2015 Implementation Guide to the

As Prescribed by The Wildlife Conservation and Restoration Program and the State Wildlife Grant Program

Illinois Wildlife Action Plan
2015 Implementation Guide

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Acknowledgments

Illinois' Wildlife Action Plan has been implemented over the past ten years through the tremendous cooperation and collaboration among many agencies, organizations and individuals. This Implementation Guide is the result of conversations with partners who requested a revised format that would identify best management practices, step down actions to make them easier to implement, provide clear directions for implementation, clarify the role of IDNR, and be written in language everyone can understand. Special thanks to Marc Miller, John Rogner, and Jim Herkert for convening representatives from statewide conservation organizations regularly during the past ten years as part of the Illinois Wildlife Action Team. A list of contributors to the Action Team, Campaigns, and species reviews can be found in Appendix 3.

In an attempt to meet the needs of our partners and Department of Natural Resources staff, we broke the Implementation Guide into seven Campaign chapters (Farmland and Prairie, Forest and Woodland, Green Cities, Invasive Species, Lake Michigan, Streams, and Wetlands) that provide conservation actions and strategies that seek to address the most widespread and the most urgent needs of wildlife and their habitats. Special thanks to Stan McTaggart, Mike Wefer, Nancy Williamson, Diane Tecic, Lisa Cotner, Leon Hinz, Ann Holtrop, Chris Evans, Jody Shimp, Randy Smith, Paul Brewer, and Jim Renn who coordinated and/or wrote the Campaign chapters. Tracy Boutelle Fidler, Jeff Walk, Elliot Brinkman, and Andrew Hulin were instrumental in more fully developing the concept of Conservation Opportunity Areas and establishing their geographic boundaries.

At the heart of the Illinois Wildlife Action Plan and this supporting Implementation Guide are Illinois' vulnerable species. We appreciate the analysis, insight, and opinions of all of the taxa experts that assisted in the review and revision of Species in Greatest Conservation Need and the development of the Watch List. Many of the taxa experts are identified in Appendix 3.

Finally, implementing the conservation actions identified in Illinois' Comprehensive Wildlife Conservation Strategy & Plan and this Implementation Guide (collectively the Illinois Wildlife Action Plan) would not be possible without the guidance and oversight of IDNR Federal Aid staff and IDNR - Office of Resource Conservation Project Managers. Thank you to all IDNR staff and to our conservation partners who actively identify and implement conservation actions, thereby ensuring that this is a living document that addresses the most immediate threats to Illinois Species in Greatest Conservation Need and their habitats.

Foreword

The purpose of Illinois' 2005 Comprehensive Wildlife Conservation Plan was to assess the health of Illinois' wildlife and supporting habitats, identify the problems they face and, most importantly, outline the strategies and actions needed to conserve them over the long term. The plan pays special attention to those species in greatest need of conservation and provides us with conservation goals and objectives designed to keep those animal populations off of Illinois' threatened and endangered species lists.

Equally important, Illinois' Comprehensive Wildlife Conservation Plan unifies our statewide network of people and organizations, both public and private, which care deeply for Illinois' environmental health. As our colleagues stated in their foreword ten years ago, "The plan is a truly historic effort; never before has such a detailed, science-based plan for conserving our state's wildlife been undertaken."

Ten years later, we are pleased to present Illinois' Wildlife Action Plan – Implementation Guide. It is completed, in part, by many natural resource professionals across government agencies and non-governmental organizations. This implementation guide focuses on campaign-specific action. Those campaigns include Farmland and Prairie, Forest and Woodland, Green Cities, Invasive Species, Lake Michigan, Streams and Wetlands. The implementation guide provides more detail on the original strategies outlined in 2005 and have been expanded to better guide on-the-ground work.

For many years, Illinois' conservation community has worked hard to acquire, conserve and nurture our divergent statewide habitats in support of our wildlife populations. Without doubt, if our network of passionate people and organizations proactively focus and adjust our efforts to better align with this implementation guide, the results of our work will increase exponentially.

From the confluence of the Ohio and Mississippi Rivers to our Wisconsin border, Illinois' long-range, landscape-level Wildlife Action Plan – Implementation Guide unifies Illinois' conservation network. Clearly, if we are going to protect our species in greatest conservation need and the habitats they rely upon, we must do so in unison. This Implementation Guide affords us that very opportunity.

Tom Clay

Executive Director

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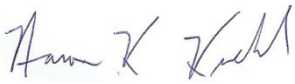

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Introduction

The Illinois Comprehensive Wildlife Conservation Plan & Strategy (CWCP) was developed in 2005 to better coordinate conservation efforts in the State of Illinois to prevent the further decline of wildlife species and to avoid the addition of more species to the endangered and threatened species list (State of Illinois 2005). The CWCP used a landscape-level approach and brought together statewide conservation partners to develop an actionable plan that addressed the particular needs of declining wildlife. Shortly after the CWCP was approved by US Fish and Wildlife Service, Illinois conservation partners began referring to the plan as the Illinois Wildlife Action Plan (IWAP). Since 2005, the Illinois Wildlife Action Plan has directed statewide conservation efforts including the implementation of 92 State Wildlife Grants that focused on Habitat Assessment & Management (40 projects), Assessment & Management of Species in Greatest Conservation Need (SGCN, 33 projects), Conservation Coordination & Planning (11 projects), and Habitat Protection (8 projects).

This 2015 Illinois Wildlife Action Plan Implementation Guide is not intended to be a replacement of the CWCP, but serves as an update and supplement to the original that provides progress reviews, status updates, and further prioritization of conservation actions for the next ten years. We view these two documents, the CWCP and the Implementation Guide, collectively as the Illinois Wildlife Action Plan. The Implementation Guide has identified and strives towards four overarching goals:

- Establish desired number and distribution of viable populations for each SGCN and target Focal Species by 2025
- Manage habitats through promoting self- maintaining natural-disturbance regimes for the benefit of native species;
- Develop resiliency and connectedness into habitats so species can adjust to landscape and environmental changes; and
- Foster an awareness, appreciation, and connection to SGCN and associated habitats among the public.

Through surveys of partners, we have identified how the IWAP has succeeded over the past ten years and how it can be improved (Browning 2015). The comprehensive plan has become a valuable resource to conservation partners across the state, creating partnerships and building further interest in conservation. Yet there is a need to make the document more user-friendly and actionable. Partners have requested that the Implementation Guide identify best management practices, step down actions to make them easier to implement, provide clear directions for implementation, clarify the role of IDNR, and be written in language everyone can understand.

In an attempt to meet the needs of our partners, we broke the Implementation Guide into seven Campaign chapters (Farmland and Prairie, Forest and Woodland, Green Cities, Invasive Species and Wildlife Diseases, Lake Michigan and Coastal Area, Streams, and Wetlands) that provide conservation

actions and strategies that seek to address the most widespread and the most urgent issues affecting wildlife, which live in similar habitats or are responding to similar threats, in an efficient, effective, and comprehensive manner. The Campaign chapters are intended to be user-friendly, stand-alone documents providing information necessary to inform and direct conservation partners' actions. Each Campaign has been developed by a team of partners working from the original CWCP. Due to differences in Campaign needs, each chapter has taken a slightly different course. Each Campaign chapter contains a description of the Campaign, Campaign goals, status as of 2015, stresses and threats to wildlife and habitat, Campaign Focal Species, Campaign Focus Areas, conservation actions, and management resources. Due to our interest in making the document user-friendly, some elements, which have not changed from 2005, have not been repeated. The CWCP can be referenced for this information. Each Campaign chapter provides a wealth of information on the species, habitats, threats and actions essential to successful conservation.

The backbones of each Campaign are Species in Greatest Conservation Need (SGCN) - wildlife species with small or declining populations or other characteristics that make them vulnerable. Many SGCN are discussed within Campaigns, and a comprehensive list of SGCN is compiled in Appendix 1. SGCN, which were identified for the IWAP by teams of taxa experts, were updated for the Implementation Guide through expert workshops and State Wildlife Grants (Metzke et al. 2012, Douglass and Stodola 2014, Hinz & Zahniser 2015). Assessments of fish, birds, mussels, snails, amphibians, reptiles, mammals, insects and other invertebrates were based on information on species distribution and abundance gathered from the Illinois Natural Heritage Database, various taxa specific databases, literature searches, NatureServe, and expert opinion. An additional group of Watch List species was developed that includes 308 species for which inadequate information was available to determine conservation status within Illinois (Appendix 2). These species have poorly known distributions, unevaluated population status, and poorly defined habitat requirements. The intent of the "Watch List" is to prioritize surveys and foster a research agenda to fill knowledge gaps and allow conservation status assessments to be conducted for at least 10% of these species by 2025.

SGCN are inextricably linked to their habitats, which are the organizing feature of the Implementation Guide. The CWCP included detailed descriptions and locations of Illinois natural divisions and ecological communities. This information has not changed since 2005, and therefore is not repeated in the Implementation Guide. In the Implementation Guide, each Campaign chapter includes an updated status section, detailing changes that have occurred in that general habitat in the last ten years. The Lake Michigan and Coastal Area has been added as a separate Campaign and the Green Cities Campaign has been greatly expanded to fill an identified need for continued conservation efforts in urban areas. To relate SGCN to their habitat, Campaign/habitat associations of each SGCN are listed in Appendix I. Some Campaigns focus on a subset of habitat types to prioritize the next ten years of implementation. Based on the CWCP and new information, each Campaign has identified and mapped Focus Areas to target conservation actions. Focus Areas are locations where conservation actions and strategies can be targeted at maintaining viable wildlife populations, enhancing or restoring habitat, and to achieve specific plan objectives. Focus Areas should not be confused with Conservation Opportunity Areas (locations with significant existing or potential wildlife and habitat resources; where partners are willing

to plan, implement and evaluate conservation actions; where financial and human resources are available; and where conservation is motivated by an agreed-upon conservation purpose and set of objectives), which are also detailed in the IWAP.

Addressing threats to SGCN and their habitats is the focus of the Implementation Guide. For consistency, threat information was summarized in the Implementation Guide similar in format to the CWCP. However, literature reviews, expert judgement, and conservation partner surveys were used to review and revise threats identified in the CWCP. Habitat stressors and other threats are summarized by Campaign in Appendixes 4, 5, 6, 7, 8, 9. In many cases, threats of a more general nature are identified in the Appendixes found in each Campaign chapter, yet many conservation actions address specific aspects of threats (e.g., water quality threat and actions associated with agriculture runoff and municipal waste water treatment). In some cases, part of the challenge of addressing threats is identifying them; in these cases research and survey efforts are identified in the actions section of each Campaign.

Priority conservation actions that address threats and stressor to SGCN and their habitats are the core of the Implementation Guide. These actions are listed within each Campaign chapter. Campaign teams varied in their approach to identifying and ranking conservation actions, and the approaches used are described in the Campaign chapters. Conservation actions that best addressed species and habitat threats identified in each Campaign were selected as top priorities for the next ten years but were not further ranked. Actions are intended to be realistic and appropriate and include the continuation or expansion of some existing programs. Most conservation actions identified in the Campaigns are designed to be addressable by all interested conservation partners and not restricted to specific groups or organizations. When possible, conservation actions are specific and detailed, and in cases where inadequate information is available to identify specific actions, research and development of actions are incorporated. Most actions identified in Campaign chapters are preceded by a statement of need and followed by an expected outcome to better describe their conservation objective.

Two types of measures will be used to assess the effectiveness of conservation actions at improving the status of SGCN and their habitats. First, performance measures are included in this Implementation Guide to assess progress toward the goals and objectives of the Campaigns rather than the effectiveness of individual conservation actions. Second, Focal Species are identified in each Campaign and are intended to be used for monitoring and assessment of conservation actions. Changes in distribution and abundance of Focal Species serve as the performance measure. Focal Species, selected by each Campaign, are intended to be species that represent the larger suite of SGCN addressed by the Campaign, species that are expected to respond to conservation actions, and/or species that are the focus of current conservation and monitoring efforts.

Monitoring is essential to understanding the status of species, their habitats, and the effectiveness of conservation actions. Illinois has a number of ongoing statewide monitoring programs that meet some of the Implementation Guide needs (e.g., North American Breeding Bird Survey, Long Term Resource Monitoring Program- large river communities, IEPA/IDNR's basin surveys, IDNR's Critical Trends

Assessment Program). Most of the existing monitoring programs are assemblage based. In addition, listed species are monitored at specific sites and tracked in the Natural Heritage database. Information associated with many Focal Species, which will serve as performance measures, is currently captured by existing monitoring programs, yet thorough assessment of Focal Species status may require additional efforts.

All monitoring programs have limitations in terms of spatial extent, temporal extent, sensitivity to structure and function, standardization and/or effectiveness of methods. Many of these limitations have been identified and actions to evaluate monitoring programs effectiveness at assessing the conservation status of SGCN have been included. In addition, we have identified the need to expand monitoring programs to better capture information on the status of Watch List species.

Creation of this Implementation Guide has been an iterative process, within the Department of Natural Resources, among other agencies and organizations, and with the public. Each Campaign chapter was developed with input from a team of core partners and IDNR members associated with the habitat or focus of the Campaign. Campaign teams used information generated through research projects and monitoring programs for the past ten years, feedback gathered from partners (e.g., Browning 2015, Hinz et al. 2015) in surveys and meetings, and expert judgement to develop Campaign chapters. Draft chapters were distributed to interested parties within and outside IDNR via email and posted on the Illinois Wildlife Action Plan webpage to gather input from the public. Comments and suggestions were carefully considered. This Implementation Guide is intended to be used for the next ten years. For the Illinois Wildlife Action Plan to remain timely and effective, review and revision will need to continue. However, the need and process for revising the Plan will be influenced by changing resource conditions, development of challenges and opportunities, and the relative success of conservation actions taken during implementation. We expect a process similar to the one used to develop this Implementation Guide to be followed ten years from now, one that allows for incorporation of available data, gathering of public and partner input, and integration of diverse perspectives. For the next revision, 24 months will be allowed to ensure adequate time to update species/habitat status, gather partner input, and review draft documents.

An action plan is nothing without implementation, and implementation of this plan has been facilitated by the Illinois Wildlife Action Team. Action Team members represent organizations that provide significant resources, staff, and/or implementation activities, or recruit support, function as an umbrella organization, and/or represent key constituent interests. The Action Team includes members representing 26 different organizations including federal and state government and nonprofit organizations (Appendix 3). The Action Team met 27 times between 2006 and 2015 (1 to 4 meetings per year) with each member attending on average 13 meetings. These meetings enabled coordination of development, implementation, review, and revision of the plan across agencies and organizations. Continuation of the Action Team will ensure the continued coordination of conservation planning and activities. Further, a communication plan is being developed (Browning 2015) that will better engage, coordinate, and guide partners in conservation actions. To further increase potential cooperation, some Focal Species were selected to correspond to surrogate species identified by Landscape Conservation

Cooperatives or other regional partnerships that are shared with other States (e.g., Streams Campaign identifies Sturgeon, Redhorse, and Smallmouth Bass as Focal Species which are also surrogate species for the Eastern Tallgrass Prairie and Big River LCC).

Public participation has been a large part of the development, revision, and implementation of conservation activities over the past ten years. The public has been informed of implementation actions, such as State Wildlife Grants, via the Illinois Wildlife Action Plan webpage and through outreach articles published in popular media, such as Outdoor Illinois. Illinois Wildlife Action Team meetings minutes are published, engaging the public on implementation plans and issues. The Action Team contains members representing numerous public organizations. To further enhance public engagement, a communications plan is being developed that will include an Action Plan Primer for those new to conservation planning and informative text for the Action Plan webpage including engaging, easy-to-understand introductions for each of the six revised Action Plan chapters (Browning 2015). Conservation Opportunity Areas detailed in the IWAP are another avenue for public participation. These local level conservation efforts rely on community engagement and support to drive and direct conservation action. The public has participated in the plan revision by commenting on drafts of Campaign chapters on the webpage, and through representation by numerous organizations that are on the Action Team and/or part of Campaign revision teams that have been active in all steps of implementation and revision.

Comprehensively planning and implementing statewide conservation efforts is a monumental task that requires coordination and cooperation across agencies and organizations. We have prepared this document in partnership with passionate conservation partners to meet their needs and better facilitate conservation efforts. It is our hope that this document provides comprehensive, appropriate, and feasible guidance for the next ten years of conservation in Illinois.

Species in Greatest Conservation Need

In the 2005 Comprehensive Wildlife Conservation Plan & Strategy (CWCP; State of Illinois 2005), staff used eight criteria for selecting Species in Greatest Conservation Need (SGCN) that were vulnerable to specific threats, rare or declining habitat, stressors outside of Illinois, or that had certain characteristics that made them vulnerable.

In developing the 2015 Implementation Guide, we reviewed the 2005 criteria, and information presented for SGCN, and made the following changes.

- Status and trend were quantitatively assessed when possible.
- Rare and declining were separated into two categories, with consideration given to both abundance and distribution as conservation actions needed to address vulnerability may be different.
- A set of habitat types were identified, applied across taxonomic groups, and linked to campaigns.
- Information on species status, trend, and stressors was located in the Campaign Chapters, where conservation actions are identified to mitigate stressors.
- Species that have poorly known status were placed on a "Watch List", which will foster development of a research agenda to fill these needs.

Criteria for identifying Illinois Species in Greatest Conservation Need

1. Species identified on formal lists
   a) Threatened or Endangered in Illinois, including federally listed species that occur within the State
   b) Species with a global conservation rank indicator of G1, G2, or G3
2. Species whose populations are identified as being rare
   a) Species that occur at a limited number of sites or that have low population numbers
3. Species whose populations are identified as declining
   a) Species that have declined in abundance or distribution since 2000, where declines are not part of a recognized population cycle
4. Species is dependent upon a rare, declining, or vulnerable habitat for one or more life history needs (e.g., breeding, migration, wintering)
   a) Rare habitats: habitats with few occurrences or restricted distributions in Illinois that may impact the viability of species that depend on them
   b) Declining habitats: Acreage or overall quality of habitat has substantially declined
   c) Vulnerable habitats: Habitats most likely to be altered or degraded in the future
5. Species is vulnerable because it has a highly localized or restricted distribution (Endemics), or the Illinois' population is disjunct from the rest of the species' range

Criteria for excluding species from Illinois Species in Greatest Conservation Need

1. Species has not been documented to occur in Illinois.
2. Species occurrence is occasional as a result of the wandering behavior of individuals and no resident populations are established or likely to become established in the next ten years. Regularly migrating species that depend on habitat within Illinois are not excluded by this criterion.
3. Species is abundant in Illinois and regionally, nationally, or globally.

A variety of approaches and data sources were used to evaluate these criteria across taxonomic groups (Metzke et al. 2012, Douglass and Stodola 2014, Sauer et al. 2014, Hinz and Zahniser 2015). Fish (Metzke et al. 2012), mussels (Douglass and Stodola 2014), and non-mussel invertebrates (Hinz and Zahniser 2015) were reviewed as part of State Wildlife Grant-funded research projects. Birds, herptiles, and mammals were reviewed by teams of taxa experts. These teams evaluated current literature and made recommendations to IDNR.

The criteria above were used to identify 421 Species in Greatest Conservation Need. Invertebrates comprise the majority of Illinois' revised SGCN list, followed by birds, fish, herptiles, and mammals (Table 1). To support implementation of conservation actions directed at conserving SGCN and their habitats, and research filling information gaps, this Implementation Guide organizes information about Illinois' SGCN in two different ways. First, SGCN and the criteria used to select them are identified in Appendix 1 along with a lead Campaign assigned to each species. Species in Appendix 1 are sorted by scientific name. Second, SGCN along with their habitat preference, status, trend, and stressors are included within an Appendix in each Campaign (see Campaign Appendices). Unless identified as a Focal Species, species are included in the Appendix for the lead Campaign only. Species lists within Campaign Appendices are sorted by common name.

Species that were thought to be vulnerable but had incomplete information on their status, trend, or stressors were placed on a Watch List (Appendix 2).

In addition to SGCN and Watch List species, a set of Campaign Focal Species were identified. Focal Species are animal species selected to be actively monitored to measure progress toward the conservation goals and objectives outlined by a campaign. The process for selecting Focal Species varied by Campaign and is described in each Campaign section.

Table 1. Summary of Illinois' Species in Greatest Conservation Need (SGCN) by taxonomic group.

Taxa	Number of Species
BIRDS	82
FISH	80
HERPTILES	
Amphibians	14
Reptiles	24
Non-MUSSEL INVERTEBRATES	
Arachnids	3
Coleoptera (Beetles)	3
Crustaceans	22
Ephemeroptera (Mayflies)	13
Hemiptera (True Bugs)	25
Hymenoptera (Bees & Wasps)	4
Lepidoptera (Butterflies & Moths)	64
Millipedes	3
Mollusks (Discidae)	1
Mollusks (Hydrobiidae)	3
Mollusks (Pleuroceridae)	2
Odonata (Dragonflies & Damselflies)	5
Orthoptera (Grasshoppers, Katydids, Crickets)	6
Other Non-Insect	3
Plecoptera (Stoneflies)	9
Trichoptera (Caddisflies)	6
MAMMALS	12
MUSSLES	37

Conservation Opportunity Areas

Description

The Illinois Wildlife Action Plan establishes a common vision for the conservation of Illinois' wildlife and natural habitat. The plan identifies a variety of components, from biologically-diverse hotspots in the state to specific conservation goals, noting that it has become "increasingly difficult for conservationists to identify priorities, efficiently direct funding and staffing to address priorities, and effectively evaluate the success of efforts" (State of Illinois 2005, p. 5). As a way to tackle the awesome conservation task before the residents of Illinois, The Plan proposed a series of Conservation Opportunity Areas (COAs). This section of the Implementation Guide seeks to capture what it means to be a Conservation Opportunity Area, along with the conservation priorities and challenges they face. Finally, this chapter outlines ways people working in these areas can coordinate efforts to best support conservation on behalf of Illinois' Species in Greatest Conservation Need (SGCN).

What are Conservation Opportunity Areas?

Conservation Opportunity Areas are, quite simply, places in Illinois:

- with significant existing or potential wildlife and habitat resources;
- where partners are willing to plan, implement, and evaluate conservation actions;
- where financial and human resources are available; and
- where conservation is motivated by an agreed-upon conservation purpose and set of objectives.

To create a list of places in the state fitting this description, scientists with Illinois Natural History Survey identified priority areas for conservation, using a variety of tools, such as Audubon's Important Bird Areas and The Nature Conservancy's portfolio sites. The centerpiece of their analyses, however, was a dataset showing the state's key blocks of habitat (called hubs) and the corridors that connect them. The Illinois Natural History Survey then convened conservation partners to review the analyses of key habitat and sites to ascertain whether these sites represented the above definition for a Conservation Opportunity Area. Specifically, conservation partners evaluated whether conservation partners exist, resources were available to do the work, and whether conservation partners had an agreed-upon conservation purpose and set of objectives. In the end, conservation partners strongly agreed with the analyses.

Although the Illinois Comprehensive Wildlife Conservation Plan & Strategy (CWCP; State of Illinois 2005) proposed a series of conservation opportunity areas, their formal acceptance came afterwards. As part of that process, conservationists worked with Illinois Department of Natural Resources staff to develop boundaries for COAs. To more effectively manage COAs, the Illinois Fish and Wildlife Action Team established a Task Force to work on administrative issues. The Task Force, which is a committee

composed of conservation partners and IDNR staff, reviews COA requests and makes recommendations to the Action Team for formal adoption.

Through these processes, Illinois:

- Mapped and formally adopted the COAs proposed in the CWCP.
- Formed a new Conservation Opportunity Area: Middle Mississippi River.
- Revised the boundaries for six COAs: Green River, Kishwaukee River, Lake McHenry Wetlands, Mason County Sands Area, Rock River and Upper Mississippi River.

Efforts also are underway to formally merge part of the Southern Hill Prairie Corridor and Sinkhole Plain COAs to coincide with organized conservation partners.
Today, Illinois is home to 33 Conservation Opportunity Areas (Figure 1). In this chapter, COA names may have been shortened or altered to accommodate local colloquialisms (also noted in Figure 1).

Status as of 2015

Illinois' natural places form a rich tapestry, from its northern prairies to southern forests. Each of the state's natural areas are unique, as are the challenges and opportunities they face. Some places are hotspots for threatened and endangered species conservation. Others are expected to face pressures from high rates of population growth by 2025. These differences translate into differing conservation priorities and threats within individual COAs (Table 2). In general, restoring and enhancing wetlands is the top conservation priority for those working in Illinois' COAs, while invasive species and degrading habitat quality are the top two threats (Fidler, 2015).

It is rare for Conservation Opportunity Areas to embody all four of the attributes that define them. The survey of stakeholders revealed that less than half of COAs embody all four criteria (see Table 2 for the 14 COAs showing moderate, high or very high in all four criterion listed). Each area within Illinois is unique, facing different conservation challenges, opportunities and levels of support. In some places, Federal and State Agencies are engaged in landscape-scale conservation, whereas other areas depend on citizen volunteers to plan and implement efforts. This disparity presents unique challenges when it comes to helping these areas realize their conservation potential. Further, the balance of people, resources and conservation agreement is dynamic.

Stakeholders within individual COAs, as expected, place differing importance and satisfaction on facets of their conservation efforts (Tables 2 and 3). For example, people working at Kankakee Sands felt the availability of core habitats and corridors for fish and wildlife populations was most important to their work, while individuals working in the Eastern Shawnee felt strong leadership from local partner organizations took priority.

A 2015 survey of stakeholders working in COAs provides a snapshot of the level of coordination, activity and conservation effort underway in Illinois' Conservation Opportunity Areas. Some key takeaways:

- Illinois' COAs need improved funding mechanisms, conservation leadership and support in combatting the spread and introduction of invasive species.
- The top factor for successful resource management is people working together, whereas lack of funding was the main impediment.
- The most important criterion for conservation projects is funding. Funding, or the lack thereof, also was the condition with which stakeholders were least satisfied.

Those interested in more detailed information on the status of individual COAs are encouraged to download the report – *Stakeholder perspectives on the status of Illinois' Conservation Opportunity Areas, a decade after their formation* (Fidler, 2015) at http://www.dnr.illinois.gov/conservation/IWAP/Pages/default.aspx .

Ways to Accomplish the Work

The last three criteria that define COAs encompass human dimensions, i.e. people work together to develop a shared conservation philosophy, while working to implement and finance conservation objectives. COAs, then, are defined by the people who work in them, whether the effort is grassroots led or part of a multi-agency collaboration. The success or failure of COAs is due, in part, to the ability of these people to coordinate conservation actions with a diverse array of people and organizations. Despite inherent differences between COAs (Table 4), there are some universal actions that individuals can take to advance conservation – locally and at the state level. These actions are designed to advance the social dimensions behind the reason for the founding of COAs within Illinois. They also were developed using a list of factors that either contribute to or reduce success of natural resource management, generated from the survey of stakeholders (Figure 2).

Each Conservation Opportunity Area is encouraged to:

1. **Form collaborative partnerships with other likeminded individuals and/or organizations working within the COA.**

   The importance of leadership in achieving conservation success is well recognized. In fact, it has been called the "most important attribute in the tool kit of a conservation biologist" (Dietz et al., 2003, p. 274). In specific, some of the most valued leadership characteristics for conservation actions include having a long-term vision, offering an organized way to approach and focus on conservation actions, as well as containing the ability to build coalitions (Dietz et al., 2003). People working to conserve Illinois would agree, ranking strong leadership right behind funding as the two most important criteria for successful conservation of our habitats and wildlife (Fidler, 2015).

2. **Connect conservation action with Species in Greatest Conservation Need.**

   The CWCP says conservationists identified COAs as having "high importance for conserving species in greatest need of conservation," (State of Illinois, 2005). Species in Greatest Conservation Need are animal species with small or declining populations or other characteristics that make them vulnerable. Conservation action should be focused on these species.

3. **Understand how each COA intersects with statewide Campaigns.**

   Each Campaign chapter contains a description of the Campaign, its goals, status, stresses and threats to wildlife and habitat, Focal Species, Focus Areas, conservation actions, and management resources. Figure 3 shows how COAs can connect with campaigns.

4. **Develop wildlife or habitat SMART goals that can be achieved by 2025.**

   SMART goals are ones that are strategic, measurable, attainable, relevant and bound by a specific timeframe. To develop these goals:

   - Use Figure 3 to understand how COAs intersect with the various campaigns.
   - Review the universal and targeted actions for relevant campaigns, which are found in the campaign chapters.
   - Identify which of these actions conservation partners within each COA intend to focus on between now and 2025.
   - Connect SMART goals directly to SGCN found within each COA.

5. **Determine funding mechanism for accomplishing work within the COA.**

   The biggest gaps between what Illinois conservationists *have* and what they *need* is in the realms of leadership and funding (Fidler, 2015). Be proactive and realistic in developing SMART goals, organization plans and objectives. It's important to take time to list potential funding sources for various activities.

6. **Share information with IDNR.**

   Recognizing that COA conservation is dynamic, it's important to make information readily available to partners working in concert. Therefore, IDNR will act as clearinghouse for COA conservation information through its Web site, the Illinois Fish and Wildlife Action Team and the COA Task Force. New updates and details will be shared online.

As work advances in each COA , partners should provide IDNR Wildlife Action Plan Coordinator with:

a. A list of participating organizations and individual contacts that will enable IDNR to communicate effectively with COA collaborators.
b. A description of the conservation philosophy that brings partners together in the COA; this could be thought of as a “mission statement” for the COA.
c. Any goals and/or plans that are developed. These documents will be shared online.
d. Progress made towards goals.
e. Requests for modifications to COAs. In specific, there is a process for nominating new COAs and for revising COA boundaries. (Visit IDNR’s Illinois Wildlife Action Plan web site for detail on these processes.)

Table 2. Summary of the 2015 status of individual Conservation Opportunity Areas(COA)[1]

COA	N[2]	RMP[3]	Conservation Priority[4]	Major Threats[5]	Campaign Connections	Criterion 1[6]	Criterion 2[7]	Criterion 3[8]	Criterion 4[9]
Apple River	8	↑	streams	invasives	Streams	↑	↔	↓	↑
Cache River Wetlands	23	↑	wetlands	hydrology	Streams, Wetlands	↑	↔	↔	↔
Eastern Shawnee	16	↔	forests & savannas	invasives	Forests and Woodlands, Streams	↑	↔	↔	↑
Green River	5	↔	wetlands	habitat quality	Farmland and Prairie, Streams, Wetlands	↓	↔	↔	↑
Illinois Beach	7	↑	wetlands & invasives	invasives	Lake Michigan, Wetlands	↑	↑↑	↔	↑↑
Illinois Ozarks	15	↑	forests & savannas	habitat quality	Forests and Woodlands, Streams, Wetlands	↑	↑	↓	↑
Kanakakee Sands	16	↑	forests & savannas	habitat loss	Farmland and Prairie, Forests and Woodlands, Streams, Wetlands	↑	↑	↓	↑
Kishwaukee River	13	↔	streams	invasives	Streams, Wetlands	↔	↑	↓	↑
Lake McHenry Wetlands	5	↓	wetlands	invasives	Farmland and Prairie, Forests and Woodlands, Streams, Wetlands	↔	↔	↓	↔
Lost Mound - Hanover Bluff - Mississippi Palisades	5	↔	forests & savannas	invasives	Farmland and Prairie, Forests and Woodlands, Wetlands	↑↑	↑	↓	↑↑
Lower Fox River	9	↑	streams & invasives	invasives	Streams	↔	↔	↓	↔
Lower Kaskaskia Bottomlands	4	↔	wetlands	hydrology, pollutants/sediment, invasives	Forests and Woodlands, Streams, Wetlands	↔	↔	↔	↔
Lower LaMoine River	6	↑	invasives	invasives	Forests and Woodlands	↔	↔	↓	↔
Mason County Sand Areas	16	↑	forests & savannas	invasives	Farmland and Prairie, Forests and Woodlands, Wetlands	↔	↔	↔	↔
Middle Illinois River	23	↑	wetlands	habitat quality	Farmland and Prairie, Streams, Wetlands	↔	↔	↔	↔
Middle Little Wabash	9	↔	wetlands	habitat quality, invasives	Wetlands	↔	↓	↓	↔
Middle Mississippi River	7	↑	wetlands	habitat quality	Forests and Woodlands, Wetlands	↑	↔	↓	↑
Midewin Grasslands	9	↑	wetlands	habitat loss	Farmland and Prairie	↑	↑	↑	↔
Nachusa	5	↑	forests & savannas, grassland & shrub	habitat loss	Farmland and Prairie, Forests and Woodlands, Streams	↔	↑	↔	↔
Northern Hill Prairie Corridor	1	↑	grassland & shrub	habitat quality, invasives	Farmland and Prairie, Forests and Woodlands	↔	↑↑	↑	↑
Pere Marquette	6	↔	forests & savannas	invasives	Forests and Woodlands, Streams	↑	↔	↓	↔
Prairie Ridge Landscape	6	↑	invasives	invasives	Farmland and Prairie, Wetlands	↔	↔	↓	↑
Pyramid Grasslands	4	↑↑	invasives	-	Farmland and Prairie, Wetlands	-	-	-	-
Rock River	7	↔	forests & savannas	invasives		↔	↔	↔	↔
Siloam Springs	7	↑	forests & savannas	habitat quality	Forests and Woodlands	↑	↔	↔	↔
Sinkhole Plain	4	↔	invasives	climate, invasives	Streams	↑↑	↔	↑	↑
Southern Hill Prairie Corridor	5	↔	invasives	invasives	Farmland and Prairie, Forests and Woodlands	↔	↔	↓	↔
Sugar and Pecatonica rivers	7	↔	wetlands	habitat quality, invasives	Streams, Wetlands	↔	↔	↓	↑
Upper Des Plaines River	3	↑	forests & savannas, invasives	invasives	Forests and Woodlands, Streams, Wetlands	↑	↑	↓	↑
Upper Mississippi River	17	↑	streams	habitat quality, pollutants/sediment	Streams, Wetlands	↑	↔	↓	↑
Vermilion River & Little Vermilion River	28	↑	streams	habitat loss	Forests and Woodlands, Streams	↔	↔	↔	↔
Wabash River	10	↔	wetlands	habitat quality	Streams, Wetlands	↑	↑	↔	↔
Wisconsin Driftless Forest	5	↑	forests & savannas	habitat quality, invasives	Forests and Woodlands	↑	↑	↑	↑

[1]Arrows indicate mean score from stakeholders on a scale of very low (1=↓↓), low (2=↓), moderate (3=↔), high 4=(↑) and very high (5=↑↑) [2] Number of stakeholders completing survey for each COA. [3] Average of the mean scores from questions 8 and 9, then rounded to nearest whole number, the effectiveness of the resource management plan in managing/protecting fish/wildlife/important habitats [4] Conservation priorities receiving highest score. [5] Conservation threats receiving highest score. [6] Criterion 1: Existing or potential wildlife and habitat resources. Average of the mean scores, then rounded to nearest whole number, for availability of core habitats and public lands. [7] Criterion 2: Partners willing to plan, implement and evaluate conservation actions. Average of the mean scores, then rounded to nearest whole number, for strong leadership from agencies and partner organizations. [8] Criterion 3: Financial and human resources available. Mean score, then rounded to nearest whole number, for funding. [9] Criterion 4: Conservation motivated by agreed-upon conservation purpose. Mean score, then rounded to nearest whole number, partners with a shared vision and participating in conservation actions. (Source: Fidler, 2015)

Table 3. Importance of conditions for planning and implementation within COAs[1]

Conditions[2]	Availability of data		Partners		Agency leadership		Partner leadership		Habitat		Project funding		Resource sharing		Outreach		Monitoring		Availability of public lands	
COAs	N[3]	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Apple River	4	5	4	5	4	4.5	4	4.25	4	4.75	4	4.75	4	3.5	4	4	4	4.25	4	4
Cache River Wetlands	14	4.43	14	4.86	13	4.85	13	4.69	14	4.5	14	4.93	14	4.14	13	4.85	14	4.21	14	4.5
Eastern Shawnee	11	4.18	11	4.73	11	4.73	11	4.91	10	4.3	11	4.64	11	3.82	11	4.45	11	4	11	4.45
Green River	5	4.2	5	4.8	5	4.2	5	3.8	4	4	5	4.8	5	4.6	4	3.75	5	4.6	5	4.4
Illinois Beach	4	4	4	4.75	4	3.75	4	4.25	4	4.25	4	4	4	3	4	4.5	4	4.5	4	3.75
Illinois Ozarks	11	4.45	12	4	12	4.08	12	3.75	12	3.92	12	4.17	12	3.92	12	4.33	12	4	11	4
Kanakakee Sands	9	4.33	9	4.44	9	4.22	8	4.25	9	4.89	8	4.75	9	3.89	9	4.44	9	4.33	9	4.33
Kishwaukee River	10	4.9	10	4.5	10	4.2	10	4.4	10	4.6	10	4.9	9	4.11	10	4.4	10	4.3	9	4.22
Lake McHenry Wetlands	2	4.5	2	5	2	5	2	5	2	5	2	4.5	2	4	2	5	2	4.5	2	2.5
Lost Mound - Hanover Bluff - Mississippi Palisades	2	5	2	4.5	2	5	2	4.5	2	5	2	5	2	4	2	4	2	4.5	2	5
Lower Fox River	7	4.43	7	4.29	7	4.43	6	4.17	7	4.29	7	4.43	7	4	6	4	7	4.29	7	3.86
Lower Kaskaskia Bottomlands	2	5	2	4.5	2	5	2	4.5	2	4.5	2	4.5	2	4.5	2	4.5	2	4.5	2	4
Lower LaMoine River	3	4	4	3.75	4	5	4	4.75	3	5	4	4.25	3	4.33	2	4.5	3	4.67	4	3.5
Mason County Sand Areas	12	4.75	12	4.5	11	4.73	10	4.6	11	4.64	11	4.82	10	3.3	11	4.18	12	4.75	11	4
Middle Illinois River	16	4.19	16	4.31	16	3.88	16	4.31	16	4.06	16	4.06	14	3.71	16	4	16	3.5	16	3.94
Middle Little Wabash	6	4.33	6	4.33	6	5	6	4.67	6	4.67	6	4.5	6	3.83	6	4.67	6	4.17	6	3.83
Middle Mississippi River	7	4.43	7	4.71	7	4.29	7	4.57	7	4.43	7	5	5	4.6	7	4.43	7	4.86	7	4.29
Midewin Grasslands	4	4.25	4	4.25	4	4.5	4	4	3	5	4	4.75	4	3.75	4	4.5	4	4.25	3	5
Nachusa	3	4.33	3	4.33	3	4	3	4.67	3	4.67	3	4.67	3	4	3	4	3	4.33	3	4.33
Northern Hill Prairie Corridor	1	4	1	4	1	5	1	4	1	5	1	5	1	4	1	4	1	4	1	4
Pere Marquette	4	4.5	4	4.5	4	5	4	3.75	4	4	4	4.5	4	3.5	4	4	4	4.5	4	4
Prairie Ridge Landscape	5	4.6	5	4.6	5	5	5	4.6	5	4.2	5	5	5	3.2	5	4.8	5	4.8	5	4.2
Pyramid Grasslands	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	-	0	-
Rock River	6	4.33	6	3.83	6	4	6	3.33	6	4.5	6	4.17	5	3.4	5	3.8	5	4.4	6	3.67
Siloam Springs	5	4.8	5	4.2	5	4.6	5	4.4	5	5	5	4.8	4	4.25	5	4.2	5	4.8	5	4.2
Sinkhole Plain	1	5	1	5	1	5	1	5	1	5	1	5	1	5	1	5	1	5	1	4
Southern Hill Prairie Corridor	3	4.67	3	5	3	4.67	3	5	3	4.67	3	4.67	3	4	3	5	3	4.33	3	2.67
Sugar and Pecatonica rivers	5	4	5	4.4	5	4.6	5	4.4	5	4.6	5	4.4	5	3.8	4	4.5	5	4.6	5	3
Upper Des Plaines River	2	4.5	2	5	1	5	1	5	2	5	2	4	1	3	1	5	2	5	2	4
Upper Mississippi River	9	4.67	9	4.67	9	5	9	4.56	9	4.78	7	5	9	4	8	4.63	9	4.67	9	4.44
Vermilion River & Little Vermilion River	15	4.67	14	4.86	15	4.73	15	4.8	15	4.73	15	4.47	14	3.71	15	4.47	15	4.33	15	4.33
Wabash River	8	4.63	8	4.38	8	4.63	8	3.88	8	4.38	7	4.71	8	3.63	8	4.38	8	4.75	7	4.29
Wisconsin Driftless Forest	1	5	1	5	1	5	1	5	1	5	1	5	1	4	1	5	1	5	1	5

[1] Importance rated on a scale 1 to 5, with 1 being “extremely unimportant” and 5 being “extremely important”

[2] Conditions taken from survey question.

[3] Number of stakeholder responses.

(Source: Fidler, 2015)

Table 4. Satisfaction of conditions for planning and implementation within COAs[1, 2]

Conditions[3]	Availability of data		Partners		Agency leadership		Partner leadership		Habitat		Project funding		Resource sharing		Outreach		Monitoring		Availability of public lands		AVG
COA	N[4]	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	Mean
Sinkhole Plain	1	4.00	1	4.00	1	2.00	1	4.00	1	5.00	1	4.00	1	5.00	1	4.00	1	4.00	1	4.00	4.00
Lost Mound - Hanover Bluff - Mississippi Palisades	2	4.00	2	4.50	2	3.50	2	4.50	2	4.50	2	2.00	1	5.00	2	2.50	2	3.50	2	5.00	3.90
Upper Des Plaines River	2	4.50	1	4.00	1	4.00	2	4.50	2	3.50	1	2.00	1	4.00	1	4.00	2	3.50	2	4.50	3.85
Illinois Beach	4	3.25	4	4.50	4	4.50	4	4.50	4	3.75	4	2.75	4	4.00	4	3.75	4	3.00	4	4.25	3.83
Wisconsin Driftless Forest	1	4.00	1	4.00	1	4.00	1	4.00	1	2.00	1	4.00	1	3.00	1	5.00	1	3.00	1	5.00	3.80
Illinois Ozarks	10	3.50	11	3.73	11	3.82	11	3.64	9	4.22	11	2.36	8	3.13	10	3.80	9	3.44	10	4.20	3.58
Midewin Grasslands	2	3.50	4	3.25	3	3.00	3	4.00	3	4.00	2	4.00	2	3.50	3	3.33	2	3.50	3	3.67	3.58
Northern Hill Prairie Corridor	1	2.00	1	4.00	1	5.00	1	4.00	1	2.00	1	4.00	1	4.00	1	4.00	1	3.00	1	3.00	3.50
Kankakee Sands	9	3.56	9	4.11	9	3.44	8	3.88	9	3.56	9	2.22	8	4.13	9	2.56	9	3.56	9	3.44	3.45
Middle Mississippi River	6	3.67	7	4.00	7	3.00	7	3.71	7	3.57	7	2.43	6	3.17	7	3.57	6	3.17	7	4.14	3.44
Upper Mississippi River	8	3.63	7	3.71	7	2.71	6	4.17	8	3.50	5	2.20	5	3.40	6	3.83	7	3.57	7	3.71	3.44
Cache River Wetlands	14	3.79	14	3.14	14	2.93	13	2.92	14	3.86	14	2.57	13	3.69	13	3.54	14	3.36	14	4.29	3.41
Eastern Shawnee	11	3.64	11	3.55	11	3.27	11	3.00	10	3.40	11	3.00	11	3.45	11	2.64	11	3.09	11	4.64	3.37
Wabash River	7	3.14	7	3.14	7	3.57	7	3.57	7	3.43	6	3.00	7	3.57	7	2.86	7	3.14	6	3.83	3.33
Kishwaukee River	9	3.00	9	4.00	8	3.00	9	4.11	8	3.38	9	1.89	7	3.86	8	2.75	8	2.75	8	3.50	3.22
Siloam Springs	4	3.50	3	2.67	3	3.33	3	2.67	4	3.25	3	2.67	2	3.00	3	2.67	4	3.25	5	4.40	3.14
Vermilion River & Little Vermilion River	11	3.55	12	3.25	13	2.85	13	3.15	13	2.69	13	2.62	9	3.00	13	3.00	12	3.50	13	3.54	3.12
Mason County Sand Areas	10	3.30	10	3.30	11	3.45	8	3.00	8	3.00	10	2.70	8	3.25	9	3.22	10	3.10	9	2.78	3.11
Lower Kaskaskia Bottomlands	2	3.50	2	3.00	2	3.00	2	3.00	2	2.00	2	2.50	2	3.50	2	4.00	2	3.50	2	3.00	3.10
Nachusa	3	3.00	3	3.33	3	3.00	3	4.00	3	3.00	3	2.67	3	3.33	3	2.67	3	3.33	3	2.67	3.10
Rock River	6	3.00	6	3.33	6	3.17	6	3.50	6	2.83	6	2.50	5	3.80	5	3.00	5	2.40	6	3.33	3.09
Apple River	4	3.50	4	3.75	4	2.25	4	3.50	4	3.50	4	2.25	4	3.00	3	2.67	3	2.67	4	3.75	3.08
Pere Marquette	4	3.00	4	3.25	4	2.75	4	2.75	4	3.75	3	2.33	3	3.00	3	3.00	4	3.50	4	3.50	3.08
Southern Hill Prairie Corridor	3	3.33	3	3.33	3	2.33	3	3.00	3	3.33	3	1.67	3	3.67	3	2.67	3	3.67	2	3.50	3.05
Green River	4	3.00	5	4.00	5	2.80	5	3.40	3	1.33	3	3.33	4	4.00	4	2.50	5	2.60	5	3.40	3.04
Middle Illinois River	16	3.69	16	2.81	16	2.50	14	3.21	16	3.00	16	2.56	14	3.00	16	2.69	16	3.63	15	3.20	3.03
Lake McHenry Wetlands	2	3.50	2	3.00	2	3.50	2	3.00	2	2.50	2	2.00	2	4.00	2	3.00	2	2.00	2	3.00	2.95
Lower Fox River	7	2.86	6	3.17	7	3.29	6	3.17	7	2.71	7	1.71	7	3.00	6	3.00	7	3.00	7	2.71	2.86
Prairie Ridge Landscape	5	2.20	5	3.60	5	2.60	5	3.00	5	2.60	5	1.80	4	2.50	5	3.00	4	3.25	5	3.20	2.78
Lower LaMoine River	2	1.50	3	3.33	3	3.00	3	3.33	3	3.00	3	2.00	2	4.00	2	2.00	3	3.00	2	2.50	2.77
Sugar and Pecatonica Rivers	4	2.25	4	3.50	4	2.25	3	3.33	3	3.00	4	1.50	3	3.33	4	2.50	4	2.50	3	2.33	2.65
Middle Little Wabash	6	2.83	6	2.50	6	2.33	6	2.17	6	2.83	6	1.83	6	2.67	6	1.83	6	2.50	6	2.33	2.38
Pyramid Grasslands	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	-	0	-	-

[1] Satisfaction rated on a scale from 1 to 5, with 1 being “extremely unsatisfied” and 5 being “extremely satisfied.”
[2] COAs ranked according to average mean responses to all questions.
[3] Conditions taken from survey question.
[4] Number of stakeholder responses.
(Source: Fidler, 2015)

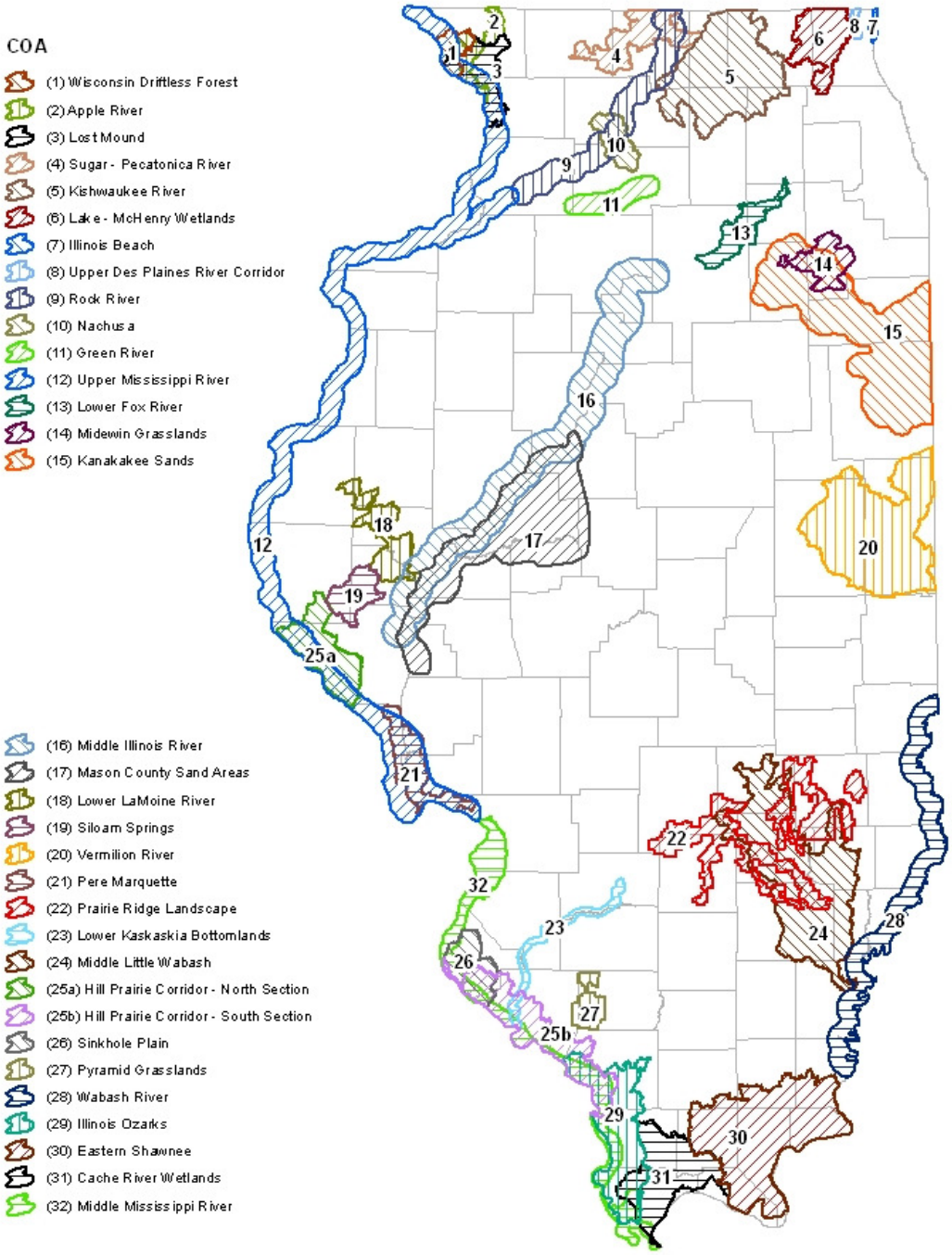
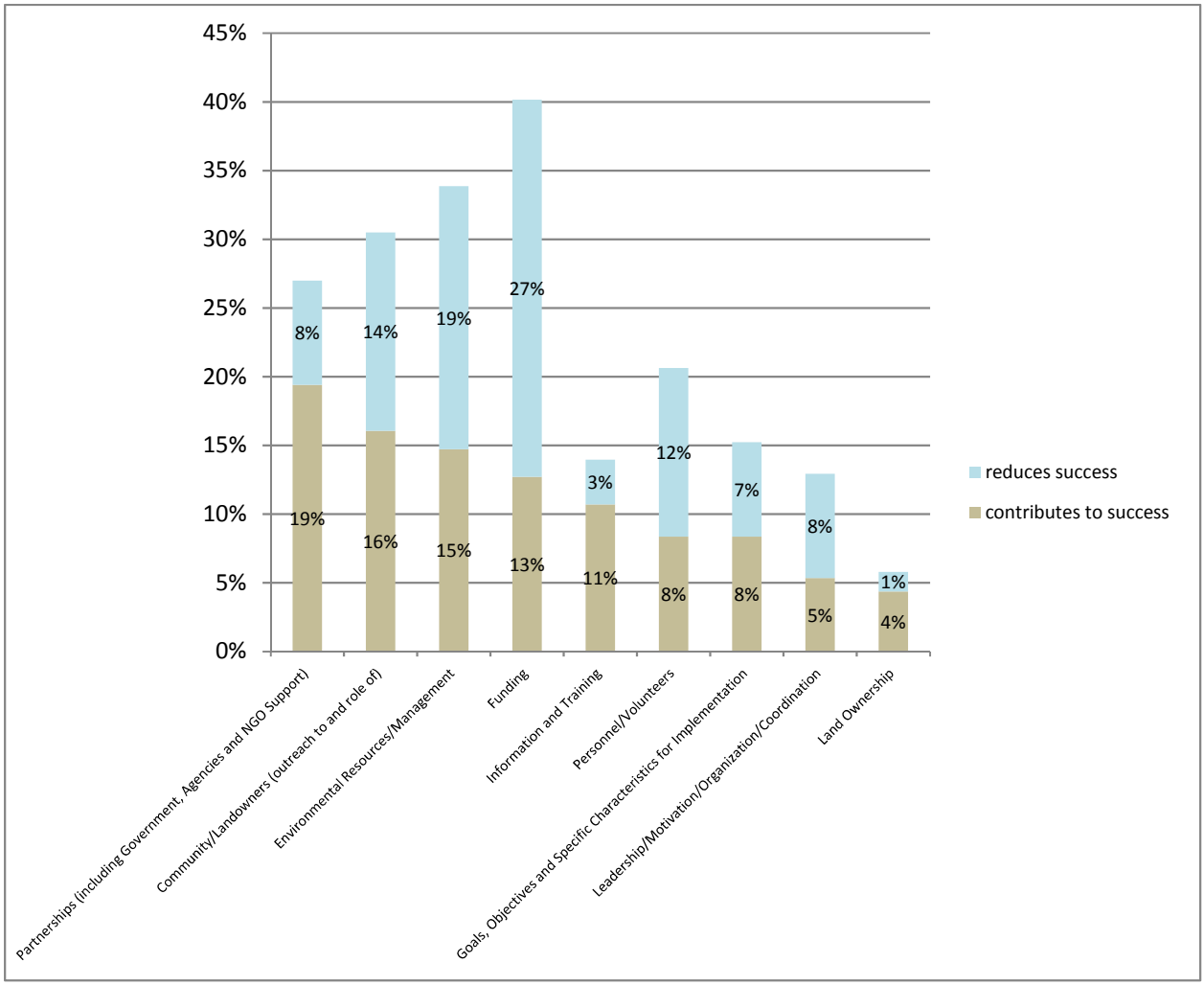


Figure 1. COAs currently recognized through the Illinois Wildlife Action Plan with abbreviated or alternate references for COA in parenthesis.

Figure 2. Factors that contribute or reduce success of natural resource management



(Source: Fidler, 2015)

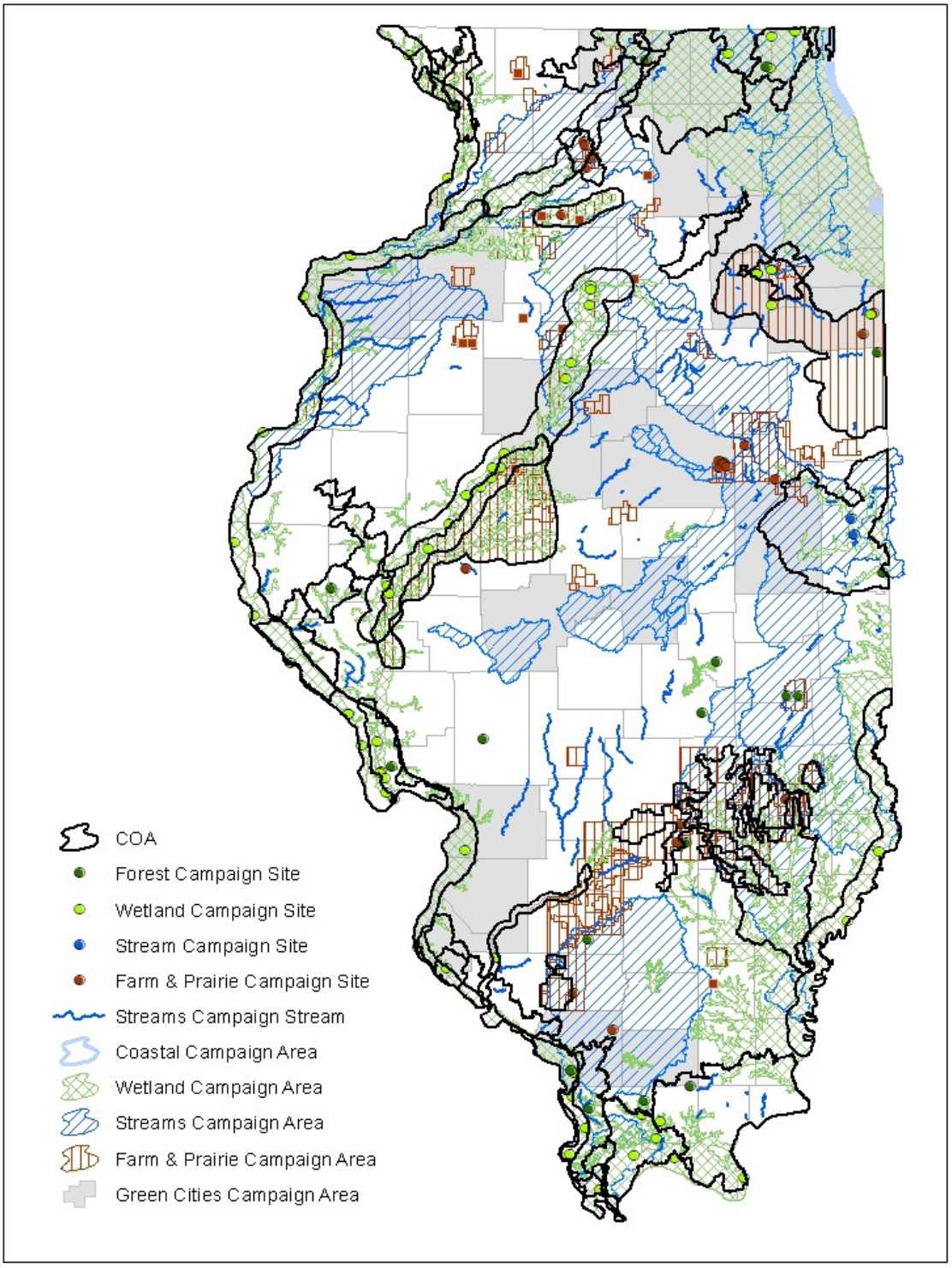


Figure 3. Intersection of COAs with Campaign Focus Areas.

References

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Campaigns

In the 2005 Comprehensive Wildlife Conservation Plan & Strategy (CWCP), seven Campaigns (Farmland and Prairie, Forest and Woodland, Green Cities, Invasive Species, Land and Water Stewardship, Streams, and Wetlands) were created to group conservation goals and actions that seek to address the most widespread and the most urgent issues affecting wildlife, which live in similar habitats or are responding to similar threats, in an efficient, effective, and comprehensive manner. In this Implementation Guide, elements of the 2005 Land and Water Stewardship Campaign were incorporated into the other original six Campaigns. A Lake Michigan Coastal Area Campaign was created to address the unique wildlife and habitat needs in Illinois' coastal habitats.

The following Campaign chapters are intended to be user-friendly, stand-alone documents providing information necessary to inform and direct conservation partners' actions. Each Campaign has been developed by a team of partners working from the original 2005 CWCP. Due to differences in Campaign needs, each chapter has taken a slightly different course. Each Campaign chapter contains a description of the Campaign, Campaign goals, status as of 2015, stresses and threats to wildlife and habitat, Campaign Focal Species, Campaign Focal Areas, conservation actions, and management resources. Due to our interest in making the document user-friendly, some elements, which have not changed from 2005, have not been repeated. The 2005 CWCP can be referenced for this information. Each Campaign chapter provides a wealth of information on the species, habitats, threats and actions essential to successful conservation. Priority conservation actions identified for the next 10 years of conservation are the core of the Implementation Guide. These actions are listed within each Campaign chapter.

The backbones of each Campaign are Species in Greatest Conservation Need (SGCN), wildlife species with small or declining populations or other characteristics that make them vulnerable. Many SGCN are discussed within Campaigns, and a comprehensive list of SGCN, organized by taxonomic group, is compiled in Appendix 1. Information on status, trend, and stressors affecting SGCN is summarized in Appendixes 4-9.

Focal species, a subset of SGCN selected by each Campaign, are intended to be SGNC that represent the larger suite of SGCN addressed by the Campaigns, species that are expected to respond to conservation actions, or species that are the focus of current conservation and monitoring efforts. Focal Species in each Campaign are intended to be used for monitoring and assessment of conservation actions with changes in distribution and abundance serving as the performance measure.

In the Campaign sections, readers will find focus or priority areas that have been selected to focus conservation actions in order to maintain viable wildlife populations and/or establish or restore habitat necessary for viable wildlife populations and achieve specific Plan objectives.

Farmland and Prairie Campaign

Description

The Farmland and Prairie Campaign Revision is intended to provide an update on the status of the 2005 Comprehensive Wildlife Conservation Plan & Strategy (CWCP; IDNR 2005) and to revisit the Goals, Stressors, Focal Species and Actions of this Campaign. There is an update of what has been accomplished towards the goals of the original Campaign as well as specific actions to help guide the next 10 years of implementation. While different goals could be set and various stressors and actions may be relevant and/or beneficial, the revision focuses on key goals that are realistic, achievable, and most needed within the next 10 years. These key goals will facilitate progress towards achieving the overarching goals of the Wildlife Action Plan and the Farmland and Prairie Campaign (Campaign).
The Campaign focuses on the conservation, restoration and management of grassland and shrubland habitats to benefit Species in Greatest Conservation Need (SGCN; Appendix 4) and other associated wildlife. The amount of native prairie that has been converted and lost to agriculture and development exceeds 99.9% in Illinois (State of Illinois 2005). The small areas that remain, as well as other restored grasslands, are under constant threat from human development and deteriorating habitat quality. Populations of obligate grassland and shrubland wildlife that were once common across Illinois on small, diverse farms continue to decline as landowners convert grassland, shrubland, pasture, hay, small grains and hedgerows to soybeans, corn or (anthropogenic) developments (Walk et al 2010). Human populations continue to grow, increasing global demand for agricultural commodities further exacerbating the competition for land use. Illinois has lost 3.6 million acres of farmland since 1950 – mostly to development (Illinois Department of Agriculture 2015).
The priority actions from the 2015 IWAP are: 1. Establish desired number and distribution of viable populations for each SGCN, 2. Manage habitats by promoting the natural processes, desired structure, and disturbance regimes to benefit native species, 3. Develop resilient and connected habitats enabling species to withstand likely changes to the landscape and environment, and 4. Foster an awareness, appreciation, and connection to SGCN and associated habitats among the public.

Goals

The goals of the 2005 Campaign set specific and measurable benchmarks for recovering specific habitats and groups of species.

<u>General Goals</u>

1. “Breeding populations of Partners in Flight priority shrub/successional species, including northern bobwhite, American woodcock and Bell’s vireo, have doubled.”
2. “Breeding populations of Partners in Flight priority grassland species including Upland sandpiper, Loggerhead shrike, Bobolink, and Grasshopper sparrow have doubled.”
3. “Use of grassland habitats by migratory grassland sparrows, Bobolinks and meadowlarks has increased by 20%.”
4. “Implementation of the Greater prairie-chicken recovery plan (Walk 2004) is completed, including recovery of Northern harrier, Short-eared owl, Upland sandpiper, Henslow’s sparrow, Loggerhead shrike and other endangered species.”

5. “Distribution and abundance of Franklin’s ground-squirrel are known and conservation needs addressed.”
6. “Clarification or change in liability statutes to promote private land access for wildlife associated recreation.”

Upland Gamebird Goals

1. “Add about 124,000 coveys (of northern bobwhite) to the pre-hunt autumn population, estimated at 95,000 coveys in 1999 (Dimmick et al 2002). This population could support an annual harvest of 876,000 birds.”
2. “Increase the autumn pre-hunt flock of wild Ring-necked pheasants to 2 million birds from an estimated current 800,000 birds.”

Grassland Bird Goals

1. “An additional 1 million acres of grassland, emphasizing upland, treeless grasslands larger than 0.5 mile wide and ecological connectivity among grasslands and other habitat patches, are established and maintained.”
2. “Wildlife-value (structure, floral diversity, disturbance regimes) of 1 million existing acres of grassland are enhanced.”
3. “Five additional “ecological pattern” Grassland Bird Conservation Areas (see Fitzgerald et al. 2000) have been established.”
4. “Three wet prairie areas of 1,000 to 2,000 acres, connected by dispersal corridors, are restored and managed in the Grand Prairie natural division.”
5. “At least 6 areas (300-500 acres each) of ephemeral wetlands and accompanying upland sand prairie habitat are restored and managed for Illinois chorus frogs in the inland sand areas.”
6. “High-quality examples of all prairie communities, including all Grade A and B Illinois Natural Areas Inventory (INAI) sites are restored and managed within all natural divisions within which they occur.”

Shrub/successional Bird Goals

1. “Extent and condition of shrub/successional habitats are known and monitoring can identify conservation needs.”
2. “As appropriate, small woodlots and forests have native shrub-dominated, early successional edges and perennial herbaceous borders.”
3. “Herbaceous and shrub corridors link isolated upland habitat patches in areas of intensive agriculture.”

Current Status as of 2015

General Goals Status

1. Populations of Northern bobwhite and American Woodcock continue to decline, Bell's Vireo have made a modest improvement.
2. Most breeding populations of Partners in Flight priority grassland species identified in the Campaign are declining. (Table 5)
3. According to Breeding Bird Survey trend data (Table 5) for Illinois, general trends of grassland sparrows, Bobolinks and meadowlarks are as follows:
    - Grasshopper sparrow population down 6.58%
    - Henslow's sparrow population up 6.02%
    - Field sparrow population down 2.88%
    - Savanna sparrow population down 3.76%
    - Bobolink population down 6.77%
    - Eastern meadowlark population down 2.77%
4. Prairie Chicken Recovery Plan update – Three year SWG grant to translocate 300 prairie-chickens form Kansas started in 2014. Ninety-three birds released in the spring of 2014, 49 birds were fitted with transmitters. Eleven radio-collared birds remained as of 1/21/15.
    - Year 2 translocation was scheduled to begin in March/April 2015 was 'paused' due to Out-of State travel authorizations and Administrative Review.
    - Record rainfall across Illinois in June and July of 2015 resulted in a very poor nesting season for the prairie chickens.
5. Information about the distribution and abundance of Franklin's ground-squirrel populations are being investigated.
    - Ongoing research has identified a significant population of Franklin's ground squirrels in Sangamon County. Additional research provided insights into habitat requirements.
    - Preliminary results show that maintenance of habitat in an early successional state and development of artificial topography for burrowing habitat is critical.
    - Franklin's ground squirrels are subject to genetic isolation when populations are cut off by development and road-building.
    - Additional populations must be identified and secured before de-listing (Young 2012).
6. Recreational access benefitted from changes to 745 ILCS 65 Recreational Use of Land and Water Areas Act. These changes were passed in January of 2014 and limit the liability of landowners who allow access for recreational and/or conservation purposes.

Upland Gamebird Status

1. Quail populations and harvest continue to decline
    - In the 2005-06 season, 29,983 quail hunters killed an estimated 244,521 quail (including some from shooting preserves) (Lischka 2006). In 2014-15 season, 11,328 quail hunters shot an estimated 54,199 wild quail (Williams 2016).
    - Breeding Bird Survey results from 2003-2013 in Illinois show an annual trend of -5.18% for northern bobwhite (Table 5).
    - Southern Illinois University's quail researcher John Roseberry suggested/predicted that the "bobwhite could be virtually extinct in 20 years" if the current population trends didn't stabilize or begin to increase (Roseberry 2012).

2. Pheasant populations and harvest continue to decline
    - In the 2005-06 season, 44,430 pheasant hunters killed an estimated 146,961 pheasants (including some from shooting preserves) (Lischka 2006). In 2014-15 season, 15,549 pheasant hunters shot an estimated 41,316 wild pheasants (Williams 2016).
    - Breeding Bird Survey trends in Illinois showed an annual trend of -9.28% from 2003 – 2013 (Table 5).

Grassland Bird Status

1. Over 4000 acres of grassland have been purchased in the last 10 years (in the Grand Prairie, Southern Till Plain and Mason County Sands COA by the IDNR)
    - IDNR has acquired and improved over 4000 acres of Grassland and shrubland (mostly Pheasant Habitat Areas or State Habitat Areas) since 2005
    - Pheasants Forever acquired Forever Fields, a 508 acre L&W Reserve that has been restored and partially planted to native warm-season grasses and forbs.
    - Pheasants Forever acquired: Buffalo Prairie and T-Lakes, (377 acres-bargain sale to IDNR), Willow Creek, (161 acres-bargain sale to IDNR)
    - The State Acres for Wildlife (SAFE) Program (CP38) has enrolled nearly all allocated acres since 2008 and current enrollment is 22,247 acres (November 2015). The Farm Service Agency requested 10,000 additional SAFE acres in December 2014, but received (and quickly allocated) 2000 additional acres in the summer of 2015.
    - Pheasants Forever and Quail Forever have a 'Build a Wildlife Area Program' with a goal of opening 80 acres to walk-in upland hunting in every county they serve. This initiative has been successfully implemented in several counties.
    - Congress Re-authorized the Farm Bill in 2014, but reduced the overall acreage cap by 8 million acres. The reduction of Conservation Reserve Program (CRP) acres in Illinois is yet to be determined.
2. Funding and staffing levels at IDNR and -federal agencies (i.e., Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA)) remain low, affecting their ability to manage the composition and structure of grasslands and shrublands, as well as the amount of disturbance applied to these habitats.
3. Existing Grassland Bird Conservation Areas:
    - Prairie Ridge State Natural Area (Jasper and Marion County Units, IDNR)
    - Midewin National Tallgrass Prairie (USDA Forest Service)
    - Pyramid State Park (IDNR)
    - Proposed 'new' Grassland Bird Conservation Areas
        - Sibley/Saybrook Pheasant Habitat Areas (IDNR)
        - Nachusa Grasslands (The Nature Conservancy)
4. Three large wet prairie areas have not yet been restored or managed in the Grand Prairie natural division.
5. Over 198 acres of CP23A (Wetland Restoration) have been enrolled in CRP in Mason Co (with Signup Incentive Payment from Illinois Chorus Frog Grant – R. Bluett, IL DNR, personal communication).

- Wetlands created in the Sands Areas include 16 lined wetlands, 5 excavated wetlands in Tazewell, Mason, Menard and Cass counties.
- Wetlands at Sparks Pond and Clear Creek were restored.
- One hundred sixteen acres of sand prairie on public land has been restored/managed (Clear Creek, Sparks and Rollo).
- GIS analysis to identify potential habitat for IL Chorus frogs and mud turtles beyond areas previously identified as suitable habitat (Figure 4) and used this new layer to refine the COA boundaries.

6. Fifty-two hill prairies were evaluated in an Illinois Natural Areas Inventory (INAI) update (Szafoni 2012)
    - Twelve of the 35 formerly High Quality INAI communities evaluated were considered of moderate quality
    - Fourteen glacial drift hill prairies, one gravel hill prairie, 2 sand hill prairies retained their 'A' or 'B' status, though some were downgraded from A to B.
    - Many prairies had been reduced in size due to woody encroachment

Shrub/successional Bird Goals

1. Goal has not been reached but work is underway to evaluate the extent and condition of this habitat type (Benson 2015).
    - Current research is using LIDAR to identify shrubland habitat
    - This work will help evaluate the amount and distribution of shrublands in different regions of Illinois
    - Research will also investigate the nesting success and preferences of shrubland birds.
    - Growing-season burns are being used in parts of the state to manage shrublands
2. In 2005 there were 18,076 acres of Upland Bird Habitat Buffers (CP33) in Illinois (USDA [2] 2015).
3. In November of 2015 there were 59,852 CP33 acres in Illinois. Net Gain of 41,776 acres of CP33 (not all acres link habitat patches). (USDA[2] 2015).

Stresses and Threats to Wildlife and Habitat

Habitat Stresses

The Farmland and Prairie Campaign covers the wildlife and habitats in Illinois' highly agricultural landscape. Over half of the land area in the state is planted to 2 crops: corn and soybeans (almost 22 million acres in 2015 (USDA[1] 2015). This is the largest stressor for this Campaign. The amount of 'Natural' land cover includes very small and isolated native prairies, restored prairie, forest and riparian areas. Human development is constantly encroaching into both the agricultural and natural areas.

There are a wide range of specific stressors and actions that can be taken to improve and restore habitat for the targeted SGCN. Stressors identified in the 2005 CWCP include the extent and amount of fragmentation, composition/structure, disturbance, hydrology, invasive/exotic species, erosion and

sedimentation in grassland and shrubland habitats. Issues on working farmland and prairie (both native remnants and restored prairie) and shrubland may be different and are described independently in this section. Actions needed to reduce the effects of these stressors and improve/enhance these habitats are discussed together.

Farmland Issues

The effects of the recent spike in corn and soybean prices from 2008 – 2014 were far-reaching and will continue to be felt for many years to come. Across the state, pastures, fencerows and tracts of timber were cleared and tilled under to make room for more corn and soybeans. There were almost 140,000 fewer acres of CRP in 2014 than in 2005 and 400,000 fewer acres of total grasslands in Illinois (USDA[2] 2015). These changes intensified two of the primary stressors listed in the 2005 CWCP by decreasing the extent of these habitats and adding to the fragmentation of the landscape.
Other stressors include the continued widespread use of modern herbicides, fertilizers and insecticides which may affect the composition and quality of habitat and have poorly understood effects on wildlife. The widespread use and acceptance of new chemical compounds continues to raise questions about their effects and safety for wildlife as well as people. Regardless of the specific chemicals and their effects, new chemistries, methods of delivery and interactions between agriculture and wildlife will continue to have potential impacts and create concerns.

Alternatives to traditional corn and soybean agriculture such as organic farming, cover crops and biofuels are steadily gaining acceptance. Recent research (Van Beek et al 2014) found higher nest success, increased bird densities and more conservative species in no-till fields compared to fields with conventional tillage. Nest success in no-till fields was relatively low but with the amount of no-till fields on the landscape, the impacts of timing and methods of tillage on nesting birds needs to be better understood (Van Beek et al 2014). Additional research at the Illinois Natural History Survey is investigating bird use, diversity and abundance of various cover crops, perennial crops and various crop rotations.

Grassland/Shrubland Issues

The loss of grassland and shrubland habitat is the primary threat to the species that depend on them. Loss can be from development (for agriculture, commercial or urban development etc.) or loss due to succession and deteriorating quality. Additional research is needed to determine the location and amount of habitat as well as the type, frequency and scale of management needed to maintain quality shrubland habitat. There are currently two research projects underway at the Illinois Natural History Survey to better understand the status and extent of existing shrublands and shrubland management needs in Illinois (Kirk Stodala, personal communication). The first project will use Light Detection and Ranging (LiDAR) equipment to identify and characterize shrublands at a large spatial scale. These data will be used to identify and quantify existing shrubland and other plant community types. Once key areas are identified, management needs can be scheduled and implemented. The second project is evaluating the effects of invasive shrub species on shrubland birds. The results of these studies will provide managers with information about the most detrimental species of invasive plants and the level of invasion that causes detrimental effects on shrubland birds.

Grasslands for hay or pasture can be suitable for many species of wildlife. However, poorly timed mowing, excessive grazing or woody succession can cause them to become unsuitable. Area-sensitive grassland species need large tracts of open, treeless grasslands. Targeted conservation programs such as

SAFE have created complexes of 'whole field' CRP. These focused areas are designed to amplify the benefits of clustered small fields to emulate larger grasslands. Research that monitors grassland bird use of these areas show that populations of Dickcissel, Eastern Meadowlark, Northern Bobwhite have doubled on SAFE areas in Mason and Tazewell Counties, despite the continued declines that are occurring statewide (Ward et al, 2015).

Extent (amount of habitat), Fragmentation, isolation, juxtaposition, patch size and edge effects,

- Reduction of 8 million acres in total CRP allotment (National allocation reduced from 32 million to 24 million in the 2014 Farm Bill).
- Total CRP enrollment in 2014 was ~140,000 fewer acres than we had in 2005 for Illinois
- Small Grains acreage in 2005-2015; 60,000 acres of oats, 630,000 acres of wheat in 2005. In 2014 there were 35,000 acres of oats and 740,000 acres of wheat (a net gain of 50,000 acres of rowcrops). (USDA[2] 2015)
- Trends in modern agriculture continue to increase field size and expand into former grasslands, forest and old fields.
- Competition for limited land/habitat is exacerbated by the increasing human population and development and expansion of towns and cities.
    - Existing grasslands are often poorly managed and unfit for grassland species most of the year due to mowing, haying or a lack of disturbance.
        - These grasslands can become traps that attract wildlife and then are manipulated in ways that destroy nests, individuals or populations
        - Grasslands left unmanaged can become unsuitable for many species of grassland wildlife
- Size and shape of grasslands are often too small and/or linear to provide adequate protection from nest predators that target edges and are more effective at finding their prey in small patches.
- High land values and commodity prices have put added pressure to sell and develop land or convert existing habitat to row-crop agriculture.

Composition-Structure

- Limited availability of staff to provide technical assistance and a lack of funding for habitat management on public and private lands
- Invasive species often change habitat composition and reduce habitat quality
- Some pollinators are host specific and must have their host plant to survive (Monarch butterfly and milkweeds)

Disturbance - frequency, timing and intensity of disturbances

- Changes in agricultural practices and crop choices have resulted in the loss of seasonal habitats provided by the rotations and farming methods common for many small grains (wheat, oats, etc.)
- The 2005 CWCP succinctly stated that the condition of Grasslands in IL are increasingly divided into two conditions:
    - Lands that are too heavily disturbed (cropped annually, frequently mowed, heavily grazed or developed).
    - Lands that are given little or no management (fire, timely mowing, grazing, forestry) and are maturing into low quality closed forest.

Invasive/Exotic species

- Invasive species (e.g., tall fescue, reed canary grass, thistle species, autumn olive etc.) encroach on grasslands and shrublands and decrease habitat quality, change the structure/suitability of the habitat and displace native wildlife including SGCN.
- Invasive species can also make restoration of old pasture or early CRP plantings more complicated and labor intensive due to the difficulties of killing the existing grass and depleting the seed bank before planting native species. Many of these undesirable grasses are still recommended and sold for new waterway plantings, soil stabilization and some CRP practices.
- Other aggressive, broad-leafed species can invade both native and restored prairie and become monotypic stands with little diversity. This lack of diversity decreases the habitat quality for wildlife by reducing the number of insects attracted to flowering plants and by displacing desirable plants with higher value as food and/or structural cover. Canada goldenrod, Teasel sp., Vetch sp., Sericea lespedeza are some problematic species.
- The Invasive Species Campaign covers the issues caused by exotics in detail.

Population Stresses

Recruitment:

- Declines in native pollinator populations due to habitat loss, fragmentation, invasive plants, non-native landscaping, and insecticides.
- Habitat fragmentation and reduced connectivity increases mortality and decreases recruitment of young (e.g., road mortality of Blanding's turtles) and limits gene flow between populations.

Direct Anthropogenic Stresses

Killing, direct killing/removal by humans

Disturbance, direct harassment by humans

- Human usage patterns preclude species use or interrupt species use (e.g., nest disturbance).

Structures-Infrastructure:

- Reduced survival of migratory birds due to threats such as collisions with buildings, wind turbines, towers, etc.
    - Researchers currently working to determine the effects of wind turbines on migratory birds, bats and other species
        - direct mortality
        - avoidance behaviors by some species
        - reduced nest success

Additional Challenges to Implementation:

- Lack secure and consistent funding mechanisms for:
    - habitat acquisition and protection projects.
    - habitat improvement projects.
- Lack of staff to adequately plan and implement restoration projects
- The effects, severity and rate of climate change is unknown, but models predict negative effects on many groups of species and native habitats. (Hall 2012, Staudinger et al 2015)

Focal Species

The Focal Species for the Farmland and Prairie Campaign were selected to "represent the larger suite of SGCN addressed by the campaigns, species that are expected to respond to conservation actions, or species that are the focus of current conservation and monitoring efforts." Monitoring for these species will be used as a measure of the success of the conservation actions of the Campaign.

1) Eastern meadowlark –
    a. Habitat – Grasslands, prairies, savannas and cultivated fields
    b. Distribution - Statewide, common migrant and summer resident, winter resident in southern part of state
    c. Abundance – declining 2.55% per year from 2003 – 2013 (Table 5)
2) Grasshopper sparrow –
    a. Habitat – Grasslands, prairies, old fields, airports and savannas
    b. Distribution - Statewide, fairly common migrant and summer resident
    c. Abundance – declining 5.73% per year from 2003 – 2013 (Table 5)
3) Northern bobwhite - Successional Field, Grassland
    a. Habitat – Grasslands, brushy fields, open woodlands and hedgerows
    b. Distribution - Statewide, common permanent resident, decreasing northward
    c. Abundance – declining 5.18% per year from 2003 – 2013 (Table 5)
4) Monarch/pollinators –
    a. Habitat – Grasslands, prairies, old fields, cultivated areas with milkweeds and other nectar sources
    b. Distribution - Statewide, active summer, year-round resident
    c. Abundance – declining
5) Ornate box turtle –
    a. Habitat – Prairies, and open fields in former prairie
    b. Distribution – Need more information
    c. Abundance – uncommon/rare
6) Henslow's sparrow –
    a. Habitat –Fields and meadows with a combination of grasses and forbs
    b. Distribution - Statewide, uncommon migrant and summer resident
    c. Abundance – increasing 6.5% per year from 2003 – 2013 (Table 5)
7) Upland sandpiper –
    a. Habitat – Grasslands, prairies, old fields, airports and savannas
    b. Distribution - uncommon to rare migrant and summer resident
    c. Abundance – Need More Information, declining, State Endangered
8) Bobolink –
    a. Habitat – Prairies, tall grasslands, wet meadows and cultivated croplands
    b. Distribution – common migrant and fairly common summer resident in northern half of Illinois, decreasing southward
    c. Abundance – declining 9.01% per year from 2003 – 2013 (Table 5)

<u>*Emphasis Game Species added 2015</u>

Ring-necked pheasant –
    a. Habitat – Open country, cultivated and grassland areas

b. Distribution - fairly common permanent resident in northern and central Illinois, decreasing southward to roughly Interstate 70, absent in southern Illinois.
c. Abundance – declining 9.28% per year from 2003 – 2013 (Table 5)

*Bird habitat, distribution and abundance data are from *Kleen et al 2004* and *Breeding Bird Survey Data. 2015*.

Actions

1. Manage quality of existing habitat.

Need: Most of the grassland and shrublands in Illinois are in need of additional management in order to provide optimal habitat for SGCN. If the Campaign is to be successful, the best place to start and build momentum may be to lead by example and show other partners and the public what quality stewardship looks like on these habitats and the response from wildlife (e.g., Prairie Ridge).

- Existing grasslands and shrublands under IDNR management will be restored and enhanced to benefit SGCN.
    - Three additional Habitat Teams (one IDNR team recently established at Gibson City, July, 2015) should be hired and placed in key locations to help manage Tier 2 and Tier 3 sites in the Grand Prairie and Southern Till Plain Natural Divisions in the next 10 years.
    - Dedicated funding for grassland management should be a priority for core grassland and shrubland sites on public and private lands (i.e., fund habitat teams and develop implementation schedules for priority sites).
    - Pheasant and Habitat Stamp Funds as well as State Wildlife Grants could be targeted for collaborative positions or contracts to do this work on state and private sites.
    - Opportunistic grants like the current funding dedicated to improve Monarch Habitat

- Collaborations with conservation partners, including IDNR offices, NGO's and other state and federal agencies to better target Campaign Goals and Focus Areas.
    - Partnerships with Pheasants Forever, Natural Resource Conservation Service, Farm Service Agency, The Nature Conservancy, etc. that target specific grassland and shrubland areas and goals of the Campaign.
    - Improved coordination between Divisions and Offices at IDNR to focus on habitat objectives from the Campaign.

- Develop a reporting/tracking system for IDNR and partners to actively track management efforts including acres managed (acres burned, disked, treated for invasive species etc.), acquisitions, restorations and other progress towards achieving the goals of the Farmland and Prairie Campaign.

- Work with all partners to develop a public relations campaign to delay roadside mowing until after August 1 (Aug. 15 is preferable).
        - Including: Illinois Department of Transportation, IDNR, County and municipal governments, county Soil and Water Conservation Districts and the public
        - Human Dimensions survey to determine the best approach and method for reaching landowners and managers to get cooperation.

Expected Outcome: This action should improve the condition of existing grassland and shrubland habitats. Many sites are under-staffed and/or lack specific and science-driven direction on grassland management. Populations of SGCN and other associated wildlife should increase on well-managed sites.

2. Increase the quantity of habitat for grassland and shrubland species (by acquisition or easement).

Need: In order to reach the goals of the Campaign, significant achievements must be made to establish more grassland and shrubland habitat.

- Improve participation and increase enrollments in existing land protection and management programs through innovative partnerships in focus areas.
    - Coordinate and promote existing initiatives and programs to increase the amount of high quality habitat for SGCN within focus areas and reach out to new partners.
        - Work with commercial and corporate agricultural retail suppliers, local yield monitor data and federal programs (Habitat Buffers for Upland Birds-CP33, State Acres for Wildlife-CP38 and Pollinator Habitat-CP42) to collectively market Farm Programs that will provide strategic grassland habitat, increase profits for landowners and reduce runoff.
        - Illinois Nutrient Loss Reduction Strategy (2015) is targeting a reduction of nitrogen and phosphorous runoff. Priority areas overlap with State Acres for Wildlife areas.
        - Seek funds from the USDA Regional Conservation Partnership Program (RCPP) and other programs to provide benefits to SGCN in focus areas. ($235 million is allocated to the RCPP Program).

- Work with partners to increase the allocation of CRP (especially SAFE) acres, nationally and in Illinois.

- Determine which agricultural practices (e.g. specific cover crops and rotations, organic crops, etc.) are beneficial (or less detrimental) to grassland wildlife on the 23+ million acres of rowcrops in Illinois.

- Partners need to discuss a permanent easement program (like the state Conservation Reserve Enhancement Program (CREP) that would offer incentives on top of CRP practices like SAFE or the Grassland Reserve Program (GRP) and provide permanent grassland and shrubland habitat.

Expected Outcome: The high cost of land and volatile commodity markets make acquisition of former prairie (aka farm land) very expensive. Through selective acquisitions, easement programs and by pooling resources and working with new partners, it is possible that areas with multiple resource concerns can be successfully converted to grasslands or shrublands that help meet multiple goals for very different purposes.

3. Improve the conservation status of SGCN.

Need: Many SGCN continue to decline.

- Develop and begin implementation of at least 1 management plan/year for a grassland or shrubland SGCN.
  - *A barn owl recovery plan was approved and initiated in 2009. They have since been downgraded from 'endangered' to 'threatened' and 258 nest boxes have been installed. In 2014, 54 active nests in 19 counties were documented (Esker, personal communication).*
- Develop and begin implementation of at least 1 Site Management Schedule/year for grassland/shrubland habitats that will benefit SGCN.

Expected Outcome: Recovery Plans and Management Schedules will help improve the conservation status of SGCN as they are implemented.

<u>Universal Management Actions for the Farmland and Prairie Campaign</u>

4. Through incentives-based programs and technical assistance, establish or restore grassland, early successional/shrub, wetland, and riparian habitat.
Need: The amount and quality of grassland and shrubland habitat has declined steadily across the state over the last half-century. Wildlife that need these habitats have decreased in response.

- promote programs that offer incentives, easements or cost-share to establish and maintain grassland and shrubland habitat
- emphasize actions on treeless grasslands larger than 0.5 mile wide and ecological connectivity among grasslands and other habitat patches to conserve area-sensitive grassland Species in Greatest Need of Conservation
- establish additional shrub/successional habitat in clumps, not strips, using native shrub species
- work with conservation partners and private landowners statewide to enhance small woodlots and forests with native, shrub-dominated, early successional edges and perennial herbaceous borders
- expanses of rowcrop cultivation should be integrated with grassland, shrub/successional and open woodland habitats by including cover crops, organic practices, alternative crops (e.g. bioenergy crops) and no-till practices to increase wildlife benefits
- connect habitats via corridors and buffer strips where possible to facilitate movement of less mobile groups (herps, inverts, small mammals etc.)

Expected Outcome: Increasing the amount and quality of habitat for many SGCN should allow local populations to increase and expand.

5. Enhance the condition of farmland habitats for wildlife.

Need: The condition and management practices (e.g. routine mowing, use of invasive grasses) for many grass waterways, filter strips and other areas on working farmland is detrimental to wildlife. Minor changes to the management and the timing when it occurs could improve the value of these areas for many SGCN.

- raise awareness of wildlife habitat and nesting seasons to build support and acceptance of delayed mowing and changes to 'normal' farming practices
- educate landowners on the proper timing and season for prescribed fire and mechanical disturbance to manage existing habitats
- restore/convert areas dominated by undesirable species (e.g., conversion of tall fescue and bluegrass to native warm-season grasses) to habitat beneficial to SGCN
- disturb successional habitats as needed with appropriately timed prescribed fire and managed grazing to enhance grassland structure and floral diversity, and to control woody vegetation.
- discourage mowing of idle grasslands during wildlife nesting seasons, and eliminate unnecessary mowing (only mow after August 1 or late winter unless meeting a specific management objective).
- maintain shrub/successional habitat and broad transitions between open and wooded habitat types
- growing season burns can help set back rank stands of grasses and overgrown shrublands)
- develop property tax codes and farm programs that reward good stewardship of wildlife habitats on private lands
- Encourage the use of native and/or wildlife friendly species of grasses, forbs and shrubs

Expected Outcome: Providing the preferred timing and management actions to landowners can lead to the acceptance of practices that can be beneficial to wildlife.

6. Restore and protect native prairie communities and imperiled and extirpated wildlife.

Need: The vast majority of native prairie has been lost in Illinois. Protecting these remnant areas and the species found there is important to preserve the legacy of our native prairies as well as the value of these sites to researchers to better understand the interactions and diversity of native flora and fauna found in native prairie. Information learned on these sites can potentially improve prairie restorations across the state.

- use appropriately timed prescribed fire and managed grazing to enhance grassland structure and floral diversity, and to control woody vegetation.
- remove and control (chemical, mechanical and biological) invasive exotic plants, especially within and adjacent to high quality natural areas
- reintroduce native species into prairie habitat where decimating factors have been eliminated and natural recovery is unlikely
- In large grassland areas, linear wooded areas (overgrown fencerows) and tall trees should be removed to reduce habitat for nest predators and to eliminate raptor perches.
- collaboration among the Illinois Endangered Species Protection Board, Illinois Department of Natural Resources, U.S. Fish & Wildlife Service and other agencies, organizations and institutions on recovery plans and actions for rare and declining species

Expected outcome: Native prairie remnants will be preserved and enhanced.

7. Conduct outreach to improve landowners participation in wildlife conservation.

Need: Some growers/landowners are simply not interested in managing for wildlife. Providing information on the economic and other benefits of wildlife conservation may increase participation in these activities.

- promote cover crops, organic farms and bioenergy crops that can contribute towards improved wildlife habitat.
- evaluate soil condition and carbon budgets for agricultural lands, and promote actions that improve soil condition and sequester atmospheric carbon
- continue working with and targeting voluntary farm programs to meet wildlife and habitat objectives compatible with and in addition to soil and water conservation.
- promote field borders of native warm-season grasses and forbs enrolled in the CRP program (Habitat Buffers for Upland Birds - CP33 and Pollinator Habitat - CP42) that are financially advantageous when planted on most wooded edges.

Expected Outcome: Educating landowners and producers about the benefits of these land use practices will impact more acres for wildlife across the state, reduce sedimentation and nutrient runoff and improve water quality in rivers, streams, lakes and ponds.

Specific Actions

8. Acquisition of grasslands should follow a Landscape Scale Approach (when possible) to maximize the benefits to grassland birds.

Need: Due to the high costs of acquisition and restoration, it will be much more productive if all partners work towards common goals in landscapes that are clearly identified, whenever possible. Defining what is desirable is an important step towards reaching the goals of the Campaign.

- purchase/protect grasslands and shrublands with the highest likelihood of providing benefits to SGCN by following the Landscape Scale Approach (Sample and Mossman 1997):
  - small-scale landscape grasslands should be made up of parcels of at least 80 acres, but 'bigger is better'.
    - Walk and Ward (2008) recommended $\geq$120 acres to increase grassland bird diversity and abundance.
    - Clusters of smaller tracts can emulate the benefits of larger, contiguous tracts
  - Medium-scale landscape grasslands should be at least 1,000 – 5,000 acres in size with a 250 – 1,000 acre core and the remaining landscape should be at least 35% grassland (Sample and Mossman 1997)
  - Large-scale grassland landscapes should be 10,000 – 50,000 acre areas with a 2000 acre core and at least 35% of the remaining area within the landscape be in grassland (Sample and Mossman 1997)

- Use USDA Programs and collaboration with private landowners and other conservation organizations (promoting suitable practices) to create and enhance medium or large scale grassland landscapes.
- The proportion of woody cover on and around potential grassland sites should be $\leq$ 10%. (Walk and Ward 2008)
- Potential grassland sites with a higher proportion of pasture, hay, small grains and other grasslands in their vicinity should receive preference for acquisition

Expected Outcome: Clearly identified landscapes and features that will benefit the Campaign goals will help the state and partners organize and target acquisitions and easements to build landscape scale grasslands in suitable areas.

9. Look for innovative partnerships to work with existing grants, programs and initiatives to increase the amount of habitat for SGCN.

Need: Many grants and initiatives tend to be narrowly focused on a particular issue; nutrient loss, Gulf Hypoxia, soil erosion, biofuels, cover crops, etc. There are opportunities to incorporate quality habitat for SGCN while achieving the goals of various grants and/or initiatives.

- Evaluate programs and initiatives that could be used to address multiple resource concerns
  - Illinois Nutrient Loss Reduction Strategy (2015) identifies specific areas of excessive nitrogen and phosphorous runoff that are contributing to the Hypoxic Zone in the Gulf of Mexico
  - The 2014 Farm Bill Authorized $225 Million for the Regional Conservation Partnership Program (RCPP) which identifies Illinois as a priority area to reduce runoff of nitrogen and phosphorous (Up to $100 million may be allocated per fiscal year)
  - The Conservation Reserve Program has various practices that may be eligible in priority areas and watersheds
    - Allocated acres for some programs have been exhausted (e.g. SAFE).
    - The current Farm Bill (2014) reduced the cap for CRP by 8 million acres
- Evaluate agricultural fields (yield monitors, soil fertility, precision agriculture equipment, etc.) to identify specific areas of individual fields that contribute the most runoff (sediment, phosphorous and nitrogen) and are NOT profitable to growers most years.
  - Work with farmers and landowners to show them which acres are costing them money, and how much money they are losing per acre, per year.
  - Show potential payments from existing USDA Programs to make these areas profitable and suitable habitat for SGCN.
  - Work with agriculture retailers (Brandt, FS, Grow-Mark, etc) to take proactive steps to reduce runoff/nutrient loss (e.g. split shot Nitrogen application, follow BMP's) and make progress towards meeting the goals of the Illinois Nutrient Loss Reduction Strategy (2015) by putting suitable habitat on the land.

- Conduct a comprehensive review of priority state and federal resource concerns and applicable programs/grants to highlight areas that could address multiple resource concerns and provide more habitat for SGCN.

Expected Outcome: Increase in the amount of grassland habitat for SGCN through the use of innovative partnerships.

Focus Areas

Priority sites and areas for the Farmland and Prairie Campaign (Figure 5) were selected by the Farmland and Prairie Committee based on current (and potential) locations of large blocks of grassland or shrubland. The priority sites and areas for the Campaign are prioritized as medium, high and highest priority. Sites that are moderate priority are small, isolated or low-moderate quality grasslands or shrublands that occur anywhere in the state. High priority sites and areas are focused on specific natural divisions and high quality, native remnants and areas with the potential for restoration of habitat to help meet the goals of the Campaign. Highest priority sites and areas are specific sites or areas within priority natural divisions with permanent protection (conservation easement or public ownership) that are key areas to meet the goals of the campaign. These sites and areas can be revised as conditions and/or opportunities for restoration change/evolve.

Highest Priority:

- Grand Prairie Natural Division
  - Jim Edgar/Panther Creek SFWA
  - Pembroke Savannas
  - Momence Wetlands Area
  - Midewin Tallgrass National Prairie
  - Des Plaines
  - Goose Lake Prairie
  - Sibley/Saybrook complex
  - SAFE areas in 50 mile radius from Sibley/Saybrook
    - 9 additional Pheasant Habitat Areas within 50 mile radius (~1300 acres of state-owned grasslands)
- Illinois River and Mississippi River Sand Areas Natural Division
  - Green River State Fish and Wildlife Area
  - Hanover Bluff State Natural Area
- Rock River Hill Country Natural Division
  - Castle Rock State Park - Lowden Miller State Forest
  - Franklin Creek State Natural Area
  - Nachusa State Habitat Area
  - Nachusa Grasslands – The Nature Conservancy
- Southern Till Plain Natural Division
  - Prairie Ridge State Natural Area (Greater Prairie Chicken)
  - Southern Till Plain SAFE areas within 25 mile radius of Prairie Ridge
  - Twelve-Mile Prairie
  - Pyramid State Park
  - Burning Star State Fish and Wildlife Area

- Wisconsin Driftless
    - Mississippi Palisades State Park
- Upper Mississippi River and Illinois River Bottomlands Natural Division
    - Lost Mound Unit – Upper Mississippi River National Wildlife and Fish Refuge

High Priority:

- Grand Prairie Natural Division
    - Grand Prairie SAFE Areas
    - Kankakee River Sands Areas
    - Pheasant Habitat Areas and State Habitat Areas
    - Snakeden Hollow State Fish and Wildlife Area and Satellites
        - Buffalo Pasture and T-Lakes Pheasant Habitat Areas
        - Forever Fields Upland Management Area (Pheasants Forever)
        - Victoria Pheasant Habitat Area
- Southern Till Plain Natural Division
    - Southern Till Plain SAFE Areas
    - Ten-Mile Creek State Fish and Wildlife Area
- Illinois River and Mississippi River Sand Areas Natural Division
    - Mason County Sands Areas
- Native prairie/shrubland remnants that contain significant examples of natural communities (Illinois Natural Areas Inventory sites)

Moderate Priority:

Areas of suitable habitat that are isolated or not in preferred landscapes and lack an easement or long-term protection

- CRP, CREP or other large areas of privately owned grassland and/or shrubland

Management Resources

A list of resources (preferably including URLs) of documents and websites that would provide resources and more depth to concepts introduced in the Universal Management Recommendations. Alternatively we could house this section of the plan only on the IWAP website (so that it would be easier to keep current and updated) and only mention it in the plan.

Grassland Birds

Cornell Lab of Ornithology – All About Birds
https://www.allaboutbirds.org/

Grassland Birds- Overview of threats and recommended management strategies:
http://www.birds.cornell.edu/pifcapemay/vickery.htm

Grassland Bird Conservation and Management:
http://wwx.inhs.illinois.edu/files/3113/9483/0974/GrasslandSciencePolicy.pdf

Midwest Birds of Concern – United States Fish and Wildlife Service:
http://www.fws.gov/midwest/MidwestBird/concern.html

North American Breeding Bird Survey:
https://www.pwrc.usgs.gov/bbS/

North American Grassland Birds: An Unfolding Conservation Crisis?:
http://www.fws.gov/southwest/es/documents/R2ES/LitCited/LPC_2012/Brennan_and_Kuvlesky_2005.pdf

Management Plans and Strategies

Partners in Flight – US Best Management Practices:
http://www.partnersinflight.org/pubs/BMPs.htm

Upper Mississippi River and Great Lakes Region Joint Venture Bird Conservation Plans. 2007. (Implementation Plan, Landbird Habitat Conservation Strategy, Shorebird Habitat Conservation Strategy, Waterfowl Habitat Conservation Strategy, Waterbird Habitat Conservation Strategy)
http://www.uppermissgreatlakesjv.org/Plans.htm

Illinois Nutrient Loss Reduction Strategy:
Illinois Department of Agriculture, Nutrient Loss Reduction Strategy
http://www.epa.illinois.gov/Assets/iepa/water-quality/watershed-management/nlrs/nlrs-final.pdf

Invasive Species:

Illinois Nature Preserves Commission Invasive Species Management Guide
http://www.dnr.illinois.gov/INPC/Pages/INPCManagementGuidelines.aspx

Missouri Department of Conservation Field Guide to Invasive Species.
http://nature.mdc.mo.gov/status/invasive

Monarch Butterfly:
Monarch Mania – Illinois Department of Natural Resources
http://www.dnr.illinois.gov/education/Pages/monarchgen.aspx

Ohio Department of Natural Resources – Milkweeds and Monarchs:
http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/publications/id%20guides/Milkweeds&Monarchs.pdf

Northern Bobwhite Quail
biology and habitat:
http://www.clemson.edu/extension/natural_resources/wildlife/publications/fs7_bobwhite_quail.html

http://www.dgif.virginia.gov/quail/open-land.asp

http://bringbackbobwhites.org/

Managing CRP Grasslands for Bobwhite Quail – Missouri Department of Conservation:
http://mdc.mo.gov/your-property/wildlife-your-property/game-birds-your-property/quail-management/managing-crp-grasslan

Why quail stocking/release is not effective:
http://mdc.mo.gov/blogs/more-quail/pen-raised-quail

http://mdc.mo.gov/blogs/more-quail/jump-starting-your-quail-population

http://mdc.mo.gov/blogs/more-quail/jump-starting-your-quail-population-part-2

http://quailforever.org/Habitat/Why-Habitat/Quail-Facts/Quail-Stocking.aspx

http://bringbackbobwhites.org/blogs/kentucky/195-more-pen-raised-quail-cmon

USDA Conservation Programs:
Conservation Reserve Program (CRP): http://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index

CRP Practices Library: http://www.fsa.usda.gov/programs-and-services/conservation-programs/crp-practices-library/index

United States Department of Agriculture, Natural Resources Conservation Service – Field Office Technical Guide:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/

United States Department of Agriculture, National Agricultural Statistics Service. 2015.
http://quickstats.nass.usda.gov/

Performance Measures

Outcome performance measures are designed to assess the overall impact of undertaking conservation actions on Implementation Goals. Output performance measures are designed to assess how active the program is at working toward the Implementation Goals.

Overarching Goal	Type	Performance Measure
Viable Populations	Outcome	Focal Species abundance (or relative abundance) is maintained or increased
	Outcome	Implement monitoring for Focal Species and SGCN that are not currently monitored at statewide or finer spatial scales (natural division)
	Output	Through direct acquisition or conservation easement, acquire (and manage) tracts large enough to support area-sensitive SGCN in priority areas.
	Output	Develop and begin implementation of 1 Recovery Plan per year for SGCN species
Habitat Management	Outcome	Manage existing grassland and shrubland habitat to maximize habitat quality and increase populations of SGCN
	Output	Net gain of grassland and shrubland acres within important natural divisions
	Output	Increased management/disturbance (prescribed fire, herbicide application, strip disking, fallowing) of grasslands (e.g., warm-season grasses and forbs) to increase quality and diversity
	Outcome	Improve water quality and reduce sediment delivery to wetlands and streams through upland management
Habitat resiliency and connectedness	Outcome	Enhanced size and quality of grassland and shrubland communities
	Outcome	Increased ecological connectivity among habitat patches that support populations of less mobile species (e.g., herpetofauna)
Public Awareness, Appreciation, Connection	Output	Targeted grassland and shrubland education to increase support for these habitats that benefit wildlife and society
	Output	Work with Partners to implement existing plans that can benefit Campaign Goals (e.g., Nutrient Loss Reduction Strategy)
	Output	Work with partners and the public to develop and implement a public relations campaign about nesting grassland birds and the need to delay mowing (roadside and recreational) until after August 1

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Table 5. Breeding Bird Survey Data from Illinois for SGCN 1966 – 2013

Credibility	Species	1966 - 2013 trend	2003 - 2013 trend
RED	American Woodcock	-0.94	-0.58
Yellow	Bell's Vireo	-0.6	0.86
Yellow	Bobolink	-6.77	-9.01
Blue	Dickcissel	-1.94	3.58
Blue	Eastern Meadowlark	-2.77	-2.55
Blue	Field Sparrow	-2.88	-1.85
Blue	Grasshopper Sparrow	-6.58	-5.73
RED	Henslow's Sparrow	6.02	6.5
Yellow	Loggerhead Shrike	-7.18	-10.34
Blue	Northern Bobwhite	-3.94	-5.18
Blue	Ring-necked pheasant	-4.05	-9.28
RED	Northern Harrier	1.52	4.81
Blue	Song Sparrow	-0.36	-1.76
RED	Upland Sandpiper	0.13	6.4

Regional Credibility Ranking - Shows the users an estimate of the validity of the data

This category reflects data with an important deficiency.

This category reflects data with a deficiency.

This category reflects data with at least 14 samples in the long term, of moderate precision, and of moderate abundance on routes.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2014. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015 USGS Patuxent Wildlife Research Center, Laurel, MD*

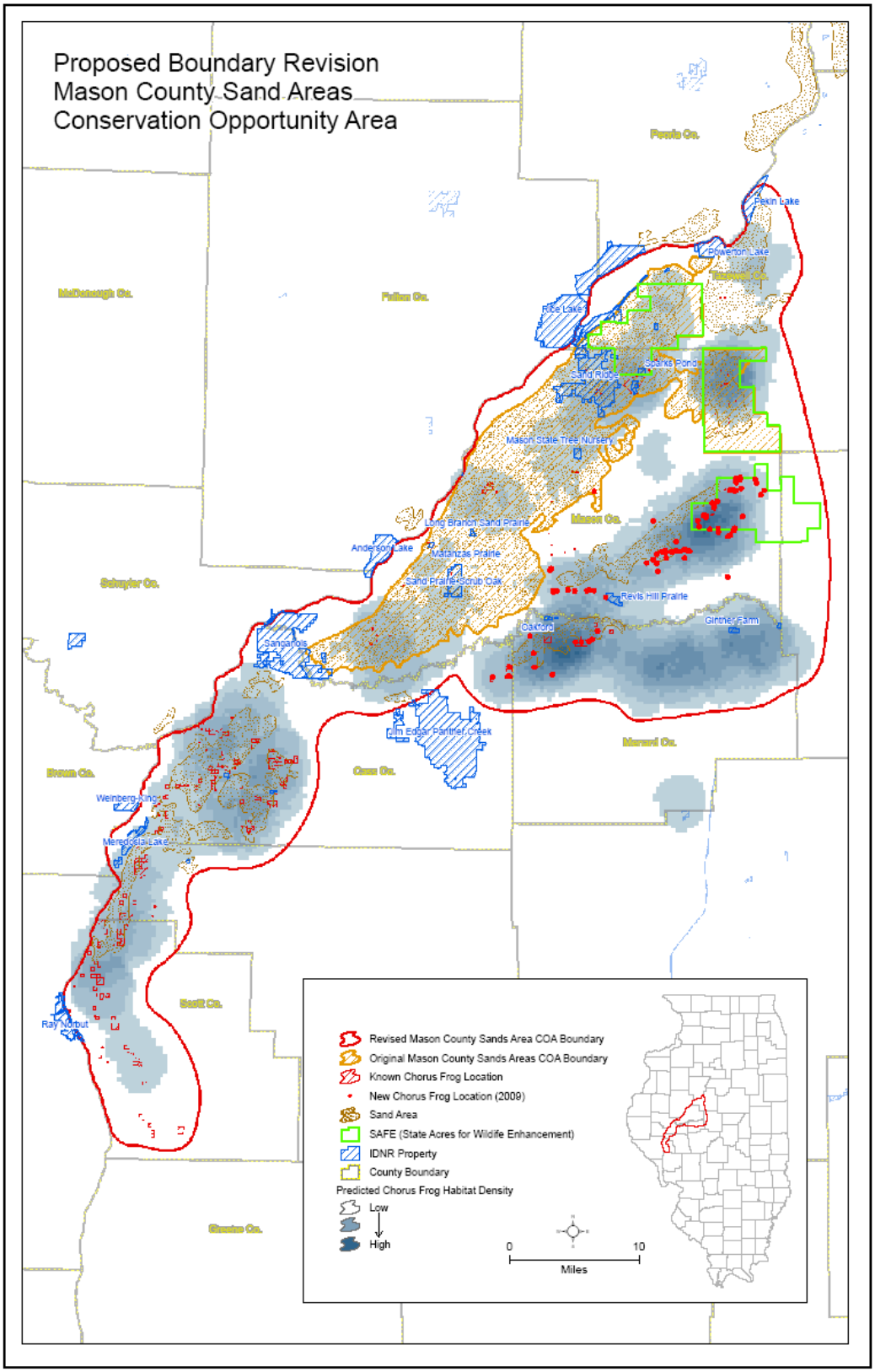


Figure 4. Amendment to the Mason Co. Sands portion of the Conservation Opportunity Area

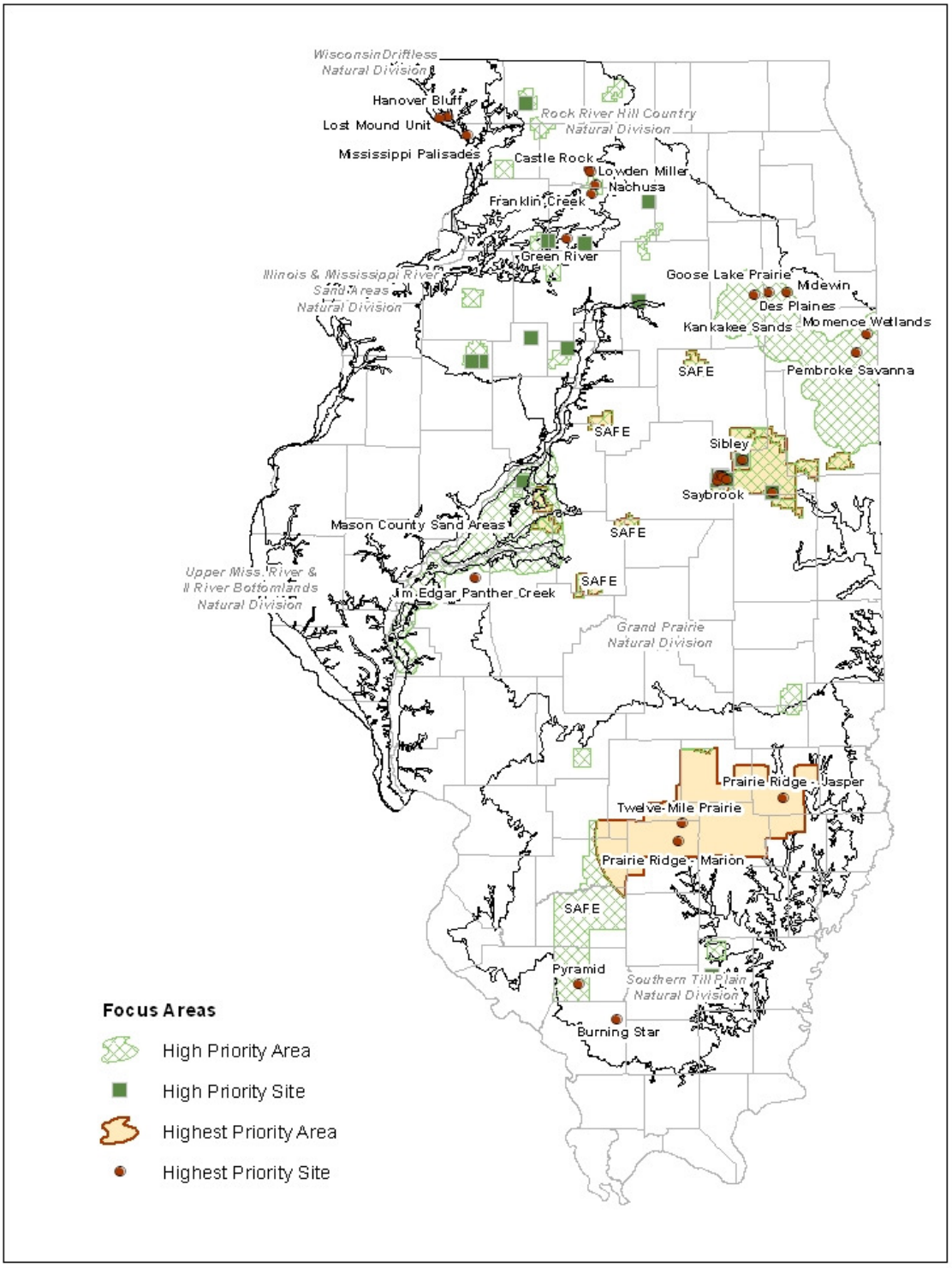


Figure 5. Focus areas and sites identified by the Farmland and Prairie Campaign

Appendix 4. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Farmland and Prairie Campaign. Definitions and methods:

Common Name: Commonly recognized name for the species.

Scientific Name: Currently recognized name for the species based on the most recently available literature.

Campaign Habitat: Major habitat type where the species occurs in Illinois.

Specific Habitat: More detail habitat location for species in Illinois.

Historic Status: Number of Counties, or HUC8 watershed for fish and mussels, with records from before 1980.

Current Status: Number of Counties, or HUC8 watersheds for fish and mussels, with recent records (last 20 years).

Trend: Trends were based on the change in distribution of the species by comparing their Current and Historic Status. If a change less than 25% was observed the trend was recorded as 0, changes with magnitudes between 25-49% were coded as +1 (distribution increased) or -1 (distribution decreased), changes greater than 50% were coded as +2 (distribution increased) or -2 (distribution decreased).

Stressors: Each stressor type was rated as either a recognized stressor (1), not a recognized stressor (0), or as having not enough information to make a rating (NMI=Need More Information).

Appendix 4. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Farmland and Prairie Campaign.

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
BIRDS																										
American Golden-Plover	*Pluvialis dominica*	Agricultural Field	Agricultural, Mudflat, Grassland	NMI	NMI	-1	0	1	1	1	0	1	0	0	1	1	0	0	0	0	0	1	1	0	0	1
Barn Owl	*Tyto alba*	Prairie (Native Grass)	Savanna, Grassland, Agriculture	4	10	1	1	1	1	1	1	1	0	1	0	1	0	0	0	0	1	1	1	0	0	1
Bobolink	*Dolichonyx oryzivorus*	Prairie (Native Grass)	Grassland	53	33	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Dickcissel	*Spiza americana*	Prairie (Native Grass)	Grassland	101	101	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Eastern Meadowlark	*Sturnella magna*	Prairie (Native Grass)	NMI	102	101	-2	1	1	1	0	1	0	0	1	0	0	0	1	0	0	0	1	1	0	1	0
Field Sparrow	*Spizella pusilla*	Prairie (Native Grass)	Successional	102	99	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Grasshopper Sparrow	*Ammodramus savannarum*	Prairie (Native Grass)	Grassland	100	74	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	0	0	1	1
Greater Prairie-Chicken	*Tympanuchus cupido*	Prairie (Native Grass)	Grassland	1	2	-1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	1	1	0	1
Henslow's Sparrow	*Ammodramus henslowii*	Prairie (Native Grass)	Undisturbed Grass	11	61	2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	0	0	1	1
Le Conte's Sparrow	*Ammodramus leconteii*	Prairie (Native Grass)	Grassland, Marsh	NMI	NMI	-2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Loggerhead Shrike	*Lanius ludovicianus*	Prairie (Native Grass)	Grassland	84	21	-2	1	1	1	1	1	1	1	1	0	1	0	1	0	0	1	1	1	0	0	1
Northern Bobwhite	*Colinus virginianus*	Prairie (Native Grass)	Successional Field, Grassland	100	91	-2	1	1	1	1	1	1	0	1	0	1	0	0	0	0	1	1	1	0	0	0
Northern Harrier	*Circus cyaneus*	Prairie (Native Grass)	Grassland, Marsh	40	33	1	1	1	1	1	1	0	0	1	0	1	0	0	0	0	0	1	1	0	0	1
Ring-Necked Pheasant	*Phasianus colchicus*	Agricultural Field	NMI	72	58	-2	1	1	1	1	1	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0
Short-Eared Owl	*Asio flammeus*	Prairie (Native Grass)	Grassland	5	NMI	0	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	1	1
Smith's Longspur	*Calcarius pictus*	Agricultural Field	Agricultural, Grassland	NMI	NMI	NMI	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0
Upland Sandpiper	*Bartramia longicauda*	Prairie (Native Grass)	Grassland	32	24	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	1	1	0	0	1
HERPTILES - Amphibians																										
Crawfish Frog	*Lithobates areolata*	Sedge Meadow	Ephemeral Wetland in Clay Soil Grassland, Prairie with Abundant Crayfish Burrows	31	10	-2	1	1	1	1	1	0	1	0	1	0	0	1	0	1	1	1	0	0	1	1
Illinois Chorus Frog	*Pseudacris illinoensis*	Sand Prairie	Ephemeral Wetland in Sandy Soil Grassland, Prairie	10	10	0	1	1	1	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
HERPTILES - Reptiles																										
Coachwhip	*Masticophis flagellum*	Rocky Grassland, Savanna Slopes	Rocky Grassland, Savanna Slopes	1	0	-2	1	0	1	1	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	1
Eastern Massasauga	*Sistrurus catenatus*	Sedge Meadow	Wet Soil Grassland, Prairie with an Abundance of Crayfish Burrows	21	8	-2	1	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	1
Grahm's Crayfish Snake	*Regina grahamii*	Sedge Meadow	Marsh, Wet Grassland	37	12	-2	1	1	1	1	1	0	0	0	0	1	0	0	0	1	1	1	0	1	1	1
Illinois Mud Turtle	*Kinosternon flavescens*	Sand Prairie	Sandy-Soil Grassland, Prairie	10	4	-2	1	1	1	1	0	0	0	1	1	0	0	0	0	1	1	1	1	0	1	0
Kirtland's Snake	*Clonophis kirtlandii*	Sedge Meadow	Marsh, Sedge Meadow, Wet Grassland with Abundant Crayfish Burrows	27	15	-1	1	1	1	1	0	0	0	0	1	1	0	0	0	1	1	1	1	1	1	1
Lined Snake	*Tropidoclonion lineatum*	Prairie (Native Grass)	Prairie	12	4	-2	1	1	1	0	0	0	1	1	1	0	0	0	0	1	1	1	1	0	0	1
Ornate Box Turtle	*Terrapene ornata*	Grassland	Sandy-Soil Grassland, Prairie	49	21	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	1	1	1	1	1	1
Plains Hog-nosed Snake	*Heterodon nasicus*	Sand Prairie	Sandy-Soil Grassland, Prairie	17	10	-1	1	1	1	1	1	0	0	1	1	0	0	1	0	0	1	1	1	1	1	1
Slender Glass Lizard	*Ophisaurus attenuatus*	Prairie (Native Grass)	Sandy-Soil Grassland, Prairie	23	10	-1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1
Smooth Greensnake	*Opheodrys vernalis*	Prairie (Native Grass)	Prairie, Old Field	26	14	-1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	1	1	1	0	1	1
INVERTEBRATE - Hemiptera (True Bugs)																										
a leafhopper	*Athysanella incongrua*	Prairie (Native Grass)	Hill Prairie	NMI	1	NMI	1	1	1	1	0	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Cuerna alpina*	Prairie (Native Grass)	Prairie	NMI	1	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
a leafhopper	*Flexamia abbreviata*	Prairie (Native Grass)	Dry Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Flexamia albida*	Prairie (Native Grass)	Hill Prairie	NMI	2	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
a leafhopper	*Flexamia grammica*	Prairie (Native Grass)	Sand Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Flexamia pectinata*	Prairie (Native Grass)	Prairie , Mesic Grassland	NMI	4	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Lonatura catalina*	Prairie (Native Grass)	Xeric Prairie	NMI	5	NMI	1	1	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Paraphlepsius carolinus*	Prairie (Native Grass)	Sand Prairie	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Paraphlepsius nebulosus*	Prairie (Native Grass)	Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Paraphlepsius umbellatus*	Prairie (Native Grass)	Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Pendarus magnus*	Prairie (Native Grass)	Wet Prairie, Marsh	NMI	5	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
a leafhopper	*Polyamia dilata*	Prairie (Native Grass)	Hill Prairie	NMI	4	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Polyamia rossi*	Prairie (Native Grass)	Sand Prairie	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Polyamia similaris*	Prairie (Native Grass)	Xeric Prairie	NMI	NMI	NMI	1	1	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Scaphytopius dorsalis*	Prairie (Native Grass)	Xeric Prairie	NMI	4	NMI	1	1	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Giant Grassland Cicada or Bush Cicada	*Tibicen dorsatus*	Prairie (Native Grass)	Prairie	NMI	10	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Redveined Prairie Leafhopper	*Aflexia rubranura*	Prairie (Native Grass)	Xeric or Mesic Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Hymenoptera (Bees & Wasps)																										
American Bumble Bee	*Bombus pensylvanicus*	Prairie (Native Grass)	Prairie	NMI	42	NMI	1	1	1	1	1	1	0	0	1	0	0	NMI	NMI	1	0	0	0	NMI	NMI	NMI
Half-black Bumble Bee	*Bombus vagans*	Prairie (Native Grass)	Prairie	NMI	23	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Rusty-Patched Bumble Bee	*Bombus affinis*	Prairie (Native Grass)	Prairie	NMI	8	NMI	1	1	1	1	1	1	0	0	1	0	0	NMI	NMI	1	0	0	0	NMI	NMI	NMI
Southern Plains Bumble Bee	*Bombus fraternus*	Prairie (Native Grass)	Prairie	NMI	14	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Lepidoptera (Butterflies & Moths)																										
a moth	*Anacampsis wikeri*	Prairie (Native Grass)	Prairie	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
a torticid moth	*Eucosma bipunctella*	Prairie (Native Grass)	Mesic Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a torticid moth	*Eucosma fulminana*	Prairie (Native Grass)	Mesic Prairie	NMI	5	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
an inch worm moth	*Digrammia ordinata*	Prairie (Native Grass)	Prairie	NMI	5	NMI	1	1	1	1	1	1	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
Brown Flower Moth	*Schinia saturata*	Prairie (Native Grass)	Sand Prairie	NMI	4	NMI	1	1	1	1	1	1	0	0	0	0	1	NMI	NMI	0	0	0	1	NMI	NMI	NMI
Cobweb Skipper	*Hesperia metea*	Prairie (Native Grass)	Sand Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Dakota Skipper	*Hesperia dacotae*	Prairie (Native Grass)	Xeric Prairie	NMI	1	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Ernestine's Moth	*Phytometra ernestinana*	Prairie (Native Grass)	Prairie	NMI	5	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Gorgone Checkerspot	*Chlosyne gorgone carlota*	Prairie (Native Grass)	Xeric Prairie	NMI	NMI	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Grote's Black-tipped Quaker	*Dichagyris grotei*	Prairie (Native Grass)	Xeric Prairie	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	1	NMI	NMI	0	0	0	1	NMI	NMI	NMI
Leadplant Leafwebber Moth	*Sciota dammersi*	Prairie (Native Grass)	Xeric Prairie	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Marked Noctuid Moth	*Tricholita notata*	Prairie (Native Grass)	Mesic Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Monarch Butterfly	*Danaus plexippus*	Prairie (Native Grass)	Prairie, Meadow	NMI	NMI	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Northern Flower Moth	*Schinia septentrionalis*	Prairie (Native Grass)	Mesic/Xeric Prairie	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	1	NMI	NMI	0	0	0	1	NMI	NMI	NMI
Orange Mint Moth	*Pyrausta orphisalis*	Prairie (Native Grass)	Prairie	NMI	4	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Orange Sallow Moth	*Rhodoecia aurantiago*	Prairie (Native Grass)	Mesic Prairie	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	1	NMI	NMI	NMI
Ottoe Skipper	*Hesperia ottoe*	Prairie (Native Grass)	Xeric Prairie	NMI	6	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Pearly Indigo Borer	*Sitochroa dasconalis*	Prairie (Native Grass)	Unknown	NMI	3	NMI	NMI	NMI	NMI	NMI	NMI	NMI	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Prairie Sedge Moth	*Neodactria murellus*	Prairie (Native Grass)	Xeric Prairie	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Regal Fritillary	*Speyeria idalia*	Prairie (Native Grass)	Xeric or Mesic Prairie	NMI	32	NMI	1	1	1	1	1	1	0	0	0	1	1	NMI	NMI	1	1	1	0	NMI	NMI	NMI
Silphium Borer Moth	*Papaipema silphii*	Prairie (Native Grass)	Prairie	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Spirea Leaftier Moth	*Evora hemidesma*	Prairie (Native Grass)	Prairie	NMI	5	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Whitney's Underwing	*Catocala whitneyi*	Prairie (Native Grass)	Hill Prairie	NMI	2	NMI	1	1	1	1	1	0	0	0	0	0	1	NMI	NMI	0	0	0	1	NMI	NMI	NMI
Yellow Sedge Borer	*Archanara subflava*	Prairie (Native Grass)	Prairie	NMI	5	NMI	1	1	1	1	1	1	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
INVERTEBRATE - Orthoptera (Grasshoppers, Katydids, Crickets)																										
Prairie Mole Cricket	*Gryllotalpa major*	Prairie (Native Grass)	Tallgrass Prairie	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Velvet-Striped Grasshopper	*Eritettix simplex*	Prairie (Native Grass)	Sand Prairie	NMI	4	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
MAMMALS																										
Franklin's Ground Squirrel	*Poliocitellus franklinii*	Prairie, Marsh	Tall/Mid-Grass Prairie, Marsh Edge, Field/Forest Edge	14	10	-2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Gray/Timber Wolf	*Canis lupus*	Prairie, Upland Forest, Woodland, Savanna	Areas of High Ungulate Population	10	NMI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0

Forest and Woodland Campaign

Description

Much of Illinois' forests and woodlands are highly altered and fragmented. The Forest and Woodlands Campaign seeks to maintain, expand, and enhance forested habitats specifically for the benefit of Species of Greatest Conservation Need (SGCNs; Appendix 5).

The actions included within this campaign section are provided to help guide the next 10 years of implementation. While other actions may be needed and larger goals could be set, the campaign prioritizes the actions contained in this section as realistic, achievable and most needed to best aid in meeting the overarching goals of the Wildlife Action Plan to:

1. Establish desired number and distribution of viable populations for each SGCN
2. Manage habitats through promoting natural processes, desired structure, and disturbance regimes for the benefit of native species, and
3. Develop resiliency and connectedness into habitats so species can adjust to landscape and environmental changes.
4. Foster an awareness, appreciation, and connection to SGCN and associated habitats among the public.

Goals

- Implement sustainable forestry practices, including forest stand improvement, prescribed fire, timber harvesting and invasive species control to enhance oak-dominance and maintain understory and herbaceous layer diversity on 1 million acres of forest and savanna/barren/open woodland habitat. Restore and manage small woodlots as open woodlands/savannas as appropriate.

- Increase statewide forest and woodland acreage by 350,000 acres, emphasizing restoration of floodplains and riparian corridors, increasing ecological connectivity among forests and other habitat patches, and reducing fragmentation of forests 500 acres and larger.

- Develop high-quality examples of all forest communities, including all Grade A and B Illinois Natural Areas Inventory sites, restored and managed within all natural divisions within which they occur.

- Manage healthy and well-maintained urban forests and woodlands.

Status as of 2015

The Forest and Woodlands Campaign Implementation Team's primary focus has been promoting forest management, particularly restoring open woodlands habitats, using an adaptive resource management approach.

Adaptive resource management is a structured, repeated process of robust decision making, with an aim to reducing uncertainty over time via system monitoring. In this way, decision making simultaneously meets one or more resource management objectives and, either passively or actively, accrues information needed to improve future management.

Open woodlands are a type of forest community with canopy coverage between 30% to 80% closure. It has a poorly developed woody understory, and a diverse herbaceous layer of forbs, grasses, and sedges with 50% to 100% ground cover. Open woodland canopy is composed of fire tolerant trees such as oak and hickory, often with wide spreading crowns. A variety of other fire tolerant trees also occur in woodlands.

Campaign partners continued or started woodlands restoration projects throughout the state to improve habitat for SGCN and to provide demonstration sites and "living laboratories" to promote open woodlands management and to hone management techniques.

Research is a keystone of adaptive resource management. As part of the campaign, researchers from the University of Illinois - Champaign use a "before-after-treatment-control" monitoring framework (with replication) to measure the effectiveness of forest management activities and to determine whether or not wildlife and habitat goals are being achieved at various locations across the state (e.g. Trail of Tears State Forest, Oakwood Bottoms, Lake Shelbyville, Siloam Springs, Hidden Springs, and Stephen A. Forbes).

Implementation Summary

The Campaign Implementation Team began work in earnest in 2010 when IDNR directed Pittman-Robertson (PR) funding to developing wildlife habitat strategies designed to implement bird and mammal goals in the forest matrix of Illinois and to develop approaches to implementing these strategies. IDNR partnered with the National Wild Turkey Federation (NWTF) and the Illinois Natural History Survey to form the Forest and Woodlands Campaign Implementation Team. It is highly likely that the implementation team will add more partners in the coming decade as they continue to define the team and network with more forest managers around the state.

Below is a summary of Campaign Implementation Team activities:

July 2010 - June 2011

- IDNR partnered with the National Wild Turkey Federation (NWTF) to begin campaign implementation in conjunction with ecologists and field staff at the Illinois Natural History Survey (INHS). To help further define the role of campaign focus, the implementation began referring to the campaign as the Illinois Forest and Woodlands Campaign.

- To aid in development of wildlife conservation strategies and operational plans to implement conservation actions identified in the Illinois Wildlife Action Plan, a forest management survey was emailed to a select group of IDNR resource managers. The survey was sent to IDNR foresters, wildlife biologists, and natural heritage biologists to assess what kind of forest management (if any) is being done by these individuals and what focal forest-associated wildlife species are important to them and their constituencies. Of the 65 surveys delivered, 36 responses were received. Based on these responses, it was determined that IDNR foresters and biologists are working in all types of forest communities ranging from bottomland forest to upland sand savanna. Those working with private landowners tend to work with smaller acreages compared to those who primarily work on public lands. Eighty percent of respondents noted that they are using various management practices (e.g. mechanical removal, chemical application, prescribed fire) in an attempt to control invasive exotic species. Seventy-two percent of respondents are using various forms of Forest Stand Improvement (FSI), while 58% are using prescribed fire, as a practice to manage for a particular forest structure or species composition and to promote forest health. Thirteen of the respondents have ongoing management efforts (that are geographically spread across the state and include different forest types) that may have the capacity for the establishment of programs monitoring wildlife responses to forest management (i.e. a before-after-treatment-control monitoring protocol).

- The respondents to the forest management survey indicated that they were interested in managing forests for forest health, wildlife diversity, white-tailed deer (particularly on private land), wild turkey, and songbirds. Wild turkeys and songbirds will be two initial priorities for establishing monitoring programs (in subsequent segments of this campaign) in conjunction with forest management. Turkeys, and in particular songbirds, can be monitored in ways that can be standardized among locations and across forest management practices. The monitoring of other species or groups of organisms may be added as opportunities and needs arise. Approximately 15-20 locations will now be surveyed to determine the best 4-6 sites to establish the first of what will hopefully become many wildlife monitoring programs merged with forest management efforts across the state.

- The Campaign Implementation Team put together a "forest management for wildlife" reference list of peer-reviewed journal articles from the past decade that highlight various types of forest management for wildlife and the wildlife/forest responses to the management. This reference list will be a living document and will be added to over time as new articles are written or are brought to our attention.

- Field visits by an INHS avian ecologist, the NWTF Regional Biologist, and the IDNR Forest and Woodland campaign lead were conducted at a bottomland hardwood forest management site, Oakwood Bottom Green Tree Reservoir, on the Shawnee National Forest. The field visit was held in cooperation with US Forest Service wildlife biologists to establish monitoring plans for proposed forest management on the 12,000 acre management area. Monitoring will begin that winter to determine the effectiveness of forest management on avian species.

- The Forest and Woodland campaign lead and the National Wild Turkey Federation regional biologist attended the 4th Fire in Eastern Oaks conference held in Springfield, Missouri.

- The National Wild Turkey Federation hired 2 temporary foresters to support reforestation and forest management efforts and campaign goals related to CREP, EQIP and FDA in the upper Illinois and upper Kaskaskia River watersheds. These positions are partially supported by an Illinois state wildlife grant with the intention of creating and enhancing forested wildlife habitat in these regions.

- Two forest wildlife management workshops directed at private and public forest owners were conducted cooperatively by the Department and NWTF. An additional conservation partner for one workshop was the US Army Corps of Engineers.

July 2011 - June 2012

Project Pin Oak

- Formed additional local partnerships along with the U.S. Forest Service (USFS), National Wild Turkey Federation (NWTF), Illinois Department of Natural Resources (IDNR), and the Illinois Natural History Survey. These include American Forests, The Arbor Day Foundation, and the USFS Plant-A-Tree program. Additional contributions were made by Forrest Keeling Nursery and Long Forestry Consultation, as well as collaboration with the Middle Mississippi River Partnership.

- 250 acres of FSI treatments completed in 2012 in Oakwood Bottoms (mgmt. units 3 and 27) ($19,000 of USFS funding).

- 250 acres of planting completed within the FSI treated units (planting funded by USFS Plant-A-Tree program=$25,000).

- The National Wild Turkey Federation provided funding from two grants for bare root tree stock for the tree planting project (a mixture of primarily Pin Oak, with Swamp White Oak and Overcup Oak)
    - American Forests contributed $5000 (7,692 seedlings)
    - The Arbor Day Foundation contributed $13,000 (20,000 seedlings)

- Prescribed burn plans were developed for approximately 1500 acres of Oakwood Bottoms Green Tree Reservoir for this fall. This will include some area where thinning and FSI was completed previously, as well as some previously planted units.

National Wild Turkey Federation (NWTF) Habitat Grant Project

- An NWTF Habitat Fund grant targeted to the Forest and Woodlands Campaign is providing nearly $50,000 with a match of $50,000 to do private forest management in both the Shawnee Hills and Western Forest-Prairie Natural Divisions. Eligible practices include FSI, NNIS control and prescribed burning. Payment rates are based on FDA rates, and we will be working with IDNR District Foresters to find interested landowners with Forest Management Plans in place. There is a high demand for forests & woodlands management in these natural divisions and EQIP funds are not often available.

- In addition, NWTF (Nation Wildlife Turkey Foundation) State Wildlife Grant Foresters working in the northern Kaskaskia and northern Illinois River watersheds are providing support for CREP and EQIP in these regions. Cumulative accomplishments through March (about 1 year of work) are summarized below:
    - Wrote 50 tree planting plans
    - Over 708 acres of tree plantings planned
    - Met with 105 private forest landowners
    - Wrote 38 Forest Management Plans
    - 2057 acres in Forest Management Plans
    - Reviewed 1146 acres of EQIP forest management practices
    - Reviewed 1647 acres of CREP easements
    - Participated in 5 outreach field days attended by 233 people

Research and Monitoring

- *A list of* field supplies was created and we are in the process of ordering supplies for the upcoming first field season. Monitoring occurred at Oakwood Bottoms, Trail of Tears State Forest, The Cache River watershed, Siloam Springs State Park, and Lake Shelbyville/COE management sites.

- A meeting and tour of management units at Lake Shelbyville/COE was conducted. Participating were USCOE Wildlife Biologist Lee Mitchell, NWTF Regional Wildlife Biologist Kent Adams, INHS Avian Ecologist Jeff Hoover, IDNR Wild Turkey Project Manager- Paul Brewer, and IDNR District Wildlife Biologists Doug Brown and Bryan Eubanks. Management techniques were discussed, management progress was evaluated, and a strategy for selection of monitoring management was developed.

- The list of Species of Greatest Conservation Need that will be affected by the campaign was reviewed.

July 2012- June 2013

Project Pin Oak

- Continuing work on Project Pin Oak at Oakwood Bottoms by the US Forest Service included:
    - Tree planting-620 acres
    - Fall dormant season burning-185 acres
    - Forest Stand Improvement (FSI)-184 acres

NWTF Habitat Grant Project

An NWTF Habitat Fund grant targeted to implementation of the Forest and Woodlands Campaign of the Statewide Wildlife Action Plan provided nearly $50,000 with a match of $50,000 to do private forest and woodland management in both the Shawnee Hills and Western Forest-Prairie Natural Divisions. Eligible practices include Forest Stand Improvement, Non-native Invasive Species control, and prescribed burning. Rates were based on FDA rates, and NWTF worked with IDNR District Foresters to find interested landowners with existing Forest Management Plans. The selected Natural Divisions have a high demand for forest management, and EQIP dollars are lacking in many counties in these Divisions.

The initial goal was to impact 600 acres of private forest land. Actual implementation affected 1,035 acres of land in Macoupin, McDonough, Monroe, Fulton, Gallatin, Hardin, Johnson and Pope Counties.

- NWTF State Wildlife Grant foresters working in the northern Kaskaskia and northern Illinois River watersheds:
    - wrote 53 tree planting plans covering 684 acres
    - met with 153 private landowners regarding forest management wrote 40 forest management plans covering 3,060 acres
    - participated in 6 forest management outreach days attended by 480 people

IDNR Implementation Strategies

- Initial planning for implementation of understory and mid-story thinning and prescribed fire management at Siloam Springs State Park and Hidden Springs State Forest were completed. Woodland management work at Stephen Forbes State Park was included in a staff field tour in spring of 2013. In addition, members of the Forest and Woodland Campaign Implementation Team met with USFS personnel to discuss plans for glade and woodland management in the eastern Shawnee National Forest.

Research and Monitoring

- Survey points were established at various Forest and Woodlands Campaign sites in a before-after-treatment-control design to enhance our ability to assess the effects of forest management (e.g. tree thinning, prescribed fire, removal of invasive exotic shrubs) on breeding birds. Survey points are sampled and then compared among areas in a given forest that are (or will be) and are not being managed. These established points (Lake Shelbyville = 200 points; Siloam Springs State Park = 150; Oakwood Bottoms in the Shawnee National Forest = 120; Trail of Tears State Forest = 66; Lake County Forest Preserve = 70) were each visited 3 times to survey breeding birds. Vegetation surveys (measuring forest structure and tree species composition) were completed at half of the survey points. We also collected songbird nesting data in the Cache River watershed to document how the restoration/consolidation of bottomland forests (acquiring and “reforesting” non-forested land) has affected the nesting success of songbirds.

- Data from Oakwood Bottoms yielded results showing that tree thinning is having a positive effect on the relative abundance of several species of forest birds. Sixteen species of forest birds are showing a strong positive response to the thinning at Oakwood Bottoms, including a number of species that are on the conservation (SGCN) list for Illinois (Red-shouldered Hawk, Red-headed Woodpecker, Yellow-billed Cuckoo, Prothonotary Warbler, Kentucky Warbler, and Yellow-breasted Chat). Also, the management is not enhancing numbers of cowbirds (a brood parasite that can threaten songbird populations). Similarly, at Lake Shelbyville most forest songbirds responded positively or neutrally to the forest management occurring there.

- Songbird nesting data from the Cache River watershed indicated that the reduction of forest fragmentation in the watershed has greatly reduced rates of cowbird parasitism (50% reduced to 20%) and marginally reduced rates of nest predation (60% reduced to 50%). These changes in nest predation and cowbird parasitism provide tangible benefits to the breeding bird community in the watershed.

- The Forest and Woodland Campaign Implementation Team was involved in developing a forest management plan for Trail of Tears State Forest. The plan is nearing implementation and our survey points (established prior to management) will document songbird and tree responses to the management activities in 3 management units where there will be tree thinning then prescribed fire, prescribed fire only, or no management.

- Oakwood Bottoms and Trail of Tears will be used as demonstration sites to inform, educate and train those interested in forest management including conservation practitioners, land managers and the general public. Ultimately, our goal for the Forest and Woodlands Campaign in Illinois is to contribute substantially to the growing body of research associated with the effects of forest management on populations of wildlife, and to use the data collected in Illinois to reinforce existing or establish new approaches to forest management that are applicable to forests throughout Illinois and other states in the Midwest.

- GIS and remote imagery needs were evaluated by Forest and Wildlife Campaign to help better prioritize management actions.

July 2013 - June 2014

Project Pin Oak

- Continuing work on Operation Pin Oak at Oakwood Bottoms by the US Forest Service included:
    - Tree planting-495 acres
    - Fall dormant season burning- 250 acres
    - Timber Stand Improvement (TSI)- 400 acres

NWTF Habitat Grant Project

- A NWTF Habitat Fund grant targeted to implementation of the Forest and Woodlands Campaign of the Statewide Wildlife Action Plan provided nearly $50,000 with a match of $50,000 to do private forest and woodland management in both the Shawnee Hills and Western Forest-Prairie Natural Divisions. Eligible practices include Forest Stand Improvement, Non-native Invasive Species control, and prescribed burning. Rates were based on FDA rates, and NWTF worked with IDNR District Foresters to find interested landowners with existing Forest Management Plans. The selected Natural Divisions have a high demand for forest management, and EQIP dollars are lacking in many counties in these Divisions. The initial goal was to impact 600 acres of private forest land. Actual implementation affected 1,035 acres of land in Macoupin, McDonough, Monroe, Fulton, Gallatin, Hardin, Johnson and Pope Counties. NWTF also partnered with SIPBA and complete 640 of prescribed burning on private lands within the Shawnee Hills.

- NWTF State Wildlife Grant foresters working in the northern Kaskaskia and northern Illinois River watersheds: This grant was completed in December of 2013 but the following statistics apply to the first half of your reporting period (Note: The Government shutdown reduced productivity during this reporting period):

    - Wrote 7 tree planting plans covering 66 acres.
    - Met with 12 private landowners regarding forest management.
    - Wrote 4 forest management plans covering 179 acres.

- Participated in 1 forest management outreach days attended by 75 people.
- Reviewed 363 acres of tree plantings for compliance.
- Completed 257 acres of forest inventories.
- Completed 20 EQIP forest management reviews impacting 447 acres.
- Completed 4 CREP easement reviews impacting 240 acres.

IDNR Implementation Strategies

- Siloam Springs
  - Thinned 150 acres of timber.
  - Installed sign explaining thinning project - sign provided by NWTF. National Wildlife Turkey
  - Began mapping and planning permanent firebreaks around thinned timber stands.

- Hidden Springs State Forest
  - At Hidden Springs State Forest, a total of 142 acres of woodland were treated with both mechanical and chemical methods to eradicate the large scale invasion of bush honeysuckle as well as reduce the understory and mid-story trees to more closely resemble an open woodland community. This project was funded by The Wild Turkey Federation and is managed by site and district IDNR personnel.
  - A spring prescribed burn was conducted in 2014 over the project area. This prescribed burn is the beginning of an aggressive burning regime that will be evaluated and adjusted on an annual basis.
  - Ten photo stations were posted and GPS recorded to provide a vegetative "documentation over time" evaluation of the project. A first set of photos were taken during the spring of 2014. More will be taken in the growing seasons annually.
  - Several vegetative assessments were conducted during the spring and early summer and late summer to evaluate vegetative specie response to the "opening" and burning efforts.
  - Due to additional funds from NWTF, a contractor was hired to do an additional 83 acres of open woodland creation.

Research and Monitoring

- Survey points at various Forest and Woodlands Campaign sites (Lake Shelbyville = 200 points; Oakwood Bottoms in the Shawnee National Forest = 126; Trail of Tears State Forest = 84) were visited multiple times for breeding forest birds. Survey points were established in a before-after-treatment-control design to enhance our ability to assess the effects of forest management (e.g. tree thinning, prescribed fire, removal of invasive exotic shrubs) on breeding birds. Survey points are sampled and then compared among areas in a given forest that are (or will be) and are not being managed. Vegetation surveys (measuring forest structure and tree species composition) were completed at half of the survey points. Automated cameras (a.k.a. camera "traps") were deployed during winter months in the various forest treatment groups in an attempt to document use of the different types of forest management by mammals and large birds (e.g. wild turkeys) during winter months. The vegetation and camera trap data currently are being analyzed.

- At Oakwood Bottoms, a total of 54 species were documented at bird survey points. The overall numbers of species detected in each of three treatment categories were 27, 42, and 41 in the no treatment, thinning, and thinning + fire categories, respectively. The mean species diversity per survey point was significantly lower in the no treatment category compared to the thinning and

thinning + fire categories. Results strongly support the conclusion that thinning, and potentially prescribed fire in conjunction with thinning, is having a positive effect on the relative abundance of several species of forest birds. Twenty species of forest birds showed a positive response to the thinning at Oakwood Bottoms including a number of species that are on the SGCN list for Illinois (Red-shouldered Hawk, Cerulean Warbler, Yellow- breasted Chat, Prothonotary Warbler, and Yellow-billed Cuckoo). Only four species seemed to have a negative response to the treatments. A number of other species that are known to associate strongly with more-open forest canopies, more-complex (heterogeneous) forest structure, or more-dense shrub layer and ground cover were also more abundant in the forest units where thinning has occurred.

- At Lake Shelbyville, a total of 65 species were documented at bird survey points and overall numbers of species detected in each the four treatment categories were 55, 55, 49 and 49 in the no treatment, thinning, fire, and thinning + fire categories, respectively. The mean species diversity per survey point was significantly lower in the two treatment categories that included fire compared to the no treatment and thinning only categories. Twenty-three species of forest birds showed a positive response to the thinning (higher abundance in one or both of the categories that included thinning compared to the no treatment category) including four species that are on the SGCN list for Illinois (Red-headed Woodpecker, Ovenbird, Northern Flicker and Acadian Flycatcher). One species from the SGCN list that was more abundant in the non-managed forest than those forests where thinning or burning had occurred (Kentucky Warbler). Finally fire had a positive effect on some species (e.g. Common Yellowthroat, Field Sparrow, Song Sparrow, Red-winged Blackbird, and American Crow), but a seeming negative effect on others (e.g. House Wren, Pileated Woodpecker, Kentucky Warbler, Gray Catbird, Northern Parula, Yellow-throated Vireo, Northern Flicker, and Wood Thrush). It is likely that negative effects associated with fire are relatively short-term in nature or may represent a trade-off whereby some species are benefitted while others are not. This illustrates the importance of collecting several years of data to understand both the immediate and long-term effects of forest management on bird populations.

- At Trail of Tears State Forest, the Forest and Woodland Campaign Implementation Team continues to assist with developing a forest management plan. Prescribed fire is being applied to several units and implementation of thinning activities should begin this winter. Our survey points (established prior to management) will document songbird and tree responses to the management activities in 3 management units where there will be tree thinning then prescribed fire, prescribed fire only, or no management, and also to the prescribed fire in other parts of the forest.

- Additional survey points will be established at Hidden Springs State Forest and Forbes State Park in 2015, in conjunction with forest management efforts at those locations.

- Oakwood Bottoms and Trail of Tears will be used as demonstration sites to inform, educate and train those interested in forest management including conservation practitioners, land managers and the general public. Ultimately, our goal for the Forest and Woodlands Campaign in Illinois is to contribute substantially to the growing body of research associated with the effects of forest management on populations of wildlife, and to use the data collected in Illinois to reinforce existing or establish new approaches to forest management that are applicable to forests throughout Illinois and other states in the Midwest.

US Army Corps of Engineers – Lake Shelbyville Forest Management - 2007-2014

The Campaign Implementation Team worked closely with the US Army Corps – Lake Shelbyville Environmental Stewardship (ES) Team. Below is a summary of some of their forest management work.

In 2007 the Environmental Stewardship (ES) Team began prescribed burning and Timber Stand Improvement (TSI) projects on Lake Shelbyville aimed at improving the wildlife habitat and timber resources on the lake. Very little fire (approximately 10 acres/year) and/or timber management had been conducted on Lake Shelbyville since acquisition and as a result the timber stands have slowed

significantly in growth due to overstocking and closed canopies. The lack of management has also impacted desirable regeneration and browse production in the stands due to limited amounts of sunlight reaching the forest floor. This has negatively impacted many species of ground nesting birds and limited food resources for browsers such as the white-tailed deer. Utilizing a big picture approach, a Geographic Information System (GIS) was used to determine strategic blocks of timber 15 – 40 acres in size approximately ½ mile apart that would receive treatment. This would ensure habitat benefits were realized across the lake rather than just localized areas. To help accomplish the goal of providing quality habitat across the landscape, a $10,000 grant from the National Wild Turkey Federation was secured. This helped bring the total treated TSI acres lake wide to 926 acres and 2,619 acres prescribed burned (327 acres/year) to date. Efforts are ongoing.

To monitor the success or failure of the TSI and prescribed burn project aimed at habitat enhancement, the ES team implemented two different strategies for assessing the impacts on wildlife. In 2006, turkey hunters were enlisted to participate in turkey surveys to provide an index of abundance over time. In the years since the projects began, the turkey harvest has doubled on Lake Shelbyville and are being seen in areas they have never been seen in before. That same year, the ES team implemented a white-tailed deer check station. White-tailed deer were chosen because they are excellent indicators of habitat quality, are easy to assess biologically, and Illinois' three day shotgun season allows for collection of an adequate sample size in a relatively short time frame.

Conservation Reserve Program - Tree Practice Acres

The Conservation Reserve Program (CRP) can have an important impact on wildlife populations. Below is a list of conservation practices that are specific to trees and how they have changed over the last 10 years.

Practice	**2006** (acres)	**2015** (acres)	**Change** (acres)
CP3A - Hardwoods	52,002	47,109	Down 4,893
CP11 – Existing Trees	16,676	10,940	Down 5,736
CP31 – Bottomland Hardwoods	1,355	4,424	Up 3,069
Total	72,039	64,488	Down 7,551

Stresses and Threats to Wildlife and Habitat

Lack of Appropriate Management/Disturbance

The quality of Illinois' wooded habitats–forest, open woodlands, savannas, barrens, and shrublands is a major concern. Alteration of natural disturbance processes including suppression of fire, inappropriate timber harvest done without professional forestry assistance, and altered flooding regimes are contributing to the changing composition of forested habitats, notably the increase in maples, other mesophytic trees and closed forests types, and decrease in oak hickory dominance and open forest types.

Exotic Species

The rate at which invasive exotic species degrade forested habitats is increasing. Chestnut blight and Dutch elm disease have reduced the diversity of canopy species, whereas Osage orange and black locust dominate canopies of former pastures and reclaimed mine lands, respectively. Oak decline is a local, poorly-understood problem. Gypsy moths, Asian Long-horned Beetles and Emerald Ash Borers have the potential to devastate urban and rural forests. Shrubs, including honeysuckles and buckthorns, degrade forest communities by reducing the abundance and diversity of native shrubs and herbaceous plants, increasing bare soils and erosion potential, reducing wildlife diversity, and inhibiting recruitment of desirable tree species. Vines (e.g., Kudzu) and herbaceous plants (e.g., Garlic Mustard) further reduce

biodiversity. Each invasion tends to reduce stability of forest systems, increasing the probability and severity of the next invasion. Illinois' forests were naturally dissected along riparian areas, but have been further fragmented by clearing for agriculture and development.

Fragmentation
Fragmentation contributes to the invasion of nonnative species, and exacerbates natural wildlife interactions such as high rates of predation by generalist predators and parasitism of songbird nests by brown-headed cowbirds to undesirable levels. Fragmentation of forests continues from a variety of sources, with exurban development being a noteworthy challenge.

Hard Edges
A general decline in management of wooded habitats has also led to stark transition areas between open agricultural fields or grasslands and closed forest (hard edges). Most field/woodland edges have no gradual transition of brushy habitat. Hard edges are often marked by a sudden wall of tall, mature trees. Hard edges provide very little habitat for wildlife particularly for edge and shrubland species.

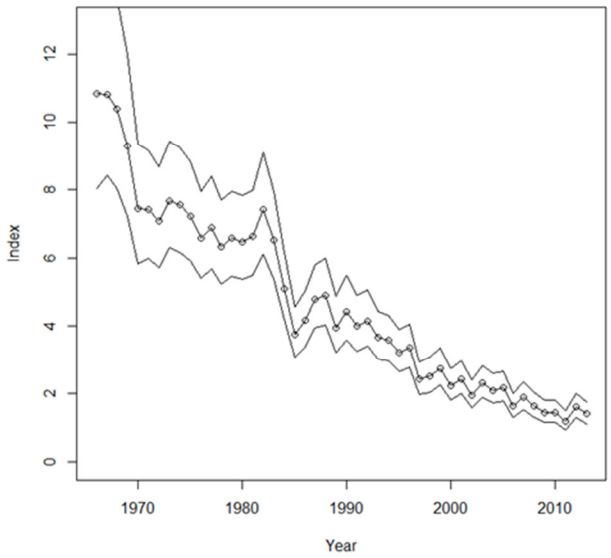
Focal Species

Campaign Focal Species – Animal species that are actively monitored to measure progress toward the conservation goals and objectives outlined by a campaign. The implementation team is focused primarily upon open woodland habitat restoration. Not surprisingly, open woodland species were selected as focal species.

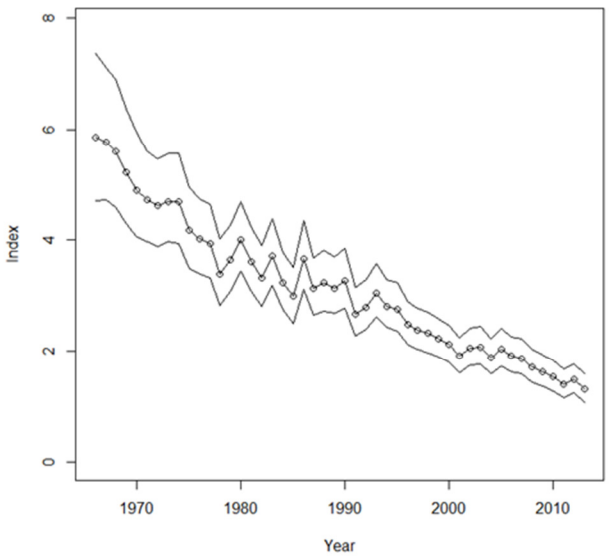
- Redheaded Woodpecker
- Northern Flicker
- Eastern Whip-poor-will
- Chuck-will's-widow
- Acadian Flycatcher

Focal Species Population Trends
As Species of Greatest Conservation Need, it is not surprising that the SGCNs the campaign is focusing upon have suffered from declining populations. Below are 1966-2013 Illinois Breeding Bird Survey (BBS) trend graphs for the focal species from the United States Geological Survey (USGS).

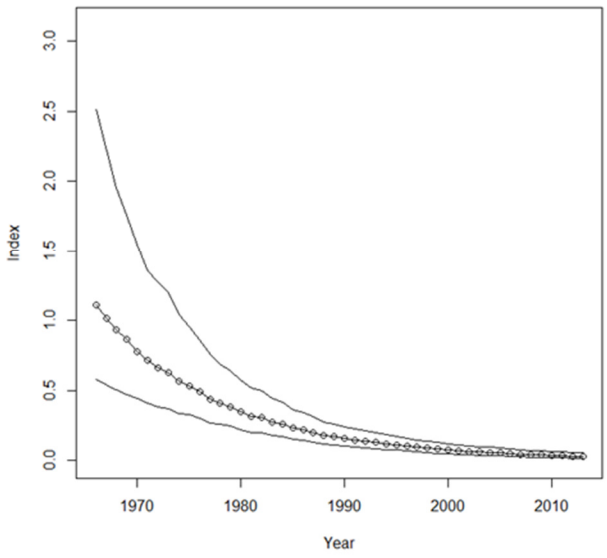
Red-headed Woodpecker



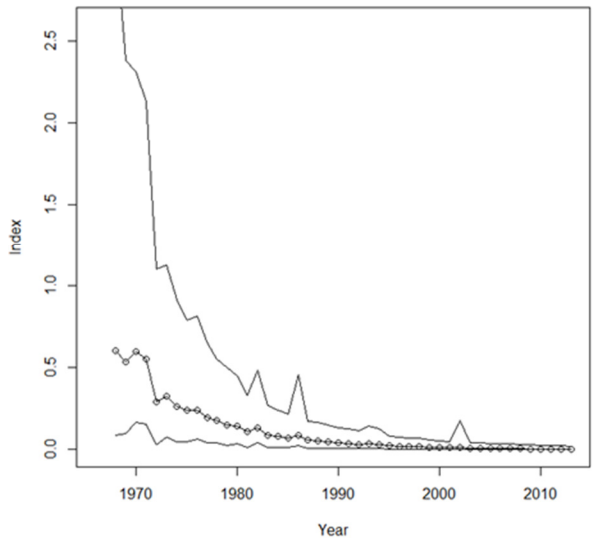
Northern Flicker

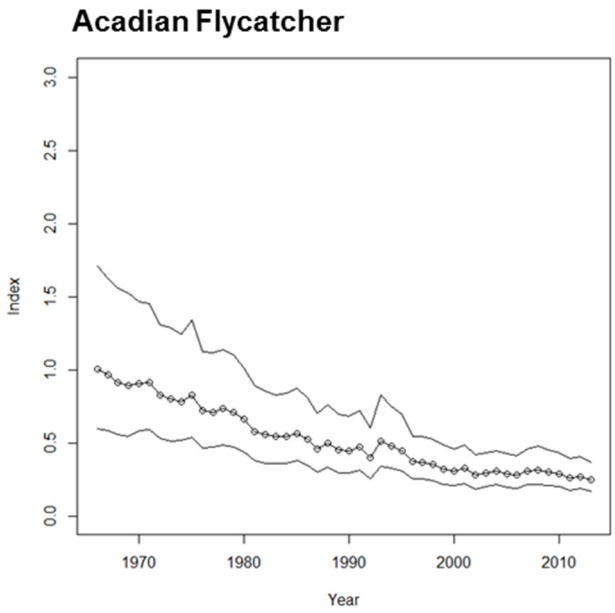


Eastern Whip-poor-will



Chuck-will's-widow





Actions

Wildlife Action Plan implementation can be broken in two approaches, general or "universal actions" and focused or "targeted actions." Universal actions are those actions that can be applied statewide and if applied can "move the needle" to meet campaign goals. Targeted actions are those actions in areas where the campaign recommends that resources be focused.

The Forest and Woodlands may be a bit different than other campaigns in that we are mostly working on improving existing cover/habitat and restoring natural functions rather than attempting to reestablish new cover. This means that universal actions may carry greater weight, especially when applied at a large scale.

Universal Actions

Universal actions are those actions that can be applied statewide and if applied can "move the needle" to meet campaign goals especially if applied at a large scale.

1. Maintain and enhance the composition of Illinois' forested habitats.
    a. Reintroduce natural disturbances or suitable substitutes on a large scale.
    b. Widen edges of forested habitats to create broader transition areas from grassland, shrub/successional, savanna/open woodland, to closed forest.
    c. Emphasize management for shrub/successional, savanna/barren and open woodlands in regions of Illinois where upland forests are highly fragmented.
    d. Remove and control invasive exotic plants, especially within high quality natural areas.
    e. Reintroduce native species into forest habitats where quality habitat has been restored but natural recovery is unlikely.
    f. Address deer populations in locations where browse is degrading habitat quality and/or preventing recovery of vegetation.

2. Promote prescribed fire.
    a. Promote prescribed burn associations.
    b. Provide prescribed burn training.
    c. Make fire equipment more readily available.

3. Direct the expected expansion of statewide forest acreage (the continuation of an 80-year trend):
    a. Emphasize ecological connectivity among forests and other habitat patches.
    b. Emphasize reducing fragmentation of forest communities >5,000 acres.
    c. Emphasize reducing fragmentation of forests 500 acres and larger.
    d. Emphasize restoring floodplains and riparian corridors.

4. Develop and expand programs to assist private forest owners in managing forest resources and employing sustainable forestry practices.
    a. Develop incentives or tax benefits and technical assistance should be provided (and expanded, as under the Illinois Forestry Development Act) to encourage the conservation and wise management of forest habitat.
    b. Develop programs to promote access to private wooded habitats.

5. Fill information gaps and develop conservation actions to address stresses.
    a. Develop a comprehensive program for preventing, eliminating and controlling invasive species is essential.
    b. Determine the extent and condition of open woodland, savanna, and barrens habitats.
    c. Determine the extent and condition of shrub/successional habitats.
    d. Degraded savannas and barrens are identified for restoration with cutting of undesirable plants, prescribed fire and invasive species control.

6. Restore and manage high-quality examples of all forest, savanna and barrens communities, including all Grade A and B Illinois Natural Areas Inventory sites, in all natural divisions within which they occur.

7. Develop zoning criteria and local greenway plans that protect important habitats and ensure “smart growth.”

Targeted Actions

Targeted actions are those actions that the campaign implementation team are or likely will be focusing on and promoting within priority areas.

8. Promote Open Woodlands Management at priority areas– The Campaign will continue to place an emphasis on open woodlands restoration and management in the coming decade.

Focus Areas

- Focal Sites – The Forest and Woodland Campaign Implementation Team will to continue to focus on those sites where we've been working and are making progress (Figure 6). These include Oakwood Bottoms, Lake Shelbyville, Hidden Springs, Stephen A. Forbes, Trail of Tears, and Siloam Springs.

- Future Focal Sites - As we improve our ability to network with other forest habitat managers and practitioners and are able to record their work and progress, it is likely that the implementation team will be adding focal sites. Once these sites are determined, they will be placed on the IDNR Illinois Wildlife Action Plan website. Examples of possible future focal sites include the Cretaceous Hills section of the Shawnee Hills/ Shawnee National Forest and Lake County Forest Preserve District's woodland habitat restoration project along the Des Plaines River.

- IDNR Sites – The IDNR conducted GIS analysis of topography, forest cover, and slope aspect to identify state sites that offer the best potential to meet campaign goals if restoration and management is applied (Figure 6). Those sites were broken into tiers, with the primary sites being identified as the ones with the greatest potential. Not surprisingly, many of the primary sites are already focal sites. These sites and the areas around them should receive more emphasis and resources from the Campaign.

    Primary Sites
    - Apple River Canyon State Park – Salem and Thompson Units
    - Pere Marquette State Park and Copperhead Hollow
    - Siloam Springs State Park
    - Hidden Springs State Forest - Rocky Spring and Big Tree Woodland Units
    - Ferne Clyffe State Park and Cedar/Draper Bluff and Wise Ridge
    - Stephen A. Forbes State Park
    - Trail of Tears State Forest

    Secondary Sites
    - Mississippi Palisades State Park
    - Moraine Hills State Park
    - Rock Cut State Park
    - Beaver Dam State Park
    - Washington County Conservation Area
    - Iroquois County State Fish and Wildlife Area
    - Harry "Babe" Woodyard SNA
    - Fox Ridge State Park/Paul C. Burrus State Habitat Area

Management Resources

Open Woodlands and Savannas Resources:

Open Woodland Restoration and Management – Tennessee Wildlife Resources Agency - http://www.tnwildlifehabitat.org/manage.cfm?uid=11022310371933670

Missouri's Savannas and Woodlands- Missouri Department of Natural Resources - http://mdc.mo.gov/conmag/2000/08/missouris-savannas-and-woodlands

Oak Savannas - http://oaksavannas.org/

General Forest Management Resources:

Breeding Birds and Forest management – Purdue Extension - https://extension.purdue.edu/extmedia/FNR/FNR-501-W.pdf

Illinois Forestry – University of Illinois Extension - https://web.extension.illinois.edu/forestry/home.html

Illinois Forestry Development Act – Illinois Department of Natural Resources - http://www.dnr.illinois.gov/conservation/Forestry/Pages/Illinois-Forestry-Development-Act.aspx

Forest Management Guides – USDA Forest Service - http://www.ncrs.fs.fed.us/fmg/nfmg/

Approaches to Ecologically Based Forest Management - USDA Forest Service - http://www.na.fs.fed.us/spfo/pubs/misc/ecoforest/dyn.htm

Forest Management for Missouri Landowners – Missouri Department of Conservation - https://mdc.mo.gov/sites/default/files/resources/2010/05/5574_3489.pdf

The Kentucky Forest Landowner's Handbook - http://www.maced.org/Forestry-handbook/index.html

Forest Practice Guidelines – University of Tennessee Extension - https://extension.tennessee.edu/publications/Documents/pb1523.pdf

Wisconsin Forest Management Guidelines – Wisconsin Department of Natural Resources - http://dnr.wi.gov/topic/ForestManagement/guidelines.html

Chicago Region Trees Initiative Tools - Chicago Region Trees Initiative - http://chicagorti.org/resources/tools

Performance Measures

Outcome performance measures are designed to assess the overall impact of undertaking conservation actions on Implementation Goals. Output performance measures are designed to assess how active the program is at working toward the Implementation Goals.

Overarching Goal	Type	Performance Measure
Viable Populations	Outcome	Focal Species abundance (or relative abundance) is maintained or increased on Focal Sites
	Output	Focal species abundance monitored on Focal Sites
	Outcome	SGCN abundance is maintained or increased Statewide
	Output	SGCN abundance and species distribution monitored statewide
	Output	Conservation or Recovery Plans developed for T&E species (annual number)
Habitat Management	Outcome	SGCN distribution and populations are maintained or increased (resiliency) through habitat management and protection
	Output	Acres where habitat management activities were conducted (prescribed fire, TSI, exotic control, open woodlands)
	Output	Number of prescribed burning classes conducted annually.
	Output	Number of prescribed burning equipment "pods" available statewide
	Output	Number of active prescribed burn associations
	Output	Acres of FDA plans
	Output	Number of acres enrolled in CRP tree practices
	Output	Acres where edge feathering projects were conducted
	Output	Deer browse is monitored on forested nature Preserves
	Output	Number of local greenway plans that protect important habitats and ensure “smart growth”
Habitat resiliency and connectedness	Outcome	Proportion of managed areas that maintain or improve their conservation status (resiliency) [e.g. INAI sites]
	Output	Habitat added adjacent to protected areas (connectivity)[area]
	Outcome	Increase ecological connectivity among forests and other habitat patches and reduce fragmentation
	Output	Use spatial analysis to monitor forest connectivity and fragmentation

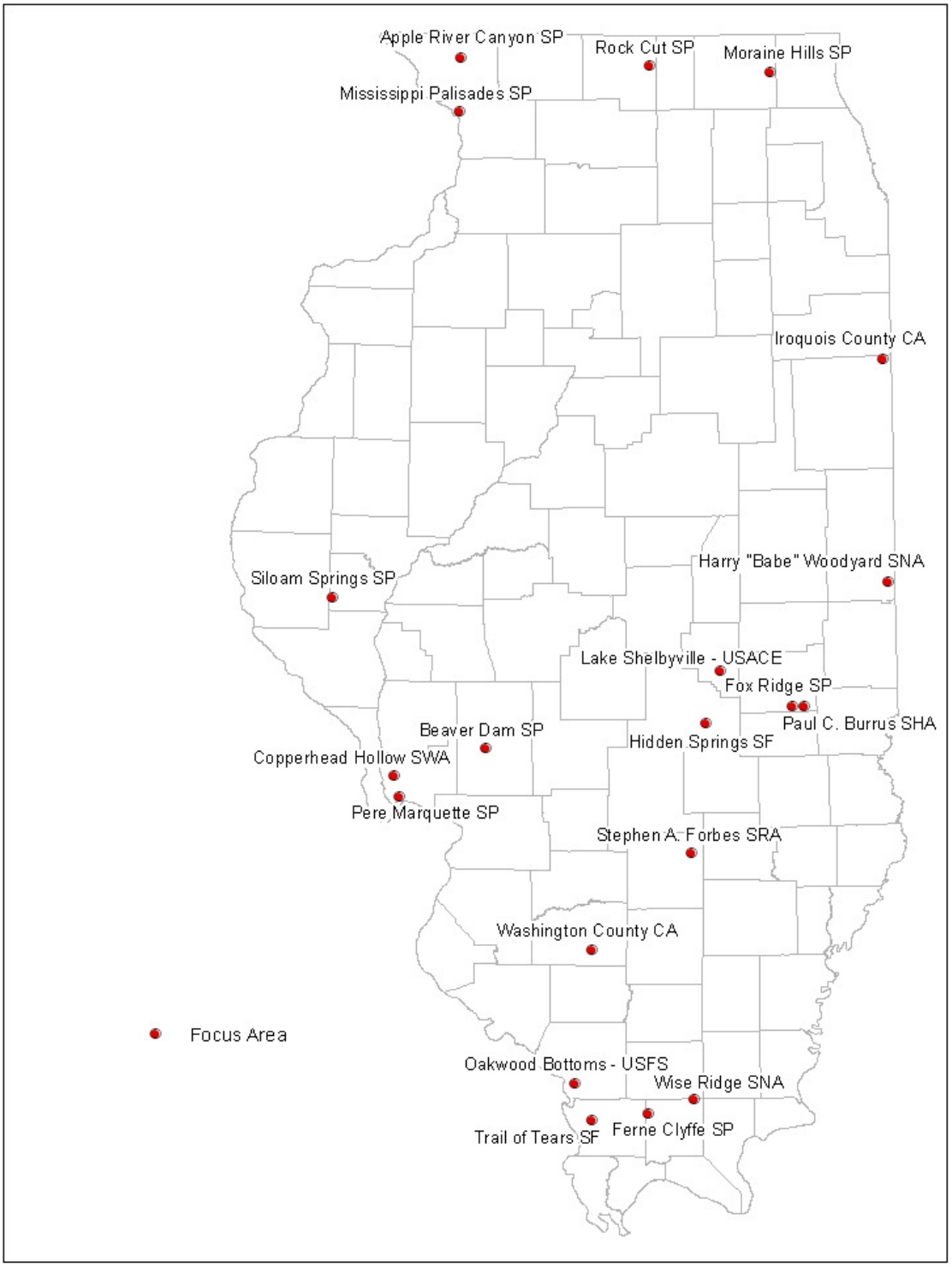


Figure 6. Focus Areas identified by the Forest and Woodland Campaign

Appendix 5. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Forest and Woodland Campaign. Definitions and methods:

Common Name: Commonly recognized name for the species.

Scientific Name: Currently recognized name for the species based on the most recently available literature.

Campaign Habitat: Major habitat type where the species occurs in Illinois.

Specific Habitat: More detail habitat location for species in Illinois.

Historic Status: Number of Counties, or HUC8 watershed for fish and mussels, with records from before 1980.

Current Status: Number of Counties, or HUC8 watersheds for fish and mussels, with recent records (last 20 years).

Trend: Trends were based on the change in distribution of the species by comparing their Current and Historic Status. If a change less than 25% was observed the trend was recorded as 0, changes with magnitudes between 25-49% were coded as +1 (distribution increased) or -1 (distribution decreased), changes greater than 50% were coded as +2 (distribution increased) or -2 (distribution decreased).

Stressors: Each stressor type was rated as either a recognized stressor (1), not a recognized stressor (0), or as having not enough information to make a rating (NMI=Need More Information).

Appendix 5. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Forest and Woodland Campaign.

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
BIRDS																										
Acadian Flycatcher	*Empidonax virescens*	Upland Forest	Forest	82	82	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Bald Eagle	*Haliaeetus leucocephalus*	Upland Forest	Forested Stream, Lake	14	66	2	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1	0	1	1
Bay-Breasted Warbler	*Setophaga castanea*	Upland Forest	NMI	NMI	NMI	-1	0	1	1	0	1	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0
Bell's Vireo	*Vireo belli*	Successional Forest	NMI	66	74	-1	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Bewick's Wren	*Thryomanes bewickii*	Successional Forest	Successional Areas, Forest	5	2	-1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	1	1	1	0	1	1
Black-Billed Cuckoo	*Coccyzus erythropthalmus*	Upland Forest	Forest	74	33	-2	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1
Blue-Winged Warbler	*Vermivora cyanoptera*	Successional Forest	NMI	29	27	1	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Broad-Winged Hawk	*Buteo platypterus*	Upland Forest	Forest	42	42	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	1
Brown Thrasher	*Toxostoma rufum*	Successional Forest	Successional	102	NMI	-2	1	1	1	0	1	0	0	1	0	0	0	1	0	0	0	1	1	0	1	0
Cerulean Warbler	*Setophaga cerulea*	Floodplain Forest	Bottomland Forest	36	27	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Chuck-Will's-Widow	*Antrostomus carolinensis*	Upland Forest	Forest	19	10	-2	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1
Connecticut Warbler	*Oporornis agilis*	Upland Forest	Forest	NMI	NMI	-2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Eastern Towhee	*Pipilo erythrophthalmus*	Upland Forest	NMI	101	97	-2	1	1	1	0	1	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0
Eastern Whip-Poor-Will	*Antrostomus vociferus*	Successional Forest	Forest, Successional	76	33	-2	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0	1	1	0	0	1
Golden-Winged Warbler	*Vermivora chrysoptera*	Successional Forest	NMI	NMI	NMI	-2	1	1	1	0	1	0	0	1	1	0	0	1	0	0	1	1	1	0	1	0
Kentucky Warbler	*Geothlypis formosa*	Upland Forest	Forest	78	63	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Little Blue Heron	*Egretta caerulea*	Floodplain Forest	Forested Stream, Lake	5	34	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	1	1
Mississippi Kite	*Ictinia mississippiensis*	Upland Forest	Forested Stream, Lake	8	18	2	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	0	1
Northern Flicker	*Colaptes auratus*	Savanna	Savanna, Grassland	102	93	-2	1	0	1	1	0	0	1	0	0	1	0	1	0	0	0	1	1	0	0	1
Osprey	*Pandion haliaetus*	Upland Forest	Forested Stream, Lake	10	33	2	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1	0	1	1
Ovenbird	*Seiurus aurocapillus*	Upland Forest	Forest	48	53	-1	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Prairie Warbler	*Setophaga discolor*	Successional Forest	Successional	12	30	-1	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Prothonotary Warbler	*Protonotaria citrea*	Floodplain Forest	Bottomland Forest	65	NMI	1	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Red-Headed Woodpecker	*Melanerpes erythrocephalus*	Savanna	Savanna	102	92	-2	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	0	0	1
Rusty Blackbird	*Euphagus carolinus*	Floodplain Forest	Swamp, Bottomland Forest	NMI	NMI	-2	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Snowy Egret	*Egretta thula*	Floodplain Forest	Forested Stream, Lake	7	29	0	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	1	1
Swainson's Hawk	*Buteo swainsoni*	Savanna	Savanna, Grassland, Agriculture	4	3	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	1	1	1	0	1	1
Swainson's Warbler	*Limnothlypis swainsonii*	Floodplain Forest	Bottomland Forest	1	3	0	1	1	1	1	1	0	0	1	1	0	0	1	0	0	1	1	1	0	0	1
Willow Flycatcher	*Empidonax traillii*	Successional Forest	NMI	89	73	-2	1	1	1	1	1	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1
Wood Thrush	*Hylocichla mustelina*	Upland Forest	Forest	101	88	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Yellow-Billed Cuckoo	*Coccyzus americanus*	Upland Forest	Forest, Savanna	102	92	-2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1
Yellow-Breasted Chat	*Icteria virens*	Successional Forest	Successional Field, Edge	92	81	-2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Yellow-Crowned Night-Heron	*Nyctanassa violacea*	Floodplain Forest	Swamp	19	21	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	0	1
American Woodcock	*Scolopax minor*	Successional Forest	Successional Field, Ecotones	62	35	-1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1
HERPTILES - Amphibians																										
Jefferson Salamander	*Ambystoma jeffersonianum*	Upland Forest	Open Floodplains, Ephemeral Wetland	3	3	2	1	1	0	1	0	0	1	0	1	0	0	0	0	1	1	1	0	0	0	0
Silvery Salamander	*Ambystoma platineum*	Upland Forest	Woodland with Ephemeral Pool	2	2	2	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	1	0	0	0	0
HERPTILES - Reptiles																										
Eastern Box Turtle	*Terrapene carolina*	Upland Forest	Open Woodland	63	49	0	1	1	0	0	0	0	0	1	1	0	0	1	0	0	1	1	1	1	1	1
Flat-headed Snake	*Tantilla gracilis*	Upland Forest	Upland Forest	4	2	-1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1
Great Plains Ratsnake	*Pantherophis emoryi*	Savanna	Sandstone, Limestone, West Facing Bluffs	5	2	-2	1	0	1	1	0	0	0	1	1	0	0	0	0	1	0	1	1	0	1	1
Timber Rattlesnake	*Crotalus horridus*	Forest, Rocky Slopes	Sandstone, Limestone, West Facing Bluffs	37	24	-1	1	1	1	1	1	0	0	1	1	0	0	1	0	1	1	1	1	1	1	1
INVERTEBRATE - Arachnids																										
Striped Scorpion	*Centruroides vittatus*	Barrens	Talus Slope, Glade	NMI	2	NMI	0	0	1	0	1	0	0	0	0	0	0	NMI	NMI	0	1	0	0	NMI	NMI	NMI
INVERTEBRATE - Coleoptera (Beetles)																										
American Burying Beetle	*Nicrophorus americanus*	Woodland	Grasslands, Forest	NMI	NMI	NMI	1	1	1	1	1	0	0	0	0	1	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
INVERTEBRATE - Hemiptera (True Bugs)																										
a leafhopper	*Polyamia herbida*	Savanna	Sand Savanna	NMI	6	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Polyamia interrupta*	Savanna	Sand Savanna	NMI	6	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Lepidoptera (Butterflies & Moths)																										
a geometrid moth	*Euchlaena milnei*	Upland Forest	Upland Forest	NMI	1	NMI	1	1	1	1	1	0	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
a noctuid moth	*Hadena ectypa*	Savanna	Sand Savanna	NMI	4	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a torticid moth	*Ancylis semiovana*	Savanna	Sand Savanna	NMI	2	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Abbreviated Underwing Moth	*Catocala abbreviatella*	Savanna	Xeric Prairie, Savanna	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
an inch worm moth	*Apodrepanulatrix liberaria*	Savanna	Sand Savanna	NMI	3	NMI	1	1	1	1	1	0	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
a geometrid moth	*Erastria coloraria*	Savanna	Sand Savanna	NMI	6	NMI	1	1	1	1	1	0	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
Buck Moth	*Hemileuca maia*	Savanna	Sand Savanna, Scrub Oak-Pine Sand Barren, Oak Forest	NMI	8	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Carolina Roadside Skipper	*Amblyscirtes carolina*	Floodplain Forest	Moist Forest near Stream or Swamp; Cane	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Creole Pearly-Eye	*Lethe creola*	Floodplain Forest	Forest with Cane	NMI	8	NMI	1	1	1	1	1	1	0	0	0	1	1	NMI	NMI	1	1	1	0	NMI	NMI	NMI
Golden Borer Moth	*Papaipema cerina*	Savanna	Savanna, Hardwood Forest	NMI	2	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Gold-lined Melanomma; Eye-Spot Moth	*Melanomma auricinctaria*	Savanna	Savanna	NMI	2	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Hoary Elfin	*Callophrys polios*	Woodland	Sand Prairie, Woodland	NMI	1	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	1	0	NMI	NMI	NMI
Karner Blue Butterfly	*Lycaeides melissa samuelis*	Savanna	Sand Savanna	NMI	1	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	1	0	0	NMI	NMI	NMI
Lace-winged Roadside-Skipper	*Amblyscirtes aesculapius*	Floodplain Forest	Forest with Cane	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Linda's Roadside-Skipper	*Amblyscirtes linda*	Floodplain Forest	Forest Stream, Cane Stand	NMI	1	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Mottled Duskywing	*Erynnis martialis*	Savanna	Prairie, Savanna, Woodland	NMI	NMI	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Olympia Marble	*Euchloe olympia*	Savanna	Sand Savanna, Open Woodland	NMI	3	NMI	1	1	1	1	1	0	1	0	0	0	0	NMI	NMI	1	1	1	0	NMI	NMI	NMI
Revered Roadside-Skipper	*Amblyscirtes reversa*	Floodplain Forest	Forest Stream, Cane Stand	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Spotted Dart Moth	*Agrotis stigmosa*	Savanna	Sand Savanna	NMI	2	NMI	1	1	1	1	1	0	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
Sprague's Pygarctic	*Pygarctia spraguei*	Savanna	Sand Savanna	NMI	5	NMI	1	1	1	1	1	0	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
INVERTEBRATE - Millipedes																										
a millipede	*Semionellus placidus*	Woodland	Leaf Litter	NMI	1	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Orthoptera (Grasshoppers, Katydids, Crickets)																										
Lichen Grasshopper	*Trimerotropis saxatilis*	Woodland	Bare Rock Surfaces, Woodland	NMI	4	NMI	0	0	1	1	1	0	0	0	0	1	0	NMI	NMI	1	1	1	0	NMI	NMI	NMI
MAMMALS																										
Eastern Wood Rat	*Neotoma floridana*	Floodplain Forest, Woodland, Marsh, Swamp	Forest Edge, Wet Area, Stream Bank, Dense Shrub	7	7	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0
Golden Mouse	*Ochrotomys nuttalli*	Upland Forest	Moist Thickets, Field, Edge	9	8	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Squirrel	*Tamiasciurus hudsonicus*	Upland Forest	Coniferous and Mixed Forest	5	4	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

Green Cities

Description

The Green Cities Campaign of the Illinois Wildlife Action Plan (IWAP) advances habitat conservation and restoration in support of wildlife species within the state's developed metropolitan areas. Metropolitan areas have higher levels of human population density with greater levels of structural development. These areas, however, still sustain significant wildlife and, as a result, having a Campaign dedicated to these areas is necessary to have a complete and effective statewide wildlife management strategy. As of 2014, urban areas in Illinois accounted for 7.4% of the total land area of the state (Figure 7). It is the goal of this campaign to look at the interaction of humans and natural resources to: provide recommendations to protect maintain and enhance resource function and species survival in urban areas; and address urban development patterns to help establish resilient and vibrant Green Cities in Illinois. This document is the collective result of input from multiple Illinois conservation partners (Appendix 3).

Illinois' population is concentrated within a number of urban areas throughout Illinois. Urban areas were isolated first by using the US Census Bureau's Metropolitan Statistical Areas (MSA; http://www.census.gov/population/metro/) designation as primary basis for identification (Figure 8). A Metropolitan Statistical Area has an urban core with a population of 50,000 or more and it can contain multiple counties that either include the core area or are integrated socially and economically into the urban core. Population information for these metropolitan areas is found in Tables 7 - 10. For purposes of this campaign, eight Illinois Metropolitan/Urban Focus Areas have been identified: Rockford Metropolitan Area; Chicago Metropolitan Area; Quad Cities Metropolitan Area; Peoria Metropolitan Area; Bloomington & Champaign/Urbana Metropolitan Area; Springfield/Decatur Metropolitan Area; East St. Louis Metropolitan Area; and Carbondale/Marion Metropolitan Area (Figure 9). The whole of the Metropolitan Planning Area for the Quad Cities, Rockford, Peoria, and East St. Louis have also been included in the Focus areas shown. Please note that these defined areas do not contain the whole of Illinois' expanding communities and all recommendations in this section can be applied to other communities and cities throughout the State of Illinois. This

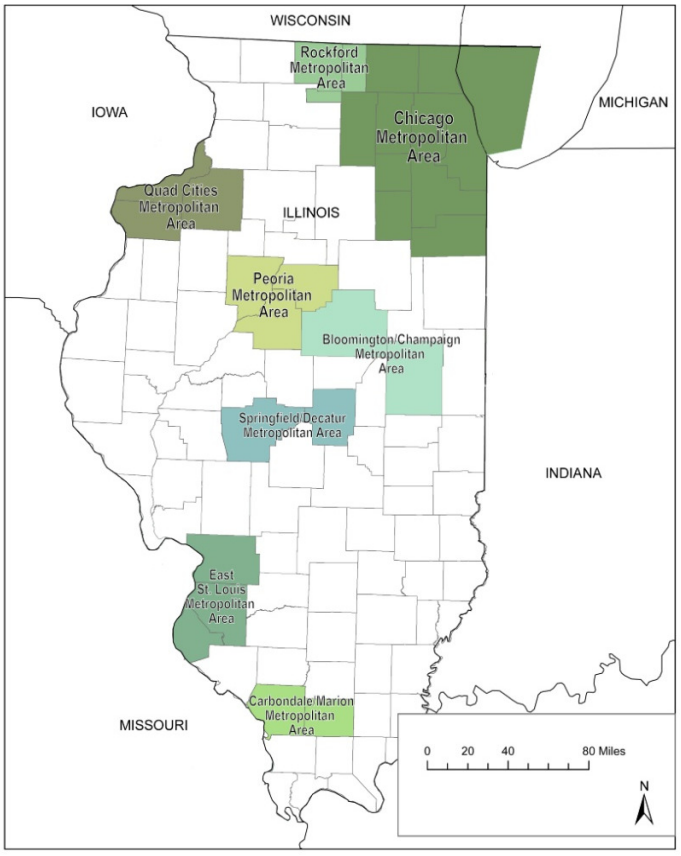


Figure 9. Metropolitan/urban focus areas - Green Cities Campaign.

campaign recommends focusing on the more densely populated urban[1] counties with these actions (http://www.dnr.illinois.gov/conservation/IWAP/Pages/GreenCities.aspx).

Why protect and enhance Metropolitan Area species and habitats in Illinois?

Cities and associated metropolitan areas are becoming increasingly important to global biodiversity conservation. Most cities were originally founded in places that are biodiverse and functionally valuable to society, such as in floodplains, along coasts, on islands, or near wetlands. Today, urbanization continues to expand into these valuable habitats and into the hinterland where society most often placed its biological reserves (McDonald et al. 2008). Species previously outside city limits may need to migrate through urban areas as they adjust to a changing climate (Hellmann et al. 2010).

In general as the world urbanizes we put pressure on species to make use of urban areas—to adapt and colonize. Some of Illinois' metropolitan areas contain important populations of rare species (e.g., Blanding's turtle and the prairie white-fringed orchid occur in the greater Chicago region), made more vulnerable to extirpation by their typically small population sizes and fragmented distribution patterns (McDonald 2013). Terrestrial natural areas in urban settings provide critical habitat for resident and migratory native species but tend to be small and isolated remnants of formerly widespread habitats that are progressively vulnerable to loss and degradation from a host of urban-centric stressors (Kowarik 2011; Cook et al. 2013). Often termed "green" or "natural infrastructure" by urban planners, the ecological functions of these natural areas and other undeveloped or formerly developed spaces provide crucial, but highly threatened, benefits to biodiversity and human communities of metropolitan regions (Goddard et al. 2011; Hostetler et al. 2011; Kattwinkel et al. 2011). Likewise, freshwater biodiversity is threatened by both water withdrawal for urban consumption (McDonald et al. 2011) and the addition of pollutants from urban stormwater, industrial, and residential sources (Alberti 2005; Blanco et al. 2011). These biodiversity impacts are all projected to accelerate as global urbanization trends continue to increase (McDonald 2013).

Twenty-six of the 32 Conservation Opportunity Areas (COAs) in Illinois are partially or totally located within the Metropolitan Statistical Areas of the Green Cities Campaign (Figure 10; Table 11). This means that the bulk of the State's designated COAs are contained or intersect with existing urban and growth/projected growth areas. This is important for several reasons, as these COAs will come under continued threat due to development scenarios over the next several decades. But this also presents an opportunity to strengthen both the COAs and the Green Cities Campaign-- these areas in and around the COA's are where the people are, where the most "on the ground" conservation action is occurring, and where much of the private conservation funding is focused, particularly in northeastern Illinois. Because of the concentration of conservation professionals, concerned citizens and culture of working together to solve local problems, there exists the biggest potential and return on investment for collaboration, and partnerships to address the goals in both the Green Cities Campaign and the COAs.

Beyond benefits to wildlife, it has been repeatedly documented over the last decade that the integration of nature and wildlife habitat into, or back into, our cities and communities has multiple benefits to the social, economic and human health of the urban citizen. The introduction of increased natural resources into city neighborhoods through parks, urban tree canopy, stormwater best

[1] An **Urbanized Area** is a statistical geographic entity designated by the Census Bureau, consisting of a central core and adjacent densely settled territory that together contain at least 50,000 people, generally with an overall population density of at least 1,000 people per square mile (Table 6).

management practices, native plantings, stream buffering and linkages through trails have been shown to produce multiple benefits including; heat island reduction, flood reduction, increased groundwater recharge, and improvement in air and water quality. Along with wildlife benefits the "greening" of urban areas has also been shown to: improve community cohesion, aesthetics, and livability; reduce gray infrastructure costs, increase property values and enhance business districts; improve health and reduce noise pollution and crime; and increase access to and appreciation of nature.

The actions included within this campaign section are provided to help guide the next 10 years of implementation. While not an exhaustive list these actions have been identified to address the Green Cities Campaign. The campaign prioritizes the actions contained in this section as realistic, achievable and most needed within the next 10 years to best aid in meeting the overarching goals of all Campaigns of the Wildlife Action Plan:

1. Establish desired number and distribution of viable populations for each Species in Greatest Conservation Need (SGCN),
2. Manage habitats through promoting natural processes, desired structure, and disturbance regimes for the benefit of native species, and
3. Develop resiliency and connectedness into habitats so species can adjust to landscape and environmental changes.
4. Public will have an awareness, appreciation, and connection to SGCN and their habitats.

Goals

Illinois' Metropolitan Areas support significant populations of SGCN (Appendix 6), which include species identified by the Illinois Endangered Species Protection Board as Threatened or Endangered Species (Figure 12). These Illinois Metropolitan Areas also include a significant number of Illinois Nature Preserves and Illinois Natural Area Inventory sites (Figure 11; Table 12), fall within designated IWAP Conservation Opportunity Areas, and Important Bird Areas (Figure 12). The goals and actions identified within the Green Cities/Metropolitan Areas Campaign are critically important to supporting SGCN and the habitats upon which they depend. And collectively, these Metropolitan Areas provide valuable Statewide linkages for migratory species that are listed as SGCN.

Urban areas continue to expand, both in the Illinois and throughout the world. Cities contain a tremendous number of resources for species that can take advantage of them, and in some cases urban adapted populations exhibit higher survival rates and greater reproduction than their counterparts in more natural landscapes. As such, we should anticipate a wider range of species adapting to and making use of urban areas in the future. The trend towards increasing green space in cities will likely accelerate, providing additional habitat availability and complexity, and creating a wide range of niches for urban-adapted species.

Traditionally, cities have been viewed as biodiversity dead zones, regions hostile to wildlife where animal species might be managed, but never conserved. However, new urban conservation ethics are now emerging, in part due to the rapidly urbanizing nature of the planet, and in part because formerly rare species such as the Butler's Gartersnake and Black-crowned Night-heron (once common, now rare) have been found in metropolitan areas. 'Reconciliation ecology', sometimes called 'win-win' ecology, is the branch of conservation biology devoted to conserving species diversity in the heart of human-created ecosystems. Concepts from landscape ecology, animal behavior, conservation genetics and other fields can be applied to allow for healthy populations of wildlife in cities. These

efforts can increase the connection of urban residents to nature and improve ecological literacy, and also help minimize conflict between humans and animals in urban spaces.

The Green Cities Campaign seeks to elevate the importance of Illinois metropolitan areas for their significant habitats and species diversity, address the need to protect, enhance and expand significant habitat for species in metropolitan areas, and replace former or existing land use policies and development patterns with a new paradigm that values wildlife and the habitats upon which they are dependent.

The Green Cities Campaign Goals:

1. Protect, manage, and restore lands and waters of importance to SGCN.
2. Utilize elements of good preserve design to identify and preserve land that builds and connects large and small blocks of habitat.
3. Integrate wildlife and habitat conservation needs into local and regional planning,
4. Increase the ecosystem services[2] in Illinois urban areas through functioning and resilient natural habitats, connections and corridors, and site-scale practices.
5. Develop citizen awareness of natural resource and wildlife value to promote understanding and support for wildlife conservation.

Status as of 2015

The Green Cities Campaign is not associated to a specific habitat or community type but metropolitan SGCN have benefitted from actions occurring regionally and state-wide in the last ten years. Listed below is a non-comprehensive sample of State and regional actions, policies, and accomplishments reflecting advances for Illinois IWAP since 2005 that have enhanced the State of Illinois and metropolitan areas ability to maintain and protect SGCN and their associated natural habitats.

Region-wide Status

ADDRESSING URBAN CONSERVATION ACTIONS

- **Ecological Places in Cities (EPIC) 2014** - Numerous Illinois agencies, NGOs, educational institutions and conservation organizations are participating in the EPIC Network Steering Committee for Urban Watershed Management**.** EPIC is a joint focus of the two of the US Fish and Wildlife Landscape Conservation Cooperatives: the Eastern Tallgrass Prairie & Big Rivers Landscape Conservation Cooperative (EPTBR LCC) and the Upper Midwest Great Lakes Landscape Conservation Cooperative (UMGL LCC). EPIC's draft mission is: *Provide people living in cities with resources to harmonize people, wildlife, natural and working landscapes and to cultivate the love of life and living systems.* *http://www.tallgrassprairielcc.org/what-we-do/*

Statewide Status

1. ADDRESSING HABITAT ASSESSMENT/ENHANCEMENT ACTIONS

A number of resource agencies in Metropolitan areas have been managing habitats to enhance resource value for SGCN. The following provide valuable update information on the effectiveness of management activities.

[2] **Ecosystem services** are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth.

- **Illinois Natural Areas Inventory Update (INAI) – completed, assessment in progress**
  The INAI is a record of high quality forests, prairies, wetlands, and other significant natural features first conducted in the mid-1970s for the Illinois Department of Natural Resources (IDNR). It was a three-year project conducted by the University of Illinois that identified 1,089 sites as natural areas. These 1,089 sites covered 25,723 acres, which represents only 0.07% of all the land area of Illinois. While the list of INAI sites has been maintained by IDNR since the first inventory was conducted 30 years ago, many changes have occurred. Some INAI sites have been degraded and others added.
- **The Illinois Sustainable Natural Areas Vision (SNAV)** is the corollary to the Illinois Natural Areas Plan written in 1980 following the completion of the first INAI. The SNAV update's primary goal is to set forth a workable, implementable framework for creating a sustainable connected system of natural areas. *http://wwx.inhs.illinois.edu/files/9513/3907/5663/SNAV_Final.pdf*

2. ADDRESSING IMPACTS OF DEVELOPMENT TO WATER

The following studies, strategies, and updates provide guidelines for comprehensive practices to address stormwater and flooding issues including site-based green infrastructure practices and Best Management Practices to achieve infiltration and water quality benefits, directly benefitting urban streams species.

- **The Illinois Nutrient Loss Reduction Strategy** (2015) guides state efforts to improve water quality at home and downstream by reducing nitrogen and phosphorus levels in our lakes, streams, and rivers. The strategy lays out a comprehensive suite of best management practices for reducing nutrient loads from wastewater treatment plants and urban and agricultural runoff. *http://www.epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/nutrient-loss-reduction-strategy/index*
- **Urban Flooding Awareness Act Study** - The IDNR prepared the report completed June 2015 in collaboration with other state agencies, at the direction of the Illinois General Assembly to detail the extent, cost, prevalence, and policies related to urban flooding in Illinois and to identify resources and technology that may lead to mitigation of the impacts of urban flooding. *http://www.dnr.illinois.gov/WaterResources/Documents/Final_UFAA_Report.pdf*
- **Illinois Urban Manual Update 2014** - updated by the Illinois Association of Soil and Water Districts in collaboration with IEPA. It contains criteria for planning, Best Management Practices (BMP) selection, practice standards, construction and materials specifications and evaluation methods. *http://www.aiswcd.org/illinois-urban-manual/*
- **Illinois Environmental Protection Agency Green infrastructure Plan and Illinois Department of Natural Resource Addendum (2010) -** Illinois EPA assessed and evaluated methods for site-scale green infrastructure to help manage stormwater in Illinois. The plan identifies effective best management practices, site-scale green infrastructure standards and institutional and policy frameworks. Department of Natural Resource's Addendum adds large-scale green infrastructure planning elements. *http://www.epa.illinois.gov/topics/water-quality/surface-water/green-infrastructure/index*

3. ADDRESSING NATURAL RESOURCE VALUE OUTREACH

- **OAKtober!** October was designated as a statewide Oak Awareness Month in Illinois in June 2015. The oak ecosystem supports many SGCN in Illinois. Outreach during the month of October calls for individual, organization, community, park district, forest preserve, and public or private landowner or manager to be involved and play an important role in celebrating oaks and oak ecosystems across Illinois throughout the month of October.

4. ADDRESSING RECREATIONAL ACCESS FOR WILDLIFE RELATED ACTIVITIES

The Department of Natural Resources instituted the **Illinois Recreational Access Program (IRAP)**, to increase public access and participation in outdoor activities and enhance public connection to wildlife. The IDNR works with private landowners who open their land for fishing, hunting and nature viewing experiences to the public.

- **Illinois Recreational Access Program (IRAP**), established in 2011, received its second USDA VPA-HIP grant in 2014 and another on August 17, 2015 to lease private land and make it available for public access for specific outdoor activities. Focus areas for leases are northern Illinois in the counties surrounding Cook County and southern Illinois. Metropolitan areas will receive a higher lease rate. IRAP is also working diligently on invasive species removal on leased acres and will be pursuing establishment a mentor database to assist new and inexperienced hunters. For every leased dollar spent, 3 more dollars are spent on habitat management practices. *http://www.dnr.illinois.gov/conservation/IRAP/Pages/default.aspx*

Metropolitan/Urban Area Status (within specific Urban Focus Areas)

1. NATURAL RESOURCE PLANNING & ASSESSMENT

A. Chicago/Northeastern Illinois Metropolitan Area:

- **The Ramsar Convention designated The Chiwaukee Prairie Illinois Beach Lake Plain as a Wetland of International Importance in September 2015**. The 3,914 acres lake plain includes 15 miles of Lake Michigan coastline straddling the Wisconsin and Illinois borders. Partners in preserving and managing the site include: Illinois and Wisconsin DNR, UW-Parkside, the villages of Pleasant Prairie and Winthrop Harbor, Zion and Waukegan Park Districts, and the Lake County Forest Preserve District. The Lake Plain provides critical stopover habitat for over 310 migratory bird species, and supports six globally rare community types and two federally protected wetland species - the threatened and rare eastern prairie fringed orchid (*Platanthera leucophaea*) and the habitat for the federally endangered piping plover (*Charadrius melodus*). *http://www.ramsar.org/wetland/united-states-of-america*
- **GO TO 2040 Plan, Chicago Metropolitan Agency for Planning (CMAP*)*** – 2008. Funded by a Federal HUD Sustainable Communities grant, CMAP completed a three-year intensive community public engagement process that called for investment in existing communities and emphasizes development that is more compact and "livable." CMAP recommended making significant, criteria-based investments in parks and open space including adding an additional 150,000 of preserved open space and providing functional connections using the green infrastructure network as a design concept. *http://www.cmap.illinois.gov/about/2040/supporting-materials/process-archive/regional-vision*. CMAP is currently working on the plan update and has developed numerous sustainable development resources in addition to this plan. *http://www.cmap.illinois.gov/about/updates/policy*
- **The Chicago Wilderness Green infrastructure Vision (GIV),** 2012. First regionally assembled GIS-based natural resource map and plan for the Chicago Metro area. Resource mapping is extended beyond Illinois state borders to include CW region's portions of Indiana and Wisconsin, in recognition of watershed boundaries and linkage impacts. Links to the full GIS data download and The Field Museum interactive mapper are available at: *http://www.chicagowilderness.org/?page=publicationsnew*

- **Quantifying resource benefits: Chicago Metropolitan Agency for Planning Ecosystem Valuation – 2015.** The Conservation Fund, CMAP, and Chicago Wilderness conducted an ecosystem service valuation of the GIV landscapes in CMAP's seven county region. The project quantified the ecosystem and economic benefits of the region's green infrastructure. Some of the measured ecosystem services provided by green infrastructure, using the GIV, included flood reduction, air and water pollutant removal, biodiversity, and carbon sequestration, and capture the monetized value of those ecosystem functions to communities. *https://datahub.cmap.illinois.gov/dataset/green-infrastructure-vision-2-3-ecosystem-valuation*
- **The Chicago Regional Trees Initiative, The Morton Arboretum -** was established in 2013 by Chicago region partners working together to develop and implement a strategy that builds a healthier and more diverse urban forest by 2040. A coalition of agency, industry, and community representatives are working together to expand the understanding of the value of the region's trees and to make meaningful tree and forest improvements in the region. This information will be transferrable to other urban areas. *http://www.mortonarb.org/science-conservation/chicago-region-trees-initiative*
- **Oak Ecosystem Recovery** – Chicago Wilderness, in collaboration with The Morton Arboretum and Lake County Forest Preserves, has developed and is implementing a regional work plan for the Chicago Wilderness Oak Ecosystems Focus Area. Mapping of remnant oak woodlands and savannas for Northeast Illinois was completed in 2015 as a first step in the process, with the following short-term actions for the near future: expand mapping of remnant oak ecosystems to the rest of the Chicago Wilderness Region of Southeast Wisconsin, Northwest Indiana, and Southwest Michigan; establishment of priority areas; compilation of baseline data; assessment of research gaps; selection of relevant metrics; prioritization of land management needs; identification of key partners and audiences and incorporation of climate considerations. Five-year goals, including health status, trends, and tracking, are being developed. *http://www.chicagowilderness.org/?page=OakEcosystemsFocus*
- **Bird monitoring as a resource for habitat restoration and management decisions –** the Bird Conservation Network, in collaboration with Chicago Region Forest Preserve Districts, Park Districts and other major public and private landowners, implemented a comprehensive and robust regional bird monitoring program (The BCN Survey) beginning in 1999. The Survey has amassed a large volume of breeding bird data, collected by volunteer bird monitors of the Region. A key goal of this analysis is to learn the regional population trends of the Region's breeding bird species to improve land management practices, educate the public, monitor species of concern, etc. An updated statistical analysis of the ongoing program results is conducted every 2 to 3 years. http://www.bcnbirds.org/trends13/index.html

B. Rockford Metropolitan area:

- **Winnebago & Boone Counties Greenway Map and Plan** - 2006, updated 2014. Adopted into the Winnebago County 2030 Comprehensive Land Use Map. County conservation partners worked with Winnebago County GIS (WinGIS) to assemble the natural resource layers of Winnebago and Boone Counties to create a greenways map. The core concept of the plan is green infrastructure connections that will create a

corridor of open space for public enjoyment as well as a place for plant habitation and movement of animals. *http://ims.wingis.org/Greenways/*

- **Winnebago Natural Resource Inventory** (NRI) map developed by Winnebago County Planning Department with input from multiple resource agencies to accompany the 2030 Comprehensive Land Use Map. *http://ims.wingis.org/OtherResources.aspx*
- **Rock River National Water Trail** was designated in 2010 by the National Park Service with the assistance of local area citizens. Through public and private partnerships, the *Rock River Trail Initiative* develops, maintains, and promotes the Rock River Water Trail to provide enhanced recreational opportunities for all to enjoy. *http://rockrivertrail.com/*

C. East St. Louis Metropolitan Area

- **A Roadmap for Green infrastructure 2013 -** lead by The Heartlands Conservancy and involving agencies, businesses, corporations, municipalities and conservation stakeholders in cooperative planning for a vision of a regionally connected green infrastructure system for a more resilient region. The Heartlands Conservancy has this resource, and other resources available on their site. *http://issuu.com/heartlandsconservancy/docs/13-12-green_infrastructure_roadmap_*
- ***O*neSTL -** funded by HUD Sustainable Communities Regional Planning Grant, this plan was developed through a collaborative process led by the East-West Gateway Council of Governments. It provides a regional framework for sustainable development that citizens, non-profit organizations, businesses, and local governments can use to make better use of resources and better meet the aspirations and needs of residents, and toolkits for getting there. *http://www.onestl.org/*

D. Quad Cities Metropolitan Area

- **Upper Mississippi Conservation Opportunity Area Plan (2012)** – gathered cooperative, collective input from a wide spectrum of local conservation partners do develop a plan for this COA. *http://prairierivers.org/wp-content/uploads/2013/01/UMR-COA-Master-Plan-Version-3.pdf*

E. Springfield/Decatur Metropolitan Area

- **Lake Springfield Watershed-based Plan and BMP Implementation (2014)** - A half million dollar project underway to put together one of the most comprehensive watershed plans in Illinois. The project will implement best management practices (BMP) in the Lake Springfield watershed to reduce nonpoint source pollution, soil erosion, and nutrient and sediment loadings in order to improve water quality in Lake Springfield and its watershed. Major funding came from IEPA through a 319 grant. A 170,000-acre watershed, Lake Springfield is a major drinking water source for many communities in Sangamon County.

2. HUMAN AND WILDLIFE INTERACTIONS

- **The gray wolf, American black bear and mountain lion (cougar) came under the protection of the Illinois Wildlife Code on Jan. 1, 2015.** IDNR was given the authority to manage these species for the protection of both wildlife and public safety.

Historically present in Illinois, this bill was prompted by increasing sightings and incidents in the state.

- **Large Carnivore Workshop, 2014,** Chicago Wilderness Alliance, IDNR and USFWS convened a large carnivores workshop as a first step in developing a coordinated, regional strategy to living with these species.
- **The Urban Wildlife Institute**, based at Lincoln Park Zoo, studies the interaction between urban development and the natural ecosystem to develop scientific standards for minimizing conflict between these overlapping areas. Landscape ecology, population biology, epidemiology, endocrinology, veterinary medicine and other core disciplines contribute to an increased understanding of ecosystem health in an urban setting. *http://www.lpzoo.org/conservation-science/science-centers/urban-wildlife-institute*

3. CLIMATE ADAPTATION

- **Chicago Wilderness Climate Action Plan for Nature** - the region's first analysis of how to navigate the complexities of nature conservation in a world with a changing climate.*http://www.chicagowilderness.org/resource/resmgr/Publications/CW_CAPN_Action_Strategies.pdf*
- **Climate Change Update to Chicago Wilderness Biodiversity Recovery Plan –** Analysis of how climate change impacts critical biodiversity in the Chicago region, providing initial strategies for adapting to changing climate. Information are both studies above available at: *http://climate.chicagowilderness.org/index.php?title=Introduction#Box1*
- **Chicago Climate Action Plan** - 2008. City of Chicago in conjunction with The Field Museum and other area resource experts and local stakeholders identified climate considerations and goals for the Chicago to the Year 2050. *http://www.chicagoclimateaction.org/*

Stresses and Threats to Wildlife and Habitat

Illinois' large population of 12.8 million is identified in the 2010 U.S. Census figures as being 88% "urban." And though figures and definitions of urban areas can vary, the primary message is that most of Illinois' population, as it is across the nation, is economically linked to central urbanizing communities for work and goods and services. As noted above, many of these metropolitan areas were originally targeted for settlement based on their abundant resources. The impact of development in these metropolitan areas has included loss, degradation, and/or fragmentation of wildlife habitat and has degraded the ecosystem services provided by our lands and waters. Despite these impacts, Illinois metropolitan areas support a disproportionately large number of SGCN in protected and unprotected habitats that materially add to the quality of life of those who live in metropolitan Areas.

With close to 7000 units of local government, more than any other state in the nation, Illinois jurisdictional landscape is often noted for its fragmentation. This can be particularly apparent in land use planning, with development decisions made at the smallest local scale. Where other areas of the country can collaborate under a regional authority, allowing for comprehensive planning on scales such as watersheds, Illinois jurisdictions operate within their own boundaries, making cross-jurisdictional planning difficult or non-existent. Decades of fractured development have led to degraded water quality and polluted urban streams, flooding and stormwater issues, and loss of

valuable habitat. Targeted actions will require collaboration between area conservation stakeholders to address the stressors and begin to change the standard development climate. Steps include the need to organize as a conservation community, inventory and set conservation goals, and begin to educate and assist jurisdictions in charge of development.

Both urban development and agricultural practices put further stresses on Illinois wildlife through increased loss of habitat, nutrient loads, pesticides and erosion. Approximately 27 million acres or 75 percent of Illinois' total land area is under agriculture, with approximately 89 percent of Illinois agricultural land suitable for growing commodity crops (*http://www.nass.usda.gov/Statistics_by_State/Illinois/Publications/Farmfacts/farmfact.pdf)*.

Removal of fencerow habitat and increased drainage of farmed wetlands continues to add to the loss of remnant habitat for many SGCN species (Figure 13). The monoculture in so much of our landscape has made remnant habitat protection in urban areas even more critical to Illinois SGCN.

In recent years, Illinois' population movement and development have primarily occurred in suburban areas on the fringes of larger metropolitan areas. Though the pace of sprawl development has slowed, this urban fringe pattern continues, increasing the amount of developed land and degrading and fragmenting already limited wildlife habitat. Lack of integration of natural resource function in development patterns continues to exacerbate flooding, water quality impairments, exposure to invasive species, and heat and atmospheric pollutants. Illinois metropolitan areas are also hubs for transportation of goods and products resulting in increased vulnerability to foreign invasive pests, pathogens and species. There is a critical need to improve urban planning efforts to include open space and wildlife needs into metropolitan areas but there are numerous obstacles and threats that need to be addressed.

See other Campaigns for additional stressors identification for specific habitats and issues.

Habitat Stresses:

Extent (amount of habitat)

- Loss of species habitat due to competing human demands on land use.

Fragmentation

- Fragmentation of habitats from roads and development that degrade land and water resources, inhibit species movement, and increase edge effect impacts on SGCN.
- Loss of historic canopy cover and important urban migratory stopover habitat.

Disturbance/Hydrology

- Alteration of surface and groundwater hydrology adversely effecting water and groundwater hydrology, water quality, water temperatures, and water quantity.
- Stress on critical water and groundwater-dependent habitats and associated species through increasing competition on water resources.

Invasive/Exotic species

- Urban ports of transportation and goods that facilitate introduction of foreign invasive pests, pathogens and species increasing vulnerability of SGCN.
- Rapid spread of invasive species through maintenance and landscape practices

Pollutants – Sediment/Nutrients

- Increase in heavy rainfall events with increases in stormwater volume, velocity and sedimentation.
- Nutrient, pharmaceutical and other pollution from wastewater and other point source discharges, affecting stream and wetland SGCN.

Composition-structure

- Loss of tree species of high resource value for SGCN, such as Oaks
- Lack of financial resources to protect, manage and restore high quality resource habitats.

Community Stresses:

Predators

- Increase in urban adapted meso-predators adding to vulnerability of SGCN to predation.

Parasites and Disease

- Spread of emerald ash borer and other disease.

Population Stresses:

Recruitment

- Poor regeneration rates of existing high habitat-value woodlands and forests.

Direct Anthropogenic Stresses:

Killing

- Declines in insects and pollinators due to loss of native plant and tree species, insecticide use, and urban monoculture landscape practices.

Disturbance, Structures-Infrastructure

- Lack of urban tree canopy diversity and tree canopy loss due to poor selection and planting practices.
- Lack of effective urban deer management programs to counter effects of deer browse and overpopulation.
- Increasing conflict between humans and wildlife species. (e.g. deer collisions, coyote, other meso-predator conflicts).

Structures – Infrastructure

- Loss of aquatic species habitat and spawning connectivity from dams, culverts and channelized streams.

Climate Change

- Climate change that is expected to compound and exacerbate existing stressors.

Other

- Diminished recreational access resulting in a public not connected to the natural world.
- Lack of public understanding of the value of nature and necessity of functioning natural systems for wildlife and human health and well-being.
- Lack of municipal strategic plans that include and prioritize wildlife and habitat protection - failure to recognize natural resource value and function.

- A fragmented, competitive, and disparate development atmosphere that discourages regional or watershed-wide planning implementation.

Focal Species and Associated Actions

Focal species are a set of species selected for each campaign to represent the larger suite of SGCN addressed by the campaigns. They will be the primary focus of monitoring efforts to determine the success of campaign actions. Focal species were selected to represent specific habitat dependence or a species guild that has important conservation value, and are likely to show measurable change in response to campaign actions taken in the timeframe of this plan. Focal species were also selected because populations are currently being monitored in some way or could reasonably be monitored effectively and efficiently. The IWAP recognizes that there are limitations to accomplishing the recommended conservation and monitoring activities outlined in the Campaigns imposed by the availability of funding and existing staffing levels.

Multiple conservation partners participated in Metro or statewide urban focus groups develop the focal species and priority habitat sections (Appendix 3). Partners in developing the Green Cities Focal Species have selected the following species as representative species to monitor the effectiveness of conservation actions for the associated habitats.

STATE-WIDE - FOCAL SPECIES FOR ALL URBAN AREAS:

As noted previously in this Campaign, metropolitan areas in Illinois are playing an increasingly important role for Illinois SGCN species, and the following three focal species have been identified for metropolitan Areas on a statewide basis.

1. Urban migratory stopover habitat - Focal species: Neotropical Migrants

Urban areas in Illinois provide valuable stopover habitat for migrating birds (Table 13). Many bird species that breed in the boreal forest and winter in the neotropics rely on habitats in Illinois to replenish fat reserves. In many areas of the state, agricultural and commercial development has left little in the way of wooded habitat that migrants can use. Urban areas represent a wooded canopy and understory in which many birds stop while migrating. Several Important Bird Areas (Figure 12) as designated by the National Audubon Society are stopover habitats within cities (Busey Wood, Urbana; Chicago lakefront parks; Ewing Park, Bloomington, etc.). Large patches of natural habitat are the best resources for these migrants, but any patch of greenspace has value from city and county parks to corporate campuses, cemeteries and schoolyards, to trees along residential streets.

Actions:

- Research urban area's value for migrating birds.
- Expand large scale monitoring of urban/suburban area neotropical migrant bird populations in Illinois metro areas (e.g. Bird Conservation Network; *http://www.bcnbirds.org/trends13/index.html*)
- Urban and suburban habitats can be improved to make cities friendlier to migrating birds. As an example, the city of Chicago has an agreement with the US government to conserve birds, especially migrants, within the city (*http://www.fws.gov/migratorybirds/partnerships/urbantreaty/urbantreaty.html).* It focuses on improving habitats for birds and reducing the hazards birds face from human

infrastructure (e.g. windows strikes on buildings and communication towers (*www.bcnbirds.org*).
- Prompt planting of specific tree species. Not all trees and shrubs in urban areas are of equal value to migrating birds. Research suggests that hardwoods such as oak and hickory support greater insect biomass and are preferred by migrating birds, while fast growing trees such as ash and elm hold less value for birds.
- Encourage pet owners to keep their cats indoors.
- Plant native trees and shrubs. Local bird clubs have on-line documents that provide suggestions for improving urban and suburban habitats, including planting lists (*http://www.bcnbirds.org/greenpapers_files/GPflyway.html)*.

2. Pollinators – Focal Species: Monarch Butterfly

Native pollinators (particularly bees and butterflies) are critical to the maintenance of biodiversity, and unique opportunities for their conservation exist in metropolitan areas. Pollination of flowering plants provides food for both humans and wildlife, including species of greatest conservation need. Pollinators are also an important food source for migrating birds, which are also a conservation target in metropolitan areas. Because of the key roles pollinators play and the emerging threats they face, many pollinators are themselves now a priority for conservation. For example, once-common species such as the Rusty-patched Bumblebee (*Bombus affinis*) and Monarch Butterfly (*Danaus plexippus*) are currently found in metropolitan areas of Illinois, but they are experiencing precipitous population declines across their range and have been considered for listing under the federal Endangered Species Protection Act. Widespread pollinator decline has been recognized at the highest levels of government, with a Presidential Memorandum on Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators issued in 2014. Native insect pollinators rely on the presence of high quality plant habitat that contains appropriate nesting sites, host plants, and a diverse array of native wildflowers for nectaring (Murray et al. 2009; Tonietto 2015, USDA). Opportunities to increasingly support the conservation of native pollinators in metropolitan areas are directly linked to providing diverse native plant communities. As such, efforts should focus on: 1) managing natural areas for native plant diversity; 2) restoring degraded habitat to support native plant and pollinator diversity; and 3) enhancing landscaping around homes, businesses, and along roads to incorporate native plants (Scheper et al. 2013, Tonietto, 2015).

Conservation of bees and other important insects requires habitat that includes adequate food and nesting areas. Most bees and other insects do not generally fly long distances. For this reason, many small plots across a large area may be more desirable than one native prairie park several acres in size surrounded by miles of lawn and non-native landscape. Such small plantings in a home flower bed or near a public building or commercial property can provide large amounts of pollen and other resources. Many bees are dependent upon pollen from only a few plants to meet the nutritional requirements of their larvae. Further, the availability of floral resources throughout the year requires plantings that incorporate species with varied bloom times. For these reasons, diverse plantings of native species in metropolitan areas would be an important means of supporting diverse communities of native bees and other insects (Table 14).

Actions:

- Conserve existing pollinator habitat areas.
- Restore/create habitat areas for pollinators in urban landscapes – incorporate plant species with varied bloom times.

- Use integrated pest management to reduce pesticide exposure.
- Survey and inventory pollinator taxa in urban areas.
- Include pollinator data in state Natural Heritage databases and NatureServe.
- Development of S-ranks and G-ranks for pollinator species.
- Work with partners to develop and implement community outreach programs.
- Address roadside/right-of-way mowing practices and habitat establishment for pollinator corridor opportunities.
- Coordinate with US Fish and Wildlife and the Eastern Tallgrass and Big Rivers Landscape Conservation Cooperative on the regional Monarch and pollinator initiative.

3. SGCN that thrive in urban areas - Focal species: Common Nighthawk

Urban environments support a unique assemblage of species, some of which are Species in Greatest Conservation Need. These species include Common Nighthawk, Peregrine Falcon, Black-crowned Night-Heron, and Chimney Swift. While each species has unique requirements, one species whose population has been declining at an alarming rate is Common Nighthawk. Nighthawks are an aerial insectivore that specializes on larger insects such as moths. The decline in habitats that support insects (i.e., pollinators) may be a contributing reason for the rapid decline of this species. While the species continues to breed in native sand prairies, the bulk of its population in Illinois resides in towns, in which they nest on rooftops. While nesting on rooftops eliminates the threat from many terrestrial nest predators, changes in the materials used on roofs (nighthawks prefer gravel roofs) may be limiting nesting habitat. Nighthawks are also vulnerable to being hit by cars as they forage over roads or roost on roadways at night (State of the Birds Report, 2014). Common Nighthawk breeding distribution is highly concentrated around major cities in the eastern U.S. Threats include reduction in mosquitoes and other aerial insects due to pesticides, and habitat loss including grasslands, open woods and flat gravel rooftops in urban/suburban areas.

Actions:

- Research/Investigate other conservation methods. Some success has been reported by creating nesting habitat by placing gravel pads in the corners of rubberized roofs and by burning and clearing patches of forest to create open nesting sites.
- Restore habitats (e.g. landscape with native plants) that support insect populations in urban areas; robust insect populations would likely benefit nighthawks.
- Reduce pesticide application (e.g. area-wide mosquito spraying) to help promote a robust insect community, and benefit Nighthawks.

Focus Areas and Associated Actions

At the time of this update in October 2015, two Metropolitan Areas, Rockford and Chicago, have completed a process to identify Priority Habitats and Focal Species for their area and are included in this section. It is recommended that other Metropolitan/Urban Focus Areas also undertake identification of priority habitats and focal species for inclusion in the Green Cities Campaign.

ROCKFORD METROPOLITAN FOCUS AREA - Priority Habitats and Focal Species

Rockford Metropolitan Area: Boone, Winnebago, and Ogle Counties.
Rockford Metropolitan Area lies at the boundary of three Natural Divisions of Illinois, the Northeastern Morainal, the Rock River Hill Country and the Grand Prairie. It includes three designated Conservation Opportunity Areas (COA): Sugar-Pecatonica Rivers, the Coon Creek/Kishwaukee River, and the Rock River. The Rockford Metropolitan Area is extremely rich in natural habitat, Species of Greatest Conservation Need, and water resources. It is the confluence of four major river systems in northern Illinois and includes several important coolwater streams. The four rivers, which form the framework for the natural resource plans for the area, are the Sugar, Pecatonica, Kishwaukee (North, South and Main Branches) and Rock. The Sugar and Kishwaukee rivers are biologically significant streams; highly valued for their natural and recreational resources and hold rich fish and mussel populations. The four rivers have very different hydrology and geomorphology, and as such each have different goals, focus species and actions.

The Rockford Metropolitan Agency for Planning (RMAP) has produced the Boone and Winnebago Greenways Plan, and a Sustainable Development Plan for Boone and Winnebago counties and RMAP has recently expanded its planning area to include the City of Byron in Ogle County. Decades of efforts to acquire land for parks, forest preserves and conservation areas in the region have resulted in the preservation of thousands of acres of land along the four rivers for public recreation and wildlife. The Rockford and Belvidere Park Districts own several parks along the Rock and Kishwaukee rivers, including important habitat for wildlife. The Forest Preserves of Winnebago County, Byron Forest Preserve District, Natural Land Institute, IDNR and the Boone County Conservation District own thousands of acres of important wildlife habitat in the region.

Groundwater is the sole source of drinking water for the region, and provides significant base flow to the rivers, creeks and wetlands of this area. The Illinois Groundwater Protection Act recognized the unique geomorphology of this region and identified this specific area as an objective of its initial focus with IEPA establishing the Northern Regional Groundwater Protection and Planning Committee in the late 1980's. This committee is involved in regional planning efforts in Winnebago, Boone and McHenry counties to protect groundwater and provide expertise to local officials.

Priority Habitats and Focal species for Rockford Metropolitan area

1. STREAMS AND RIVERS - FOUR RIVERS AND RIPARIAN AREAS

    Riparian habitat in the Rockford metro area is abundant, with four major rivers flowing through the area. The habitat value of these streams—both in terms of water quality and hydrologic character—varies widely, though. The best habitat occurs within the Kishwaukee River and Sugar River drainages, which harbor a number of species of greatest conservation concern. One such species, the Black Sandshell mussel, was once widespread in these counties and likely occurred in all but the smallest streams; today, it is restricted to the relatively clean waters of the Kishwaukee River. Pollution represents the greatest threat to

this species, particularly nutrient pollution from agricultural runoff. The Rock River is a major corridor for migratory waterfowl and Neotropical birds, while the east-west flowing Pecatonica and Kishwaukee Rivers provide vital stopover habitat for migrating birds. The extensive forests and wetlands in the Pecatonica River valley have been recognized by the U.S. Fish and Wildlife Service, The Nature Conservancy and the IDNR as important habitat for migratory birds. For all river corridors it is important to address and monitor point (e.g. wastewater treatment discharge) and non-point (e.g. road run-off) pollution.

Over all Focal Species for all Four River Watersheds: River otter and bald eagles. Once extirpated from the region, river otters were reintroduced to the area, and now healthy populations are found in all four-river systems. A single Bald Eagle nest along the Pecatonica River expanded to breeding pairs on every one of the four rivers in the region. Bald Eagles are now a common sight flying along the Rock River in downtown Rockford, Rockton, Belvidere and Byron. Additional focus species are listed below for each of the four rivers.

Kishwaukee River Watershed

The Kishwaukee River is a high-quality, groundwater-fed glacial outwash river, with portions classified by the Illinois Department of Natural Resources as class A. The North and South branches of the river converge in Winnebago County at Blackhawk Springs Forest Preserve. It has been a priority of open space agencies in the Rockford metro area to protect lands along the Kishwaukee River to preserve habitat communities, protect water quality, and limit run-off. Immediate threats to the entire watershed come from development due to access from I-39, the Chicago-Rockford Airport, the Winnebago County Landfill and economic growth potential of Rockford and Belvidere. The entire Kishwaukee River watershed offers a diverse range of habitats from floodplain forest, upland forests, sedge meadows, oxbows, and many prairie communities. There are large sections along the Kishwaukee River with steep slopes and a few cliff communities. Unique upland forests and exposed rock outcroppings provide a diverse range of plant and bird species. The river itself holds a diverse mix of mussels and fish.

Focal species: Black Sandshell Mussel. Actions would also benefit Osprey, Black-billed Cuckoo, Red-Shouldered Hawk, Cerulean Warbler, Smallmouth Bass, Cope's Grey Tree Frog, River Otter, and Blanding's Turtle.

Actions:

- Accelerate land preservation and active management.
- Establish buffer areas.
- Install erosion and run-off controls.
- Use prescribed fire.
- Control invasive species.
- Protect groundwater to assure continued stream baseflows.
- Reduce nutrients and pollution from wastewater plants (ammonia, sediment, other) for pollution sensitive mussels and fish.
- Monitor water quality, species richness, and population numbers.

Pecatonica/Sugar Rivers Watersheds

The Pecatonica River is a tributary of the Rock River. The Sugar River is a tributary of the Pecatonica River. The Pecatonica River is a low gradient, meandering, deep muddy river while the Sugar River is clean, shallow, swift and sandy. Both rivers have many oxbows and floodplain wetlands associated with them. Extensive floodplain forest is found within this

watershed. Many of the wetlands that once occurred here have been drained for farming through ditches and tiling. Invasive species, such as Reed Canary grass, are a major problem in the floodplain wetlands.

Focal species: Pileated Woodpeckers. Actions will also benefit: Sandhill Cranes, Black-crowned Night-Herons, River Otters, Blue-spotted Salamanders, Fragile Papershell Mussel, and Pistol Grip Mussels, American Bittern and Blanding's Turtle.

Actions:

- Protect additional land to create large blocks of forest habitat.
- Fill drainage ditches and break drain tile to rebuild wetlands where feasible.
- Provide large buffer areas to filter water to enhance water quality.

Rock River Watershed

The Rock River, extending from the Rockton Dam to the Oregon Dam, has sculpted the lands lining its banks into a variety of important habitats, ranging from sandbar islands and shallow, rocky riffles to flood plain forests and scenic, forested limestone bluffs. It harbors many species of fish, and many more species of birds, both nesting and migratory. This stretch of the Rock encounters urban, rural, and natural areas. Industrial, and municipal discharges, agricultural runoff, highways, railways, and the Rockford Airport all can impact water quality of the river. The series of dams on the Rock River are known to isolate fish and prevent them from reaching important spawning areas. The recently designated *Rock River National Water Trail* is an opportunity under which to coordinate actions (*http://rockrivertrail.com/*).

Focal species: Walleye, a fish native to the upper Rock River and stocked in the river in the past, is a highly sought-after sport fish by anglers. It plays a key role as a predator and also as a nutritious prey species for Bald Eagles and Ospreys. Walleye are also a host for the Fatmucket, a mussel known to be an important food source for River Otters.

Actions:

- Coordinate transportation project planning along the Rock River corridor - especially Illinois Route 2.
- Limit erosion and runoff from agricultural and urban areas.
- Adopt special regulations on walleye fishing (i.e. lowering the bag limit, adding a slot limit, special seasonal regulation of night fishing at dams).
- Remove or modify barriers to fish migration.
  Identify and prioritize valuable habitats and lands.
  Install wetland restoration projects, particularly in conjunction with the Rock River corridor.

Cool Water Streams

Kinnikinnick, Beaver, Coon, Raccoon, Mosquito, Piscasaw, and Kilbuck creeks are tributaries to the four rivers, and provide high quality habitat for many species of wildlife in greatest need of conservation, including healthy populations of mussels and cool-water species like Mottled Sculpin, *Cottus bairdii*. Mottled Sculpin are found in tributaries of the Kishwaukee and Rock River. Historically, there were Mottled Sculpin in Kinnikinnick Creek and Raccoon Creek. Stream modifications have altered groundwater inputs and the natural hydrology of the streams. Barriers to fish movement include low-head dams and culverts with elevation drops. Bottom substrates and benthic invertebrates are susceptible to smothering from

sedimentation. Drainage activities and removal of native riparian vegetation buffers accelerate erosion and overland transport of sediments into streams.

Focal species: Mottled Sculpin

Actions needed to protect the natural hydrology, and water quality of the coolwater streams in the region include:

- Complete an inventory of streams in region to document existing populations of Mottled Sculpin and other cool-water fish species.
- Monitor groundwater supplies and characterization (e.g., temperature and salt pollution from septic systems and road run-off), and monitor groundwater extractions.
  Promote recharging of regional aquifers by allowing more precipitation into the ground.
- Encourage use of native vegetation that helps draw water into the soil.
- Remove or modify barriers to fish migration.

2. OAK WOODLANDS

Oak Savanna

Oak savannas are some of the most important communities in the region. Many savanna areas were cleared for agriculture and developed for towns and villages while remaining savannas quickly turned into dense forests after wildfires were stopped. Some efforts have been made to restore savannas where remnants exist and to recreate savannas from bare ground by planting trees and native prairie species together (e.g. at the Nygren Wetlands complex). Many urban parks retain savanna-like tree structure, but lack the native understory and ground layer species. Limiting factors that land managers face are controlling the deer and rodent populations, very slow growth of oak trees, and the continuous battle with exotic and invasive species.

Focal species: Red-headed Woodpecker. Actions for this species will also benefit Brown Creeper.

Actions:

- Control invasive species.
- Increase fire frequency.
- Create savanna areas as buffer zones between prairies and woodlands.
- Promote oak regeneration.
- Acquire and build large continuous tracts of land.

Oak-Hickory Woodland

Oak-Hickory forests were once common in the Rockford metro area, but have been reduced to scattered remnants due to clearing, and residential development. The few remnants that remain are small, disconnected and degraded by past grazing, lack of fire and invasive species like bush honeysuckle and multi-flora rose. Regeneration of oaks and hickories is low to non-existent, and remnant woodlands are slowly being taken over by sugar maple, black cherry and other shade-tolerant species. A large number of neotropical migratory birds are dependent upon healthy oak-hickory forests for breeding.

Focal Species: Ovenbird. Expansion and regeneration of oak-hickory woodlands will also benefit Wood Thrush and Broad-winged Hawk.

Actions:

- Inventory oak-hickory woodlands in the Rockford metro area and evaluate their health.
- Develop management tools to regenerate oaks and hickories.
- Remove invasive trees and brush, and restore understory species.
- Connect and expand blocks of upland oak-hickory forests where possible to increase habitat for neotropical migratory birds.

3. GRASSLANDS

Upland grasslands once dominated the landscape in the Rockford Metro area. Very few remnants exist to this day and almost all native grasslands are re-created. Challenges with re-creating grasslands and managing them are the continued threat from invasive and exotic species, lack of diversity, and performing routine management activities. One of the biggest limiting factors on the recovery of some to these species is fragmentation. Management and protection of these species require setting aside large tracts of land, having good travel corridors, management that promotes plant diversity, invasive species control, and implementing a regular fire regime.

Focal species: Dicksissel. Actions will also benefit Bobolinks, Henslow's Sparrows, Green Snakes, Badgers, Franklin's Ground Squirrels, and Monarch Butterflies.

Actions:

- Protect and acquire more land that can be restored to grasslands.
- Increase diversity of grassland plant species.
- Maintain habitat long term by improving burn regiment and invasive control.

CHICAGO METROPOLITAN FOCUS AREA - Priority Habitats and Focal Species

Chicago Metropolitan Area:
McHenry, Lake, DeKalb, Kane, Cook, DuPage, Will, Grundy and Kankakee Counties.

The Chicago Metropolitan Area lies with two defined natural divisions: The Northeastern Morainal Natural and Grand Prairie Division. The Northeastern Morainal Natural Division, covering much of DuPage, Kane, Lake, McHenry, and Will counties, contains a landscape of the most recently glaciated portion of Illinois. Four distinct Sections within in the Division are recognized due to variations in topography, soil, glacial activity, flora and fauna. Drainage is poorly developed in some areas, thus abundant marshes, natural lakes, and bogs are distinctive features. Other areas have well-drained glacial outwash soils with seeps, fens, and springs. This area holds the unique Chicago lake plain and ancient beach ridge, bluff and panne communities, along with most of Illinois' glacial lakes and a significant number of the State's remaining wetlands and savannas. Higher gradient streams flow over gravel, cobble, and bedrock, providing good substrate for habitat and more stable stream bed characteristics compared to than many older' regions of Illinois with loess-dominated soils. Stable, rocky substrate, combined with significant ground water flow in some areas provides unique coolwater conditions for excellent gamefish populations and diverse non-game communities.

On the outer ring of the Chicago Metropolitan area are Kankakee, Grundy, Kendall and DeKalb Counties that lie primarily within the Grand Prairie Natural Division. The Grand Prairie Natural Division of central and east-central Illinois is a vast plain formerly occupied primarily by tallgrass prairie, now converted extensively to agriculture. Natural drainage of the fertile soils was poor, resulting in many marshes and potholes. This area includes Kankakee Sands, Pembroke Savannas, Kankakee River and Momence Wetlands Areas with opportunities for habitat restoration of black oak sand savanna, sand prairie and sand flatwoods communities, and in-stream restoration. The Midewin, DesPlaines, Goose Prairie Macrosite lies within this natural division, where restoration and management of tallgrass prairie vegetation are on-going.

The Chicago Metropolitan Area hosts the greatest biodiversity in Illinois with diverse wetlands, prairie, forest, savanna, lakes, and streams. Like most areas of the State, natural land cover has been extensively altered and expansion of development continues to be a major threat. Along with the largest human population, the Chicago Metropolitan Area also has the most extensive acreage of protected natural areas, managed by seven Forest Preserve and Conservation Districts, the USDA Forest Service, IDNR, and numerous other conservation partners.

1. GRASSLANDS - FOCAL SPECIES – BOBOLINK

Grassland birds have declined precipitously in abundance as their preferred habitats In Illinois have been converted to row crops and, in urban areas, additional residential and commercial development. During the 25-year period ending in 1984, grassland birds in Illinois declined by as much as 75-95% and their numbers continue to decline. Grassland birds are "area sensitive" and are attracted to larger blocks of grasslands. Additionally, larger grasslands provide more secure nesting habitat with lower rates of nest predation. The Chicago metropolitan area remains an important stronghold for grassland birds, primarily because large grasslands have been protected and restored by natural resource agencies. Research and monitoring of these grasslands has documented that the abundance of grassland bird species has remained stable or increased. Restoration efforts that target the bobolink will also benefit Henslow's Sparrow, Eastern Meadowlark, Smooth Green Snake and a host of other grassland species. The Bird Conservation Network has an extensive system for monitoring grasslands so that the baseline abundance of grassland birds and their population trends over time (*http://www.bcnbirds.org/trends13/index.html*) has been established for many locations. Some notable grasslands in the Chicago metro area include Orland and Bartel Grasslands, Glacial Park, Goose Lake Prairie, Springbrook Prairie, Nelson Lake Marsh, Midewin National Tallgrass Prairie and Rollins Savanna. Grassland birds face significant threats related to development, the lack of fire and resultant brush invasion, and invasive species. See Herkert et al. (1993) for a review of habitat management guidelines for grassland birds.

Actions:

- Protect large parcels of non-linear grasslands.
- Identify areas on urbanizing edge where large grassland tracts can be established.
- Remove woody incursions such as tree lines, mow brush, and mow herbaceous weeds.
- Restore hydrology.
- Establish a fire regime.

2. OAK WOODLANDS

Oaks and oak dominated ecosystems provide myriad benefits within the Midwest region, including food and habitat for wildlife species, ecosystem functions such as carbon storage and water regulation, and natural beauty for the enjoyment of the people who inhabit them (Dwyer et al. 1992). Oaks are foundational species in forested ecosystems across the temperate zone, creating ecosystem structure and supporting an array of plant and animal life (McShea and Healy 2002, Rodewald and Abrams 2002, Spetich, 2004). Oaks provide the structure that shapes Chicago's savanna, woodland and forest habitats, and promote high biodiversity in part because they foster heterogeneous landscapes. The oak ecosystems of the Midwest region are generally classified into four categories based on canopy density and composition and structure of associated plant communities: Forests – 60-100% cover, Woodlands – 25-60% cover, Savanna – 10-25% cover, and Open savanna/barrens – >0-25%. Many of the oak species that were abundant in the Midwest region are adapted to live in fire-dominated ecosystems. The historical landscape's frequent fires therefore favored open oak barrens, savannas and woodlands. White, bur, red, and black oak were most common, but varied in abundance across the region with fire frequency and edaphic factors.

Many species identified as Species in Greatest Conservation Need in the Illinois Wildlife Action Plan are associated with high quality, open oak ecosystems including: Red-headed Woodpeckers, Black-billed Cuckoos, Northern Flickers, Wood Frogs, and Blue-spotted Salamanders. In addition, many other wildlife species utilize the energy rich acorns produced by oaks as well as the nuts of the hickories, walnuts, and hazelnuts that are associated with these ecosystems. These nut crops are a major food source for a wide variety of birds, mammals, and insects and are a key component of food webs in the region. Finally, oaks are a very important source of shelter for wildlife species in the form of cavities in large, old trees, standing dead trees, and downed woody debris. Many species rely on these cavities for burrows or nesting locations.

Mesic Oak woodlands – Focal Species - Blue spotted Salamander

In the Chicago metro area, the more mesic oak woodlands are restricted to moist soils arrayed along the eastern shores (or fire shadows) of the Des Plaines, Du Page, Chicago, and Fox Rivers.

Actions:

- Restore and maintain vernal pool systems.
- Remove invasive species.
- Restore hydrology.
- Implement actions to encourage oak regeneration.
- Assemble large 1000 acre woodlands/forested complexes.
- Link protected oak complexes to existing urban oak canopies.
- Educate the public on the value of oak woodlands.

Dry/Mesic Oak woodlands – Focal Species - Red-headed Woodpecker

The dry-mesic woodlands exist throughout the Chicago metro area, are associated with rolling topography characteristic of the Northeastern Morainal Division, and occur on drier soils formed from glacial till.

Actions:

- Remove invasive species.

- Restore hydrology.
- Implement prescribed burning.
- Adopt management practices that encourage oak regeneration, while maintaining existing large blocks of mature woodlands.
- Assemble large forested complexes - 1000 acre woodlands;
- Reduce edge effects.
- Link protected oak complexes to existing urban oak canopies.
- Adopt management practices that benefit oak ecosystem dependent bird species.

3. WETLANDS

Sulloway and Hubbell (1994) provide a good overview of the extent and distribution of different types of wetlands in Illinois. Many of those wetlands occur along rivers and lakes that later became developed as urban areas. Emergent wetlands that support diverse and abundant populations of wetlands birds occur in northeastern Illinois (Sulloway and Hubbell 1994). Northeast Illinois once supported large numbers of freshwater wetlands. Despite the efforts to drain or fill these wetlands, a large number of wetlands still survive in the region and support the largest populations of Yellow-headed Blackbirds, Sandhill Cranes, Black Terns, and Virginia Rails in the state. A study of 12 wetland bird species from 196 wetlands in the region during the period 1980-2005 showed that 10 species declined in abundance while only 2 species increased in abundance (Ward et al. 2010). The study further demonstrated that the value of wetlands to wetland birds was compromised by development within 2 km of the wetland basin.

Freshwater marshes – Focal species – Yellow-headed Blackbird

The preferred nesting habitat of the Yellow-headed Blackbird, and many other wetland bird species, consists of an interspersion of emergent vegetation and open water known as a “hemi-marsh”. While many wetlands have been protected by natural resource agencies, the hydrological regimes necessary to establish “hemi-marshes” are frequently compromised by land use decisions on adjacent properties that preclude natural fluctuations in water levels. With altered hydrological regimes, hemi-marshes typically become either monocultures of emergent vegetation or open ponds; both of which support fewer wetlands birds.

Actions:

- Manage the hydrological regime in wetland basins with water control structures that are manipulated to aid in establishing hemi-marsh conditions by drawing down water levels to reestablish wetland vegetation or by increasing water levels to prevent solid stands of emergent vegetation from becoming established.
- Establish a collaborative approach by natural resource agencies to manage for hemi-marsh wetlands on a regional basis to provide habitat for a number of wetland bird species that have declined in abundance over the last 25+ years.
- Use existing wetland basin models to prioritize acquisition and restoration of wetland basins and sites with hydric soils in the Chicago Wilderness area during the implementation period. Utilize the two Chicago Wilderness wetland basin models, one for wetland birds and one for amphibians and reptiles, which rank the value of several parameters (wetland size, distance to nearest wetland, adjacent land uses).

Fen wetlands - Focal Species - Baltimore Checkerspot (*Euphydryus phaeton*).

Fen wetlands are the rarest wetland communities in Illinois and nearly all occur in the Northeast Morainal Natural Division of Northeastern Illinois. Fen wetlands are represented by six community types that include calcareous floating mat, calcareous seep, forested fen, graminoid fen, low shrub fen, and tall shrub fen. Collectively, fen communities identified on the Illinois Natural Areas Inventory are represented by only 353 acres at 44 different locations (Byers 2000). Many, but not all of these fen wetlands occur with the Lake-McHenry Wetland COA. Most fen wetlands are associated with sand and gravel lenses laid down by torrential melt during the retreat of the Wisconsinan glaciation. Rainfall percolates through these glacial deposits, becomes laden with calcium and other minerals, and surfaces in groundwater discharge zones. The groundwater discharge zones provide habitat for unique plant and animal communities.

Fen wetlands are extremely sensitive to alterations in groundwater quality and groundwater flow rates and are, consequently, sensitive to land use changes that occur in and well beyond the actual groundwater discharge zones. Land use changes that affect infiltration rates in groundwater recharge zones (conversion from pasture or agriculture to more intensive land uses) or groundwater quality (high chloride levels associated with roadways) can also degrade fen wetlands.

Actions:

- Implement management that includes controlled burning (2- to 3-year rotations) and efforts to remove invasive woody and herbaceous species.
- Identify and protect groundwater recharge zones, using tools such as designation of a Class III groundwater zone for dedicated Illinois Nature Preserves in which fen wetlands are located.
- Address and monitor salt contamination of source groundwater for fens, especially from water softeners on septic systems.
- Restore hydrology by removing woody invasive species and implementing steps (installing check dams to rehydrate the peat, and removing drain tiles) that restore hydrological function.
- Reintroduce extirpated inspect species[3]. Establish protocols for identifying suitable host populations and developing captive rearing strategies that can lead to reintroductions.

4. STREAMS

Urban streams - Focal Species – Iowa Darter (*Etheostoma exile)*

Iowa Darter prefers clear water with vegetation in lakes or streams of moderate to slow current, which would include portions of the Fox River and Des Plaines Rivers and numerous tributaries of these rivers. Aquatic vegetation can grow in a variety of stream habitats, in both slow and fast currents. Iowa Darter lives along the bottom, hidden among the

[3] The Baltimore Checkerspot is known from 15 locations in northeastern Illinois (Cook, Kane, DuPage, Will, Lake, and McHenry Counties) and is actively monitored by the Illinois Butterfly Monitoring Network. It occurs in close association with the larval host turtlehead (*Chelone glabra*) in the northern part of the state. Implementation of management activities, and protection of the groundwater resource will maintain populations of the Baltimore Checkerspot. In some instances, reintroduction of the Baltimore Checkerspot to restored habitat is appropriate.

vegetation, foraging on small aquatic invertebrates. They spawn over fibrous root mats, but will settle for filamentous algae or other vegetation at times. They are not particularly good swimmers, so strong currents run the risk of displacing them if there is no cover for them to find shelter from extreme flows. Reducing the flashiness of streams will prevent the scouring of streambeds and also benefit Iowa Darters along with a host of other species.

Actions:

- Improve water quality and clarity by reducing the amount of pollutants and particulates that enter the stream. Clearer and cleaner water will facilitate growth of native aquatic vegetation.
- Use native riparian vegetation buffers help prevent erosion and overland transport of sediments into streams.
- Enhance the effectiveness and capacity of wastewater treatment facilities (e.g., reduced phosphorus loads).
- Protect and buffer headwater wetlands and wetlands adjacent to streams to filter water before it enters the mainstream channel, these areas may provide additional habitat for Iowa darters.
- Increase stream habitat heterogeneity by creating meanders and leaving woody debris, natural stones, etc. in the stream channel to facilitate the formation of pools, riffles, side channels, backwaters, etc. The resulting variety of depths, current velocities, and bottom substrate types will provide the basis for habitat heterogeneity.
- Decrease flashiness of streams by allowing more rainwater to enter the ground (e.g., permeable pavement, plantings of native trees, shrubs, grasses, etc.).
- Install non-point source infiltration practices to mitigate discharge from wastewater treatment facilities after extreme storm events to reduce or eliminate the occurrences of Combined Sewer Overflows.
- Create natural floodplains adjacent to streams.

Coolwater Streams - Focal Species - Mottled Sculpin (*Cottus bairdii*)

Coolwater streams in northern Illinois are typically of small to medium size. Primary source of water is groundwater, which helps explain the colder temperatures. In some instances coolwater streams start from visible springs or seeps. They often fall into the category of headwater streams, which are typically isolated from one another, making them susceptible to fragmentation. Although headwater species may have habitat preferences specific to headwater systems, it is still possible and important for them to move from headwaters to headwaters to facilitate gene flow and re-colonization efforts. Mottled Sculpin live in well-oxygenated coolwater streams of moderate to high gradient. Bottom substrate is usually a mix of cobble and gravel, but they can also be found over sand. When sand is the dominant substrate, the sculpins are usually associated with sticks, logs, etc. or some other type of protective cover. They are well camouflaged among the rocks while foraging for aquatic invertebrates, and lay eggs in the interstitial spaces, cracks, and crevices underneath rocks. In the greater Chicago Metropolitan area, Mottled Sculpin are found in tributaries along the Fox River

Small streams, especially in metropolitan areas, are relatively easy to fill in or redirect during development, resulting in a coolwater stream being destroyed and replaced by a warmwater ditch. In other instances, streams are just filled in and forgotten, especially if they are only seasonally filled with water.

Actions:

- Protect natural hydrology, specifically groundwater inputs; monitor groundwater supplies, extractions, and the characterization (e.g., temperature and potential salt contamination from septic systems) of the water.
- Promote recharging of regional aquifers by allowing more precipitation into the ground; encourage use of permeable pavements.
- Encourage restoration of native plants species in forests and prairies and use of native vegetation in urban park and yards to help infiltrate water into the soil.
- Establish baselines and protect and monitor groundwater during watershed land use change and stream modifications to maintain natural hydrology.
- Protect connectivity among headwater systems. Barriers, including low-head dams and culverts, need to be removed or modified to allow fish to bypass them.
- Encourage native riparian vegetation buffers to prevent erosion and overland transport of sediments into streams to prevent sedimentation of bottom substrates and smothering of benthic invertebrates.

Actions

Actions included within the Green Cities Campaign are divided into two distinct sets: Universal Management Recommendations and Targeted Actions. ***Universal Management Recommendations*** *are****: on-the-ground practices that will benefit Illinois wildlife species, including SGCN, wherever they are implemented with Metropolitan areas.*** *Anyone that values wildlife and wants to contribute to meeting the overarching goals of the Illinois Wildlife Action Plan should consider implementing these practices where applicable.*

For the purposes of the Green Cities Campaign, which is not focused on a specific habitat, ***Targeted Actions*** *have been defined as:* ***actions that address specific stressors caused by human development and human interaction with natural resources and wildlife****. They are actions that are designed to enhance and restore natural resource function and stability in our built environments in cities and communities, and provide SGCN benefits.*

See other Campaigns for additional actions in direct relation to specific habitats and issues.

UNIVERSAL MANAGEMENT RECOMMENDATIONS:

Universal recommendations*: on-the-ground practices that will benefit Illinois wildlife species, including SGCN, wherever they are implemented with Metropolitan areas.*

1. Increase high quality habitat for SGCN in Metropolitan Areas;
   - Identify potential new core preserves to provide habitat for grassland, woodland and wetland species according to existing conservation plans and through GIS conservation planning. *(e.g. - Chicago Wilderness Green Infrastructure – Note: copy and paste URL: http://www.chicagowilderness.org/?page=publicationsnew)*
   - Utilize principles of good preserve design to: establish blocks of habitat capable of supporting area-sensitive species, provide appropriate buffers, utilize genetically appropriate seed and plant sourcing, and maintain or establish landscape linkages (corridors).
   - Identify and expand existing funding sources to proliferate protection of lands of high habitat value for SGCN. *(e.g. - CMAP GO TO 2040 Plan recommendation.)*
2. Restore and manage Metropolitan waters that support SGCN
   - Address altered hydrology, water quantity and quality.
   - Increase connectivity in Metropolitan waterways, including floodplain connectivity where feasible, to increase species diversity and abundance and connect recreational waterways.
   - Remove dams that no longer serve a purpose on Metropolitan rivers and streams to: facilitate fish passage; increase upstream headwaters spawning habitat; mitigate low oxygen conditions and poor water quality in dam pools; remove safety hazards and structurally unsound dams.
   - Address thermal pollution from point source and non-point source delivery.
   - Daylight streams (i.e., uncover some or all of a previously covered river, stream, or stormwater drainage) and naturalize hardscaped stream channels. (e.g. – American Rivers: *http://urbanomnibus.net/redux/wp-content/uploads/2013/11/daylighting-streams-report.pdf*)
   - Locate and prioritize headwater stream areas for future protection.
3. Increase habitat connectivity to reduce fragmentation in urban land and water habitats at all scales and facilitate wildlife movement. Use Green Infrastructure principles (Core and Hub) to establish habitat corridors to large open space.
   - Landscape Scale linkages:

        - Link large blocks of habitat together with corridor plantings of native habitat along streams and rivers
    - Community /Neighborhood Scale linkages:
        - Protect streams corridors through communities with conservation easements and as openspace
        - add native plantings and native buffer zones along streams, wetlands and lakes
        - install native habitat planting along trials and bike paths
        - work with right-of-way property owners to establish linear habitat corridors
    - Site Scale linkages:
        - Increase areas of native plantings in public and private land and in raingardens and swales, naturalize detention ponds and restore small wetlands.
        - Establish native habitat along streets and parkways and in conjunction with stormwater BMP practices.
4. Investigate causes of initial decline and feasibility of reintroduction success. Species reintroductions may be appropriate where species have been extirpated, where suitable habitat has been reestablished, and where fragmentation prevents re-colonization.
5. Expand research on the value of Metropolitan Areas for neotropical migrants and other migratory species.
6. Establish and support large scale monitoring programs (e.g. Bird Conservation Network)
7. Recognize and manage specific (niche) habitats in Metropolitan Areas that provide for SGCN not found in the rest of the State such as cave amphipods in karst region, Blue-spotted Salamander in northern flatwoods, and Blanding's Turtle.
8. Address wildlife species/human interaction with appropriate education and training for mutually beneficial interaction including large carnivore, deer populations and other urban wildlife.
9. Study urban areas for their importance or role in maintaining Illinois species of SGCN.
    - Species that thrive in and have adapted to urban habitat –i.e. - peregrine falcon, chimney swift, black-crowned night herons
    - Species that have restricted historical ranges that has or is currently being subjected to urban and exurban development.
    - Research Urban Tree Canopy importance for Illinois migratory species.
    - Establish a baseline and inventory of existing Urban tree canopies (e.g. Chicago Regional Trees Initiative (CRTI), The Morton Arboretum - *http://www.mortonarb.org/science-conservation/chicago-region-trees-initiative)*
    - Study wildlife disease and potential zoonotic diseases.
10. Establish long term monitoring of SGCN and the species they depend on. Provide data to State and local agencies to inform management decisions. Expand and refine existing data sharing networks for transfer of information.
11. Utilize and train volunteers as stewards and citizen scientists to expand habitat restoration capabilities across the state and to expand collected data.

TARGETED ACTION RECOMMENDATIONS:

Targeted Actions: *for the purposed of the Green Cities Campaign* ***Targeted Actions*** *are being defined as:* ***actions addressing specific stressors caused by human development and human interaction with the natural world and wildlife****. These actions are representative of the some of the current urban conservation best management practices that have been shown to enhance resiliency and ecological function in urban areas.*

12. Organize under a common conservation goal and coordinate planning efforts.

Need: Urban land-use patterns and rapid land-use change destroys and fragments important wildlife habitats that support SGCN. Establishing under a collective voice will provide a platform for comprehensive priority resource protection, planning and outreach. (e.g. – Vital Lands Illinois: *http://www.grandvictoriafdn.org/how-we-work/how-can-we-overcome-fragmentation-and-unite-behind-a-big-picture-vision)*

If not already existing, establish a Metropolitan Area–wide network of coordination among local, county, state, and federal resource agencies, regional planning agencies, and private conservation groups to promote area-wide comprehensive resource planning and work together to:

- Develop a baseline inventory of the urban area's natural resources;
- Set conservation priorities and goals, include habitat and species priorities specific to the Urban area (e.g. - Chicago Wilderness *Biodiversity Recovery Plan http://www.chicagowilderness.org/?page=publicationsnew);*

Work with the conservation community to assist county and local units of government, citizens and stakeholders to develop strategic planning that protects, preserves and enhances natural resources and their vital ecosystem functions:

- Develop technical assistance programs for local jurisdictions on watershed and natural resource planning (e.g. Heartlands Conservancy – Building Greener Communities: *http://heartlandsconservancy.org/what-we-do/building-greener-communities/*);
- Develop outreach programs for urban area populations on the importance of wildlife and resources, and informal educational opportunities for citizen scientists or volunteers (e.g. Chicago Audubon, Bird Collision Monitors: *http://www.birdmonitors.net/);*
- Provide technical assistance to local park districts and towns for acquisition of natural space and native habitat restoration
- Establish a forest preserve or a township open space district if no local open space entity current exists for access to open space grants or funding
- Developing county comprehensive plans with natural resource policy chapters and resource mapping (e.g. – *Winnebago and Boone Greenways Plan: http://ims.wingis.org/Greenways/)*
- Update ordinances to be natural resource sensitive through targeted assistance programs (e.g.- CMAP assessment for five watershed communities: *http://www.cmap.illinois.gov/programs-and-resources/lta/silver-creek-sleepy-hollow-watershed*
- Locate and establish funding mechanisms for resource-sensitive planning work (e.g. IEPA Watershed-Based Planning grants)
- Facilitate comprehensive natural resources protection and connectivity in planning with local agencies and jurisdictions:

- Introduce green infrastructure planning concepts (Benedict and McMahon: Green Infrastructure: Linking Landscapes and Communities);
    - Creation of large preserves and protection of priority natural areas and remnant communities;
    - Creation of landscape linkages (including trails and stream buffers) that connect and expand existing natural areas to provide wildlife corridors movement corridors and recreational corridors
    - Establishment of site-based green infrastructure (BMP) practices, native plantings, other.
    - Utilize GIS mapping tools and facilitate in the gathering of resource layers
- Provide a platform for cross-jurisdictional planning through a variety of venues such as workshops, mapping exercises and yearly theme-based seminars.
- Provide accessibility to resource layers through easy-to-use interactive web sites (e.g. Interactive web mapper – The Field Museum: *http://www.fieldmuseum.org/science/special-projects/gis-science-and-education/gis-science-and-education-interactive-maps)*

13. Integrate wildlife and habitat conservation in developed areas.

Need: SGCN have experienced habitat decline and loss in urban areas from local landuse decisions. Increasing technical assistance for local units of government and property owners will help facilitate establishment of wildlife habitat and habitat linkages within developed areas:

- In partnership with local jurisdictions, indentify methods to expand protection of high quality habitats and increase urban native plantings, urban tree canopy and forests through watershed planning, grant programs, easements, mitigation funds and other avenues.
- Work with local jurisdictions to develop or redevelop using "conservation design" principles to establish neighborhood/community scale openspace and landscape linkages and trails, for wildlife and humans. Connect to large natural habitats.
- Coordinate with local Land Conservancies; establish a conservancy if needed.
- Coordinate with federal and state resource agencies and private funders and identify match resources to provide greatest wildlife and habitat benefit.
- Encourage inter-agency and inter-jurisdictional coordination through coordinated networking.
- Develop area workshops and educational materials for specific topics and target audiences (e.g. Beyond the Basics Stormwater Management Seminars –The Conservation Foundation, Naperville, IL).
- Integrate native species into the public and private property plantings working with local jurisdictions, DOTs and right-of-way owners.
- Identify, manage/restore via partnerships, and then use 'non-traditional' open space lands (closed landfills, utility and powerline rights of way, etc.) to increase available high quality habitat in and around Illinois' Metropolitan Areas
- Work with and provide technical assistance to individual property owners (i.e. – Conservation @ Home, Conservation @ Work: *http://www.theconservationfoundation.org*)
- Encourage and develop wildlife and natural resource monitoring programs that can continuously update biodiversity inventories. (e.g.- Plants of Concern, Chicago

Botanic Garden: *http://www.plantsofconcern.org/*; Birds of Concern, Bird Conservation Network: *http://www.bcnbirds.org/trends13/concern.html*)

- Explore/expand the use of programs, Smartphone apps and online venues as a means of promoting citizen scientists, collecting digital data and expanding citizen knowledge base. (National Great Rivers Research and Education Center RiverWatch program: *http://www.ngrrec.org/riverwatch/)*

14. Improve water quality in areas under high development pressure and/or within fragile geographic zones.

Need: Local jurisdictions do not typically examine the lakes, streams and rivers within their boundaries on the comprehensive watershed basis needed (i.e. - looking beyond their community borders) to ensure they institute actions that will sustain and improve water quality and SGCN they support. Actions below address integrated planning methods that will help address resource needs and also aid communities in complying with federal and state regulations for water resources.

- Coordinate with IEPA and USEPA and local jurisdictions on Clean Water Act legislation and work with local NPDES and MS4 (Municipal Separate Storm Sewer Systems) communities to provide workshops, BMP information and education materials that satisfy MS4 Permit requirements and annual reporting. (USEPA MS4 requirements*: http://www.epa.illinois.gov/topics/forms/water-permits/storm-water/ms4/index*).
- Promote development of local subwatershed plans and work to implement projects from subwatershed plans and other integrated natural resource plans.
- Promote riparian development and redevelopment that allows for native buffers, resource enhancement, and increased uses of public river access.
- Work with counties and communities on protection of groundwater-dependent resources such as streams and fens. (e.g. - Class Three Groundwater designations - Illinois Nature Preserves.)
- Promote adoption of resource-sensitive water policies and ordinances at the county and local scale. Actions could include:
  - Deduce pollution and improve water quality of point discharge and non-point discharge *(http://water.epa.gov/polwaste/nps/whatis.cfm)* by implementing the Illinois Nutrient Loss Reduction Strategy guidelines and other guidelines to resolve nitrogen, phosphorus and other nutrient-caused impairments in urban, streams, rivers and lakes.
  - Establish imperviousness limits.
  - Develop *Watershed-wide* river and wetland buffering standards.
  - Protect the floodplain from development.
  - Recreate overflow space for streams in urban areas, and investigate benefits of the FEMA Hazard Mitigation program where appropriate (e.g. McHenry County 2014, Nippersink Creek *http://usasearch.fema.gov/search?query=Nippersink+creek+mchenry+county&op=Search&affiliate=fema).*
  - Address reductions in road salt applications and encourage alternative methods (e.g. Beet Juice applications).
  - Promote preservation of headwater streams as a flood and stormwater mitigation strategy (e.g. - Milwaukee Metropolitan Sewerage District Greenseams program.) *http://www.mmsd.com/floodmanagement/greenseams*).

- Address Combined Sewer Overflow systems (CSO), which are sewer systems that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe. Separate stormwater from wastewater and infiltrate stormwater.
- Institute stormwater fees and incentives to offset costs of stormwater management.
- For those counties with authority but no current plan, develop a county-wide storm water management plans and ordinance (Illinois P.A. 94-675 (55 ILCS 5/5-1062.2).
- Develop statewide enabling legislation to allow urbanizing counties to develop stormwater management plans, ordinances and stormwater fees.

15. **Integrate natural areas conservation, ecology and environmental education into local Metropolitan area school curricula.**

    Need: Culturally and developmentally appropriate environmental education is a critical step to ensuring future environmental stewardship.

    - Target conservation education to all citizens of Illinois.
    - Target early childhood education and provide opportunities for outdoor nature experiences.
    - Develop and provide community specific educational and research materials for public and private school use.
    - Connect students to wildlife research via citizen science portals and websites. *(www.chicagowildlifewatch.org; http://www.friendsofthefoxriver.org/)*
    - Work with Institutions of Higher Education to provide hands-on experience and training in conservation practice and environmental education, to develop a pool of qualified conservation advocates, practitioners, and volunteers.
    - Connect citizens with nature in their local communities. Build support for ecosystem protection by partnering with community based organizations to host events and programs focused on local natural communities and wildlife species. (e.g.,Openlands: *Space to Grow: Greening Chicago Schoolyards: http://www.openlands.org/space-to-grow)*

16. **Fill information gaps and research needs, and develop conservation actions to address priority stresses for the Metropolitan area.**

    Need: Urban areas may serve an increasing role in maintaining and conserving SGCN in the future. Urban areas in Illinois still contain significant resources, and are believed to be playing a key role in regional migration patterns and other dispersal needs for SGCN. A better understand of the Urban area's role, and future actions necessary to maintain and enhance SGCN within the expanding footprint of Illinois Metropolitans/Urban area is needed.

    - Study urban boundaries and growth patterns, in relation to important habitats and species locations, to inform land and water protection decisions.
    - Study impacts of road / highway / interstate construction on wildlife habitats and connectivity of movement for wildlife.
    - Determine value of urban areas for migration and climate change adaptation for species located and utilizing urban areas.
    - Better understand the rural-urban interface and improve actions with respect to deer, mesopredators (e.g., cats, raccoons), apex predators (e.g., cougar) human-wildlife conflicts, invasive species, recruitment, dispersal and survival of wildlife, and infrastructure (e.g., roads)

- Improve our understanding of how urban wildlife species select and move between habitats, and come into conflict with humans, in order to develop growth strategies for urban areas that minimize conflict and protect SGCN species.
- Develop effective strategies for deer harvest in urban and suburban settings to alleviate extreme habitat degradation caused by overpopulation.
- Study the effects of climate change and determine adaptive management steps needed to maintain and enhance habitats to support SGCN.
- Encourage/expand partnerships between public and private landowners and NGOs, volunteer groups, etc. Focus partnerships to harness public interest in monitoring Illinois native species in general, and SGCNs in particular.

17. **Increase access to open lands and waters within and near Metropolitan areas for wildlife-related recreation.**

    Need: Connection to natural resource value comes with contact to the natural world. Increase access to natural lands to help Illinois' urban area citizens experience wildlife adventures and encounters.

    - Work with local land holding and open space agencies that share a common recreational mission to create and connect region-wide land and water trails.
    - Increase concentration of IDNR naturalist, fishing and other outdoor programs to heavily populated areas
    - Increase naturalist and other DNR programs in state parks with high usage by constituents. Make these designated IDNR Priority Outreach work areas.
    - Continue to open up private lands for public users (e.g. - IDNR Recreational Access Program (IRAP)).

Management Resources

Numerous resource information links are contained within the body of the Green Cities document. Some of these are repeated and additional resources are listed below.

Natural Division recommendations from IL State Wildlife Action Plan (2005):
http://www.dnr.illinois.gov/conservation/IWAP/Pages/NaturalDivisions.aspx
Also - Illinois Natural History Survey Natural Division site
http://www.inhs.illinois.edu/outreach/natural-divisions/

Chicago Wilderness Biodiversity Recovery Plan:
http://www.chicagowilderness.org/?page=publicationsnew

Illinois Important Bird Areas:
http://www.habitatproject.org/birds/ibacurrent.html

Migratory Bird information:

Practices for Urban Areas:
http://www.fws.gov/migratorybirds/partnerships/urbantreaty/urbantreaty.html
Species trends:
http://www.bcnbirds.org/trends13/concern.html#migrants
The Lake Michigan Flyway: Chicagoland's Role in the Miracle of Bird Migration A Green Paper: http://www.bcnbirds.org/greenpapers_files/GPflyway.html
http://www.bcnbirds.org/greenpapers_files/GPflyway.html

Grassland Birds:
Grassland Birds - Chicago Audubon: Plan to Meet Illinois Wildlife Action Plan Population Targets for Grassland Species of Concern in Kane County Forest Preserves:
http://www.habitatproject.org/webdocs/birds/KanePlan2011.pdf

Monarch Butterfly/Pollinators:
http://www.fs.fed.us/wildflowers/pollinators/Monarch_Butterfly/habitat/
http://www.xerces.org/pollinator-conservation/learn-about-pollinators/
http://monarchjointventure.org/

Wetlands:
(Paste link, allow for upload time)
http://www.fws.gov/wetlands/Documents%5C%5CWetland-Resources-of-Illinois-An-Analysis-and-Atlas.pdf

MITIGATING DEVELOPMENT IMPACTS TO NATURAL RESOURCES

Addressing Impacts of development to water

The Illinois Nutrient Loss Reduction Strategy (2015):
http://www.epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/nutrient-loss-reduction-strategy/index

Urban Flooding Awareness Act Study (2015):
http://www.dnr.illinois.gov/WaterResources/Documents/Final_UFAA_Report.pdf

Illinois Urban Manual Update (2014):
http://www.aiswcd.org/illinois-urban-manual/

Illinois Environmental Protection Agency Green infrastructure Plan and Illinois Department of Natural Resource Addendum (2010):
http://www.epa.illinois.gov/topics/water-quality/surface-water/green-infrastructure/index

Smart Growth/Climate/Green Infrastructure publications:

USEPA website keeps an updated list of useful free publications from EPA and Smart Growth Network partners.
http://www2.epa.gov/smartgrowth/free-smart-growth-publications-epa-and-smart-growth-network-partners

Urban Climate Adaptation Strategies:

Chicago Wilderness Climate Action Plan for Nature
http://www.chicagowilderness.org/resource/resmgr/Publications/CW_CAPN_Action_Strategies.pdf
Climate Change Update to Chicago Wilderness Biodiversity Recovery Plan
http://climate.chicagowilderness.org/index.php?title=Introduction#Box1

Performance Measures

Outcome performance measures are designed to assess the overall impact of undertaking conservation actions on Implementation Goals. Output performance measures are designed to assess how active the program is at working toward the Implementation Goals.

Overarching Goal	Green Cities Campaign Goal	Type	Performance Measure
Habitat Management	1. Protect, manage, and restore lands and waters of importance to SGCN.	Outcome	Acres/miles of restored Urban/Metropolitan areas lands: prairies, forests, woodlands, streams, wetlands.
		Outcome	Acres of invasive species controlled
		Output	Number of established Land Trusts
		Output	Number of established Forest Preserve/Conservation Districts
		Output	Number of Park Districts restoring native habitats
Habitat Management	2. Utilize elements of good preserve design to identify and preserve land that builds and connects large and small blocks of habitat.	Outcome	Number of acres of protected lands
		Outcome	Number of dams removed
		Outcome	Number of conservation easements
		Outcome	Number of hiking/biking trails with natural habitat
		Outcome	Number acres ROW habitat
Habitat resiliency and connectedness	3. Integrate wildlife and habitat conservation needs into local and regional planning,	Output	Number of local jurisdictions with green Infrastructure/environmental plans and comprehensive plans that include complete habitat mapping.
		Output	Number of Urban/Metropolitan areas with biodiversity and habitat inventories
		Output	Number of local jurisdictions with stormwater fee authority
		Output	Number of counties with stormwater ordinances/authority
		Output	Number of completed Urban watershed plans
Habitat resiliency and connectedness	4. Increase the ecosystem services in Illinois urban areas through functioning and resilient natural habitats, connections	Outcome	Number installed site-based green infrastructure and BMP (raingardens, vegetated swales, pervious surface installations)
		Outcome	Tree canopy increases - including native trees

Habitat resiliency and connectedness	and corridors, and site-scale practices.	Output	Number of environmentally-sensitive Ordinances adopted: "Conservation Design" ordinances; stream buffers; inflitration practices utilizing green infrastructure BMPs native plantings; invasives removal, other.
Public Awareness, Appreciation, Connection	5. Develop citizen awareness of natural resource and wildlife value to promote understanding and support for wildlife conservation.	Outcome	Number of volunteer stewards and volunteer stewardship workdays (for all agencies, entities in Urban/Metropolitan areas)
		Outcome	Number of citizen scientist networks and participants
		Outcome	Number of schoolyard habitat installations
		Outcome	Number of Urban areas open to hunters, anglers
		Outcome	Number of voter-supported openspace referenda
		Outcome	Number - Visitors to FPDs, State Parks
		Output	Number - bird watchers
		Output	Number of local community targeted nature appreciation programs

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Table 6. Definition of terms used in the Green Cities Campaign.

An **ecosystem** is a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit. Humans are an integral part of ecosystems. (Millennium Ecosystem Assessment)

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth. (Millennium Ecosystem Assessment)

A **Metropolitan Planning Area** is defined in the Code of Federal Regulations, (23 CFR 450.104) as the geographic area in which the metropolitan transportation planning process must be carried out. This term is further described in 23 CFR 450.308. The MPA boundary shall, as a minimum, cover the UZA(s) and the contiguous geographic area(s) likely to become urbanized within the twenty year forecast period covered by the transportation plan. The boundary may encompass the entire metropolitan statistical area or consolidated metropolitan statistical area, as defined by the Census Bureau.

Metropolitan Statistical Area: Metropolitan Statistical Areas (MSA), as described by the U.S. Census Bureau using 2010 standards, must have at least one urbanized area of 50,000 or more inhabitants. The largest city in each MSA is designated a "principal city." Additional cities qualify if specified requirements are met concerning population size and employment. The title of each MSA consists of the names of up to three of its principal cities and the name of each state into which the metropolitan statistical area extends. MSA information*:* *http://www.census.gov/population/metro/*

Point source/Nonpoint source pollution generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. The term "nonpoint source" is defined to mean any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the Clean Water Act. That definition states:

> The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture.
> *http://water.epa.gov/polwaste/nps/whatis.cfm*

An **Urbanized Area** is a statistical geographic entity designated by the Census Bureau, consisting of a central core and adjacent densely settled territory that together contain at least 50,000 people, generally with an overall population density of at least 1,000 people per square mile. Within the transportation planning community Urbanized Areas are typically referred to as the UZAs.

Table 7. IL Metropolitan Statistical Area counties and population.

Metropolitan Statistical Area	Included IL Counties	Total Population in IL
Bloomington, IL	*De Witt; McLean*	186,251
Cape Girardeau, MO-IL	*Alexander*	8,147
Carbondale-Marion, IL	*Jackson; Williamson*	126,327
Champaign-Urbana, IL	*Champaign; Ford; Piatt*	231,655
Chicago-Naperville-Elgin, IL-IN-WI	*Cook; DeKalb; DuPage; Grundy; Kane; Kendall; Lake; McHenry; Will*	8,587,206
Danville, IL	*Vermilion*	81,463
Davenport-Moline-Rock Island, IA-IL	*Henry; Mercer; Rock Island*	214,303
Decatur, IL	*Macon*	110,558
Kankakee, IL	*Kankakee*	113,170
Peoria, IL	*Peoria; Stark; Tazewell; Woodford*	378,886
Rockford, IL	*Boone; Winnebago*	348,574
Springfield, IL	*Menard; Sangamon*	210,202
St. Louis, MO-IL	*Bond; Calhoun; Clinton; Jersey; Macoupin; Madison; Monroe; St. Clair*	671,733

Table 8. Population Levels in Metropolitan Statistical Areas, 1960 – 2013.

Metropolitan Statistical Area	2013	2000	1990	1980	1970	1960
Bloomington, IL	186,251	167,231	145,696	137,257	121,364	101,130
Cape Girardeau, MO-IL	8,147	9,590	10,626	12,264	12,015	16,061
Carbondale-Marion, IL	126,327	120,908	118,800	118,060	104,029	88,268
Champaign-Urbana, IL	231,655	210,275	202,848	200,238	195,172	164,002
Chicago-Naperville-Elgin, IL-IN-WI	8,587,206	8,272,768	7,410,858	7,246,032	7,103,510	6,312,517
Danville, IL	81,463	83,919	88,257	95,222	97,047	96,176
Davenport-Moline-Rock Island, IA-IL	214,303	217,351	217,172	243,222	237,245	217,457
Decatur, IL	110,558	114,706	117,206	131,375	125,010	118,257
Kankakee, IL	113.170	103,833	96,255	102,926	97,250	92,063
Peoria, IL	378,886	366,899	358,552	387,732	362,791	334,898
Rockford, IL	348,574	320,204	283,719	279,514	272,063	230,091
Springfield, IL	210,202	201,437	189,550	187,789	171,020	155,787
St. Louis, MO-IL	671,733	671,581	656,987	659,969	665,992	607,274

Table 9. Percent change in total population in Metropolitan Statistical Areas.

Metropolitan Statistical Area	2000 – 2013	1990 – 2000	1980 – 1990	1970 – 1980	1960 – 1970
Bloomington, IL	11.37%	14.78%	6.15%	13.10%	20.01%
Cape Girardeau, MO-IL	-15.05%	-9.75%	-13.36%	2.07%	-25.19%
Carbondale-Marion, IL	4.48%	1.77%	0.63%	13.49%	17.86%
Champaign-Urbana, IL	10.17%	3.66%	1.30%	2.60%	19.01%
Chicago-Naperville-Elgin, IL-IN-WI	3.80%	11.63%	2.27%	2.01%	12.53%
Danville, IL	-2.93%	-4.92%	-7.31%	-1.88%	0.91%
Davenport-Moline-Rock Island, IA-IL	-1.40%	0.08%	-10.71%	2.52%	9.10%
Decatur, IL	-3.62%	-2.13%	-10.79%	5.09%	5.71%
Kankakee, IL	8.99%	7.87%	-6.48%	5.84%	5.63%
Peoria, IL	3.27%	2.33%	-7.53%	6.87%	8.33%
Rockford, IL	8.86%	12.86%	1.50%	2.74%	18.24%
Springfield, IL	4.35%	6.27%	0.94%	9.81%	9.78%
St. Louis, MO-IL	0.02%	2.22%	-0.45%	-0.90%	9.67%

Table 10. Total number of natural communities in Illinois by metropolitan area.

Metropolitan Statistical Area	Freshwater Communities	Subterranean Communities	Terrestrial Communities	Other Ecological Communities
Bloomington, IL	2	0	5	0
Cape Girardeau, MO-IL	2	0	8	0
Carbondale-Marion, IL	3	5	5	1
Champaign-Urbana, IL	0	0	15	0
Chicago-Naperville-Elgin, IL-IN-WI	46	0	109	209
Danville, IL	0	0	6	6
Davenport-Moline-Rock Island, IA-IL	2	0	16	1
Decatur, IL	2	0	4	0
Kankakee, IL	2	1	15	0
Peoria, IL	1	0	37	2
Rockford, IL	4	0	12	1
Springfield, IL	0	0	5	0
St. Louis, MO-IL	11	21	84	0

Table 11. Conservation Opportunity Areas in each Metropolitan Statistical Area.

Metropolitan Statistical Area	Conservation Opportunity Areas
Bloomington, IL	*None listed*
Cape Girardeau, MO-IL	*Cache River – Cypress Creek* *LaRue – Pine Hills – Western Shawnee – Trail of Tears* *Middle Mississippi River*
Carbondale-Marion, IL	*Eastern Shawnee* *LaRue – Pine Hills – Western Shawnee – Trail of Tears* *Pyramid – Arkland Landscape* *Hill Prairie Corridor – South Section* *Middle Mississippi River*
Champaign-Urbana, IL	*Vermilion River (Middle Fork, North Fork & Salt Form) & Vermilion R**
Chicago-Naperville-Elgin, IL-IN-WI	*Illinois Beach – Chiwaukee Prairie* *Kankakee Sands – Kankakee River – Momence Wetlands – Pembroke Savanna* *Lower Fox River* *Midewin – Des Plaines – Goose Lake Prairie* *Upper Des Plaines River Corridor* *Coon Creek – Kishwaukee River – Crow's Foot Marsh* *Lake McHenry Wetland Complex*
Danville, IL	*Vermilion River (Middle Fork, North Fork & Salt Form) & Vermilion R**
Davenport-Moline-Rock Island, IA-IL	*Upper Mississippi River*
Decatur, IL	*None listed*
Kankakee, IL	*Kankakee Sands – Kankakee River – Momence Wetlands – Pembroke Savanna*
Peoria, IL	*Middle Illinois River – Meredosia to DePue* *Mason County Sand Areas*
Rockford, IL	*Coon Creek – Kishwaukee River – Crow's Foot Marsh* *Rock River* *Sugar-Pecatonica River*
Springfield, IL	*Mason County Sand Areas*
St. Louis, MO-IL	*Hill Prairie Corridor – North Section* *Hill Prairie Corridor – South Section* *Lower Kaskaskia Bottomlands* *Middle Mississippi River* *Pere Marquette* *Prairie Ridge Landscape* *Sinkhole Plain* *Upper Mississippi*

Table 12. Total Illinois Nature Preserve acreage in each Metropolitan Statistical Area.

Metropolitan Statistical Area	Nature Preserve Total Acreage
Bloomington, IL	1,485.50
Cape Girardeau, MO-IL	552.29
Carbondale-Marion, IL	1,459.37
Champaign-Urbana, IL	1,501.44
Chicago-Naperville-Elgin, IL-IN-WI	35,195.09
Danville, IL	2,262.47
Davenport-Moline-Rock Island, IA-IL	515.76
Decatur, IL	342.97
Kankakee, IL	1,920.57
Peoria, IL	4,485.51
Rockford, IL	1,407.23
Springfield, IL	367.27
St. Louis, MO-IL	6,427.23

Nature preserves are protected as a part of state law, and they are instrumental in the preservation of Illinois's native wildlife. The IL Nature Preserves Commission (*http://dnr.state.il.us/INPC/)* works with private and public landowners to maintain and protect these protected zones. A preserve ranges in size from one acre to more than 2,000 acres, and they provide protection to more than 900 different types of endangered threatened animals and plants. These areas are especially useful in areas with higher levels of development and human population since they provide protected zones for wildlife.

Table 13. Ranking of migratory bird species that utilize urban areas. Species are ranked in order of the potential importance that Illinois urban areas might play for the species. Species identified are recommended as prime representatives for the Green Cities Campaign focus areas of the diversity of migrant songbirds, weighted toward Neotropical Migrants and declining species. *(Doug Stotz, The Field Museum/ Michael Patrick Ward, Illinois Natural History Survey*).

1. Golden-winged Warbler steep decline, nests mainly west of Great Lakes, migration-oak woodlands
2. Connecticut Warbler small global pop, wintering range unknown, migration-dense understory, Chicago one of best places to see species in world
3. Bay-breasted Warbler declining spruce breeder, heart of breeding range north of us, migration-oak woodlands
4. Black-throated Green Warbler winters in Mexican mountains, pine breeder, migration-oak woodlands
5. Rusty Blackbird spruce bog breeder, winters SE US, rapid decline, Illinois pops holding up better than most migration - low-lying woodlands (riparian, flatwoods, etc.)
6. LeConte's Sparrow declining grassland sparrow, winters SE US (to so. Illinois), breeds northern Great Plains, migration-dense grasslands
7. Canada Warbler declining spruce breeder, winters base of Andes, under pressure at both ends migration-mostly understory of good woodlands
8. Blackburnian Warble, conifer breeder, winter mid-Andean slopes, under pressure at both ends migration-oak woodlands.
9. Nelson's Sparrow basically same as LeConte's Sparrow, but in wetter habitats, so probably less at risk
10. Philadelphia Vireo uncommon woodland species, Central American winterer Migration-Oak woodlands
11. Cape May Warbler declining spruce breeder, West Indian winterer, migration-oak woodlands, flowering trees and shrubs
12. Nashville Warbler conifer breeder, Mexican mountains in winter migration - oak woodlands
13. Black-and-white Warbler declining, Central American winterer migration - oak woodlands
14. Mourning Warbler declining, but more widespread and common than Connecticut, migration-understory

Note: The Bird Conservation Network compiled and published in early 2015, a comprehensive list of ***Birds of Concern*** specific to Chicago metro area, including neotropical migrants that nest in the Chicago metro area, as well as those species that use the habitat available in the area for foraging, as they proceed north to their breeding grounds in the Spring, and pass through on their way south in the autumn. (*http://www.bcnbirds.org/trends13/concern.html#migrants)*

Table 14. 1928 pollinator study by Charles Robertson in Carlinville, IL.

Number of bees found on various plants at Carlinville, Ill. by Charles Robertson					
Plant, common name	Plant, scientific name	Blooming season	Type	Long-tongued bees	Short-tongued bees
Virginia Bluebell	Mertensia virginica	early spring	woodland wildflower	16	2
Spring Beauty	Claytonia viginica	early spring	woodland wildflower	21	37
Jacob's Ladder	Polemonium reptans	spring	woodland wildflower	21	17
Golden Alexanders	Zizea aurea	spring	prairie forb	19	42
Red Bud	Cercis canadensis	spring	tree	22	19
Salix interior	Salix interior	spring	tree	16	43
Foxglove beards-tongue	Pentstemon digitalis	late Spring - summer	prairie forb	17	5
Purple Cone-flower	Echinacea purpurea	summer	prairie forb	16	7
Swamp Milkweed	Asclepias incarnate	summer	prairie forb	12	6
Man of the Earth	Ipomoea pandurate	summer	prairie forb	14	0
Brown-eyed Susan	Rudbeckia triloba	summer	prairie forb	23	25
Sawtooth sunflower	Helianthus grosseserratus	fall	prairie forb	29	9
Hairy white oldfield aster	Symphyotrichum pilosum	fall	prairie forb	37	53
Adapted by John C. Marlin from Flowers and Insects by Charles Robertson, 1928.					

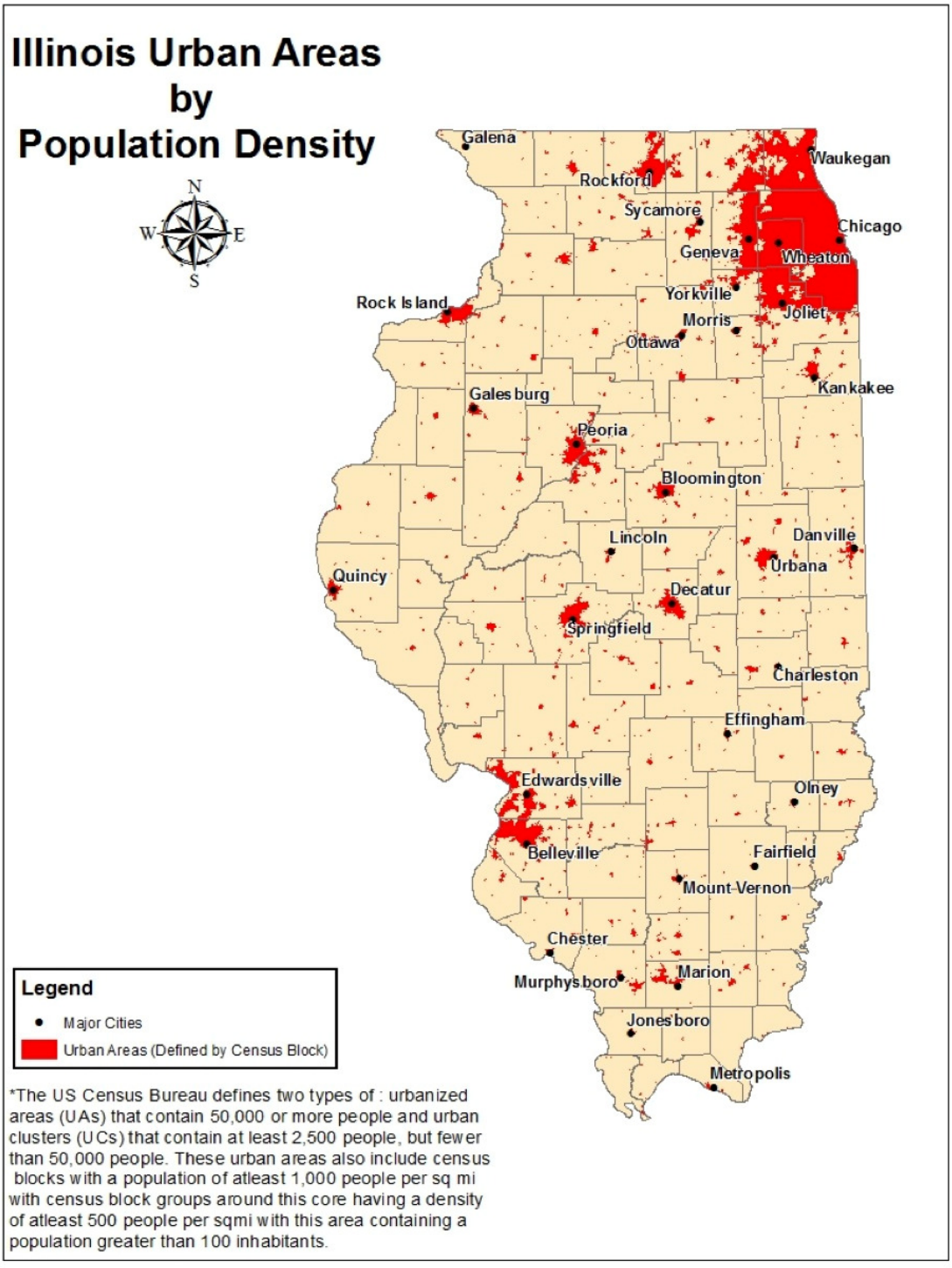


Figure 7. Urban areas in Illinois based on population density.

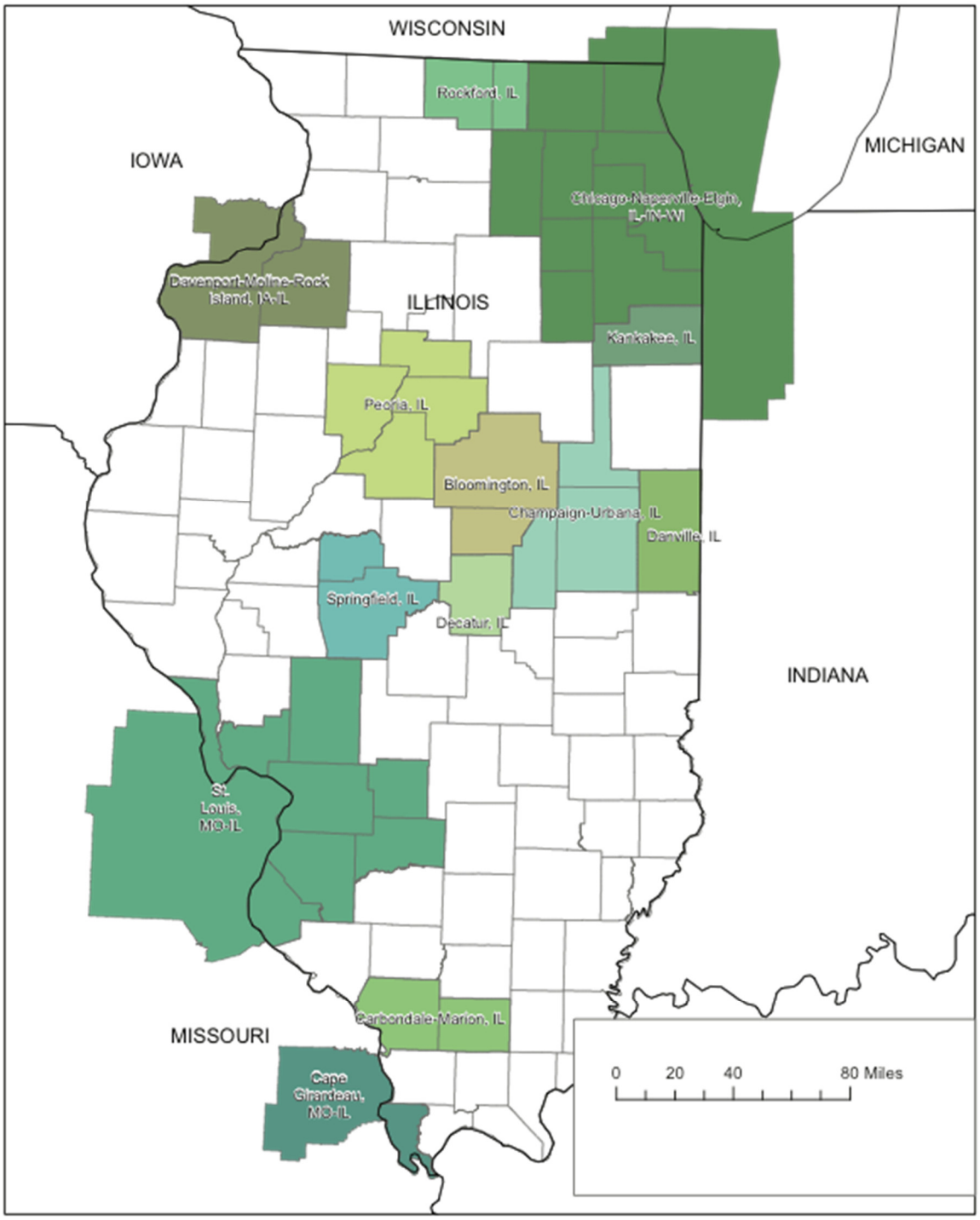


Figure 8. Metropolitan statistical areas in Illinois. These areas have an urban core with a population of 50,000 or more, and can contain multiple counties that either include the core area or are integrated socially and economically into the urban core. These areas are delineated by the Office of Management and Budget (OMB).

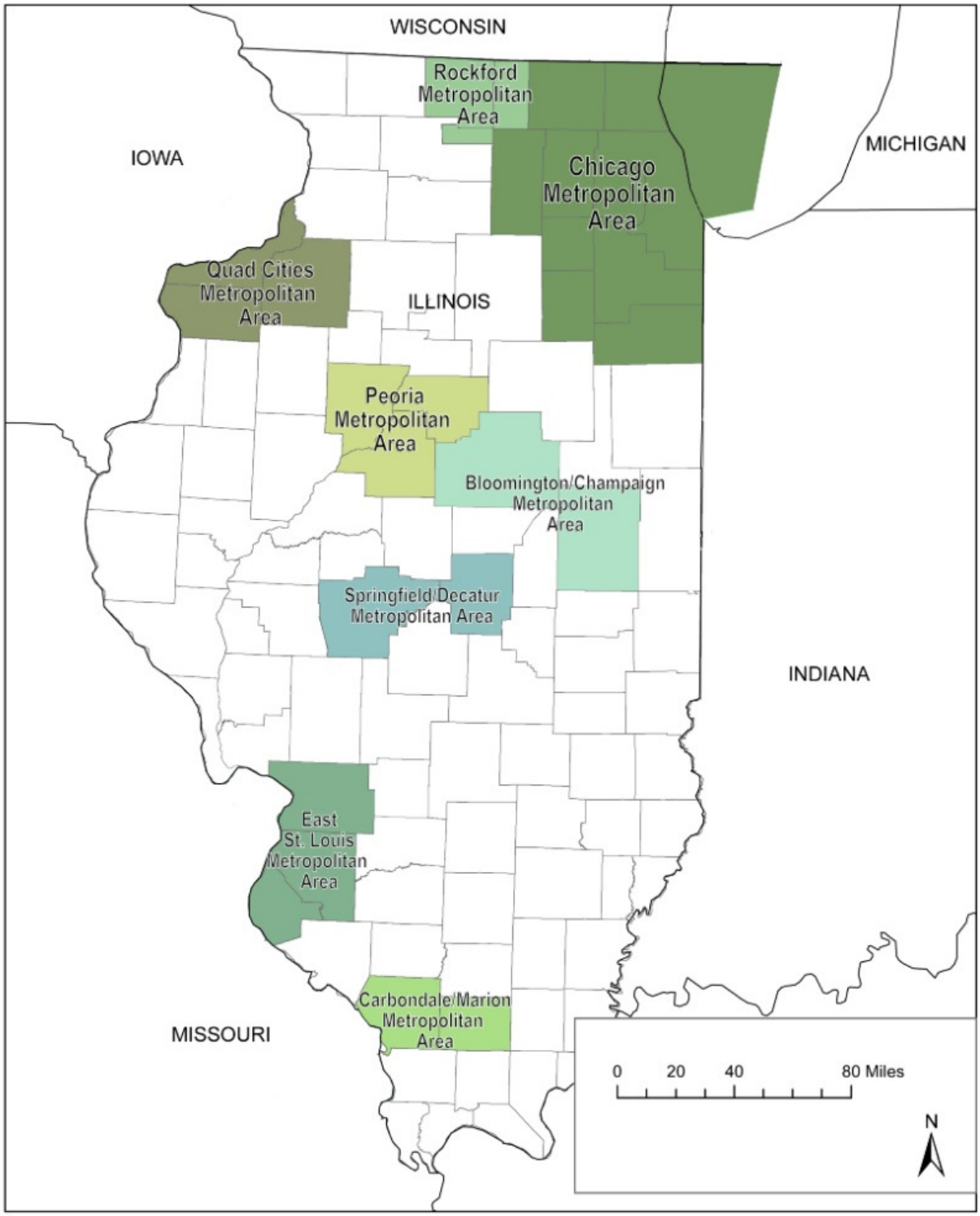


Figure 9. Metropolitan/urban focus areas for the Green Cities Campaign. The whole of the Metropolitan Planning Area for the Quad Cities, Rockford, Peoria, and East St. Louis have also been included in the Focus areas shown.

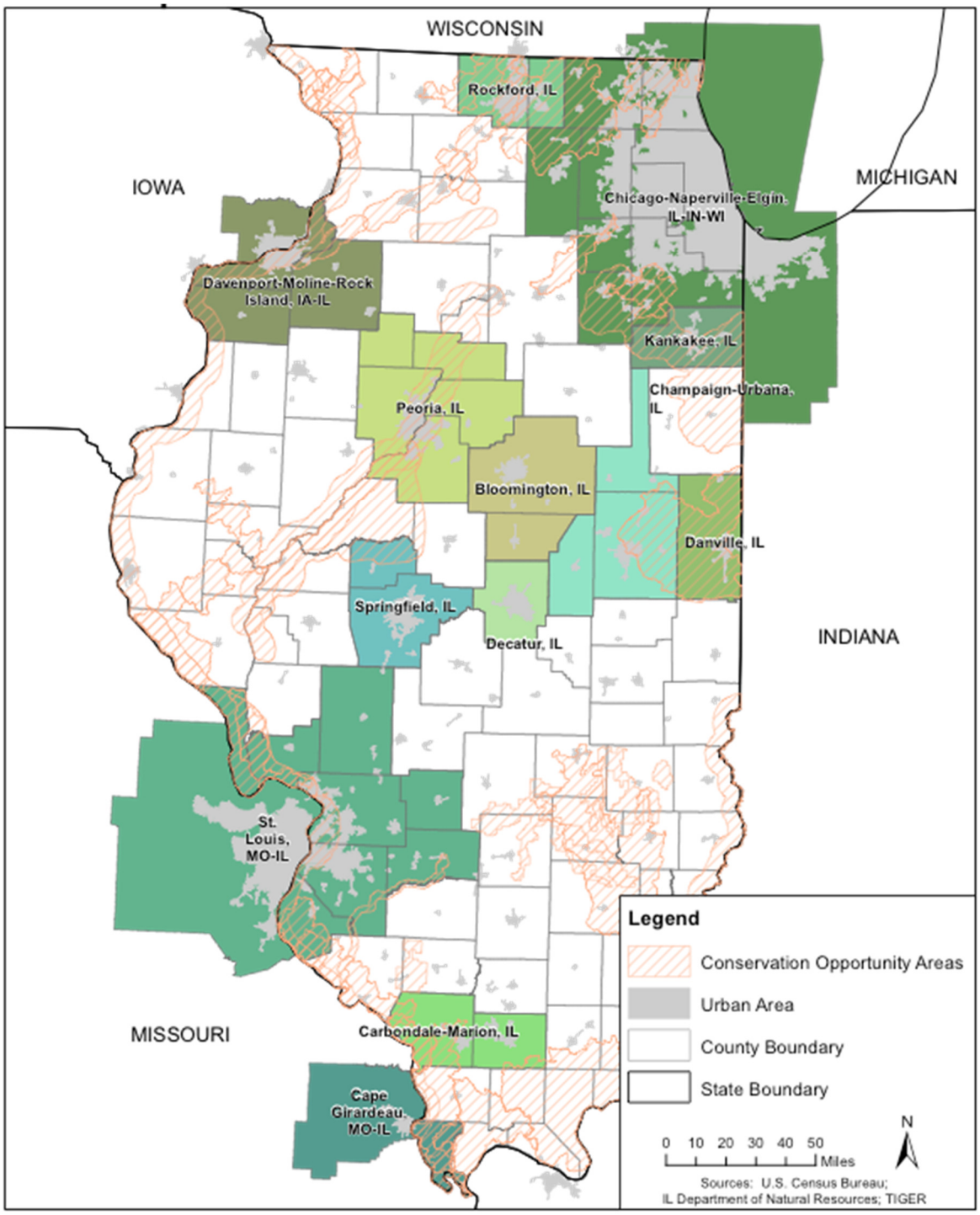


Figure 10. Conservation Opportunity Areas in relation to Metropolitan Statistical Areas and urbanized areas.

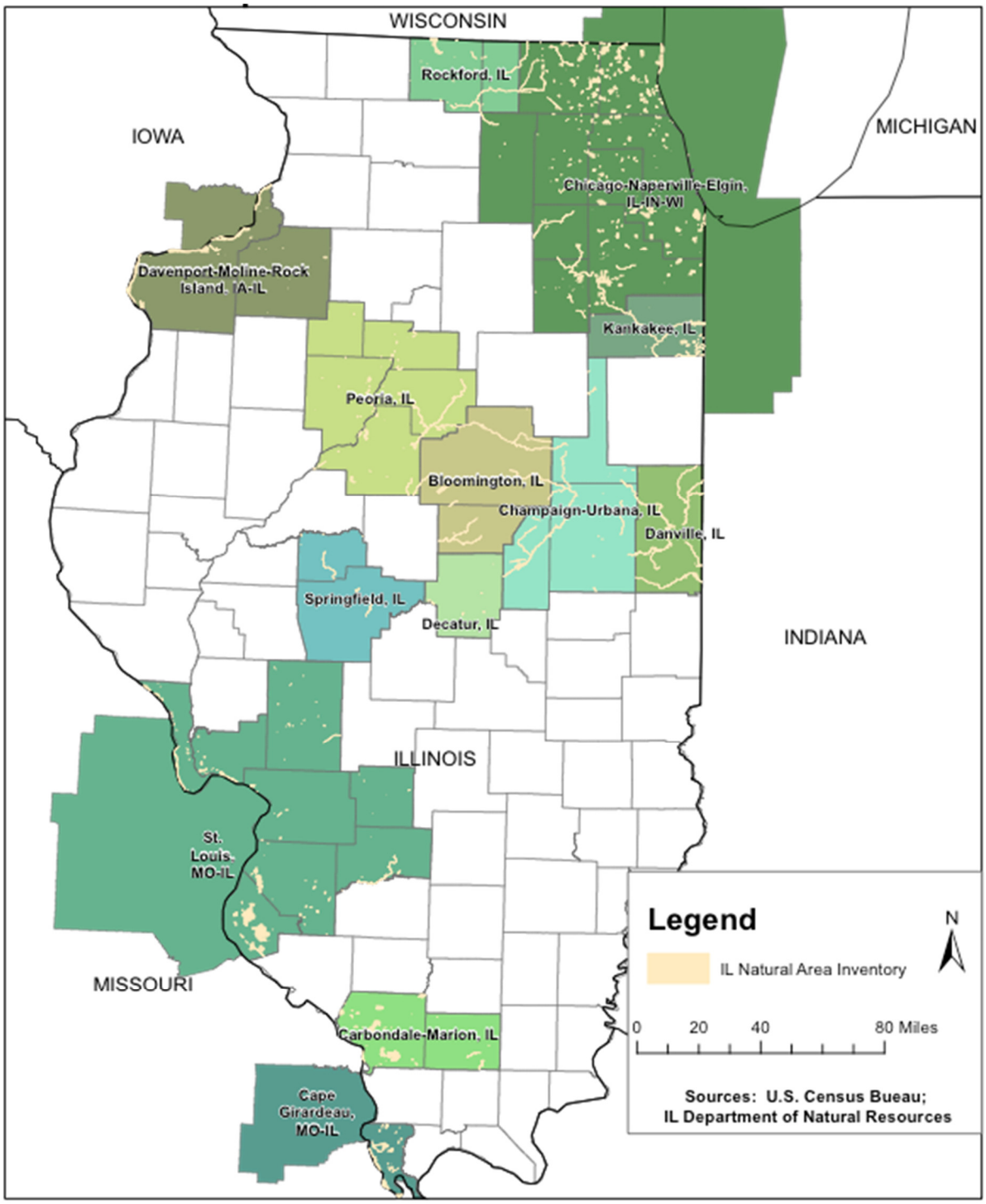
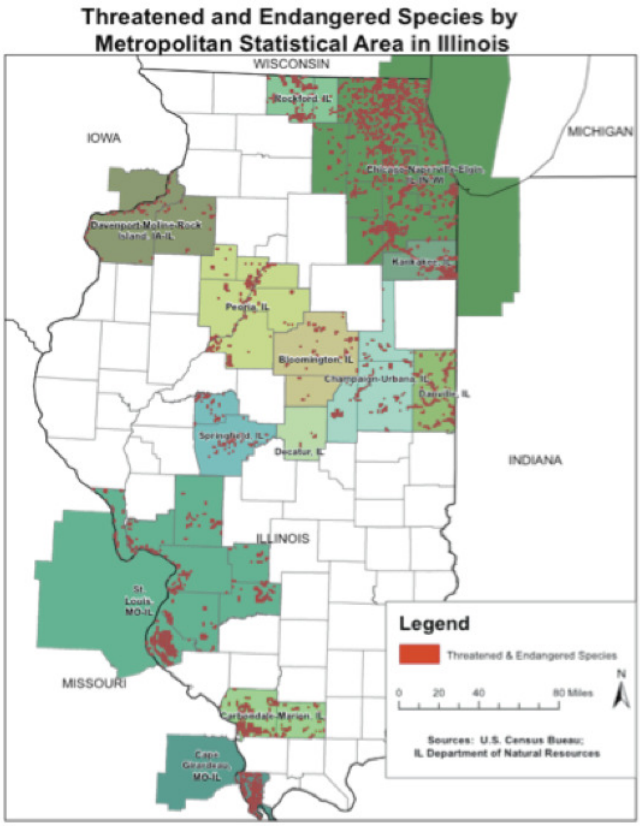
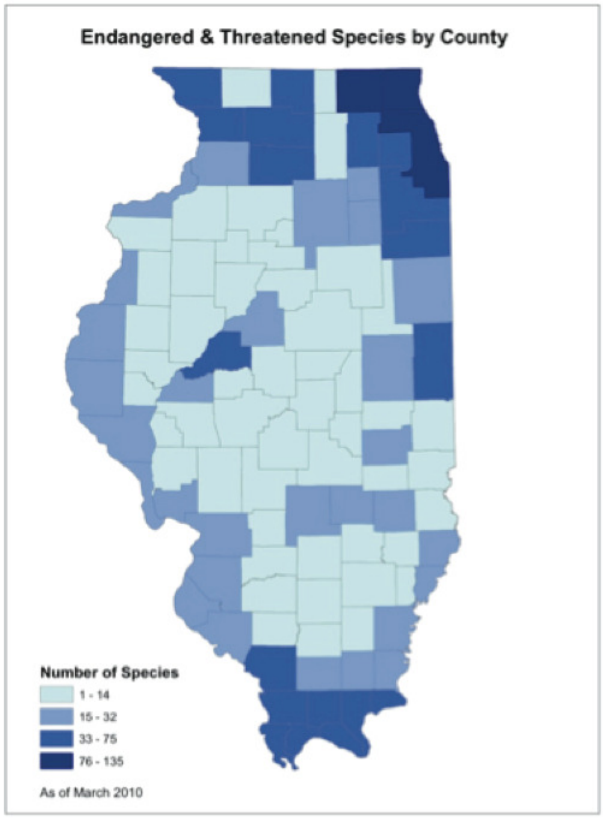


Figure 11. Illinois Natural Areas Inventory sites by Metropolitan Statistical Area.





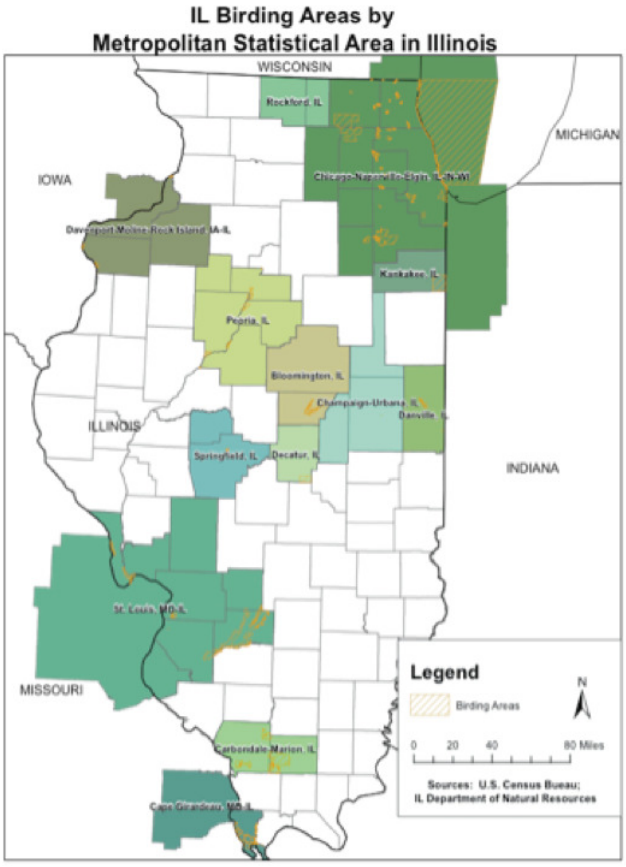


Figure 12. Threatened and Endangered Species information and IL Breeding Areas by Metropolitan Statistical Area.

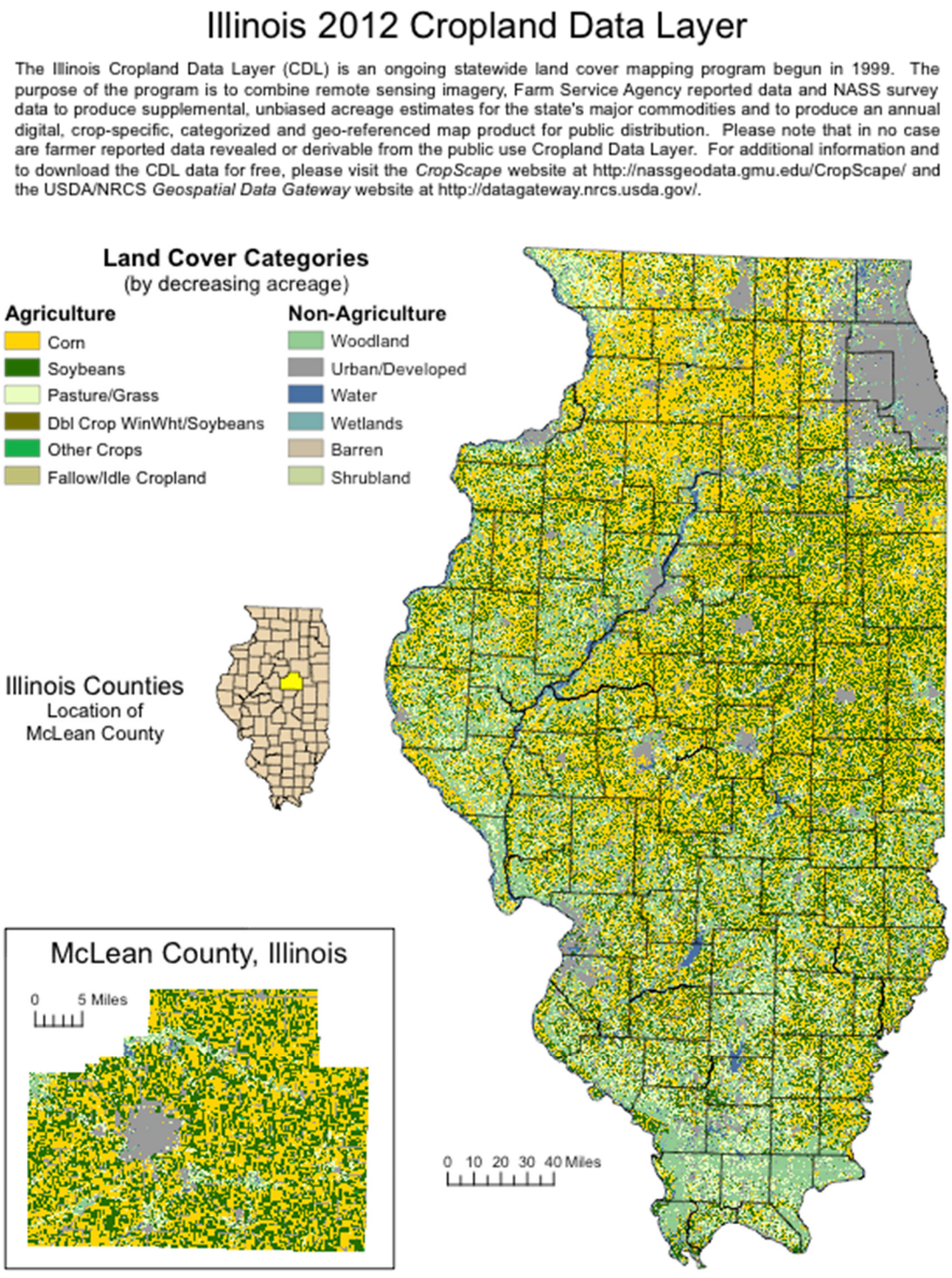


Figure 13. Illinois cropland data from 2012.

Appendix 6. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Green Cities Campaign. Definitions and methods:

Common Name: Commonly recognized name for the species.

Scientific Name: Currently recognized name for the species based on the most recently available literature.

Campaign Habitat: Major habitat type where the species occurs in Illinois.

Specific Habitat: More detail habitat location for species in Illinois.

Historic Status: Number of Counties, or HUC8 watershed for fish and mussels, with records from before 1980.

Current Status: Number of Counties, or HUC8 watersheds for fish and mussels, with recent records (last 20 years).

Trend: Trends were based on the change in distribution of the species by comparing their Current and Historic Status. If a change less than 25% was observed the trend was recorded as 0, changes with magnitudes between 25-49% were coded as +1 (distribution increased) or -1 (distribution decreased), changes greater than 50% were coded as +2 (distribution increased) or -2 (distribution decreased).

Stressors: Each stressor type was rated as either a recognized stressor (1), not a recognized stressor (0), or as having not enough information to make a rating (NMI=Need More Information).

Appendix 6. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Green Cities Campaign.

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
BIRDS																										
American Bittern	*Botaurus lentiginosus*	Marsh	Marsh	13	17	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	1	1
Bald Eagle	*Haliaeetus leucocephalus*	Upland Forest	Forested Stream, Lake	14	66	2	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1	0	1	1
Black-Billed Cuckoo	*Coccyzus erythropthalmus*	Upland Forest	Forest	74	33	-2	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1
Black-Crowned Night-Heron	*Nycticorax nycticorax*	Swamp	Swamp	31	32	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	0	1
Bobolink	*Dolichonyx oryzivorus*	Prairie (Native Grass)	Grassland	53	33	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Broad-Winged Hawk	*Buteo platypterus*	Upland Forest	Forest	42	42	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	1
Cerulean Warbler	*Setophaga cerulea*	Floodplain Forest	Bottomland Forest	36	27	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Chimney Swift	*Chaetura pelagica*	Urban	Swamp, Urban	102	100	-2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1
Common Nighthawk	*Chordeiles minor*	Urban	Urban, Barren, Grassland	87	76	-1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	1	0	1	1
Dickcissel	*Spiza americana*	Prairie (Native Grass)	Grassland	101	101	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Henslow's Sparrow	*Ammodramus henslowii*	Prairie (Native Grass)	Undisturbed Grass	11	61	2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	0	0	1	1
Osprey	*Pandion haliaetus*	Upland Forest	Forested Stream, Lake	10	33	2	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1	0	1	1
Ovenbird	*Seiurus aurocapillus*	Upland Forest	Forest	48	53	-1	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Peregrine Falcon	*Falco peregrinus*	Urban	Urban, Cliff	3	22	1	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0
Red-Headed Woodpecker	*Melanerpes erythrocephalus*	Savanna	Savanna	102	92	-2	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	0	0	1
Sandhill Crane	*Grus canadensis*	Marsh	Marsh	6	21	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Wood Thrush	*Hylocichla mustelina*	Upland Forest	Forest	101	88	-2	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	Marsh	Marsh	13	12	-1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1
FISH																										
Iowa Darter	*Etheostoma exile*	Large Reservoir, Creek, Backwater, Swamp	Lake, Stream, Backwater, Swamp with Vegetation	10	5	-1	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
HERPTILES - Amphibians																										
Blue Spotted Salamander	*Ambystoma maculatum*	Sedge Meadow	Fish-free Vernal Pool	33	29	0	0	1	1	1	1	1	0	1	0	0	0	1	0	0	1	1	0	0	1	1
HERPTILES - Reptiles																										
Blanding's Turtle	*Emydoidea blandingii*	Marsh	Nesting in Upland Habitat, Numerous Types of Wetland	31	21	-1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1
Smooth Greensnake	*Opheodrys vernalis*	Prairie (Native Grass)	Prairie, Old Field	26	14	-1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	1	1	1	0	1	1

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
INVERTEBRATE - Lepidoptera (Butterflies & Moths)																										
Monarch Butterfly	*Danaus plexippus*	Prairie (Native Grass)	Prairie, Meadow	NMI	NMI	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
MUSSELS																										
Black Sandshell	*Ligumia recta*	River	Riffle, Gravel or Sand	32	15	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Pistolgrip	*Tritogonia verrucosa*	River	Sand, Gravel, Muck	38	29	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1
MAMMALS																										
Franklin's Ground Squirrel	*Poliocitellus franklinii*	Prairie, Marsh	Tall/Mid-Grass Prairie, Marsh Edge, Field/Forest Edge	14	10	-2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1

Invasive Species Campaign

Description

Invasive species are defined as non-native organisms whose introduction cause or are likely to cause environmental harm. Worldwide and within Illinois, invasive species are a primary threat to species of wildlife, the integrity of natural communities, and the quality of habitats. Invasive species are a leading cause of extinctions worldwide, and, in Illinois, are a contributing factor to the listing of a majority of the Species in Greatest Conservation Need (SGCN).

In Illinois, invasive species can come from all groups of organisms, including plants, invertebrate animals, vertebrate animals, and pathogens. Current examples of invasive species that are impacting the state include exotic bush honeysuckles (*Lonicera maackii, L. morrowii*, and *L. tatarica*), Asian carp (*Hypophthalmichthys molitrix* and *H. nobilis*), Emerald Ash Borer (*Agrilus planipennis*), and Viral Hemorrhagic Septicemia (VHS).

This campaign crosses habitats and addresses all taxa of invasive species. As such, it is applicable to any conservation project in Illinois. All aspects of invasive species management, including control, monitoring, early detection and rapid response, prevention, outreach, and restoration are addressed within the actions set forth by this campaign.

The actions included within this campaign section are provided to help guide the next 10 years of implementation. While other actions may be needed and larger goals could be set, the campaign prioritizes the actions contained in this section as realistic, achievable and most needed within the next 10 years to best aid in meeting the overarching goals of the Wildlife Action Plan to 1. Establish desired number and distribution of viable populations for each SGCN and target Focal Species by 2015, 2. Manage habitats through promoting self-maintaining natural-disturbance regimes for the benefit of native species, 3. Develop resiliency and connectedness into habitats so species can adjust to landscape and environmental changes, and 4. Foster an awareness, appreciation, and connection to SGCN and associated habitats among the public.

Goals

Managing current and preventing new introductions of invasive species will aid in reducing the direct and indirect impacts these exotic organisms have on our Species in Greatest Conservation Need. Invasive species alter the health of habitats in Illinois, directly impacting that habitat's resiliency and ability to adjust to landscape and environmental changes. The actions in this campaign were designed to reduce or remove stressors that limit the population size, range, and health of our SGCN as well as improve habitats that benefit the native species of Illinois.

Goals for the invasive species campaign include:

- Create a comprehensive, integrated approach to addressing invasive species that crosses jurisdictional, organizational, and agency boundaries;

- Identify key invasive species and situations that are impacting Species in Greatest Conservation Need and the habitats they rely on and take actions to reduce or negate those current negative effects;
- Identify invasive species that pose a future threat to SGCN, and prevent their introduction into or spread throughout Illinois;
- Maintain and restore health of populations of our SGCN to decrease likelihood of contraction and impacts of exotic diseases and pathogens;
- Develop robust policy, protocols, and regulations for Illinois to address invasive species introduction, use, and transport;
- Increase awareness of invasive species in Illinois and foster the acquisition of the knowledge, skills, and abilities necessary for effective management, particularly on private lands.

Status as of 2015

Invasive species continue to expand throughout the state. They remain a primary challenge to conserving and maintaining the rich biodiversity of Illinois, in particular the conservation of our rare wildlife species and the habitats they depend upon. Since the publication of the Comprehensive Wildlife Conservation Plan & Strategy (CWCP; State of Illinois 2005) many invasive species have expanded their range in Illinois. For example, previously confined largely to far southern Illinois, Japanese Stiltgrass (*Microstegium vimineum*) has experienced an explosive range expansion. As of 2015, Japanese Stiltgrass can be found in at least 26 counties, including several locations in far northern Illinois. Emerald Ash Borer (*Agrilus planipennis*) was first found in Illinois in 2006, but since has continued to expand its range. As of 2015, Emerald ash borer has been found in 310 communities and 50 counties. Teasel (*Dipsacus* sp.) while being present in Illinois for a long time, has continued to expand its range and can be found along almost any major transportation right-of-way in the state.

Since 2005, several exotic species that have become (or have the potential to become) invasive have been found in Illinois:

Plants: Japanese Chaff Flower, *Achyranthes japonica* (2008); †Giant Hogweed, *Heracleum mantegazzianum* (2006); Smallflower Saltcedar, *Tamarix Parviflora* (2012); Hyssop Loosestrife, *Lythrum hyssopifolium* (2011); Parrotfeather Milfoil, *Myriophyllum aquaticum* (2008); Sacred lotus, *Nelumbo nucifera* (2012); Reed Mannagrass, *Glyceria maxima* (2006)

Insects: Emerald Ash Borer, *Agrilus planipennis* (2006); Brown Marmorated stinkbug, Halyomorpha halys (2009); *Velvet Longhorn Beetle, *Trichoferus campestris* (2009)

Pathogens: Viral Hemorrhagic Septicemia, VHS (2008); Ranavirus, (2012); White-nose Syndrome, causal agent *Pseudogymnoascus destructans* (2013)

Animals: Corbiculid Clam, *Corbicula largillierti* (2008); Mottled Fingernail Clam, *Eupera cubensis* (2006); *Red Swamp Crayfish, *Procambarus clarkii* (2010); Quagga Mussel, *Dreissena rostriformis bugensis* (2005);

**= discovered but not known to be established in Illinois*
†= thought to be eradicated from Illinois (as of 2015)

However, even with expanding populations of invasive species and continued introduction of new species, significant progress has been made since the CWCP (State of Illinois 2005) was written.

Three cooperative weed management areas (CWMAs) have been established in Illinois. These local partnerships plan, prioritize, and coordinate invasive plant actions across agencies and organizations in a defined area. The two most well-established CWMAs in Illinois are the River to River Cooperative Weed Management Area in southern Illinois and the Northeast Illinois Invasive Plant Partnership in Northeastern Illinois. Additional CWMAs are being established in other regions of Illinois. Other local partnerships also collaboratively address invasive species. One example is the Clifftop Alliance in southwestern Illinois.

Exotic Plant Strike Teams are proving to be an effective means of controlling priority populations of invasive plants and to implement Rapid Response for new infestations. These teams also provide crucial data collection and mapping functions, which help inform priority-setting for their region and the entire state. As of 2015, Strike teams are functioning in southern, northwestern, and northeastern Illinois.

The Illinois Invasive Plant Species Council has been established and serves as the avenue for enhanced communication between land management agencies and the horticulture industry. This council has developed a strategic plan that corresponds with the Wildlife Action Plan's Invasive Species Campaign. Additionally, the council has developed and initiated a species assessment protocol to review and make recommendations for the regulation of plant species.

Illinois Invasive Species Awareness Month (ISAM) was established in 2010 to create a concerted, statewide effort to raise awareness about invasive species issues. Many local, state, and federal agencies and organizations participate in ISAM by hosting events and programs. Between 2010 and 2015, over 550 events have been held as part of ISAM. Starting in 2014, an annual Invasive Species Symposium has been held to highlight and update invasive species projects and initiatives in Illinois.

Illinois has ramped-up efforts on Asian Carp (*Hypophthalmichthys molitrix* and *H. nobilis)* during the last ten years, including hiring new biologists that deal primarily with these efforts, reinforcing the electric barrier with the Chicago Area Waterway System and contracting commercial fishermen as means of preventing carp from entering the Great Lakes watershed. The electronic barrier, which was installed in 2002, was upgraded and repaired in 2008 with additional barriers added in 2009 and 2011. A more detailed discussion on the status of the Asian carp efforts is included in the Streams Campaign section (Page 186).

The 2006 discovery of Emerald Ash Borer (*Agrilus planipennis)* in Illinois has drastically changed the urban forests, urban forestry, and forest health in Illinois. The Illinois Department of Agriculture and USDA-APHIS lead an aggressive response that included quarantines, educational campaigns, new regulations, and grants to assist in removal and replanting.

Wildlife health continues to be an important aspect of wildlife management. Recent discoveries of exotic diseases, such as Ranavirus, Snake Fungal Disease, White-nose Syndrome, and Viral Hemorrhagic Septicemia have wide impacts on our native wildlife, including SGCN. The exotic Faucet Snail (*Bithynia tentaculat*), is invading the Mississippi River and has recently been found in the river adjacent to northern Illinois. This snail harbors pathogenic helminthes (*Cyathocotyle bushiensis and Sphaeridiotrema pseudoglobulus*). These helminths, when consumed by waterfowl or other water birds,

cause internal hemorrhaging and death. Efforts have ramped up in terms of response to these issues, particularly with Chronic Wasting Disease, CWD, in white-tailed deer and the exotic diseases impacting herpetofauna. Recent efforts to develop statewide wildlife health programs and wildlife disease response plans have started and are a promising advance of this important issue.

Launched in 2011, the Illinois-Indiana Sea Grant Sea Grants' Clean Boats Crew is a volunteer outreach program that empowers the public to keep their waters free from aquatic invasive species (AIS). Clean Boats Crew members talk with boaters, anglers, and other recreational water users at local boat ramps about AIS and apply simple steps to prevent transfer of AIS from one waterbody to another. From 2011 to 2014, Clean Boat Crews reported a total of 8,964 contacts with recreational water users about what they can do to decrease the likelihood that their equipment is carrying AIS from lake to lake.

The public's familiarity with and knowledge about invasive species has increased dramatically since 2005, in large part due to the efforts outlined in the original Invasive Species Campaign. Currently Illinois citizens, in general, know about invasive species and understand that they can be a threat.

Several state regulations and rules have been created or amended to better address invasive species.

- In 2005, the Illinois Injurious Species Rule (17 IAC Sec. 805) was amended to include the three Asian carp species and in 2013, the rule was again amended to include 27 invasive aquatic plant species as injurious species, making it illegal to possess, propagate, buy, sell, barter, trade, or transport them;
- In 2006, under the authority of the Insect Pest and Plant Disease Act (505 ILCS 90/1 et seq.), an internal quarantine was established to limit the spread of emerald ash borer through regulating the movement of ash wood material and hardwood firewood. This internal quarantine has been amended 11 times in response to the expanding range of emerald ash borer;
- In 2008, USEPA amended rules for ballast water discharge to help prevent introduction of new aquatic invasive species in the Great Lakes (Vessel General Permit, VGP). In 2013, these rules were reissued;
- In 2012, under the authority of the Insect Pest and Plant Disease Act (505 ILCS 90/1 et seq.), an external quarantine was established to prevent the introduction of the causal agents of Thousand Cankers Disease through regulating the introduction and movement of walnut wood material;
- In 2013, the Boat Registration and Safety Act (625 ILCS 45/5-23 new) was amended to make it illegal for any person to place or operate a vehicle, seaplane, watercraft, or other object of any kind in waters of this State if it has any aquatic plants or aquatic animals attached to the exterior of the vehicle, seaplane, watercraft, or other object (excluding duckweed);
- In 2014, a section was added to the Illinois Administrative Code to regulate wild swine (17 Ill. Adm. Code 700). This addition regulates the importation, possession, release, take, sale, and propagation of wild swine in Illinois.

Stresses and Threats to Wildlife and Habitats

The mechanisms that are utilized by invasive species to impact native wildlife species and the scale of those impacts are extremely variable. In general, invasive species can act as stressors or threats to native wildlife species in three ways. Some invasive animal species directly compete for the same

natural resources and life requirements (food, water, space, shelter) as native species. For example, the Round Goby (*Neogobius melanostomus*) has a well-developed sensory system that enhances its ability to detect water movement. This allows it to feed in complete darkness, giving it an advantage over native fish in the same habitat. Invasive species can displace native plant communities and/or radically change the nature of the habitats they invade. Through their impacts on species and ecosystem processes, invasive species can result in the fragmentation, destruction, alteration or complete replacement of habitats which in turn, has cascading effects on even more species and ecosystem processes. Some examples of these impacts include the following: studies have demonstrated that songbirds often use exotic plants as nesting substrates and may suffer elevated predation rates relative to nests placed in native plants; Common Carp have a stronger influence on water quality and aquatic community structure than benthic fish native to Illinois; or the destructive feeding habits of Feral Swine (*Sus scrofa*), primarily rooting disturbance, can reduce plant cover, diversity, and regeneration. Invasive pathogenic microbes are introduced microorganisms which are usually single-celled, or too small for the unaided eye to see, including bacteria, viruses, protists, and fungi. Some pathogenic invasive species cause direct mortality to native wildlife or impact their health or fecundity is such a way as to impact the overall population. Examples of this would be Ranavirus decreasing survivorship and fecundity of eastern box turtles or increased mortality of Eastern Massasauga individuals due to Snake Fungal Disease (causal agent *Ophidiomyces ophidiicola*). When in combination with other stressors, such as climate change, fragmentation, and habitat loss, impacts from invasive species are often exacerbated.

Before any specific invasive species can impact native wildlife, it must first arrive to Illinois. Invasive species are introduced into Illinois via three major pathways:

1. **Intentional Introductions –** Some species of plants, animals, and microorganisms have been spread by humans over much wider ranges than they occupied naturally. Some of these introductions have and continue to be deliberate in Illinois most often with the intention to improve conditions for some human activity such as; benefiting agriculture, aquiculture, or other economic interests; improving wildlife habitat; purposes of sport fishing and hunting, horticultural escapes (included here because their initial transport to a new region is human motivated), pets, and erosion control. While most of the exotic species are benign or even beneficial, some of these introductions result in naturalization of species which are highly invasive. Examples of intentionally introduced species include Kudzu Vine (*Pueraria montana*) introduced for erosion control and as livestock forage, Feral Swine introduced for hunting opportunities, and Multiflora Rose (*Rosa multiflora*) introduced for agriculture and wildlife.

2. **Accidental introductions -** Other introductions are accidental, as when plants are introduced with soil; transported as ballast in ships; or insects were transported with timber or food. Illinois has structural features that increase its susceptibility to accidental invasions. Chicago for example, is the largest inland general cargo port in America, and the city as a whole is the commercial transportation hub of the nation. International ports via air and water mean Illinois has been and should expect to continue to be a point-of-origin for biological invasions. These invasions can occur as a result of direct importation into Illinois from overseas, or indirectly, through domestic redistribution of species that have invaded other parts of the U.S. The state's massive transportation infrastructure facilitates the spread of established invasive species

throughout the state. Examples of accidental introductions into Illinois include Asian Longhorn Beetle (*Anoplophora glabripennis*), which was directly introduced into Chicago through imported wood packing material, and the Emerald Ash Borer (*Agrilus planipennis*), which originally invaded the state of Michigan through imported wood packing material and was then likely introduced into Illinois through domestic movement of firewood and/or other wood products.

3. **Natural spread from introductions in adjacent regions** – Illinois is a diverse state that touches four major physiographic regions (Central Lowland, Interior Low Plateau, Ozark Plateau, and Coastal Plain) and bridges two major watersheds (Great Lakes and Mississippi River). Illinois is bordered by two of the largest river systems in North America (Mississippi and Ohio Rivers). Because of these factors and Illinois' location within the United States, the state is at high risk of invasive species, spreading naturally from other regions of the country. Examples include: Japanese Stiltgrass (Microstegium vimineum) and Japanese Chaff Flower (*Achyranthes japonica*) likely made their way into Illinois by moving down the Ohio River; Saltcedar (*Tamarix* sp.) down the Mississippi River, and White-nose Syndrome (causal agent *Pseudogymnoascus destructans*) introduced via migrating bat species.

Unfortunately, many of these methods of introduction are difficult to curtail, resulting in constant introductions of new species. As detailed above, since the publication of the CWCP, at least 18 new invasive species have been discovered in Illinois. With the 'community' of invasive species in Illinois continually changing with new and often poorly understood invasive species being introduced each year, mitigating actions and priorities must also continually change through updates and reprioritization.

Exotic invasive plant species impact native wildlife chiefly through habitat modification and outcompeting native plant species necessary for forage and habitat. Many of the invasive plants in Illinois can disperse easily and rapidly spread through the landscape once introduced. Invasive plant species that have the ability to invade and alter high-quality natural communities are particularly threatening to our SGCN since these high-quality remnants are often strongholds for populations of SGCN. Altering habitat suitability may not directly lead to mortality of a SGCN, but can alter fecundity, health, survivorship, susceptibility to predation from other wildlife species (including native species), etc.

Exotic invasive wildlife species, including exotic invasive insects, can directly compete with native wildlife, including SGCN, for limited resources. Some exotic invasive wildlife species may also modify habitat and alter suitability and quantity for SGCN. In addition, some exotic invasive wildlife may directly consume SGCN. These impacts lead both to directly mortality of individuals of a SGCN but also reductions in reproduction, health, survivorship, etc.

Exotic invasive pathogens can either directly impact native wildlife, including SGCN or impact native plant species used as forage or habitat. Direct pathogenic impacts to native wildlife influence population dynamics and even survivability of a species or population. Pathogenic invasive species could increase mortality, reduce fecundity, increase stress and susceptibility to other diseases or climatic conditions, or other means of impacting wildlife populations. Indirect impacts, through influencing plant species used for forage or habitat is similar to the potential impacts from invasive insects.

Note on Climate Change

Illinois will be affected directly and indirectly by a changing climate over the next 100 years. Climate models indicate a potential increase in mean annual temperature of 2 to 7 °F for this region. Projections for precipitation show an increase in winter and spring precipitation. There is high agreement among multiple lines of evidence that many invasive plants, insect pests, and pathogens will increase or become more severe. Several species, for example, are likely to have stronger or more widespread effects on forest composition and structure under the projected climate. Some drought- and fire-tolerant invasive plants, such as Sericea Lespedeza (*Lespedeza cuneata*), may also benefit from projected climate changes. In addition, a warming climate may make conditions more favorable for invasive species that are currently invading from farther south. However, uncertainty pervades predictions because of the lack of adequate data on species and because some species depend on complex, incompletely understood relationships. While targeted research will increase our confidence in making predictions, some uncertainty will always persist. Therefore, policies should allow for this uncertainty by considering a wide range of possible scenarios.

Each campaign within the Wildlife Action Plan addresses the threat of invasive species. Listed below are priority invasive species for each of the other campaigns:

Farmland and Prairie Campaign:

- Exotic cool season grasses, such as Smooth Brome (*Bromus inermis*) and Tall Fescue (*Schedonorus arundinaceus*);
- Autumn Olive (*Elaeagnus umbellata*);
- Sericea Lespedeza (*Lespedeza cuneata*);
- Exotic composites such as teasel (*Dipsacus* sp.), exotic thistles (*Cirsium* sp. and *Carduus nutans*), and knapweeds (*Centaurea* sp.);
- Multiflora Rose (*Rosa multiflora*).

Forest and Woodlands Campaign:

- Exotic invasive shrubs, such as Bush Honeysuckle (*Lonicera maackii*, *L. tatarica*, and *L. morrowii*), Autumn Olive (*Elaeagnus umbellata*), Common Buckthorn (*Rhamnus cathartica*), and Burning Bush (*Euonymus alatus*);
- White-nose Syndrome (causal agent *Pseudogymnoascus destructans*);
- Garlic Mustard (*Alliaria petiolata*);
- Feral Swine (*Sus scrofa*);
- Forest insect pests such as Emerald Ash Borer (*Agrilus planipennis*) and Gypsy Moth (*Lymantria dispar*).

Green Cities Campaign:

- Emerald Ash Borer (*Agrilus planipennis*);
- Invasive ornamental/landscaping plants such as Japanese Barberry (*Berberis thunbergii*), Burning Bush (*Euonymus alatus*), and Callery Pear (*Pyrus calleryana*);
- Exotic bush honeysuckles (*Lonicera maackii*, *L. tatarica*, and *L. morrowii*);
- Garlic Mustard (*Alliaria petiolata*);
- Common and Glossy Buckthorns (*Rhamnus cathartica* and *Frangula alnus*).

Lake Michigan Coastal Campaign:

- Phragmites (*Phragmites australis);*
- Narrowleaf Cattail (*Typha angustifolia*); and hybrids
- Round Goby (*Neogobius melanostomus*);
- Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussel (*Dreissena bugensis*);
- Exotic waterfleas including Spiny Waterflea (*Bythotrephes longimanus*) and Fishhook Waterflea (*Cercopagis pengoi*);
- Sea Lamprey (*Petromyzon marinus*).

Streams Campaign:

- Asian Carp [Bighead Carp (*Hypophthalmichthys nobilis*), Black Carp (*Mylopharyngodon piceus)*, Grass Carp (*Ctenopharyngodon idella)*, Silver Carp (*Hypophthalmichthys molitrix*)] and Common Carp (*Cyprinus carpio);*
- Chinese Mystery Snail (*Cipangopaludina chinensis*) and Faucet Snail (*Bithynia tentaculata*)
- Dreissenid mussels (Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussel (*Dreissena rostriformis bugensis*);
- Round Goby (*Neogobius melanostomus*) and Tubenose Goby (*Proterorhinus marmoratus*);
- Rusty Crayfish (*Orconectes rusticus*);
- Purple Loosestrife (*Lythrum salicaria*) and Eurasian Milfoil (*Myriophyllum spicatum*);
- VHS (Viral Hemorrhagic Septicemia) ;
- Potential threats also include Didymo (*Didymosphenia geminata*) and New Zealand Mudsnail (*Potamopyrgus antipodarum*).

Wetlands Campaign:

- Phragmites (*Phragmites australis*);
- Reed Canarygrass (*Phalaris arundinacea*);
- Purple Loosestrife (*Lythrum salicaria*);
- Narrow-leaved and Hybrid Cattails (*Typha angustifolia* and *T. ×glauca*);
- Disease/pathogens for herpetofauna such as *Ranavirus* and Chytrid fungus (*Batrachochytrium dendrobatidis*);
- Common and Grass Carp (*Cyprinus carpio* and *Ctenopharyngodon idella*).

Focal Species

The Illinois Comprehensive Wildlife Conservation Plan & Strategy (CWCP; State of Illinois 2005) Appendix II (Status, Objectives, and Stresses to Illinois' Wildlife & Habitat Resources) included invasive species in both the ranked Habitat Stresses and Community Stresses to SGCN and to habitats in Illinois. Nearly 60% of the SGCN listed in Appendix II were rated as 'Invasive Species having or is likely to have a moderate to severe effect on population viability or abundance'. This includes 52% of mussels, 66% of fishes, 24% of herpetofauna, 91% of birds, and 3% of mammals. Similarly, 95% of habitats had invasive species rated as a moderate (7/41) or severe (32/41) threat.

With changes in the SGCN list (additions of invertebrates without data for threats), new invasive species being found in the state, and a better understanding of the impacts of invasive species on wildlife, those numbers have changed in this revision. Currently, 121 species ranked as moderately to severely threatened by invasive species out of the entire list of 521 species (23%). When only vertebrate species

are used to compare with the 2005 CWCP, then the number changes to 121/265 (46%) including 77/93 (83%) birds, 37/44 (84%) herptiles, and 7/30 (23%) mammals.

The Invasive Species Campaign addresses all habitats in Illinois and a majority of the SGCN that are threatened by invasive species, therefore this campaign does not have a narrowed, focused list of particular SGCN. Instead, the actions within this campaign were crafted to be applicable to many different invasive species and beneficial to a broad swath of SGCN. Specific actions to address an invasive species-related threat to a particular invasive species are included when warranted. Invasive species Table 16 summarizes which SGCN that we have high confidence are severely threatened by invasive species, separated by campaign.

Actions

Actions included within this campaign can be divided into Universal Management Recommendations and Targeted Actions. Universal Management Recommendations are on-the-ground practices that will benefit Illinois wildlife species, including SGCN, wherever they are implemented. Anyone that values wildlife and wants to contribute to meeting the overarching goals of the Illinois Wildlife Action Plan should consider implementing these practices where applicable. The Targeted Actions are specific, often place-based, actions designed to address a particular need, stressor, or situation.

Universal Management Recommendations

1. **Use Best Management Practices to prevent the introduction and spread of invasive species.**
    a. Clean mud, soil, and plant material from equipment, vehicles, boots, and clothing before moving to a new site;
    b. Inspect off-site material and equipment and ensure they are free of invasive plant seeds or other plant material before moving on-site;
    c. Monitor for new infestations of invasive species, particularly in areas with recent disturbance;
    d. Build in and enforce equipment cleaning requirements for any contract and grant work;
    e. Do not move animals from one area to another, particularly if they seem sick or unhealthy;
    f. Sanitize your hands, boots, and any equipment if working in an area with known wildlife disease outbreaks;
    g. Remove plants, animals, and mud from boats, trailers, and any other equipment;
    h. Drain water from live wells and bait buckets;
    i. Minimize transportation of firewood; buy it where you will burn it.

2. **Contribute to the overall knowledge of the distribution of invasive species in Illinois.**
    a. Enter observations of invasive plants into online databases, such as the Early Detection and Distribution Mapping System (http://www.eddmaps.org) or the New Invaders Watch Program (http://www.newinvaders.org);
    b. Report sightings of Feral Swine to the Illinois Department of Natural Resources;
    c. Report concentrations of sick and/or dead animals to the Illinois Department of Natural Resources;
    d. Report concentrations of dead and/or dying trees to the Illinois Department of Natural Resources or the Illinois Department of Agriculture;

e. Report observations of invasive insects to USDA-APHIS-PPQ, Illinois Department of Agriculture or Illinois Natural History Survey.

3. **Control existing infestations of invasive species.**
    a. Priority for implementing control should be given to an Early Detection Rapid Response species, a species listed as a priority within the IWAP campaigns, a species designated as a priority by the local CWMA, or a species with the potential to impact SGCN habitat (see Invasive Species Table 15);
    b. Use control methods proven to be safe and effective, such as the methods recommended in the Illinois Nature Preserves Vegetation Management Guidelines for plant species;
    c. Include invasive species considerations in planning and evaluation of other restoration and management tasks.

4. **Participate in local invasive species partnerships, such as Cooperative Weed Management Areas, if available.**

5. **Use and promote native or non-invasive alternatives to plantings of invasive species.**
    a. Increase promotion and use of native and non-invasive species for horticulture, landscaping, and wildlife and environmental planning;
    b. Native plants are preferable over non-invasive non-native plants because they play a critical ecological role in maintaining overall native biodiversity.

6. **Increase education and outreach efforts on invasive species, particularly to private landowners**
    a. Participate in Illinois Invasive Species Awareness Month (www.illinoisinvasives.org);
    b. Organize field tours, presentations, or other events on invasive species;
    c. Develop, use, and distribute educational materials on invasive species.

Targeted Actions

7. **Establish collaborative Early Detection /Rapid Response (EDRR) and Spread Prevention programs.**

    NEED: EDRR and Spread prevention are the most effective and cost-efficient means of controlling invasive species. These methods also work to control populations of invasive species before they impact SGCN and other species.
    a. Develop regional Early Detection target list, based upon threat to SGCN or their habitats. (Current statewide Early Detection priorities can be found in Invasive Species Table 15);
    b. Work cooperatively with adjacent states on regional Early Detection programs;
    c. Develop Rapid Response protocols to use when a population of a target species is found
    d. Identify pathways of introduction and spread for new invasive species and ways to minimize these pathways;
    e. Establish and use Best Management Practices for the prevention of spread and introduction of invasive species.

8. Create a comprehensive, integrated approach to addressing invasive species.

NEED: A comprehensive integrated approach will help reduce redundancy, identify and address needs, and allow invasive species to be addressed in Illinois at a scale and scope necessary to reduce or remove the negative impacts to SGCN.

a. Develop an interagency invasive species management plan that defines roles, responsibilities, and priorities for each state agency and addresses all aspects of invasive species management – prevention (introduction and spread), early detection/rapid response, restoration, impact mitigation, survey/monitoring, regulation/enforcement, and control;
b. Foster existing Cooperative Weed Management Areas and other local invasive species partnerships in Illinois and establish at least two additional such partnerships in Campaign Focus Areas or Conservation Opportunity Areas to assist with implementation the Invasive Species Campaign actions;
c. Conduct an annual invasive species symposium for information sharing and updates to invasive species projects/programs in Illinois;
d. Promote the use of native or non-invasive species for landscaping, wildlife habitat and environmental planting. Native plants are preferable over non-invasive non-native plants because they play a critical ecological role in maintaining overall biodiversity;
e. Partner with neighboring states on regional invasive species groups, projects, or initiative.

9. Prioritize control of targeted locations to benefit SGCN.

NEED: With limited funds for control efforts, address invasive species actions identified in the Wildlife Action habitat campaigns to benefit SGCN;

a. Control autumn olive and other exotic shrubs in grassland sites within the Pyramid-Arkland COA for the benefit of grassland bird SGCN, including Henslow's Sparrows and Grasshopper Sparrows;
b. Develop and implement mitigating practices to lessen the impact and transfer of White-nose Syndrome within Illinois' cave systems for the benefit of bat species, particularly SGCN;
c. Control bush honeysuckle and other exotic shrub species in forests utilized by nightjar SGCN for the benefit of Whip-poor-Wills and Chuck Will's Widows;
d. Control buckthorn in large blocks of forests in northern Illinois for the benefit of SGCN requiring open forest habitat and for amphibian species breeding in forested wetlands;
e. Control other populations of invasive species that have been deemed threatening or impactful to SGCN.

10. Increase capacity for invasive species management in Illinois.

NEED: With invasive species being widespread in Illinois and impacts to SGCN being incurred on private and public lands, there is a strong need to enhance the capacity to manage invasive species across the state.

a. Create and enhance existing platforms to increase access to technical and financial resources to private landowners for invasive species management practices that address threats to SGCN;

b. Identify opportunities to establish additional Regional Invasive Plant Strike Teams, with the ability to work in Focus Areas and Conservation Opportunity Areas in the state;
c. Provide regular training opportunities on safe and effective invasive species management techniques to landowners, land managers, and agency staff;
d. Develop programs and policies that foster resource sharing between agencies.

11. Utilize the most up-to-date, current, and accurate information when managing invasive species.

NEED: Success of management, benefits to wildlife, costs of management activities, and prioritization of limited resources all are influenced by the use of up-to-date, accurate information. Current information can help ensure that the most effective, safe, and cost-effective methods are being used and that resources are being spent to address the most-needed situations.

a. Identify research needs for controlling invasive species and work with researchers to establish projects to gather that information;
b. Update and expand the Illinois Nature Preserve Commission's Vegetation Management Guidelines on a regular basis for sensitive species and high quality natural areas;
c. Communicate, through a website or other platforms, known interactions of rare and invasive species and the control methods that had been used to manage invasive species in the presence of SGCN;
d. Provide land managers and private landowners with materials, resources, and opportunities for training in plant identification and cost-effective control practices
e. Improve tracking and monitoring of control efforts by improving the use and accessibility of weed information systems;
f. Establish a central database (such as www.eddmaps.org) for collecting and compiling distribution records of invasive species. Expand network of reporters by providing training and efficiency of reporting structure;
g. To facilitate documentation of interactions between rare and invasive species, incorporate assessments and observations of invasive species into Elemental Observation Record reporting.

12. Assess, improve, and update invasive species-related management plans, strategies, policies and regulations.

NEED: Policies, plans, and regulations should be regularly assessed and updated to address new species being introduced to Illinois and any new knowledge about the impacts of invasion, pathways of spread, and management needs.

a. Investigate alternative structures, including bonding and shared risk pools for funding management of invasive species, particularly Rapid Response activities.
b. Review and update regulated species lists, such as the Illinois Exotic Weed Act List, the Illinois Injurious species List, and the Illinois Noxious Weed List on an annual basis;
c. Continue working with Illinois Invasive Species Plant Council to assess, categorize, and list invasive vascular plants according to their impact on native species and natural biodiversity;
d. Provide tools and resources to land managers and landowners necessary to **assess**, prioritize, and control invasive species to aid in the development of management plans.

13. Establish a Wildlife Health / Wildlife Disease program.

NEED: Maintaining the health of wildlife, especially SGCN, and preventing or mitigating exotic wildlife diseases is a crucial aspect of wildlife management and to the goals and objectives of the Illinois Wildlife Action Plan. Having an established program to address these aspects is a strong need for the state.

a. Increase monitoring and reporting of wildlife health, particularly for SGCN;
b. Establish wildlife health monitoring protocols and baseline health information
c. Establish partnerships, programs, and funding necessary to allow for diagnosis and tracking of wildlife diseases;
d. Incorporate wildlife health measurements as an aspect of evaluating success of habitat restoration/management projects;
e. Train agency field staff and others on disease recognition and reporting procedures
f. Develop response protocols for disease outbreak scenarios.

14. Enhance land managers', land owners', and citizens of Illinois' knowledge and awareness of invasive species.

NEED: Increasing knowledge and awareness is the critical first step to effective invasive species management. Having more people in Illinois aware of and concerned about invasive species helps gain support for management efforts.

a. Continue organization and wide participation in Illinois Invasive Species Awareness Month events;
b. Maintain an updated and comprehensive invasive species website for Illinois;
c. Develop Illinois-specific publications on invasive species and make them available both in printed and electronic forms;
d. Further incorporate invasive species into Master Naturalist / Master Gardener program curriculum;
e. Increase emphasis on invasive species interpretation at visitor centers, nature centers, etc.;
f. Continued inclusion of invasive species language in hunting and fishing digests
g. Install boot brush stations, including informational signage at trailheads
h. Install informational signage at boat ramps;
i. Support programs such as Clean Boats Crews and boat washing stations at popular boat launches.

15. Research the interactions between invasive species and their effects on native taxa, particularly SGCN.

NEED: assessments and documentation of the impacts and interactions non-native species are having on SGCN. Use literature surveys and personal interviews to assess the information that is available on SGCN and non-native species interactions.

a. Support research that investigates the distribution of exotic mollusks within Illinois and their impacts on SGCN. In particular, Faucet Snail (*Bithynia tentaculata)* and its effects on waterfowl; New Zealand Mudsnail (*Potamopyrgus antipodarum)* and its effects on fishes; and Chinese Mystery Snail (*Bellamya chinensis*) and its effects on native snails.

b. Support research that investigates the impacts of terrestrial and riparian invasive plant species on stream water condition and suitability for aquatic or semi-aquatic SGCN
c. Support research that investigates the impacts of exotic shrubs within forests and woodlands on avian SGCN
d. Support research that further investigates the effects of invasive species on other SGCN when potential impacts are indicated.
e. Document and assess the risks of fire, habitat degradation, competitive exclusion, and other threats caused by invasive species infestations on SGNC habitats
f. Identifying invasive weed species common among agency districts and sensitive species habitat

16. Implement invasive species-related actions from other Wildlife Action Plan Campaigns.

Farmland and Prairie Campaign

Invasive species identified as habitat stressors to Grassland/Shrubland:

- Invasive species (e.g., Tall Fescue, Reed Canary Grass, thistle species, Autumn Olive etc.) encroach on grasslands and shrublands and decrease habitat quality, change the structure/suitability of the habitat and displace native wildlife including SGCN;
- Invasive species can also make restoration of old pasture or early CRP plantings more complicated and labor intensive due to the difficulties of killing the existing grass and depleting the seed bank before planting native species. Many of these undesirable grasses are still recommended and sold for new waterway plantings, soil stabilization and some CRP practices;
- Other aggressive, broad-leafed species can invade both native and restored prairie and become monotypic stands with little diversity. This lack of diversity decreases the habitat quality for wildlife by decreasing the amount of insects attracted to flowering plants throughout the growing season provided by native forbs. Canada Goldenrod, Teasel sp., Vetch sp., Sericea lespedeza, etc;
- Invasive species often change habitat composition and reduce habitat quality.

Action Item:

- Continue removal and control (chemical, mechanical and biological) of invasive exotic plants, especially within high quality natural areas.

Forest and Woodlands Campaign

- Maintain and enhance the composition of Illinois' forested habitats
    - Remove and control invasive exotic plants, especially within high quality natural areas.

- Fill information gaps and develop conservation actions to address stresses.
    - Develop a comprehensive program for preventing, eliminating and controlling invasive species is essential.

- Degraded savannas and barrens are identified for restoration with cutting of undesirable plants, prescribed fire and invasive species control.

Green Cities Campaign

Rockford Metropolitan Area

Action Items:

- (1. Streams and Rivers – Four Rivers and Riparian Areas) Kishwaukee River Watershed – invasive species control;
- (2. Oak Woodlands) Oak Savanna – control invasive species;
- (2. Oak Woodlands) Oak-Hickory Woodland – remove invasive trees and brush, and restore understory species;
- (3. Grasslands) – Long term habitat maintenance including burn regiment and invasive control.

Chicago Metropolitan Area

Action Items:

- (2. Oak Woodlands) Mesic Oak Woodlands – invasive species removal;
- (2. Oak Woodlands) Dry-Mesic Oak Woodlands – invasive species removal;
- (3. Wetlands) Fen Wetlands – Implement management that includes controlled burning (2- to 3- year rotations) and efforts to remove invasive woody and herbaceous species;
- (3. Wetlands) Fen Wetlands – Restore hydrology by removing woody invasive species and implementing steps (installing check dams to rehydrate the peat, and removing drain tiles) that restore hydrological function.

Universal Management Recommendations

- (10. Study urban areas for their importance or role in maintaining Illinois species of SGCN) – Study wildlife disease and potential zoonotic diseases.

Lake Michigan and Coastal Area Campaign

Action Items/Research Needs:

- Conduct or support invasive species research and monitoring on:
  - Zebra Mussel,
  - Quagga Mussel,
  - Sea Lamprey,
  - Round Goby,
  - Spiny Waterflea,
  - Fishhook Waterflea,
  - Emerging invasive species.

- Investigate the role Round Goby plays in the Lake Michigan ecosystem, both pro (food for Lake Trout, basses, and Lake Whitefish, etc.) and con (competition with Yellow Perch, darters, Mottled Sculpins, other sculpin species, etc.);
- Emerald Ash Borer planning and mitigation.

Action Items/Targeted Needs:

- Control invasive plants in [Wetlands: Marsh, Sedge Meadow];
    - Phragmites, Narrow-leaved Cattail, Reed Canary Grass, Purple Loosestrife.
- As feasible, exclude common carp from wetland restoration sites to protect native plants as they become established, and eradicate from high quality established wetlands. [Wetlands: Marsh. sedge Meadow];
- Monitor development in Zebra and Quagga Mussel control under consideration by the Invasive Mussel Collaborative [in Lake Michigan: Bedrock Outcrops, Cobble Reefs];
- Support targeted Sea Lamprey control efforts to limit losses due to predation by parasitic adult lamprey. [in Lake Michigan: Bedrock Outcrops, Cobble Reefs];
- Replace invasive plants with native species [in ravines];
- Control invasive plants including Phragmites and Lyme grass in [Lakeshore Communities: Foredune, Panne, Dune, and Swale];
- Control and prevent the spread of invasive species [in streams and waterways].
    - Curlyleaf Pondweed, Eurasian Watermilfoil, Dreissenid Mussels.

Streams Campaign

Action Items:

- Support work of the Asian Carp Regional Coordinating Committee as described in the Asian Carp Control Strategy Framework and the Monitoring & Response Plan.
- Assist the Invasive Species Campaign by conducting effectiveness monitoring & assessment.
- Develop and implement a sentinel monitoring program for detecting changes in distributions of known threats and identifying new aquatic invasive species or wildlife diseases in Illinois.
- Investigate the cumulative impacts of land use alteration, climate change, and invasive species on SGCN and aquatic species assemblages.

Wetlands Campaign

Action Items:

- (2. Enhance habitat quality of existing wetlands) a. Manage wetlands to promote native plant communities by removing, reducing or controlling invasive species, especially:

- Phragmites, Purple Loosestrife, Reed Canary-grass, Eurasian Water Milfoil, Water Hyacinth, Narrow-leaf Cattail, and others.
- Common Carp, Grass Carp, Silver Carp, Bighead Carp and other non-native fish.

Management Resources

An updated list of links to documents, recommendations, contacts, grant opportunities, and other resources for the invasive species campaign, the other campaigns, and the wildlife action plan in general are found on the Illinois Wildlife Action Plan's website at:
http://www.dnr.illinois.gov/conservation/IWAP/Pages/default.aspx

Illinois State Resource:

https://www.invasivespeciesinfo.gov/unitedstates/il.shtml

http://www.dnr.illinois.gov/conservation/InvasiveSpecies/Pages/default.aspx

http://wwx.inhs.illinois.edu/programs/invasive/

http://web.extension.illinois.edu/bcjmw/cat91_4270.html

Organizations:

http://www.rtrcwma.org/

http://www.mipn.org/

http://www.iiseagrant.org/

http://www.niipp.net/

Illinois Invasive Species Awareness Month:

http://www.invasive.org/illinois/

Regulated Species:

http://www.dnr.illinois.gov/adrules/documents/17-805.pdf

Illinois herptiles-herps Act: *http://www.ilga.gov/legislation/ilcs/ilcs5.asp?ActID=3563&ChapterID=41*

Illinois approaches aquatic life with a white list and thus restricts anything not on the aquatic life approved species list (some marginal terrestrial species):
http://www.ifishillinois.org/programs/aquaculture/aquatic_approved_species2014.pdf

Illinois department of Agriculture regulates pests and pet trade:

https://www.agr.state.il.us/exotic-pests/

https://www.agr.state.il.us/animal-import

Identification, Distribution, and alternative planting:

http://www.eddmaps.org/tools/statereport.cfm?id=us_il

http://www.dupageforest.com/Conservation/Managing_Natural_Resources/Managing_Invasive_Species/Identifying_Invasive_Species.aspx

http://www.chicagobotanic.org/research/identifying_threats/invasive

http://www.cityofchicago.org/content/dam/city/depts/doe/general/NaturalResourcesAndWaterConservation_PDFs/InvasiveSpecies/LandbasedInvasivePlantBrochure2009.pdf

http://dnr.state.il.us/orep/ctap/invasive/

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3791353.pdf

Forest Management:

http://www.nifatrees.org/Invasive-Species

Aquatic:

http://www.iisgcp.org/ais/releasezero.php

http://iiseagrant.org/ais/transportzero.php

http://www.takeaim.org/

Performance Measures

Outcome performance measures are designed to assess the overall impact of undertaking conservation actions on Implementation Goals. Output performance measures are designed to assess how active the program is at working toward the Implementation Goals.

Overarching Goal	Type	Performance Measure
Viable Populations	Outcome	Focal Species abundance (or relative abundance) is maintained or increased
	Outcome	Implement monitoring for Focal Species and SGCN that are believed to be threatened by invasive species
Habitat Management	Outcome	Maximize habitat quality and increase populations of SGCN by reducing the threat of invasive species.
	Output	Net gain of quality of aquatic and terrestrial communities within important natural divisions
	Output	Increased management of invasive species (prescribed fire, herbicide application, mechanical removal, prevention) of critical habitat for SGCN by employing invasive species strike teams within COA's
Habitat Resiliency and Connectedness	Outcome	Detect, eliminate or control the spread of newly established invasive species before they cause significant harm to critical habitat or SGCN.
	Outcome	Increase ecological connectivity by eliminating barriers caused by invasive species to support distribution of less mobile species (e.g., herpetofauna)
Public Awareness, Appreciation, Connection	Output	Targeted invasive species education to increase the awareness of the impact they can have on the States critical habitats for SGCN
	Output	Perform a comprehensive assessment of existing communication and education programs and disseminate the information through an upgraded IWAP website
	Output	Work with partners and the public to develop and implement a public relations campaign about transporting invasive species. Adopt the Be A Hero campaign for aquatic and terrestrial systems.

Table 15. Early detection priority species.

Early Detection Species	Scientific Name	Category	Habitat	Campaign	SGCN (or group) threatened	Comments
Hydrilla	*Hydrilla verticillata*	Aquatic plant	Lakes/reservoirs, backwaters	Streams		
Exotic Faucet Snail (and associated helminths)	*Bithynia tentaculata*	Aquatic mollusk	Rivers, backwaters, lakes/reservoirs	Wetlands, Streams	Waterfowl SGCN	
Didymo (rocksnot)	*Didymosphenia geminata*	Aquatic diatom	Streams	Streams	Aquatic invertebrates, mussels, stream fish	
Japanese Stiltgrass	*Microstegium vimineum*	Terrestrial plant	Floodplain forest, upland forest	Forests and Woodlands		ED species only for northern ½ of Illinois
Japanese Chaff Flower	*Achyranthes japonica*	Terrestrial plant	Floodplain forest, upland forest	Forests and Woodlands		ED species only for northern ¾ of Illinois
Salt Cedar	*Tamarix sp.*	Terrestrial/wetland plant	Floodplain forest, riparian areas, Wet mudfloat/Moist soil plants	Streams, wetlands, Forests and Woodlands		
New Zealand Mudsnail	*Potamopyrgus antipodarum*	Aquatic mollusk	Streams	Streams		
Lesser Celandine	*Ficaria verna*	Terrestrial plant	Floodplain forest	Forest and Woodlands		
Asian Longhorned Beetle	*Anoplophora glabripennis*	Terrestrial insect / Wood boring beetle	Hardwood tree species	Green Cities, Forest and Woodlands		
Gypsy Moth	*Lymantria dispar*	Terrestrial insect	Hardwood tree species	Green Cities, Forest and Woodlands	SGCN reliant on mature hardwood forests	ED Species only for southern ¾ of Illinois
Feral Swine	*Sus scrofa*	Terrestrial animal	Floodplain forest, upland forest, Agriculture field,	Forest and Woodlands, Farmland and Prairie	Ground nesting bird SGCN,	Occurs in low densities in Illinois, active elimination program ongoing
Thousand Cankers Disease Walnut Twig Beetle	*Geosmithia morbida* and Pityophthorus juglandis	Insect/pathogen complex	Black Walnut trees	Green Cities, Forest and Woodlands	SGCN reliant on black walnut	

Table 16: Species in Greatest Conservation Need severely threatened or stressed from Invasive/Exotic Species

Appendix II in the original IWAP (2005) was analyzed to determine which species we had a high confidence was rated that invasive species has had, is having, or is likely to have a severe effect on population viability or abundance, either through a habitat stress of a community stress.

Habitat stress = novel species that are changing a habitat (i.e. mostly invasive plants)
Community stress = novel animals functioning as competitors, predators, parasites, etc.
Habitat associations for these species from Appendix I were used to place each SGCN under a Campaign

Farmland and Prairie Campaign

SGCN with high confidence of a severe threat from Invasive/Exotic Species

Taxa	Common Name	Scientific Name	Specific Habitat	Habitat	Community
Birds	Bobolink	*Dolichonyx oryzivorus*	Grassland	Severe	
Birds	Dickcissel	*Spiza americana*	Grassland	Severe	
Birds	Field Sparrow	*Spizella pusilla*	Successional	Severe	
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	Grassland	Severe	
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*	Grassland	Severe	
Birds	Henslow's Sparrow	*Ammodramus henslowii*	Undisturbed Grass	Severe	
Birds	Loggerhead Shrike	*Lanius ludovicianus*	Grassland	Severe	
Birds	Northern Bobwhite	*Colinus virginianus*	Successional Field, Grassland	Severe	
Birds	Northern Harrier	*Circus cyaneus*	Grassland, Marsh	Severe	
Birds	Ring-Necked Pheasant	*Phasianus colchicus*	Agricultural Field	Severe	
Birds	Short-Eared Owl	*Asio flammeus*	Grassland	Severe	
Birds	Upland Sandpiper	*Bartramia longicauda*	Grassland	Severe	
Herptile	Plains Hog-nosed Snake	*Heterodon nasicus*	Sand Prairie	Severe	Severe

Forest and Woodlands Campaign

SGCN with high confidence of a severe threat from Invasive/Exotic Species

Taxa	Common Name	Scientific Name	Campaign Habitat	Habitat	Community
Birds	Acadian Flycatcher	*Empidonax virescens*	Upland Forest	Severe	
Birds	Blue-Winged Warbler	*Vermiforma pinus*	Successional Forest	Severe	
Birds	Cerulean Warbler	*Dendroica cerulea*	Floodplain Forest	Severe	
Birds	Connecticut Warbler	*Oporornis agilis*	Upland Forest	Severe	
Birds	Prairie Warbler	*Dendroica discolor*	Successional Forest	Severe	
Birds	Red-Headed Woodpecker	*Melanerpes erythrocephalus*	Savanna	Severe	Severe
Birds	Willow Flycatcher	*Empidonax trailli*	Successional Forest	Severe	Severe
Birds	Wood Thrush	*Hylocichla mustelina*	Upland Forest	Severe	
Birds	Worm-Eating Warbler	*Helmitheros vermiforma*	Upland Forest	Severe	
Birds	Yellow-Crowned Night-Heron	*Nyctanassa violacea*	Floodplain Forest	Severe	
Herptile	Flat-headed Snake	*Tantilla gracilis*	Upland Forest	Severe	Severe

Wetlands Campaign

SGCN with high confidence of a severe threat from Invasive/Exotic Species

Taxa	Common Name	Scientific Name	Specific Habitat	Habitat	Community
Birds	American Bittern	*Botaurus lentiginosus*	Marsh	Severe	
Birds	Black Rail	*Laterallus jamaicensis*	Marsh	Severe	
Birds	Black Tern	*Chlidonias niger*	Marsh	Severe	
Birds	Black-Crowned Night-Heron	*Nycticorax nycticorax*	Swamp	Severe	
Birds	Buff-Breasted Sandpiper	*Tryngites subruficollis*	Vernal Pool, Mudflat, Marsh	Severe	
Birds	Common Gallinule	*Gallinula chloropus*	Marsh	Severe	
Birds	Common Tern	*Sterna hirundo*	Beach	Severe	
Birds	Forster's Tern	*Sterna forsteri*	Marsh	Severe	

Wetlands Campaign (Cont.)

SGCN with high confidence of a severe threat from Invasive/Exotic Species

Taxa	Common Name	Scientific Name	Specific Habitat	Habitat	Community
Birds	King Rail	*Rallus elegans*	Marsh, Grassland	Severe	
Birds	Least Bittern	*Ixobrychus exilis*	Marsh	Severe	
Birds	Marsh Wren	*Cistothorus palustris*	Marsh	Severe	
Birds	Pied-Billed Grebe	*Podilymbus podiceps*	Marsh, Lake	Severe	
Birds	Wilson's Phalarope	*Phalaropus tricolor*	Marsh, Vernal Pool	Severe	
Birds	Wilson's Snipe	*Gallinago delicatata*	Marsh, Vernal Pool	Severe	
Birds	Yellow Rail	*Coturnicops noveboracensis*	Marsh	Severe	
Birds	Yellow-Headed Blackbird	*Xanthocephalus xanthocephalus*	Marsh	Severe	
Herptile	Four-toed Salamander	*Hemidactylium scutatum*	Seep, Sedge Meadow,	Severe	Severe

Lake Michigan and Coastal Area Campaign

The actions included within this campaign are provided to help guide the next 10 years of implementation. While other actions may be needed and larger goals could be set, the campaign prioritizes the actions contained in this section as realistic, achievable and most needed to best aid in meeting the overarching goals of the Illinois Wildlife Action Plan (IWAP) to:

1. Establish desired number and distribution of viable populations for each Species in Greatest Conservation Need (SGCN)
2. Manage habitats through promoting natural processes, desired structure, and disturbance regimes for the benefit of native species, and
3. Develop resiliency and connectedness into habitats so species can adjust to landscape and environmental changes.
4. Foster an awareness, appreciation, and connection to SGNC and associated habitats among the public.

Description

Lake Michigan is a deep-water, oligotrophic ecosystem comprised of nearshore and open water benthic and pelagic zones that support a diverse mix of native and non-native species. Illinois shares Lake Michigan ownership with 3 other states: Indiana, Michigan, and Wisconsin. Management authority is shared by the states and a number of tribes represented by the Chippewa-Ottawa Resource Authority. Approximately 1,526 square miles of Lake Michigan are within the Illinois state boundary, but management and stewardship of the lake's resources requires coordination among all the Lake Michigan management jurisdictions.

The land-based coastal ecosystem in Illinois includes three subunits of the Northeastern Morainal Natural Division that contain oak savannah remnants, woodlands, coastal bluffs and ravines, prairies, wetlands, urbanized waterways, beaches, dune/swale habitats and pannes. This varied landscape is important to numerous aquatic and terrestrial resident and migratory fauna, including imperiled taxa categorized as Species in Greatest Conservation Need (SGCN; Appendix 7).

Illinois coastal habitats are especially significant because of their proximity to this large Great Lake, which exerts influences and effects not found in other parts of the state. Wave energy and changeable water levels directly affect the interface of land and water, while wind dynamics, strong storm events, and lake temperature exert their influence farther inland, causing more regional effects. In addition, the presence of the lake significantly affects the migration of birds, bats, and flying insects, funneling them into a coastal corridor through northeastern Illinois. Finally, the urban metropolis of Chicago creates its own set of influences and challenges to the variety of species and habitats in the region. As such, these coastal habitats, terrestrial and aquatic, are unique and face challenges often different than those encountered in other parts of the state.

The purpose of the Lake Michigan and Coastal Area Campaign is to maintain and enhance biodiversity in the lake and coastal area largely through habitat protection and improvement. Rehabilitation of rare or extirpated plant and animal populations is also considered, when appropriate. The campaign focuses on the area within boundaries defined for the Illinois Coastal Management Program (ICMP; Figure 14). This area encompasses the lake offshore to the Illinois State line and inland to the boundary of the hydrologically-modified Lake Michigan basin and the Chicago and Calumet Rivers (See http://www.dnr.illinois.gov/conservation/IWAP/Pages/LakeMichiganandCoastalCampaign.aspx).

The area within the campaign boundary is located entirely within the Chicago Metropolitan Area. This landscape has been substantially altered by human activities (e.g., invasive species, housing and urban development, shoreline hardening and modifications, and landfills, among others). Campaign goals and actions included within this document reflect this reality and are intended to be realistic, achievable and could be implemented during the 10 years covered by this update of the IWAP (2015-2025).

This campaign was created with substantial input from federal, state, and local governments and non-governmental organizations, many of which will be instrumental in IWAP implementation. This included representatives from the Lake County Forest Preserve District, Shedd Aquarium, the Illinois Natural History Survey, and the National Audubon Society, among others. Feedback and input from these organizations helped to shape the goals of this campaign, select focal species and habitats, assess stresses and threats and evaluate and select appropriate actions to achieve desired outcomes.

Guiding Principles and Goals

Guiding Principles

- There is significant overlap of needs among the various IWAP campaigns, so this campaign will focus on area-specific needs and priorities, understanding that some goals and actions identified in other campaigns are also very relevant in the Lake Michigan Coastal Campaign.
- A diversity of functional habitats (i.e., dynamic systems of hydrologically and biologically connected areas that support requirements of desired species for sustained production) will be needed to maintain and enhance SGCN in Lake Michigan and its coastal areas.
- Utilize an adaptive, hypothesis-driven approach to habitat protection and improvement that includes monitoring results as a feedback mechanism to guide future actions.
- Recognize that successful outcomes from habitat protection and improvement actions will require cooperation among stakeholders.
- Understand that cumulative actions may be necessary before desired benefits for SGCN are realized.
- Protecting critical, existing habitat to benefit SGCN has a higher priority than habitat enhancement, which in turn, has a higher priority than restoring habitat to pre-settlement conditions.

- Rehabilitation of imperiled fish populations in Lake Michigan requires coordination with the Lake Michigan Committee of the Great Lakes Fishery Commission, as agreed to by Great Lakes state, federal, tribal and provincial resource agencies party to A Joint Strategic Plan for Management of Great Lakes Fisheries (Joint Plan). The Illinois Department of Natural Resources (IDNR) is a signatory to the Joint Plan.

Campaign Goals

- Minimize and mitigate adverse effects of new and existing coastal development on SGCN and the habitats necessary to sustain populations.
- Increase public education/outreach and the use of best management practices to prevent new introductions of aquatic and terrestrial invasive species, limit expansion of existing populations and reduce impacts of invasive species on native populations and habitats.
- Increase abundance and richness of SGCN and other native taxa in Lake Michigan and its coastal habitats.
- Increase the abundance and quality of functional habitats that support healthy populations of Lake Michigan's fish and wildlife.
- Maintain and increase, if possible, the quality and extent of rare coastal natural communities and complexes of these communities that support SGCN.
- Maintain and/or reestablish hydrologic and biological/ecological connectivity between Lake Michigan and associated coastal wetlands and tributary streams while considering potential adverse and beneficial effects of connectivity on native populations and habitats.
- Develop public support for Lake Michigan wildlife and fish conservation by supporting outreach activities and recreational access to Lake Michigan and coastal natural areas.
- Increase funding availability and consistency for habitat work in Lake Michigan and the coastal area.

Status as of 2015

In the Comprehensive Wildlife Conservation Strategy of 2005, Lake Michigan and the Coastal region was not addressed in its entirety. This new campaign was established to address this gap as part of the IWAP 2015 update and to reflect the ongoing and needed work to protect the Great Lakes and coastal specific species and habitats. This section highlights noteworthy initiatives, activities, and threats relevant to species and habitat conservation and provides some history and status information on key IWAP targets.

Status of Lake Michigan Species and Management

Lake Michigan Fisheries

The present day Lake Michigan fish community includes a diversity of native and nonnative species that comprise a highly managed and unstable fishery. Historically, Lake Trout and Burbot were the top predators preying on Lake Whitefish, Ciscoes, Chubs, Sculpins and Yellow Perch. Due to a complicated array of factors including environmental degradation, over-harvest and predation by invasive Sea

Lamprey, the historic fish community collapsed by 1950. Lake Trout populations were the most impacted. The resulting decline of predator populations allowed the non-native Alewives and Rainbow Smelt, and native Bloaters to reach historic levels of abundance. Control of Sea Lamprey populations by the Great Lakes Fishery Commission allowed for rehabilitation efforts to begin for Lake Trout and stocking of other non-native salmon and trout. The present fishery consists of five salmonine predators, which are largely maintained by stocking, Yellow Perch, and several nearshore species found primarily in harbors and near breakwalls (e.g., Northern Pike, Largemouth Bass, Smallmouth Bass, Rockbass, Bluegill and Freshwater Drum).

Lake Michigan fish SGCN have received limited attention in the past, except for recent and ongoing work by researchers at the Shedd Aquarium. The emphasis has been on filling data gaps from other surveys, looking for threatened and endangered species to aid the listing process of the Illinois Endangered Species Protection Board, and collecting species-habitat utilization data that can be incorporated into habitat restoration projects.

Effective management of the Lake Michigan fishery requires the IDNR to manage its fishery as a component of a whole-lake management strategy described in *Fish Community Objectives for Lake Michigan*. Environmental and habitat issues impeding achievement of fish community objectives have been identified in *Lake Michigan Environmental Objectives*, which includes a strategy to guide habitat improvement. A draft document of environmental principle for sustainable fisheries in the Great Lakes has been developed by the Great Lakes Fishery Commission Council of Lake Committees. These principles informed the guiding principles included earlier in this Campaign narrative.

Invasive species are a significant threat to Lake Michigan fisheries and aquatic habitat covered by this campaign. There is a separate, stand-alone Invasive Species Campaign that addresses these threats, impacts, and needed actions on a statewide level. However, the following paragraph highlights invasive species that are specific to, or a high priority threat to Lake Michigan.

Numerous Aquatic Invasive Species (AIS) were brought to the U.S. in ballast water from ocean going vessels or gained access to the Great Lakes through man-made shipping canals or waterways. Species, such as the Spiny Water Flea, Zebra and Quagga Mussels, Sea Lamprey and Round Goby have flourished in Lake Michigan and continue to have substantial adverse effects on lake ecology and native taxa. Mandatory ballast water management regulations were implemented in 2008. These regulations appear to have stopped the influx of AIS via the ballast water vector, as no new aquatic invasive species from outside North America have been identified in the Great Lakes during the past 7 years. Prior to the regulation changes, it has been reported that a new, non-native species was identified in the Great Lakes on average every 9 months.

Asian Carp species (Bighead- *Hypophthalmichthys nobilis* and Silver Carp- *Hypophthalmichthys molitrix)* have moved north through the Mississippi and Illinois Rivers and have the potential to enter the Great Lakes in the future. This would be a significant threat to the Great Lakes system and has prompted

numerous efforts including research, reports, committees, and the construction of electric dispersal barriers in the Chicago Sanitary and Ship Canal near Romeoville, IL. Asian carp are not present in Lake Michigan and are not currently a direct threat to SGCN in Lake Michigan, so they are not addressed in detail in this campaign. Please refer to the Invasive Species campaign for more information.

Lake Michigan Management and Monitoring

A broad range of environmental issues in the Illinois waters are addressed through the *Lake Michigan Lakewide Management and Action Plan* (LAMP). Lakewide biodiversity has been addressed in the *Lake Michigan Biodiversity Conservation Strategy* developed by The Nature Conservancy for the LAMP Technical Coordinating Committee. Additional environmental management plans, including a Nearshore Framework and Lake Ecosystem Objectives are being developed to meet requirements of the 2012 Great Lakes Water Quality Agreement.

A number of federal agencies participate in lake-wide monitoring programs that have sampling stations in the Illinois portion of Lake Michigan. The United States Geological Survey (USGS) Great Lakes Science Center has conducted annual surveys of Lake Michigan prey fish populations with bottom trawls since 1973 and hydroacoustics since 1992. Both sampling methods have documented declining prey fish abundance and biomass in recent years. For all preyfish species combined, lake wide bottom trawl biomass estimates reached a record low of 5.1 kilotonnes in 2014.

Nearshore and offshore fish populations are assessed annually by the IDNR Lake Michigan Program through five assessment surveys that track relative abundance of fish predators and prey (spring index gill netting), Yellow Perch population trends (Yellow Perch gill netting and beach seining), nearshore sport fish populations (summer harbors boat electrofishing), stocked salmon and trout returns (fall harbor electrofishing) and Lake Trout rehabilitation efforts (spring lakewide and fall spawning gill net surveys). These assessments are supplemented by research conducted by the Illinois Natural History Survey's (INHS; Prairie Research Institute, University of Illinois) Lake Michigan Biological Station located in Zion. Long term monitoring data show substantial declines in abundance of Yellow Perch, Alewife, Bloater and Rainbow Smelt. Abundances of many of these species are at or near record lows in the time series. While specific causes of declining populations are not clear, they appear to correspond to population expansion of invasive species (e.g., Zebra Mussels and Round Gobies during the 1990's and Quagga Mussels during the 2000's). Of positive note is the stable Lake Trout population in Lake Michigan's southern basin and relatively high rate of unmarked "wild" trout from Illinois offshore reefs (about 50 percent in recent fall assessments).

The National Oceanic and Atmospheric Administration (NOAA) Great Lakes Environmental Research Laboratory has conducted lake-wide benthic surveys at 5-year intervals (1995–2010) to track changes in abundances of the amphipod *Diporeia* spp. and abundances and biomass of Zebra and Quagga Mussels [NOAA; http://www.glerl.noaa.gov/res/Programs/eco_dyn/eco_dyn.html). Over the past 15 years, densities of *Diporeia* spp. have declined dramatically lake wide and Quagga Mussels have expanded their abundance and distribution, largely replacing Zebra Mussels throughout the lake. The United

States Environmental Protection Agency (USEPA) Great Lakes National Program Office samples nutrients and zooplankton at 11 offshore stations around the lake twice annually. Monitoring has documented substantial declines in Lake Michigan offshore productivity (now similar to Lake Superior) and established a link (via silica cycling) between lower productivity and the expansion of the Quagga Mussel population.

Much of the nutrient and lower trophic level research in Lake Michigan occurs on a 5-year cycle coordinated through the Cooperative Science and Monitoring Initiative (CSMI), a bi-national monitoring and research effort to improve understanding of aquatic ecosystems in each of the Great Lakes. The next Lake Michigan CSMI is scheduled for 2015 and will focus on nearshore and offshore food web linkages.

Illinois participates in the Lake Michigan Monitoring Coordination Council, which provides a forum to identify data gaps, establish monitoring priorities, exchange information and form partnerships among Lake Michigan scientists and managers. The Council also promotes standardized methodologies for collection and management of data.

Status of Lake Michigan Coast and Terrestrial Habitats

Shoreline

The Illinois coast has been significantly altered as urbanization spread through northeastern Illinois through the last century. The mix of armored and natural stretches of shoreline has changed the dynamics of coastal processes including the natural movements of sediments along the shore. More recently, weather patterns, extreme storm events, changing water levels, and additional man-made infrastructure have exacerbated erosion and accretion along the coast, especially from Evanston north to the Wisconsin State Line. Illinois Beach State Park is the most unaltered stretch of shoreline in Illinois, and is experiencing significant erosion that has resulted in the loss of high quality beach, dune and wetland habitats. This problem is accelerating and threatens to erode away portions of the designated Illinois Nature Preserves that contain the highest quality habitats and rarest species found in the Illinois coastal area.

The other aspect of this dynamic is that sand eroded from Illinois Beach State Park and other areas causes a build-up of sand downdrift (south in the direction of predominant littoral current), which causes problems with water intake structures, access to ports, and increased dredging costs. However, the accretion in the Waukegan area has resulted in the development of an additional 30-40 acres of dune and swale habitat that is supporting rare and endangered plants and animals.

Lake Michigan Migratory Flyway

Lake Michigan and the coastal area are located in the Mississippi Flyway. This migratory route extends from the Mackenzie Valley in northwest Canada, along the Great Lakes, and down the Mississippi River Delta. Twice a year, millions of birds, representing more than 250 species, use this flyway to migrate to their more

southerly wintering grounds in the fall and back to their breeding grounds in the spring. Wetlands and forests throughout our region provide critical stopover habitat where these birds find shelter and food during the day before continuing their migration from dusk until dawn. The nearshore wetlands, forests and shrublands are particularly important for migratory birds as many migrate over the water at night and rest onshore and refuel during the day. Often covering thousands of miles each season, migration represents the highest period of mortality of these birds' life cycles due to a lack of stopover habitat and collisions with manmade structures. Compounding these threats is climate change, which disrupts food availability during migration and is changing the suitable climatic range for migratory species. Deforestation and habitat loss is the most significant threat in these birds' neotropical wintering habitat.

Monarch Butterflies and several species of bats also use the Lake Michigan shoreline as a migratory route. Tree roosting species of bats, including Eastern Red Bats and Silver-Haired Bats, have been documented colliding into buildings, towers and power lines along the Chicago lakefront during migration. Collisions with manmade structures, often caused by bright lights or reflective glass that draw in and confuse migrants, and the loss or degradation of stopover habitat are among the biggest risks for all migratory species. Since the mid-1990's, a "Lights Out" program in Chicago has encouraged building owners and managers of tall buildings to turn off or dim their decorative lights after 11 p.m. during migration, which helps . This program, combined with other efforts to reduce window collisions, has prevented thousands of migrant deaths.

Invasive Species

Many invasive species are a significant threat to nearly every aquatic and terrestrial natural habitat covered by this campaign. The Invasive Species Campaign addresses threats, impacts, and needed actions on a statewide level and other IWAP campaigns (Forest and Woodland, Green Cities, Streams, Wetlands and Prairie and farmland) address priority invasive species in specific habitats pertinent to the Lake Michigan Coastal Campaign.

The following invasive species are specific to, or a high priority threat to terrestrial and aquatic habitats within the Lake Michigan Coastal Campaign area:

- Phragmites (*Phragmites australis*)
- Narrowleaf Cattail (*Typha angustifolia*) and hybrids
- Round Goby (*Neogobius melanostomus*)
- Zebra mussel (*Dreissena polymorpha*) and Quagga mussel (*Dreissena bugensis*)
- Exotic waterfleas including spiny waterflea (*Bythotrephes longimanus*) and fishhook waterflea (*Cercopagis pengoi*)
- Sea Lamprey (*Petromyzon marinus*)

Primary terrestrial habitats

The Illinois coast extends along 63 miles (101 km) of the southern-most reach of the western shore of Lake Michigan. Within the Lake Michigan Coastal campaign boundary, there are three primary areas of species and habitat concentration that are surrounded by varying levels of urbanization: the Illinois Lake

Plain, the Ravines, and the Calumet region. These three areas include numerous high quality natural habitats that are designated Illinois Natural Areas Inventory (INAI) sites. The INAI identifies Illinois' highest quality natural areas, essential habitat for endangered species, and other important natural features. These three areas hold the greatest potential for diverse species conservation efforts. However, the importance of urban, suburban and exurban habitats should not be underestimated or ignored. The more urbanized areas are being addressed in the Green Cities IWAP campaign, though some of the actions identified in this campaign span the full range of habitats throughout the coastal region. The following is a brief description of the extent and condition of the three primary habitat areas in the terrestrial coastal region along with description of ongoing projects focused on habitat management.

Zion Beach Ridge Plain Habitat

From the Illinois-Wisconsin state line south to North Chicago, the land bordering the shore is a low-lying plain, the Zion Beach Ridge Plain, which is at most 10 to 15 feet (3 to 4.5 m) above mean lake level. Much of the southern plain in the vicinity of Waukegan Harbor has been altered for port and industrial land use. The plain is up to one mile wide (1.6 km) at Zion. It contains four INAI sites, totaling 4,356 acres.

The Zion Beach Ridge Plain includes over 4,000 acres of contiguous high-quality natural area including: Illinois Beach State Park owned by IDNR; Spring Bluff Nature Preserve owned by the Lake County Forest Preserve District; the Zion Park District; property of the former Johns Manville manufacturing plant; and undeveloped portions of property near the decommissioned Zion Nuclear Power Station owned by Exelon Generation Company (parent company of Commonwealth Edison). This extensive complex contributes significantly to national and regional biodiversity, preserves coastal wetland ecosystems, and provides critical habitat for declining plant and animal species.

Illinois Beach State Park and Spring Bluff Nature Preserve support 14 natural community types as identified by the Illinois Natural Areas Inventory (INAI), including 66 acres of rare and globally declining pannes, and habitat for more than 500 species of plants and 300 species of animals.

Illinois Ravines

Ravines are an important and unique feature in the northern part of the Lake Michigan Coastal campaign boundary. They extend along approximately 15 miles of shoreline from North Chicago to Winnetka. Long-term wave erosion along Morainal upland has resulted in bluffs that form the highest and steepest landscape along the Illinois coast. Stream erosion has carved steep-sided ravines into these bluffs. Ravines originate as much as one mile (1.6 km) inland from the shore and typically have intermittent streams that discharge to the lake. This area contains ten INAI sites, totaling 365.3 acres.

The 47 steep-sided ravines located along the northern coast of Lake Michigan support groundwater-fed growing conditions and microclimates and offer habitat for unique communities of plants and animals. The topography and positioning of the ravine systems provide the right conditions for

several threatened and endangered northern plant and tree species rarely found this far south. Managing the ravines to address the stormwater runoff and the erosion associated with it is a significant challenge, especially for the ravines surrounded by urban development.

Habitat management in the ravines area is challenging because of the number and diversity of landowners, complexity of issues, and cost of management actions. Some municipalities, organizations and private landowners have been actively involved in projects to restore and protect ravine habitat. Projects completed or ongoing include daylighting of streams in the ravines, stream restoration, erosion control, and education and outreach about ravine management. However, there are many ravines lacking management and faced with severe erosion and habitat degradation.

Calumet Region/ Southern Chicago Lake Plain – (Millennium Reserve area)
The Chicago Lake Plain extends from Winnetka south to the Illinois-Indiana state line and covers approximately 33 square miles. Much of this region was submerged in up to 60 feet of water by ancestral Lake Michigan, and its predecessor "Lake Chicago" in the recent geologic past. The plain continues into Indiana where it is known as the Calumet lake plain. Historically, the Calumet region contained a wide variety of coastal, wetland, and upland habitats within a small geographic area. This habitat diversity resulted in a biodiversity hotspot, hosting many endemic plant and animal species. The area still supports rich biodiversity in Illinois and is an important stopover location for migratory species, although the habitat has been significantly altered from its natural state; first by industrial development in the early 20th Century, and then by insufficient ecological management and restoration. The region has also suffered disproportionately from fragmentation and residential and industrial development, leaving the existing remnants especially vulnerable to terrestrial invasive species. Actions such as fire suppression and lack of invasive control continue to threaten habitat.

There are 23 INAI sites in the Calumet Region, totaling nearly 6,000 acres. Some of these sites are outside of the boundary of this campaign, but are part of the regional natural system overlapping with this Campaign. Within the coastal campaign area, there are seven INAI sites, totaling 4,023.5 acres. The INAI Sites in the Calumet region include high-quality remnants of original dune and swale community, prairies and savannas, large wetlands, and important breeding habitat for declining species of birds- especially those dependent on hemi-marshes.

Programs and Initiatives

Great Lakes Restoration Initiative
Launched in 2010, the Great Lakes Restoration Initiative (GLRI; http://greatlakesrestoration.us/) has provided approximately $300 million in federal funding annually to clean up legacy chemical pollution at Areas of Concern (AOCs), battle invasive species, reduce nutrient input and restore habitat for native species throughout the Great Lakes Basin. Illinois has benefitted from the Initiative in numerous ways: The IDNR has expanded its Aquatic Invasive Species Management Program by leading a multi-agency effort to prevent Asian carp from entering Lake Michigan via the Chicago Area Waterway System and

establish a law enforcement investigative unit to stop invasive species including Asian carp from entering the lake via alternative pathways (e.g., live fish markets, bait shops and the pet trade).

The US Army Corps of Engineers has completed or is in construction phase on several habitat enhancement projects through the Great Lakes Fishery and Ecosystem Restoration Act (GLFER; http://www.glfc.org/glfer/), including 63rd Street Beach, Northerly Island, Jackson Park, Ravine 8L, Ft. Sheridan and Openlands Lakeshore Preserve, Burnham Annex and Burnham Prairie. Additional GLFER projects have been proposed for Illinois, but they remain inactive due to a lack of non-federal matching funds.

Research projects mapping substrates and hydrodynamics at offshore Lake Trout spawning reefs and identifying sources (wild vs. hatchery) of unmarked Lake Trout sampled in Illinois waters have been completed with funding from the Great Lakes Fish and Wildlife Restoration Act (GLFWRA) administered by the US Fish and Wildlife Service.

Significant funding has been directed to clean up the Waukegan Harbor AOC. Since 2011, three Beneficial Use Impairments have been removed at Waukegan Harbor and all management actions that were needed to address PCB contamination in the harbor were completed in 2014. This AOC will be delisted when the results of monitoring show that the benthos, phytoplankton, and zooplankton communities are not impaired and that there are no differences in fish consumption advisories between Waukegan Harbor and Lake Michigan as a whole.

Lake Plain Habitat Restoration Partnership.

Conservation landowners, regional managers and organizations have partnered to form the Lake Plain Habitat Restoration Partnership. This is a bi-state project with the goal of completing landscape-scale restoration across jurisdictional and property boundaries in Lake County, Illinois and Kenosha County, Wisconsin. Funding through the Great Lakes Restoration Initiative (GLRI) has allowed the partnership to restore and protect over 2,500 acres of coastal wetlands and prairies by preventing the spread of invasive plant species and restoring hydrology, thus improving the long-term sustainability of this natural area for the enjoyment of local citizens and the thousands of tourists this coastal area attracts annually. Significant projected outcomes of this project include:

- 1,200 acres of nature preserve protected by control of invasive plants at their “leading edge” and eradication of invasive plants that are potentially invasive in the Lake Plain
- 2,000 acres of invasive cattail, Phragmites and buckthorn controlled.
- Eradicated and contained 10 early detection invasive plant species across 59 populations from the Lake Plain.
- 790 feet of gravel roadway removed to reconnect habitat for the federally-listed Eastern prairie fringed orchid.
- Coordination of Lake Plain restoration with upstream watershed improvement projects to develop a more comprehensive watershed management approach.

- Basic Wildfire Training provided to 55 local partners to increase capacity for controlled burns in the Lake Plain.

Illinois Coastal Management Program

The Illinois Coastal Management Program (ICMP; http://www.dnr.illinois.gov/cmp/Pages/default.aspx) of the IDNR was officially established in 2012 to protect and manage the natural and cultural resources along the 63 miles of Illinois Lake Michigan shoreline. ICMP is federally funded by NOAA and USEPA. This new funding source allowed IDNR to expand its role and its investment in managing the Coastal region. An important goal of ICMP is to increase the capacity of our coastal communities to balance human and ecological needs through investment in programs that seek to restore our ecosystems and meet the increasing demands for open space, recreation, and public access. This is achieved by supporting and coordinating partnerships among local, state and federal agencies and organizations, engaging in the planning and land management activities, assisting entities with regulatory compliance, increasing public awareness and involvement in coastal resource protection, along with on-the-ground restoration and enhancement of our coastal resources. One of the first projects of ICMP was development of a prioritized implementation plan to guide program investments. The Illinois Lake Michigan Implementation Plan (ILMIP) was created through a two-year stakeholder involvement process and builds off of numerous local and regional plans.

ICMP has brought new resources to supplement habitat management, invasive species control and sustainable land use planning for state owned lands and natural lands owned by partner agencies such as the Forest Preserve District of Cook County, Chicago Park District, Lake County Forest Preserve District and coastal municipalities. Significant investments have been made in education, outreach and stewardship related to habitat protection and management of Lake Michigan and the coastal area. In addition, ICMP is addressing non-point source pollution issues by raising awareness through education and outreach, and direct improvements with programs like Illinois Clean Marinas, and grant-funding for on-the ground planning and implementation of green infrastructure practices. These actions help to improve water quality in the lake and its tributaries, and provide additional habitat areas.

Millennium Reserve

Millennium Reserve (http://www.millenniumreserve.org/) is an initiative that started in 2012 and focused on improving the economy, environment and communities of the Illinois Calumet region. One of the driving forces behind establishment of this initiative is protection and enhancement of the area's high biodiversity.

Millennium Reserve is a shared vision that unifies public, nonprofit, and commercial leaders seeking to make the most of the region's assets. It is an ongoing initiative guided by partners who understand community priorities, and it is designed to make on-the-ground projects happen. The initiative includes projects that range in scale from neighborhood-based to those of regional significance. Millennium Reserve recognizes the work of partners, particularly those whose decades-long commitment to the region have created the foundation for this initiative.

As part of Millennium Reserve, five major landowning agencies entered into an agreement to bring together their resources and expertise for common management of high-quality natural areas in the Reserve. The goal of the Conservation Compact (the Compact) is to restore and preserve high-biodiversity habitat in Illinois' Calumet region. The Compact deals specifically with sites listed on the Illinois Natural Areas Inventory, which identified the highest quality habitats remaining in Illinois.

Since the Compact was signed in 2014, these partners have committed to coordinating conservation actions to reduce invasive species across this fragile archipelago of wetlands, prairies, and savannas. Partners are using a combination of time-tested strategies and innovative techniques directly applied to the control of invasive plants, from herbicide and prescribed burning to hydrologic improvements and work by Greencorps Chicago, a community-based job-training and conservation program. The anticipated result will be improvements in habitat quality that translate to regional benefits for declining species, particularly wetland-nesting birds, prairie flora and fauna, and species associated with Midwest savanna communities.

Stresses and Threats to Wildlife and Habitat

Habitat Stresses:

Extent (amount of habitat)

- Urban development and extensive hardened shorelines reduce available habitat.
- High density human population and associated impacts on lands and waters that can disrupt species life cycle needs and activities. (e.g., noise pollution, light pollution, and human traffic through natural areas, etc.).
- Narrow approaches to capital development result in missed opportunities to incorporate habitat features into capital improvements (e.g., road and trail projects, marina design, and streambank and shoreline stabilization projects)

Fragmentation, isolation, juxtaposition, patch size and edge effects,

- Habitat fragmentation and reduced connectivity increases mortality and decreases recruitment of young (e.g., road mortality of Blanding's Turtles).
- Limited options for protection, restoration, increased connectivity, and enhancement of habitat because of extensive urbanization, development, hardened shorelines, and waterways that are channelized with vertical sheet pile banks or diverted underground into a culvert, pipe, or drainage system.

Composition-Structure

- Limited availability of technical assistance and funding for active habitat management by public and private landowners, and both residents and corporate entities
- Habitat composition/structure degraded due to invasive species (e.g. Quagga Mussels, Emerald Ash Borer) and diseases (e.g., Oak wilt).

Disturbance/Hydrology, frequency, timing and intensity of disturbances

- Altered wetland hydrology has resulted in the loss of hemi-marsh habitats and subsequent declines in wetland bird populations.

- Climate change alters water levels, water temperatures, shoreline stability (due to increased storm frequency and intensity), and effects habitat quality and species composition.

Invasive/Exotic species

- Abundant populations of aquatic invasive species, (e.g., Dreissenid Mussels, Spiny Water Flea, Round Goby and Sea Lamprey) cause disruptions in the lower trophic level food web, degrade habitat and displace native fish species, including SGCN.
- Asian Carp species have the potential to enter the Great Lakes through Illinois waterways or alternative pathways. These species, if introduced, are anticipated to have significant negative impacts on the Lake Michigan foodweb.
- Abundant terrestrial invasive species that displace native species, change the structure and function of natural communities, and affect life cycle needs of native species.

Pollution – Sediment:

- Bioaccumulative and toxic contaminants from industrial legacy found in Lake Michigan, waterways, ponds and terrestrial areas (brownfield sites) impact habitat quality and survival of organisms
- Non-point source pollution from combined sewer overflows; stormwater runoff; and atmospheric deposition degrade water quality and impair aquatic habitats.

Community Stresses

Predators

- High nest failure of birds and turtles is exacerbated by urban-adapted meso-predators such as raccoons.

Population Stresses

Dispersal:

- Lack of hydrologic and biological/ecological connectivity between the lake and coastal wetland and tributary habitats impedes fish and wildlife reproduction.

Recruitment:

- Foreign debris, manmade structures, and sand deposition at ravine and small tributary outlets, along with artificially steep gradients, impede fish access to spawning habitat in coastal streams and wetlands.
- Declines in native pollinator populations due to habitat loss, fragmentation, invasive plants, non-native landscaping, and insecticides.
- Habitat fragmentation and reduced connectivity increases mortality and decreases recruitment of young (e.g., road mortality of Blanding's Turtles).

Direct Anthropogenic Stresses

Disturbance, direct harassment by humans

- Impacts on species and habitat from recreational use of sensitive areas (e.g., nest disturbance, trampling, dispersal of invasive plant seeds, and litter).

Structures-Infrastructure:

- Reduced survival of migratory birds due to threats such as collisions with buildings.
- Road mortality.
- Limited understanding of littoral drift dynamics and effects on nearshore habitat and SGCN from the construction of shore protection structures, groins and landfills impairs our ability to assess impacts of proposed projects.
- The interaction between human structures, natural coastal processes, and intensive weather events causes detrimental erosion of dune and ravine habitat and lakebed down cutting.

Additional challenges to implementation:

- Lack of knowledge of the amount and quality of available aquatic habitats (e.g., nearshore and offshore reefs, submersed aquatic vegetation and rocky shoals/substrates) impedes our ability to protect important habitats, or build/modify habitat as needed
- Lack of a secure and consistent funding mechanism, particularly with State/private dollars needed to match federal funding.

Focal Species

Description and process

Focal species are a set of species selected for each campaign that represent the larger suite of SGCN addressed by the campaigns. The use of focal species provides a manageable approach to monitoring the effectiveness of conservation actions.

The Lake Michigan Coastal Campaign identified 12 focal species -five birds, one invertebrate, two reptiles/amphibians, and four fish. Each of the priority habitats in the Lake Michigan coastal area corresponds with one to four focal species. The selection process is described at http://www.dnr.illinois.gov/conservation/IWAP/Pages/LakeMichiganandCoastalCampaign.aspx .

Lake Michigan Coastal Campaign Focal Species

- Piping Plover (*Charadrius melodus*)
- Common Tern (*Sterna hirundo*)
- Red-headed Woodpecker (*Melanerpes erythrocephalus*)
- Sedge Wren (*Cistothorus platensis*)
- Black-crowned Night-heron (*Nycticorax nycticorax*)
- Hoary Elfin (*Callophrys polios*)
- Mudpuppy (*Necturus maculosus*)
- Blanding's Turtle (*Emydoidea blandingii*)
- Lake Trout (*Salvelinus namaycush*)
- Mottled Sculpin (*Cottus bairdii*)
- Cisco (*Coregonus artedi*)
- Banded Killifish (*Fundulus diaphanus*)

Actions

Actions included within this campaign can be divided into Universal Management Recommendations and Targeted Actions. Universal Management Recommendations are on-the-ground practices that will benefit Illinois wildlife species, including SGCN, wherever they are implemented. Anyone that values wildlife and wants to contribute to meeting the overarching goals of the IWAP should consider implementing these practices where applicable. The Targeted Actions are specific, often place-based, actions designed to address a particular need, stressor, or situation.

Several performance measures have been identified for this campaign. However, in order to best identify targets and track progress, the Campaign Team will reconvene after approval of the Illinois Wildlife Action Plan update and collaboratively develop a final suite of performance measures and plan to broadly collect those measures.

Universal Actions:

1. Improve wildlife populations and habitat, as appropriate and realistic, within the Lake Michigan and Coastal Area Campaign boundaries.

- Prevent, minimize and mitigate non-point source pollution and debris in the coastal area; develop, update, and implement watershed plans.
- Promote use of native species for landscaping and gardening, particularly butterfly host plants and assortments of native wildflowers that provide food for pollinators throughout the entire growing season.
- Promote remediation and restoration of contaminated sites, especially in or adjacent to important fish and wildlife areas.
- Encourage strategies to reduce the amount of road salts that get washed into streams, wetlands, and lakes.
- Reduce combined sewer overflows.
- Preserve and protect high-quality natural areas.
- Work with public land owners to develop sustainable long-term strategies to balance habitat preservation, public access and recreational interests.
- Work with state and federal partners to establish contingency plans for oil or other toxic spill response or other environmental catastrophes.

Expected outcome: Improved aquatic and terrestrial habitat quality, resulting in more diverse and resilient fish and wildlife communities.

2. Increase knowledge, understanding, and concern about fish, wildlife, and habitat threats and challenges in Lake Michigan and coastal area, and increase amount and diversity of citizen participation in targeted conservation actions.

- Support and promote outreach and education that raises awareness about important species, habitats, and functions.

- Promote citizen science to collect data on focal species and habitats (e.g., fishing participants, butterfly monitors, Plants of Concern (POC) monitoring, BugGuide, and Great Lakes Fish Finder app., etc.)

Expected outcome: increased interest, participation and advocacy for targeted conservation actions by Chicagoland residents.

*Performance Measure***:** Number of education and outreach projects completed that address the general public's fundamental understanding of fish, wildlife and habitats in Lake Michigan and the Illinois Coastal Area.

Targeted Actions Benefitting Priority SGCN

Forest and Woodlands: Dry Sand Savanna, Dry-mesic Sand Savanna

Focal Species: Red-headed Woodpecker (*Melanerpes erythrocephalus*), Hoary Elfin (*Callophrys polios*)

3. Improve and increase management of existing savanna habitat and expand and enhance savannas, where possible, to expand populations of SGCN that use this habitat.

- Continue savanna restoration efforts including prescribed burning, thinning, and invasive species control to maintain structure and function of community.
- Maintain snags as part of woodland management.
- Maintain open savannas through timber stand improvement and thinning.
- Remove invasive species that affect structure and function of habitat.
    - Buckthorn, Honeysuckle, Garlic Mustard.
- Plant native shrubs.
- Plant host plants for Hoary Elfin butterflies.
- Increase the width of habitat corridors and improve connectivity of corridors.
- Emerald Ash Borer planning and mitigation.

Expected outcome: Increased amount, connectivity, and quality of savanna habitat and increasing populations of Red-headed Woodpecker, Hoary Elfin, and other savanna-dependent SGCN.

Wetlands: Marsh, Sedge Meadow

Focal Species: Blanding's Turtle (*Emydoidea blandingii*)**,** Sedge Wren (*Cistothorus platensis*), Black-crowned Night-heron (*Nycticorax nycticorax*), Banded Killifish (*Fundulus diaphanus*)

4. Improve and increase management, including hydrology and connectivity, of existing marsh and sedge meadow habitat and expand and enhance wetlands, where possible, to benefit populations of SGCN that use this habitat. Minimize and mitigate effects of fragmentation, human interactions and urban infrastructure on wetland function and species mortality.

- Control invasive plants (e.g., Phragmites, narrowleaf cattails, reed canary grass, purple loosestrife.).
- Implement strategies to reduce wildlife road mortality such as flat-bottomed culverts, guide fencing, speed bumps, reduction in speed limits, caution signs (e.g., "Watch for Turtles").
- Implement strategies to increase recruitment of Blanding's Turtles, such as head starting, predator reduction, and nest protection. Increase adult survivorship through appropriate means.
- Maintain healthy native aquatic vegetation in swales.
- Support activities to maintain and improve wetland hydrology to sustain diverse natural habitats and support Black-crowned Night Heron nesting habitat.
- Improve and restore hemi-marsh conditions (e.g., Calumet Region) through the removal and control of invasive species and improved ability to manage water levels. Improve quality, diversity and structure of sedge meadow and bulrush communities.
- Ensure connectivity between wetlands and upland grasslands adjacent to wetlands to attract breeding bitterns and King Rails and provide nesting habitat for Blanding's Turtle
- Maintain wetland connectivity with nearby water bodies, such as Lake Michigan, streams, or inland lakes and with groundwater aquifers.
- As feasible, exclude Common Carp from wetland restoration sites to protect native plants as they become established, and eradicate from high quality established wetlands.
- Study habitat use, movement patterns, and home range of Blanding's Turtles throughout the Lake Plain to identify focal areas and promote habitat connectivity and conservation actions.

Expected outcome: Increased amount, connectivity, and quality (including improved or restored hydrology) of marsh and sedge meadow habitat; and increasing populations of Blanding's Turtle, Sedge Wren, Black-crowned Night-heron, Banded Killifish and other wetland-dependent SGCN.

Lake Michigan: Bedrock Outcrops, Cobble Reefs

Focal Species: Mudpuppy (*Necturus maculosus*), Lake Trout (*Salvelinus namaycush*), Mottled Sculpin (*Cottus bairdii*), Cisco (also called Lake Herring; *Coregonus artedi*)

5. Identify and protect bedrock outcrops and cobble reefs and expand and enhance this habitat structure and function, where possible, to improve populations of SGCN that use this habitat.

- Minimize and mitigate effects of water pollution, invasive species, and other stresses on habitat function and species mortality.
- Incorporate rocky habitat features into shoreline stabilization and beach-saver structures, taking into consideration the size and shape of stones and size of spaces between stones to provide cover and protective habitat for Mudpuppies and Mottled Sculpins.

- Pollution prevention: Implement Total Maximum Daily Loads and best management practices to reduce bacterial and nutrient pollution, road salt pollution, siltation and sedimentation. These actions benefit SGCN by preventing hypoxia (currently an issue in Wisconsin) and reducing the risk of avian botulism.
- Identify and protect nearshore rocky shoals important for fish spawning; prevent negative impacts to rocky bottom habitats.
- Support ongoing regional efforts to monitor and rehabilitate Cisco and Lake Trout populations in Lake Michigan
- Investigate the feasibility of building nearshore spawning reefs or enhancing existing reef habitat, as needed, in support of Cisco and Lake Trout rehabilitation.
- Support targeted Sea Lamprey control efforts to limit losses due to predation by parasitic adult lamprey.
- Monitor developments in Zebra and Quagga Mussel control under consideration by the Invasive Mussel Collaborative.

Expected outcome: Expanded availability of rocky habitat, decreased effects of stressors on habitat function and expanded populations of mudpuppy, Lake Trout, Mottled Sculpin, Cisco and other SGCN dependent on rocky habitat for one or more life stage.

Lake Michigan: Submersed Vegetated Areas

Focal Species: Banded Killifish (*Fundulus diaphanus*)

6. Identify and protect areas of submersed aquatic vegetation and expand and enhance this habitat structure and function, where possible, to improve populations of SGCN that use this habitat. Minimize and mitigate effects of water pollution, invasive species, and other stresses on habitat function and species mortality/survival.

- Establish submersed aquatic vegetation in sheltered areas of the lake, where feasible, to promote invertebrate production and fish nursery habitat.
- Study and implement green marina solutions that provide fish habitat and decrease herbicide use while balancing the interests of recreational watercraft users.
- Maintain hydrologic and biological connectivity between Lake Michigan and coastal tributaries and wetlands.
- Pollution prevention: Implement Total Maximum Daily Loads and best management practices to reduce bacterial and nutrient pollution, siltation and sedimentation. These actions benefit SGCN by preventing hypoxia (currently an issue in Wisconsin) reducing the risk of avian botulism, and preventing sedimentation of submersed vegetated areas.

Expected outcomes: Improved and expanded areas of submerged aquatic vegetation, increased hydraulic conductivity to these areas, and expanded populations of Banded Killifish and other SGCN that utilize aquatic vegetation spawning, nursery, feeding or protective cover.

Ravines

Focal Species: Red Headed woodpecker (*Melanerpes erythrocephalus*), Banded Killifish (*Fundulus diaphanus*)

7. Increase awareness of the habitat value of the Illinois ravines; improve management and enhancement of existing ravine habitat, expand connectivity to the lake and other habitat, where possible, to improve populations of SGCN that use the ravines.

- Mitigate stormwater inflows. Promote stormwater infiltration in ravine watersheds
- Target ravines with erosion issues for restoration.
- Replace invasive plants with native species.
- Encourage and incentivize active management by private landowners.
- Encourage the reconnection of ravines with Lake Michigan, facilitating the movement of fishes and other organisms between the two systems. Ravines, even if water flow is seasonal, are areas of potential spawning opportunities. Ravine mouths can provide sheltered areas for SGCNs, like Banded Killifish.

Expected outcomes: Improved habitat conditions and connectivity in the ravines and expanded populations of Red Headed Woodpeckers, Banded Killifish and other SGCN that use ravine habitats.

Lakeshore Communities: Foredune, Panne, Dune and Swale

Focal Species: Piping Plover (*Charadrius melodus*), Common Tern (*Sterna hirundo*), Hoary Elfin (*Callophrys polios*)

Need: Because of the spatial limitations and specific conditions needed to support lakeshore communities and limitations for expansion due to shoreline modifications, there are limited opportunities to expand these community types. In addition, these lakeshore areas are a magnet for human recreation, use, and development.

8. Protect, maintain and improve existing foredune, panne, dune and swale habitat; identify strategic opportunities for expanding and enhancing these communities, and manage and balance human use and impacts, where possible, to improve survival, reproductive success and population viability of lakeshore-dependent SGCN.

- Control invasive plants including Phragmites and Lyme grass.
- Close existing footpaths that negatively impact dune habitat and create trails and boardwalks to keep foot traffic on designated routes and prevent trampling.
- Promote dune restoration where possible.
- Provide education and outreach on sensitive lakeshore species to lakeshore landowners and users.
- Develop a lakeshore habitat restoration and management guide for landowners of lakefront property.

Expected outcomes: Improved and protected habitat conditions and expanded populations of Piping Plover, Common Tern, Hoary Elfin and other SGCN that use lakeshore habitats.

Beaches
Focal Species: Piping Plover (*Charadrius melodus*), Common Tern (*Sterna hirundo*)

Need: Because of the spatial limitations and specific conditions needed to support lakeshore communities and limitations for expansion due to shoreline modifications, there are limited opportunities to expand these community types. In addition, these lakeshore areas are a magnet for human recreation, use, and development.

9. Protect, maintain and improve existing beach habitat; identify strategic opportunities for expanding and enhancing these communities, and manage and balance human use and impacts, where possible, to improve survival, reproductive success and populations of lakeshore-dependent SGCN.

- Implement sand nourishment to provide broader beaches for nesting plovers.
- Frequent surveys to identify shorebird nesting to enable timely predator-proof fencing installation.
- Captive rearing and release of Piping Plovers.
- Raise public awareness of the value of beaches as habitat for SGCN.
- Beach cleanup and litter prevention activities.
- Implementation of Total Maximum Daily Loads and best management practices to reduce bacterial and nutrient pollution and sedimentation.
- Research and reduce outbreaks of avian botulism.

Expected outcome: Improved and protected habitat conditions for Piping Plover, Common Tern, and other SGCN that use lakeshore habitats.

Targeted Actions Benefiting Multiple SGCN:

Publicly Owned and Protected Lands:
Need: Publicly owned and protected lands, such as forest preserves and state and local parks provide the permanent land base for wildlife in the Campaign area. Maintenance and improvement of habitats on these lands is needed to ensure that these habitat anchors in a matrix of urbanized and privately owned lands will support viable populations of target wildlife.

10. Maintain or improve habitat quality through appropriate management actions, utilizing best management practices, with a primary focus on key habitat types for SGCN.

- Expand (where possible), restore, and/or improve coastal wetlands throughout the region.
- Assist coastal communities and park managers to minimize non-point source runoff and beach debris; improve beach and dune habitat management; and encourage protection of beach areas of high importance to target species.

- Continue to implement fire management policies that are sensitive to lifecycles and habitat needs of SGCN (e.g., Hoary Elfin, and Blanding's Turtle, etc.).
- Implement setbacks and buffers, where feasible.
- Reconnect a minimum of one wetland and one tributary to the lake.
- Identify and pursue strategic opportunities to connect or expand protected public lands through land acquisition, easements, and other long-term conservation strategies.

Expected outcome: Improved quality and connectivity of habitat for target SGCN on public lands.

High Priority Privately Owned Lands:

Need: Privately owned land makes up the vast majority of the overall landscape in the Campaign area, and some areas provide significant habitat benefits and opportunities for protecting and improving populations of SGCN.

11. Understand overall habitat and connectivity needs and partner with private landowners to protect and improve high priority habitat areas.

- Identify key locations for strategic habitat connection or expansion, or to fill habitat gaps and do strategic landowner outreach to provide information and assistance.
- Determine potential lands for acquisition/conservation easements.
- Promote and support appropriate restoration and management action on private lands.
- Focus outreach, communication, and technical assistance to ravine landowners to promote and support improved ravine habitat management.
- Seek opportunities to work with industrial/commercial landowners to expand and improve habitat for SGCN

Expected outcome: Improved connectivity of high quality habitat areas and an increase in overall quantity of habitat area on privately owned lands.

Performance measure – Number of landowners contacted about ravine management practices.
Benchmarks: Develop outreach plan for ravine landowners based on previous work and studies. Determine outreach already conducted. Identify percentage of landowners to be contacted. Develop outreach strategy.

Migration Corridor:

Need: The Lake Michigan shore is a major migratory corridor, especially for birds, but also for bats, butterflies and other flying organisms. Illinois' shoreline is particularly important because intensive Chicagoland urbanization funnels migrants through a fairly narrow band – only 1-2 miles from the lakeshore. Human use and numerous structures and obstructions pose many perils for these migrants.

12. Mitigate and minimize hazards to migrants through this important corridor and provide improved quality and quantity of stopover habitat to improve the likelihood of safe passage for these important and often imperiled species.

- Conduct an analysis of migratory bird habitat within 1-2 miles of the lakefront to identify opportunities for improving the quality of existing stopover habitat and filing critical gaps where habitat could be created.
- Promote bird and bat-friendly building design and management for communities and lakefront developments. This includes non-reflective windows and implementing and expanding "Lights-out" programs.
- Maintain and restore stopover sites for migratory insects.
- Encourage retrofitting of communication towers with strobe or "bird safe" lighting technology.
- Protect and expand migratory stop-over sites to increase proximity or connectedness; promote structural and successional diversity through management actions; and improve quality by using and promoting appropriate and beneficial trees, shrubs and plants, such as those identified by Audubon-Chicago Region. Work with municipal planners, park and forest preserve districts and others.
- Monitor impact of bird and bat collisions using standard protocols.
- Improve understanding of habitat needs for non-bird migrants and begin incorporating new knowledge into management planning and actions.

Expected Outcome: Decreased mortality of birds and other migrants, increased availability of habitat patches, and improved composition of habitat that provides high-energy food, adequate shelter, and protection for migrants travelling through the Illinois coastal area.

*Performance measure***-** Number of habitat patches created to fill migratory corridor gaps.
Benchmarks - Complete analysis of suitable migratory habitat patches and gaps. Identify 5 migratory habitat gaps and complete installation of habitat using appropriate Audubon guidelines.

Shoreline and Connectivity:

Need: The Illinois shoreline has been significantly changed by urbanization and various aspects of development and modifications for shore protection, expansion, drainage and other human uses. These modifications have changed natural and structural processes and connectivity between the coastal uplands, lowlands and the lake, resulting in impacts to aquatic and terrestrial habitats, infrastructure and shoreline stability. There is a need to better understand the singular and cumulative impacts of these modifications to species and habitats.

13. Restore or improve functionality for SGCN that is both sustainable and compatible with human needs and uses.

- Find a sustainable long-term solution or strategies to severe erosion and loss of habitat at Illinois Beach State Park. Structural erosion controls should be selected and implemented with careful consideration of potential impacts on habitat for focal species.

- Determine impacts of modified littoral drift and lake-shoreline dynamics, including shoreline erosion and accretion; develop sustainable strategies to improve habitat functionality for SGCN while maintaining human uses including public access for recreation; and work with coastal communities and land managers to implement those strategies.
- Encourage the reconnection of ravines with Lake Michigan to allow movement of fishes and other organisms between the two systems. Ravines, even those with seasonal water flow, are potential spawning sites. Ravine mouths can provide sheltered areas for SGCNs, such as the Banded Killifish.
- Incorporate habitat features in shoreline stabilization and beach-saver structures
- Maintain hydraulic and biological connectivity between Lake Michigan and coastal tributaries and wetlands.
- Incorporate fluctuating Lake Michigan water levels, and the possibility of dropping water levels with future climate change, into nearshore infrastructure plans. This includes wetland restoration and tributary re-connection projects.

Expected outcome: Improved shoreline management, including connectivity to upland and lowlands, that is sustainable, maintains natural processes, and improves habitat for SGCN.

Performance measure- Stabilize Illinois Beach State Park shoreline to prevent further loss of important coastal habitats.

Research and Analysis:

Need: Appropriate research will inform and direct management actions to improve long-term viability of fish and wildlife in Lake Michigan and the coastal area of Illinois.

14. Initiate research and refine knowledge to improve understanding of biotic and abiotic factors that affect important habitats and SGCN.

- Identify specific functional habitats and the anthropogenic stressors limiting healthy populations of SGCN.
- Identify and inventory potential priority management areas or specific habitats (e.g., offshore reefs) for protection and improvement.
- Support research on deep-water communities, particularly foodweb dynamics. This would include SGCN fishes, *Diporeia* spp., and impacts from invasive species.
- Investigate the role of Round Goby in the Lake Michigan ecosystem, both pro (food for Lake Trout, basses, and Lake Whitefish, etc.) and con (competition with Yellow Perch, darters, Mottled Sculpins, other sculpin species, etc.).
- Map nearshore aquatic substrate types to determine rarity or commonality of various forms of habitat. Refine species-habitat associations.
- Research potential impacts of off-shore wind energy development on SGCN and assess potential siting criteria.
- Assess groundwater contribution to baseflow in ravines and other first order streams

- Support research on the impacts of climate change on migration phenology and ensure that Lights Out policies are adaptive to changing conditions.
- Determine effects of regulatory activities on SGCN as feasible and appropriate.
- Conduct or support invasive species research and monitoring on:
    - Zebra Mussel
    - Quagga Mussel
    - Sea Lamprey
    - Round Goby
    - Spiny Water Flea
    - Fishhook Water Flea
    - Emerging invasive species

Expected outcome: Improved understanding of biotic and abiotic factors that affect important habitats and SGCN and enhanced knowledge of species-habitat associations leading to better informed and managed habitat restoration actions and sustained population viability of SGCN.

Monitoring and Assessment Actions:

15. Assess and/or monitor lands, waters, and species groups for which there is little information or to assess trends that can inform management and habitat improvement actions to enhance populations of SGCN.

- Continue to assess, monitor, prioritize, and seek remediation funding for areas with contaminated soil and sediments.
- Develop standardized monitoring protocols to assess trends in abundance and species composition of small-bodied, non-game fishes in the Lake Michigan nearshore zone.
- Survey and monitor aquatic invertebrates, including mussels, snails (such as *Aplexa elongate*), aquatic insects (larval distribution), and other lower trophic level taxa, etc.
- Continue to monitor fish populations.

Expected outcome: Improved understanding of the effects of current conditions and management actions on SGCN or surrogates, and the necessary information to evaluate habitat protection and enhancement projects and design adaptive management actions for SGCN.

Actions for other (non-priority) habitats:

Streams and Waterways (See Streams Campaign for statewide plan and priority actions)
Focal Species: Banded Killifish (*Fundulus diaphanus*)

Need: Streams and waterways are important habitat and connectors to and from Lake Michigan. They often provide corridors of habitat and movement routes throughout the urbanized matrix.

16. Maintain and expand habitat quality and quantity, and restore functionality, where possible.

- Control and prevent the spread of invasive species
    - Curlyleaf Pondweed, Eurasian Water Milfoil, Dreissenid Mussels,
- Support installation of shoreline habitat
- Promote nonpoint source pollution prevention- including green infrastructure
- Daylight flows where possible
- Remove instream barriers to fish passage where possible, while considering potential negative effects of invasive species with barriers removal.
- Watershed planning.

Expected outcome: Improved habitat quality and water quality and an increase in populations of Banded Killifish and other SGCN that use streams and waterways.

Urban Habitats (See Green Cities Campaign for statewide plan and priority actions)
Need: Although urban habitats do not support as wide diversity of species as more natural or undisturbed habitats, many species can and do thrive in urban areas.

17. Improve and increase these habitat patches, where possible, to maintain and increase species diversity and functionality of habitat areas.

- Encourage planting of native, non-invasive trees, shrubs and herbaceous plants in neighborhoods
- Decrease the use of harmful pesticides in urban yards and private lands.
- Promote and implement green stormwater management techniques
- Promote plantings to support and enhance pollinator insects.

Expected outcomes: An increase in functional urban habitat patches that support increase species diversity.

Grassland (See Farmland & Prairie Campaign for statewide plan and priority actions)
Focal Species: Sedge Wren (*Cistothorus platensis*), Blanding's Turtle (*Emydoidea blandingii*)

Need: Some significant areas of functional grassland habitat exist within the Lake Michigan Coastal Campaign area.

18. Identify significant grassland areas with Lake Michigan Coastal Area and provide protection and management, where possible, to support grassland-dependent SGCN that use these habitats.

- Protect and enhance native grasslands and promote appropriate management strategies
- Identify native and non-native grasslands that provide habitat for migrating birds and other wildlife and provide protection and/or management where possible.
- Provide a matrix of habitat that includes both short open structure and medium thick patches with duff layers

Expected outcome: Increased amount and functionality of grassland habitat, resulting in stable or increasing populations of Sedge Wren, Blanding's Turtles and other grassland dependent SGNC.

Management Resources

A select listing of available resources on Lake Michigan and coastal wildlife and habitats are referenced below. Additional related references can be found at:
http://www.dnr.illinois.gov/conservation/IWAP/Pages/LakeMichiganandCoastalCampaign.aspx

Calumet Area Ecological Management Strategy:
http://www.cityofchicago.org/content/dam/city/depts/doe/general/NaturalResourcesAndWaterConservation_PDFs/Calumet/EMS_ExecutiveSummary_1.pdf
Calumet Open Space Reserve:
http://www.cityofchicago.org/city/en/depts/dcd/supp_info/calumet_open_spacereserve.html
Chicago Wilderness Biodiversity Recovery Plan
http://c.ymcdn.com/sites/www.chicagowilderness.org/resource/resmgr/Publications/biodiversity_recovery_plan.pdf
Chicago Wilderness Climate Action Plan for Nature:
http://www.chicagowilderness.org/resource/resmgr/Publications/Climate_Action_Plan_for_Natu.pdf
Chicago Wilderness Climate Action Plan for Nature: Community Action Strategies:
http://www.chicagowilderness.org/resource/resmgr/Publications/CW_CAPN_Action_Strategies.pdf
Developing a Community of Climate-Informed Conservation Practitioners to Protect a Priority Coastal Landscape in Illinois and Wisconsin: http://glisa.umich.edu/projects/wi-and-il-ravine-restoration-under-climate-change
Great Lakes Fishery and Ecosystem Restoration Act: http://www.glfc.org/glfer/
Great Lakes Restoration Initiative: http://greatlakesrestoration.us/
Green Infrastructure Vision Data Package: www.cmap.illinois.gov/green-infrastructure
Illinois Coastal Management Program: http://www.dnr.illinois.gov/cmp/Pages/default.aspx
Illinois Coastal Management Program Document:
https://www.dnr.illinois.gov/cmp/Pages/documentation.aspx
Illinois Lake Michigan Implementation Plan: https://www.dnr.illinois.gov/cmp/Pages/ILMIP.aspx
Illinois Lake Michigan Implementation Plan Watershed Wiki:
https://wiki.epa.gov/watershed2/index.php/Illinois_Lake_Michigan_Implementation_Plan
Kellogg Creek Watershed Based Management Plan:
http://www.lakecountyil.gov/Stormwater/LakeCountyWatersheds/LakeMichiganWatershed/Pages/KelloggCreek.aspx
Lake Michigan Biodiversity Conservation Strategy:
http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/wholesystems/greatlakes/Pages/lakemichigan.aspx
Lake Michigan Lakewide Management Plan (LaMP): http://www.epa.gov/greatlakes/michigan.html
Millennium Reserve: http://www.millenniumreserve.org/

National Oceanic and Atmospheric Administration Great Lakes Environmental Research Laboratory:
http://www.glerl.noaa.gov/res/Programs/eco_dyn/eco_dyn.html

Oak Ecosystem Recovery Plan:
http://www.chicagowilderness.org/resource/resmgr/News_Photos/CW_OakERP-ExecSum-07.31.15-E.pdf
Ravine Restoration Toolkit: http://www.greatlakes.org/RavineRestoration/Toolkit
Strategic Sub-Watershed Identification Process: http://www.greatlakes.org/LMWEP/SSIP
Waukegan Harbor Area of Concern Habitat Management Plan:
http://www.waukeganharborcag.com/Waukegan%20Harbor%20Habitat%20Plan101212.pdf

Links to additional resources can be found on the following sites:
Chicago Wilderness Resources: http://www.chicagowilderness.org/default.asp?page=publicationsnew
Illinois Lake Michigan Implementation Plan Reference Documents:
https://wiki.epa.gov/watershed2/index.php/Illinois_Lake_Michigan_Implementation_Plan_Reference_Documents

Performance Measures

Outcome performance measures are designed to assess the overall impact of undertaking conservation actions on Implementation Goals. Output performance measures are designed to assess how active the program is at working toward the Implementation Goals.

Overarching Goal	Type	Performance Measure
Viable Populations	Outcome	Focal Species abundance (or relative abundance) is maintained or increased
	Output	Implement monitoring for Focal Species and SGCN that are not currently monitored at statewide or finer spatial scales (coastal area)
Habitat Management	Outcome	Develop outreach plan for ravine landowners based on previous work and studies. Determine outreach already conducted. Identify percentage of landowners to be contacted. Develop outreach strategy.
	Output	Number of landowners contacted about ravine management practices.
	Output	Number of stabilization activities along the Illinois Beach State Park shoreline to prevent further loss of important coastal habitats.
Habitat resiliency and connectedness	Outcome	Complete analysis of suitable migratory habitat patches and gaps. Identify migratory habitat gaps and complete installation of habitat using appropriate Audubon guidelines.
	Output	Number of habitat patches created to fill migratory corridor gaps
Public Awareness, Appreciation, Connection	Output	Number of education and outreach projects completed that address the general public's fundamental understanding of fish, wildlife and habitats in Lake Michigan and the Illinois Coastal Area.

Figure 14. Lake Michigan and Coastal Area campaign boundaries and Focus Areas (in green).

Appendix 7. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Lake Michigan and Coastal Area Campaign. Definitions and methods:

Common Name: Commonly recognized name for the species.

Scientific Name: Currently recognized name for the species based on the most recently available literature.

Campaign Habitat: Major habitat type where the species occurs in Illinois.

Specific Habitat: More detail habitat location for species in Illinois.

Historic Status: Number of Counties, or HUC8 watershed for fish and mussels, with records from before 1980.

Current Status: Number of Counties, or HUC8 watersheds for fish and mussels, with recent records (last 20 years).

Trend: Trends were based on the change in distribution of the species by comparing their Current and Historic Status. If a change less than 25% was observed the trend was recorded as 0, changes with magnitudes between 25-49% were coded as +1 (distribution increased) or -1 (distribution decreased), changes greater than 50% were coded as +2 (distribution increased) or -2 (distribution decreased).

Stressors: Each stressor type was rated as either a recognized stressor (1), not a recognized stressor (0), or as having not enough information to make a rating (NMI=Need More Information).

Appendix 7. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Lake Michigan and CoastalArea Campaign.

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
BIRDS																										
Black-Crowned Night-Heron	*Nycticorax nycticorax*	Swamp	Swamp	31	32	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	0	1
Common Tern	*Sterna hirundo*	Beach	Beach	5	11	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	1	1	0	1	1
Piping Plover	*Charadrius melodus*	Beach	Beach	0	2	0	1	1	1	1	0	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1
Red-Headed Woodpecker	*Melanerpes erythrocephalus*	Savanna	Savanna	102	92	-2	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	0	0	1
FISH																										
Banded Killifish	*Fundulus diaphanus*	Large Reservoir, Natural Lake	Lake with Sand, Gravel, Vegetation	3	5	2	1	NMI	1	NMI	NMI	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Blackchin Shiner	*Notropis heterodon*	Large Reservoir, Creek	Lake, Stream with Vegetation	5	2	1	1	NMI	1	NMI	NMI	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Blacknose Shiner	*Notropis heterolepis*	Large Reservoir, Creek	Lake, Stream with Sand, Vegetation	24	4	-2	1	NMI	1	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Bloater	*Coregonus hoyi*	Lake Michigan	Lake Michigan	1	0	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Brook Trout	*Salvelinus fontinalis*	Lake Michigan, Coolwater Stream	Lake Michigan or Coolwater Stream with Gravel	2	1	-1	1	1	1	0	1	1	1	1	0	1	NMI	NMI	NMI	1	1	1	0	NMI	NMI	1
Brown Bullhead	*Ameiurus nebulosus*	Backwater, Swamp	Still Pool of Lake, Backwater, Swamp with Silt, Vegetation	31	26	1	1	0	1	0	0	1	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Burbot	*Lota lota*	Lake Michigan, Major River	Lake Michigan, River	6	0	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Central Mudminnow	*Umbra limi*	Creek, Backwater, Swamp	Low-Gradient or Still Pool Stream, Backwater, Swamp with Silt, Vegetation	23	17	2	1	0	1	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Cisco	*Coregonus artedi*	Lake Michigan	Lake Michigan	3	0	-2	0	0	0	NMI	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	0
Deepwater Sculpin	*Myoxocephalus thompsonii*	Lake Michigan	Sand or Gravel, Rock in Lake Michigan	1	0	NMI	0	0	0	0	0	0	0	0	0	0	NMI	NMI	NMI	0	1	0	0	NMI	NMI	1
Ghost Shiner	*Notropis buchanani*	Major River, River	Low-Gradient or Still Pool of River with Sand, Gravel, Silt	25	7	-1	1	1	0	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Iowa Darter	*Etheostoma exile*	Large Reservoir, Creek, Backwater, Swamp	Lake, Stream, Backwater, Swamp with Vegetation	10	5	-1	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Lake Chub	*Couesius plumbeus*	Lake Michigan	Lake Michigan over Sand or Gravel	1	4	2	0	0	0	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Lake Sturgeon	*Acipenser fulvescens*	Large Reservoir, Major River	Lake, River with Gravel, Rock	12	1	-2	NMI	NMI	1	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	1
Lake Trout	*Salvelinus namaycush*	Lake Michigan	Lake Michigan	2	2	0	0	0	0	0	1	0	1	1	0	1	NMI	NMI	NMI	0	0	1	1	NMI	NMI	0
Lake Whitefish	*Coregonus clupeaformis*	Lake Michigan	Lake Michigan	1	1	0	0	0	0	0	1	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Least Darter	*Etheostoma microperca*	Natural Lake, Creek	Lake, Stream with Vegetation	10	8	2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Longnose Dace	*Rhinichthys cataractae*	Lake Michigan, Creek	Lake Michigan or Riffle in High-Gradient Stream with Sand, Gravel, Rock, Stable Flow	4	3	2	1	1	1	1	0	1	0	0	0	0	NMI	NMI	NMI	0	1	0	0	NMI	NMI	1
Longnose Sucker	*Catostomus catostomus*	Large Reservoir, Creek	Lake, Lake Michigan Stream	2	3	2	0	0	0	NMI	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	1
Muskellunge	*Esox masquinongy*	Large Reservoir, Major River, River	Lake, Still River with Sand, Gravel, Rock, Wood, Vegetation	20	26	2	1	1	0	0	0	1	0	0	0	0	NMI	NMI	NMI	0	0	1	0	NMI	NMI	0

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
Ninespine Stickleback	*Pungitius pungitius*	Lake Michigan, Major River	Coolwater River, Lake	3	1	-2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Northern Pike	*Esox lucius*	Large Reservoir, Creek, River, Backwater, Major River	Lake, Low-Gradient or Still Pool of Backwater, Stream, River with Vegetation	27	21	-1	1	1	1	0	0	1	0	0	0	0	NMI	NMI	NMI	0	0	1	0	NMI	NMI	0
Round Whitefish	*Prosopium cylindraceum*	Lake Michigan	Lake Michigan	1	0	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Silver Lamprey	*Ichthyomyzon unicuspis*	Major River, Creek	Riffle of River, Stream with Sand, Gravel	24	4	-2	0	0	0	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	1
Slimy Sculpin	*Cottus cognatus*	Lake Michigan	Lake Michigan	1	0	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Starhead Topminnow	*Fundulus dispar*	Large Reservoir, Backwater, Swamp, Natural Lake	Lake, Backwater, Swamp with Vegetation	14	8	2	1	NMI	1	1	NMI	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Trout-Perch	*Percopsis omiscomaycus*	Lake Michigan, Major River, River	Lake Michigan, Low-Gradient or Still River with Gravel, Wood, Stable Flow	8	1	-2	0	0	1	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Yellow Perch	*Perca flavescens*	Lake Michigan, Major River, River	Lake Michigan, Lake or Low-Gradient or Still Pool of River with Sand, Gravel, Rock, Silt , vegetation	22	21	-1	1	0	1	0	1	1	0	0	0	0	NMI	NMI	NMI	0	0	1	0	NMI	NMI	0
HERPTILE - Amphibian																										
Mudpuppy	*Necturus maculosus*	River	Rocky-bottom Stream, Lake	40	12	-2	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	0	1
HERPTILES - Reptiles																										
Blanding's Turtle	*Emydoidea blandingii*	Marsh	Nesting in Upland Habitat, Numerous Types of Wetland	31	21	-1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1
INVERTEBRATE - Crustaceans																										
Great Lakes Amphipod	*Diporeia hoyi*	Lake Michigan	Lake Michigan	2	2	NMI	0	0	0	0	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
INVERTEBRATE - Lepidoptera (Butterflies & Moths)																										
Hoary Elfin	*Callophrys polios*	Woodland	Sand Prairie, Woodland	NMI	1	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	1	0	NMI	NMI	NMI

Streams Campaign

Description

The Illinois landscape is dissected by stream and river channels and underlain with subsurface water. Three major rivers border the State of Illinois and are responsible for much of its characteristic shape. Other major freshwater habitats include bogs, fens, glacial lakes, ponds, reservoirs, spring seeps, swamps, and reservoirs. These vast aquatic resources provide vital ecosystem services to the citizens of Illinois and critical habitat for the other species that rely upon them. The Illinois Wildlife Action Plan addresses these habitats in several Campaigns including the Lake Michigan and Coastal Area Campaign, the Streams Campaign, and the Wetlands Campaign. The Streams Campaign focuses on maintaining robust communities of native wildlife and improving the capacity of lands and waterbodies to support populations of aquatic Species in Greatest Conservation Need (SGCN; Appendix 8) through restoration, enhancement, and protection.

Portions of Illinois are included in six Fish Habitat Partnerships (http://fishhabitat.org/partnerships) and four Landscape Conservation Cooperatives (http://lccnetwork.org/find-an-lcc). Common goals for these regional efforts include the protection of healthy waters, restoration of natural flows, reconnection of fragmented stream habitats, and the improvement of water quality by reducing sediment and nutrient loading. The Streams Campaign supports these goals and strives to have local efforts in Illinois contribute to regional conservation.

The Streams Campaign is organized around six basic themes that provide continuity and focus to Conservation Actions identified as priorities for effective aquatic conservation in Illinois. These themes broadly organize activities necessary to address critical stressors and evaluate the effectiveness of conservation actions on aquatic species and their habitats. Campaign Themes include Monitoring & Assessment, Protection & Stewardship, Flow Management & Water Quality, Fragmentation & Connectivity, Invasive Species & Wildlife Diseases, and Public Support & Action.

Goals

Our Vision is for Illinois' waters to support viable populations of all aquatic species native to the state. Goals were developed to assist with obtaining this vision through consensus of the Streams Campaign Steering Committee that consists of IDNR staff and statewide conservation partners (Hinz et al. 2015).

Campaign Goals:

- Viable populations of each SGCN will be supported
- Habitats will be managed for appropriate structure and function, including water quality, to support SGCN
- The public will have an awareness, appreciation, and connection to SGCN and associated habitats

Implementation Goals:

1. Illinois waters will support high biodiversity.
2. Abundance and distribution of SGCN will be increased or maintained.
3. High quality aquatic communities will be protected by conservation easement, public ownership, or designation as Illinois Nature Preserves, Land & Water Reserves, or Outstanding Resource Waters.
4. Illinois waters will fully support designated uses.
5. Illinois waters will provide appropriate physical habitat, hydrologic regimes, fluvial geomorphology, and connectivity to support SGCN.
6. The public's environmental awareness, appreciation, and connection to SGCN and their associated habitats will be increased.

Status as of 2015

Illinois contains over 119,000 miles of streams and rivers and 318,000 acres of lake and ponds (exclusive of Lake Michigan and the large border rivers) that provide ecosystem services throughout the state including supporting SGCN. Over 200 species of fish, 80 species of mussels, and 70 species of freshwater snails are known to have resided in Illinois waters along with numerous crayfish, frogs, salamanders, snakes, turtles, waterfowl, and hundreds of species of aquatic insects. Based on 2011 monitoring data aquatic life use was fully supported in 60.8% of stream miles and 92.2% of standing waters that were assessed in Illinois. Major potential sources of impairment for streams include atmospheric deposition of toxics, agriculture, channelization, municipal point sources, urban runoff, surface mining, and flow regulation. Potential sources of impairment for lakes are similar to those of streams but also include littoral area modifications, animal feeding operations, contaminated sediments, and on-site water treatment systems (IEPA 2014a).

Conservation of aquatic habitats and associated species continues to be a priority in Illinois. At least ten major funding and effort sources drove activities supporting Streams Campaign goals between 2005 and 2015 (Table 1). Thirty-five projects were funded with Illinois State Wildlife Grants (SWG) with twenty-three of these directly targeting SGCN. Thirty-two additional projects were sponsored by the Wildlife Preservation Fund (WPF) consisting primarily of biological surveys and evaluations of management actions. The Endangered Species Protection Board also sponsored six studies addressing the distribution and abundance of SGCN since 2005.

Monitoring & Assessment

The IDNR and IEPA conduct surface water and groundwater monitoring throughout the state with the assistance of numerous partners (e.g., USGS, USDA Forest Service, INHS). These efforts are aimed at assessments of aquatic life, designated use attainment, identification of impaired waters, trends in water quality, and evaluating the effectiveness of water-management programs (IEPA 2014b). Examples of additional efforts include those conducted by the Long Term Resource Monitoring Program (LTRMP; http://www.umesc.usgs.gov/ltrmp.html); the Long Term Illinois, Mississippi, Ohio, and Wabash River Fish Population Monitoring Program (LTEF, http://wwx.inhs.illinois.edu/fieldstations/irbs/research/ltef-website/); monitoring by staff of Illinois Forest Preserve Districts (e.g., Forest Preserves of Cook County (http://fpdcc.com/), Lake County Forest Preserves (http://www.lcfpd.org/)); investigations by watershed groups and those of Citizen Scientists through RiverWatch (http://www.ngrrec.org/riverwatch/). The

recovery plan for the Illinois Cave Amphipod (*Gammarus acherondytes*) established surveys that were completed in 2007, 2011, and 2014 in cave systems where they were known to have occurred in the past. Although the Illinois cave amphipod was not found at two previous locations ten new populations were discovered resulting in fourteen known populations (Lewis and Lewis 2014).

Three separate initiatives were undertaken to assess the conservation status of SGCN in support of the Streams Campaign largely using data from these monitoring programs. All species of fish (Metzke et al. 2012) and mussels (Douglass & Stodola 2014) known from Illinois and 563 invertebrate taxa (Hinz & Zahniser 2015) were independently assessed for possible listing as SGCN using IWAP criteria. Updated status and statewide distribution maps for each of these species were completed using data compiled during these initiatives.

Bol et al. (2007) developed a multi-taxa rating system to categorize the integrity and diversity of aquatic biota and identify stream reaches with biological significance. This update and revision of the Biological Stream Characterization (BSC; Hite and Bertrand 1989, Bertrand et al. 1996) and the Biologically Significant Streams classification (Page et al. 1992) was identified as a priority in the 2005 Illinois Comprehensive Wildlife Conservation Plan & Strategy (CWCP). Over 1000 stream segments were rated in Bol et al. (2007) with 13% characterized as Class A for diversity and 9% as Class A for biotic integrity. One hundred twenty-two stream segments (9% of all stream segments rated) were identified as biologically significant (Figure 15) (http://www.dnr.illinois.gov/conservation/BiologicalStreamratings/Pages/default.aspx). Despite the magnitude of this effort less than 1% of stream segments in Illinois were able to be rated due to a lack of biological information from the vast majority of segments.

Protection & Stewardship

Illinois contains over 120 state protected areas including state parks, wildlife areas, and state forests many of which are adjacent to, or contain, bodies of water. Additional protection of land and water resources occurs through dedication as an Illinois Nature Preserve, registration as an Illinois Land and Water Reserve, or through the establishment of conservation easements (e.g., CRP/CREP). Forest Preserve Districts, County Conservation Districts, and Municipalities also protect and manage many aquatic resources under their jurisdictions. Illinois Land trusts and other nongovernmental organizations also actively protect and manage important aquatic habitats (e.g., The Wetlands Initiative [http://www.wetlands-initiative.org/overview/]The Nature Conservancy [http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/illinois/placesweprotect/index.htm]). Federal protected areas include the Shawnee National Forest, Midewin National Tallgrass Prairie, and several National Wildlife Refuges (e.g., Chautauqua National Wildlife Refuge, Cypress Creek National Wildlife Refuge, Hackmatack National Wildlife Refuge, Meredosia National Wildlife Refuge). Stewardship activities conducted on these areas support SGCN statewide.

The mission of the Illinois Endangered Species Protection Board is to protect native plants and animals which are in danger of being lost from the wild. The Board maintains and periodically reviews the Illinois List, conducts research and surveys, and develops recovery plans in coordination with IDNR. Illinois currently lists as either endangered or threatened dozens of species associated with freshwaters including 35 fish, 26 mussels, 9 crustaceans, 5 salamanders, 5 turtles, 2 stoneflies and 2 dragonflies.

Protection of important aquatic habitats continues to occur in Illinois, supporting SGCN. Aquatic features were in, or adjacent to, eighty-eight Nature Preserves and Land & Water Reserves totaling

8,345 hectares that have been dedicated since 2005. Seventeen of these are within 0.5km of a SGCN record. The IDNR Owned, Managed, Leased and Purchased (OMLP) database identifies 80 properties that IDNR has added since 2005 including ten within 0.5km of an aquatic SGCN record. Since 2005, the Conservation Reserve Program has added, or renewed easements on 24,694 hectares of agricultural land in Illinois (15,916 properties of which 107 are also in the Conservation Reserve Enhancement Program) under the filter strip (CP21) or riparian buffer (CP22) practices. Two hundred twenty-eight of these easements were within 0.5km of a SGCN record of an aquatic species.

Protection efforts have also targeted some subterranean habitats. In 2014, the Illinois Nature Preserves Commission dedicated the Paul Wightman Subterranean Nature Preserve, a 535 acre site that surrounds the IDNR Fogelpole Cave Nature Preserve and includes a significant portion of the groundwater recharge area of the Fogelpole Cave system. Fogelpole Cave is one of the largest and least disturbed cave systems in Illinois and includes several miles of underground streams.

Stream enhancement activities have improved habitats for SGCN throughout the state. The Illinois Department of Natural Resources (IDNR) has participated in thirteen stream restorations since 2005 including five within 0.5km of an aquatic SGCN. The US Fish and Wildlife Service's Partners for Fish and Wildlife Program has completed 23 stream restorations in Illinois since 2005. Five of these projects occurred within 0.5km of an aquatic SGCN.

Conservation efforts associated with subterranean aquatic habitats and their specialized fauna are also underway in Illinois. Efforts to delineate groundwater recharge areas associated with known locations of Illinois Cave Amphipod have been supported by the Illinois Wildlife Preservation Fund. A vulnerability assessment identifying potential threats to this species and their habitats is currently underway with funding through a State Wildlife Grant.

Flow Management & Water Quality

Water resources are intensively used throughout Illinois for agriculture, domestic and industrial supply, navigation, and recreation. Activities supporting these uses have included the development of agricultural drainage networks, flood control dams and levees, water withdrawal and storage systems, water treatment and distribution systems, cooling water reservoirs, and recreational lakes. Engineering activities directed at agricultural drainage, flood control, navigation, and wastewater processing have greatly improved the quality of life for the residents of Illinois. However, these agricultural and urban development activities have also dramatically transformed how water moves across the landscape along with the quantity and makeup of the materials this water carries. Few, if any, watersheds in Illinois are free from the influence of these activities.

The USACE operates two large reservoirs on the Kaskaskia River (Lake Shelbyville and Carlyle Lake), one large reservoir on the Big Muddy River (Rend Lake) and the Illinois Waterway that includes a series of eight locks designed to provide navigation between the Mississippi River and the Great Lakes. Flows are managed for flood control, navigation, water supply, and recreational uses. Water control structures are also managed at many lakes, ponds, reservoirs, and wetlands for the benefit of recreation, water supply, or local flood control, often with little consideration for downstream environmental impacts.

The Illinois Nutrient Loss Reduction Strategy (State of Illinois 2015a; http://www.epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/nutrient-loss-reduction-strategy/index) is a partnership program that seeks to reduce nitrogen and phosphorus

loading to streams by encouraging implementation of best management practices in targeted watersheds. The goal of the Strategy is to improve water quality within Illinois and reduce nutrient loading to the Mississippi River. Eighteen watersheds (Figure 15) have been prioritized for Strategy implementation, and each watershed has a reduction goal for nitrate-nitrogen and for phosphorus. Under the IEPA 319 Grant Program, 139 projects to reduce non-point source pollution were initiated in the past 10 years (Table 1). Twenty-four of these projects are within 0.5km of a SGCN record.

The Illinois Mud to Parks Program (http://www.dnr.illinois.gov/conservation/m2p/Pages/default.aspx) provides funds for reuse of sediment dredged from rivers and lakes. More than fifteen agencies, institutions and private companies have contributed funds, effort or research for the Mud to Parks Program. Projects within this program have improved aquatic habitats by removing sediments from the Illinois River (and backwater lakes), the Fox River and Lake Michigan for reuse as topsoil, landfill caps and strip-mine reclamation material.

Fragmentation & Connectivity

Much of the infrastructure that supports water resource use in Illinois can also isolate local sections of the river channel from upstream or downstream reaches or from the adjacent floodplain. Longitudinal fragmentation can occur from dams, perched or poorly maintained culverts, or seasonal drying of some stream segments. Highly maintained channels and an expansive levee system can alleviate many of the problems associated with flooding but also restrict streams, and associated species, from their floodplains.

Dam modifications and removals in Illinois are designed to support biodiversity, provide appropriate habitat, and to improve environmental awareness and public safety. The Illinois Dam Removal Initiative (http://www3.illinois.gov/PressReleases/ShowPressRelease.cfm?SubjectID=2&RecNum=10665) was started in 2012 and designed to remove or modify 12 dams on the Des Plaines and Chicago Rivers in Cook County. State-wide since 2005 IDNR has approved permits for thirty-five dam removals of which nine have occurred within 0.5km of an aquatic SGCN.

Invasive Species & Wildlife Diseases

Aquatic Nuisance Species (ANS) include non-native viruses, algae, plants, mollusks, fish or other organisms that cause harm when introduced into aquatic ecosystems. ANS impact systems by altering habitats, shifting trophic dynamics, or by causing direct mortality of native species. Illinois-Indiana Sea Grant has developed an extensive outreach program to prevent ANS from spreading between waterways. Developed in partnership with the IDNR the “Be a Hero – Transport Zero” campaign encourages application of three simple steps to equipment (remove, drain, and dry) used in Illinois waterways to assist in the fight against invasive species (http://www.iiseagrant.org/ais/transportzero.php).

Asian Carp have expanded their distribution since 2005 in some parts of the Upper Mississippi and Ohio River Basins. Efforts to restrict this spread in Illinois waters increased dramatically with the start of the Asian Carp Program in 2009 that focused on restricting access to the Great Lakes through the Chicago Area Waterway System (CAWS). The development of the Asian Carp Control Strategy Framework in 2010 established a goal of creating a systematic multi-tiered defense against Asian Carp (http://www.asiancarp.us/). Activities are now focused on directly preventing Asian Carp dispersal toward the Great Lakes with an extensive monitoring program, evaluation and improvements of the

USACE electric dispersal barriers in the Chicago Sanitary and Ship Canal (CSSC), and an active research component that includes application of additional technologies as barriers to movement (e.g., waterguns, CO_2). In 2014, the Illinois Department of Natural Resources formed an Invasive Species Unit to prevent illegal movement of Asian Carp by fish transportation companies, commercial fisherman, or bait dealers who may sell or transport live fish. These efforts appear to be effectively preventing the establishment of new breeding populations of Asian Carp although continued vigilance is required.

Public Support & Action

Illinois contains a vibrant and active community focused on freshwater conservation that includes NGOs (e.g., Prairie Rivers Network, Sierra Club, The Nature Conservancy), Federal Agencies (e.g., USFWS, USACE, USDA, USGS), State Agencies (e.g., IDNR, IDOA, IDOT, IEPA), Conservation Partnerships (e.g., Chicago Wilderness (http://www.chicagowilderness.org/), Fox River Ecosystem Partnership (http://www.foxriverecosystem.org)), National Fish Habitat Partnerships, Landscape Conservation Cooperatives), and private citizens. A critical role provided by this community is the support of outreach and educational services to the people of Illinois. Twenty percent of the 139 projects initiated in the past 10 years under the IEPA 319 Grant Program have included an educational component addressing environmental awareness of non-point source pollution. Other examples of ongoing activities include the Illinois Master Naturalists program (http://web.extension.illinois.edu/mn/) designed to engage citizens in environmental stewardship by providing science-based education, the RiverWatch volunteer stream monitoring program for Citizen Scientists, and IDNR sponsored fishing clinics that occur throughout the state and introduce young people to aquatic conservation.

Stresses and Threats to Wildlife and Habitat

Agriculture, Pollution, Residential & Commercial Development, and Invasive Species were the top four ranked threats identified in a survey of Illinois conservation partners. With the exception of some Invasive Species these are primarily threats that cause stress by modifying the characteristics of the aquatic habitat from altered rates of flow and/or associated loads (e.g., sediment, nutrients).

Climate Change

Freshwater habitats and species are consistently rated as highly vulnerable to climate change (e.g., Staudinger et al. 2015, Walk et al. 2011). Expected changes include increases in water temperature, altered hydrology brought about by differences in the timing and intensity of precipitation events, and higher rates of erosion and delivery of sediment and chemical loads (Hall 2012). Climate change is expected to interact with hydrology, water chemistry, and biological interactions in complex ways and is considered a "threat multiplier" that will increase the magnitude of other stressors (CNA Corporation 2007). The implications of an altered climate should be considered as part of the challenge to implementation of each of the Campaign Themes.

Walk et al. (2011) conducted 584 climate change vulnerability assessments for 162 SGCN in Natural Divisions and Watersheds of Illinois using NatureServe's Climate Change Vulnerability Index (CCVI; Young et al. 2011). High proportions of mollusk and fish SGCN were rated as Extremely Vulnerable or Highly Vulnerable to climate change. In most cases crustaceans in streams and cave systems were also rated as Moderately Vulnerable or Highly Vulnerable. These assessments identified greater exposure, a

limited ability to disperse, and increased sensitivity to thermal change (for coolwater species) as the primary factors associated with climate vulnerability for these species.

Monitoring & Assessment

The sheer magnitude of effort required to adequately monitor the conservation status of aquatic SGCN is immense. Over 180 SGCN are associated with freshwater habitats including amphibians, fish, snakes, turtles, and many invertebrates (e.g., crustaceans, mussels, insects). Current monitoring efforts are primarily designed to assess fisheries or water quality objectives rather than the conservation status of individual species populations. Therefore, existing programs as they are currently executed may not be sufficient to assess the status of all aquatic SGCN.

Protection & Stewardship

The Illinois landscape is over 90 percent privately owned with most of this actively managed for agriculture or other high intensity use. For aquatic systems that integrate water, and associated materials, from throughout their watersheds this can result in systemic problems that cannot be solved by local stewardship activities where protected lands occur. These twin challenges of small public landholdings and high intensity landuse require comprehensive watershed planning, coordination between public and private land managers, and cooperation toward a shared vision of land stewardship for conservation goals to be achieved.

Flow Management & Water Quality

Major stressors associated with agricultural, residential, and commercially developed landscapes include changes in the timing and magnitude of storm flows and associated loads, fragmentation and loss of lateral connectivity with the floodplain, and altered thermal regimes (State of Illinois 2015b). Unnaturally high levels of nutrients, sediment, and some unregulated substances may also stress our aquatic biota. Groundwater and other subterranean waters are subject to similar threats as surface waters since these habitat types are physically linked by the movement of water within the landscape. Subterranean waters are especially vulnerable to groundwater withdrawals and contamination from sediment or chemical loading in areas of groundwater recharge and near cave entrances.

Fragmentation & Connectivity

A major stressor associated with developed landscapes is fragmentation of habitats and loss of connectivity between populations. Fragmentation can restrict SGCN from habitats required by their life histories (e.g., fish spawning in floodplains) and prevent movements of individuals into adjacent areas that supplement existing populations. This lack of connectivity increases the vulnerability of populations to extirpation and limits the establishment of new ones. Subterranean habitats and headwater streams are especially vulnerable to fragmentation as they have few physical connections to similar habitats and often host specialized organisms with limited dispersal capacity.

Invasive Species & Wildlife Diseases
(http://www.dnr.illinois.gov/conservation/IWAP/Pages/InvasiveSpecies.aspx)

Native species can be stressed by invasive species through predation, competition, or habitat alteration. Wildlife disease can further weaken already stressed individuals or in some cases cause direct mortality.

Asian Carp are a major concern in the Upper Mississippi River and Ohio River basins due to the potential for direct competition for food (plankton) used by larval and juvenile stages of native fish and by certain invertebrate species.

The following Invasive Species and Wildlife Diseases are of primary concern for the Streams Campaign:

- **Asian Carp** (Bighead Carp (*Hypophthalmichthys nobilis*), Black Carp (*Mylopharyngodon piceus)*, Grass Carp (*Ctenopharyngodon idella)*, Silver Carp (*Hypophthalmichthys molitrix*)) and **Common Carp** (*Cyprinus carpio)*
- **Gobies** (Round Goby (*Neogobius melanostomus*) and Tubenose Goby (*Proterorhinus marmoratus*))
- **Dreissenid mussels** (Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussel (*Dreissena rostriformis bugensis*))
- **Chinese Mystery Snail** (*Cipangopaludina chinensis*) and **Faucet Snail** (*Bithynia tentaculata*)
- **Rusty Crayfish** (*Orconectes rusticus*)
- **Purple Loosestrife** (*Lythrum salicaria*), **Eurasian Milfoil** (*Myriophyllum spicatum*), and other listed injurious aquatic weeds (http://www.ilga.gov/commission/jcar/admincode/017/017008050000200R.html)
- **VHS** (Viral Hemorrhagic Septicemia)
- Potential threats also include **Didymo** (*Didymosphenia geminata*) and **New Zealand Mudsnail** (*Potamopyrgus antipodarum*)

Public Support & Action

Most watersheds in Illinois cross many jurisdictional and ownership boundaries and are used for multiple purposes (e.g., agriculture, recreation, water supply). Since aquatic species are supported by the ecological functioning of their watersheds, public support is required for effective conservation planning and action. Without citizens who are informed, connected, and empowered conservation actions that support SGCN or their habitats will not be prioritized over other activities.

Focal Species

Focal Species are SGCN selected for use in monitoring and assessment of the effectiveness of conservation actions associated with particular habitats or stressors. Surrogates are selected for use when SGCN are too rare or vulnerable to monitor or study directly and to represent multiple SGCN with similar life histories, sensitivities to stressors, or that reside in similar habitats. In some cases we selected indices, or groups of species, as surrogates to represent the condition of the waterbody where range restrictions limit the selection of a single species. Our approach for the Streams Campaign was to select several species and surrogates that span the range of aquatic habitats occurring statewide and that are appropriate for monitoring and assessment of the effectiveness of Conservation Actions. Focal species (or surrogates) were also targeted for Campaign Themes and Campaign Focus Areas.

Climate Change

While all aquatic SGCN may respond to changes in water temperature or altered hydrology those with restricted distributions, limited dispersal capacity, and thermal preferences near the edge of current conditions are expected to be more vulnerable to changes in climate.

Focal Species: American Brook Lamprey (*Lethenteron appendix*), Brook Stickleback (*Culaea inconstans*), Mottled Sculpin (*Cottus bairdii*), Banded Sculpin (*Cottus carolinae*); Surrogates: Ephemeroptera, Plecoptera, Trichoptera (EPT), Plain Pocketbook (*Lampsilis cardium*), Pimpleback (*Amphinaias pustulosa*).

Monitoring & Assessment

Natural variability in physical conditions between Illinois waterbodies requires selection of Focal Species and surrogates for several broad habitat types in addition to several applicable statewide.

> **Statewide Focal Species:** Smallmouth Bass (*Micropterus dolomieu*), Spotted Bass (*Micropterus punctulatus*), Highfin Carpsucker (*Carpiodes velifer*), Creek Heelsplitter (*Lasmigona compressa*), Pistolgrip (*Tritogonia verrucosa*). Surrogates: EPT; Fish Index of Biotic Integrity (IBI), freshwater mussel diversity.
>
> **Headwater Streams & Springs Habitats:** Southern Redbelly Dace (*Chrosomus erythrogaster*), Spring Cavefish (*Forbesichthys agassizii*); Surrogates: EPT
>
> **Wadeable and Non-wadeable Stream Habitats:** Smallmouth Bass, Spotted Bass, Highfin Carpsucker; Surrogates: Redhorses (*Moxostoma spp.)*, EPT, fish IBI, freshwater mussel diversity
>
> **Large Rivers and Backwater Habitats:** Sturgeon [Shovelnose Sturgeon (*Scaphirhynchus platorynchus*), Lake Sturgeon (*Acipenser fulvescens*), Pallid Sturgeon (*Scaphirhynchus albus*)], North American Paddlefish (*Polyodon spathul*a), Bluntnose Darter (*Etheostoma chlorosoma*), Smooth Softshell Turtle (*Apalone mutica*); Surrogates: Gars (Alligator Gar (*Attactosteus spatula*), Shortnose Gar (*Lepisosteus platostomus*), Longnose Gar (*Lepisosteus osseus*), Spotted Gar (*Lepisosteus oculatus*)), Pimpleback.
>
> **Lakes and Pond Habitats:** Yellow Perch (*Perca flavescens*), Iowa Darter (*Etheostoma exile*), Least Darter (*Etheostoma microperca*), Brown Bullhead (*Ameiurus nebulosus*); Surrogates: Odonata
>
> **Subterranean Habitats:** Spring Cavefish (*Forbesichthys agassizii*), Illinois Cave Amphipod (*Gammarus acherondytes*), Hine's Emerald Dragonfly (*Somatochlora hineana*). Surrogates: Species associated with the subterranean system under study.

Protection & Stewardship

Conservation Actions occur across the range of freshwater habitats in Illinois and have the potential to impact each SGCN through protection and management of their habitat. Stewardship activities undertaken to benefit individual species, or groups of species, should use the response(s) of these species as an assessment tool.

Focal Species: *targeted SGCN,* Endangered & Threatened species; Surrogates: fish IBI, mussel diversity.

Flow Management & Water Quality

Highly developed landscapes are often associated with rapidly alternating high and low flow conditions, sedimentation, and spikes in pollutant loads. Species requiring clear gravel substrates are expected to be sensitive to these flow conditions. Focal species associated with altered water quality based on sensitivity to low dissolved oxygen (sensitive fish and mussels) or elevated ammonia levels (sensitive mussels) have also been selected for Nutrient Management Priority Areas (see Table 18).

Focal Species: Highfin Carpsucker (*Carpiodes velifer*), Gravel Chub (*Erimystax x-punctatus*).

Fragmentation & Connectivity

Species which make spawning migrations, use floodplains during part of their life history, or are relatively immobile are all sensitive to fragmentation of habitats in different ways.

Focal Species: Sturgeon [Shovelnose Sturgeon (*Scaphirhynchus platorynchus*), Lake Sturgeon (*Acipenser fulvescens*), Pallid Sturgeon (*Scaphirhynchus albus*)], North American Paddlefish (*Polyodon spathul*a); *Surrogates*: Redhorses (*Moxostoma* spp.), Rosyface Shiner (*Notropis rubellus*), Spotted Gar (*Lepisosteus oculatus*).

Invasive Species & Wildlife Diseases

Minimizing the impact of Aquatic Nuisance Species (ANS) on SGCN requires tracking their presence, reducing their numbers, and preventing their spread to new areas.

Focal Species: none selected; *Surrogates*: fish IBI, mussel diversity.

Focus Areas

Streams Campaign Focus Areas have been selected to indicate geographical locations where significant activity is expected to occur that benefits Campaign Goals (Figure 15). Focus Areas correspond with aquatic biodiversity hotspots of statewide importance and areas identified in existing conservation initiatives with strong public and State support. Focal species and surrogates were selected for Focus Areas corresponding with known stressors and SGCN or Surrogates in these areas.

Biologically Significant Stream Reaches
(http://www.dnr.illinois.gov/conservation/BiologicalStreamratings/Pages/default.aspx)

Illinois' Biologically Significant Stream (BSS) ratings (Page et al. 1992) were designed to expand the Biological Stream Characterization (BSC; Hite & Bertrand 1989, Bertrand et al. 1996) by identifying stream reaches with high species richness or very rare species. These products, and their subsequent revisions, have formed the backbone of stream conservation planning in Illinois for over 25 years. Since the most recent revisions (Bol et al. 2007, State of Illinois 2008) many hundreds of additional fish, macroinvertebrate (http://www.epa.illinois.gov/topics/water-quality/watershed-management/resource-assessments/index), and especially mussel samples (http://wwx.inhs.illinois.edu/collections/mollusk/swg/) have been collected throughout Illinois.

Focal species: BSS reaches were identified as segments with high ecological integrity or biological diversity in multiple taxonomic groups (e.g., Fish, Mussels, EPT, Crayfish). Conservation efforts should focus on maintaining the qualifying features of each reach.

Cache River

Despite over a century of widespread hydrological alteration and land clearing the Cache River continues to flow through rich wetlands that hold some of the highest quality natural communities in the State of Illinois. The area is listed as a wetland of international importance by the Ramsar Convention and contains the northernmost cypress/tupelo swamp in the USA. The Cache River Joint Venture was formed in 1991 with a goal of protecting and restoring this important wetland river system by restoring habitat, reducing sediment loading, and restoring base flow to the lower basin.

Focal species: Species associated with backwater habitats or requiring continuous flows were prioritized within the Cache River (Banded Pygmy Sunfish (*Elassoma zonatum*), Banded Sculpin (*Cottus carolinae*), Pugnose Minnow (*Opsopoeodus emiliae*), Little Spectaclecase (*Villosa lienosa*); *Surrogates*: EPT.)

IDNR Implementation Sites
(http://www.dnr.illinois.gov/conservation/IWAP/Pages/IDNRImportantAreas.aspx)

Areas with the greatest opportunity for implementation of IWAP goals and actions were identified by the Office of Resource Conservation and the Office of Land Management for properties that are owned and managed by IDNR. Apple River Canyon State Park and the Vermilion River at Middle Fork State Fish & Wildlife Area and at Kickapoo State Recreation Area were identified for the Streams Campaign.

Focal species: Species that were intolerant of sediment and other pollutants (Smogor 2000) were prioritized when possible for Apple River Canyon State Park (Carmine Shiner (*Notropis percobromus*), Ozark Minnow (*Notropis nubilus*), Smallmouth Bass (*Micropterus dolomieu*)) and the Vermilion River (Bigeye Chub (*Hybopsis amblops*), Bluebreast Darter (*Etheostoma camurum*), Wavy-rayed Lampmussel (*Lampsilis fasciola*)).

Nutrient Management Priority Areas
(http://www.epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/index)

The Illinois Nutrient Loss Reduction Strategy (State of Illinois 2015a) builds on existing efforts and identifies priority watersheds for nutrient loss reduction through regulatory and voluntary efforts to reduce loads from wastewater treatment and runoff from urban and agricultural landscapes (Figure 15).

Focal species: Species that are intolerant to low dissolved oxygen concentrations (IDNR & IEPA 2006) and/or high ammonia concentrations (USEPA 2013) were prioritized for these areas when possible (see Table 18).

Actions

The Streams Campaign Steering Committee and our conservation partners were surveyed to identify conservation actions required to address threats to SGCN and their habitats. We received over 200 recommendations for Conservation Actions associated with the Streams Campaign from our partners in conservation and research organizations. We reviewed each recommended Action and consolidated these when possible. Conservation Actions were then sent to the Streams Campaign Technical Committee for review (Hinz et al. 2015). Suggested changes, including additions, were incorporated into the Actions presented here.

The Actions included within this Campaign section are provided to help guide the next 10 years of implementation. While other Actions may be needed and larger Goals could be set, the Campaign prioritizes the Actions contained in this section as realistic, achievable and most needed within the next 10 years to best aid in meeting the overarching goals of the Wildlife Action Plan to: (1) Establish desired number and distribution of viable populations for each SGCN and target focal species by 2025, (2) Manage habitats through promoting disturbance regimes for the benefit of native species, (3) Develop resiliency and connectedness into habitats so species can adjust to landscape and environmental changes, and (4) Foster an awareness, appreciation, and connection to SGNC and associated habitats among the public.

Implementation Actions (numbers following actions refer to the Implementation Goal(s) they address)

Monitoring & Assessment:

> ***Need:*** *The conservation status of SGCN, and their habitats, changes over time in response to conservation actions as well as with new and existing stressors. Monitoring is necessary to track status and assess trends associated with current conditions and management activities.*
> ***Outcomes:*** *Conservation status and trends will be regularly updated and appropriate for use in adaptive management of aquatic SGCN and their habitats.*

1. Continue statewide comprehensive monitoring & assessment programs focused on the conservation status of aquatic SGCN. (1,2,5)
    - Examine the efficiency of existing biological monitoring in Illinois to assess the conservation status of SGCN and modify or expand monitoring efforts where needed. (1,2,4,5)
    - Conduct targeted surveys for SGCN and Watch Listed species statewide, especially in undersampled habitat types, protected areas, and Campaign Focus Areas. (1,2,5)
    - Conduct status and vulnerability assessments of native species. (1,2)
    - Conduct vulnerability assessments of protected habitats (e.g., Nature Preserves) (1,2,3,5)
    - Develop efficient and effective assessment methods for SGCN that are difficult to collect using standard survey methods and approaches. (1,2,5)
    - Develop biodiversity benchmarks for aquatic habitats situated in the developed landscapes (urban and agricultural) of Illinois (1,2,4,5)
2. Initiate a sentinel monitoring program for a broad range of habitat conditions & taxa to improve trend analysis and assessment (1,2,5)

- Expand annual monitoring of water temperature, water quality, and other habitat measures in aquatic systems statewide. (1,2,4,5)
- Expand annual monitoring of biological assemblages in aquatic habitats statewide. (1,2,4,5)

3. Encourage or require implementation and effectiveness monitoring in work plans on Public Lands or within projects supported by State funds. (1,2,5)
4. Evaluate the success of, and potential barriers to, recruitment (reproduction) of SGCN. (1,2,5)

Protection & Stewardship:

Need: *Rare habitats often support SGCN and can be especially vulnerable to disturbances associated with adjacent areas. Maintaining these habitats may require additional protection or management activities to support viable populations of SGCN. Prioritization of vulnerable habitats associated with SGCN will allow for more efficient and effective use of limited conservation resources.*
Outcomes: *Priority habitats will be protected and managed effectively improving the viability of SGCN populations.*

5. Identify and prioritize areas associated with SGCN for protection, enhancement, and restoration. (1,2,3,5)
    - Develop benchmarks for identification or designation of Illinois waters as Biologically Significant Streams, Land & Water Reserves, Nature Preserves, or Outstanding Resource Waters (1,2,3,4,5)
    - Protect, enhance, and restore aquatic habitats where priorities have been identified. (1,2,3,5)
    - Acquire land where existing SGCN populations are declining and require protection, enhancement, or restoration (1,2,3)
    - Delineate groundwater contribution areas for associated Protected Lands (e.g., Nature Preserves, Land & Water Reserves). (1,2,3,5)
    - Develop BMPs and alternative strategies for deicing roads near ecologically sensitive areas. (4,5)
6. Develop and begin implementation of recovery plans for state-listed aquatic species. (1,2,3,5)
    - Identify habitat requirements and limiting factors for SGCN and develop recommendations to address them where information is lacking (1,2,5)

Flow Management & Water Quality:

Need: *Unnatural flow regimes and compromised water quality are recognized stressors to aquatic biota. Minimizing these stressors by effective management of stormwater and low flows, and concurrent improvements to water quality will improve aquatic habitats for SGCN.*
Outcomes: *Improved resilience and quality of aquatic habitats will increase the viability of SGCN populations.*

7. Assist with implementation of the Illinois Nutrient Loss Reduction Strategy (1,2,4,5,6)
    - Initiate efforts to require nutrient management plans for lands receiving State or Federal funds. (3,4,5)

8. Explore efforts to develop environmental flows for Illinois waterbodies (1,2,4,5,6)
    - Develop strategies for naturalizing hydrologic regimes to benefit SGCN. (1,2,5)
    - Initiate efforts to establish and protect flows for ecological needs (1,2,4,5,6)
9. Assess, grow, and increase the impact of buffer easement programs (1,2,3,4,5,6)
    - Focus programs on reducing sediment and nutrient inputs to aquatic systems (1,2,4,5)
    - Develop statewide guidance for establishment and management of riparian buffers on waterbodies throughout Illinois (1,2,3,4,5)
10. Improve the compatibility of implementation of drainage law and other statutes with the needs of SGCN and their habitats including those of Endangered & Threatened Species. (1,2,3,4,5)
    - Review Illinois drainage law and allowable drainage and channel maintenance practices to identify changes needed to minimize impacts on SGCN. (1,2,3,4,5)
    - Review flowage easements and associated plans for their effectiveness on flood reduction and minimizing environmental impact on SGCN. (3,4,5)
    - Develop guidance consisting of a model local stormwater ordinance for use by counties and local community planning organizations that address the needs of SGCN. (1,2,4,5)
11. Identify and quantify the principle stressors for SGCN in aquatic systems associated with flow modifications, water chemistry, and physical "habitat" quality and availability. (1,2,5)
    - Identify impacts of "Contaminants of Emerging Concern" (e.g., Pharmaceuticals and Personal Care Products [PPCPs], Coal-Tar Sealants) on aquatic SGCN. (1,2,5)

<u>Fragmentation & Connectivity:</u>

Need: *Fragmented populations are at greater risk of extirpation from stochastic events, genetic isolation, or temporal changes in habitat conditions. Artificial barriers that fragment populations by preventing dispersal and by altering local habitat can put additional stress on native populations. Reducing fragmentation of habitats will alleviate these stressors on SGCN.*
Outcomes: *Increased connectivity of aquatic habitats and increased resilience of SGCN populations.*

12. Investigate the potential for aquatic species to disperse through the existing landscape (1,2,5)
13. Develop a comprehensive approach for identifying barriers (e.g., dams, levees, dewatered reaches) that fragment aquatic habitats and no longer provide essential services. (1,2,5)
    - Identify BMPs and opportunities where reconnection would benefit SGCN. (1,2,5)
    - Remove or modify barriers where possible to benefit SGCN and their habitats. (1,2,5)

<u>Invasive Species & Wildlife Diseases:</u>

Need: *Invasive species and wildlife diseases have been identified as important stressors to both native species and their habitats. Improved identification, prevention, and control of new threats, along with management of existing threats will benefit SGCN that share habitats with Invasive Species.*
Outcomes: *Stresses associated with Invasive Species will be reduced or mitigated to the benefit of native species and their habitats.*

14. Assist the Asian Carp Regional Coordinating Committee's work as described in the Asian Carp Control Strategy Framework and the Monitoring & Response Plan (ACRCC 2015a,b) (1,2,6)

15. Conduct effectiveness monitoring & assessment of efforts to reduce and mitigate impacts of Invasive Species. (1,2,4,5)
16. Develop and implement a sentinel monitoring program for detecting changes in distributions of known threats and identifying new aquatic invasive species or wildlife diseases in Illinois. (2,4,6)
17. Investigate the cumulative impacts of landuse alteration, climate change, and invasive species on SGCN and aquatic species assemblages. (1,2,3,5)

Public Support & Action:

Need: *Conservation of SGCN will require public support and action. Awareness, appreciation, and connection to these species is a prerequisite for such support and action. Furthermore, awareness and connection to nature have a positive influence on human well-being (Russell et al. 2013).*
Outcomes: *Citizens of Illinois will be empowered to support and assist with the conservation of their natural resources including SGCN and their habitats.*

18. Provide informational programing that builds awareness and appreciation of SGCN, their habitats and threats, including the water cycle, ecological flows, storm water, and current policies, practices, and laws related to aquatic SGCN (6)
19. Develop and promote programing that connects people to SGCN and their habitats (6)
20. Promote citizen science projects, such as RiverWatch (http://www.ngrrec.org/riverwatch/) and the Illinois Odonate Survey (http://www.illinoisodes.org/), and develop and encourage scientific collaborations that utilize data collected by these organizations (1,2,6)
21. Provide information to citizens about ways they can contribute to aquatic conservation, such as water conservation, rain gardens, permeable surfaces, responsible medicine disposal, invasive species prevention, nutrient reduction, and alternative de-icing strategies (4,5,6)
22. Develop and implement assessment tools to monitor awareness, appreciation, and connection to nature/SGCN across the state (6)
23. Collaborate with resource managers to identify, evaluate, and/or disseminate guidance and outreach materials focused on best management practices related to stewardship and management of aquatic species (1,2,5)

Management Resources

An updated list of links to documents, recommendation, contacts, grant opportunities, and other resources for the Streams Campaign, the other campaigns, and the wildlife action plan in general are found on the Illinois Wildlife Action Plan's website at:
http://www.dnr.illinois.gov/conservation/IWAP/Pages/default.aspx#tabitem5

Performance Measures

Outcome performance measures are designed to assess the overall impact of undertaking conservation actions on Implementation Goals. Output performance measures are designed to assess how active the program is at working toward the Implementation Goals.

Overarching Goal	Streams Campaign Implementation Goal	Type	Performance Measure
Viable Populations	**Biodiversity**	Outcome	BSS quality stream segments (total # or stream km)
		Outcome	Mean native taxa richness of waterbody is maintained or increases (for fish, mussels, EPT).
		Output	Number of conservation plans and recovery plans developed for aquatic SGNC (annual total)
		Output	Number of reintroduction or translocation projects for aquatic SGNC (initiated annually or currently funded)
Viable Populations	**Abundance & Distribution**	Outcome	Focal Species abundance (relative abundance) is maintained or increased within Focus Areas
		Outcome	Focal Species distribution is maintained or increased within Focus Areas (Mean number of reaches [waterbodies] with recent observations; proportion of reaches evaluated)
		Output	Number of waterbodies surveyed for SGNC (annual total)
		Output	Number of vulnerability assessments conducted for SGNC (annual total)
Habitat Management	**Protection of High Quality Communities**	Outcome	Percentage of BSS reaches with protected status (based on stream length or number of reaches)
		Outcome	Waterbodies under protected status (acres or stream length)
		Outcome	Percentage of aquatic SGNC with >2 populations (recent observation locations) within protected areas.
		Output	Waterbodies, stream kilometers, or total area that have received permanent protected status (e.g., Illinois Nature Preserve, annual total)
		Output	Waterbodies, stream kilometers, or total area that have received term-limited protected status (e.g., long-term easements; annual total)

Overarching Goal	Streams Campaign Implementation Goal	Type	Performance Measure
Habitat Management	**Support Designated Uses**	Outcome	Percentage of evaluated reaches meeting aquatic life designated use
		Outcome	Percentage of evaluated reaches fully supporting all designated uses
		Output	ratio of impaired waters (CWA 303(d) list) receiving Section 319 program funding to eligible impaired (Category 5) waters [based on biennial integrated report]
		Output	TMDLs or Category 4b plans completed (number per year)
Habitat Resiliency and Connectedness	**Provide Habitat for SGCN**	Outcome	Connected stream reaches statewide (total or mean length)
		Outcome	Major dams with functioning fish passage systems (percent)
		Outcome	Number of reaches (waterbodies) with recent observations of T&E species
		Outcome	Change in distribution and/or abundance of fragmentation & connectivity focal species (and surrogates)
		Outcome	Habitat quality measures of waterbodies are maintained or improve (QHEI, IHI, fish IBI, mussel diversity)
		Output	Habitat enhancement projects conducted annually (number, acres or stream km, funds expended)
Public Awareness, Appreciation, Connection	**Public Awareness, Appreciation, Connection**	Outcome	Proportion of individuals donating to Wildlife Preservation Fund on IL State Income Tax returns.
		Outcome	Proportion of Public with an awareness of IESPB, INPC, or Invasive Species Programs (requires initiating surveys)
		Outcome	Proportion of public who have knowledge of and attachment to local aquatic natural areas and species (requires initiating an attachment survey)
		Output	Number of hits on Streams Campaign Web page
		Output	Number of requests for IDNR educational information kits related to aquatic habitats or species
		Output	Outreach events held relating to aquatic habitats or species (number of events, number of participants)

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Table 17. Activities in support of the Wildlife Action Plan Streams Campaign and their relationship to the Implementation Goals.

		Percent Related to Implementation Goals					
Funding and Effort Sources	**Activities Related to Streams Campaign**	**Goal 1**	**Goal 2**	**Goal 3**	**Goal 4**	**Goal 5**	**Goal 6**
State Wildlife Grants	35 projects	23%	34%	6%	0%	29%	9%
Wildlife Protection Fund Grants	32 projects	38%	31%	0%	0%	28%	6%
Endangered Species Protection Board projects	6 studies	0%	100%	0%	0%	0%	0%
EPA 319 projects	139 projects	93%	17%	0%	56%	37%	20%
Nature preserve/Land and water reserve additions	88 properties	0%	19%	100%	0%	0%	0%
DNR OMLP purchases	80 properties	0%	13%	100%	0%	0%	0%
CRP/CREP additions in riparian enhancement practices	15,916 properties (107 in CREP)	0%	1%	100%	0%	0%	0%
Dam removals	35 removals	100%	26%	0%	0%	100%	0%
IDNR-driven stream restorations	13 projects	100%	38%	0%	0%	100%	0%
FWS Partners Program stream restorations	23 projects	100%	23%	0%	0%	100%	0%

Table 18. Focal species selected for Nutrient Management Priority Areas based on the Illinois Nutrient Management Loss Strategy. Available at http://www.epa.illinois.gov/topics/water-quality/monitoring/strategy/index	
Nutrient Management Priority Area	**Focal Species for Priority Area**
Priority Watersheds for Agricultural Non-Point Sources (Total Phosphorus)	
Big Muddy River Watershed	Spotted Bass, Spotted Gar, Pugnose Minnow
Embarras River Watershed	Steelcolor Shiner, Northern Hogsucker, Pistolgrip (*Tritogonia verrucosa*)
Little Wabash River Watershed	Steelcolor Shiner, Northern Hogsucker, Little Wabash Crayfish (*Orconectes stannardi)*
Priority Watersheds for Agricultural Non-Point Sources (Nitrate-Nitrogen)	
Lower Illinois River-Senachwine Lake Watershed	Black Redhorse, Northern Hogsucker
Lower Rock River Watershed	Fantail Darter, Northern Hogsucker, Black Sandshell
Mississippi Central Watershed	Statewide Focal Species
Vermilion-Illinois River Watershed	Fantail Darter, Northern Hogsucker, Smallmouth Bass
Vermilion-Wabash River Watershed	Steelcolor Shiner, Wavy-rayed Lampmussel (*Lampsilis fasciola*)
Priority Watersheds for Point Sources	
Upper Fox River Watershed	Northern Hogsucker, Smallmouth Bass, Ellipse
Des Plaines River/DuPage River Watershed	Northern Hogsucker, Smallmouth Bass, Ellipse
Upper Sangamon River Watershed	Fantail Darter, Steelcolor Shiner, Pistolgrip, Creek Heelsplitter (*Lasmigona compressa*)
Lower Rock River Watershed	Fantail Darter, Northern Hogsucker, Black Sandshell
Lower Illinois River-Senachwine Lake Watershed	Black Redhorse, Northern Hogsucker
Keep it for the Crop Priority Watersheds	
Evergreen Lake Watershed	Statewide Focal Species
Lake Bloomington Watershed	Ellipse (*Venustaconcha ellipsiformis*)
Lake Decatur Watershed	Steelcolor Shiner, Fantail Darter, Smallmouth Bass
Vermilion-Illinois River Watershed	Fantail Darter, Northern Hogsucker, Smallmouth Bass
Lake Mauvaise Terre Watershed	Statewide Focal Species
Lake Springfield Watershed	Statewide Focal Species
Lake Vermilion Watershed	Northern Hogsucker, Smallmouth Bass
Salt Fork Vermilion River Watershed	Steelcolor Shiner, Northern Hogsucker, Wavy-rayed Lampmussel, Rainbow (*Villosa iris*)

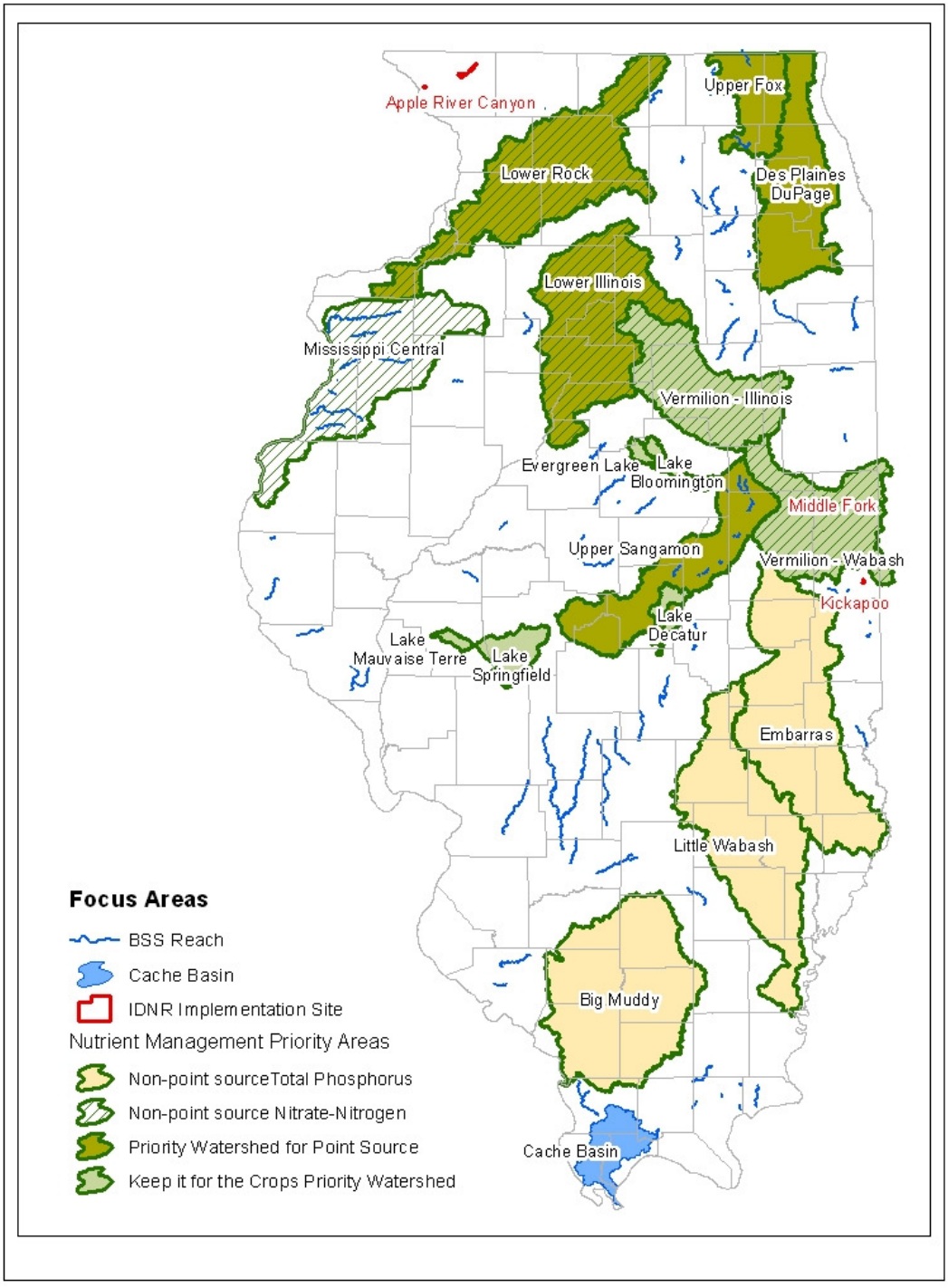

Figure 15. Streams Campaign Focus Areas have been compiled to emphasize priority areas associated with Biologically Significant Stream reaches (blue lines), initiatives to protect and enhance the Cache River Basin (blue polygon), IDNR Implementation Sites (red outlined), and Nutrient Management Priority Areas based on the Illinois Nutrient Loss Reduction Strategy (green outlined).

Appendix 8. Status and stresses to Illinois Species in Greatest Need of Conservation addressed in the Streams Campaign. Definitions and methods:

Common Name: Commonly recognized name for the species.

Scientific Name: Currently recognized name for the species based on the most recently available literature.

Campaign Habitat: Major habitat type where the species occurs in Illinois.

Specific Habitat: More detail habitat location for species in Illinois.

Historic Status: Number of Counties, or HUC8 watershed for fish and mussels, with records from before 1980.

Current Status: Number of Counties, or HUC8 watersheds for fish and mussels, with recent records (last 20 years).

Trend: Trends were based on the change in distribution of the species by comparing their Current and Historic Status. If a change less than 25% was observed the trend was recorded as 0, changes with magnitudes between 25-49% were coded as +1 (distribution increased) or -1 (distribution decreased), changes greater than 50% were coded as +2 (distribution increased) or -2 (distribution decreased).

Stressors: Each stressor type was rated as either a recognized stressor (1), not a recognized stressor (0), or as having not enough information to make a rating (NMI=Need More Information).

Appendix 8. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Streams Campaign.

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
FISH																										
Alabama Shad	*Alosa alabamae*	Major River	River	2	0	-2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Alligator Gar	*Atractosteus spatula*	Backwater	Backwater, Floodplain Lake	4	0	-2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
American Brook Lamprey	*Lethenteron appendix*	Creek	Riffle, Run, Pool of Stream with Sand, Grave, Rock	11	3	-2	1	1	1	0	0	1	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	1
American Eel	*Anguilla rostrata*	River, Major River	Pool of River, Stream	29	7	-2	0	0	0	0	0	0	0	0	0	0	NMI	NMI	NMI	0	1	0	0	NMI	NMI	1
Banded Pygmy Sunfish	*Elassoma zonatum*	Backwater, Swamp, Creek	Low-Gradient or Still Pool of Backwater, Stream, Swamp with Silt, Vegetation	5	1	1	1	1	1	0	0	0	0	0	0	0	NMI	NMI	NMI	0	1	0	0	NMI	NMI	0
Bantam Sunfish	*Lepomis symmetricus*	Backwater, Swamp, Large Reservoir	Backwater, Swamp, Lake with Vegetation	3	2	0	1	1	1	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Bigeye Chub	*Hybopsis amblops*	Creek	Stream with Sand, Gravel, Vegetation	8	3	2	1	NMI	1	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	1
Bigeye Shiner	*Notropis boops*	Creek	Stream with Sand, Gravel, Vegetation	19	5	0	NMI	NMI	NMI	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Blacktail Shiner	*Cyprinella venusta*	Creek	High-Gradient Run, Pool of Stream with Stable Flow, Sand	4	4	2	1	0	0	0	0	1	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Bleeding Shiner	*Luxilus zonatus*	Creek	High-Gradient Stream	0	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Bluebreast Darter	*Etheostoma camurum*	River, Creek	High-Gradient Riffle in River, Stream with Rock	1	1	1	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Brassy Minnow	*Hybognathus hankinsoni*	Creek	Pool of Stream	10	1	-2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Brown Bullhead	*Ameiurus nebulosus*	Backwater, Swamp	Still Pool of Lake, Backwater, Swamp with Silt, Vegetation	31	26	1	1	0	1	0	0	1	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Chestnut Lamprey	*Ichthyomyzon castaneus*	Major River, River	River	20	6	-2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Crystal Darter	*Crystallaria asprella*	Major River, River, Creek	Riffle, Run in River, Stream	2	2	1	0	0	0	0	0	0	0	0	0	0	NMI	NMI	NMI	0	1	0	0	NMI	NMI	1
Cypress Darter	*Etheostoma proeliare*	Creek, Swamp	Low-Gradient or Still Pool of Stream, Swamp with Silt, Vegetation	4	2	2	0	0	0	0	0	1	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Cypress Minnow	*Hybognathus hayi*	Larger Reservoir, Swamp, Backwater, Creek	Lake, Swamp, Backwater, Stream with Sand, Silt	4	2	0	1	NMI	1	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Eastern Sand Darter	*Ammocrypta pellucida*	Major River, River	River with Sand	4	2	2	1	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
Flathead Chub	*Platygobio gracilis*	Major River	Turbid River with Sand	6	2	-2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Flier	*Centrarchus macropterus*	Backwater, Swamp, Creek	Still, Low-Gradient Pool of Stream, Backwater, Swamp with Vegetation	10	8	0	1	0	1	0	0	1	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Fringed Darter	*Etheostoma crossopterum*	Creek	Riffle, Run of Stream with Gravel, Rock, Stable Flow	2	2	2	0	0	0	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Ghost Shiner	*Notropis buchanani*	Major River, River	Low-Gradient or Still Pool of River with Sand, Gravel, Silt	25	7	-1	1	1	0	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Gravel Chub	*Erimystax x-punctatus*	Major River, River	River with Sand or Gravel	14	4	1	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Greater Redhorse	*Moxostoma valenciennesi*	River, Large Resevoir	River, Lake with Sand, Gravel, Rock	4	4	1	NMI	NMI	NMI	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Harlequin Darter	*Etheostoma histrio*	Major River, River, Creek	High-Gradient River, Stream with Gravel, Wood	3	1	-1	1	NMI	1	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Iowa Darter	*Etheostoma exile*	Large Reservoir, Creek, Backwater,	Lake, Stream, Backwater, Swamp with Vegetation	10	5	-1	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Ironcolor Shiner	*Notropis chalybaeus*	Creek, Swamp	Stream, Swamp with Sand, Vegetation	5	4	2	NMI	1	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Lake Sturgeon	*Acipenser fulvescens*	Large Reservoir, Major River	Lake, River with Gravel, Rock	12	1	-2	NMI	NMI	1	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	1
Largescale Stoneroller	*Campostoma oligolepis*	Creek	High-Gradient Riffle, Run of Stream with Gravel, Rock, Stable Flow	18	10	2	1	0	0	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Least Brook Lamprey	*Lampetra aepyptera*	River, Creek	Riffle with Gravel in River, Stream	2	2	0	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Least Darter	*Etheostoma microperca*	Natural Lake, Creek	Lake, Stream with Vegetation	10	8	2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Mooneye	*Hiodon tergisus*	Major River, River	River	26	20	-2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Mountain Madtom	*Noturus eleutherus*	Major River, River, Creek	High-Gradient Riffle in River, Stream with Sand, Gravel, Vegetation	5	2	0	1	1	1	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	1
North American Paddlefish	*Polyodon spathula*	Major River, River	Low-Gradient River with Sand, Gravel , Silt	22	9	-2	0	1	0	0	1	0	0	0	0	0	NMI	NMI	NMI	0	1	0	0	NMI	NMI	1
Northern Brook Lamprey	*Ichthyomyzon fossor*	Major River	River with Sand or Gravel	2	2	-2	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Northern Madtom	*Noturus stigmosus*	Major River, Creek	High-Gradient Stream, River with Sand	3	1	-1	1	NMI	1	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Pallid Shiner	*Hybopsis amnis*	Major River	Pool of River with Sand	12	3	2	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Pallid Sturgeon	*Scaphirhynchus albus*	Major River, Creek	Turbid River with Sand or Gravel	2	1	0	1	NMI	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1	1	1	1	NMI	NMI	1
Plains Minnow	*Hybognathus placitus*	Major River	River	7	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
Pugnose Minnow	*Opsopoeodus emiliae*	Major River, River, Creek, Backwater, Swamp	Low-Gradient or Still Pool of River, Stream, Backwater, Swamp with	22	10	1	1	1	1	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Pugnose Shiner	*Notropis anogenus*	Large Reservoir, Creek	Lake, Low-Gradient Stream with Vegetation	7	3	0	1	NMI	1	1	NMI	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Redside Dace	*Clinostomus elongatus*	Creek	Pool of Stream	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Redspotted Sunfish	*Lepomis miniatus*	Backwater, Swamp, Creek	Backwater, Swamp, Low-Gradient Stream with Vegetation	10	8	1	1	NMI	1	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Ribbon Shiner	*Lythrurus fumeus*	Creek	Low-Gradient Pool of Stream with Sand, Silt, Vegetation	14	8	0	1	0	0	1	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
River Chub	*Nocomis micropogon*	Major River, Creek	High-Gradient River, Stream with Gravel, Rock	4	3	0	NMI	NMI	1	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
River Darter	*Percina shumardi*	Major River	River with Gravel or Mixed Sand	15	11	2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
River Redhorse	*Moxostoma carinatum*	Major River, River	High-Gradient River with Gravel	14	10	0	NMI	NMI	NMI	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Shoal Chub	*Macrhybopsis hyostoma*	Major River, River	Riffle in River	27	14	-2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Sicklefin Chub	*Macrhybopsis meeki*	Major River	Turbid Riffle of River with Sand, Gravel, Stable Flow	6	1	-2	1	1	1	0	0	1	0	0	0	0	NMI	NMI	NMI	0	1	0	0	NMI	NMI	1
Silverband Shiner	*Notropis shumardi*	Major River, River	High-Gradient River with Sand, Gravel, Stable Flow	20	14	1	1	1	1	0	0	1	0	0	0	0	NMI	NMI	NMI	0	1	0	0	NMI	NMI	1
Spottail Darter	*Etheostoma squamiceps*	Creek	Riffle, Run, Pool of Stream with Rock, Stable Flow	31	3	0	1	1	0	1	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Spring Cavefish	*Forbesichthys agassizii*	Cave(Aquatic), Creek	Coolwater Cave, Stream with Gravel or Rock, Stable Flow	2	3	-2	1	1	1	0	0	0	0	0	0	0	NMI	NMI	NMI	0	0	0	0	NMI	NMI	0
Stripetail Darter	*Etheostoma kennicotti*	Creek	Pool, Headwater of Stream with Gravel	3	3	-2	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Sturgeon Chub	*Macrhybopsis gelida*	Major River	Turbid River with Sand	2	1	0	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Taillight Shiner	*Notropis maculatus*	Backwater, Large Resevoir, Creek,	Backwater, Lake, Stream, Swamp with Vegetation	0	1	-2	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Weed Shiner	*Notropis texanus*	Creek	Stream with Sand, Vegetation	12	6	2	NMI	NMI	NMI	NMI	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Western Sand Darter	*Ammocrypta clara*	Major River, River	Low-Gradient River with Sand	13	6	2	NMI	NMI	1	1	NMI	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	1
Yellow Perch	*Perca flavescens*	Lake Michigan, Major River, River	Lake Michigan, Lake or Low-Gradient or Still Pool	22	21	-1	1	0	1	0	1	1	0	0	0	0	NMI	NMI	NMI	0	0	1	0	NMI	NMI	0

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
HERPTILE - Amphibian																										
Hellbender	*Cryptobranchus alleganiensis*	Creek	Clear Rock Bottomed River, Stream	6	1	-2	1	1	1	1	0	1	0	0	1	0	0	0	0	1	0	1	0	0	0	0
Mudpuppy	*Necturus maculosus*	River	Rocky-bottom Stream, Lake	40	12	-2	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	0	1
Spotted Dusky Salamander	*Desmognathus conanti*	Creek	Headwater Stream, Adjacent Riparian Area	2	2	0	1	0	1	1	0	1	0	0	1	0	0	1	0	1	0	0	1	0	1	1
HERPTILE - Reptile																										
Alligator Snapping Turtle	*Macrochelys temminckii*	River, Swamp	River, Swamp	13	0	-2	1	1	1	1	0	0	0	0	1	0	0	0	0	1	0	1	1	0	0	0
Queesnake	*Regina septemvittata*	River, Stream	Clear Running River, Stream with Rocky Bottom	18	10	-1	1	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	1
River Cooter	*Pseudemys concinna*	Floodplain lake, Slough, Backwater	River, Slough or Backwater Lake	13	6	-1	1	0	1	1	0	0	0	1	1	0	0	0	0	1	0	1	1	0	1	1
Smooth Softshell Turtle	*Apalone mutica*	River	Sand-Bottomed Stream, River	35	9	-2	0	1	1	1	0	1	0	1	1	0	0	0	0	1	1	1	0	1	0	0
INVERTEBRATE - Coleoptera (Beetles)																										
Variegated False Water Penny Beetle	*Dicranopselaphus variegatus*	Stream	Creek (Larvae), Riparian Areas (Adults)	NMI	NMI	NMI	1	1	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Crustaceans																										
Bigclaw Crayfish	*Orconectes placidus*	Stream	Gravel, Rocky Stream, River	NMI	4	NMI	0	0	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Bousfield's Amphipod	*Gammarus bousfieldi*	River	Gravel Shoal of Ohio River	NMI	3	NMI	0	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Cavespring Crayfish	*Cambarus tenebrosus*	Stream	Rocky Stream, Springs, Cave	NMI	5	NMI	1	1	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Illinois Cave Amphipod	*Gammarus acherondytes*	Subterranean	Cave	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Illinois Crayfish	*Orconectes illinoiensis*	Stream	Stream	NMI	9	NMI	0	0	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Indiana Crayfish	*Orconectes indianensis*	Stream	Rocky Stream	NMI	7	NMI	0	0	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Kentucky Crayfish	*Orconectes kentuckiensis*	Stream	Rocky Stream	NMI	1	NMI	0	0	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Little Wabash Crayfish	*Orconectes stannardi*	Stream	Creek, Riffle	NMI	8	NMI	1	1	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Shrimp Crayfish	*Orconectes lancifer*	Lakes, Reservoir	Deep Water at Horseshoe Lake	NMI	1	NMI	1	0	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Ephemeroptera (Mayflies)																										
a mayfly	*Anafroptilum album*	River	Medium to Large River	6	1	NMI	0	0	0	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Clay Burrowing Mayfly	*Pentagenia vittigera*	River	Large River	34	6	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Flatheaded Mayfly	*Raptoheptagenia cruentata*	River	Large River	9	1	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Fork Gilled Mayfly	*Paraleptophlebia ontario*	Stream	Small Wooded Stream	3	2	NMI	1	1	0	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Large Minnow Mayfly	*Isonychia arida*	River	Large River	1	2	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
a mayfly	*Siphlonurus marshalli*	Stream	Small Stream	4	3	NMI	0	0	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Minnetonka Flatheaded Mayfly	*Stenacron minnetonka*	River	Small to Large River	8	4	NMI	0	0	0	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
Pecatonica River Mayfly	*Acanthametropus pecatonica*	River	Large Sandy River	1	NMI	NMI	0	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Say's Large Minnow Mayfly	*Isonychia sayi*	River	Large River	5	2	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Spiny Crawler Mayfly	*Dannella lita*	River	Small to Large River	3	6	NMI	0	0	0	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
a mayfly	*Dannella simplex*	River	Small to Large River	4	2	NMI	0	0	0	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
White Sand-River Mayfly	*Pseudiron centralis*	River	Large River	7	3	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Small Minnow Mayfly	*Camelobaetidius waltzi*	Stream	Medium to Large River	0	1	NMI	0	0	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Mollusks (Hydrobiidae)																										
Missouri Cave Snail	*Fontigens antroecetes*	Stream	River	NMI	NMI	-2	0	1	1	1	0	1	0	0	0	0	0	0	0	1	1	1	1	0	0	1
Mud Amnicola	*Amnicola limosa*	Stream	River	NMI	NMI	NMI	0	1	1	1	0	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0
INVERTEBRATE - Mollusks (Pleuroceridae)																										
Onyx Rocksnail	*Leptoxis praerosa*	Stream	River	NMI	NMI	-2	0	1	1	1	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0	1
Shawnee Rocksnail	*Lithasia obovata*	Stream	River	NMI	5	-2	0	1	1	1	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0	1
INVERTEBRATE - Odonata (Dragonflies & Damselflies)																										
Canada darner	*Aeshna canadensis*	Lakes, Reservoir	Lake Margin, Sluggish Stream	2	4	NMI	1	0	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Elusive Clubtail	*Stylurus notatus*	River	Large River	11	8	NMI	0	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Hine's Emerald Dragonfly	*Somatochlora hineana*	Wet Meadow	Fen, Seep	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Spatterdock Darner	*Rhionaeschna mutata*	Pond	Pond, Swamp	2	NMI	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Plecoptera (Stoneflies)																										
Austin Springfly	*Hydroperla fugitans*	River	Large River	9	6	NMI	0	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Central Stone	*Acroneuria frisoni*	Stream	Small to Medium Permanent Stream	14	9	NMI	0	0	0	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Common Stone	*Acroneuria abnormis*	River	Large River	21	9	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Illinois Winter Stonefly	*Allocapnia illinoensis*	Stream	Small Wooded Stream	1	1	NMI	1	1	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Mottled Willowfly	*Strophopteryx fasciata*	River	Small to Large River	13	8	NMI	0	0	0	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Ozark Forestfly	*Prostoia ozarkensis*	Stream	Small Wooded Stream	1	1	NMI	1	1	0	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Robust Springfly	*Diploperla robusta*	Stream	Small, Permanent Stream	0	1	NMI	0	0	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Small Willowfly	*Taeniopteryx lita*	River	Large River	4	4	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Two-Lined Stone	*Perlesta golconda*	River	Medium to Large River	6	9	NMI	0	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Trichoptera (Caddisflies)																										
Large River Net-Spinning Caddisfly	*Hydropsyche arinale*	River	Medium to Large River	9	5	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Net-Spinning Caddisfly	*Cheumatopsyche speciosa*	River	Medium to Large River	12	2	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Caddisfly	*Chimarra aterrima*	Stream	Spring, Springbrook	5	4	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Caddisfly	*Hydropsyche cuanis*	River	Medium to Large River	6	4	NMI	0	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Sandboil Caddisfly	*Frenesia missa*	Stream	Spring, Springbrook	4	5	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Seep Inhabiting Net-Spinning Caddisfly	*Diplectrona metequi*	Stream	Seep	2	2	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
MUSSELS																										
Black Sandshell	*Ligumia recta*	River	Riffle, Gravel or Sand	32	15	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Bleufer	*Potamilus purpuratus*	River	Slow Flow, Fine Substrate	5	4	0	1	1	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0
Butterfly	*Ellipsaria lineolata*	Major River	Swift Flow, Sand, Gravel	18	9	-1	1	1	1	1	1	1	0	0	0	0	0	1	0	0	1	1	1	1	1	0
Clubshell	*Pleurobema clava*	River	Swift Flow, Cobble to Sand	5	1	-2	0	1	1	1	0	1	0	0	0	0	1	0	0	1	1	1	1	0	1	1
Creek Heelsplitter	*Lasmigona compressa*	Creek	Sand or Gravel	22	21	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	1	0
Ebonyshell	*Fusconaia ebena*	Major River	Swift Flow, Sand, Gravel	18	4	-1	0	1	0	1	1	1	0	0	0	0	1	1	0	0	1	1	1	1	1	1
Elephantear	*Elliptio crassidens*	Major River	Swift Flow	17	3	-1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	1	1	1	1	1	0
Elktoe	*Alasmidonta marginaa*	River	Swift Flow	23	15	-1	0	1	1	1	0	1	0	0	0	0	1	1	0	1	1	1	1	0	0	0
Ellipse	*Venustaconcha ellipsiformis*	Creek	Swift Flow, Cobble to Sand	21	15	-1	1	1	1	1	0	1	0	0	0	0	1	0	0	0	1	1	1	0	1	0
Fanshell	*Cyprogenia stegaria*	River	Swift Flow, Gravel	6	0	-2	1	1	1	1	1	1	0	0	0	0	1	1	0	1	1	1	0	0	1	0
Fat Pocketbook	*Potamilus capax*	River	Sand, Gravel, Muck	11	5	-1	0	1	0	1	1	1	0	0	0	0	0	1	0	0	0	1	1	1	1	0
Flutedshell	*Lasmigona costata*	River	Sand or Gravel	27	12	-1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1
Gulf Mapleleaf	*Quadrula nobilis*	Major River	Sand, Gravel, Muck	3	2	-1	0	0	0	0	0	1	0	0	0	0	1	0	0	1	1	1	0	0	0	1
Higgins Eye	*Lampsilis higginsii*	Major River	Sand or Gravel	12	2	0	0	0	0	0	1	1	1	0	0	0	0	1	0	1	1	1	1	0	0	1
Kidneyshell	*Ptychobranchus fasciolaris*	River	Fine to Coarse Substrate	7	2	-1	0	1	0	1	0	1	0	0	0	0	1	0	0	1	1	1	1	0	1	1
Little Spectaclecase	*Villosa lienosa*	Creek	Sand, Muck, Edge	10	6	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0
Louisiana Fatmucket	*Lampsilis hydiana*	Creek	Slow Flow, Sand, Gravel, Muck	13	12	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monkeyface	*Theliderma metanevra*	River	Sand or Gravel	22	15	-1	0	1	0	1	0	1	0	0	0	0	1	0	0	0	1	1	1	1	1	0
Northern Riffleshell	*Epioblasma rangiana*	River	Riffle, Coarse Substrates	2	1	-1	0	1	1	1	0	1	0	0	0	0	1	0	0	1	1	1	1	0	0	1
Ohio Pigtoe	*Pleurobema cordatum*	River	Sand or Gravel	5	1	-2	0	0	0	1	1	1	0	0	0	0	0	1	0	1	1	1	0	0	0	1
Orangefoot Pimpleback	*Plethobasus cooperianus*	River	Swift Flow, Cobble to Sand	1	0	-2	0	1	0	1	1	1	0	0	0	0	1	1	0	1	1	1	1	0	0	1
Pink Mucket	*Lampsilis abrupta*	Major River	Swift Flow, Rocky Substrate	6	0	-2	0	1	0	1	0	1	0	0	0	0	1	1	0	1	1	1	1	0	1	0
Pistolgrip	*Tritogonia verrucosa*	River	Sand, Gravel, Muck	38	29	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1
Pocketbook	*Lampsilis ovata*	Creek	All Substrates	4	1	-2	0	1	1	1	0	1	0	0	0	0	1	0	0	1	1	1	0	0	1	1
Purple Lilliput	*Toxolasma lividum*	Creek	Sand, Muck, Root, Edge	7	3	0	0	1	1	1	0	1	0	1	0	0	0	0	0	0	1	1	0	0	1	0
Purple Wartyback	*Cyclonaias tuberculata*	River	Swift Flow, Coarse Substrate	7	5	-1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	1	1
Rabbitsfoot	*Theliderma cylindrica*	River	Sand or Gravel	2	2	-2	0	1	0	1	0	1	0	0	0	0	1	0	0	1	1	1	1	0	1	1
Rainbow	*Villosa iris*	Creek	Sand or Gravel	15	1	-2	0	1	0	1	0	1	0	0	0	1	1	0	0	1	1	1	1	0	0	1
Rayed Bean	*Villosa fabalis*	Creek	Flow, Fine Substrate, Vegetation	2	1	-2	1	1	1	1	0	1	0	0	0	0	1	0	0	1	1	1	0	0	0	1
Salamander Mussel	*Simpsonaias ambigua*	River	Coarse Substrate, Slab Rock	12	1	-2	1	1	1	1	0	1	0	0	0	0	1	0	0	0	1	1	0	0	1	0

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
Scaleshell	*Leptodea leptodon*	River	Flow	10	1	-2	1	1	1	1	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0	0
Sheepnose	*Plethobasus cyphyus*	River	Swift Flow, Cobble to Sand	16	3	-2	1	1	1	1	1	1	0	0	0	0	0	1	0	1	1	1	0	0	1	1
Slippershell	*Alasmidonta viridis*	Creek	Sand, Gravel, Muck	25	17	-1	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	1	1	0	1	0
Snuffbox	*Epioblasma triquetra*	River	Riffle, Coarse Substrates	17	1	-2	0	1	1	1	0	1	0	0	0	0	1	0	0	1	1	1	1	0	1	1
Spectaclecase	*Margaritifera monodonta*	Major River	Gravel, Muck, Roots	6	1	-2	0	1	0	1	1	1	0	0	0	0	1	1	0	0	1	1	1	1	1	0
Spike	*Elliptio dilatata*	River	Coarse Substrate	40	18	0	1	1	1	1	0	1	0	0	0	0	1	1	0	1	0	0	1	0	0	0
Wavy-rayed Lampmussel	*Lampsilis fasciola*	Creek	Flow, Coarse Substrate	3	1	-1	0	1	0	1	0	1	0	0	0	0	1	0	0	0	1	1	1	0	1	0

Wetlands Campaign

Description

The Wetlands Campaign focuses on the conservation of wetlands throughout Illinois, but with specific emphasis on priority natural divisions with the greatest wetland resources or potential (Schulthies and Eichholz 2014). More specifically, the Campaign will try to positively influence wetland Species in Greatest Conservation Need (SGCN; Appendix 9) through increases in wetland acreage, increasing wetland quality, and/or through wetland management. Additionally, wetland supportive administrative policy may provide the greatest wetland habitat benefits at broad landscape scales. Conservation actions are focused to impact wildlife species, but secondary results will have positive effects on ecosystems, plant communities, and society.

Wetlands are important habitats that provide a number of valuable ecological services.
By holding drainage waters and moderating storm water runoff, wetlands help to dampen changes in water levels in rivers and streams, reducing flooding (Demissie and Khan 1993), and recharging groundwater supplies. When allowed to persist naturally in structure and function, wetlands provide locations where water and nutrients pool, and are highly productive in plant and animal life. Similarly, by intercepting and slowly releasing runoff, wetlands allow physical and biochemical treatment of sediment and other pollutants that severely degrade natural features and ecosystem services.

Wetlands were historically a dominant feature of the Illinois landscape but have been reduced by more than 90% for agriculture, development, and other land uses (Dahl 2006). Of the remaining wetlands in Illinois, most have been highly degraded. Invasive plants and animals have reduced biodiversity and degraded the habitat structure and function. Remaining wetlands are increasingly isolated from other wetlands and other quality habitats. Sedimentation has reduced wetland volume. Changes in hydrology and drainage have starved some wetlands of water and overwhelmed others. Wetlands are naturally dynamic systems, and are dependent on disturbance (both flood and drought) to remain healthy and functional. However, the type, rate and severity of changes have often been outside of natural thresholds. Therefore, each of these stresses has reduced the ability of remaining wetlands to perform their ecosystem functions, including the provision of sustainable, diverse, and abundant wildlife populations.

Despite perceived changes in societal views of wetlands (Johnson and Pflugh 2008, Kim and Petrolia 2013), some sectors continue to perceive wetlands negatively as breeding grounds for mosquitoes or undesirable animals and as wastelands or marginal areas for “productive” uses. Thus, pressure to drain, fill, or otherwise eliminate wetlands as well as resistance to restoration or establishment remains high in many areas. In light of the increasingly-known benefits of wetlands, a focused and persistent educational component may prove valuable to raise public awareness of the benefits provided by wetlands. A number of regulations have emerged to protect remaining wetlands and mitigate for losses. Illinois’ Interagency Wetlands Act of 1989, for example, outlined a goal of no net loss of wetland acres or

functional value due to state-supported activities. In addition to mitigation regulations, many agencies, organizations and programs encourage the voluntary restoration of wetlands. In general, restored wetlands may have lesser ecological function than natural wetlands, though restoration techniques are improving. Restoring wetlands to former function (e.g., wildlife habitat) may not be possible by simply restoring historic physical attributes or conditions. Adjacent systems and landscapes have also changed substantially through time, thus, simply mimicking historic features may not result in desired conditions. Despite these challenges, a number of large-scale partnership wetland restoration projects have been underway in Illinois, including the Cache River project in far southern Illinois, and the Emiquon Complex and Hennepin & Hopper Lakes on the middle Illinois River. These restorations have resulted in high quality wetland systems recognized by the international community for their importance (see Status, page 215; Ramsar 2014).

Goals

The primary goals of the Wetlands Campaign include increasing wetland acreage, interconnectedness and quality in order to meet the requirements of SGCN, while promoting progressive, adaptable, sustainable, science-based management of existing wetlands to support all wetland wildlife. Achieving these goals will preserve natural features by restoring ecosystem processes that allow self-regulation, decrease habitat fragmentation and integrate best management practices on both public and private lands within selected opportunity areas. In addition, particular emphasis will be given to enhancing highly productive wetland and aquatic habitats to benefit wetland-dependent SGCN, especially migratory waterfowl and waterbirds. Management practices that emphasize high quality and highly productive wetland habitats and migratory birds will benefit all wetland-dependent species targeted within the Illinois Wildlife Action Plan (IWAP).

Habitat Goals

- A net gain of 20% of marsh wetland types is achieved through restoration, enhancement and management. These should be concentrated in priority Natural Divisions.
- A net gain of 40% of combined wetland types is achieved in the river bottomlands natural divisions of Illinois, primarily the Illinois and Mississippi River Sand Areas, Lower Mississippi River Bottomlands, Upper Mississippi River and Illinois River Bottomlands, Wabash River Border, and Coastal Plain.
- Review wetland habitat goals and deficits identified by the Upper Mississippi River and Great Lakes Region Joint Venture needed to achieve focal species population goals. Implement strategies to reduce or eliminate deficits in Illinois.
- Sufficient ephemeral and fishless semi-permanent wetlands (i.e. vernal pools, prairie potholes, landscape depressions) to support objectives for dependent species of wildlife (e.g., dragonflies, amphibians). Use acreage objectives developed for shallow semi-permanent marsh (185,750 acres) by the Upper Mississippi River and Great Lakes Region Joint Venture if specific acreage goals do not exist within each priority Natural Division (Pierce et al. 2014).

- Moist-soil management or other natural wetland management strategies (e.g., hemi-marsh) adopted on public waterfowl management areas and other sites to increase wading bird, waterfowl, shorebird, and other wildlife use.
- Water quality is maintained or improved through habitat management (in wetlands and uplands) in order to support SGCN.
- Increased wetland education in targeted locations (e.g., areas under pressure for wetland loss, with high wetland restoration potential, or with chronic flooding issues associated with local streams or rivers) will increase support for wetlands and wetland management regimes that benefit wildlife and society.
- Total sediment delivery to wetlands is reduced through the use of buffers along streams, ditches and other waterways, use of conservation easements on highly erodible lands, and adoption of other erosion control practices across broad regions.
- The distribution and impact of detrimental wetland invasive species is stabilized or reduced by active management or other conservation action.
- High-quality examples of all wetland communities, including all Grade A and B Illinois Natural Areas Inventory sites, are protected, restored and managed within the natural divisions within which they occur (White 1978).
- Increase wetland abundance to increase water storage capacity by 50% within targeted watersheds with persistent flooding issues (Demisse and Khan 1993). These wetlands should be structured to provide habitat for SGCN and function as natural systems where possible.

SGCN Goals

- Identify and develop monitoring programs for species guilds where we are able to recognize population trends at statewide, or ideally, finer spatial scales (i.e., natural division). Existing surveys (e.g., Breeding Bird Survey) may meet these needs for some guilds.
- Establish Odonate monitoring protocols throughout all priority natural divisions that will effectively monitor populations of common species as well as species of concern.
- Provide sufficient habitat to support stable Odonate populations of species of concern in all priority natural divisions. It is assumed that meeting the needs of species of concern will also provide sufficient habitat for common species.

Amphibian & Reptile Goals

- The distribution and abundance of herpetofauna are understood with confidence, and sentinel monitoring can identify conservation needs.
- Provide sufficient complexes of wetland habitat of varying types (i.e., ephemeral – semi-permanent) within suitable spatial distribution to support diverse herpetofauna through their life cycle within each priority natural division. These wetlands should be connected with corridors to facilitate movement, distribution and population expansion.

Wetland Bird Goals

- Develop strategies to increase breeding populations of Wilson's Snipe, Black Tern, Willow Flycatchers, and Marsh Wrens by 50%. (Marsh, Vernal Pool)
- Recovery plans for state-listed wetland birds, including King Rail, Least Bittern, Black- and Yellow-crowned Night Herons, Forster's Tern, Common Gallinule, American Bittern, and Wilson's Phalarope, are developed. Habitat suitable to support at least two breeding populations of Black Rails is established. (Marsh, Sedge Meadow, Swamp)
- Maintain the number of multiple-species wading bird rookeries throughout Illinois (Hagy et al. 2014). (Swamp, Bottomland forest)
- Implement shorebird monitoring during migration periods to track statewide trends. Provide sufficient shorebird habitat (e.g., mudflat) during spring and fall migration to meet Upper Mississippi River and Great Lakes Region Joint Venture objectives. (Potter et al. 2007a; Mudflat, Vernal Pool, Marsh)
- Achieve and maintain 1970's levels (i.e., a time period of high waterfowl abundance used to set NAWMP population goals; Havera 1999) of use-days by migrant duck populations (September-January) on important waterfowl areas in the Illinois and Mississippi River valleys (an increase of 18.5 million duck use-days, or 50%). Assuming average weather conditions and continental duck populations at North American Waterfowl Management Plan goals. (Marsh, Mudflat, Moist-soil)
- Increase *Athya spp*. (i.e., diving duck) abundance during fall migration in the Illinois River valley by 50% from 1.2 million to 1.8 million duck use-days annually. Lesser Scaup should account for half of this increase (300,000 DUD increase). (Marsh, Moist-soil)
- Support breeding duck densities of 5.0 pairs/sq. km or annual breeding Mallard population of 20,000 in the Glacial Lakes region of northeastern Illinois. (Marsh, associated upland)
- Maintain, where stable or increasing, or increase, where declining, statewide nesting populations of Wood Ducks, Hooded Mergansers (Sauer et al. 2014) and other wooded wetland dependent SGCN (e.g., Prothonotary Warbler, Pileated Woodpecker). (Bottomland Forest, Swamp)

Status as of 2015

Despite strides towards wetland conservation in a few strategic locations within Illinois, wetlands remain well below historic acreages (Dahl 2006), and goals set in the 2005 Comprehensive Wildlife Conservation Plan & Strategy (CWCP). This deficit is reflected by a list of species classified as SGCN due to habitat limitations. Furthermore, Illinois experiences extreme fluctuations in stream flow due to wetland drainage, consolidation, and elimination (Bellrose et al. 1983, Demissie and Khan 1993). Flood pulses are more frequent and more pronounced (i.e., greater depth and duration) statewide, in nearly all watersheds. Flood pulses are not only more intense, but also occur during all periods of the year, as opposed to historic systems where spring rains and runoff caused dependable, annual flood pulses. While rivers, streams and their associated wetlands have become more unpredictable, water levels in many wetland systems have also been artificially stabilized, reducing the natural cycling that maintains

quality, diversity and productivity. Wetland systems and other interconnected habitats continue to degrade in Illinois for a variety of reasons.
Education and outreach is necessary to help the public understand water management at local and landscape scales. Typically, pooled water not associated with waterbodies is treated as unacceptable, and every effort is made to move this water to ditches, streams and rivers as quickly as possible. Rapid movement of water off the landscape exacerbates flooding and erosion in downstream areas. This is true of municipalities as well as agricultural areas. Many places where water pools were likely once natural wetlands that have been converted to other uses. Natural wetlands hold water and slowly release it to streams, rivers and groundwater, effectively storing precipitation or runoff. Flooding may still occur in unaltered wetland systems, but it is typically less intense and less frequent.

Six primary Actions were identified in the 2005 CWCP and are presented here along with their current status. Some of these actions have been and continue to be addressed, while others have largely languished, making little progress. Note, these are Actions identified in the 2005 CWCP, and not necessarily reflective of specific Actions included in this update, although many are related.

1. *Improve the condition of existing natural and artificial wetlands*.
   Status: As an indication of wetland importance, condition and quality, Illinois encompasses three wetlands that have been designated Wetlands of International Importance by the RAMSAR Convention. These include the Cache River and Cypress Creek wetlands in southern Illinois and the Emiquon Complex and the Sue and Wes Dixon Waterfowl Refuge at Hennepin and Hopper Lakes along the middle Illinois River. The two sites along the Illinois River were dedicated in 2012 following restoration of wetlands once drained for agriculture and contained within drainage and levee districts adjacent to the Illinois River. These wetland restorations and the biological and ecological responses observed represent exceptional examples of wetland conservation potential and are recognized as such by the international wetland community.

   The Wetland Reserve Program (WRP) administered by the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS) is a successful nationwide wetland conservation program that restores and protects wetland acres in perpetuity. In Illinois, over 16,000 acres have been added to the program between 2005 and 2015. A large percentage of these acres lie within Wetlands Campaign priority Natural Divisions.

   Since 2005, Ducks Unlimited has restored or enhanced 8,000 acres of wetland and 2,000 acres of associated upland habitat across Illinois, and protected another 6,400 acres of wetland habitat through fee-title acquisition, conservation easements, or long-term management agreements. Many of these projects improved water management capabilities as a strategy to enhance natural wetland functions, values and productivity. DU's wetland projects are most concentrated in the Upper Mississippi River & Illinois River Bottomlands, Lower Mississippi River Bottomlands and Northeastern Morainal Natural Divisions, all of which are identified as being statewide priorities. Ducks Unlimited's southern Illinois program has targeted the Coastal Plain and Lower Mississippi Bottomlands natural divisions.

2. *Develop and manage additional wetland habitat*.
   Status: Ducks Unlimited has acquired and developed approximately 750 acres of additional wetland habitat along the Illinois River, another 400 acres of wetland habitat along the Mississippi River, and 100 acres of wetlands in Northeast Illinois in partnership with the Illinois Department of Natural Resources, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, U.S. Forest Service and local Forest Preserves/Conservation Districts. Since 2006, 812 acres have been enrolled in federal CP23 and CP9 programs and 4,185 acres of bottomland forest has been permanently protected through Illinois Conservation Reserve Enhancement Program (CREP).

   National Bird Conservation plans step down goals through bird Joint Ventures. These Joint Ventures develop conservation plans using a panel of regional experts for each bird group. In Illinois, the Upper Mississippi River and Great Lakes Region Joint Venture (UMRGLR JV) has developed bird conservation plans for waterfowl (Soulliere et al. 2007a), shorebirds (Potter et al. 2007a), waterbirds (Soulliere et al. 2007b) and landbirds (Potter et al. 2007b). These plans develop habitat objectives based on regional population objectives for focal species. Population deficits (i.e., regional populations have not reached objectives), are assumed to be habitat driven, and habitat deficits are calculated to reach population objectives. In the UMRGLR JV region of Illinois, approximately 325,000 acres of quality marsh, mudflat and open water habitat are needed to maintain current bird populations (Pierce et al. 2014).

   The major habitat deficits for wetland dependent birds include 18,000 acres of shallow semi-permanent marsh, hemi-marsh for waterfowl (Soulliere et al. 2007a), 64,000 acres of dry mudflat for shorebirds (Potter et al. 2007), and 2,200 acres of shallow semi-permanent marsh, hemi-marsh for waterbirds (Soulliere et al. 2007b). Habitat deficits exist for other habitat types as well, but these represent the greatest deficit for each wetland bird guild. The Joint Venture tracks habitat accomplishments from its partners in each UMRGLR JV state. Illinois has reached 92.1% of its marsh habitat goals, 16.6% of open water/beach goals, and only 3.5% of mudflat/shallows goals (Kahler 2014).

   Since 2010, over 40 ephemeral wetlands have been created in the Illinois River and Mississippi River Sands Area Natural Division, specifically in Mason and Tazwell counties to increase Illinois Chorus Frog habitat.

3. *Fill information gaps and develop conservation actions to address stresses.*
   Status: The Wetlands Campaign initiated a review of wetland wildlife habitat requirements throughout Illinois (Schulthies and Eichholz 2014). This report identified important wetland regions to focus conservation efforts (i.e., focus Natural Divisions) in the locations that were most important for wetland dependent wildlife. Specific results indicated that wetland habitat requirements were greatest for palustrine forested wetlands, followed by palustrine deep marsh. Wetland habitat requirements were greatest for beavers and waterfowl, and least for marsh rice rats, swamp rabbits, and waterbirds. Deepwater habitat requirements were also highest for beavers and waterfowl, and deep marsh habitat is most lacking statewide. Habitat quality considerations may increase habitat deficits by decreasing the effective acreage of current wetland areas. Finally, because waterfowl abundance can be so large, their energetic demands are also so great, and diverse, that they overwhelm the habitat needs of all other species groups. We assume that if habitat requirements are met for this group, then the habitat needs of other species groups should be met.

Wightman Lake, a former Ducks Unlimited project now owned and managed by the IDNR, serves as a demonstration site for wetland restoration, management and research associated with the Illinois River. Many natural resource professionals and private land managers have participated in DU led tours of the restored wetland, forest, and prairie habitats at this site. More opportunities exist to educate land managers about wetland management techniques utilizing demonstration sites like Wightman Lake.

A 2005 Wetlands Campaign goal identified increasing duck use-days by 38.9 million, or 147% from current averages (2005) in the Illinois and Mississippi River valleys. Current estimates indicate that this goal has been partially achieved; the deficit has been reduced by approximately 20.4 million use-days to a deficit of 18.5 million.

Critical Trends Assessment Program has continued to monitor plant, bird, and arthropod communities at randomly selected wetlands throughout Illinois. Since 2005, at least 150 wetland sites were visited throughout the state, most of them twice (Molano-Flores 2002). In 2012, Illinois Natural History Survey personnel initiated monitoring of plant community structure and bird communities at select CREP wetland restoration sites.

A range-wide monitoring program has been implemented for the Illinois Chorus Frog beginning in 2015, and will continue for 10 years.

Illinois Natural History Survey personnel are examining use of temporary and seasonal wetlands developed on agricultural lands using drainage water management. This technique involves installing water control structures on agricultural drainage tile to manage these waters. Spring migrating American Golden Plovers use these areas extensively, and the technique does not impact agricultural production.
Illinois Natural History Survey personnel conducted statewide aerial surveys of wading bird rookeries in 2012 and 2014 and found an increase of 37% from previous estimates last recorded in 2001. Although rookeries increased, mean number of nests per colony decreased, and several colonies in perceived high quality areas were vacant (Hagy et al. 2014).

4. *Inter-agency cooperation and coordination to ensure wetland programs do not have conflicting objectives.*
   Status: Numerous conservation entities representing federal, state, local government and non-profit organizations are working together in formal, or informal, partnerships to conserve vital wetland habitats through coordinated strategic action. Examples of these wetland focused partnerships include the Cache River Joint Venture, Middle Mississippi River Partnership, Friends of Hackmatack and the Middle Illinois River Conservation Partnership. IWAP Conservation Opportunity Area (COA) designations and objectives are utilized by many of these partnerships to help guide local conservation action.

5. *Emphasize multiple-resource benefits of wetland conservation*.
   Status: Although the benefits of wetlands are well known and accepted among managers, researchers, and conservationists, many sectors of society may remain unfamiliar or uncertain about wetland necessity and importance. Agencies, organizations and other groups should work to provide consistent positive messaging about wetlands in order to increase public awareness and knowledge.

6. *Increase water quality education efforts in areas under high development pressure, and/or within fragile geographic zones (i.e., karst terrain).*
   Status: Efforts to educate the public on wetlands issues are common, but may focus on specific segments of the population and not provide a comprehensive or standardized message. Targeted messaging may be the most effective means to educate specific groups about issues. However, a basic understanding of wetlands among society is needed to provide appropriate messaging. As part of the North American Waterfowl Management Plan, the waterfowl and wetland management community is currently conducting a nationwide evaluation of the public's wetland knowledge and attitudes. These results will likely shape the direction and messaging of wetland conservation toward non-wetland professionals in the future.

Stresses and Threats to Wildlife and Habitat

Habitat Stresses

Extent/Fragmentation

- Destruction (drainage/filling; Stressors are *Extent, Fragmentation* and *Disturbance/Hydrology*) due to land conversion for expanding urban/suburban areas, and agriculture.
- Although greater than 90% of Illinois wetlands have already been lost, continued loss is an issue in many areas. This pressure largely stems from agricultural production and continued urban/suburban expansion.
    - Continued pressure from agricultural producers often focusses on removing any standing water from the landscape that could hinder crop production, such as delaying working ground in the spring due to wet conditions, or allowing water to pool while crops are standing.
    - Unfortunately, these actions taken by producers are still viewed as "land improvements" and are not only allowed, but often encouraged to bolster land values and crop production potential.
    - Pressure on wetlands from development largely stems from desires of residents near urban areas to own homes on their own lot of land, which continues to spread (sprawl) urban areas into the surrounding landscape.
    - In Illinois this is most pronounced around the Greater Chicago Metro Area, and the Northeastern Morainal natural division, but other areas of the state are not immune.
- Fiscal and societal barriers to restoration/rehabilitation.
- Monetary land values are high in many areas and land use pressure (i.e., use for other purposes, particularly agriculture and development) prevents further restoration/rehabilitation, or costs are prohibitive to large scale wetland projects.
    - This varies regionally, often by land value and dominant land use. Unfortunately, the areas with the greatest barriers to restoration or rehabilitation are also the areas with the greatest need for wetlands, in terms of habitat for wildlife, and to provide societal benefits (e.g., flood storage, ground water recharge, nutrient sequestration).

Composition

- Wetland degradation, or loss of wetland quality, continues to be a problem in many areas.

- Wetlands remain intact, but either some function is lost/limited, or habitat changes which limit suitability, prevents use by some species, or makes them less attractive.
    - Such issues include unnatural hydrology (growing season flooding, prolonged flooding, lack of drying;), water quality (clarity, oxygen saturation, temperature, etc.), invasive species (carps;), and sedimentation (clarity, depth, substrate firmness).

<u>Hydrology</u>

- Unseasonable flooding
    - Floods exceeding the variability in timing, magnitude and duration of those that regularly occurred prior to human induced changes.
    - Reduces wetland quality by preventing or hindering growth of favorable vegetation adapted to historic conditions.
    - May favor undesirable plants and animals (i.e., non-native invasive carps),
    - Eliminate habitat at critical times of the annual cycle for some dependent wildlife species.
    - Exacerbated by increased water volume entering the river systems more rapidly through increased over-land or subsurface flows (i.e., runoff in developed areas and agricultural drainage), increased weather and precipitation variability due to climate change, and stream channelization.

- Unnatural Hydrologic Stability
    - Wetlands must cycle through periodic drying and flooding over appropriate (natural or artificial) time periods to affect vegetation and wetland substrates in order to retain their natural character or meet design specifications.
    - While some wetlands experience regular flooding and stable water levels, they may rarely experience drying which consolidates substrates, promotes some favorable plant species growth, and increases nutrient cycling and wetland productivity.
    - Artificial stabilization that deviates from pre-disturbance flooding and flow regimes, or a desired artificial water regime in natural or intensively managed wetland systems through stream flow manipulation and other processes further reduces the quality of an already scarce resource.

Pollution

- Sediment carried from uplands and stream bank and bed instability in runoff continues to increase siltation
    - Reduces: depth, clarity, substrate firmness and ability of submersed and emergent vegetation to establish roots in many wetlands.
- Thermal Pollution
    - Warm water inflows from many sources degrade or change wetland systems
- Chemical Pollution
    - Direct point source pollution as well as non-point source chemicals entering wetlands degrade systems and negatively impact wetland dependent species.
- Biological Pollution
    - Wastewater treatment plants inundated by floodwaters
    - Raw sewage flowing into waterways during significant runoff events.

Invasive Species

- Stress natural systems and species through predation, competition, or habitat alteration.
    - Non-native invasive plants often outcompete natives, disrupting wetland habitats, negatively impacting many wetland dependent species.
    - Invasive animals can further degrade habitat or displace native animal species.
- Diseases may stress species through direct mortality or reduced fitness.
- The following Invasive Species are of primary concern for the Wetlands Campaign:
    - Phragmites (*Phragmites australis*)
    - Reed canarygrass (*Phalaris arundinacea*)
    - Purple loosestrife (*Lythrum salicaria*)
    - Narrow-leaved and hybrid cattails (*Typha angustifolia* and *T. ×glauca*)
    - Disease/pathogens for herpetofauna such as *Ranavirus* and Chytrid fungus (*Batrachochytrium dendrobatidis*)
    - Common and grass carp (*Cyprinus carpio* and *Ctenopharyngodon idella*)

Focal Species

Focal species are a set of species selected for each campaign that represent the larger suite of SGCN addressed by the campaigns. They will be the primary focus of monitoring efforts to determine the success of campaign actions. Focal species were selected to represent specific habitat dependence or a species guild that has important conservation value, and are likely to show measureable change in response to campaign actions within the timeframe of this plan. Focal species may have been selected because populations are currently being monitored or could reasonably be monitored effectively and efficiently. The IWAP recognizes that there are limitations to accomplishing the recommended conservation and monitoring activities outlined in the Campaigns that are imposed by the availability of funding and existing staffing levels. The use of focal species provides a manageable approach to monitoring the effectiveness of conservation actions.

The Wetlands Campaign selected 9 focal species. The Campaign team in cooperation with local and state taxa experts used the following process to select focal species:

1. Identified all SGCN dependent upon wetland habitats.
2. Identified specific habitats associated with all wetland-SGCN.
3. Compared Illinois wetland SGCN to other regional or national species conservation plans (e.g., Soulliere et al. 2007b), and focal species identified by those plans. When practical, those focal species were used in the Wetlands Campaign.

<u>Blanding's Turtle</u>

- Full life cycle
- Marsh, Sedge Meadow
- Northeastern Morainal

Black-crowned Night Heron

- Breeding, migration
- Swamp, Marsh
- Coastal Plain, Illinois and Mississippi River Sand Areas, Lower Mississippi River Bottomlands, Northeastern Morainal, Upper Mississippi and Illinois River Bottomlands, Wabash River Border

Black Tern

- Breeding, migration
- Marsh
- Northeastern Morainal, Upper Mississippi and Illinois River Bottomlands

Illinois Chorus frog

- Full life cycle
- Marsh, Vernal Pool
- Illinois and Mississippi River Sand Areas

Lesser Scaup

- Migration
- Marsh, Emergent Wetland
- Illinois and Mississippi River Sand Areas, Lower Mississippi River Bottomlands, Northeastern Morainal, Upper Mississippi and Illinois River Bottomlands, Wabash River Border

Odonates

- Full life cycle
- Marsh, Swamp, Bog, Fen, Sedge Meadow, Panne, Seep & Spring, Vernal Pool
- Coastal Plain, Illinois and Mississippi River Sand Areas, Lower Mississippi River Bottomlands, Northeastern Morainal, Upper Mississippi and Illinois River Bottomlands, Wabash River Border

Short-billed Dowitcher

- Migration
- Mudflat, Vernal Pool
- Coastal Plain, Lower Mississippi River Bottomlands, Northeastern Morainal, Upper Mississippi and Illinois River Bottomlands, Wabash River Border

Wilson's Snipe

- Breeding, migration
- Marsh, Vernal Pool, Mudflat
- Coastal Plain, Illinois and Mississippi River Sand Areas, Lower Mississippi River Bottomlands, Northeastern Morainal, Upper Mississippi and Illinois River Bottomlands, Wabash River Border

Wood Duck

- Breeding, migration
- Bottomland Forest, Swamp, Marsh
- All priority natural divisions (Coastal Plain, Illinois and Mississippi River Sand Areas, Lower Mississippi River Bottomlands, Northeastern Morainal, Upper Mississippi and Illinois River Bottomlands, Wabash River Border)

Focus Areas

To determine priority places for the Wetlands Campaign to target, we relied heavily on a final report produced through a cooperative project between IDNR and Southern Illinois University-Carbondale which outlined the spatial and energetic needs of several focal species and groups of wetland-dependent wildlife (Schulties and Eichholz 2013). Input from Wetlands Campaign Partners provided during an April 2013 meeting, subsequent correspondence, and expert opinion from the Campaign Lead and a number of other engaged partners determined three tiers in which to focus wetland conservation efforts (Figures 16 and 17, Wetlands Campaign Appendix 10). These ranged from statewide (Tier 1), to priority natural divisions and individual high quality wetlands (Tier 2), to specific sites within priority natural divisions (Tier 3). The priority tiers are identified and are listed in the Actions section of the Wetlands Campaign below (Appendix 10). Additionally, Conservation Opportunity Areas (*see* Conservation Opportunity Areas portion of this document) fall within several Tier 2 natural divisions and encompass several Tier 3 sites (highest priority).

Actions

Illinois has lost over 90% of its original wetlands (Dahl 2006), with the majority of remaining wetlands clustered in relatively small spatial areas within six natural divisions. For this reason, wetland work throughout the state should be considered (Tier 1 prioritization, Appendix 10). Special attention should be given to large acreages, wetland complexes (i.e., clusters of individual wetlands) that provide critical habitat where relatively little exists, and spatial relationship to existing wetlands that may increase wildlife value. Many wetland dependent wildlife species (i.e., birds) are highly mobile, and are able to find and exploit habitat patches, even isolated patches significant distances from other suitable habitat are used. Wetland habitat loss and degradation has become so prevalent throughout the state, restoration must not neglect any opportunities at any spatial scale, but priority must be given to those sites that produce the greatest landscape-scale benefits for targeted SGCNs.

<u>Universal Management Recommendations</u>

1. Conserve (protect, restore, rehabilitate, construct) wetlands throughout Illinois.
2. Promote wetland enhancement and management that increases wetland quality through vegetation establishment, management and manipulation.
3. Promote vegetated wetlands, especially marsh wetland types with complex vegetation heterogeneity, identified by Upper Mississippi River Great Lakes Region Joint Venture as greatest habitat deficit (Soulliere et al. 2007) which support more focal SGCN than other wetland types.
4. Promote natural habitat management (e.g., moist-soil, hemi-marsh) for managed wetlands as opposed to flooded row crops often used for waterfowl hunting management.
5. Support wetland conservation policy and regulations that offer additional protection, funding for conservation, or otherwise benefits wetland habitats and the species that depend on them.

Targeted Actions

Actions in this section are targeted toward priority natural divisions. The Wetlands Campaign Partners targeted six natural divisions (*Tier 2* locations; Figures 16 and 17, Appendix 10) based on their importance to wetland wildlife, wetland users, existing wetland habitat, and wetland habitat potential (Schulthies and Eichholz 2014). Targeted Actions should be focused within these natural divisions to have the greatest impact on SGCN. These natural divisions include: Coastal Plain, Illinois River and Mississippi River Sand Areas, Lower Mississippi River Bottomlands, Upper Mississippi River and Illinois River Bottomlands, Northeastern Morainal, and Wabash River Border. Other regions that warrant high priority consideration include the Middle Mississippi River Border natural division and the lower Kaskaskia River from the Carlyle Lake dam to its mouth at the Mississippi River. Additionally, several large reservoirs were believed to meet the criterion for inclusion in Tier 2 despite being located outside priority natural divisions. These include: Carlyle Lake, Clinton Lake, Crab Orchard Lake, Rend Lake, and Lake Shelbyville.

The highest priority sites (Tier 3) include specific sites within the Tier 2 Natural Divisions ranked as high priority. Not all sites received Tier 3 ranking due to wetland quality, potential wetland quality, habitat value, management capability, wildlife use, and other considerations. Tier 3 sites typically offer moderate to high quality wetland habitat, or have high habitat potential, have significant wetland wildlife use, wetland constituent use, and can significantly impact wetland dependent wildlife, particularly SGCN. Sites considered highest priority, by natural division, are included in Wetlands Appendix 10 and Figure 17.

Targeted actions and acreage goals in this section assume 2015 wetland acreages, quality, and that significant wetland loss does not occur during the implementation period. If significant losses occur, quality continues to degrade or is found to be too poor to support wetland SGCN, acreages need to be revised upward to account for additional lost or degraded habitat.

Habitat Actions

6. Acquire and protect existing wetlands or restorable wetlands.

    Need: Degradation of wetlands and/or conversion of wetlands to other uses continues despite educational efforts, regulatory protection, and voluntary incentives that are intended to encourage private landowners to preserve, maintain, and manage wetland habitats on their property. Also, very few private landowners are sufficiently motivated to restore prior converted wetlands on their property to their fullest function and value.

    a. Federal, state, local government and non-profit conservation organizations that have a conservation mission which includes wetland habitat preservation may purchase existing /restorable wetlands in fee-title, or protect them under a permanent conservation easement, in order to maintain wetland habitat in perpetuity.

b. Prioritization of wetland acquisition and protection is desirable to more efficiently achieve wetland and wildlife conservation objectives. When prioritizing wetland acquisition and protection, consideration may be given to:
    i. Expanding existing protected lands to establish/protect large wetland complexes;
    ii. Creating habitat "corridors" to connect already protected wetland sites;
    iii. High quality, rare, declining, vulnerable, or threatened wetlands;
    iv. Wetland habitats critical to specific wildlife species or needed to achieve specific wildlife conservation objectives;
    v. Land costs and alternative conservation actions.
c. Engage unconventional partners (e.g., Illinois Department of Transportation), who may conduct significant wetland conservation activities (e.g., mitigation banking), but may not focus efforts on maximizing benefits to SGCN.

Outcomes: Protecting existing wetlands is usually a more economically and ecologically sound approach than restoring or rehabilitating wetlands after conversion. Implementing these strategies will result in stabilizing wetland acres within Illinois, which is an essential first step towards increasing wetland acres to positively influence SGCN at statewide or broader scales.

7. Enhance habitat quality of existing wetlands.

Need: Wetland quality has likely declined statewide over the course of several decades (Stafford et al. 2010). These declines are not consistent throughout the state and among natural divisions; they are exacerbated by many factors along large rivers (Mills et al. 1966, Bellrose et al. 1979, 1983), but may impact all wetland systems.

a. Manage wetlands to promote native plant communities by removing, reducing or controlling invasive species, especially:
    i. Phragmites, purple loosestrife, reed canary-grass, Eurasian water milfoil, water hyacinth, narrow-leaf cattail, and others (*see* Invasives Campaign).
    ii. Common carp, grass carp, silver carp, bighead carp and other non-native fish.
b. Timber stand improvement of bottomland forest
    i. Reduce shade tolerant soft woods (i.e., cottonwood, green ash, silver maple, willow)
    ii. Increase mast producing hardwoods (i.e., oak, hickory, pecan) within floodplain sites that will support these tree species
    iii. Manage for diversity of stand density, age, and structure utilizing strategies that promote natural regeneration where appropriate (Knutson et al. 1996).
c. Reduction of undesirable plant species (river bulrush, cattail, perennial smartweed, etc.) in managed wetlands, manage for desirable seed producing annual plants.
d. Use disturbance (e.g., water level manipulation, prescribed fire, mechanical manipulation, herbicide) to control encroaching undesirable woody vegetation in open wetland types, and undesirable herbaceous plants where appropriate.
e. Increase historically abundant habitats, and duplicate historic habitat complexity and juxtaposition within wetlands (Stafford et al. 2010)
f. Restore floating leaved, submersed aquatic and emergent vegetation to backwater lakes and wetlands along Illinois and Mississippi rivers (Bellrose et al. 1983).

g. Increase water depth, water clarity, and substrate firmness of appropriate bottomland lakes and wetland management impoundments through consolidation of sediments by repeated annual dewatering and drying.
h. Reduce sediment inputs into streams, rivers, and wetlands from row crop field through minimum tillage, vegetated waterways, buffers, and wetland restoration.
i. Maintain and increase water control in lakes and wetlands within river floodplains through managed or partial connections which will isolate habitats from growing-season floods yet allow movement of aquatic species when appropriate.

Outcomes: Increasing wetland quality will simultaneously increase wetland habitat diversity and spatial arrangement within wetlands, more closely mimicking historic wetland conditions (Stafford et al. 2010). Many wetland dependent wildlife species were more abundant and more widely distributed under historic conditions, thus, managing for these lost wetland attributes will facilitate conservation of SGCN and other wildlife species.

8. Restore shallow wetlands.

Need: Shallow wetlands often promote greater primary productivity and can be more important than larger, more permanent wetlands to many wildlife species. They are also more easily eliminated from the landscape through drainage or filling, thus, are more imperiled. Additionally, herptiles are less mobile than some other wetland wildlife groups (i.e., birds), thus, depend on habitats that are more spatially clustered. Herpetofauna require a diversity of interconnected habitats within a landscape context to provide for habitat needs at every stage of their life cycle (Phillips et al. 1999).

a. Plug ditches and drain tiles or add water control weirs in agricultural areas to allow altered shallow wetlands to hold water for greater time periods and dewater naturally.
b. Provide wetland habitat complexes that support diverse herpetofauna communities.
    i. Restore ephemeral and other largely fishless, seasonal wetlands, including 5-10 per Illinois Department of Natural Resources region per year on public lands, for migratory shorebirds and waterfowl, amphibians, and other wildlife, focusing initially on Wabash Border, Coastal Plain, Illinois River and Mississippi River Sand Areas and Northeastern Morainal natural divisions to benefit amphibian SGCN.
    ii. To maintain or increase occupancy of Illinois Chorus Frogs, increase the number of ephemeral wetlands and upland sand prairie habitat in the Mason County COA (Illinois River and Mississippi River Sand Areas) by 10% (approximately 100 wetlands) during the next 10 years.
    iii. Provide diverse wetland habitats in close spatial proximity with upland buffers and corridors that provide for all herptile life stages.
    iv. Delay wetland dewatering until mid-summer to allow successful reproduction in spring and early summer.
c. Restore basin marshes in the Northeastern Morainal natural division and stream-side marshes in floodplain areas.

d. Use incentive-based, or voluntary programs (such as private land easement programs) and with technical assistance to establish shallow water wetlands on private lands.
e. Continue development of programs to better manage drainage water on agricultural lands through installation of water control structures on drain systems, this will provide additional water to crops (benefiting producers or land owners) while reducing agricultural runoff, and habitat for migratory waterbirds during appropriate times of the year (i.e., primarily spring migration).
f. Work towards eliminating wetland habitat deficits identified by Upper Mississippi River and Great Lakes Region Joint Venture - Shorebird, Waterbird, and Waterfowl conservation plans (Potter et al. 2007a, Soulliere et al. 2007a, b, Pierce et al. 2014).

Outcomes: Establishing additional shallow wetlands will greatly increase total available wildlife habitat for a variety of species, including herptiles, positively influencing their populations. Additionally, these wetlands will greatly improve the surface water storage capacity of the landscape to reduce flooding, nutrient sequestration and contribute to groundwater recharge. Private land is essential in making significant progress.

9. Manage existing wetlands to maximize wildlife benefits.

Need: Despite large wetland losses within Illinois, remaining wetland acreage is often not managed to maximize wildlife benefits (Stafford et al. 2011). Managed wetlands often focus on attracting individual species for hunting (i.e., planting and flooding corn to attract mallards), which greatly reduces wetland quality and limits value to most wetland dependent species. Impoundments managed for row crops must be drained early in, or prior to the growing season, often before spring migrants have departed and prior to herptile reproduction (i.e., in winter or early spring). These wetland units must be kept dry throughout the growing season to support row crops, often fertilizer and herbicides are used, and row crops provide very little habitat for most wetland dependent wildlife species, and essentially no habitat for SGCN.

a. Maintain water in managed wetlands through mid- to late-spring to maximize wetland habitat availability for a variety of species and mimic historic flooding regimes.
    i. Spring migration habitat and food resources may be limited for many species. Maintaining water through spring migration may greatly benefit migratory species, including waterfowl (Lesser Scaup), wading birds (Black-crowned Night Heron), and shorebirds (Short-billed Dowitcher, Wilson's Snipe), and resident herptiles (Illinois Chorus Frog), and mammals (Muskrat; Erb and Perry 2003).
    ii. Delay flooding of some managed moist soil until late winter or early spring for spring-migrating waterfowl, especially diving ducks (Greer et al. 2007).
b. Adopt moist-soil, or other natural wetland management strategies on public waterfowl management areas and other sites to increase wading bird, waterfowl, shorebird, and other wildlife use during spring, summer and fall.

c. Reduce acreage of wetlands planted to row crops and other planted waterfowl food plots.
    i. Natural vegetation can be managed, enhanced, or supplemented to produce abundant waterfowl foods that are more nutritious, often more preferred, more persistent, and used by a greater number of species (Fredrickson and Taylor 1982, Loesch and Kaminski 1989).
    ii. Moist-soil management allows wetlands to be inundated longer during the growing season which benefits more species of wildlife and provide more functions and values of wetlands (Fredrickson and Taylor 1982).
    iii. Plant with a purpose: when disturbance is necessary in moist-soil wetlands to set back succession(i.e., 1 in 3-5 years), tillage followed by planting "grassy corn" (minimal herbicide and fertilizer, wide row spacing, and late planting date to encourage natural vegetation to grow between corn rows) or millet may be used.

Outcomes: Maximize benefits of available wetland habitat for a variety of wildlife species. Wetlands that can be intensively managed should provide the best and most preferred habitat used by targeted SGCN, and implementing these changes will facilitate this goal.

10. Restore historic hydrology to wetlands associated with large rivers.

Need: The hydrology of large rivers in Illinois has been altered for commercial navigation, cropland protection, and other purposes (Bellrose et al. 1983, Havera 1999). These alterations have largely led to a decrease in wetland quality and quantity, and have altered natural processes which made wetlands associated with rivers excellent wildlife habitat (Mills et al. 1966, Bellrose et al. 1979, Havera 1999). Although altering large river hydrology to mimic historic flows is difficult, wetland management regimes should promote natural hydrological cycles where possible, and the conservation community may be able to induce change in some systems (Konrad 2010). Alternatively, in highly altered systems, wetlands may benefit from maintaining hydrologic separation (Jackson and Pringle 2010), while managing for high quality habitats.

a. Implement wetland management practices which restore or mimic historic wet/dry cycles annually and over longer time periods. This should include spring flooding of appropriate magnitude and duration followed by slow drawdown throughout summer, and shallow fall flooding annually, with periodic complete drying to mimic drought, and deep water to mimic flooding, preferably following several years of drawdown, which may support submersed aquatic vegetation.
b. Utilize managed connections between streams, rivers and floodplain wetlands when such connectivity will enhance wetland values, functions and quality and/or when the risks of wetland degradation by sediments and other pollutants, invasive species, and water level fluctuations associated with unhealthy streams and rivers can be controlled, minimized or reversed by management intervention.

Outcomes: Restoring or mimicking historic hydrologic regimes should result in habitat types and vegetation assemblages that are most beneficial to native wildlife along major rivers.

11. Identify and prioritize areas for wetland habitat management in the Wabash Border Natural Division. (Manage at least 1,000 acres of wetland habitat accessible to the public in the Wabash Border natural division.)

    Need: The Wabash Border natural division has been identified as an important migratory corridor and stopover location during spring and fall migration, and an important region for resident wetland wildlife. Additionally, this area remains one of the last major rivers with a largely intact floodplain (i.e., not separated by levees) and wetlands have the ability to fluctuate naturally with flood pulses and drying.

    a. Wetland habitat should exist in complexes interspersed with other bottomland habitats including grasslands and forests to benefit the greatest number of SGCN.
    b. Wetland habitat should be emergent marsh, following natural hydrologic regimes and timing for the area.

    Outcomes: These habitat assemblages will benefit a variety of SGCN during breeding, migration and wintering periods, including Wood Duck, Lesser Scaup, Short-billed Dowitcher, Black-crowned Night Heron, Wilson's Snipe, Muskrat, and Odonates.

<u>Policy/Advocacy Actions</u>

12. Support state and national wetland conservation legislation.

    Need: Wetlands are imperiled nationwide, and legislation impacting wetland policy and conservation will facilitate wetland conservation in Illinois as well.

    a. Protection of isolated wetlands through legislation preventing draining, filling, and destroying wetlands on private land. Implementation of an incentive or easement program for protecting farmable wetlands (USFWS; SWAP).
    b. Changes to restrictions on levee construction/creation/maintenance that encourage partial wetland connectivity along large river floodplains.
    c. Review and update floodplain inundation risk maps to more accurately characterize flood frequency zones (e.g., 100-year floodplain).
    d. Use U.S. Fish and Wildlife Service Small Wetland Acquisition Program as a model for farmable wetland conservation in Illinois. An easement agreement is entered by the landowner and USFWS; drainage features (e.g., tiles and ditches) are removed. Landowners may farm anything that is dry enough whenever possible, but drainage is not allowed, and land remains in private ownership. This is a popular and successful program.

    Outcomes: Greater protection for wetlands or funding for wetland conservation in Illinois and throughout the nation.

13. Adopt/support agricultural practices which are less detrimental to wetlands and wildlife.

    Need: Many practices on modern farms are detrimental to wetlands either directly (e.g., drainage), or indirectly (e.g., sedimentation). Slight modifications that do not significantly impact yield or production can make large differences if implemented at large scales.

    a. Support policies that reduce agricultural chemicals entering wetlands and waterways which negatively impact aquatic ecosystems locally and continentally.
    b. Implement lateral drainage to reduce nitrogen, phosphorus, and herbicide and pesticide runoff into waterways.
    c. Install water control structures on drain tile to hold water at times of the year when it is beneficial to crops or to wildlife.
    d. Establish field buffers to limit sediment and other undesirable runoff into waterways and wetlands and provide linear habitat for wildlife.
    e. Support policies linking crop insurance to conservation practices.
    f. Reexamine agricultural producer subsidies to provide greater benefits to those who provide wetlands and wildlife habitat on their properties and reduce benefits for those who do not.
    g. Restore farmable wetlands and allow seasonal wetlands within floodplains and uplands to maintain surface hydrology, slow water movement to streams and rivers, and capture sediments.

    Outcomes: Agricultural producers own and manage the majority of land in Illinois. Implementing small changes across broad areas will have measurable impacts on wildlife habitat and populations. Work with producer groups to identify strategies that will be acceptable or beneficial to producers and provide benefits to wetland dependent species.

14. Adopt/support economic and social development planning and strategies which are less detrimental to wetlands and wildlife.

    Need: Similar to agricultural areas throughout the state, urban and exurban areas continue to expand and negatively impact native habitats, including wetlands. Initiating strategies for development that facilitate natural habitats, rather than eliminate them will greatly benefit SGCN in these areas.

    a. *See* Green Cities Campaign (pages 100-104)

    Outcomes: Eco-friendly development and green infrastructure will benefit SGCN and human populations in urban and exurban environments.

15. Facilitate interagency communication to provide consistent messaging and information about wetlands and other wildlife habitats.

    Need: Agencies often have conflicting messages to media, the public, agricultural producers and other entities regarding wetlands and other wildlife habitat. Attitudes among people outside the conservation community regarding wetlands and other habitat types is likely inconsistent and poorly understood, potentially as an effect of misinformation or preconceived notions.

Outcomes: Positively influence the perception of wildlife habitats among constituents and society outside of the conservation community. Facilitate cooperation among and within state and federal agencies to provide accurate information and strengthen public support for conservation actions.

Research Actions

16. Conduct research to gain a greater understanding of wetland ecology, wetland wildlife and the relationship between wildlife and wetlands in Illinois.

    Need: Although the body of knowledge regarding wetlands and wildlife is extensive, there are many areas that remain unknown, and new questions are continually arising as habitats are degraded or restored, wildlife populations change, or research or management results lead to additional questions. The ability to investigate these issues is fundamental to our ability to effectively manage populations and habitats in an ever changing environment.

    Specific research topics include, but are not limited to:

    a. Gain a greater understanding of wetland quality throughout the state.
    b. Conduct research to better understand wetland hydrology throughout the state.
    c. Conduct research and monitoring to better understand wildlife (particularly SGCN) and wetland habitat relationships, especially at the landscape level within Tier 2 and Tier 3 wetland areas.
    d. Understand the effects of waterfowl management activities on other wetland-dependent wildlife (e.g., shorebirds, marshbirds, wading birds, songbirds, and herpetofauna).
    e. Compare traditional row crops, grassy corn, and moist-soil on managed areas for wildlife.
    f. Evaluate the assumption that meeting waterfowl habitat deficits will support all other wetland-dependent wildlife species.
    g. Evaluate whether harvest of waterfowl and furbearers provides a suitable metric for measuring waterfowl abundance in spring and relative habitat conservation priorities.
    h. Assess tradeoffs for focal species in wetland management practices (e.g., emergent marsh, moist soil, grassy corn, food plots, passive management, bottomland forest planting, etc.); which practices benefit which species?
    i. Examine effects of hunting and management to support fall hunting on food for spring-migrating ducks. Does hunting limit use and conserve food for spring migration?
    j. Understand and address the influence of subsurface drainage (drain tiles and groundwater depletion), groundwater withdrawal (especially where irrigation is prevalent), and groundwater depletion on statewide wetland hydrology.
    k. Evaluate drainage water management for spring migration habitat for shorebirds, impacts on agricultural production and feasibility of broad implementation.
    l. Examine the tradeoffs for wetland dependent wildlife and fish associated with floodplain isolation and connectivity.
    m. Assess the impacts of managed summer drawdown and drying of wetlands on unconsolidated sediments, substrate firmness, and wetland plant community response.

n. Understand establishment and maintenance approaches for submersed aquatic vegetation assemblages in backwater wetlands.
o. Determine potential impacts of mosquito control efforts on non-target Odonates and other wetland dependent SGCN.

Outcomes: Furthering our understanding of wetland wildlife and the systems they depend on will inform species and habitat management at local, natural division and landscape scales, leading to more effective conservation of SGCN.

Management Resources

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- Upper Mississippi River and Great Lakes Region Joint Venture Bird Conservation Plans. 2007. (Implementation Plan, Landbird Habitat Conservation Strategy, Shorebird Habitat Conservation Strategy, Waterfowl Habitat Conservation Strategy, Waterbird Habitat Conservation Strategy) http://www.uppermissgreatlakesjv.org/Plans.htm

- North American Waterfowl Management Plan http://www.fws.gov/birds/management/bird-management-plans/north-american-waterfowl-management-plan/plan-documents.php

- Illinois Nutrient Loss Reduction Strategy http://www.epa.illinois.gov/Assets/iepa/water-quality/watershed-management/nlrs/nlrs-final.pdf

- North American Breeding Bird Survey https://www.pwrc.usgs.gov/bbS/

Performance Measures

Outcome performance measures are designed to assess the overall impact of undertaking conservation actions on Implementation Goals. Output performance measures are designed to assess how active the program is at working toward the Implementation Goals.

Overarching Goal	Type	Performance Measure
Viable Populations	Outcome	Focal Species abundance (or relative abundance) is maintained or increased
	Output	Implement monitoring for Focal Species and SGCN that are not currently monitored at statewide or finer spatial scales (natural division)
	Outcome	SGCN abundance is maintained or increased Statewide.
	Output	Conservation or Recovery Plans developed for T&E species (annual number)
Habitat Management	Outcome	SGCN distribution and populations are maintained or increased (resiliency) through habitat management and protection.
	Outcome	Net gain in acres of important habitat types within important natural divisions
	Output	Increased acres of specific habitat types (e.g., moist-soil) and quality achieved through management
	Output	Increased water quality through habitat management
	Output	Reduced sediment delivery to wetlands and streams through upland management
	Output	Reduce acres of wetlands degraded by invasive plant species
	Output	Increase wetland abundance to increase water storage capacity and reduce flooding
Habitat resiliency and connectedness	Output	Establish high quality examples of all wetland communities (INAI) within natural divisions within which they occur
	Outcome	Increase ecological connectivity among habitat patches to support distribution of less mobile species (e.g., herpetofauna)
Public Awareness, Appreciation, Connection	Output	Targeted wetland education to increase support for wetlands and wetland management that benefit wildlife and society
	Output	Support state and national wetland conservation legislation
	Output	Facilitate communication among agencies to provide consistent positive messaging for wetland conservation

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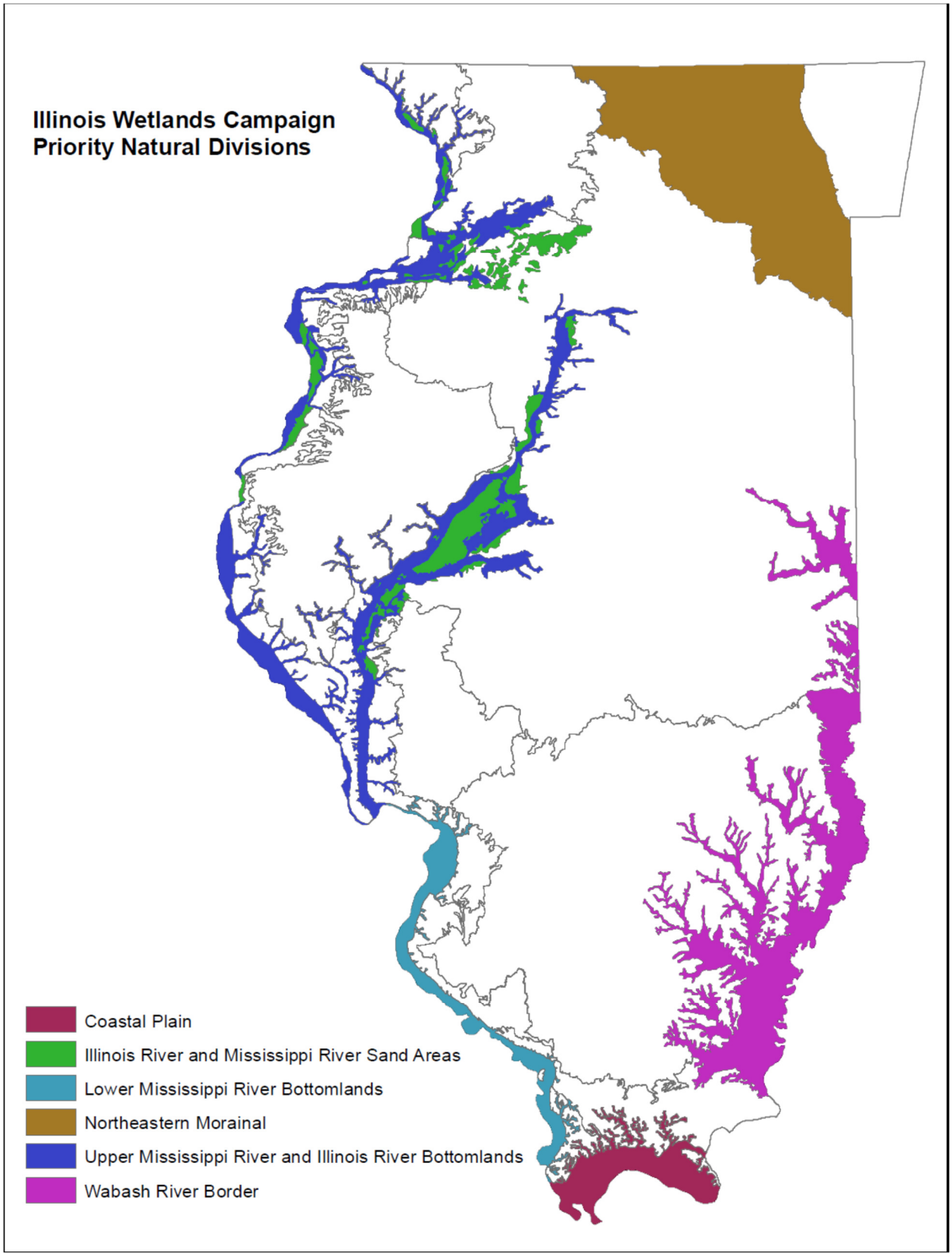

Figure 16. Wetlands Campaign six priority natural divisions.

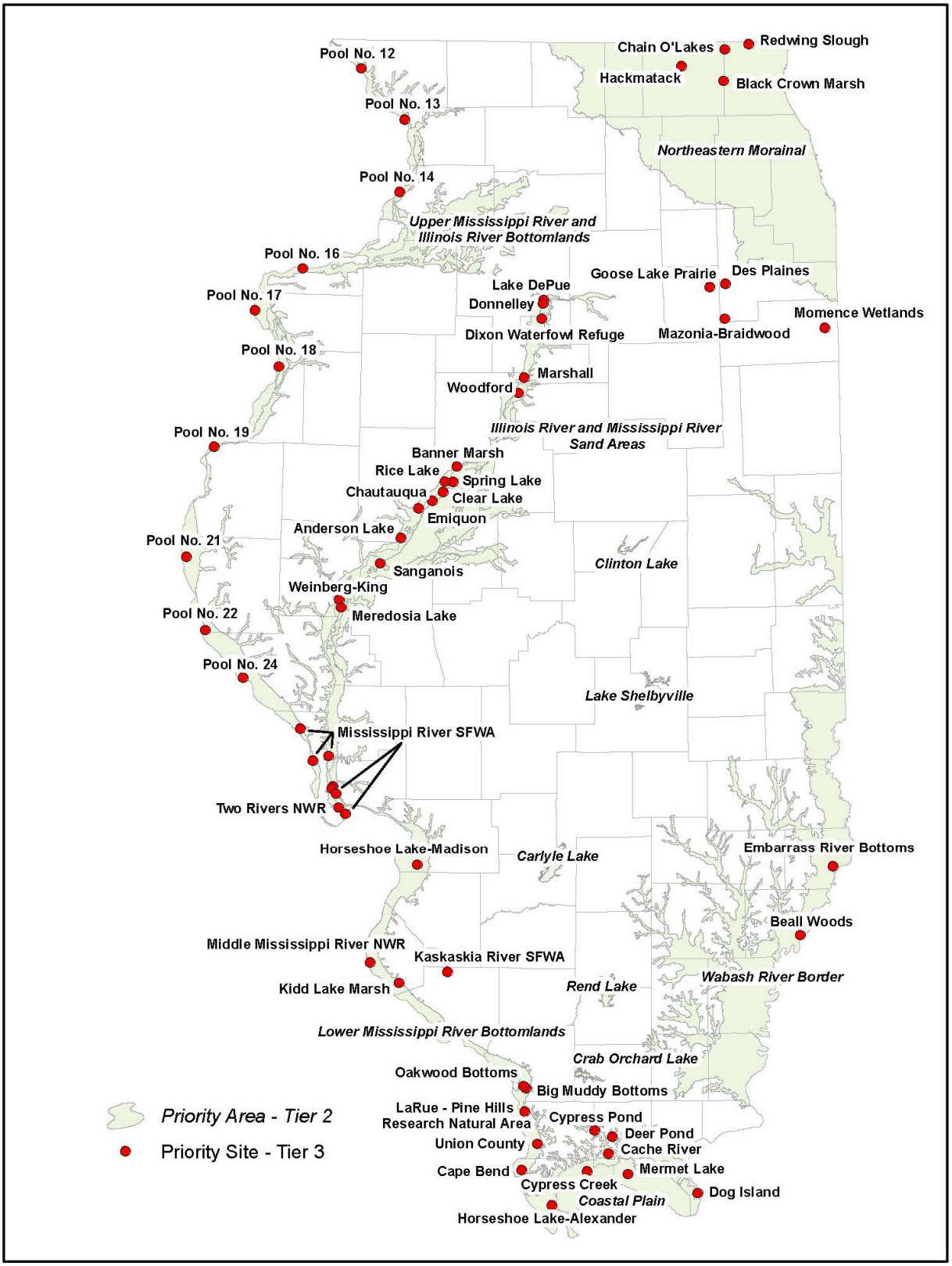

Figure 17. Wetlands Campaign Focus Areas (Tier 2) and sites (Tier 3).

Appendix 9. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Wetlands Campaign. Definitions and methods:

Common Name: Commonly recognized name for the species.

Scientific Name: Currently recognized name for the species based on the most recently available literature.

Campaign Habitat: Major habitat type where the species occurs in Illinois.

Specific Habitat: More detail habitat location for species in Illinois.

Historic Status: Number of Counties, or HUC8 watershed for fish and mussels, with records from before 1980.

Current Status: Number of Counties, or HUC8 watersheds for fish and mussels, with recent records (last 20 years).

Trend: Trends were based on the change in distribution of the species by comparing their Current and Historic Status. If a change less than 25% was observed the trend was recorded as 0, changes with magnitudes between 25-49% were coded as +1 (distribution increased) or -1 (distribution decreased), changes greater than 50% were coded as +2 (distribution increased) or -2 (distribution decreased).

Stressors: Each stressor type was rated as either a recognized stressor (1), not a recognized stressor (0), or as having not enough information to make a rating (NMI=Need More Information).

Appendix 9. Status and stresses to Illinois Species in Greatest Conservation Need addressed in the Wetlands Campaign.

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
BIRDS																										
American Bittern	*Botaurus lentiginosus*	Marsh	Marsh	13	17	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	1	1
American Black Duck	*Anas rubripes*	Marsh	Forested Stream, Lake	NMI	NMI	-1	1	1	0	1	1	1	1	0	1	1	0	1	0	1	0	1	0	0	0	0
Black Rail	*Laterallus jamaicensis*	Wet Meadow	Marsh	0	2	0	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	1	1	0	0	1
Black Tern	*Chlidonias niger*	Marsh	Marsh	12	29	-2	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	1	1	0	1	1
Black-crowned Night-Heron	*Nycticorax nycticorax*	Swamp	Swamp	31	32	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	0	1
Buff-breasted Sandpiper	*Tryngites subruficollis*	Wet Mudflat/Moist-soil Plants	Vernal pool, mudflat, marsh	NMI	NMI	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	1	0
Canvasback	*Aythya valisineria*	Marsh	River, Lake	NMI	NMI	0	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1	0	1	1
Common Gallinule	*Gallinula galeata*	Marsh	Marsh	11	23	0	1	1	1	1	1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1
Common Tern	*Sterna hirundo*	Beach	Beach	5	11	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	1	1	0	1	1
Forster's Tern	*Sterna forsteri*	Marsh	Marsh	7	28	0	1	1	1	1	1	1	0	1	0	1	0	0	0	0	0	1	1	0	1	1
King Rail	*Rallus elegans*	Marsh	Marsh, Grassland	10	16	0	1	1	1	1	1	1	0	1	0	1	0	0	0	0	1	1	1	0	0	1
Least Bittern	*Ixobrychus exilis*	Marsh	Marsh	21	29	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	0	1
Least Tern	*Sternula antillarum*	Beach	River, Shoreline	1	16	0	1	1	1	1	0	1	0	1	0	1	0	0	0	1	1	1	1	0	1	1
Lesser Scaup	*Aythya affinis*	Marsh	River, Lake	NMI	NMI	0	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1	0	1	1
Lesser Yellowlegs	*Tringa flavipes*	Wet Mudflat/Moist-soil Plants	Vernal pool, mudflat, marsh	NMI	NMI	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Marsh Wren	*Cistothorus palustris*	Marsh	Marsh	20	31	-1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	1
Pectoral Sandpiper	*Calidris melanotos*	Wet Mudflat/Moist-soil Plants	Vernal pool, mudflat, marsh	NMI	NMI	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Pied-Billed Grebe	*Podilymbus podiceps*	Marsh	Marsh, Lake	32	40	-1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Red Knot	*Calidris canutus*	Wet Mudflat/Moist-soil Plants	Vernal pool, mudflat, marsh	NMI	NMI	-2	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sandhill Crane	*Grus canadensis*	Marsh	Marsh	6	21	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Short-billed Dowitcher	*Limnodromus griseus*	Wet Mudflat/Moist-soil Plants	Marsh, Vernal Pool, Mudflat	NMI	NMI	-2	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	0	1	0
Trumpeter Swan	*Cygnus buccinator*	Marsh	Marsh, Lake	0	5	NMI	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	1	1	0	0	1
Whooping Crane	*Grus americana*	Marsh	Marsh	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Wilson's Phalarope	*Phalaropus tricolor*	Wet Mudflat/Moist-soil Plants	Marsh, Vernal Pool	1	12	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	1
Wilson's Snipe	*Gallinago delicata*	Wet Mudflat/Moist-soil	Marsh, Vernal Pool	16	17	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Yellow Rail	*Coturnicops noveboracensis*	Marsh	Marsh	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	Marsh	Marsh	13	12	-1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
HERPTILES - Amphibians																										
Blue Spotted Salamander	*Ambystoma maculatum*	Sedge Meadow	Fish-free Vernal Pool	33	29	0	0	1	1	1	1	1	0	1	0	0	0	1	0	0	1	1	0	0	1	1
Bird-voiced Treefrog	*Hyla avivoca*	Swamp	Swamp	6	6	0	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
Eastern Narrow-mouthed Toad	*Gastrophryne carolinensis*	Floodplain	Open Floodplains, Ephemeral Wetland	6	3	-1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1
Eastern Newt	*Notopthalmus viridescens*	Floodplain Lake, Slough Backwater	Semi-Permanent Ponds, Slough	27	19	0	0	1	1	1	1	1	0	1	0	0	0	1	0	0	1	1	0	0	1	0
Four-toed Salamander	*Hemidactylium scutatum*	Sedge Meadow	Seep, Sedge Meadow, Vernal Pool	13	8	-1	1	1	1	1	1	1	0	0	1	0	0	1	0	1	1	1	1	0	1	1
Illinois Chorus Frog	*Pseudacris illinoensis*	Sand Prairie/Emphemeral Wetland	Ephemeral Wetland in Sandy Soil Grassland, Prairie	10	10	0	1	1	1	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Lesser Siren	*Siren intermedia*	Swamp	Swamp, Ditch, Lowland, Wetland, Pool	35	20	-1	1	1	1	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0
Pickerel Frog	*Lithobates palustris*	Sedge Meadow	Wet Meadow	25	16	-1	1	1	1	1	0	1	0	0	1	0	0	0	0	1	0	1	0	0	0	0
HERPTILES - Reptiles																										
Blanding's Turtle	*Emydoidea blandingii*	Marsh	Nesting in Upland Habitat, Numerous Types of Wetland	31	21	-1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1
Eastern Ribbonsnake	*Thamnophis sauritus*	Swamp	Swamp	10	7	-1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1
Mississippi Green Watersnake	*Nerodia cyclopion*	Swamp	Swamp	2	1	0	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1
Red-bellied Mudsnake	*Farancia abacura*	Swamp	Swamp	7	6	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1
Southern Watersnake	*Nerodia fasciata*	Swamp	Swamp	1	0	-2	1	1	1	1	0	1	1	0	0	0	0	0	0	1	0	1	1	0	1	1
Spotted Turtle	*Clemmys guttata*	Marsh	Marsh, Sedge Meadow, Wet Grassland	2	2	0	1	1	1	1	1	0	0	1	1	0	1	1	0	1	1	1	1	1	1	0
INVERTEBRATE - Crustaceans																										
Neglected Fairy Shrimp	*Eubranchipus neglectus*	Wet Meadow	Ephemeral Wetland	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Hemiptera (True Bugs)																										
a leafhopper	*Cosmotettix delector*	Wet Meadow	Wet Prairie	NMI	6	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Destria fumida*	Wet Meadow	Wet Prairie	NMI	5	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Draeculacephala inscripta*	Swamp	Swamp, Marsh	NMI	3	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
a leafhopper	*Limotettix parallelus*	Wet Meadow	Wet Prairie, Freshwater Marsh	NMI	5	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Limotettix truncatus*	Wet Meadow	Wet Prairie	NMI	4	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a leafhopper	*Memnonia panzeri*	Wet Meadow	Wet Dolomite Prairie	NMI	3	NMI	1	1	0	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
INVERTEBRATE - Lepidoptera (Butterflies & Moths)																										
a borer moth	*Papaipema limpida*	Wet Meadow	Mesic/Wet Prairie	NMI	4	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
a noctuid moth	*Photedes enervata*	Wet Meadow	Wet Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
an owlet moth	*Bagisara gulnare*	Wet Meadow	Wet Prairie, Opening in Floodplain Forest, Along Stream	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
Appalachian Eyed Brown	*Lethe appalachia*	Swamp	Wooded Swamp, Forest Edge	NMI	6	NMI	1	1	1	1	1	1	0	0	0	1	1	NMI	NMI	1	1	1	0	NMI	NMI	NMI
Blazing Star Clearwing Moth	*Carmenta anthracipennis*	Wet Meadow	Mesic/Wet Prairie	NMI	6	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Blazing Star Stem Borer	*Papaipema beeriana*	Wet Meadow	Prairie, Fen	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Byssus Skipper	*Problema byssus*	Wet Meadow	Mesic/Wet Prairie	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Canadian Sphinx Moth; Clemens' Hawkmoth	*Sphinx luscitiosa*	Wet Meadow	Meadow, Boreal Forest, Riparian	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Cluvers Root Borer	*Papaipema sciata*	Wet Meadow	Prairie, Fen	NMI	5	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Duke's Skipper	*Euphyes dukesi*	Swamp	Bog, Fen, Forested Wetland	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Ironweed Borer Moth	*Papaipema cerussata*	Wet Meadow	Wet Prairie, Fen	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Poweshiek Skipperling	*Oarisma poweshiek*	Wet Meadow	Wet Prairie	NMI	3	NMI	1	1	1	1	1	1	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI	NMI
Rattlesnake-master Borer Moth or Eryngium Stem Borer	*Papaipema eryngii*	Wet Meadow	Wet, Mesic Prairie	1	7	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Sensitive Fern Borer Moth	*Papaipema inquaesita*	Wet Meadow	Wet Prairie	NMI	4	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Slender Flower Moth or Iva Flower Moth	*Schinia gracilenta*	Wet Meadow	Wet Prairie	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	1	NMI	NMI	0	0	0	1	NMI	NMI	NMI
Spartina Borer Moth	*Photedes inops*	Wet Meadow	Wet Prairie	NMI	6	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Straight-lined Argyria Moth	*Argyria critica*	Wet Meadow	Wet Prairie	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Swamp Metalmark	*Calephelis muticum*	Wet Mudflat, Moist-soil	Fen, Marsh	NMI	4	NMI	1	1	1	1	1	1	0	0	0	1	1	NMI	NMI	1	1	1	0	NMI	NMI	NMI
Two-spotted Skipper	*Euphyes bimacula*	Wet Meadow	Mesic/Wet Prairie	NMI	NMI	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Umbellifer Borer Moth	*Papaipema birdi*	Wet Meadow	Wet Prairie, Fen	NMI	4	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
INVERTEBRATE - Mollusks (Lymnaeidae)																										
Spindle Lymnaea	*Acella haldemani*	Wetland	Sedge Meadow	NMI	NMI	-2	0	1	1	1	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0	0
INVERTEBRATE - Odonata (Dragonflies & Damselflies)																										
Elfin Skimmer	*Nannothemis bella*	Wet Meadow	Fen, Seep	NMI	2	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Hine's Emerald Dragonfly	*Somatochlora hineana*	Wet Meadow	Fen, Seep	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI

							Habitat Stresses						Community Stresses							Population Stresses				Direct Human Stressors		
Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Extent	Fragmentation	Composition-structure	Distrubtion/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Deisease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
INVERTEBRATE - Orthoptera (Grasshoppers, Katydids, Crickets)																										
Broad-Winged Bush Katydid	*Scudderia pistillata*	Wet Meadow	Wet, Mesic Prairie	NMI	4	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Low-ridged Pygmy Grasshopper	*Nomotettix parvus*	Wet Meadow	Wet Groundcover	NMI	3	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Seaside Grasshopper	*Trimerotropis maritima*	Beach, Dunes	Dunes	NMI	8	NMI	1	1	1	1	1	1	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
MAMMALS																										
Marsh Rice Rat	*Oryzomys palustris*	Marsh, Swamp, Wet Meadow	Marsh, Swamp, Wet Meadow, Upland Bording Wetland	13	10	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Appendix 10. Wetlands Campaign Priority Tiers in Illinois.

To rank priority sites for the Wetlands Campaign, we will rely heavily on the planning document written by Schulties and Eichholz (A multi-scale wetland conservation plan for Illinois, 2013), input from Wetlands Campaign Partners provided during an April 2013 meeting and subsequent correspondence, and expert opinion from the Campaign Lead and a small number of other engaged partners.

Here, we present a 3 tiered ranking, including justification, for wetland conservation in Illinois. We anticipate significant revision to this ranking as additional information is gathered and wetland conservation priorities are refined.

Tier 1 – Low priority.

Tier 1 includes any wetland habitat in the state of Illinois. Illinois has lost over 90% of its original wetlands, with the majority of remaining wetlands clustered in relatively small spatial areas. For this reason, wetland work throughout the state should be considered, with special attention given to large acreages, wetland complexes that create critical habitat where relatively little exists, or connectivity to existing wetlands that may increase wildlife value. Many wetland dependent wildlife species (i.e., birds) are highly mobile, and are able to find and exploit habitat patches, even isolated patches significant distances from other suitable habitat are used.

Tier 2 – High priority.

Tier 2 includes any sites that fall within important natural divisions as determined by A Multi-scale Wetland Conservation Plan for Illinois (Schulthies and Eichholz 2013). This document used information on wetland dependent wildlife abundance and harvest to rank natural divisions throughout the state (Figures 1 and 2). Additionally, the Wetlands Campaign Partners determined at their April 2013 meeting that 2 additional natural divisions should be included. These areas likely did not have significant abundance or harvest data to increase their ranking, but Partner consensus was that these areas are indeed very important to wetland dependent wildlife.

Based on these criteria, wetlands within the following natural divisions will be included in Tier 2:
Coastal Plain
Illinois River and Mississippi River Sand Areas
Lower Mississippi River Bottomlands
Upper Mississippi River and Illinois River Bottomlands

The two additional natural divisions that should be included are the:
Northeastern Morainal
Wabash River Border

Partners debated including the lower Kaskaskia River floodplain (Mississippi River to Carlyle Lake dam). This area includes many high quality wetlands, and has high wetland potential. Wetlands in this area have been deemed priority in other Illinois wetland conservation plans (Ducks Unlimited, The Nature Conservancy, IDNR Conservation Opportunity Area), thus, may warrant inclusion here as well.

Finally, some of our most important wetlands in terms of wildlife value and constituent use are large reservoir lakes and the associated wetlands scattered throughout the state. Although these wetlands serve as islands, as opposed to complexes, the wetlands associated with the lakes may be extensive, and form a relatively large, although isolated, complex.

The sites that should be considered in this tier include:
Carlyle Lake
Rend Lake
Lake Shelbyville
Clinton Lake
Crab Orchard Lake

Tier 3 – Highest Priority

Tier 3 includes specific sites within the Tier 2 Natural Divisions ranked as high priority. Not all sites received Tier 3 ranking due to wetland quality, potential wetland quality, habitat value, management capability, wildlife use, and other considerations. Tier 3 sites typically offer moderate to high quality wetland habitat, or have high habitat potential, have significant wetland wildlife use, wetland constituent use, and can significantly impact wetland dependent wildlife, particularly species in greatest need of conservation.

Sites considered highest priority, by natural division, include:
Northeastern Morainal –

- Black Crown Marsh
- Chain O'Lakes State Park
- Redwing Slough/Deer Lake State Natural Area
- Des Plaines State Fish and Wildlife Area (SFWA)
- Mazonia SFWA
- Momence Wetlands
- Goose Lake Prairie State Natural Area/Morris Wetlands
- Hackmatack National Wildlife Refuge (state purchase area)

Upper Mississippi and Illinois River Bottomlands

- Anderson Lake SFWA
- Banner Marsh SFWA
- Donnelley SFWA
- Lake DePue SFWA

Marshall SFWA
Mississippi River Pools 12, 13, 14, 16, 17, 18, 19, 21, 22, 24 (State and Federal)
Rice Lake SFWA
Spring Lake SFWA
Woodford SFWA
Clear Lake SFWA
Mississippi River SFWA (and satellites)
Meredosia Lake SFWA and Meredosia NWR
Sanganois SFWA
Weinberg King SFWA (Spunky Bottoms Unit)
Hennepin and Hopper Lakes (Wes and Sue Dixon Waterfowl Refuge)
Chautauqua NWR (Including Cameron-Billsbach Unit)
Emiquon Preserve and Emiquon NWR
Two Rivers NWR

Lower Mississippi River Bottomlands
Cape Bend SFWA
Horseshoe Lake State Park
Kaskaskia River SFWA
Middle Mississippi River NWR
Kidd Lake State Natural Area
Union County SFWA
Oakwood Bottoms (Shawnee National Forest)
Big Muddy Bottoms (Shawnee National Forest)
LaRue Swamp (Shawnee National Forest)
East Cape Wetlands (Shawnee National Forest)

Coastal Plain
Cache River State Natural Area
Cypress Creek NWR
Cypress Pond State Natural Area
Deer Pond State Natural Area
Dog Island State Wildlife Management Area
Horseshoe Lake SFWA
Mermet Lake SFWA

Wabash River Boarder
Beall Woods State Park
Embarrass River Bottoms State Habitat Area

Review and Revision

For Illinois' Comprehensive Wildlife Conservation Plan & Strategy and this Implementation Guide (collectively the Illinois Wildlife Action Plan) to remain relevant and effective, periodic review and revision will be required in the future. For the next review and revision, 24 months will be allowed to ensure adequate time to update species/habitat status, gather partner input, and review draft documents. The need and process of reviewing the Wildlife Action Plan and identifying a subset of conservation actions for implementation will be influenced by changing resource conditions, development of challenges and opportunities, and the relative success of conservation actions taken during 2015-2025. We expect a process similar to what has been used for this revision to be followed ten years from now (2025), one that allows for incorporation of available data, gathering of public and partner input, and integration of diverse perspectives.

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Appendix 1. Illinois Species in Greatest Conservation Need.

The criteria used to select Illinois SGNC were:

Listed Species

a) Threatened or endangered in Illinois, including federally listed species that occur within the State; S=State, F=Federal, T=Threatened, E=Endangered
b) Species with a global conservation rank indicator of G1, G2, or G3

Rare Populations

a) Species that occur at a limited number of sites or have low population numbers

Declining Populations

a) Species that have declined in abundance or range since 2000, and declines are not part of a recognized population cycle

Vulnerable Habitat - Species is dependent upon a rare, declining, or vulnerable habitat for one or more life history needs (breeding, migration, wintering).

a) Rare habitats: habitats with few occurrences or restricted distributions in Illinois that may impact the viability of species that depend on them
b) Declining habitats: Acreage or overall quality of habitat has substantially declined
c) Vulnerable habitats: Habitats most likely to be altered or degraded in the future

Vulnerable Characteristics - Species is vulnerable because it has a highly localized or restricted distribution (Endemics), or Illinois' population is disjunct from the rest of the species' range

NMI = Needs More Information before an assessment can be made

Common Name	Scientific Name	Lead Campaign	Listed Species	Rare Populations	Declining Populations	Vulnerable Habitat	Vulnerable Characteristics
BIRDS							
Chuck-Will's-Widow	*Antrostomus carolinensis*	Forest and Woodland	ST, G5	0	1	0	0
Henslow's Sparrow	*Ammodramus henslowii*	Farmland and Prairie	G4	0	0	1	1
Le Conte's Sparrow	*Ammodramus leconteii*	Farmland and Prairie	G4	0	1	0	0
Grasshopper Sparrow	*Ammodramus savannarum*	Farmland and Prairie	G5	0	1	0	0
American Black Duck	*Anas rubripes*	Wetlands	G5	0	1	0	0
Eastern Whip-Poor-Will	*Antrostomus vociferus*	Forest and Woodland	G5	0	1	0	0
Short-Eared Owl	*Asio flammeus*	Farmland and Prairie	SE, G5	1	0	1	0
Lesser Scaup	*Aythya affinis*	Wetlands	G5	0	0	1	0
Canvasback	*Aythya valisineria*	Wetlands	G5	0	0	1	0
Upland Sandpiper	*Bartramia longicauda*	Farmland and Prairie	SE, G5	1	0	0	0
American Bittern	*Botaurus lentiginosus*	Wetlands	SE, G4	1	1	1	0
Broad-Winged Hawk	*Buteo platypterus*	Forest and Woodland	G5	1	0	0	0
Swainson's Hawk	*Buteo swainsoni*	Forest and Woodland	SE, G5	1	1	1	0
Smith's Longspur	*Calcarius pictus*	Farmland and Prairie	G5	0	0	1	0
Red Knot	*Calidris canutus*	Wetlands	ST, G4	0	1	0	0
Pectoral Sandpiper	*Calidris melanotos*	Wetlands	G5	0	0	1	0
Chimney Swift	*Chaetura pelagica*	Green Cities	G5	0	1	0	0
Piping Plover	*Charadrius melodus*	Lake Michigan	FE, SE, G3	1	0	1	0
Black Tern	*Chlidonias niger*	Wetlands	SE, G4	1	1	1	0
Common Nighthawk	*Chordeiles minor*	Green Cities	G5	0	1	0	0
Northern Harrier	*Circus cyaneus*	Farmland and Prairie	SE, G5	1	0	1	0
Marsh Wren	*Cistothorus palustris*	Wetlands	G5	0	1	0	0
Yellow-Billed Cuckoo	*Coccyzus americanus*	Forest and Woodland	G5	0	1	0	0
Black-Billed Cuckoo	*Coccyzus erythropthalmus*	Forest and Woodland	ST, G5	0	1	0	0
Northern Flicker	*Colaptes auratus*	Forest and Woodland	G5	0	1	0	0
Northern Bobwhite	*Colinus virginianus*	Farmland and Prairie	G5	0	1	0	0
Yellow Rail	*Coturnicops noveboracensis*	Wetlands	G4	1	0	0	0
Trumpeter Swan	*Cygnus buccinator*	Wetlands	G4	1	0	0	1
Bobolink	*Dolichonyx oryzivorus*	Farmland and Prairie	G5	0	1	0	0
Little Blue Heron	*Egretta caerulea*	Forest and Woodland	SE, G5	1	0	1	0
Snowy Egret	*Egretta thula*	Forest and Woodland	SE, G5	1	0	1	0
Willow Flycatcher	*Empidonax traillii*	Forest and Woodland	G5	0	1	0	0
Acadian Flycatcher	*Empidonax virescens*	Forest and Woodland	G5	0	1	0	0
Rusty Blackbird	*Euphagus carolinus*	Forest and Woodland	G4	1	0	0	0
Peregrine Falcon	*Falco peregrinus*	Green Cities	G4	1	0	0	0
Wilson's Snipe	*Gallinago delicata*	Wetlands	G5	1	0	1	0
Common Gallinule	*Gallinula galeata*	Wetlands	SE, G5	1	0	1	0

Common Name	Scientific Name	Lead Campaign	Listed Species	Rare Populations	Declining Populations	Vulnerable Habitat	Vulnerable Characteristics
BIRDS continued							
Kentucky Warbler	*Geothlypis formosa*	Forest and Woodland	G5	0	1	0	0
Whooping Crane	*Grus americana*	Wetlands	G1	1	0	1	1
Sandhill Crane	*Grus canadensis*	Wetlands	G5	1	0	0	0
Bald Eagle	*Haliaeetus leucocephalus*	Forest and Woodland	G5	1	0	0	0
Wood Thrush	*Hylocichla mustelina*	Forest and Woodland	G5	0	1	0	0
Yellow-Breasted Chat	*Icteria virens*	Forest and Woodland	G5	0	1	0	0
Mississippi Kite	*Ictinia mississippiensis*	Forest and Woodland	ST, G5	1	0	0	0
Least Bittern	*Ixobrychus exilis*	Wetlands	ST, G5	1	0	0	0
Loggerhead Shrike	*Lanius ludovicianus*	Farmland and Prairie	SE, G4	0	1	1	0
Black Rail	*Laterallus jamaicensis*	Wetlands	SE, G3G4	1	0	1	0
Short-billed Dowitcher	*Limnodromus griseus*	Wetlands	G5	0	1	1	0
Swainson's Warbler	*Limnothlypis swainsonii*	Forest and Woodland	SE, G4	1	0	1	0
Red-Headed Woodpecker	*Melanerpes erythrocephalus*	Forest and Woodland	G5	0	1	0	0
Yellow-Crowned Night-Heron	*Nyctanassa violacea*	Forest and Woodland	SE, G5	1	1	0	0
Black-Crowned Night-Heron	*Nycticorax nycticorax*	Wetlands	SE, G5	0	1	0	0
Connecticut Warbler	*Oporornis agilis*	Forest and Woodland	G4	0	1	0	0
Osprey	*Pandion haliaetus*	Forest and Woodland	SE, G5	1	0	0	0
Wilson's Phalarope	*Phalaropus tricolor*	Wetlands	SE, G5	1	0	0	0
Ring-Necked Pheasant	*Phasianus colchicus*	Farmland and Prairie	G5	0	1	0	0
Eastern Towhee	*Pipilo erythrophthalmus*	Forest and Woodland	G5	0	1	0	0
American Golden-Plover	*Pluvialis dominica*	Farmland and Prairie	G5	0	1	1	1
Pied-Billed Grebe	*Podilymbus podiceps*	Wetlands	G5	1	1	0	0
Prothonotary Warbler	*Protonotaria citrea*	Forest and Woodland	G5	0	0	1	0
King Rail	*Rallus elegans*	Wetlands	SE, G4	1	0	1	0
American Woodcock	*Scolopax minor*	Forest and Woodland	G5	1	1	0	0
Ovenbird	*Seiurus aurocapillus*	Forest and Woodland	G5	0	1	0	0
Bay-Breasted Warbler	*Setophaga castanea*	Forest and Woodland	G5	0	1	0	0
Cerulean Warbler	*Setophaga cerulea*	Forest and Woodland	ST, G4	1	1	0	0
Prairie Warbler	*Setophaga discolor*	Forest and Woodland	G5	0	1	0	0
Dickcissel	*Spiza americana*	Farmland and Prairie	G5	0	1	0	0
Field Sparrow	*Spizella pusilla*	Farmland and Prairie	G5	0	1	0	0
Forster's Tern	*Sterna forsteri*	Wetlands	SE, G5	1	0	1	0

Common Name	Scientific Name	Lead Campaign	Listed Species	Rare Populations	Declining Populations	Vulnerable Habitat	Vulnerable Characteristics
BIRDS continued							
Common Tern	*Sterna hirundo*	Wetlands	SE, G5	1	0	1	0
Least Tern	*Sternula antillarum*	Wetlands	FE, SE, G4	1	0	1	0
Eastern Meadowlark	*Sturnella magna*	Farmland and Prairie	G5	0	1	0	0
Bewick's Wren	*Thryomanes bewickii*	Forest and Woodland	SE, G5	1	1	0	0
Brown Thrasher	*Toxostoma rufum*	Forest and Woodland	G5	0	1	0	0
Lesser Yellowlegs	*Tringa flavipes*	Wetlands	G5	0	0	1	0
Buff-Breasted Sandpiper	*Tryngites subruficollis*	Wetlands	G4	0	1	1	1
Greater Prairie-Chicken	*Tympanuchus cupido*	Farmland and Prairie	SE, G4	1	1	1	0
Barn Owl	*Tyto alba*	Farmland and Prairie	ST, G5	1	0	0	0
Golden-Winged Warbler	*Vermivora chrysoptera*	Forest and Woodland	G4	0	1	0	0
Blue-Winged Warbler	*Vermivora cyanoptera*	Forest and Woodland	G5	1	0	1	0
Bell's Vireo	*Vireo belli*	Forest and Woodland	G5	0	1	0	0
Yellow-Headed Blackbird	*Xanthocephalus xanthocephalus*	Wetlands	SE, G5	1	1	1	0

Common Name	Scientific Name	Lead Campaign	Listed Species	Rare Populations	Declining Populations	Vulnerable Habitat	Vulnerable Characteristics
FISH							
Lake Sturgeon	*Acipenser fulvescens*	Lake Michigan	SE, G3G4	1	0	1	0
Alabama Shad	*Alosa alabamae*	Streams	G2G3	1	1	0	0
Brown Bullhead	*Ameiurus nebulosus*	Lake Michigan	G5	1	0	1	1
Western Sand Darter	*Ammocrypta clara*	Streams	SE, G3	1	0	1	0
Eastern Sand Darter	*Ammocrypta pellucida*	Streams	ST, G4	1	0	1	0
American Eel	*Anguilla rostrata*	Streams	ST, G4	1	1	1	0
Alligator Gar	*Atractosteus spatula*	Streams	SH, G3G5	1	1	0	0
Largescale Stoneroller	*Campostoma oligolepis*	Streams	G5	1	0	1	0
Longnose Sucker	*Catostomus catostomus*	Lake Michigan	ST, G5	1	0	1	0
Flier	*Centrarchus macropterus*	Streams	G5	1	0	1	0
Redside Dace	*Clinostomus elongatus*	Streams	G3G4	1	0	0	0
Cisco	*Coregonus artedi*	Lake Michigan	ST, G5	1	1	0	0
Lake Whitefish	*Coregonus clupeaformis*	Lake Michigan	G5	1	0	0	0
Bloater	*Coregonus hoyi*	Lake Michigan	S1, G4	1	0	0	0
Slimy Sculpin	*Cottus cognatus*	Lake Michigan	S1, G5	1	0	0	0
Lake Chub	*Couesius plumbeus*	Lake Michigan	G5	1	0	1	0
Crystal Darter	*Crystallaria asprella*	Streams	G3	1	0	0	0
Blacktail Shiner	*Cyprinella venusta*	Streams	G5	1	0	1	0
Banded Pygmy Sunfish	*Elassoma zonatum*	Streams	G5	1	0	1	0
Gravel Chub	*Erimystax x-punctatus*	Streams	ST, G4	1	1	1	0
Northern Pike	*Esox lucius*	Lake Michigan	G5	0	1	1	0
Muskellunge	*Esox masquinongy*	Lake Michigan	G5	1	0	1	0
Bluebreast Darter	*Etheostoma camurum*	Streams	SE, G4	1	0	1	0
Fringed Darter	*Etheostoma crossopterum*	Streams	G5	1	1	0	0
Iowa Darter	*Etheostoma exile*	Lake Michigan	ST, G5	1	1	1	0
Harlequin Darter	*Etheostoma histrio*	Streams	SE, G5	1	1	1	1
Stripetail Darter	*Etheostoma kennicotti*	Streams	S2S3, G4G5	1	1	0	0
Least Darter	*Etheostoma microperca*	Lake Michigan	S2S3, G5	1	0	0	0
Cypress Darter	*Etheostoma proeliare*	Streams	G5	1	1	1	0
Spottail Darter	*Etheostoma squamiceps*	Streams	G4G5	1	0	1	0
Spring Cavefish	*Forbesichthys agassizii*	Streams	G4G5	1	1	1	1
Banded Killifish	*Fundulus diaphanus*	Lake Michigan	ST, G5	1	0	1	0
Starhead Topminnow	*Fundulus dispar*	Lake Michigan	ST, G4	1	1	1	1
Mooneye	*Hiodon tergisus*	Streams	S2S3, G5	0	1	0	0
Brassy Minnow	*Hybognathus hankinsoni*	Streams	ST, S1S2, G5	1	1	0	0
Cypress Minnow	*Hybognathus hayi*	Streams	SE, G5	1	1	1	0
Plains Minnow	*Hybognathus placitus*	Streams	S2, G4	1	0	0	0
Bigeye Chub	*Hybopsis amblops*	Streams	SE, G5	1	0	1	0
Pallid Shiner	*Hybopsis amnis*	Streams	SE, G4	1	1	1	1
Chestnut Lamprey	*Ichthyomyzon castaneus*	Streams	S3, G4	1	1	0	0

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Northern Brook Lamprey	*Ichthyomyzon fossor*	Streams	SE, G4	1	1	1	0
Silver Lamprey	*Ichthyomyzon unicuspis*	Lake Michigan	G5	1	1	0	0
Least Brook Lamprey	*Lampetra aepyptera*	Streams	ST, G5	1	0	1	0
Redspotted Sunfish	*Lepomis miniatus*	Streams	SE, G5	1	0	1	1
Bantam Sunfish	*Lepomis symmetricus*	Streams	ST, G5	1	1	1	0
American Brook Lamprey	*Lethenteron appendix*	Streams	ST, G4	1	1	0	0
Burbot	*Lota lota*	Lake Michigan	S1S2, G5	1	0	0	0
Bleeding Shiner	*Luxilus zonatus*	Streams	G5	1	0	0	0
Ribbon Shiner	*Lythrurus fumeus*	Streams	G5	1	0	1	0
Sturgeon Chub	*Macrhybopsis gelida*	Streams	SE, G3	1	0	1	0
Shoal Chub	*Macrhybopsis hyostoma*	Streams	S3, G5	1	1	0	0
Sicklefin Chub	*Macrhybopsis meeki*	Streams	G3	1	1	1	0
River Redhorse	*Moxostoma carinatum*	Streams	ST, G4	1	1	1	0
Greater Redhorse	*Moxostoma valenciennesi*	Streams	SE, G4	1	0	1	0
Deepwater Sculpin	*Myoxocephalus thompsonii*	Lake Michigan	G5	1	0	0	0
River Chub	*Nocomis micropogon*	Streams	SE, G5	1	0	1	0
Pugnose Shiner	*Notropis anogenus*	Streams	SE, G3	1	1	1	0
Bigeye Shiner	*Notropis boops*	Streams	SE, G5	1	0	1	0
Ghost Shiner	*Notropis buchanani*	Lake Michigan	G5	1	1	0	0
Ironcolor Shiner	*Notropis chalybaeus*	Streams	ST, G4	1	0	1	1
Blackchin Shiner	*Notropis heterodon*	Lake Michigan	ST, G5	1	0	1	0
Blacknose Shiner	*Notropis heterolepis*	Lake Michigan	SE, G4	1	0	1	0
Taillight Shiner	*Notropis maculatus*	Streams	SE, G5	1	1	1	0
Silverband Shiner	*Notropis shumardi*	Streams	G5	1	0	1	0
Weed Shiner	*Notropis texanus*	Streams	SE, G5	1	0	1	1
Mountain Madtom	*Noturus eleutherus*	Streams	G4	1	0	0	0
Northern Madtom	*Noturus stigmosus*	Streams	SE, G3	1	1	1	1
Pugnose Minnow	*Opsopoeodus emiliae*	Streams	G5	1	0	1	0
Yellow Perch	*Perca flavescens*	Lake Michigan	G5	1	1	1	0
River Darter	*Percina shumardi*	Streams	S2S3, G5	1	0	0	0
Trout-Perch	*Percopsis omiscomaycus*	Lake Michigan	G5	1	1	0	0
Flathead Chub	*Platygobio gracilis*	Streams	SX, G5	1	1	0	0
North American Paddlefish	*Polyodon spathula*	Streams	G4	1	1	1	0
Round Whitefish	*Prosopium cylindraceum*	Lake Michigan	SX, G5	1	0	0	0
Ninespine Stickleback	*Pungitius pungitius*	Lake Michigan	S1S2, G5	1	1	0	0
Longnose Dace	*Rhinichthys cataractae*	Lake Michigan	G5	1	0	1	0
Brook Trout	*Salvelinus fontinalis*	Lake Michigan	G5	1	1	0	0
Lake Trout	*Salvelinus namaycush*	Lake Michigan	G5	1	0	0	0
Pallid Sturgeon	*Scaphirhynchus albus*	Streams	FE, SE, G2	1	0	1	0
Central Mudminnow	*Umbra limi*	Lake Michigan	G5	1	0	1	0

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HERPTILES - Amphibians							
Jefferson Salamander	*Ambystoma jeffersonianum*	Forest and Woodland	ST, G4	1	0	1	0
Blue Spotted Salamander	*Ambystoma aterale*	Woodland and Wetlands	G5	0	0	1	0
Silvery Salamander	*Ambystoma platineum*	Forest and Woodland	SE, NR	1	0	1	0
Hellbender	*Cryptobranchus alleganiensis*	Streams	SE, G3G4	1	1	1	0
Spotted Dusky Salamander	*Desmognathus conanti*	Streams	SE, G5	1	0	1	0
Eastern Narrow-mouthed Toad	*Gastrophryne carolinensis*	Wetlands	ST, G5	1	1	0	0
Four-toed Salamander	*Hemidactylium scutatum*	Wetlands	ST, G5	1	1	1	0
Bird-voiced Treefrog	*Hyla avivoca*	Wetlands	ST, G5	1	0	1	0
Crawfish Frog	*Lithobates areolata*	Farmland and Prairie	G4	1	1	1	0
Pickerel Frog	*Lithobates palustris*	Wetlands	G5	1	1	1	0
Mudpuppy	*Necturus maculosus*	Streams	ST, G5	1	1	1	0
Eastern Newt	*Notopthalmus viridescens*	Wetlands	G5	1	0	1	0
Illinois Chorus Frog	*Pseudacris illinoensis*	Farmland and Prairie	ST, G5T3	1	0	1	0
Lesser Siren	*Siren intermedia*	Wetlands	G5	1	1	1	0

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HERPTILES - Reptiles							
Smooth Softshell Turtle	*Apalone mutica*	Streams	SE, G5	1	1	1	0
Spotted Turtle	*Clemmys guttata*	Wetlands	SE, G5	1	0	1	0
Kirtland's Snake	*Clonophis kirtlandii*	Farmland and Prairie	ST, G2	1	1	1	0
Timber Rattlesnake	*Crotalus horridus*	Forest and Woodland	ST, G4	1	1	1	0
Blanding's Turtle	*Emydoidea blandingii*	Wetlands	SE, G4	0	1	1	0
Red-bellied Mudsnake	*Farancia abacura*	Wetlands	G5	1	0	1	0
Plains Hog-nosed Snake	*Heterodon nasicus*	Farmland and Prairie	ST, G5	1	1	1	1
Illinois Mud Turtle	*Kinosternon flavescens*	Farmland and Prairie	SE, G5	1	1	1	1
Alligator Snapping Turtle	*Macrochelys temminckii*	Streams	SE, G3	1	1	1	0
Coachwhip	*Masticophis flagellum*	Farmland and Prairie	SE, G5	1	1	1	0
Mississippi Green Watersnake	*Nerodia cyclopion*	Wetlands	ST, G5	1	0	1	0
Southern Watersnake	*Nerodia fasciata*	Wetlands	SE, G5	1	1	1	0
Smooth Greensnake	*Opheodrys vernalis*	Farmland and Prairie	G5	1	1	0	0
Slender Glass Lizard	*Ophisaurus attenuatus*	Farmland and Prairie	G5	1	1	1	0
Great Plains Ratsnake	*Pantherophis emoryi*	Forest and Woodland	SE, G5	1	1	1	0
River Cooter	*Pseudemys concinna*	Streams	SE, G5	1	1	1	0
Grahm's Crayfish Snake	*Regina grahamii*	Farmland and Prairie	G5	0	1	1	0
Queesnake	*Regina septemvittata*	Streams	G5	1	1	1	0
Eastern Massasauga	*Sistrurus catenatus*	Farmland and Prairie	FT, SE, G3G4	1	1	1	0
Flat-headed Snake	*Tantilla gracilis*	Forest and Woodland	ST, G5	1	1	1	0
Eastern Box Turtle	*Terrapene carolina*	Forest and Woodland	G5	1	0	0	0
Ornate Box Turtle	*Terrapene ornata*	Farmland and Prairie	ST, G5	1	1	1	0
Eastern Ribbonsnake	*Thamnophis sauritus*	Wetlands	ST, G5	1	1	1	0
Lined Snake	*Tropidoclonion lineatum*	Farmland and Prairie	ST, G5	1	1	0	0

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INVERTEBRATE - Arachnids							
Striped Scorpion	*Centruroides vittatus*	Forest and Woodland	SE, GNR	1	0	0	1
A Troglobitic Pseudoscorpion	*Mundochthonius cavernicola*	Caves/Subterranean	G1G2	1	0	1	1
Appalachian Cave Spider	*Porrhomma cavernicola*	Caves/Subterranean	G5	1	0	1	0
INVERTEBRATE - Coleoptera (Beetles)							
Variegated False Water Penny Beetle	*Dicranopselaphus variegatus*	Streams	G1G3	1	0	0	1
American Burying Beetle	*Nicrophorus americanus*	Forest and Woodland	FE, G2G3	0	1	0	0
Illinois Cave Beetle	*Pseudanophthalmus illinoisensis*	Caves/Subterranean	G1	1	0	1	1
INVERTEBRATE - Crustaceans							
Short-tailed Bactrurid	*Bactrurus brachycaudus*	Caves/Subterranean	G4	1	0	1	1
a cave obligate isopod	*Caecidotea beattyi*	Caves/Subterranean	G3G4	1	0	1	1
a cave obligate isopod	*Caecidotea bicrenata*	Caves/Subterranean	G5	1	0	1	0
an isopod	*Caecidotea lesliei*	Caves/Subterranean	SE, G1G2	1	0	0	1
Packard's Cave Isopod	*Caecidotea packardi*	Caves/Subterranean	G2G4	1	0	1	1
a subterranean isopod	*Caecidotea tridentata*	Caves/Subterranean	G1G2	1	0	1	1
Cavespring Crayfish	*Cambarus tenebrosus*	Streams	G5	1	0	0	0
Anomolous Spring Amphipod	*Crangonyx anomalus*	Caves/Subterranean	SE, G4G5	1	0	1	0
Packard's Cave Amphipod	*Crangonyx packardi*	Caves/Subterranean	SE, G4	1	0	1	0
Yeatman's Groundwater Copepod	*Diacyclops yeatmani*	Caves/Subterranean	G2G3	1	0	1	0
Great Lakes Amphipod	*Diporeia hoyi*	Lake Michigan	GNR	1	0	1	0
Neglected Fairy Shrimp	*Eubranchipus neglectus*	Wetlands	G5	1	0	1	0
Illinois Cave Amphipod	*Gammarus acherondytes*	Caves/Subterranean	FE, SE, G2G3	1	0	1	1
Bousfield's Amphipod	*Gammarus bousfieldi*	Streams	G1	1	0	1	1

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INVERTEBRATE - Crustaceans Continued							
Illinois Crayfish	*Orconectes illinoiensis*	Streams	G3	1	0	0	1
Indiana Crayfish	*Orconectes indianensis*	Streams	SE, G3	1	1	1	1
Kentucky Crayfish	*Orconectes kentuckiensis*	Streams	SE, G4	1	0	1	1
Shrimp Crayfish	*Orconectes lancifer*	Streams	SE, G5	1	0	0	0
Bigclaw Crayfish	*Orconectes placidus*	Streams	SE, G5	1	0	1	1
Little Wabash Crayfish	*Orconectes stannardi*	Streams	G2G3	0	1	1	1
Iowa Amphipod	*Stygobromus iowae*	Caves/Subterranean	SE, G2G3	1	0	1	1
Subtle Cave Amphipod	*Stygobromus subtilis*	Caves/Subterranean	G2	1	0	1	1
INVERTEBRATE - Ephemeroptera (Mayflies)							
Pecatonica River Mayfly	*Acanthametropus pecatonica*	Streams	G2G4	1	0	1	0
a mayfly	*Anafroptilum album*	Streams	G5	1	1	0	0
Small Minnow Mayfly	*Camelobaetidius waltzi*	Streams	G5	1	1	0	0
Spiny Crawler Mayfly	*Dannella lita*	Streams	G5	1	0	NMI	0
Spiny Crawler Mayfly	*Dannella simplex*	Streams	G5	1	1	NMI	0
Large Minnow Mayfly	*Isonychia arida*	Streams	G5	1	0	NMI	1
Say's Large Minnow Mayfly	*Isonychia sayi*	Streams	G5	1	1	NMI	1
Fork Gilled Mayfly	*Paraleptophlebia ontario*	Streams	G4	1	1	NMI	0
Clay Burrowing Mayfly	*Pentagenia vittigera*	Streams	G5	0	1	NMI	0
White Sand-River Mayfly	*Pseudiron centralis*	Streams	G5	1	1	NMI	0
Flatheaded Mayfly	*Raptoheptagenia cruentata*	Streams	G4	1	1	NMI	0
Large Minnow Mayfly	*Siphlonurus marshalli*	Streams	G5	1	1	NMI	0
Minnetonka Flatheaded Mayfly	*Stenacron minnetonka*	Streams	G4	1	0	NMI	0

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INVERTEBRATE - Hemiptera (True Bugs)							
Redveined Prairie Leafhopper	*Aflexia rubranura*	Farmland and Prairie	ST, G2	1	0	1	0
a leafhopper	*Athysanella incongrua*	Farmland and Prairie	SE, GNR	1	1	1	0
a leafhopper	*Cosmotettix delector*	Wetlands	GNR	1	0	0	0
a leafhopper	*Cuerna alpina*	Farmland and Prairie	GNR	1	0	1	1
a leafhopper	*Destria fumida*	Wetlands	GNR	1	0	0	0
a leafhopper	*Draeculacephala inscripta*	Wetlands	GNR	1	0	0	0
a leafhopper	*Flexamia abbreviata*	Farmland and Prairie	GNR	1	0	1	0
a leafhopper	*Flexamia albida*	Farmland and Prairie	GNR	1	0	1	0
a leafhopper	*Flexamia grammica*	Farmland and Prairie	GNR	1	0	1	0
a leafhopper	*Flexamia pectinata*	Farmland and Prairie	GNR	1	0	1	0
a leafhopper	*Limotettix parallelus*	Wetlands	GNR	1	0	1	0
a leafhopper	*Limotettix truncatus*	Wetlands	GNR	1	0	1	0
a leafhopper	*Lonatura catalina*	Farmland and Prairie	GNR	1	0	1	0
a leafhopper	*Memnonia panzeri*	Wetlands	GNR	1	0	1	0
a leafhopper	*Paraphlepsius carolinus*	Farmland and Prairie	GNR	1	0	1	0
a leafhopper	*Paraphlepsius nebulosus*	Farmland and Prairie	GNR	1	0	0	0
a leafhopper	*Paraphlepsius umbellatus*	Farmland and Prairie	GNR	1	0	0	0
a leafhopper	*Pendarus magnus*	Farmland and Prairie	GNR	1	1	1	0
a leafhopper	*Polyamia dilata*	Farmland and Prairie	GNR	1	0	1	0
a leafhopper	*Polyamia herbida*	Forest and Woodland	GNR	1	0	1	1
a leafhopper	*Polyamia interrupta*	Forest and Woodland	GNR	1	0	1	0
a leafhopper	*Polyamia rossi*	Farmland and Prairie	GNR	0	0	1	0
a leafhopper	*Polyamia similaris*	Farmland and Prairie	GNR	0	1	1	0
a leafhopper	*Scaphytopius dorsalis*	Farmland and Prairie	GNR	1	0	0	0
Giant Grassland Cicada or Bush Cicada	*Tibicen dorsatus*	Farmland and Prairie	GNR	1	0	1	0
INVERTEBRATE - Hymenoptera (Bees & Wasps)							
Rusty-Patched Bumble Bee	*Bombus affinis*	Farmland and Prairie	G1	1	1	0	0
Southern Plains Bumble Bee	*Bombus fraternus*	Farmland and Prairie	G4	0	1	0	0
American Bumble Bee	*Bombus pensylvanicus*	Farmland and Prairie	G3G4	0	1	0	0
Half-black Bumble Bee	*Bombus vagans*	Farmland and Prairie	G4	0	1	0	0

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INVERTEBRATE - Lepidoptera (Butterflies & Moths)							
Spotted Dart Moth	*Agrotis stigmosa*	Forest and Woodland	G4	1	0	1	0
Lace-winged Roadside-Skipper	*Amblyscirtes aesculapius*	Forest and Woodland	G3G4	1	0	1	0
Carolina Roadside Skipper	*Amblyscirtes carolina*	Forest and Woodland	G3G4	1	0	1	1
Linda's Roadside-Skipper	*Amblyscirtes linda*	Forest and Woodland	G2G3	1	0	1	0
Revered Roadside-Skipper	*Amblyscirtes reversa*	Forest and Woodland	G3G4	1	0	1	1
a moth	*Anacampsis wikeri*	Farmland and Prairie	GNR	1	0	1	1
a torticid moth	*Ancylis semiovana*	Forest and Woodland	GNR	1	0	1	0
an inch worm moth	*Apodrepanulatrix liberaria*	Forest and Woodland	G3	1	0	1	0
Yellow Sedge Borer	*Archanara subflava*	Farmland and Prairie	G4	1	0	1	0
Straight-Lined Argyria Moth	*Argyria critica*	Wetlands	GNR	1	0	0	0
an owlet moth	*Bagisara gulnare*	Wetlands	GU	0	0	1	0
Swamp Metalmark	*Calephelis muticum*	Wetlands	SE, G3	1	0	1	0
Hoary Elfin	*Callophrys polios*	Forest and Woodland	SE, G5	1	0	1	0
Blazing Star Clearwing Moth	*Carmenta anthracipennis*	Wetlands	GNR	1	0	1	0
Abbreviated Underwing Moth	*Catocala abbreviatella*	Forest and Woodland	G4	1	0	1	0
Whitney's Underwing	*Catocala whitneyi*	Farmland and Prairie	G3G4	1	0	1	0
Gorgone Checkerspot	*Chlosyne gorgone carlota*	Farmland and Prairie	G5T5	0	1	1	0
Monarch Butterfly	*Danaus plexippus*	Farmland and Prairie	G4T3	0	1	1	0
Grote's Black-tipped Quaker	*Dichagyris grotei*	Farmland and Prairie	G4	1	0	1	0
an inch worm moth	*Digrammia ordinata*	Farmland and Prairie	GNR	1	0	1	0
an inch worm moth	*Erastria coloraria*	Forest and Woodland	G3G4	1	0	1	0
Mottled Duskywing	*Erynnis martialis*	Forest and Woodland	G3	0	0	1	0
a geometrid moth	*Euchlaena milnei*	Forest and Woodland	G2G4	1	0	0	1
Olympia Marble	*Euchloe olympia*	Forest and Woodland	G4	1	0	1	0
a torticid moth	*Eucosma bipunctella*	Farmland and Prairie	GNR	0	1	1	0
a torticid moth	*Eucosma fulminana*	Farmland and Prairie	GNR	1	0	1	0
Two-Spotted Skipper	*Euphyes bimacula*	Wetlands	G4	0	0	1	0
Duke's Skipper	*Euphyes dukesi*	Wetlands	G3	1	0	1	0
Spirea Leaftier Moth	*Evora hemidesma*	Farmland and Prairie	GNR	1	0	1	0
a noctuid moth	*Hadena ectypa*	Forest and Woodland	G3G4	1	0	1	0
Buck Moth	*Hemileuca maia*	Forest and Woodland	G5	0	1	1	0
Dakota Skipper	*Hesperia dacotae*	Farmland and Prairie	FT, G2	1	1	1	0
Cobweb Skipper	*Hesperia metea*	Farmland and Prairie	SE, G4	1	0	1	0
Ottoe Skipper	*Hesperia ottoe*	Farmland and Prairie	SE, G3G4	1	0	1	0

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INVERTEBRATE - Lepidoptera (Butterflies & Moths)							
Appalachian Eyed Brown	*Lethe appalachia*	Wetlands	G4	1	0	1	0
Creole Pearly-Eye	*Lethe creola*	Forest and Woodland	G3G4	0	1	1	0
Karner Blue Butterfly	*Lycaeides melissa samuelis*	Forest and Woodland	FE, SE, G5T2	1	0	1	0
Gold-lined Melanomma; Eye-Spot Moth	*Melanomma auricinctaria*	Forest and Woodland	G4	1	0	0	0
Prairie Sedge Moth	*Neodactria murellus*	Farmland and Prairie	GNR	1	0	0	0
Poweshiek Skipperling	*Oarisma poweshiek*	Wetlands	FT, G1	1	1	1	0
Blazing Star Stem Borer	*Papaipema beeriana*	Wetlands	G2G3	1	0	1	0
Umbellifer Borer Moth	*Papaipema birdi*	Wetlands	G5	1	0	1	0
Golden Borer Moth	*Papaipema cerina*	Forest and Woodland	G2G4	1	0	1	0
Ironweed Borer Moth	*Papaipema cerussata*	Wetlands	G5	1	0	1	0
Rattlesnake-Master Borer Moth or Eryngium Stem Borer	*Papaipema eryngii*	Wetlands	ST, G1G2	1	0	1	0
Sensitive Fern Borer Moth	*Papaipema inquaesita*	Wetlands	G5	1	0	1	0
a borer moth	*Papaipema limpida*	Wetlands	G4	1	0	1	0
Cluvers Root Borer	*Papaipema sciata*	Wetlands	G3	1	0	1	0
Silphium Borer Moth	*Papaipema silphii*	Farmland and Prairie	G3G4	1	0	1	0
a noctuid moth	*Photedes enervata*	Wetlands	G4	1	0	1	0
Spartina Borer Moth	*Photedes inops*	Wetlands	G3G4	1	0	1	0
Ernestine's Moth	*Phytometra ernestinana*	Farmland and Prairie	G4	1	0	0	0
Byssus Skipper	*Problema byssus*	Wetlands	G3G4	NMI	NMI	1	0
Sprague's Pygarctic	*Pygarctia spraguei*	Forest and Woodland	G5	1	0	1	0
Orange Mint Moth	*Pyrausta orphisalis*	Farmland and Prairie	GNR	1	0	1	0
Orange Sallow Moth	*Rhodoecia aurantiago*	Farmland and Prairie	G3G4	1	0	1	0
Slender Flower Moth or Iva Flower Moth	*Schinia gracilenta*	Wetlands	G4Q	1	0	1	0
Brown Flower Moth	*Schinia saturata*	Farmland and Prairie	G5	1	0	1	0
Northern Flower Moth	*Schinia septentrionalis*	Farmland and Prairie	G3G4	0	0	1	0
Leadplant Leafwebber Moth	*Sciota dammersi*	Farmland and Prairie	GNR	0	0	1	0
Pearly Indigo Borer	*Sitochroa dasconalis*	Farmland and Prairie	GNR	1	0	1	0
Regal Fritillary	*Speyeria idalia*	Farmland and Prairie	FC, ST, G3	0	1	1	0
Canadian Sphinx Moth; Clemens' Hawkmoth	*Sphinx luscitiosa*	Wetlands	G4	1	1	1	0
Marked Noctuid Moth	*Tricholita notata*	Farmland and Prairie	G5	1	0	1	0

Common Name	Scientific Name	Lead Campaign	Listed Species	Rare Populations	Declining Populations	Vulnerable Habitat	Vulnerable Characteristics
INVERTEBRATE - Millipedes							
a millipede	*Semionellus placidus*	Forest and Woodland	G3	1	0	NMI	1
a cave obligate millipede	*Tingupa pallida*	Caves/Subterranean	G4	1	0	1	0
a cave millipede	*Zosteractis interminata*	Caves/Subterranean	G2G3	1	0	1	1
INVERTEBRATE - Mollusks (Discidae)							
Iowa Pleistocene Snail	*Sicus macclintocki*	Farmland and Prairie	FE, SE, G1G2	1	0	0	1
INVERTEBRATE - Mollusks (Hydrobiidae)							
Mud Amnicola	*Amnicola limosa*	Streams	G5	0	0	0	0
Missouri Cave Snail	*Fontigens antroecetes*	Streams	G2	1	0	1	1
Hydrobiid Cavesnail	*Fontigens antroecetes*	Caves/Subterranean	FE, SE, G2	1	0	0	1
INVERTEBRATE - Mollusks (Pleuroceridae)							
Onyx Rocksnail	*Leptoxis praerosa*	Streams	G5	1	1	0	1
Shawnee Rocksnail	*Lithasia obovata*	Streams	G4	1	1	0	1
INVERTEBRATE - Odonata (Dragonflies & Damselflies)							
Canada darner	*Aeshna canadensis*	Streams	G5	1	0	NMI	0
Elfin Skimmer	*Nannothemis bella*	Wetlands	ST, G4	1	0	1	0
Spatterdock Darner	*Rhionaeschna mutata*	Streams	G4	1	0	1	0
Hine's Emerald Dragonfly	*Somatochlora hineana*	Wetlands	FE, SE, G2G3	1	0	1	0
Elusive Clubtail	*Stylurus notatus*	Streams	G3	1	1	1	0
INVERTEBRATE - Orthoptera (Grasshoppers, Katydids, Crickets)							
Velvet-Striped Grasshopper	*Eritettix simplex*	Farmland and Prairie	G5	1	0	0	0
Prairie Mole Cricket	*Gryllotalpa major*	Farmland and Prairie	FC2, G3	1	1	0	0
Low-Ridged Pygmy Grasshopper	*Nomotettix parvus*	Wetlands	G3G4	1	0	1	0
Broad-Winged Bush Katydid	*Scudderia pistillata*	Wetlands	GNR	1	0	0	0
Seaside Grasshopper	*Trimerotropis maritima*	Wetlands	G5	0	1	0	0
Lichen Grasshopper	*Trimerotropis saxatilis*	Forest and Woodland	G3	1	0	0	0

Common Name	Scientific Name	Lead Campaign	Listed Species	Rare Populations	Declining Populations	Vulnerable Habitat	Vulnerable Characteristics
INVERTEBRATE - Other Non-Insect							
a cave springtail	*Oncopodura iowae*	Caves/Subterranean	G3G4	1	0	1	0
Madonna Cave Springtail	*Pygmarrhopalites madonnensis*	Caves/Subterranean	SE, GNR	1	0	1	1
a cave obligate planarian	*Sphalloplana hubrichti*	Caves/Subterranean	G2G4	1	0	1	1
INVERTEBRATE - Plecoptera (Stoneflies)							
Common Stone	*Acroneuria abnormis*	Streams	G5	1	1	NMI	0
Central Stone	*Acroneuria frisoni*	Streams	G5	1	1	NMI	0
Illinois Winter Stonefly	*Allocapnia illinoensis*	Streams	G3	1	1	NMI	0
Robust Springfly	*Diploperla robusta*	Streams	SE, G5	1	0	NMI	0
Austin Springfly	*Hydroperla fugitans*	Streams	G3	1	1	NMI	0
Two-Lined Stone	*Perlesta golconda*	Streams	G2G3	1	0	NMI	0
Ozark Forestfly	*Prostoia ozarkensis*	Streams	SE, G5	1	0	NMI	0
Mottled Willowfly	*Strophopteryx fasciata*	Streams	G4	0	1	NMI	0
Small Willowfly	*Taeniopteryx lita*	Streams	G5	1	1	NMI	0
INVERTEBRATE - Trichoptera (Caddisflies)							
Net-Spinning Caddisfly	*Cheumatopsyche speciosa*	Streams	G5	1	1	NMI	0
Net-Spinning Caddisfly	*Chimarra aterrima*	Streams	G5	1	1	1	0
Seep Inhabiting Net-Spinning Caddisfly	*Diplectrona metequi*	Streams	G5	1	0	NMI	0
Sandboil Caddisfly	*Frenesia missa*	Streams	G5	1	1	1	0
Large River Net-Spinning Caddisfly	*Hydropsyche arinale*	Streams	G4G5	1	1	NMI	0
Net-Spinning Caddisfly	*Hydropsyche cuanis*	Streams	G5	1	1	NMI	0

Common Name	Scientific Name	Lead Campaign	Listed Species	Rare Populations	Declining Populations	Vulnerable Habitat	Vulnerable Characteristics
MAMMALS							
Gray/Timber Wolf	*Canis lupus*	Farmland and Prairie	ST, FE, G4G5	0	0	0	1
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	Caves/Subterranean	SE, G3G4	0	0	1	1
Southeastern Myotis	*Myotis austroriparius*	Caves/Subterranean	SE, G3G4	0	0	1	1
Gray Bat	*Myotis grisescens*	Caves/Subterranean	SE, FE, G3G4	0	0	1	1
Eastern Small-Footed Bat	*Myotis leibii*	Caves/Subterranean	ST, G3G4	1	0	1	1
Northern Long-eared Bat	*Myotis septentrionalis*	Caves/Subterranean	ST, FT, G1G2	0	0	1	1
Indiana Bat	*Myotis sodalis*	Caves/Subterranean	SE, FE, G2	0	0	1	1
Eastern Wood Rat	*Neotoma floridana*	Forest and Woodland	SE, FE, G5	0	0	1	1
Golden Mouse	*Ochrotomys nuttalli*	Forest and Woodland	G5	0	0	0	1
Marsh Rice Rat	*Oryzomys palustris*	Wetlands	G5	0	0	1	0
Franklin's Ground Squirrel	*Poliocitellus franklinii*	Farmland and Prairie	ST, G5	0	1	1	0
Red Squirrel	*Tamiasciurus hudsonicus*	Forest and Woodland	G5, S3	1	0	1	1

Common Name	Scientific Name	Lead Campaign	Listed Species	Rare Populations	Declining Populations	Vulnerable Habitat	Vulnerable Characteristics
MUSSLES							
Elktoe	*Alasmidonta marginaa*	Streams	G4	0	1	0	0
Slippershell	*Alasmidonta viridis*	Streams	ST, G4G5	1	0	0	0
Purple Wartyback	*Cyclonaias tuberculata*	Streams	ST, G5	1	1	1	0
Fanshell	*Cyprogenia stegaria*	Streams	FE, SE, G1	1	1	1	0
Butterfly	*Ellipsaria lineolata*	Streams	ST, G4G5	1	1	1	0
Elephantear	*Elliptio crassidens*	Streams	SE, G5	1	1	0	0
Spike	*Elliptio dilatata*	Streams	ST, G5	1	0	1	0
Northern Riffleshell	*Epioblasma rangiana*	Streams	FE, SE, G1	1	1	1	1
Snuffbox	*Epioblasma triquetra*	Streams	FE, SE, G3	1	1	1	1
Ebonyshell	*Fusconaia ebena*	Streams	SE, G4G5	1	1	0	0
Pink Mucket	*Lampsilis abrupta*	Streams	FE, SE, G2	1	1	1	0
Wavy-rayed Lampmussel	*Lampsilis fasciola*	Streams	SE, G5	1	1	1	0
Higgins Eye	*Lampsilis higginsii*	Streams	FE, SE, G1	1	1	0	0
Louisiana Fatmucket	*Lampsilis hydiana*	Streams	G4Q	1	0	0	0
Pocketbook	*Lampsilis ovata*	Streams	G5	1	0	0	0
Creek Heelsplitter	*Lasmigona compressa*	Streams	G5	1	0	0	0
Flutedshell	*Lasmigona costata*	Streams	G5	1	1	1	0
Scaleshell	*Leptodea leptodon*	Streams	FE, SE, G1	1	1	0	1
Black Sandshell	*Ligumia recta*	Streams	ST, G4	1	0	0	0
Spectaclecase	*Margaritifera monodonta*	Streams	FE, SE, G3	1	1	1	0
Orangefoot Pimpleback	*Plethobasus cooperianus*	Streams	FE, SE, G1	1	1	1	0
Sheepnose	*Plethobasus cyphyus*	Streams	FE, SE, G1	1	1	1	1
Clubshell	*Pleurobema clava*	Streams	FE, SE, G1G2	1	1	1	1
Ohio Pigtoe	*Pleurobema cordatum*	Streams	SE, G4	1	1	0	1
Fat Pocketbook	*Potamilus capax*	Streams	FE, SE, G2	1	1	0	0
Bleufer	*Potamilus purpuratus*	Streams	G5	1	0	0	0
Kidneyshell	*Ptychobranchus fasciolaris*	Streams	SE, G4	1	1	1	1
Gulf Mapleleaf	*Quadrula nobilis*	Streams	G4	1	0	0	0
Salamander Mussel	*Simpsonaias ambigua*	Streams	SE, G3	1	1	1	0
Rabbitsfoot	*Theliderma cylindrica*	Streams	FT, SE, G3G4	1	1	1	0
Monkeyface	*Theliderma metanevra*	Streams	G4	1	1	0	0
Purple Lilliput	*Toxolasma lividum*	Streams	SE, G3	1	1	0	0
Pistolgrip	*Tritogonia verrucosa*	Streams	G4G5	0	1	0	0
Ellipse	*Venustaconcha ellipsiformis*	Streams	G3	1	1	1	0
Rayed Bean	*Villosa fabalis*	Streams	X, FE, G2	1	1	1	0
Rainbow	*Villosa iris*	Streams	SE, G5	1	1	1	1
Little Spectaclecase	*Villosa lienosa*	Streams	ST, G5	0	0	0	0

Appendix 2. Watch List species in Illinois. These species have poorly known distribution, status, trends, or specific habitat needs in Illinois. The intent of the "Watch List" is to foster a research agenda and target surveys to fill these knowledge gaps. NatureServe Explorer http://explorer.natureserve.org/ was used to identify global rankings.

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Birds		Nelson's Sparrow	*Ammodramus nelsoni*	Prairie (Native Grass)	G5
		Sedge Wren	*Cistothorus platensis*	Prairie (Native Grass)	G5
		Worm-Eating Warbler	*Helmitheros vermivorum*	Upland Forest	G5
Invertebrate	Ephemeroptera (Mayflies)	a mayfly	*Heptagenia patoka*	Larger Rivers	G1G3
		a mayfly	*Plauditus veteris*	Stream	G2
		Burrowing Mayfly	*Hexagenia atrocaudata*	Small to Large River	G5
		Flatheaded Mayfly	*Macaffertium pudicum*	NMI	G5
		Flatheaded Mayfly	*Macdunnoa persimplex*	Large River	G4
		Flatheaded Mayfly	*Stenacron candidum*	Small to Large River	G4
		Fork Gilled Mayfly	*Habrophlebiodes americana*	Small, Wooded Stream	G5
		Fork Gilled Mayfly	*Paraleptophlebia moerens*	Small, Wooded Stream	G5
		Fork Gilled Mayfly	*Paraleptophlebia sticta*	Stream	G1G3
		Frison's Serratellan Mayfly	*Serratella frisoni*	Small to Medium River	G4
		Gildersleeve's *Stenacron* Mayfly	*Stenacron gildersleevei*	Small to Large River	G4
		Horned Caenid Mayfly	*Sparbarus lacustris*	Medium to Large River	G4
		Laurentian armored Mayfly	*Baetisca laurentina*	Large River	G5
		Obese Armored Mayfly	*Baetisca obesa*	Medium to Large River	G5
		Sand Minnow Mayfly	*Siphloplecton interlineatum*	Large River	G5
		Sand-Loving Caenid Mayfly	*Cercobrachys winnebago*	Medium to Large River	G5
		Sand-Loving Large Minnow Mayfly	*Homoeoneuria ammophila*	Large Sandy River	G4
		Small Minnow Mayfly	*Centroptilum bifurcatum*	Medium to Large River	G3G4
		Small Minnow Mayfly	*Procloeon simplex*	Stream	G5
		Small Minnow Mayfly	*Procloeon viridoculare*	Stream	G5
		Spiny Crawler Mayfly	*Ephemerella dorothea*	Large River	G5
		Spiny Crawler Mayfly	*Ephemerella excrucians*	Large River	G5
		Spiny Crawler Mayfly	*Ephemerella invaria*	Large River	G5
		Spiny Crawler Mayfly	*Ephemerella needhami*	Small to Large River	G5
		Spiny Crawler Mayfly	*Eurylophella funeralis*	Small, Wooded Stream	G5

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Invertebrate	Ephemeroptera (Mayflies)	Spiny Crawler Mayfly	*Eurylophella lutulenta*	Small to Large River, Lake	G5
		Spiny Crawler Mayfly	*Eurylophella temporalis*	Small to Large River, Lake	G5
		Spiny Crawler Mayfly	*Teloganopsis deficiens*	NMI	G5
		Springbrook Small Minnow Mayfly	*Baetis tricaudatus*	Spring and Springbrook	G5
		Wallace's Deepwater Mayfly	*Spinadis simplex*	Large River	G2G4
Invertebrate	Hemiptera (true bugs)	a froghopper	*Paraphilaenus parallelus*	Wet prairie	GNR
		a leafhopper	*Auridius helvus*	Prairie	GNR
		a leafhopper	*Chlorotettix dentatus*	Wet Prairie or Woods	GNR
		a leafhopper	*Chlorotettix limosus*	Wet prairie	GNR
		a leafhopper	*Commellus colon*	Sand Prairie	GNR
		a leafhopper	*Cosmotettix beirnei*	Wet Savanna, Flat Wood	GNR
		a leafhopper	*Cosmotettix luteocephalus*	Wet Prairie, Marsh	GNR
		a leafhopper	*Daltonia estacada*	Prairie	GNR
		a leafhopper	*Draeculacephala paludosa*	Swamp, Marsh	GNR
		a leafhopper	*Extrusanus oryssus*	Prairie	GNR
		a leafhopper	*Graminella oquaka*	Sand Prairie	GNR
		a leafhopper	*Hebecephalus signatifrons*	Prairie	GNR
		a leafhopper	*Limotettix elegans*	Wet prairie	GNR
		a leafhopper	*Paraphlepsius altus*	Sand Prairie	GNR
		a leafhopper	*Paraphlepsius humidus*	Wet prairie	GNR
		a leafhopper	*Paraphlepsius incisus*	Savanna	GNR
		a leafhopper	*Paraphlepsius lobatus*	Prairie	GNR
		a leafhopper	*Paraphlepsius rossi*	Savanna	GNR
		a leafhopper	*Paraphlepsius umbellatus*	Prairie	GNR
		a leafhopper	*Pendarus punctiscriptus*	Prairie, Forest	GNR
		a leafhopper	*Prairiana cinerea*	Prairie, Savanna	GNR
		a planthopper	*Bruchomorpha jocosa*	Prairie	GNR
		a planthopper	*Delphacodes sagae*	Prairie	GNR
		a planthopper	*Fitchiella robertsoni*	Hill Prairie	GNR
		Green-winged Scrub Cicada	*Diceroprocta vitripennis*	Sand Savanna	GNR
		Helianthus Leafhopper	*Mesamia straminea*	Mesic Prairie	GNR
		Peppered Paraphlepsius Leafhopper	*Paraphlepsius maculosus*	Sand Prairie	GNR
		Prairie Cicada	*Okanagana balli*	Silt Loam Prairie	GNR

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Invertebrate	Hymenoptera (Bees & Wasps)	Northern Amber Bumble Bee	*Bombus borealis*	Prairie	G4G5
		Tri-Colored Bumble Bee	*Bombus ternarius*	Prairie	G5
		Variable Cuckoo Bumble Bee	*Bombus variabilis*	Prairie	GU
		Yellowbanded Bumble Bee	*Bombus terricola*	Prairie	G2G4
Invertebrate	Lepidoptera (Butterflies & Moths)	a borer moth	*Papaipema leucostigma*	Sand Savanna	G4
		a borer moth	*Papaipema lysimachiae*	Sedge Meadow	G4G5
		a borer moth	*Papaipema nelita*	Fen, Savanna	G4
		a borer moth	*Papaipema nepheleptena*	Wet Prairie, Fen	G4
		a borer moth	*Papaipema rigida*	Mesic Prairie	G5
		a butterfly	*Satyrium edwardsii*	Savanna	G4
		a moth	*Aristotelia elegantella*	Prairie	GNR
		a moth	*Euxoa manitobana*	Sand Prairie	GNR
		a moth	*Feltia manifesta*	Sand Savanna	G4
		a moth	*Pococera baptisiella*	Prairie	GNR
		a moth	*Triclonella determinatella*	Prairie	GNR
		a noctuid moth	*Eremobina leucoscelis*	Sand Prairie	GNR
		a noctuid moth	*Hadena capsularis*	Sand Savanna	G5
		a noctuid moth	*Oligia obtusa*	Sand Savanna	G4
		a noctuid moth	*Plagiomimicus heitzmani*	Prairie	GNR
		a noctuid moth	*Schinia oleagina*	Xeric Prairie	G4
		a noctuid moth	*Ulolonche modesta*	Sand Savanna	G5
		a pyralid moth	*Atascosa glareosella*	Dune	GNR
		a pyralid moth	*Platytes vobisne*	Wet prairie	GNR
		a pyralid moth	*Prionapteryx achatina*	Sand Prairie	GNR
		a torticid moth	*Eucosma palabundana*	Sand Prairie	GNR
		a torticid moth	*Eucosma pandana*	Prairie	GNR
		a torticid moth	*Eucosma rusticana*	Mesic Prairie	GNR
		a torticid moth	*Eucosma sombreana*	Sedge Meadow	GNR
		a torticid moth	*Olethreutes comandranum*	Prairie	GNR
		an inch worm moth	*Erastria coloraria*	Sand Savanna	G3G4
		an inch worm moth	*Speranza amboflava*	Mesic to Wet Prairie	GNR
		an oecophorid moth	*Agonopterix lythrella*	Wet prairie	GNR
		Aralia Shoot Borer Moth	*Papaipema araliae*	Forest Understory, Forest Edge	G3G4
		Banded Quaker	*Protorthodes incincta*	Sand Prairie	GNR

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Invertebrate	Lepidoptera (Butterflies & Moths)	Barrens Paectes	*Paectes abrostolella*	Sand Prairie	G4
		Blazing Star Stem Borer	*Papaipema beeriana*	Prairie, Fen	G2G3
		Bleeding Flower Moth	*Schinia sanguinea*	Sand and Hill Prairie	G4
		Braken Borer Moth	*Papaipema pterisii*	Sand Savanna	G5
		Brou's Underwing	*Catocala atocala*	Riparian Floodplain Forest	G3G4
		Brown-Lined Owlet	*Macrochilo (Hormisa) litophora*	Prairie	GNR
		Buck Moth	*Hemileuca maia*	Sand Savanna, Scrub Oak-Pine Sand Barrens, Oak Forest	G5
		Canadian Owlet Moth	*Calyptra canadensis*	Wet prairie	G5
		Chalcedony Midget Moth	*Elaphria chalcedonia*	Wet prairie	G5
		Clouded Crimson Moth	*Schinia gaurae*	Mesic Prairie	G4
		Clouded Veneer Moth	*Prionapteryx nebulifera*	Dune	GNR
		Columbine Duskywing	*Erynnis lucilius*	Sand Savanna, Forest Understory	G4
		Curve-lined Argyia Moth	*Argyria auratella*	Wet prairie	G4G5
		Dreamy Duskywing	*Erynnis icelus*	Prairie, Sand Savanna	G5
		Duke's Skipper	*Euphyes dukesi*	Bog, Fen, Forested Wetland	G3
		Dune Cutworm	*Euxoa aurulenta*	Dune	G5
		Dune Noctuid	*Sympistis riparia*	Sand Prairie	G4
		Dusted Skipper	*Atrytonopsis hianna*	Sand Prairie	G4G5
		Fingered Lemmeria Moth	*Lemmeria digitalis*	Wet prairie	G4
		Fringed Dart Moth	*Eucoptocnemis fimbriaris*	Sand Prairie	G4
		Frosted Elfin	*Callophrys irus*	Sand Savanna	G3
		Frothy Moth	*Plagiomimicus (Stibadium) spumosum*	Prairie	GNR
		Girard's Grass-Veneer Moth	*Crambus girardellus*	Sand Prairie	GNR
		Goldenrod Flower Moth	*Schinia nundina*	Sand Savanna	G5
		Great Copper	*Lycaena xanthoides*	Wet Prairie	G4
		Hanham's Owlet	*Phalaenostola hanhami*	Prairie	G4
		Harris' Checkerspot	*Chlosyne harrisii*	Fens	G4
		Indian Skipper	*Hesperia sassacus*	Sand Savanna	G4G5
		Jaguar Flower Moth	*Schinia jaguarina*	Mesic to Xeric Prairie	G4
		Leadplant Flower Moth	*Schinia lucens*	Prairie	G4
		Leonard's Skipper	*Hesperia leonardus*	Xeric Prairie	G4

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Invertebrate	Lepidoptera (Butterflies & Moths)	Louisiana Macrochilo Moth	*Macrochilo (Hormisa) louisiana*	Prairie	G4
		Marbled Underwing	*Catocala marmorata*	Hardwood, Riparian Forest	G3
		Maritime Sunflower Borer	*Papaipema maritima*	Prairie, Fen	G3
		Marsh Fern Moth	*Fagitana littera*	Wet prairie	G4
		Mayapple Borer Moth	*Papaipema rutila*	Savanna	G4
		Meadow Rue Borer	*Papaipema unimoda*	Prairie, Fen	G5
		Mixed Dart Moth	*Euxoa immixta*	Sand Prairie	G4
		Mottled Duskywing	*Erynnis martialis*	Prairie, Savanna, Woodland	G3
		Nevada Buck Moth	*Hemileuca nevadensis*	Sand Savanna	G5
		Northern Cordgrass Borer	*Photedes panatela*	Wet prairie	GNR
		Orange Sallow Moth	*Rhodoecia aurantiago*	Mesic Prairie	G3G4
		Osmunda Borer or Regal Fern Borer	*Papaipema speciosissima*	Sand Prairie, Bog, Forest	G4
		Perseus Duskywing	*Erynnis persius*	Sand Savanna, Woodland	G5
		Phlox Moth	*Schinia indiana*	Sand Savanna	G2G4
		Pink Prominent	*Hyparpax aurora*	Sand Savanna	G5
		Plain Schizura	*Schizura apicalis*	Shrubland, Chaparral, Woodland	G3G4
		Polymorphic Pondweed Moth	*Parapoynx maculalis*	Marsh	GNR
		Praeclara Underwing	*Catocala praeclara*	Prairie	G5
		Prairie Bird-Lime Moth	*Ponometia binocula*	Xeric, Wet Prairie	GNR
		Purplish Copper	*Lycaena helloides*	Wet prairie	G5
		Quiet Or Sweet Underwing	*Catocala dulciola*	Hardwood Forest	G3
		Red Sedge Borer	*Archanara laeta*	Sedge Meadow	G4
		Reed-Boring Crambid Moth	*Carectocultus perstrialis*	Wetlands	GRN
		Rosinweed Moth	*Tebenna silphiella*	Prairie	GNR
		Sand Prairie Wainscot Moth	*Leucania extincta*	Sand Prairie	G4
		Silphium Borer Moth	*Papaipema silphii*	Prairie	G3G4
		Silvery Blue	*Glaucopsyche lygdamus*	Savanna, Forest	G5
		Similar Underwing Moth	*Catocala similis*	Sand Savanna	G5
		Slender Flower Moth or Iva Flower Moth	*Schinia gracilenta*	Wet prairie	G4Q

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Invertebrate	Lepidoptera (Butterflies & Moths)	Southern Purple Mint Moth	*Pyrausta laticlavia*	Prairie	GNR
		Sparkling Aterpia Moth	*Aterpia approximana*	Wet prairie	GNR
		Spirea Leaftier Moth	*Evora hemidesma*	Prairie	GNR
		Straight-Lined Looper	*Pseudeva purpurigera*	Wet prairie	G4
		Sunflower Borer Moth	*Papaipema necopina*	Savanna	G4
		Sunflower Bud Moth	*Suleima helianthana*	Prairie	GNR
		Sweetfern Geometer	*Cyclophora pendulinaria*	Savanna	G5
		Three-Horned Moth	*Pachypolia atricornis*	Mesic Forest	G3G4
		Three-Lined Angle Moth	*Digrammia eremiata*	Sand Prairie, Savanna	G4
		Three-Lined Grapholita Moth	*Grapholita tristrigana*	Prairie	GNR
		Three-Staff Underwing	*Catocala amestris*	Sand Savanna	G4
		Tufted Sedge Moth or Sordid Wainscot Moth	*Hypocoena inquinata*	Sedge Meadow	GNR
		Two-Spotted Skipper	*Euphyes bimacula*	Mesic to Wet Prairie	G4
		Two-Striped Cordgrass Moth	*Macrochilo (Hormisa) bivittata*	Prairie	G3G4
		White Cutworm Moth	*Euxoa scandens*	Sand Prairie	G5
		White-Eyed Borer Moth	*Iodopepla u-album*	Sand Prairie	G5
		Wood-colored Apamea Moth	*Apamea lignicolora*	Prairie	G5
Invertebrate	Mollusks (Ancylidae)	Creeping Ancylid	*Ferrissia rivularis*	Stream	G5
		Dusky Ancyliid	*Laevapex fuscus*	Stream	G5
		Fragile Ancylid	*Ferrissia fragilis*	Stream	G5
		Knobby Ancylid	*Rhodacmea hinkleyi*	Stream	GHQ
Invertebrate	Mollusks (Hydrobiidae)	Boreal Marstonia	*Marstonia lustrica*	Stream	G5
		Coldwater Pebblesnail	*Somatogyrus tryoni*	Stream	G2G3
		Globe Siltsnail	*Birgella subglobosus*	Stream	G4
		Hoosier Amnicola	*Fontigens aldrichi*	Stream	G4
		Midland Siltsnail	*Cincinnatia integra*	Stream	G5
		Moss Pyrg	*Marstonia scalariformis*	Stream	G1
		Ohio Pebblesnail	*Somatogyrus integra*	Stream	GU
		Sandbar Pebblesnail	*Somatogyrus depressus*	Stream	G2
		Storm Hydrobe	*Hoyia sheldoni*	Stream	G1
Invertebrate	Mollusks (Lymnaeidae)	Woodland Pondsnail	*Stagnicola catascopium*	Wetland	G5
		Coldwater Pondsnail	*Stagnicola woodruffi*	Wetland	G2G3

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Invertebrate	Mollusks (Lymnaeidae)	Spindle Lymnaea	*Acella haldemani*	Wetland	G3
		Swamp Lymnaea	*Lymnaea stagnalis*	Wetland	G5
		Tazwell Fossaria	*Galba tazewelliana*	Wetland	GH
		Wrinkled Marshsnail	*Stagnicola caperata*	Wetland	G5
Invertebrate	Mollusks (Physidae)	Ashy Physa	*Physella integra*	Wetland	G5Q
		Lance Aplexa	*Aplexa elongata*	Wetland	G5
		Pewter Physa	*Physella heterostropha*	Wetland	G5Q
		Protean Physa	*Physella virgata*	Wetland	G5Q
Invertebrate	Mollusks (Planorbidae)	Bellmouth Rams-horn	*Planorbella campanulata*	Wetland	G5
		Bugle Sprite	*Micromenetus dilatatus*	Wetland	G5
		Druid Rams-horn	*Planorbella truncata*	Wetland	G3G4
		Flexed Gyro	*Gyraulus deflectus*	Wetland	G5
		Sampson Sprite	*Micromenetus sampsoni*	Wetland	G2G3Q
		Sharp Sprite	*Promenetus exacuous*	Wetland	G5
		Thicklip Rams-horn	*Planorbula armigera*	Wetland	G5
		Two-ridge Rams-horn	*Helisoma anceps*	Wetland	G5
		Umbilicate Sprite	*Promenetus umbilicatellus*	Wetland	G4
Invertebrate	Mollusks (Pleuroceridae)	Armored Rocksnail	*Lithasia armigera*	Stream	G3G4
		Ornate Rocksnail	*Lithasia geniculata*	Stream	G3
		Rugged Hornsnail	*Pleurocera alveare*	Stream	G4
		Varicose Rocksnail	*Lithasia verrucosa*	Stream	G4
Invertebrate	Mollusks (Pomatiopsidae)	Brown Walker	*Pomatiopsis cincinnatiensis*	Stream	G4
		Slender Walker	*Pomatiopsis lapidaria*	Stream	G5
Invertebrate	Mollusks (Valvatidae)	Fringed Valvata	*Valvata lewisi*	Stream	G5
		Mossy Valvata	*Valvata sincera*	Stream	G5
		Purplecap Valvata	*Valvata perdepressa*	Stream	G3
		Threeridge Valvata	*Valvata tricarinata*	Stream	G5
		Two-ridge Valvata	*Valvata bicarinata*	Stream	G5
Invertebrate	Mollusks (Viviparidae)	Furrowed Lioplax	*Lioplax sulculosa*	Stream	G5
		Olive Mysteryshell	*Viviparus subpurpureus*	Stream	G5
		Rotund Mysteryshell	*Viviparus intertextus*	Stream	G4
Invertebrate	Odonata (Dragonflies & Damselflies)	Allegheny River Cruiser	*Macromia alleghaniensis*	NMI	G4

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Invertebrate	Odonata (Dragonflies & Damselflies)	Aurora Damsel	*Chromagrion conditum*	Wide Range of Habitat	G5
		Bayou Clubtail	*Arigomphus maxwelli*	NMI	G5
		Black Meadowhalf	*Sympetrum danae*	NMI	G5
		Brown Spiketail	*Cordulegaster bilineata*	Small, Permanent Stream	G5
		Cocoa Clubtail	*Gomphus hybridus*	NMI	G4
		Double-Ringed Pennant	*Celithemis verna*	Pond	G5
		Duckweed Forktail or Duckweed Firetail	*Telebasis byersi*	NMI	G5
		Dusky Clubtail	*Gomphus spicatus*	Glacial Lake	G5
		Dusky Dancer	*Argia translata*	Medium to Large River	G5
		Frosted Whiteface	*Leucorrhinia frigida*	Bog	G5
		Gray Petaltail	*Tachopteryx thoreyi*	Seep	G4
		Green-Striped Darner	*Aeshna verticalis*	Lake Margin, Sluggish Stream	G5
		Horned Clubtail	*Arigomphus cornutus*	NMI	G4
		Lilypad Forktail	*Ischnura kellicotti*	Lake	G5
		Orange Shadowdragon	*Neurocordulia xanthosoma*	NMI	G5
		Rambur's Forktail	*Ischnura ramburii*	NMI	G5
		River Jewelwing	*Calopteryx aequabilis*	Small to Medium Stream	G5
		Skillet Clubtail	*Gomphus ventricosus*	Large River	G3
		Stillwater Clubtail	*Arigomphus lentulus*	NMI	G5
		Stygian Shadowdragon	*Neurocordulia yamaskanensis*	NMI	G5
		Tiger Spiketail	*Cordulegaster erronea*	Small, Permanent Stream	G4
Invertebrate	Orthoptera (Grasshoppers, Katydids, Crickets)	Bog Conehead Katydid	*Neoconocephalus lyristes*	Sedge Meadow, Fen	GNR
		Clear-Winged Grasshopper	*Camnula pellucida*	Gravel Prairie	G5
		Dawson's Spur-Throat Grasshopper	*Melanoplus dawsoni*	Sand Prairie	G5
		Prairie Mole Cricket	*Gryllotalpa major*	Tallgrass Prairie	G3
		Three-Banded Range Grasshopper	*Hadrotettix trifasciatus*	Sand Prairie	G5
		Two-Lined Short-Winged Grasshopper	*Paratylotropidia brunneri*	Sand Prairie	G4G5

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Invertebrate	Other Non-Insect	a cave springtail	*Pygmarrhopalites fransjanssens*	Cave	GNR
		a cave springtail	*Pygmarrhopalites incantator*	Cave	GNR
		a cave springtail	*Pygmarrhopalites salemensis*	Cave	GNR
		a springtail	*Onychiurus pipistrellae*	Cave	GNR
		an aquatic worm	*Rhyacodrilus subterraneus*	Cave	GNR
Invertebrate	Plecoptera (Stoneflies)	Alta Needlefly	*Leuctra alta*	Small, Wooded Stream	G3
		Arkansas Stone	*Neoperla harpi*	Small, Wooded Stream	G4
		Ash Cave Needlefly	*Zealeuctra fraxina*	Small, Wooded Stream	G5
		Banded Stripetail	*Isoperla burksi*	Small, Permanent Stream	G4
		Brook Needlefly	*Leuctra sibleyi*	Small, Wooded Stream	G5
		Brook Snowfly	*Allocapnia nivicola*	Small, Wooded Stream	G5
		Constricted Stone	*Acroneuria evoluta*	Large River	G5
		Freckled Stone	*Perlesta ephelida*	Medium to Large River	G5
		Illinois Stone	*Acroneuria filicis*	NMI	G5
		Intrepid Forestfly	*Shipsa rotunda*	NMI	G5
		Longhorn Forestfly	*Prostoia similis*	Small, Wooded Stream	G5
		Midwestern Stripetail	*Isoperla marlynia*	Large River	G5
		Narrow-Lobed Needlefly	*Leuctra tenuis*	Small, Wooded Stream	G5
		Northern Needlefly	*Zealeuctra narfi*	Small, Wooded Stream	G4
		Plains Stone	*Perlesta cinctipes*	NMI	G4
		Rock Island Springfly	*Isogenoides varians*	Large River	G3
		Slippery Stone	*Neoperla catharae*	Small, Wooded Stream	G5
		Swamp Forestfly	*Prostoia hallasi*	Small, Wooded Stream	G3
		Teays Stone	*Perlesta teaysia*	Small, Permanent Stream	G4
		Texas Stripetail	*Isoperla mohri*	Small, Permanent Stream	G4
		Three-Lobed Snowfly	*Allocapnia smithi*	Small, Wooded Stream	G4
		Three-Spined Forestfly	*Nemoura trispinosa*	Spring and Springbrook	G5

Taxa		Common Name	*Scientific Name*	Campaign Habitat	Global Status
Invertebrate	Plecoptera (Stoneflies)	Valley Forestfly	*Soyedina vallicularia*	Seep	G5
		Wabash Stone	*Perlesta ouabache*	Medium to Large River	GNR
Invertebrate	Trichoptera (Caddisflies)	Brachycentrid Caddisfly	*Brachycentrus numerosus*	Medium to Large River	G5
		Brachycentrid Caddisfly	*Micrasema rusticum*	Large River	G5
		Coldwater Stickcase Caddisfly	*Pseudostenophylax uniformis*	Spring and Springbrook	G5
		Coldwater Stonecase Caddisfly	*Hesperophylax designatus*	Spring and Springbrook	G5
		Coldwater Stonecase Caddisfly	*Hydatophylax argus*	Spring and Springbrook	G5
		Large River Net-Spinning Caddisfly	*Hydropsyche arinale*	Medium to Large River	G4G5
		Large River Net-Spinning Caddisfly	*Hydropsyche hageni*	Large River	G5
		Net-Spinning Caddisfly	*Cheumatopsyche speciosa*	Medium to Large River	G5
		Net-Spinning Caddisfly	*Chimarra aterrima*	Spring and Springbrook	G5
		Net-Spinning Caddisfly	*Hydropsyche cuanis*	Medium to Large River	G5
		Net-Spinning Caddisfly	*Nyctiophylax serratus*	Small, Wooded Stream	G4
		Net-Spinning Caddisfly	*Polycentropus pentus*	Spring and Springbrook	G5
		Net-Spinning Caddisfly	*Wormaldia moesta*	Spring and Springbrook	G5
		Predaceous Caddisfly	*Rhyacophila fuscula*	Small, Wooded Stream	G5
		Saddle-Case Caddisfly	*Glossosoma intermedium*	Spring and Springbrook	G5
		Seep Inhabiting Net-Spinning Caddisfly	*Diplectrona metequi*	Seep	G5
		Stick-Case Caddis	*Ironoquia lyrata*	Spring and Springbrook	G5
		Stick-Case Caddis	*Lepidostoma griseum*	Seep	G5
		Stick-Case Caddis	*Lepidostoma sommermanae*	Seep	G5
Invertebrate	Mussels	Bankclimber	*Plectomerus dombeyanus*	Stream	G5
		Wartyback	*Amphinaias nodulata*	Stream	G5

Taxa	Common Name	*Scientific Name*	Campaign Habitat	Global Status
Mammals	American Badger	*Taxidea taxus*	Prairie, Savanna, Shrubland, Agriculture Field	G5
	Eastern Red Bat	*Lasiurus borealis*	Woodland, Upland Forest	G4
	Evening Bat	*Nycticeius humeralis*	Subterranean, Upland Forest, Woodland	G5
	Gray Fox	*Urocyon cinereoargenteus*	Woodland, shrubland, Upland Forest	G5
	Hoary Bat	*Lasiurus cinereus*	Upland Forest, Woodland	G4
	Least Weasel	*Mustela nivalis*	Marsh, Woodland, Prairie	G5
	Little Brown Bat	*Myotis lucifugus*	Subterranean, Woodland, Upland Forest	G3G4
	Plains Pocket Gopher	*Geomys bursarius*	Agricultural Field, Prairie, Savanna	G5
	Silver-Haired Bat	*Lasionycteris noctivagans*	Upland Forest, Woodland	G4
	Southeastern Shrew	*Sorex longirostris*	Marsh, Wet Meadow, Agricultural Field	G5
	Swamp Rabbit	*Sylvilagus aquaticus*	Floodplain Forest, Woodland	G5
	Tri-Colored Bat (Eastern Pipistrelle)	*Perimyotis subflavus* (*Pipistrellus subflavus*)	Upland Forest, Woodland	G3G4
	Western Harvest Mouse	*Reithrodontomys megalotis*	Agricultural Field, Prairie	G5

Appendix 3. Contributors to Illinois Wildlife Action Plan implementation and 2015 Implementation Guide development.

Partnering Organization	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
Regional Partners										
Association of Illinois Soil and Water Conservation Districts	Y									
Bird Conservation Network				Y						
Chicago Wilderness	Y			Y						
Clifftop Alliance							Y			
Conservation Technologies							Y			
Ducks Unlimited	Y							Y		
Heartlands Conservancy				Y						
Huff and Huff Inc						Y				
Illinois Audubon Society	Y	Y				Y	Y			
Illinois Chapter of the American Fisheries Society	Y						Y			Y
Illinois Chapter of Sierra Club	Y				Y		Y			
Illinois Federation for Outdoor Resources	Y									
Illinois Forestry Development Council	Y									
Illinois Green Industry Association					Y					
Jo Daviess Conservation Foundation							Y			
Little River Research and Design							Y			
Living Lands and Waters							Y			
Max McGraw Wildlife Foundation						Y				
National Wild Turkey Federation	Y		Y				Y			
Natural Land Institute				Y						
Northeast Illinois Invasive Plant Partnership					Y					
Openlands				Y						Y
Park Lands Foundation							Y			Y
Pheasants Forever & Quail Forever	Y	Y								
Prairie Rivers Network	Y				Y		Y			
Quail Unlimited	Y									
River to River Cooperative Weed Management Area					Y					
Shawnee Resource Conservation & Development							Y	Y	Y	
Southwestern Illinois Metropolitan and Regional Planning Commission							Y			
The Conservation Foundation				Y			Y			
The Nature Conservancy	Y	Y				Y	Y	Y		Y
The Nature Institute							Y			
The Wildlife Society	Y									
Trout Unlimited							Y			

Partnering Organization	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
Conservation, Forest Preserve, and Park Districts										
Boone County Conservation District				Y						
Byron Forest Preserve District				Y						
Carroll County Soil and Water Conservation District							Y			
Champaign County Forest Preserve District					Y		Y			
Forest Preserve District of Du Page County							Y			
Forest Preserve District of Cook County (FPDCC)							Y			
FPDCC - Chicago Botanic Garden				Y						
Jo Daviess County Soil and Water Conservation District							Y			
Forest Preserves of Winnebago County				Y						
Lake County Forest Preserve District	Y			Y	Y	Y				
McHenry County Conservation District				Y						
Rockford Park District				Y						
Urbana Park District							Y			
Federal Partners										
US Army Corps of Engineers - Rock Island District	Y						Y			
US Department of Agriculture - APHIS					Y					
US Department of Agriculture - Farm Service Agency	Y									
US Department of Agriculture - Natural Resource Conservation Service	Y	Y			Y		Y	Y		
US Fish and Wildlife Service	Y			Y	Y	Y	Y	Y		Y
US Forest Service - Shawnee National Forest	Y		Y				Y			
State of Illinois Partners										
Illinois Department of Agriculture	Y				Y					
IDNR - Illinois State Museum						Y				Y
IDNR - Office of Land Management		Y				Y				
IDNR - Office of Reality & Environmental Planning						Y	Y	Y		
IDNR - ORC - Coastal Management Program						Y				Y
IDNR - ORC - Division of Fisheries					Y	Y	Y			Y
IDNR - ORC - Division of Forestry			Y							
IDNR - ORC - Division of Natural Heritage		Y		Y	Y	Y	Y	Y		Y
IDNR - ORC - Division of Private Lands & Watersheds				Y			Y	Y		
IDNR - ORC - Division of Wildlife		Y	Y		Y	Y		Y		Y
Illinois Department of Transportation	Y									
Illinois Endangered Species Protection Board	Y									Y
Illinois Environmental Protection Agency	Y						Y			Y
Illinois Farm Bureau	Y									
Illinois Nature Preserves Commission	Y			Y		Y	Y			
Illinois Pollution Control Board				Y						

Partnering Organization	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
Research & Education Partners										
Chicago Academy of Sciences - Peggy Notebaert Nature Museum						Y				
Lincoln Park Zoo				Y		Y				
Loyola University						Y				
Shedd Aquarium				Y		Y	Y			Y
The Morton Arboretum				Y						
The Field Museum				Y		Y				Y
Southern Illinois University Carbondale		Y						Y		Y
University of Illinois (UIUC)					Y					
PRI - Illinois Natural History Survey (INHS)	Y	Y	Y	Y	Y	Y	Y	Y		Y
PRI - INHS - National Great Rivers Research & Education Center							Y			
PRI - Illinois Sustainable Technology Center				Y		Y				
University of Washington						Y				

Partnering Organization and participant - State of Illinois Partners	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
Illinois Department of Agriculture										
Steve Chard	Y									
Terri Savko	Y									
Scott Schirmer					Y					
Illinois Department of Natural Resources										
IDNR - Illinois State Museum										
Tim Cashatt						Y				Y
IDNR - Office of Land Management		Y								
Chris Rollins						Y				
Dave Suthard						Y				
Saki Villalobos						Y				
Barry Walker						Y				
IDNR - Office of Reality & Environmental Planning										
Nathan Grider							Y			
Barry Hart						Y				
Pat Malone							Y	Y		
Jessica Riney							Y			
IDNR - Office of Resource Conservation										
Jim Herkert	Y									Y
IDNR - ORC - Coastal Management Program										
Lisa Cotner						Y				
Diane Tecic						Y				Y
IDNR - ORC - Division of Fisheries										
Debbie Bruce							Y			
Kevin Irons					Y					
Frank Jakubicek						Y				
Jim Mick							Y			Y
Steve Robillard						Y				
Vic Santucci						Y	Y			Y
Randy Sauer							Y			Y
IDNR - ORC - Division of Forestry										
Tom Gargrave						Y				
Dave Griffith			Y			Y				

Partnering Organization and participant - State of Illinois Partners	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
IDNR - ORC - Division of Natural Heritage										
Ann Holtrop						Y	Y	Y		Y
Scott Ballard										Y
Maggie Cole						Y				
Bob Gillespie							Y			
Mark Guetersloh							Y	Y		Y
Andrew Hulin	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Joe Kath										Y
Tara Kieninger							Y			Y
James Renn	Y									Y
Brad Semel						Y				
Jody Shimp		Y			Y					
Scott Simpson		Y								
Eric Smith							Y			
Robert Szafoni		Y					Y			Y
IDNR - ORC - Division of Private Lands & Watersheds										
Lynn Boerman				Y						
Mike Chandler							Y	Y		
Luke Garver							Y			
Randy Holbrook				Y						
Tammy Miller				Y						
IDNR - ORC - Division of Wildlife										
Mark Alessi		Y						Y		
Chad Bartman		Y								
Bob Bluett										Y
Paul Brewer			Y							Y
Roy Domazlicky						Y		Y		
Doug Dufford					Y					
Stephanie Fitzsimons						Y				
Dan Ludwig						Y				
Randy Smith								Y		
Mike Wefer		Y	Y							

Partnering Organization and participant - State of Illinois Partners	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
Illinois Department of Transportation									
Charles Perino	Y								
Illinois Endangered Species Protection Board									
Ann Mankowski	Y								Y
Randy Nyboer	Y								
Illinois Environmental Protection Agency									
Gregg Good	Y					Y			
Diane Shasteen									Y
Matt Short						Y			
Roy Smogor						Y			Y
Scott Tomkins						Y			
Amy Walkenbach						Y			
Brian Willard						Y			
Illinois Farm Bureau									
Nancy Erickson	Y								
Illinois Nature Preserves Commission									
Steven Byers				Y		Y			
Donnie Dann				Y					
Randy Heidorn	Y								
Angella Moorehouse						Y			
MaryKay Solecki						Y			
Illinois Pollution Control Board									
Deanna Glosser				Y					

Partnering Organization and participant - Federal Partners	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
US Army Corps of Engineers - Rock Island District										
Ken Barr	Y									
Marshall Plumley	Y									
Chuck Theiling							Y			
Brad Thomas	Y									
Ben Vandermyde							Y			
US Department of Agriculture - APHIS										
Scott Blackwood					Y					
Timothy White					Y					
US Department of Agriculture - Farm Service Agency										
Jami Diebal	Y									
Donald King	Y									
US Department of Agriculture - Natural Resource Conservation Service										
Gene Barickman	Y	Y						Y		
Wade Conn					Y					
Kerry Goodrich							Y			
US Fish and Wildlife Service										
Donovan Henry							Y			
Gwen Kolb							Y	Y		
Kris Lah							Y			Y
Jacob Randa							Y			
Mike Redmer	Y			Y	Y	Y				Y
Greg Soulliere								Y		
US Forest Service - Shawnee National Forest										
Chad Deaton			Y							
Matthew Lechner	Y						Y			
Allan Nicholas	Y									
Steve Widowski	Y									

Partnering Organization and participant - Research & Education Partners	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
Chicago Academy of Sciences - Peggy Notebaert Nature Museum										
Doug Taron						Y				
Lincoln Park Zoo										
Liza Lehrer						Y				
Seth Magle				Y						
Loyola University										
Marty Berg						Y				
Shedd Aquarium										
Philip Willink				Y		Y	Y			Y
The Morton Arboretum										
Lydia Scott				Y						
The Field Museum										
Mark Bouman				Y						
Abigail Derby-Lewis				Y						
Erika Hasle				Y						
Doug Stotz				Y		Y				Y
Southern Illinois University Carbondale										
Mike Eichholz								Y		
Eric Hellgren										Y
Clay Nielsen		Y								
Robin Warne								Y		
University of Illinois (UIUC)										
Matt Allender					Y					
Jay Hayek					Y					
Prairie Research Institute (PRI) - Illinois Natural History Survey (INHS)										
Brian Anderson	Y									
T.J. Benson		Y						Y		Y
Lama BouFajreldin							Y			
Yong Cao							Y			Y
Andrew Casper							Y			Y
Kevin Cummings						Y				Y
Ed DeWalt						Y	Y			Y
Chris Dietrich										Y
Sarah Douglass							Y			Y
Mike Dreslik						Y				Y
Kelly Estes					Y					
Andrea Fritts							Y			Y
Mark Fritts							Y			Y
Heath Hagy								Y		

Partnering Organization and participant - Research & Education Partners	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
Prairie Research Institute (PRI) - Illinois Natural History Survey (INHS)										
Bridget Henning							Y			
Sam Heads										Y
Ed Heske						Y				Y
Leon Hinz						Y	Y	Y		Y
Jeff Hoover			Y							Y
Joe Merritt										Y
Brian Metzke							Y			Y
Chris Phillips						Y				Y
Jason Robinson							Y			Y
Alison Stadola							Y			Y
Sergiusz Jakob Szesny						Y				Y
Chris Taylor							Y			Y
Steve Taylor							Y			Y
Jeremy Tiemann						Y	Y			Y
Jodi Vandermyde							Y			Y
Michael Ward		Y		Y						
Aaron Yetter								Y		
Jamie Zahniser										Y
PRI - INHS - National Great Rivers Research & Education Center										
Lisa Beja							Y			
Lyndsey Ramsey							Y			
Matt Young							Y			
PRI - Illinois Sustainable Technology Center										
John Marlin				Y		Y				Y
University of Washington										
Jenny Duggan						Y				

Partnering Organization and participant - Conservation Districts	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
Conservation, Forest Preserve, and Park Districts										
Boone County Conservation District										
Ace Minson				Y						
Dan Kane				Y						
Josh Sage				Y						
Byron Forest Preserve District										
Russell Brunner				Y						
Todd Tucker				Y						
Carroll County Soil and Water Conservation District										
Shay Bradbury							Y			
Champaign County Forest Preserve District										
Michael Daab					Y		Y			
Forest Preserve District of Dupage County										
Jessi DeMartini							Y			
Forest Preserve District of Cook County (FPDCC)										
Charles O'Leary							Y			
FPDCC - Chicago Botanic Garden										
Rachel Goad				Y						
Jo Daviess County Soil and Water Conservation District										
Mike Malon							Y			
Forest Preserves of Winnebago County										
Mike Groves				Y						
Jamie Johannsen				Y						
Jerry Paulson				Y						
Vaughn Stamm				Y						
Lake County Forest Preserve District										
James Anderson	Y			Y		Y				
Gary Glowacki				Y		Y				Y
Debbie Maurer					Y	Y				
McHenry County Conservation District										
Ed Collins				Y						
Rockford Park District										
Nathan Hill				Y						
Urbana Park District										
Derek Liebert							Y			

Partnering Organization and participant - Regional Partners	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
Association of Illinois Soil and Water Conservation Districts										
Richard Nichols	Y									
Bird Conservation Network										
Bob Fisher				Y						
Chicago Wilderness										
Chris Mulvaney				Y						
Melinda Pruett-Jones	Y									
Suzanne Malec-McKenna				Y						
Clifftop Alliance										
Carl DauBach							Y			
Conservation Technologies										
Dave Maginel							Y			
Ducks Unlimited										
Eric Schenck	Y							Y		
Mike Sertle								Y		
Heartlands Conservancy										
Dave Eustis				Y						
Meaghan Gass				Y						
Sarah Vogt				Y						
Huff and Huff Inc										
Roger Klocek						Y				
Illinois Audubon Society										
Tom Clay	Y	Y								
Nathaniel Miller						Y				
Debbie Newman							Y			
Illinois Chapter of the American Fisheries Society										
Trent Thomas	Y						Y			Y
Illinois Chapter of Sierra Club										
Jack Darin	Y									
Cindy Skrukrud	Y						Y			
Terry Treacy	Y				Y					
Illinois Federation for Outdoor Resources										
Brenda Potts	Y									
Illinois Forestry Development Council										
Dick Little	Y									
Illinois Green Industry Association										
Joe Khayyat					Y					
Jo Daviess Conservation Foundation										
Jim Johannsen							Y			
Little River Research and Design										
Amanda Nelson							Y			
Living Lands and Waters										
Mike Coyne-Logan							Y			
Max McGraw Wildlife Foundation										
Bob Montgomery						Y				

Partnering Organization and participant - Regional Partners	Action team	Farmland & Prairie	Forest & Woodlands	Green Cities	Invasive Species	Lake Michigan	Streams	Wetlands	COA	SGNC
National Wild Turkey Federation										
Kent Adams	Y									
John Burk			Y				Y			
Natural Land Institute										
Ed Cope				Y						
Kerry Leigh				Y						
Northeast Illinois Invasive Plant Partnership										
Cathy McGlynn					Y					
Openlands										
Roger Klocek										Y
Emy Brawley				Y						
Park Lands Foundation										
Angelo Capparella							Y			Y
Pheasants Forever & Quail Forever										
Aaron Kuehl	Y	Y								
Tom Schwartz	Y									
Prairie Rivers Network										
Elliott Brinkman	Y				Y		Y			
Stacy James							Y			
Quail Unlimited										
Mel Gajewski	Y									
River to River Cooperative Weed Management Area										
Karla Gage					Y					
Shawnee Resource Conservation & Development										
Tracy Boutelle-Fidler							Y	Y	Y	
Chris Evans					Y					
Southwestern Illinois Metropolitan and Regional Planning Commission										
Paul McNamara							Y			
The Conservation Foundation										
Dan Lobbes				Y						
Stephen McCracken							Y			
Brook McDonald				Y						
The Nature Conservancy										
Kevin Bennett	Y									
Doug Blodgett								Y		
Carl Gnaedinger						Y				
Krista Kirkham							Y			
John Legge						Y				
Jeff Walk	Y	Y						Y		Y
The Nature Institute										
Patricia Brown							Y			
The Wildlife Society										
Tom Nelson	Y									
Trout Unlimited										
Jeff Hastings							Y			