

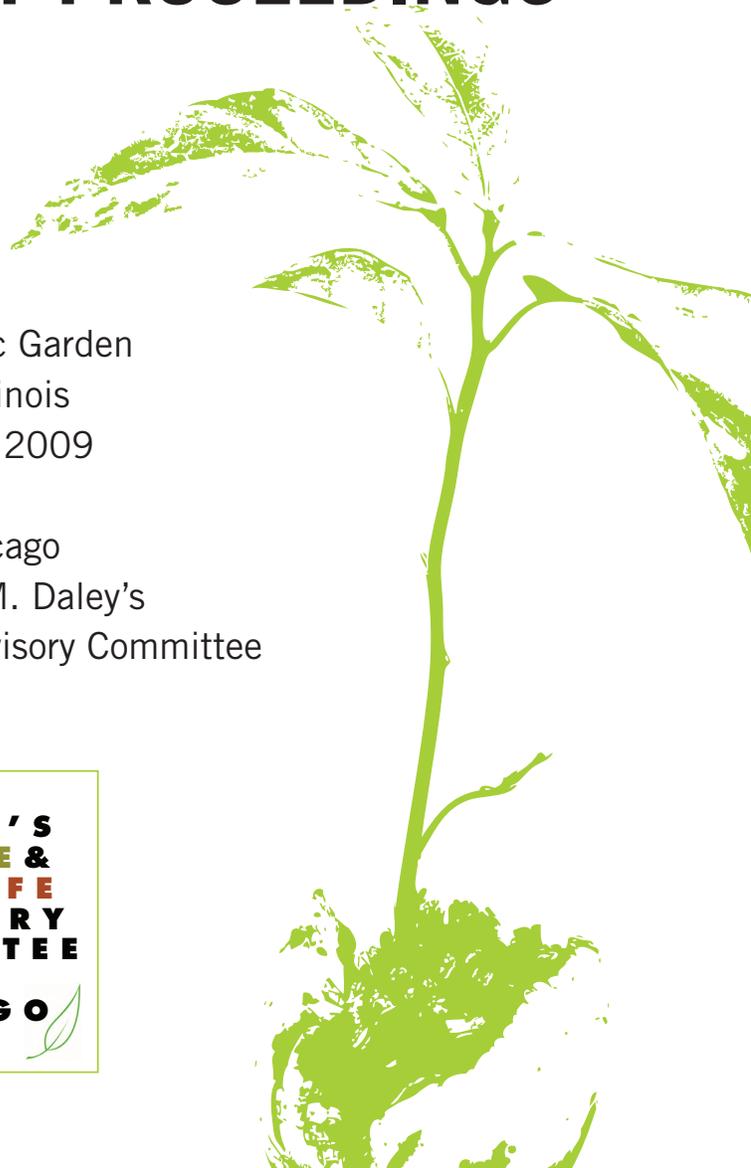
CHICAGO NATURE AND WILDLIFE RESEARCH SUMMIT PROCEEDINGS

Chicago Botanic Garden
Glencoe, Illinois
November 6, 2009

City of Chicago
Mayor Richard M. Daley's
Nature and Wildlife Advisory Committee

**MAYOR'S
NATURE &
WILDLIFE
ADVISORY
COMMITTEE**

CHICAGO



CHICAGO NATURE AND WILDLIFE RESEARCH SUMMIT

Convened by City of Chicago

Mayor Richard M. Daley's Nature and Wildlife Advisory Committee

Meeting held: November 6, 2009

Sponsors:



Proceedings published: April 15, 2010

Summit proceedings compiled by Jill Riddell

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EXECUTIVE SUMMARY

Mayor Daley's Nature and Wildlife Advisory Committee hosted the Nature and Wildlife Research Summit to identify priority research needs, connect researchers to land managers and policymakers, and envision a biodiversity research network for Chicago. Over 100 land managers and researchers convened for the Summit at Chicago Botanic Garden's Daniel F. and Ada L. Rice Plant Conservation Science Center.

The Research Summit jumpstarted the process of meeting research goals contained in the 2006 *Chicago Nature & Wildlife Plan*. Participants were asked to consider: What are the top three research priorities for Chicago? What are long-term research needs? What would a research network on biodiversity in Chicago look like?

The Summit addressed applied ecology research needs of Chicago's urban landscape. A subset of the concerns, however, overlapped with regional issues addressed by the Chicago Wilderness Research Agenda¹.

Through plenary sessions, breakout groups, poster sessions and informal conversations, specific research questions emerged and a draft agenda took shape. Three areas of research were determined to be essential.

1) Understand and improve the contribution of Chicago's natural areas to biodiversity.

Research Questions: What determines "success" in a large Chicago natural area? What about a very small one? Do small urban sites contribute significantly to improving biodiversity? What are the effects of management on a given site? Which species can be effectively reintroduced to city sites, and which should not be?

2) Understand, improve and accurately describe the ecosystem services that natural areas provide.

Research Questions: Which is more effective for stormwater management, having many small basins or one large reservoir? What value do natural areas provide by storing stormwater and returning it to the natural water cycle? How might Chicago's natural areas play a role in mitigating climate change?

3) Understand the relationships and interfaces of the urban built environment with the natural one, and discover best practices for improving the relationship between the two while addressing negative impacts.

Research Questions: What are the effects of pollution on wildlife and natural areas? What are the effects of salt and urban runoff in specific aquatic systems? What impact does pest management have on food webs?

¹ Chicago Wilderness is a large regional coalition that covers the city and communities along the southern shore of Lake Michigan. For more information on Chicago Wilderness, visit <http://www.chicagowilderness.org/>.

Social Research: An Urgent Need

Though social research questions were not an explicit part of the agenda, each of the breakout sessions and many of the informal conversations revolved around questions about human communities. Having the people of Chicago benefit from the presence of nature and wildlife is important. How to cultivate enjoyment and understanding of nature, how best to describe and talk about healthy ecosystems to adult audiences, and how to make natural area restoration sites aesthetically pleasing for nearby residents are issues of concern. Some of these questions have been addressed by research that is available through Chicago Wilderness. Others are questions urgently requiring fresh investigation and sound data.

Proposed Next Steps

Tasks to be addressed in the next six months as an outcome of the Summit include:

- Convening a team that addresses how a Web-based database or clearinghouse could serve as a Biodiversity Research Network for Chicago.
- Investigating when funding for seed grants can be found to help pay for joint projects between researchers and land managers.
- Figuring out how land managers can have better access to scientific literature, since online access to articles is limited.
- Hold smaller meetings or after-work events to work on specific questions and topics, to push forward the process of initiating research projects.
- Investigate how social networking sites might be harnessed to help land managers and researchers find one another.

The actors for each of these tasks are yet to be determined. Some will likely come from the Mayor's Nature and Wildlife Advisory Committee and area universities, but more participants are essential to move the research agenda forward.

PROCEEDINGS

I. Understanding and improving the value of city natural areas.

Both on a daily basis and over the long-term, the managers of Chicago's natural areas need to be able to operate with sound, scientific information on what is required to maintain and improve biodiversity. Land managers should be given the right information at the right time to make wise decisions for the resources they are protecting, in order to avoid spending time and money on management actions that may be less effective than others or have unintended negative consequences.

With government and private funding in short supply, it is more important than ever that natural area dollars and labor are used strategically. It is imperative that the scientific community help support land managers by researching key issues and providing necessary data to solve real-world challenges.

Specific Research Needs and Projects

- Collect baseline data for all natural areas. Quantify what species, natural communities, invasive species, and existing threats are present.
- Monitor effects of management. Using baseline data, determine how populations of species and the quality of natural communities change over time and determine the role that management plays in the changes that are noted.
- Develop a standardized way to collect and capture information on sites, including management histories.
- Quantify what “success” means for different scales of urban natural areas. How many native species is enough? What Swink/Wilhelm index rating? How does a land manager know when he or she has succeeded or fallen short?
- Determine if small-scale areas such as backyards and roof gardens help biodiversity, and how the geographic location of such sites (whether near or far away from large, connected systems of natural land) might impact their effectiveness.
- Determine the relative importance of local seed sources for restoring urban natural areas, particularly for those that are not connected to larger systems.
- Determine the impacts that cultivars of native plants are having on the original, wild native genotypes of the plants in natural areas.

- Determine and then provide prescriptions to land managers for the most successful seed mixes and plants for Chicago's natural area restorations.
- Determine and then provide prescriptions to land managers for the most effective and important soil amendments that land managers might use for Chicago's natural area restorations.
- Evaluate various species for consideration for restoration/reintroduction to city natural areas, and determine which ones are good candidates and which are not.
- Determine what the best management practices are for restoring natural areas in places with an extensive underlayer of slag (a byproduct of steel production commonly found in the soils of Calumet Area natural areas).
- Investigate and document the locations of unprotected lands where species of conservation concern are living.
- Evaluate the biodiversity value of specific pieces of unprotected, unmanaged open spaces, and of such lands generally. Examples include the spaces under power lines, along railroads, and in large vacant lots.
- Describe which wildlife species of concern are using Chicago's natural and landscaped areas.
- Determine which features of natural and landscaped areas provide for habitat needs (food and shelter) for wildlife species of concern.

II. Understand, improve and accurately describe the ecosystem services that natural areas provide.

Natural areas provide an extraordinary array of services to our human communities. Plants improve air quality and sequester carbon dioxide; birds and other wildlife consume insects and various pests; and open spaces provide porous soils for rainwater to soak in.

These ecosystem services are not always obvious to decision makers when they are in the midst of a furious economic or political debate. Scientific research is needed to better quantify these services in Chicago. With data in hand on how natural areas provide important civic functions and improve quality of life, advocates will be better prepared to defend open spaces threatened by development. They will also be better positioned to help secure the resources necessary to sustain natural areas.

In some cases, pertinent research may have already been conducted, and the task will be to apply and test it in Chicago.

Specific Research Needs and Potential Projects

- Determine the role of natural areas in stormwater management. How do their levels of effectiveness compare with other types of landscape cover? Is there a threshold where stormwater begins to have a negative impact on a natural area?
- Understand the effectiveness of many small basins for stormwater management versus one, larger reservoir.
- Quantify and measure the role of urban natural areas in meeting the goals of the Chicago Climate Action Plan.
- Determine the ecological needs or ecosystem services that can be met only by Chicago's natural areas.

III. Understand the relationships and interfaces of the urban built environment with the natural one, and discover best practices for improving these relationships while addressing negative impacts on nature.

Having Chicago's dense population living in close proximity to natural areas provides outstanding opportunities for fostering a population knowledgeable about nature and wildlife. However, the intensity and pervasiveness of the built environment, with its many inherent disruptions to habitat make harmony between humans and nature difficult to achieve.

Specific Research Needs and Projects

- How do pest management practices for mosquitoes, gypsy moths and other insects impact the food webs that native wildlife depends upon? When there is a negative impact, how can it be reduced or eliminated?
- What impact would renewable energy systems, specifically wind turbines—on land, on rooftops, and possibly in Lake Michigan—have on birds and bats in Chicago?
- What is the interaction among specific species of domesticated, feral and wild animals?
- What are the effects of different types of pollution—water/air/light/soil/noise—on wildlife and natural areas?
- What are the effects of salt and urban runoff in specific aquatic systems, and what are best practices to prevent negative impacts?
- What are the impacts of fragmentation of habitats?
- What are the impacts of connectivity? Are greenways working? For who?

IV. Biodiversity Research Network

Following up on recommendations developed at the Summit, the next step is to convene a team that will address how a web-based database or clearinghouse could serve as a Biodiversity Research Network. Ideally, the network would be a place where matches can be made among land managers and researchers. The site would provide links to ongoing research efforts and provide an interface for researchers, planners, and the public to interact.

The team will evaluate different models, and develop recommendations. Building on issues raised at the Summit, the team will determine whether:

- A web site already exists that can be adapted or extended to include the City of Chicago Biodiversity Research Network.
- It is possible to make use of existing social networking sites like Facebook and/or LinkedIn.
- It is preferable to participate in the development of a regional research network (e.g. proposed CW Knowledge BASE) rather than limit the database to the city.

The team could begin to address issues such as where the site would be hosted, how it will be funded and kept up to date, and how the site's presence will be advertised so all the people who could benefit from it know of its existence.

V. Conclusion

The future survival of Chicago's natural areas depends on effective management, but it also depends on it being informed by the best science available. The Summit was one step along the path toward meeting the needs of Chicago's natural areas and expanding the breadth of scientific knowledge about urban natural areas. By gathering many people in one room to spend a day thinking about these problems and solutions, the Summit may have played an important role in jumpstarting specific projects and a biodiversity research network.

But whether its role was important will be determined by what happens next. It is up to participants in the Summit and the readers of these proceedings to take action.

APPENDIX I: List of Summit Participants

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*Member of Mayor Daley's Nature & Wildlife Advisory Committee (as of 2009)

APPENDIX II: Summit Poster Session Abstracts

Links in Lincoln Park: Soil and Tree Feedbacks in an Urban Forest

Author: Kimberly L. Frye, DePaul University

Keywords: urban forest, soil quality, tree health, feedbacks, ecosystem services

In 1995 the total net value of ecosystem services provided by Chicago's urban forests was reported at \$9.2 million. The value of an urban forest increases when trees mature and forest canopies increase in size, yet maintaining urban tree longevity is met with a vast array of challenges (e.g. diverse management, limited root space, soil compaction, runoff, pollution, etc.). Maximizing tree growth is recognized as a critical urban forestry objective but is difficult to manage without understanding the urban area at the ecosystem level. Integrating urban soils into forest management can provide ecosystem level insight for tree management decisions. This study tested for the presence of biogeochemical feedbacks between soil quality and tree health, as well as between soil quality and tree species. The study was performed in the Lincoln Park neighborhood, in an area containing approximately 4,000 trees. Using a blocked sampling design, nine soil properties were measured across four of the most common tree species (*Gleditsia triacanthos*, *Acer saccharinum*, *Acer platanoides*, and *Tilia americana*) and four health condition categories (good, fair, poor, dead).

No significant patterns were found linking any of the nine soil properties to tree health conditions using ANOVA, Principle Component Analysis (PCA), and kriging tests. In contrast, differences were found between tree species in the values for two soil macronutrients and pH, indicating that soil properties in this urban forest may vary due to geographical associations with individual tree species. Disconnection between aboveground health condition and belowground soil properties counters agro-ecology concepts where soil quality is used to drive plant production. Our findings that link soil patterns to tree species resemble previously identified tree-soil relationships within temperate savannas and tropical rainforests, where tree species appear to alter nearby soil properties.

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Bee species richness and abundance in an urban landscape: Chicago Area Pollinator Study as a citizen science project

Author: Caroline Gottschalk-Druschke, Jennifer Howell-Stephens, Emi Kuroiwa, Carrie E. Seltzer, and Cliff Shierk, University of Illinois at Chicago, IGERT LEAP Fellows

Keywords: urban ecology, bees, land-use, citizen science, pollinators

The Chicago Area Pollinator Study seeks to determine how urban land use affects bee diversity and abundance, and at what scale. How does a garden in a highly industrial area compare to a garden near a park? Or a yard in a large residential neighborhood? We have recruited citizen scientists to collect bees in their yards throughout the Chicago region. Each participating household received a kit with instructions for collecting and returning the bees. As of October 2009, three collections had been completed by

volunteers, and we are in the initial stages of identifying bees and analyzing data.

In addition to analyzing the data from bees, we are also assessing the learning, attitudinal, and behavioral outcomes of citizen participation in the Chicago Area Pollinator Study. Citizens were asked to take a survey before the first collection and will be asked to complete a post-participation survey in fall 2009.

In collaboration with the Lincoln Park Zoo's Urban Wildlife Institute, the project is expected to continue in summer 2010 with many more participants. Collecting data from additional years will eventually allow analysis of how land use change affects bee abundance and diversity.

The Chicago Area Pollinators Study is an IGERT capstone project for a cohort of five students in the Landscape, Ecological, and Anthropogenic Processes (LEAP) IGERT at the University of Illinois at Chicago. We have three ecologists (plant animal interactions, foraging ecology, and ecological genetics), one civil engineer-turned-landscape ecologist, and one rhetorician.

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Backyards provide safer nesting sites: Avian nest predation across the urban-rural gradient

Authors: Amy E. Hank^{1*}, Kirsten Almberg², Norbert Cordeiro^{2,3}, Eric Lonsdorf², Aaron Nash^{2,4}, L. Kristen Page⁵, Christopher J. Whelan⁶

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Keywords: nest predation, urban-rural gradient, birds, urban habitat, avian assemblage

Urban bird communities are characterized by low diversity and high abundances of few, often exotic, species. Many hypotheses exist to explain this widespread pattern, including increased nest predation, increased resource competition, and differential habitat selection, among others. We used artificial nests to experimentally assay nest predation in residential (single-family homes) and wildland (county forest preserves) habitat across metropolitan Chicago, USA. Experimental sites contained a ground, low, and high shrub nest, each baited with a quail egg and a plasticine egg, resulting in 240 nests (120 in each habitat) containing 480 eggs. Predation rates were significantly lower in residential habitat than in urban wildlands, with the mean survival time 44.5% greater in residences (Tarone-Ware $\chi_1^2 = 64.04$, $P < 0.001$). Ground nests suffered the lowest predation rate in residential habitat while suffering the greatest predation rate in urban wildland. These different rates and patterns of predation suggest that birds nesting in residential habitat and urban wildlands experience contrasting predation pressures. We conclude factors

other than nest predation produce the depauperate bird communities found in urban areas worldwide. Our results implicate competition, perhaps in conjunction with other processes like differential habitat selection, as the paramount factor(s) producing the homogeneous bird communities found worldwide in urban environments.

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Chicago Ring-Billed Gull Damage Management Project

Author: John Hartmann, USDA-Wildlife Services

Keywords: gulls, lakefront, swim bans, population

USDA-APHIS-Wildlife Services (WS), with the help and support from the Chicago Department of Environment and the Chicago Park District, has been part of an integrated program to reduce conflicts seen from ring-billed gulls (*Larus delawarensis*).

The regional population of ring-billed gulls has increased exponentially in recent decades. The high number of gulls in public areas leads to conflicts including general nuisance, property damage, economic losses, threatening human safety, and potentially threatening human health. For example, some studies have suggested a link between gull fecal droppings and elevated *E. coli* levels, which cause swim bans.

The objectives of the Chicago Ring-Billed Gull Damage Management Project are to reduce the local production of ring-billed gulls, reduce the severity of conflicts with gulls including swim bans, and evaluate the effectiveness egg oiling has on the Chicago lakefront gull population.

Since our operational work started in 2007, egg oiling has been a successful method in reducing the number of gulls produced in Chicago, reducing HY gull use of Chicago's beaches, and reducing conflicts between people and gulls. In 2009, WS oiled approximately 80% of all nests at three Chicago gull colonies (21,141 nests containing 50,133 eggs). Without this project, we estimate that the Chicago hatch-year gull population would have increased by an additional 21,000 to 49,000 gulls beginning in July 2009, based on a fledge rate of 1 to 2 birds per nest.

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Developing a Chicago Wilderness Land Management Research Program (CWLMPR): Preliminary Results from the First Year of the 100 Sites for 100 Years Project

Authors: Liam Heneghan, Lauren Umek and Elizabeth Kosson*, DePaul University
(*presenting author)

Keywords: Chicago Wilderness, long term research, land management and research

This project emerged as a high priority during the development of the Chicago Wilderness Research Agenda. This agenda identifies critical gaps in our scientific and management knowledge that must be

closed over the next decade in order for the CW coalition to move toward realizing its vision of increasing the number of accessible, interconnected, restored, diverse and healthy ecosystems in the greater Chicago metropolitan area. During the past two years, we have been designing a network of over 100 one-hectare research sites across the Chicago Wilderness region. The sites are representative woodland, savanna and prairie habitats, and have been selected along gradients of management effort, from those that are highly degraded, usually due to impacts of invasive species, to mature restoration sites that have been managed for several years. We have also included sites that represent the “highest quality/pristine” habitats in the region as well as some sites of particular interest to counties. This network of sites is the core of CWLMRP. It will be used to evaluate the effectiveness of biodiversity management practices, allowing us to validate (where appropriate), and improve and invent (where necessary), the most effective restoration practices for the Chicago region. This project is an active collaboration between four county forest preserve districts, veteran land stewards, and regional scientists. This regional collaborative approach is rapidly establishing Chicago Wilderness as a model of conservation in a metropolitan context, in which enhancement of regional biodiversity is linked to improved economic vitality and the quality of life for millions of citizens. This summer, 4 interns were hired to begin collecting ecological data on these sites. Here, we report on the development of this project, including some preliminary results from this summer’s data collection.

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The Chicago Parakeet Project

Authors: Amela Jakupovic, University of Illinois at Chicago; Emily Minor, University of Illinois at Chicago; Christopher Appelt, St. Xavier University; Stephen Pruett-Jones, University of Chicago

Keywords: exotic species, bird, GIS, railroad

Monk parakeets (*Myiopsitta monachus*) have been present in Chicago for more than forty years. It is thought that these tropical birds were originally introduced as escaped or released pets but they have since become established and the population appears to be spreading. Little is known about the habitat requirements or nesting behavior of this species in its new environment or how this South American species survives the Chicago winters.

The goal of the Chicago Parakeet Project is to map every monk parakeet nest in the metropolitan area. With this information, we hope to learn about the spatial distribution, habitat requirements, and nesting behavior of this exotic bird. This may allow us to predict patterns of future spread. To accomplish our goal, we have created a web page and online survey to enlist the help of Chicago residents. This web page (<http://www.uic.edu/labs/minor/chicago-parakeet.html>) allows citizens to contribute locations of nests in their neighborhoods; to date we have collected over 200 observations through this survey.

Preliminary results from this project suggest that there are more than 500 individual nests and at least 1000 birds in our region. Our data indicate that human infrastructure may be influencing the nesting patterns and/or dispersal of monk parakeets. Specifically, monk parakeet nests are closer than random to railroad tracks (mean distance = 0.6 km). We speculate about the various factors that may attract Monk Parakeets to nest in these locations, from the food resources around railroads to the physical infrastructure

used for nesting. A complete map of nests will provide more insight into these and other factors and may allow us to make predictions about where monk parakeets will spread in the future.

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Hegewisch Marsh Ecological Rehabilitation

Authors: Nicole Kamins, Chicago Department of Environment and Jack Brunner, Tetra Tech

Key Words: restoration, calumet, wildlife, ecotoxicology, outreach

Hegewisch Marsh, located in the Calumet region of Chicago, totals 130 acres and is the future home of the Ford Calumet Environmental Center (FCEC), a hub for environmental education, stewardship, and ecological rehabilitation. An ecological rehabilitation plan for Hegewisch Marsh was developed and implemented based on the site goals, including (1) incorporating a world-class environmental center and exhibits that consider visitors to the site and (2) protecting and enhancing the native flora and fauna in accordance with the Calumet Area Ecological Management Strategy. Ecological rehabilitation activities include trail establishment; debris removal; invasive herbaceous and woody species removal; tree removal to achieve appropriate canopy cover for savannah habitat; seeding and planting for forested wetland, wet savannah, wet prairie, and open marsh habitats. To reduce costs and engage the community, local volunteers participated in tree planting and other rehabilitation activities.

Throughout the site planning and preparation of the design plans and specifications, outreach meetings with the public and various stakeholders were held to develop the site plan and the design plans and specifications. Of special concern were the consideration of any ecotoxicological issues and the protection and enhancement of the native flora and fauna. Soil, sediment, surface water, vegetation, and macroinvertebrate samples were collected and the results were evaluated using the Calumet Area Ecotoxicology Protocol to determine any necessary remedial or other recommended actions.

During the site planning process, stakeholders determined that a water level control system would be necessary and, therefore, was constructed to maintain conditions necessary for marsh-dependent bird species, especially the state-listed, endangered yellow-headed blackbird.

Hegewisch Marsh is the first site to be rehabilitated in the Calumet area and offers lessons learned for future projects, as well as long-term monitoring and other research opportunities.

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The Effect of Genetic Diversity of Tall Grasses in Remnant and Reconstructed Habitats

Authors: Geoffrey Morris*, Paul Grabowski, Justin Borevitz, University of Chicago, Dept. of Ecology and Evolution

Keywords: grasses, biodiversity, genetics, dunes, microclimate

There is great focus on the effect of biodiversity on natural areas and habitat restorations/reconstructions; however, the importance and effect of within-species genetic diversity has not received the same level of attention. Biodiversity measures the suite of different species that inhabit an area, whereas genetic diversity is the amount of genetic variation that exists among members of the same species that inhabit an area. With greater genetic diversity comes greater diversity in physical traits, allowing a species to live in and adapt to a greater range of habitats and conditions than if all the individuals were genetically identical. Increased genetic diversity also helps a species to adapt to new conditions as the landscape changes. We are studying genetic diversity in three different contexts: natural populations, habitat reconstructions, and agriculture plots. Our focus is tall grasses (switchgrass, big bluestem, little bluestem) because they are dominant species in local ecosystems and essential components of Chicago-area ecological restorations and reconstructions. By surveying and manipulating genetic diversity in multiple settings and species, we will better the understanding of the role of genetic diversity in habitat reconstructions and of the effect that genetic diversity has on ecosystem services provided to urban environments by natural areas.

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Chicago Wilderness Climate Action Plan for Nature

Author: Bob Moseley, The Nature Conservancy in Illinois

Keywords: climate change, ecosystem services, carbon sequestration, biodiversity, humans and nature

Climate change is among the top environmental challenges facing society today. It has the potential to jeopardize all collective investments we have made in land and water conservation to date. The science is clear: Greenhouse gas levels in the atmosphere are higher today than they have been during the last 800,000 years. Scientists predict this trend will increase through the 21st century before any reductions in greenhouse gas emissions begin to stabilize the climate system. Such change outpaces the ability of many native plants and animals to adapt in place or migrate. Similarly, rapid climate change has the potential to disrupt many of the services that healthy ecosystems provide to human society, such as flood reduction and clean water supply.

Recognizing the potential to disrupt its social and economic fabric, the City of Chicago released a Climate Action Plan in 2008 that outlines five strategies for reducing greenhouse gas emissions and adapting city services to a warmer future. The Chicago Wilderness Climate Action Plan for Nature complements Chicago's plan for the human community by including conservation of native species, natural areas, and ecosystem services as part of the solution. This is especially critical because the ability of natural systems to adapt to increasing rates of climate change is generally more limited than built systems. The plan for nature also expands the geographic scope beyond city boundaries to include the Chicago Wilderness area.

The Climate Action Plan for Nature includes four major components:

1. Mitigating the Threat of Climate Change: Actions to Reduce Greenhouse Gases in the Atmosphere
2. Adapting to a Rapidly Changing Climate: Actions to Modify Conservation Practice and Promote Ecosystem-based Approaches
3. Engagement: Actions to Create a Climate for Change
4. Chicago Wilderness Biodiversity Recovery Plan Climate Change Update

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Improved Bird Data Gathering and Analysis: BCN Survey Provides Valid Trend Information for Key Chicago Wilderness Species

Authors: Judy Pollock, Audubon Chicago Region; Eric Secker, Bird Conservation Network; Glenn Gabanski, Bird Conservation Network; Dr. Mike Ward, Illinois Natural History Survey; Dr. John Yunger, Governors State University; and Dr. Douglas Stotz, Field Museum of Natural History

Keywords: citizen science, bird monitoring, bird trends, BCN Survey

Since 1997 the Bird Conservation Network Survey (formerly named the BCN Census) has collected birders' data from the natural areas of Chicago Wilderness using standardized protocols. Although the Survey was designed primarily to give information to local land managers, a secondary purpose was to accumulate a robust database that could be analyzed for CW avian population trends. This study was undertaken in 2007 after 10 years of data collection to address whether there are sufficient data to detect trends, and to address issues related to detectability and coverage. A log-linear regression model with Poisson error terms for the analysis of time series of counts yielded significant results for 41 species, including 14 species of concern, and another 14 species had meaningful results, including two more birds of concern. Detectability issues were considered, and the amount of habitat coverage was quantified. Results of this and future analyses can give useful local bird trend information for planners and researchers in the Chicago Wilderness area.

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Project Squirrel: A citizen science project for all ages

Author: Steve Sullivan, Peggy Notebaert Nature Museum

Key Words: Tree squirrel, citizen science, urban ecology

Urbanization is a worldwide and rapidly accelerating phenomenon that is creating new habitats and ecological relationships. Urbanization also tends to make people feel isolated from nature and many urban residents lack fundamental knowledge about the natural world. Project Squirrel is a unique citizen science program that utilizes tree squirrels as a way to study the ecology of the urban habitats and evaluate the knowledge and feelings of urban residents towards their local environment.

Tree squirrels are effective sentinel organisms for many reasons: they are diurnal, inhabit small territories, are active year round, share many of the same resources and vulnerabilities of other urban wildlife, and have a well understood natural history. Tree squirrels are also one of a handful of organisms that the average urbanite—regardless of their level of environmental knowledge—can readily identify, has an opinion about, and likely lives near. This makes squirrels more accessible for citizen data collection than most other species. By using citizen scientists as observers, we are able to collect broad-scale, fine-resolution data on squirrel diversity and abundance. Demographic changes in tree squirrels are likely to signal changes that will also impact other urban wildlife. Project Squirrel aims to develop this data into a tool to allow local urban habitat management—from backyards and parks to forest preserves and isolated natural areas—to maximize regional biodiversity

Project Squirrel is also evaluating how participation as a citizen scientist correlates with knowledge about the regional environment and opinions about the local environment. It is anticipated that participation in the project will positively correlate with accurate knowledge about the environment. Further, it is hoped that, because squirrels are so accessible to nearly all urbanites, they can be used to help an increasingly disconnected human population get a little closer to their natural environment.

Contact: Steve Sullivan, sciurus@uic.edu

Integrating soil ecological knowledge into restoration practice: A case study for restoration following invasion by *Rhamnus cathartica*.

Authors: Umek, Lauren G.* and Liam Heneghan, DePaul University

Keywords: restoration, invasive species, soil ecology, european buckthorn, collaboration

European buckthorn (*Rhamnus cathartica*) invades woodlands and forests in the Northeast and upper Midwest of the US. Once established, this large shrub often forms dense thickets and significantly diminishes native plant species diversity. Ecosystems inundated with buckthorn are associated with elevated soil N, altered ecosystem processes (accelerated decomposition and nutrient cycling) and greatly modified soil foodwebs and these effects persist following buckthorn removal. We hypothesize that successful prevention of buckthorn re-invasion and restoration of native plant communities will be promoted by reducing buckthorn's legacy effect of elevated soil N by employing management techniques that reduce soil N concentrations after buckthorn removal. We report results from a field-scale experiment conducted in a heavy invaded old-field site in Mettawa, IL, examining several best management and novel management strategies on ecosystem processes and vegetation outcomes. Our results indicate that reinvasion by *R. cathartica* was significantly reduced when woody mulch (using mulch composed of *R. cathartica* wood, or a commercially available mulch) was incorporated into the soil. Mulch incorporation also resulted in higher decomposition rates, higher earthworm populations and lower primary productivity of the first year vegetation. Bioavailable plant nutrient supply rates, measured using PRS™-probes were altered in all treatments. Plant diversity was not significantly different in the first year following restoration but community changes are becoming apparent in this second year. This work is discussed in the context of more general efforts to incorporate soil ecological knowledge into restoration practice.

Contact: Lauren Umek, lumek@depaul.edu

APPENDIX III: Chicago's Citizen Science Programs

Adopt-a-Beach

Organized by the Alliance for the Great Lakes, this program engages schools, businesses and community groups to conduct litter removal and monitoring and water quality testing of along Lake Michigan's beaches and shorelines. The data collected is available online and used for pollution prevention and education purposes.

Frances Canonizado
312.939.0838.228
fcanonizado@greatlakes.org
<http://www.greatlakes.org/Page.aspx?pid=525>

Bird Conservation Network Survey (Formerly BCN Census)

An ongoing survey of birds in our region's natural areas, deigned to give specific information to land managers.

Lee Ramsey
847.501.4683
leeramsey@comcast.net
www.bcnbirds.org/census.html

Bird Blitzes to Monitor Grasslands, Woodlands, Shrublands, or Single Sites

Each year birders explore our natural areas in June to answer questions about the status of our breeding birds.

Judy Pollock
847.328.1250
jpollock@audubon.org
www.habitatproject.org

Chicago Bird Collision Monitors

A monitoring & rescue program that patrols the Loop each morning during migration in order to save and collect data on birds that strike buildings.

773.988.1867
info@birdmonitors.net
www.birdmonitors.net

Chicago Wilderness Calling Frog Survey

A Chicago region effort to monitor the 13 species of frogs and toads that live in our wetlands. They also look for salamanders, snakes, and turtles.

Karen Glennemeier
847.328.1250
kglenemeier@audubon.org
www.habitatproject.org/frogssurvey/index.html

Chicago Wilderness Habitat Project

A network of thousands of volunteers and staff – scientists, monitors, land managers, and advocates – who work side by side to assure the holistic and effective conservation of Chicago Wilderness.

www.habitatproject.org

Christmas Bird Count

For over a century, volunteers have been collecting information on the early-winter birds in their communities by participating in this annual event. Each December and early January, dozens of counts take place in the region including a few within Chicago.

www.illinoisbirds.org/
www.audubon.org/bird/cbc/index.html

Dragonfly Monitoring Network

A network of volunteers that monitor dragonfly and damselfly populations at public and private sites, in the tristate area. The data is shared with local naturalists.

Craig Stettner
847.925.6214
crstettner@aol.com

eBird

Audubon and Cornell have partnered to present a website (www.ebird.com) that provides birdwatchers a way to save sightings to an online database. The information is used to study population movements and distributions. Additionally, The Bird Conservation Network Survey has its own eBird portal. Find sightings by trained monitors in Chicago parks and preserves at www.eBird.org/bcn.

Flint Creek Wildlife Rehabilitation Rescue & Recovery

A monitoring & rescue program that patrols the Loop each morning during migration in order to save and collect data on birds that strike buildings.

847.381.8813

volunteer@flintcreekwildlife.org

www.flintcreekwildlife.org/Rescue_and_Recovery

Great Backyard Bird Count

An annual Presidents' Day Weekend event for volunteers to count the birds in their backyards.

www.birdcount.org

Illinois Butterfly Monitoring Network

For more 15 years, this effort has identified and counted butterflies, running more than 3,000 routes on sites in Illinois. The data collected is used by researchers and land managers in evaluating how restoration practices and other changes affect butterfly populations.

Tom Peterson

630.443.8604

ibmn-tom@earthlink.net

www.bfly.org

Illinois RiverWatch Network

RiverWatch certified volunteers collect high quality data that is used to gauge long-term trends in stream health, develop land management strategies, identify potentially degraded waters, and assess the effectiveness of restoration projects.

Vera Bojic

618.468.4870

vbovic@lc.edu

<http://www.ngrrec.org/index.php/riverwatch>

ILEPA Volunteer Lake Monitoring Program

With the help of citizen scientists, ILEPA is able to collect historic data on the water quality impacts on Illinois' inland lakes which inform lake management decision-making. Over the life of the Program, 2,000 volunteers have collected data on 400 lakes.

Statewide Coordinator

217.782.3362

epa.vlmp@illinois.gov

<http://www.epa.state.il.us/water/conservation/vlmp/index.html>

Important Bird Areas (IBAs) Program

An international effort to identify, conserve, and monitor a network of sites that provide essential habitat for bird populations. The goals of the Illinois IBA Program are to quickly identify the state's most important bird areas and the threats to them, and to form conservation teams that can implement needed actions.

Judy Pollock

847.328.1250

jpollock@audubon.org

<http://iba.audubon.org/iba/viewState.do?state=US-IL>

Plant Community Audits of Woods, Prairies, or Wetlands

Ongoing monitoring to assess the status of upland forests, prairies, and wetlands.

Karen Glennemeier

847.328.1250

kglenneier@audubon.org

Plants of Concern (Rare Plant Monitoring)

Administered by staff and volunteers of the Chicago Botanic Garden, Plants of Concern trains volunteers to monitor populations of threatened or endangered plants. Information about habitat quality and disturbance levels helps reveal the factors that influence rare plant populations.

Susanne Masi
847.835.8269
smasi@chicagobotanic.org
www.plantsofconcern.org

Project Budburst

Lead by Chicago Botanic Garden, a nationwide, citizen-scientist initiative to track climate change by recording the timing of leafing and flowering of flowers and foliage. Over 5,000 observations have been collected since 2007.
www.budburst.org

Project Squirrel

A citizen science program for all ages that monitors the ecology of our neighborhoods through the eyes of squirrels.
Steve Sullivan
773.525.0166
sciurus@uic.edu
www.projectsquirrel.org

Spring Bird Count

The statewide Illinois Spring Bird Count is held on the first or second Saturday each year in early May, and many local birders participate. It is organized by county. View results at <http://www.inhs.uiuc.edu/databases/sbc/about.html>.

Cook County coordinator: Alan Anderson
847.390.7437
casresearch@comcast.net

APPENDIX IV: Chicago Nature & Wildlife Research Survey Summary of Results (November 2009)

Introduction

In December, 2008, as the Mayor's Nature and Wildlife Committee was planning the Research Summit, the committee conducted a survey of conservation researchers and practitioners working in Chicago. These survey results helped inform the planning of the November 6th Summit. The goal of the Summit is to align research activities with the information needs of conservation managers to help the conservation community work together to meet the goals of the Chicago Nature and Wildlife Plan.

Susan Ask, University of Illinois at Urbana-Champaign, conducted the survey, and the results described here are taken from her preliminary analysis. The survey was conducted via an online survey tool. Participants were sent email invitations to take part in the survey between October 27 and December 8, 2008. More than 80 invitations were sent out; 24 people completed the survey. The responses tended to identify focus areas without identifying specific research questions.

Results

Key priorities identified from the survey are:

- Preserving existing habitat and open space and enhancing connectivity between parcels.
- Research on effective strategies to reduce threats to birds, particularly mortality caused by collisions with buildings.
- More research on effective restoration, particularly seeding rates and evaluating the success of restoration projects.
- Research on ecosystem services—particularly stormwater management, but also urban heat island mitigation and carbon sequestration—and their economic benefits.
- The need for more funding for managing conservation areas.
- The need for better communication among researchers, managers and government agencies.
- Public engagement with nature is important for successful conservation.
- Invasive species are a key management concern.
- Research on actions to support declining bird populations.
- Better coordination in research design.
- Regulatory follow up and government action are needed.
- Park District sites were identified as priorities for future work.

- “Easily addressed” research needs include strategies to reduce threats to birds, improving restoration projects with research on optimal seeding rates and focused inventory effort on specific sites or taxonomic groups.

Observations

A few generalizations can be made about conservation priorities of the respondents. First, much of the current monitoring, research and management is focused around Calumet. Second, birds are a major concern of the respondents. Third, social sciences did not figure prominently in the priorities, perhaps because few respondents were social scientists.

Original Survey Questions

1. Please briefly describe your research, monitoring and inventory projects.
2. Which research, inventory or monitoring projects are your highest priorities?
3. Which sites are your highest priorities? Please list them.
4. What are the three highest priority research needs related to your work?
5. What lack of information presents the greatest impediment to your work?
6. Do you have any immediate research needs that could be fairly easily addressed? If so, please describe them.
7. What do you think are the most important conservation priorities for lands in the city of Chicago?
8. Do you have baseline inventories for any sites? If so, please list the sites and the focus of the inventory.
9. Do you have baseline inventories for any taxa? If so, please list them.
10. Do you have any sites or taxa that need to be inventoried? Please list your highest priority sites and taxa.
11. Do you have any volunteer programs?
12. Do volunteers help with research and monitoring? If so, please describe their role.



Richard M. Daley, Mayor