pine barrens habitat managed through prescribed burning, whip-poor-wills were more generally distributed, although activity was consistently low in areas lacking in significant understory. Taken together, these data, plus observations from other occupied sites, support the hypothesis that loss of suitable habitat may be a factor in whip-poor-will declines. Management that results in forest with low-density understory, extensive forest canopy gaps, and/or openings adjacent to such forests has the potential to enhance whip-poor-will populations.

Factors associated with occupancy and nest survival in Barn Owl nest boxes in Illinois –Amber K. Wingert and Thomas J. Benson

Barn Owl populations have decreased in the Midwestern U. S. in recent years, and they are listed as endangered in several states, including Illinois. This is largely due to the loss of grassland habitat to increased row cropping and development, as well as a potential decrease in suitable nesting substrates. To deal with the problem of nest site scarcity, many states, including Illinois, have initiated nest-box programs. In Illinois, >300 nest boxes have been installed since 1990. However, monitoring of these nest boxes has been intermittent. We set out to examine factors associated with nest box use, estimate the number of occupied nest boxes in Illinois, and examine survival of nests in these boxes. We monitored 235 previously installed nest boxes located throughout Illinois, and examined landscape composition and structure at Barn Owl nest sites and unoccupied boxes. Although most boxes were unoccupied, we found that a number of factors, including crop cover and grassland cover in the surrounding landscape, were associated with nest box use. At active nests sites, nest box type and grassland cover affected daily survival rates. In addition to improving our understanding of Barn Owl ecology, this information will aid in the placement of future nest boxes and will contribute to efforts to conserve this species in Illinois and elsewhere in the Midwestern U. S.

Secretive Marshbirds

Effects of wetland management strategies on habitat use of autumn migrating rails in intensively-managed wetland complexes in Missouri, progress and future directions – Auriel M. V. Fournier, Doreen C. Mengel, Andrew H. Raedeke, David G. Kremetz

Most wetland managers use a combination of water level manipulation and soil disturbance to create a desired plant community. Here we focus on how water level manipulations and disturbance type influences wetland use by migrating rails through the central portion of the Mississippi Flyway. In Missouri, water level manipulations on intensively-managed wetland areas generally include an early to mid-summer drawdown that enables summer- soil disturbance activities followed by late summer or late autumn flooding. We surveyed migrating Sora (*Porzana carolina*), Virginia Rails (*Rallus limicola*), Yellow Rails (*Coturnicops noveboracensis*) and King Rails (*Rallus elegans*) across four regions in Missouri during four sampling periods in the autumns of 2012 and 2013. We sampled rails using line transects from ATVs at night and analyzed the Sora detections using a distance sampling framework in R package ‘unmarked’, and analyzed each survey period separately. We used occupancy modeling to examine non-Sora detections and were unsuccessful in modeling habitat selection and are pursuing other methods. We detected 3,457 Sora, 57 Virginia, 41 Yellow and 8 King Rails. We observed no change in peak migration of Sora between the two years and a small shift in both Virginia and Yellow Rail peaks ($p < .001$ for both). We found that habitat type, plant/water interspersions, water depth, and flooding date explained Sora density in different periods during the autumn. Sora density was positively influenced by flooding in late summer (August) vs autumn (October). We found Sora density increased with water depth across all regions early in the autumn. We found Sora densities were higher in wetlands managed for moist soil than in wetlands managed for perennial emergent habitat types. To account for landscape scale factors and water level manipulation we will be doing crossover experiments to examine migratory rail habitat selection in 2014 and 2015.

Effect of wetland management strategies on the distribution and habitat associations of secretive marsh birds on public wetlands in Missouri – Evan Hill, Elisabeth Webb, Doreen Mengel

Distribution information of secretive marsh birds (SMBs) on public wetlands in Missouri is lacking and the extent to which SMBs rely on wetlands in Missouri to fulfill different life-history stages is largely unknown. The objective of this study is to determine effects of water-level management on the

distribution, habitat use, and nesting effort of SMBs during migration and breeding across a gradient of habitats. Focal species included Sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), king rail (*Rallus elegans*), American bittern (*Botaurus lentiginosus*), and Least Bittern (*Ixobrychus exilis*). We surveyed 60 wetland units on 12 public wetlands in Missouri from April-June 2013 and 2014 using standardized marsh bird monitoring protocol. We sampled a total of 180 points in five wetland vegetation types a minimum of three times. We classified water management strategies on study wetlands as either active (water drawdown during sampling period) or passive (no water drawdown). Sora had the greatest number of detections (n=881), followed by least bittern (n=265), American bittern (n=180), Virginia rail (n=95), and king rail (n=9). In both years, the greatest number of detections for each species occurred at survey points with passive water management and points dominated by persistent emergent vegetation. The fewest detections for each species occurred at points dominated by agricultural crops. Using the detection histories from 2013, we calculated detection probability and occupancy for each species except king rail and used AIC to evaluate models best predicting species occupancy. Future analysis will evaluate results of the detection histories from 2014. In 2013, null models best predicted American bittern and Virginia rail occupancy. In addition, wetlands with passive water management had greater occupancy rates for both Sora and least bittern, compared to sites with active water management.

Developing an optimization tool for a balanced delivery of breeding marshbird and nonbreeding waterfowl habitats on an intensively managed mid-latitude National Wildlife Refuge in the Mississippi Flyway – Brian W. Loges and James E. Lyons

Located in the Mississippi floodplain of Eastern MO, Clarence Cannon National Wildlife Refuge provides high quality emergent marsh and moist-soil habitat benefitting both nesting marshbirds and migrating waterfowl. Refuge staff manipulate 17 units to provide a diversity of wetland community types and water regimes for both guilds in response to regional priorities for marshbirds and waterfowl. Nonbreeding dabbling duck-use days and king rail unit occupancy are being used as performance measures to inform decisions influencing the balance between high energy nonbreeding waterfowl habitat and breeding king rail habitat. We are using linear programming to find the optimum sets of management routines with the sum of dabbling-duck and king rail utilities as an objective function. Management routines are defined by growing season water regimes and level of applied early-successional management strategies. Utilities specific to the three management routines are being developed for each unit. Nonbreeding dabbler utilities are derived from Integrated Waterbird Management and Monitoring Initiative (IWMM) habitat and bird observation data collected between 2010 and 2013. Elicited expert opinion will be used to generate king rail utilities and waterfowl utilities undocumented in the IWMM data. Main constraints include a minimum energetic carrying capacity compiled across units and management costs; other constraints of interest are easily added. Numerous refuge-wide scenarios will be created, each representing a unique mix of the three routines across all units. Our analysis culminates in a graphical solution – a Pareto efficiency front – that identifies a variety of scenarios for maximizing delivery of management benefits while ensuring habitat for both guilds.

Urban Birds

eBird: Where Birding, Science, and Conservation Meet - Nicholas M. Anich; Thomas G. Prestby; Ryan S. Brady

Millions of observations are reported every year to eBird, a free online bird database. Birdwatchers submit their bird observations to the website (www.ebird.org) and are able to use the online tools for record-keeping and visualization while contributing to an increasingly massive pooled database. This database is available to managers and scientists and holds great potential for conservation. We introduce eBird to those not familiar with it, and discuss potential applications for conservation

professionals such as identifying bird species present on a property, learning about typical dates of occurrence, and gathering observations of species of concern. We also provide examples of analyses from downloaded datasets. Because eBird accepts a variety of data from around the world, even entering your yard lists contributes to our understanding of avian distribution and abundance. eBird fills gaps in other monitoring methods and as use of the website continues to increase, the dataset is able to better inform conservation decisions.

Employing Lights Out Programs to Protect Migrating Birds - Amanda Duren

Every spring and fall, many millions of birds migrate through the Midwest on their way to or from their breeding grounds. Many birds migrate at night, and lights on tall buildings or aimed at the sky disorient them and draw them into the buildings. This causes many birds to strike windows or circle buildings until they fall from exhaustion. Lights Out programs provide an opportunity to reduce the number of collision-related kills, and have been successful in a number of cities across the Midwest, including Chicago, Minneapolis, Indianapolis, and Columbus. These programs have all benefited from strong partnerships with businesses, local government, and conservation, sustainability, and building manager organizations. Gaining public support and recognition for participating buildings are also key to growing a Lights Out program. A Lights Out program can be an important piece in a community's efforts to create bird-friendly urban habitat.

Developing Citizen Science Monitoring Programs to Understand Bird-Building Collisions- Amanda Duren

Engaging citizen scientists in research or monitoring projects allows for the inexpensive collection of data, often at a larger scale than would be possible with paid staff alone. Most of the available data on bird-building collisions was collected through citizen science monitoring programs in cities across the U.S. However, it is essential to clearly establish a purpose and goals before starting a citizen science collision monitoring program to ensure the collection of accurate and useful data. In 2012, a citizen science collision monitoring program was developed in Columbus, OH, following a structured 10-step approach presented in The Northeast Bird Monitoring Handbook. This approach offers a framework for developing a citizen science collision monitoring program that can contribute data to answer both local and national research questions.

Bird-Friendly Communities Program - Joanna Eckles and Bob Petty

Most Americans live in cities, towns and suburbs and can play a critical role in fostering healthy wildlife populations through their daily lifestyle choices. Recognizing this power the National Audubon Society made "Creating Bird-Friendly Communities", one of its five conservation strategies, during strategic planning in 2012. This strategy is recognized as a priority for Audubon across the country. We'll share examples of how this priority is being realized in different communities. Engaging people in conservation through our network of centers, chapters and state offices will be key to creating communities where birds can thrive.

Project BirdSafe – Audubon Minnesota - Joanna Eckles and Mark Martell

Audubon Minnesota and a variety of partners began Project BirdSafe to study and reduce bird-window collisions in the spring of 2007. Starting in the downtowns of Minneapolis and St. Paul, and using protocols developed in Chicago and other cities, we began a campaign to have tall buildings reduce their lighting after 12pm during the fall and spring migratory periods. We also began a monitoring program using volunteers following a prescribed route in the early morning of every day during the lights out program. The positive response we received from building owners and managers and the growing realization that building design and materials were crucial to reducing the mortality caused by building

collisions led us to expand our efforts. We developed a “Bird Safe” building guidelines booklet which summarized the latest information for architects, landscape architects, building owners and managers to guide both building retrofits and new building construction. Our program has grown to include workshops with architects, consultation on new building design and window retrofit, and inclusion of lights out requirements and bird safe design in state owned or funded buildings. As research evidence mounts that building collisions are one of the highest causes of anthropogenic mortality to birds the National Audubon Society is making Bird Safe a national priority using locally developed projects in Minnesota, Chicago and other cities as a model.

Stopover Habitat Restoration in Wisconsin’s Great Lakes Basins- Kim Grveles and Sumner Matteson

The Wisconsin Stopover Initiative (WISI) is a partnership of many agencies and organizations working together to protect, conserve, and enhance the habitats used by birds migrating through Wisconsin’s Great Lakes basins. These habitats, called “stopover” habitats, offer vital cover and food at a time in a bird’s life when risk of mortality may be highest. WISI has developed education programs to promote replacing manicured lawns and ornamental shrubs with a diversity of native plants. In addition to providing stopover habitat for migratory birds, native plants sustain a diversity of wildlife and reduce or eliminate the need for chemical fertilizers and pesticides in landscaping. Learn how recipients of our education programs, from private landowner to professional land managers, have implemented stopover habitat restoration on their properties and in their communities.

The U.S. Fish and Wildlife Service’s Urban Bird Treaty Program - Steve Lewis

In 1999, the U.S. Fish and Wildlife Service (USFWS) established an initiative entitled the Urban Conservation Treaty for Migratory Birds (<http://www.fws.gov/migratorybirds/Partnerships/UrbanTreaty/urbantreaty.html>). Through this grant program, the USFWS enters into agreements with, and provides funding and technical assistance to, city governments and their partners to make cities healthy and safe environments for birds while engaging citizens in conservation. Activities undertaken through Urban Bird Treaties (UBTs) include: habitat protection, restoration, and enhancement; management of non-native, invasive, and nuisance species; reduction of threats to birds caused by building collisions and other hazards; creation of opportunities for people to view, learn about, and enjoy birds; and citizen science, including bird monitoring. There are currently 20 UBTs throughout the U.S. In the Midwest, UBTs have been established in Chicago, Minneapolis/St. Paul, Indianapolis, and St. Louis. Accomplishments of these UBTs will be summarized and the future of the UBT program will be discussed.

The Twin Cities Guide to Urban Bird Conservation - Mark Martell and Kristin Hall

On July 14, 2011, the cities of Minneapolis and Saint Paul were jointly named as a member of the Urban Bird Treaty Program (one of only 18 treaty cities in the nation) in recognition of their value to bird conservation in the United States. We produced The Guide to Urban Bird Conservation for the Twin Cities and Surrounding Seven County Area (<http://mn.audubon.org/twin-cities-bird-conservation>), which provides details on how the Twin Cities and surrounding area can work to protect, restore and enhance urban/suburban areas for birds through targeted habitat restoration, species management, environmental education, and community involvement activities. The Guide outlines and prioritizes action for bird conservation in the metro area by identifying:

1. Available habitat and protected lands , placing an emphasis on existing and potential Important Bird Areas
2. Specific threats to birds, including those that are unique to the urban environment
3. Strategies and recommendations to overcome these threats and provide suitable bird habitat within the metro area.

The Guide to Urban Bird Conservation for the Twin Cities and Surrounding Seven County Area is intended as a catalyst for more comprehensive and strategic action. Together partners can enhance the overall quality of life in the metro area; socially, economically and environmentally, by providing a better home for birds.

***Conservation Design for Metropolitan Landscapes: A Possible Role for Landscape Conservation Cooperatives?* - John Rogner**

More than 80% of Americans live in metropolitan areas, which collectively comprise an ever-increasing percentage of the North American landscape. They also tend to be situated along coastlines and major rivers, which are typically species-rich landscapes. The conservation community can neither ignore urban areas nor view them solely as conservation battlegrounds, but must work collaboratively with urban planners, decision-makers, and the public to design and retrofit communities in ways that best conserve biodiversity. Developing the best science to support landscape-scale conservation is the niche of Landscape Conservation Cooperatives, which must consider the full continuum of landscapes, from remote wilderness to highly-developed urban areas.

***Natural areas management within an important western Great Lakes migration corridor* – Brian Russart**

The Milwaukee County Department of Parks, Recreation & Culture (DPRC) comprises nearly 75% of all the remaining green space left within Milwaukee County, Wisconsin's most urban county. The Park System totals just over 15,000 acres, 10,000 acres of which are managed as part of the Park System's Natural Areas Program. These urban natural areas are composed of lowland and upland hardwood forests, wetlands, surrogate grasslands, oak savanna, and prairie. This mosaic of urban natural areas along the western shores of Lake Michigan serve as vital breeding and stopover habitat for birds and other wildlife within an important Upper Great Lakes migration corridor. Over the past six years the DPRC's Natural Areas Program has been actively engaging the citizens of Milwaukee County in the management and conservation of these unique resources, amidst a vastly urban landscape. Join the DPRC's Natural Areas Coordinator for an overview of how the Natural Areas Program is using a creative mix of partnerships to address the various threats to bird habitat including invasive species, public use conflicts, and habitat fragmentation.

***Reducing Bird Mortality Associated with Communication Towers, Wind Turbines, and Power Lines* - Bob Russell**

The U.S. Fish and Wildlife Service and others have worked in recent years to use the best scientific information available to develop guidelines that are aimed at reducing various anthropogenic hazards to birds. This presentation will address three hazards that are particularly problematic for birds in urban/suburban landscapes: communication towers, wind turbines, and power lines. Guidelines for communication towers (<http://www.fws.gov/midwest/es/planning/index.html>) consider how tower siting, design (height, guy wires), and operation (lighting regimes) can affect the likelihood and magnitude of bird collisions with towers. Birds can be adversely affected by wind turbines through collisions and loss, degradation, and fragmentation of habitat; guidelines (<http://www.fws.gov/midwest/wind/resources/guidances.html>) address siting, design, and operation of turbines as well as pre- and post-construction monitoring to assess impacts. Power lines can kill birds through collisions and electrocutions, and the Avian Power Line Interaction Committee has produced excellent guidelines for reducing these sources of mortality (<http://www.aplic.org/index.php>).

Bird city Wisconsin: making our communities healthy for birds... and people – Carl Schwartz

The Bird City Wisconsin program is now in its fourth year and continues to demonstrate strong growth. It remains focused on *making communities healthier for birds...and people* and features a strong emphasis on community partnerships. It has recognized 81 communities, including eight of the states ten largest cities as well as villages with as few as 187 people. It presented awards to 16 new communities in 2013, and six more already in 2014. The program draws major support from the Bird Protection Fund of the Natural Resources Foundation of Wisconsin. It also profits from a strong relationship with the DNR's Urban Forestry Division and Bureau of Wildlife Management. Work has begun to make the Bird City program part of the National Audubon Society's "Bird Friendly Communities" initiative, with Minnesota Audubon planning to replicate the program while creating a manual to assist other Audubon chapters nationwide in doing the same. Representatives of 44 BCW communities attended a Bird City Summit that was the focus of the 2014 annual meeting of the Wisconsin Bird Conservation Initiative March 21-22, 2014 in Oshkosh. Participants heard from experts and shared best practices with each other as well as communities seeking future recognition. Kent Hall, a BCW steering committee member and vice president of the Bluebird Restoration Association, says, "The BCW initiative has done more to awaken municipal officials to the importance of bird conservation than any program I have been associated with in my 44 years in Wisconsin." This presentation focuses on new healthy-community initiatives fostered by BCW and the collaborative partnerships it has generated, resulting in:

- Improved habitat conditions for breeding and migrating birds.
- Sound management of urban forests.
- Reductions in bird fatalities caused by domestic cats allowed to roam outdoors, and by window strikes.
- Active and coordinated engagement in conservation activities.
- A strong sense of community pride in conservation accomplishments.

How Birding and International Migratory Bird Day Can Engage Urban Audiences in Conservation - Yoyi Steele

In this presentation, I will present an overview of how birding, birding trails, birding festivals, and International Migratory Bird Day celebrations can engage new audiences in birding and bird conservation, with examples from around Wisconsin.

The Cat Problem: Less Caterwauling, More Solutions Needed - Stanley A. Temple

Professor Stan Temple has devoted his career to studying and trying to reduce threats to native wildlife, including predation by free-ranging domestic cats. He conducted one of the first assessments of the impacts of free-ranging cats in rural Wisconsin had on wildlife. His findings drew sharp criticism and even death threats from cat advocates who accused him of being a "cat hater" (even though he had pet indoor cats) and dismissed his findings as "wild exaggerations." Now many years and dozens of similar studies later, a recent study has shown that cat predation is the largest source of bird and mammal mortality in the U.S. directly related to human behavior. Almost everyone agrees cat populations are out of control and increasing rapidly in the U.S., and those cats with outdoor access take a heavy toll on wildlife, which should prompt action to control populations of free-ranging cats. Temple's criteria for population control are that it must be biologically effective (it must actually work), ecologically benign (it must not harm wildlife) and acceptable to most people (not just a vocal few). Name-calling, denial and ineffective approaches (such as Trap-Neuter-Release) must give way to real solutions. Keeping owned

pet cats confined indoors, neutering them, and humanely dealing with unowned cats in truly effective ways that also protect wildlife from cat predation seem like reasonable goals. Solutions that match the enormous scale of the problem must be found and implemented soon, for the sake of the cats and the wildlife for which we are responsible.

Citizen Science as a Tool to Engage New Audiences to Inquiry-based Research and Monitoring- Tim Vargo

The goal of the Citizen Science Program at the Urban Ecology Center (Milwaukee, WI) is to facilitate partnerships between community members and professional researchers that allows space for collaborative research and to help create a more engaged, knowledgeable and ecologically literate citizenry. Partnerships have been key in enabling the Center to engage a younger, more diverse audience in all aspects of urban bird research and conservation, from project design to data analysis and dissemination. This presentation will focus on a powerful partnership between the University of Minnesota and the Urban Ecology Center's Young Scientist Program.

POSTER PRESENTATIONS

Aerial Insectivores

Monitoring roosting Chimney Swifts in Green Bay, WI - William Mueller and Nancy Nabak

The Chimney Swift (*Chaetura pelagica*) currently nests primarily in human-built structures and largely in urban areas in eastern North America. The Chimney Swift is one of a group of aerial insectivores experiencing population declines. As part of a series of conservation initiatives focused on this species, and since late summer of 2011, participants from Bird City Green Bay, a member city of Bird City Wisconsin (see: <http://www.birdcitywisconsin.org/>) have conducted an extensive set of "swift nights out" – citizen science events with the purpose of monitoring evening roosts of Chimney Swifts in chimneys within urban areas of the city of Green Bay, Wisconsin, and other nearby communities. As of mid-autumn of 2013, over 100 chimneys are being monitored during this annual monitoring effort. This poster presents data from this monitoring effort, maps the locations of roosts, and graphs building types for which monitoring of roosting swifts has been done. The chimneys are described according to presence or absence of swifts, building ownership and type, and numbers of roosting swifts found. The Wisconsin Chimney Swift Working Group hopes to promote other local efforts for monitoring roosting swifts throughout Wisconsin and elsewhere, and we present this as a model for such efforts.

Forest Birds

Reproductive success of shrub-nesting birds in Illinois and the potential conservation value of forest preserves in the Chicago region – Scott J. Chiavacci, Thomas J. Benson and Michael P. Ward

Populations of numerous shrub-nesting bird species have declined in Illinois over the past century, some by up to 66%. These declines are increasingly recognized as a conservation concern, yet little has been done to better understand their causes. We sought to identify the relative quality of shrubland habitats by comparing nest success of and nest predation rates on shrub-nesting birds breeding within shrublands embedded in urban- and agriculture-dominated landscapes. We were specifically interested in evaluating the quality of shrublands embedded within the Chicago region, as it contains thousands of

hectares of potentially suitable shrubland habitat within its vast forest preserve network. From 2011–2013 we located and monitored over 3,300 nests of 30 shrub-nesting species. We found that nest success was considerably higher among sites within the Chicago region (47% to 68% success) compared to sites in the agriculture-dominated landscape of east-central Illinois (27% success). The primary cause of nest failure at all sites was predation, but nest predation rates were considerably higher in east-central Illinois, likely owing to the greater suite of predator species in the latter. Our results reveal the potential conservation value of shrubland habitats in the Chicago region, especially because they are managed with the intent of maintaining them as shrubland and appear to be valuable refuges from the high nest predation rates experienced elsewhere. The high rates of nest predation we observed in east-central Illinois, if applicable to the remaining agriculture-dominated landscape throughout the state, may be a factor contributing to population declines among shrub-nesting birds.

Using bird data to assess condition of western Great Lakes forests – Erin E. G. Giese, Robert W. Howe, Amy T. Wolf, Nicholas A. Miller, and Nicholas G. Walton

Biodiversity of western Great Lakes forests are vulnerable to human disturbances such as unsustainable logging, development, invasive species, and climate change. Impacts of these threats may be inconspicuous and long term, so effective land managers must carefully and continuously monitor forest “health.” We constructed a simple, yet rigorous tool for assessing forest condition based on the Index of Ecological Condition (IEC), a method originally developed by Howe et al. (2007) for Great Lakes coastal wetlands. Our forest IEC model is based on occurrences of breeding bird species with known sensitivities to landscape disturbance. An iterative computer algorithm (in MS Excel or the statistical program R) is used to calculate the index, ranging from zero (maximally degraded) to 10 (minimally degraded). We successfully applied our forest IEC model to the Wild Rivers Legacy Forest (WRLF), a forested landscape in northeastern Wisconsin that is managed primarily under a working forest conservation easement. IEC results clearly distinguish between degraded sites (e. g., near towns) and relatively undisturbed areas as well as sites with different forest management strategies; however, more data are needed to reinforce these conclusions. To explore the performance of our model, we apply it to newly collected bird data from the WRLF and other nearby forests (e. g., Chequamegon-Nicolet National Forest). Results from these applications will provide us with a better understanding of model performance and management outcomes at the WRLF and other forests in northeastern Wisconsin. Future applications of this tool can be used to guide sustainable forestry management, wildlife management and conservation (e. g., forest birds, mammals), and policy decisions. The tool also may be used for evaluating temporal and spatial changes resulting from ecological restoration efforts in forest landscapes.

Landscape analysis of the Central Hardwoods Bird Conservation Region – Robin Graham, Dave Londe, Dave Peitz, and Kevin James

The National Land Cover Database (NLCD) displays satellite detected land cover types across the United States in thematic classes from deciduous forests to high intensity developed lands. The recently released 2011 NLCD products provided the landscape information used to compare the changes in bird habitat between the years 2001 and 2011. Anderson Level II land cover classifications were used to assess these changes across the Central Hardwood Bird Conservation Region. Additionally, a pattern analysis of deciduous forest patches was conducted to determine the spatial change in the dominant land cover type of the region. The freely accessible data were obtained from Multi-Resolution Land Characteristics consortium (MRLC) and analyzed in ArcMap 10.2 software. A method-based workflow was created to display how the spatial analyst toolbox within ArcMap was utilized as well as the results reached. Through the zonal statistics tool, the area of each land cover type was calculated and the percent change between years compared. The results showed that the cover type with the largest

percent decrease was deciduous forest at 0.55%. The cover type that showed the largest percent increase of 0.31% was herbaceous cover. Decreases in the percentage of crop and pasture cover types were also seen. Contrastingly, the percentages of scrub and developed cover types displayed increases over the ten year interval. To isolate a single cover type for the pattern analysis, the cover types from the NLCD images were converted to polygons using the conversion tool. The changes in polygons, or patches, of the deciduous forest cover in this case provided the basis for further investigation into bird species who utilize this habitat.

Evaluating changes in forest interior habitat for the Central Hardwoods Bird Conservation Region with NLC data - David Londe, Robin Graham, Kevin James, and David Peitz

The Central Hardwoods Bird Conservation Region (CHBCR) contains extensive deciduous forests (about 14 million hectares) generally dominated by oaks and hickories. These forests provide important habitat for many neotropical migrants that require forest interior conditions to reproduce. Some forest species are particularly sensitive to habitat fragmentation, and require large tracts of forest with little disturbance to maintain viable breeding populations. Bird species that require this type of habitat could be considered forest interior specialists. Nine bird species that breed in the CHBCR fulfill this definition of forest interior specialist. Monitoring changes in habitat for these species is of particular concern as seven species were identified as species of continental importance by Partners in Flight, and five species are of regional concern for the CHBCR. Using information from the National Land Cover Database (NLCD 2011), the CHBCR lost approximately 170,000 hectares of deciduous forest habitat between 2001 and 2011. We used NLCD data and population trend data from the Breeding Bird Survey (BBS) to evaluate how this loss of habitat may impact forest interior specialists. We compared the 2001 and 2011 NLCD data for the CHBCR to evaluate changes in optimal habitat available for these nine forest species. We focused on the changes in interior forests (greater than 100 meters from an edge) in the context of the overall forests, and the greater landscape of the Central Hardwoods. Population trends were obtained from Breeding Bird Survey (BBS) data collected between 2002 and 2012.

Evaluating forest conservation areas for priority birds in Southern Wisconsin - Yoyi Steele

Hardwood forests of southern Wisconsin—concentrated in the Driftless Area of the southwest—support many breeding-bird species, including several of high conservation priority for which little or no management opportunity exists in the extensive forests of the north, e. g., Acadian Flycatcher, Cerulean Warbler, Kentucky Warbler, and Prothonotary Warbler. These species depend on various forest community types as well as features such as tree size class distribution, understory structure, successional development, landscape pattern, and tract size. The long-term sustainability of these habitats and features is threatened by factors including a decline in oak dominance, spread of invasive species, forest fragmentation and parcelization, development, unsustainable forestry practices, and changing landowner demographics. In response, the WBCI Southern Forests Committee is engaged in a Strategic Habitat Conservation-style effort to develop and implement a positive landscape design for priority forest birds that integrates priority conservation areas, population goals, sustainable forest management, and private landowner/stakeholder engagement. After identifying focal species, priority habitats and features, and considering various measures of habitat cover and connectivity, the Committee identified 10 Forest Conservation Areas (FCAs), extensive forested landscapes delineated according to criteria in the Cerulean Warbler Conservation Area Model (Knutson et al. 2001). Landscape-scale bird data collection is needed in order to evaluate this model, refine FCA boundaries, set focal species population goals, and monitor effects of management. We anticipate that a suitable sampling frame for such an effort will necessitate some proportion of road-based sampling points due to overwhelming (>90%) private ownership of southern forests. In 2012, we piloted the Driftless Area Roadside Bird Survey (DARBS) to determine whether roadside sampling along small township roads

could generate sufficient detections of priority species. In this presentation, we give an overview of the WBCI Southern Forests SHC project, present preliminary results from 2 years of DARBS data collection, and outline next steps.

Grassland Birds

The complexity of restoring genetic diversity in a threatened population of Greater Prairie-Chickens – Zachary W. Bateson, Peter O. Dunn, Scott D. Hull, Amberleigh E. Henschen, Jeff A. Johnson, and Linda A. Whittingham

Many species that once inhabited large contiguous grassland prairies are now forced to occupy a fragmented landscape, where long-term persistence is uncertain. The future of these small and isolated populations depends on management strategies that include counteracting the loss of genetic diversity from the eroding effects of genetic drift. Translocations, the movement of individuals from one population to another, have been used for decades to supplement and restock populations. However, relatively few studies have determined the effectiveness of translocations at increasing genetic diversity. Here, we studied the genetic consequences of translocations of greater prairie-chickens (*Tympanuchus cupido pinnatus*) to Wisconsin, which has a small population (<550 birds) with low genetic diversity. During 2006–2009, we translocated 110 females from the genetically diverse Minnesota population to Wisconsin, and at least 25% (28/110) of known nesting attempts by these females were successful. We compared genetic diversity of pre-translocation (1996–1999) to post-translocation (2011) Wisconsin at both non-functional (microsatellites; mtDNA) and functional markers important to population fitness (major histocompatibility complex, MHC). Two years after the final translocation, we found introgression of unique Minnesota alleles. Although there was an increase in mtDNA diversity to near historic levels, there was no change in diversity at microsatellites or the MHC. Computer simulations of drift predicted that microsatellite diversity would have been lower in the absence of the translocation, and, thus, the translocation was a success in temporarily stemming the ongoing erosion of genetic diversity due to drift. Overall, our results caution that introgression varies for genetic markers that differ in functionality and inheritance, and, therefore, the success of genetic restoration projects may depend on how the goals are defined.

Incorporating stakeholder knowledge in a Bayesian network to identify factors driving Bobolink population trends - Ethier, D.M., and T.D. Nudds

Management decisions are often made despite considerable scientific uncertainty. Failure to acknowledge and treat this uncertainty can result in poor management decisions and inappropriate use of limited resources. It is therefore important to acknowledge uncertainty and embrace a means to effectively deal with it in developing policy for species at-risk. To better identify critical uncertainties as hypotheses, we present a method in which stakeholder knowledge (i. e., expert opinion) can be taken into account during policy development for a Threatened grassland bird: Bobolink (*Dolichonyx oryzivorus*). Using a Bayesian network, we elicit the views of stakeholders about the factors driving Bobolink population trends, where expert opinions are regarded as alternative hypotheses about causes of declines. Together with information from a literature review, the approach forms the basis for the transparent development of competing hypotheses and, in turn, models to be evaluated against data. This approach efficiently captures the current state of our knowledge about the system in a manner that is accessible to stakeholders, transparent regarding the information sources and assumptions, and provides a framework for assessing alternative conservation policies.

Estimating responses in Midwestern grassland bird abundance in response to changes in Conservation Reserve Program land availability – Sarah E. Rasmussen, Jonelle L. Johnson, Breanna L. Pool, Elizabeth A. Rasmussen

Throughout the midwestern United States, there has been concern about the decline of grassland birds. Horned lark (*Eremophila alpestris*), dickcissel (*Spiza americana*), eastern meadowlark (*Sturnella magna*), western meadowlark (*Sturnella neglecta*), and ring-necked pheasant (*Phasianus colchicus*) were among the most abundant grassland birds in Bird Conservation Region (BCR) 22 during our study period (1986-2012). To estimate potential effects of how Conservation Reserve Program (CRP) acreage influences abundance of our focal species, Breeding Bird Survey (BBS) detection counts from BCR 22 were analyzed using generalized linear models predicted by CRP acreage enrollment and year as predictors. Route and year random effect variables were included in each model. Although BBS counts of nearly all species displayed positive correlations with CRP acreage (except horned lark, which displayed a negative correlation), temporal effects best predicted the count of all five species analyzed. Models including acreage as the only fixed effect variable had over 100% higher AIC scores than the models including year as the only fixed effect variables. This might suggest that CRP acreage does not significantly affect populations of our five focal species, and other variables should be considered before changing management strategies based on this research.

Recent developments in Midwest NPS breeding bird databases – Gareth Rowell and David Peitz

Breeding bird or land bird databases are maintained by most of the 32 Inventory and Monitoring (I&M) Networks in the National Park Service (NPS), typically in the form of Access databases. The Ft Collins Service Office of the NPS I&M Division has initiated a preliminary effort to migrate multiple monitoring databases from Access to SQL Server, and to investigate common tables and relationships among them as a first step towards creating a centralized bird monitoring database system. The Heartland and Great Lakes I&M Networks are contributing to this effort using a bottom up approach. We are directly converting our existing grassland bird databases from Access to SQL Server and prioritizing those database components that are most critical for analysis and reporting of park data. We have identified issues that need to be addressed in the move towards a centralized database system that include stability of long-term monitoring protocols, potential for information loss in re-design, and requirements for flexibility in order to capture necessary monitoring information across varying landscapes. High priority components of the HTLN and GLKN Access monitoring databases include location data (which links to GIS plot data), event data including weather data and bird observations. Sample design of HTLN bird data is based on Variable Circular Plots (VCP) using systematic matrix of plot locations with the purpose of using distance analysis. These are features most likely shared with other I&M network databases. Once migrated to SQL Server, these databases can be shared by the Ft. Collins office and integrated into a single system. Issues surrounding standardization of habitat data will most likely be handled locally owing to the variability in ecosystems and landscapes

Landbird Migration

Temporal patterns of functional diversity in migratory birds at a Great Lakes coastal stopover site – Stephanie J. Beilke, Robert W. Howe, Amy T. Wolf, and Erin E. G. Giese

Stopover habitat is critical for hundreds of millions of migratory birds that travel long distances every spring and fall across the Laurentian Great Lakes region. Stopover ecology involves poorly known but highly dynamic interactions that occur within a narrow time frame. Perhaps because of the highly variable spatial and temporal environments encountered by migrants and the large number of species involved, ecological interactions among migratory bird assemblages and local stopover ecosystems have rarely been studied. We are using a functional ecological approach to evaluate migratory phenology at

the Point au Sable Nature Preserve, a 73 hectare mosaic of Great Lakes coastal wetlands, wooded uplands and lowlands, and brushy meadows along the eastern shore of lower Green Bay, Lake Michigan (Brown County, Wisconsin, USA). During both spring and fall migration periods (2012-2014), we have collected bird morphological and occurrence data through weekly mist netting and standardized counts at permanent sample points. Results provide the basis for analysis of functional differences of species groups during migration periods. For example, we will evaluate whether certain suites of traits (bill dimensions, tarsus length, wing cord, etc.) are characteristic of early vs. late migrants in the western Great Lakes region. Functional and phylogenetic differences in migratory bird assemblages will provide insights into the resource demands and evolutionary history of migratory birds, which comprise approximately 80% of the breeding land bird fauna in Wisconsin. These analyses will ultimately provide a better understanding of stopover site ecology and help guide the conservation and protection of Great Lakes coastal habitats for migratory birds.

The Milwaukee BIOME (Biodiversity Monitoring and Education) Project – Rachel Fukumoto, Christopher Lepczyk, William Mueller, Owen Boyle, and Timothy Vargo

Migratory birds use stopover habitats to replenish depleted energy stores, and are necessary in successful and well-timed migrations. However, stopover habitats are not well understood, particularly in urban areas. As a result, the Milwaukee BIOME Project (Biodiversity Monitoring and Education) was established to monitor migratory bird use of stopover habitat, in an urban matrix. Specifically, the objectives of the Milwaukee BIOME Project are to: 1) review habitat use and quality in urban forests of differing management approaches, and 2) assess habitat use by migratory bird species. A total of eight parks that vary in distance from Lake Michigan and in management were investigated during spring and fall migration from 2007 to 2011. Over these five years, we conducted transect and point counts of birds and vegetation sampling in each park. Data were evaluated using parametric statistics in JMP software. The results of the analysis showed differentiation of species richness and species abundance across the different parks, particularly in parks that were nearer to the Lake Michigan shoreline. The findings in our results will assist in future research projects in the greater Milwaukee area, and will provide information about the potential significance that urban parks have as stopover habitat for migratory birds.

Tree species preferences of foraging birds during spring migration in Upper Mississippi River floodplain forests – Eileen M. Kirsch and Michael J. Wellik

Floodplain forest tree species composition and structure is changing on the Upper Mississippi River because of past management and altered hydrology. Information on trees that birds use for foraging during spring migration can help guide forest management goals. We characterized tree species composition and structure and observed bird foraging behavior in five 40ha plots that represented the range of diversity and structure typical of Pools 8 and 9 between La Crosse, WI, and New Albin, IA, during spring 2010-2013. We recorded species, size and phenological stage of trees that birds used for foraging. The most common bird species that breed locally were American Redstart, Baltimore Oriole, Blue-grey Gnatcatcher, Warbling, Red-eyed and Yellow-throated Vireo, Yellow and Prothonotary Warbler, and Rose-breasted Grosbeak. The most common transient species were Yellow-rumped, Chestnut-sided, Magnolia, Tennessee, and Nashville Warbler, and Ruby-crowned Kinglet. Locally breeding species preferred silver maple and green ash, which are dominant in this system. However, the six transient migrant species preferred oaks and hackberry. Spring weather conditions during 2010-2013 contrasted sharply between warmer and colder than normal, with concomitant differences in leaf development phenology of trees. We noted differences in tree preferences between warm and cold years. Four bird species were abundant enough all four years to examine yearly differences in tree preferences. American Redstart, Baltimore Oriole, Warbling Vireo breed in the area and their

preference for silver maple was more pronounced during warm years when leaves completed development early, and migration may have occurred more quickly. Tree preferences of Yellow-rumped Warbler, a transient migrant in this area, varied each year. However, during warm years Yellow-rumped Warblers more strongly preferred oaks and avoided silver maple. During cold years this species tended to increase use of other tree species especially hackberry and cottonwood.

Inquiring Urban Ecology Center Citizen Scientists want to know: has there been a significant trend in arrival and departure dates for 42 bird species found in Riverside Park, Milwaukee, WI – Anne Reis, Tanya Havlicek, Emily Bernstein, Jennifer Callaghan, Tim Vargo, Owen Boyle, and William Mueller

Since 2001, citizen scientists from the Urban Ecology Center have conducted weekly bird walk surveys and entered their data into e-bird, an international database and interactive source for visualizing global data. Over time, volunteers have expressed a hope that their efforts would meaningfully contribute to science and a desire to do more than data collection – specifically to help analyze the rich dataset they created. With that in mind, the Center began data analysis workshops. Two volunteers, both with graduate degrees in biological and ecological data analysis, investigated whether a documented regional and national trend in the earlier arrival times of migratory bird species could also be found in the Riverside Park dataset. For consistency, e-bird data were filtered to include only the weekly walks, as they occur on the same day and time each week and with similar effort. Forty-two of the most common species were selected and segregated into groups A (spring and fall migrants, n=8 species), B (summer residents, n=31), and C (winter residents, n=3). Regression analyses were used to identify and describe trends in species arrival, departure, and duration of residence over time from 2001 to 2014. Time is assumed a proxy for climate change and a variable that would capture shifting climate or weather cues that could impact bird migration and residence patterns. 50% of the species investigated show statistically significant trends among the three groups and between long- and short-distance migrants. Six species from the three groups are arriving later by 1-2 days per year, including two species arriving later in the fall, while two arrive sooner in the spring (PAWA, RWBL). Surprisingly, seven species in the B group are leaving 1-3 days earlier, while one species (BTNW) is leaving 2 days later. These local analysis results will be interpreted in the context of regional trends and biological species characteristics.

Help shape the future of the Midwest Landbird Migration Monitoring Network –

Amber M. Roth, Katie Koch, William Mueller, Dave Ewert, Ralph Grundel, Anna Peterson, Mark Shieldcastle, and Tom Will

The Midwest Landbird Migration Monitoring Network is a working group within the Midwest Coordinated Bird Monitoring Partnership. The Network is directed by a dedicated group of professionals with the mission of coordinating efforts of migration monitoring stations, research projects, and stakeholders as part of a sustainable network to expedite knowledge of migrant landbird ecology and distribution to improve conservation efforts in the Midwest. To fulfill this mission, we are developing a strategic action plan to guide our activities over the next 5-years and beyond. We have crafted mission and vision statements and identified our core values, programmatic focal areas, and strategic goals. We are currently refining the objectives and adding strategies and actions needed to make substantial progress toward each of these goals. We invite you to visit our poster and contribute your ideas for what is needed to aid our migratory landbirds during the migratory period within the context of full-lifecycle conservation. To follow the progress of the Midwest Landbird Migration Monitoring Network and this strategic action plan, please visit our webpage at <http://midwestbirdmonitoring.ning.com/group/mwlandbirdmigration>.

Migratory bird use of coastal stopover habitats along Northern Lake Michigan – Heather L. Shaw

Recent declines in migratory bird populations have motivated research involving breeding and wintering habitat availability and quality. Little information has been documented on coastal migratory stopover locations, which act as stepping-stones, which link breeding and wintering areas. The Great Lakes act as a major barrier to migratory birds, and movement corridors around the Great Lakes contain important coastal stopover sites among mainland locations and offshore islands where birds may rest and refuel energy stores. Among these numerous coastal areas, determining avian species diversity using traditional techniques is limiting with respect to time and personnel, while the use of acoustic monitoring devices allows continuous, remote recording of species presence at several locations. Furthermore, recent documentation signed by Great Lakes state governors plans to advance offshore wind energy development within the Great Lakes, specifically Lake Michigan. The objectives of this study were to identify migratory bird diversity at coastal stopover locations using acoustic monitoring methods, and to determine the habitat composition of these sites and its influence on species use and diversity. We placed acoustic monitors on offshore islands and coastal areas of varying habitat complexity along eastern and northern shores of Lake Michigan and recorded continuously through spring and fall migration. Habitat complexity characteristics were measured at each site and will be integrated with landscape characteristics at multiple spatial scales with a Geographic Information System in order to identify potential suitable stopover habitat. With information gained from this study, managers may have the ability to focus conservation efforts on significant coastal habitat and resources needed to support migratory birds as they journey to breeding or wintering grounds. Results of this study may provide important data for migratory bird management in respect to stopover locations in Lake Michigan, while furthering the use of acoustic monitoring devices as a monitoring tool.

Secretive Marshbirds

Nesting habitat characteristics and nest success of secretive marsh birds on public wetlands in

Missouri – Evan Hill, Elisabeth Webb, and Doreen Mengel

Distribution information of secretive marsh birds (SMBs) on public wetlands in Missouri is lacking and the extent to which SMBs rely on wetlands in Missouri to fulfill different life-history stages is largely unknown. The objective of this study is to determine effects of water-level management on nesting habitat characteristics and success of SMBs on public wetlands in Missouri. Focal species included Sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), king rail (*Rallus elegans*), American bittern (*Botaurus lentiginosus*), and least bittern (*Ixobrychus exilis*). We surveyed 60 wetlands on 12 public areas in Missouri from April-June 2013 and 2014 using standardized marsh bird monitoring protocol. We searched for nests in wetlands where SMB were detected that remained flooded at the end of the survey period. We recorded the distance from the top of the nest to the water and the number of eggs and/or hatchlings. We took five water depth, vegetation height, and robel measurements-the first was positioned at the nest and the remaining four were 5 meters from the nest in each cardinal direction. Within a 50m radius surrounding the nest, we estimated the proportion of five vegetation types. We returned to each nest three times over 4 weeks to monitor nest fate. A nest was considered failed if no eggs, nestlings, or parents were present on a return visit. Forty least bittern nests were found in 2013, while nest searches are still in progress for 2014. All nests were located in either cattails or river bulrush, with a mean vegetation height of 98.7 cm and mean robel reading of 1.6. Mean nest height above water was 56.7 cm and mean water depth around nests was 71.7cm. On average, habitat types surrounding nests consisted of 50.7% open water and 49.3% persistent emergent vegetation. Overall, daily nest survival rate was 0.64 in 2013.

Urban Birds

The effect of Twin Cities metropolitan area development on regional breeding bird distributions – Michael R. North and William E. Faber

Urban development is known to impact avian distribution and abundance, although there are surprisingly few studies, especially experimental studies, on such effects. Marzluff et al. (2001) found the majority of such studies focused on changes in relative abundance in forested ecosystems, and they found only nine studies that examined changes in presence/absence. We examined distribution maps on the Minnesota Breeding Bird Atlas website to identify species that visually appeared to be adversely affected in their distribution due to urbanization. We identified 22 species for which there was strong visual evidence of an adverse impact, and 16 species with weaker visual evidence. We established three zones around the metro area, one each representing intensive urbanization, suburban development, and exurban/rural development; we randomly selected 25 priority blocks in each strata for further analysis. For each priority block (n=75) we recorded presence/absence for 37 species and one species complex (meadowlarks) and compared the results with a chi-square test for independence; 25 of 37 species had a significant chi-square value ($p \leq 0.1$) indicating adverse impacts. Species most affected by urbanization were grassland species and ground-nesting species, and marsh-nesting species. The five highest chi-square values were for Vesper Sparrow, Savannah Sparrow, Horned Lark, Dickcissel and Bobolink. Urbanization may be restricting gene flow into the southeastern Minnesota Ruffed Grouse population.