

# Forest and Woodland Campaign

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## 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.

<b>Practice</b>	<b>2006 (acres)</b>	<b>2015 (acres)</b>	<b>Change (acres)</b>
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
<b>Total</b>	<b>72,039</b>	<b>64,488</b>	<b>Down 7,551</b>

## **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**

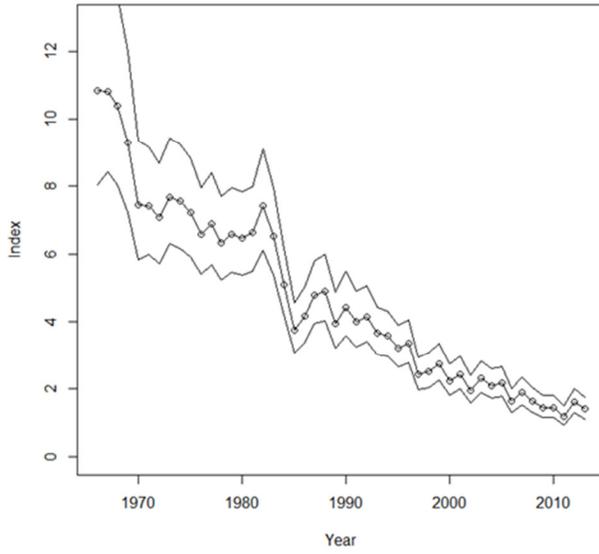
Campaign Focal Species – Animal species that are actively monitored to measure progress toward the conservation goals and objectives outlined by a campaign. The implementation team is focused primarily upon open woodland habitat restoration. Not surprisingly, open woodland species were selected as focal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

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

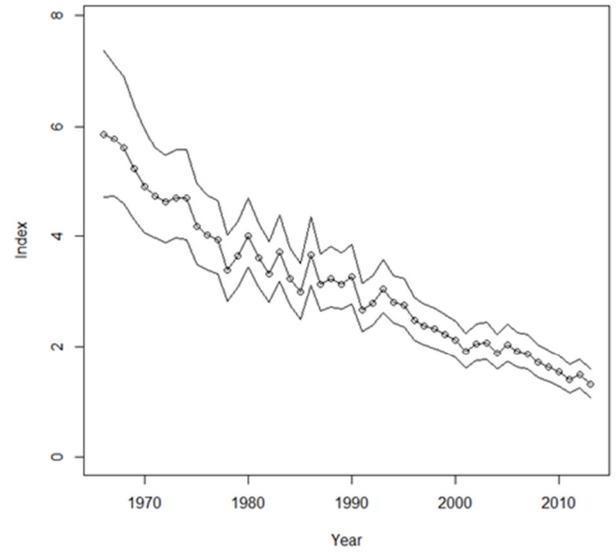
### *Focal Species Population Trends*

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).

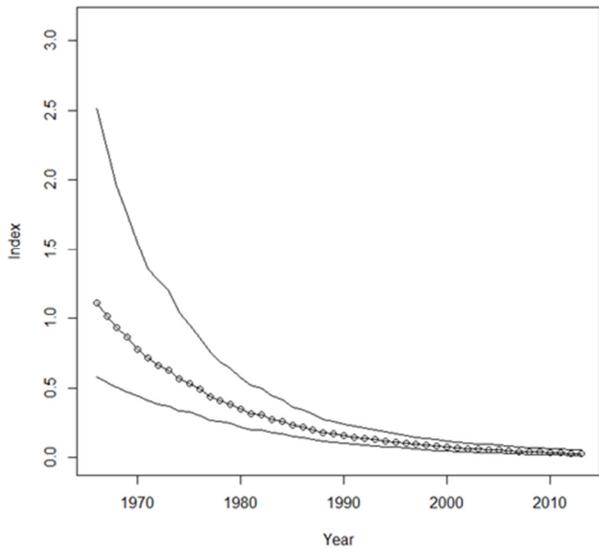
**Red-headed Woodpecker**



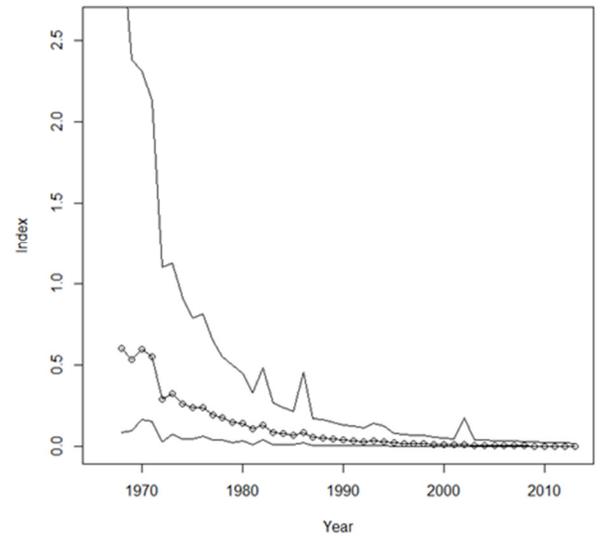
**Northern Flicker**



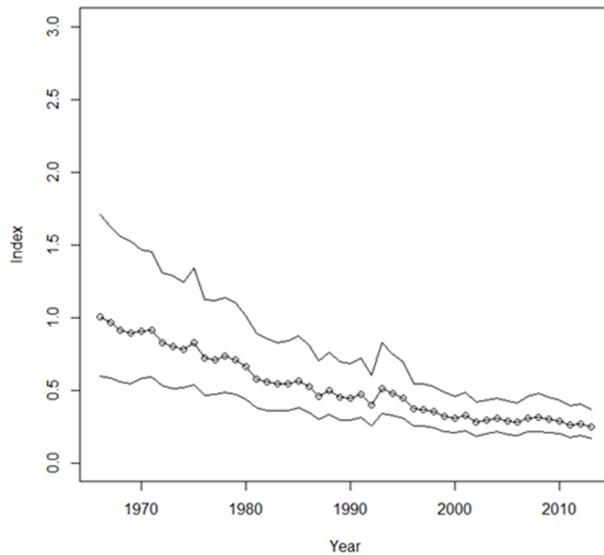
**Eastern Whip-poor-will**



**Chuck-will's-widow**



## Acadian Flycatcher



## 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 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](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
<b>Viable Populations</b>	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)
<b>Habitat Management</b>	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"
<b>Habitat resiliency and connectedness</b>	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

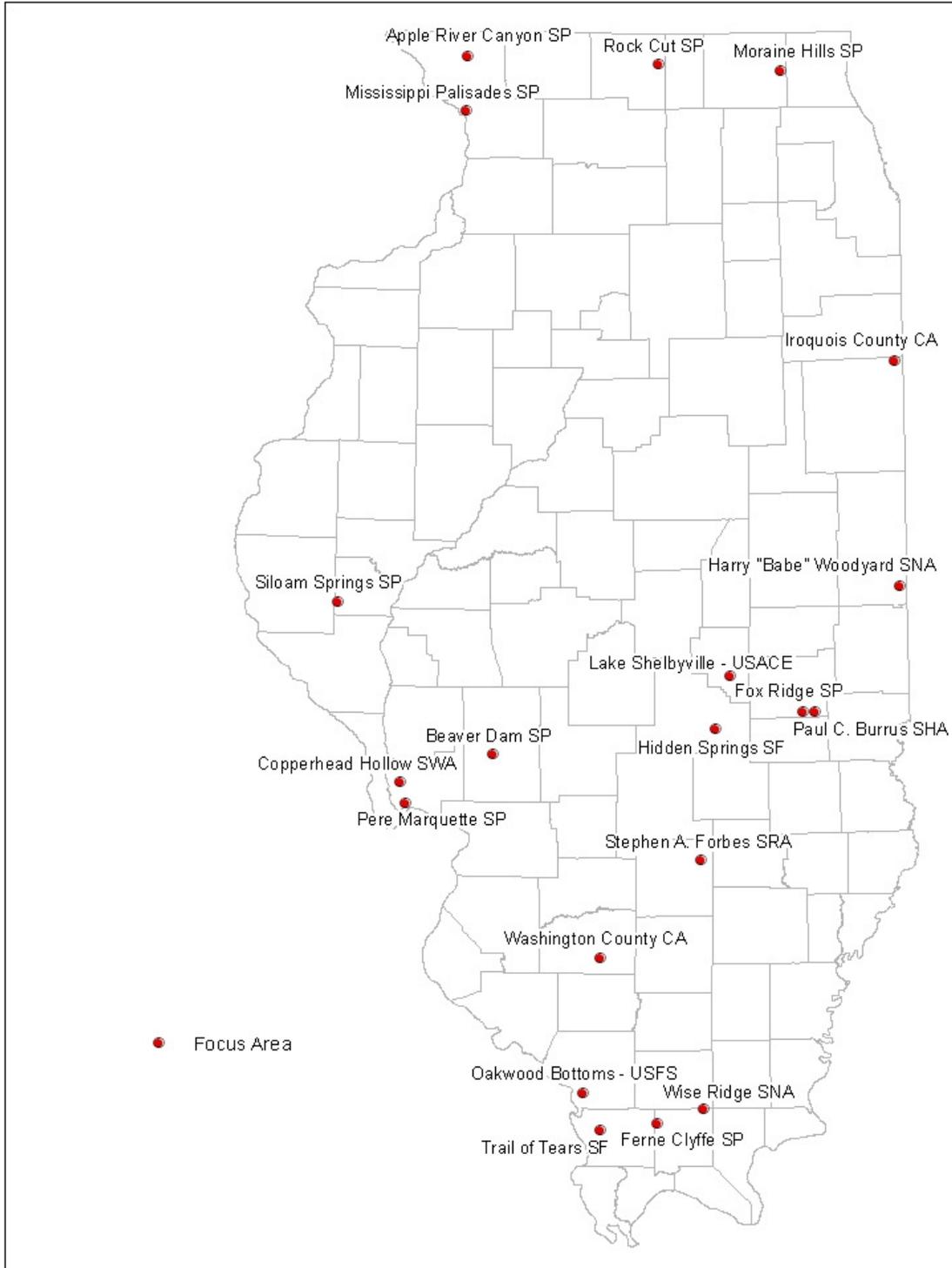


Figure 6. Focus Areas identified by the Forest and Woodland Campaign

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.

Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Habitat Stresses						Community Stresses						Population Stresses			Direct Human Stressors				
							Extent	Fragmentation	Composition-structure	Distribution/Hydrology	Invasive/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Disease	Prey/Food	Hosts	Invasive/Exotics	Other Symbionts	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
<b>BIRDS</b>																										
Acadian Flycatcher	<i>Empidonax vireescens</i>	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	<i>Haliaeetus leucocephalus</i>	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	0
Bay-Breasted Warbler	<i>Setophaga castanea</i>	Upland Forest	NMI	NMI	NMI	-1	0	1	1	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0
Bell's Vireo	<i>Vireo belli</i>	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	<i>Thryomanes bewickii</i>	Successional Forest	Successional Areas, Forest	5	2	-1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	1	1	1	1	0	1
Black-Billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Upland Forest	Forest	74	33	-2	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0	0
Blue-Winged Warbler	<i>Vermivora cyanoptera</i>	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	<i>Buteo platypterus</i>	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	<i>Toxostoma rufum</i>	Successional Forest	Successional	102	NMI	-2	1	1	1	0	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0	1
Cerulean Warbler	<i>Setophaga cerulea</i>	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	<i>Anrostomus carolinensis</i>	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	<i>Oporornis agilis</i>	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	<i>Pipilo erythrophthalmus</i>	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	<i>Antrostomus vociferus</i>	Successional Forest	Forest, Successional	76	33	-2	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0
Golden-Winged Warbler	<i>Vermivora chrysoptera</i>	Successional Forest	NMI	NMI	NMI	-2	1	1	1	0	1	0	0	1	1	0	0	1	0	0	0	1	1	1	0	1
Kentucky Warbler	<i>Geothlypis formosa</i>	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	<i>Egretta caerulea</i>	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	0
Mississippi Kite	<i>Ictinia mississippiensis</i>	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	<i>Colaptes auratus</i>	Savanna	Savanna, Grassland	102	93	-2	1	0	1	1	0	0	1	0	0	1	0	0	1	0	0	0	1	1	0	0
Osprey	<i>Pandion haliaetus</i>	Upland Forest	Forested Stream, Lake	10	33	2	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	1	1	0	1
Ovenbird	<i>Seiurus aurocapillus</i>	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	<i>Setophaga discolor</i>	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	<i>Protonotaria citrea</i>	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	<i>Melanerpes erythrocephalus</i>	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	<i>Euphagus carolinus</i>	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	<i>Egretta thula</i>	Floodplain Forest	Forested Stream, Lake	7	29	0	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1	1	0	1
Swainson's Hawk	<i>Buteo swainsoni</i>	Savanna	Savanna, Grassland, Agriculture	4	3	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	1	0	1
Swainson's Warbler	<i>Limnithlypis swainsonii</i>	Floodplain Forest	Bottomland Forest	1	3	0	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0	1	1	1	0	1
Willow Flycatcher	<i>Empidonax traillii</i>	Successional Forest	NMI	89	73	-2	1	1	1	1	1	0	0	1	0	0	1	0	0	0	0	1	1	0	0	1
Wood Thrush	<i>Hyllocichla mustelina</i>	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	<i>Coccyzus americanus</i>	Upland Forest	Forest, Savanna	102	92	-2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Yellow-Breasted Chat	<i>Icteria virens</i>	Successional Forest	Successional Field, Edge	92	81	-2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Yellow-Crowned Night-Heron	<i>Nyctanassa violacea</i>	Floodplain Forest	Swamp	19	21	-1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1	1	0	1
American Woodcock	<i>Scolopax minor</i>	Successional Forest	Successional Field, Ecotones	62	35	-1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
<b>HERPILES - Amphibians</b>																										
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	Upland Forest	Open Floodplains, Ephemeral Wetland	3	3	2	1	1	0	1	0	0	1	0	1	0	0	0	0	0	1	1	1	0	0	0
Silvery Salamander	<i>Ambystoma platineum</i>	Upland Forest	Woodland with Ephemeral Pool	2	2	2	1	1	1	1	0	0	1	0	1	0	0	0	0	0	1	1	0	1	0	0
<b>HERPILES - Reptiles</b>																										
Eastern Box Turtle	<i>Terrapene carolina</i>	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	<i>Tantilla gracilis</i>	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	<i>Pantherophis emoryi</i>	Savanna	Sandstone, Limestone, West Facing Bluffs	5	2	-2	1	0	1	1	0	0	0	1	1	0	0	0	0	0	1	0	1	1	0	1
Timber Rattlesnake	<i>Crotalus horridus</i>	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
<b>INVERTEBRATE - Arachnids</b>																										
Striped Scorpion	<i>Centruroides vittatus</i>	Barrens	Talus Slope, Glade	NMI	2	NMI	0	0	1	0	1	0	0	0	0	0	0	0	0	0	NMI	NMI	0	1	0	0
<b>INVERTEBRATE - Coleoptera (Beetles)</b>																										
American Burying Beetle	<i>Nicrophorus americanus</i>	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

Common Name	Scientific Name	Campaign Habitat	Specific Habitat	Historic Status	Current Status	Trend	Habitat Stresses					Community Stresses					Population Stresses			Direct Human Stressors						
							Extent	Fragmentation	Composition-structure	Distribution/Hydrology	Invasives/Exotics	Pollutants-Sediment	Competitors	Predators	Parasites/Disease	Prey/Food	Hosts	Invasive/Exotics	Other Symptoms	Genetics	Dispersal	Recruitment	Mortality	Killing	Disturbance	Structures/Infrastructure
<b>INVERTEBRATE - Hemiptera (True Bugs)</b>																										
a leafhopper	<i>Polyamia herbida</i>	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	<i>Polyamia interrupta</i>	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
<b>INVERTEBRATE - Lepidoptera (Butterflies &amp; Moths)</b>																										
a geometrid moth	<i>Euchlaena milnei</i>	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	<i>Hadena ectypa</i>	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 tortricid moth	<i>Ancylis semiovana</i>	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	<i>Catocala abbreviatella</i>	Savanna	Xeric Prairie, Savanna	NMI	3	NMI	1	1	1	1	1	0	0	0	0	0	1	NMI	NMI	0	1	0	1	NMI	NMI	NMI
an inch worm moth	<i>Apodrepanulatrix liberaria</i>	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	<i>Erostria coloraria</i>	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	<i>Hemileuca maia</i>	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	<i>Amblyscirtes carolina</i>	Floodplain Forest	Moist Forest near Stream or Swamp; Cane	NMI	2	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Creole Pearly-Eye	<i>Lethe creola</i>	Floodplain Forest	Forest with Cane	NMI	8	NMI	1	1	1	1	1	0	0	0	0	1	1	NMI	NMI	1	1	1	0	NMI	NMI	NMI
Golden Borer Moth	<i>Papaipema cerina</i>	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	<i>Melanomma auricinctaria</i>	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 Elf	<i>Callophrys polios</i>	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	<i>Lycaeides melissa samuelis</i>	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	<i>Amblyscirtes aesculapius</i>	Floodplain Forest	Forest with Cane	NMI	3	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Linda's Roadside-Skipper	<i>Amblyscirtes linda</i>	Floodplain Forest	Forest Stream, Cane Stand	NMI	1	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Mottled Duskywing	<i>Erynnis martialis</i>	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	<i>Euchloe olympia</i>	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	<i>Amblyscirtes reversa</i>	Floodplain Forest	Forest Stream, Cane Stand	NMI	NMI	NMI	1	1	1	1	1	0	0	0	0	0	0	NMI	NMI	0	0	0	0	NMI	NMI	NMI
Spotted Dart Moth	<i>Agrotis stigmata</i>	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 Pygmaic	<i>Pygarcia spraguei</i>	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
<b>INVERTEBRATE - Millipedes</b>																										
a millipede	<i>Semionellus placidus</i>	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
<b>INVERTEBRATE - Orthoptera (Grasshoppers, Katydid, Crickets)</b>																										
Lichen Grasshopper	<i>Trimerotropis saxatilis</i>	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
<b>MAMMALS</b>																										
Eastern Wood Rat	<i>Neotoma floridana</i>	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	<i>Ochrotomys nuttalli</i>	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	<i>Tamiasciurus hudsonicus</i>	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