The State of Our Chicago Wilderness

A Report Card on the Health of the Region's Ecosystems

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A Report Card on the Ecological Health of the Region

CHICAGO WILDERNESS

A Regional Nature Reserve

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Chicago Wilderness is a regional nature reserve that includes more than 225,000 acres of protected natural areas. It stretches from southeastern Wisconsin, through northeastern Illinois and into northwestern Indiana. The protected lands and waters of Chicago Wilderness include county preserves, state parks, federal preserves, and privately owned areas. There are also many unprotected natural areas within Chicago Wilderness.

The Chicago Wilderness consortium is an alliance of more than 180 organizations working to study, restore, protect and manage the natural ecosystems of the Chicago region in order to contribute to the conservation of global biodiversity and enrich local residents' quality of life.


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Foreword

What is Chicago Wilderness?
Chicago Wilderness is a regional nature reserve that includes more than 225,000* acres of protected natural areas. It stretches from southeastern Wisconsin, through northeastern Illinois and into northwestern Indiana. The protected natural areas of Chicago Wilderness are forest preserves, state parks, federal lands, county preserves, and privately owned lands. They are located in Kenosha County in Wisconsin; in Cook, DuPage, Kane, Lake, McHenry and Will Counties in Illinois; and in Lake and Porter Counties in Indiana.

What is the Chicago Wilderness consortium?
In 1996, a diverse group of 34 organizations, calling itself the Chicago Region Biodiversity Council, found much to celebrate in the region's remaining natural areas, but determined that these areas were threatened by development and neglect. The efforts of the Council, now commonly known as the Chicago Wilderness consortium, were predicated upon the certainty that without active management, most if not all of the region's natural areas would disappear or become so degraded as to retain little ecological or aesthetic value. The Chicago Wilderness consortium is now an alliance of more than 180 organizations working together to protect, restore, study and manage the natural ecosystems of the Chicago region, contribute to the conservation of global biodiversity, and enrich local residents' quality of life.

Recognizing that the business community also has a profound influence on the region's ecological health through its land use, management practices, political activity and philanthropy, in 2002, members of the Chicago Wilderness consortium worked with 12 local businesses to launch the Chicago Wilderness Corporate Council. As of this writing, the Corporate Council has 27 members committed to improving our local environment and reaching out to other public and private partners in the coming years.

It is important to note that Chicago Wilderness also benefits from an increasing awareness of conservation principles and needs by local citizens throughout the region. A steadily growing number of volunteers, people from all walks of life, give generously of their time and talents: they remove invasive species, sow seeds, count birds, monitor frogs, restore streambanks, teach children, write letters to elected officials and engage in a host of other conservation activities.

What is biodiversity and why is it important?
First coined by entomologist E.O. Wilson in 1986, the term biodiversity is short for biological diversity. Although a quick Internet search reveals dozens of attempts to flesh out its definition, the one approved at the 1992 United Nations Earth Summit in Rio de Janero and subsequently adopted by most countries is: "the variability among living organisms from all sources, including, *inter alia*, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and ecosystems."

For all of the many benefits our built environment affords us, much has been lost of our natural heritage. While 226,000 acres of natural areas may seem like a lot, in truth they represent less than seven percent of the 3,160,000 total acres within the region. High quality remnants of natural areas are even more rare. In 1978, the Illinois Natural Areas Inventory identified 25,700 acres of natural areas with significant natural features throughout the entire state, representing just seven-hundredths of one percent of the total land and water area of Illinois (White 1978).

Some unprotected natural areas have been lost since 1978. Even more are hanging on by a thread. Nature is resilient, but detailed studies show that unless actively protected and restored, what little remains of

*The *Biodiversity Recovery Plan*, published in 1999, cites "200,000 acres of protected conservation land." This project documented a combined acquisition of 25,980 acres since 1999, yielding the rounded estimate of 226,000 of protected lands and waters.

our remaining ecological treasures will be irreparably degraded or lost altogether.

The Chicago Wilderness region is not alone in facing this dilemma. Across the world, a growing number of people are coming to understand how important it is to protect and preserve natural communities in balance with human communities. As stated in the foreword to the *Global Biodiversity Assessment Summary for Policy Makers* (Watson *et al*. 1995),

> "Biodiversity represents the very foundation of human existence. Beside the profound ethical and aesthetic implications, it is clear that the loss of biodiversity has serious economic and social costs. The genes, species, ecosystems and human knowledge which are being lost represent a living library of options available for adapting to local and global change. Biodiversity is part of our daily lives and livelihood and constitutes the resources upon which families, communities, nations and future generations depend."

As much as we depend upon the natural areas of the Chicago Wilderness region—for recreation, for the resources they afford and the functions they perform, for their sheer beauty—they depend on us for their very survival. This report card measures how well we are doing in holding up our end of the bargain.

CHAPTER 1
EXECUTIVE SUMMARY

1.1 INTRODUCTION

In 1996, the Chicago Region Biodiversity Council, now commonly known as the Chicago Wilderness consortium, published *An Atlas of Biodiversity*. It provided the general public an introduction to the region's remaining wealth of natural communities—their beauty, their importance to the region and the world, the threats they face and the efforts to save them for future generations.

In 1999, the consortium followed up by publishing the *Biodiversity Recovery Plan*, the purpose of which was to assess the condition of the region's natural communities and to outline region-wide objectives for their protection and recovery to long-term viability.

The goals of *The State of Our Chicago Wilderness—A Report Card on the Ecological Health of the Region*, are to assess changes in the condition of the region's natural communities since the publication of the *Biodiversity Recovery Plan*, document the condition of available data, measure progress toward achieving *Biodiversity Recovery Plan* objectives and make recommendations for future report cards.

1.2 OVERVIEW OF THE *BIODIVERSITY RECOVERY PLAN*

The condition of the region's natural communities, as reported in the *Biodiversity Recovery Plan*, was determined by regional experts convened in 1997. After developing classification systems for natural community and animal assemblage types found in the Chicago Wilderness region, experts rated each community and assemblage by quantity, condition, biological importance and global significance, then ranked them in order of conservation priority. For each community type, a broad vision and goals were outlined, along with an overarching set of recommended recovery actions for all terrestrial and aquatic communities.

In support of on-the-ground recovery efforts, the *Biodiversity Recovery Plan* discusses and outlines visions, goals and recommended actions related to public and private landowner protection measures; ecological management, research and monitoring; education and communication; and the role of key players, including governments, the private sector and volunteers.

The *Biodiversity Recovery Plan* distills the various component visions, goals and recommended actions into eight major objectives:

- Involve the citizens, organizations and agencies of the region in efforts to conserve biodiversity
- Improve the scientific basis of ecological management
- Protect globally and regionally important natural communities
- Restore natural communities to ecological health
- Manage natural communities to sustain native biodiversity
- Develop citizen awareness and understanding of local biodiversity to ensure support and participation
- Foster a sustainable relationship between society and nature in the region
- Enrich the quality of the lives of the region's citizens

1.3 DEVELOPMENT OF THE *REPORT CARD*

A project steering committee was formed to set project goals and guide the development of the *Report Card*. This committee met regularly to shepherd, shape and lend expertise to the project. To gather the necessary information to assess the health of the region's biodiversity, many experts and stakeholders were also brought into the process. In the summer of 2004, more than 150 people were invited to participate in workshops designed to provide expert information regarding the region's natural communities and species assemblages. One day of

workshops was held to evaluate animal groups—the region's bird, insect, fish, reptile and amphibian assemblages. A second day of workshops was held to assess forest, woodland, savanna, grassland, wetland, and aquatic communities, and plants of conservation concern. Draft findings were circulated among workshop participants and other regional experts for additional feedback.

Numerous regional experts provided additional information, particularly related to the non-biological goals and objectives of the *Biodiversity Recovery Plan*.

A draft of the entire *Report Card* was circulated to members of the Chicago Wilderness consortium. Feedback was incorporated into several iterative drafts, culminating in the publication of the Report Card in the spring of 2006.

1.4 How the *Report Card* is Organized

To underscore the relationship between the *Report Card* and the *Biodiversity Recovery Plan*, the *Report Card* generally subscribes to the format and order of the *Biodiversity Recovery Plan*. Note that where appropriate, The Nature Conservancy's global rankings of natural communities are included in the *Report Card*, as they were in the *Biodiversity Recovery Plan*. As far as the *Report Card* team is aware, these rankings are the most thorough available, and are included in this document to provide perspective on the global conservation importance of natural communities within the Chicago Wilderness region.

In chapters one through three, included for each natural community and animal assemblage is a Report Card Condition Ranking based on a four-tier system:


Poor


Fair


Good


Excellent

These are further defined in each chapter as they relate to each community type or assemblage.

1.5 Key Findings of the *Report Card*

The threats to our natural communities remain as described in the *Biodiversity Recovery Plan*. Major stressors include poorly planned urban expansion, the invasion of non-native species, excessive deer populations and the loss of natural processes due to hydrological change and the lack of controlled fire. These stressors contribute to the *Report Card* determination that overall, the region's natural communities and animal assemblages remain in a declining or threatened state of health.

The good news is that there are notable exceptions. The *Report Card* features examples of well-managed natural areas that boast a significant recovery of native biodiversity. Overall, the sites within the Chicago Wilderness region that are being actively managed exhibit recovering communities of native plants and animals. Yet the majority of the region's natural areas remain unmanaged or under-managed, which more than offsets the positive gains made at well-managed sites.

However, there are many encouraging trends to report. Since 1997, Illinois voters have approved nearly two dozen conservation-related bond referenda totaling more than $540 million dollars. The acreage benefiting from controlled burns is increasing as shown in these totals from six forest preserve and conservation districts: 2002—4537 acres, 2003—6190 acres, and 2005—6908 acres. Also encouraging is the fact that in 2003, the latest year for which information is available, estimates place the annual value of conservation volunteer hours in the Chicago Wilderness region at more than $1 million. In some respects, the region is leading the nation in sustainable development, with the passage of local government ordinances, plans and development policies aimed at improving protections for habitat and natural areas.

1.6 *Report Card* Recommendations

In spite of the many challenges confronting the region, the Chicago Wilderness consortium has made significant strides since the publication of the

Biodiversity Recovery Plan. The *Report Card* chronicles those successes and outlines next steps toward the achievement of a healthier environment for all of the region's rich diversity of plants, animals and people. Following are the recommendations of this *Report Card* to members of the Chicago Wilderness consortium:

- Aggressively spur the development and region-wide adoption of specific recovery goals, indicators and monitoring protocols for each Chicago Wilderness natural community and assemblage type
- Utilize these goals, indicators and monitoring results to guide site-specific management plans and the collection of data
- Develop baseline data for each of the region's natural communities and assemblages
- Develop a repository for the region's data
- Coordinate the region's data collection and reporting
- Secure more broad-based participation throughout the region
- Clarify and potentially refine the boundaries of the Chicago Wilderness region
- Come to region-wide consensus on a natural community classification system
- Articulate specific goals for non-biological objectives
- Schedule the development of the next *Report Card* to aggressively spur the completion of the above recommendations

These recommendations are discussed in more detail in chapter nine.

Additionally, to promote a balance between continued population growth and the preservation of our natural heritage, the recommendations of this *Report Card* to members of the Chicago Wilderness consortium, state and local governments, and other local decision-makers are:

1. **Significantly increase the number of natural areas under active management.**

2. **Acquire or otherwise protect additional natural areas to balance sustainable growth with the conservation of local biodiversity.**

These last recommendations are further discussed in the *Summary Report–The State of Our Chicago Wilderness: A Report Card on the Health of the Region's Ecosystems*, published as a supplement to this document.

Chapter 2
Terrestrial and Aquatic Communities

2.1 Introduction

Across the region, there are sites that serve as prime examples of ongoing efforts to restore the region's native biodiversity: Chiwaukee Prairie, Harms Woods, Ivanhoe Dune and Swale, Middlefork Savanna and Nippersink Creek, to name but a few. However, the majority of the region's natural areas—both those protected and unprotected—remain unmanaged or under-managed, resulting in an overall decline in the region's biodiversity. Accordingly, one of the key recommended actions of the *Biodiversity Recovery Plan* is also one of the key recommended actions of the *Report Card*: increase the number of acres under active management.

In 1997, experts from throughout the Chicago Wilderness region convened to assess the region's natural communities. Participants assessed each community type utilizing four criteria: quantity, condition, biological importance and distribution within and beyond the Chicago Wilderness region. Their findings underpinned the assessments reported in the *Biodiversity Recovery Plan.*

In 2004, experts again convened, this time primarily to assess the current condition of the region's natural communities, as it was anticipated there would be no changes in biological importance or distribution. Regarding quantity of natural communities, it was hoped that sufficient data would be identified to assess changes in quantity, but a general lack of region-wide data precluded a precise quantity assessment. The lack of sufficient data likewise limited the ability to precisely quantify changes in the condition of the region's natural communities and assemblages, and therefore the majority of assessments are based on observations of experts working in the field.

Notable exceptions to the lack of data included: 1) the resurveys of high quality prairie and wetland sites in 2000-2001 and upland forest sites in 1997-1998. Following up on sampling conducted by the Illinois Natural Areas Inventory in 1976, the Chicago Wilderness survey provided important status, trend and management information about high quality sites in Illinois. 2) The Chicago Wilderness Woods Audit, which established important baseline information in the first region-wide assessment of the condition of upland forests and woodlands. These examples, however, remain the exception rather than the rule.

The lack of data, as it became clear in the course of developing the *Report Card*, is directly related to the lack of specific recovery goals, indicators and monitoring protocols for each community type. Again, there is an exception. As recommended in the *Biodiversity Recovery Plan*, in 2002 a conservation design was developed for woodlands. The conservation design established measurable recovery goals through 2025, with specific benchmarks in five-year increments. It also outlined a range of management strategies based on specifically identified threats and also recommended parameters for monitoring protocols. As evidenced in the following sections, "The Chicago Wilderness Conservation Design for Woodlands" provides a solid framework for reporting progress toward specific woodland recovery goals.

This chanpter of the *Report Card* strives to provide the following information:

Overview of Findings
A summary of the overall condition of the community and recommended future actions.

Condition of Data
An overview of the available data that informed the *Report Card* assessment. It should be noted that the majority of data that were identified is concentrated primarily in Illinois. Some Indiana data are referenced. Very little data are referenced from Wisconsin. This fact underscores a *Report Card* recommendation to increase the data collection from all three states located in the Chicago Wilderness region.

Table 2.1
Terrestrial Community Types in the Chicago Wilderness Classification System

Forested Communities
- Upland forest
  - o Dry-mesic
  - o Mesic
    - ◊ Maple dominant+
    - ◊ Oak dominant+
  - o Wet-mesic
- Floodplain
  - o Wet-mesic
  - o Mesic
  - o Wet
- Flatwoods
  - o Northern
  - o Sand
- Woodland
  - o Dry-mesic*
  - o Mesic
  - o Wet-mesic

Savanna Communities
- Fine-textured-soil savanna
  - o Dry-mesic*
  - o Mesic
  - o Wet-mesic
- Sand Savanna
  - o Dry
  - o Dry-mesic
  - o Mesic

Shrubland Communities
- Fine-textured-soil shrubland
  - o Dry-mesic
  - o Wet-mesic
- Sand shrubland
  - o Dry-mesic
  - o Wet-mesic

Prairie Communities
- Fine-textured-soil prairie
  - o Dry
  - o Mesic
  - o Wet
- Sand Prairie
  - o Dry
  - o Mesic
  - o Wet
- Gravel Prairie
  - o Dry
  - o Mesic
- Dolomite Prairie
  - o Dry
  - o Mesic
  - o Wet

Wetland Communities
- Marsh
  - o Basin
  - o Streamside
- Bog
  - o Graminoid
  - o Low Shrub
  - o Forested
- Fen
  - o Calcareous
  - o Graminoid
  - o Forested
- Sedge Meadow
- Panne
- Seep and Spring
  - o Neutral
  - o Calcareous
  - o Acid

Cliff Communities
- Eroding Cliff
- Dolomite Bluff

Lakeshore Communities
- Beach
- Foredune
- High Dune

+*Recommended addition to classification system reported in Recovery Plan*
**Identified as globally important in the* Recovery Plan

Community Description
A brief overview of the community "tree" types and sub-types. It should be noted that during the workshop, there was much discussion about the merit of refining the Chicago Wilderness terrestrial community type classification system. In advance of any changes formally adopted by the Chicago Wilderness consortium, the *Report Card* community type definitions stem from those included in Appendix 1 of the *Biodiversity Recovery Plan*.

Long-Term Vision and Goals
An extrapolation of the long-term vision and goals for an entire community type embedded in the *Biodiversity Recovery Plan*.

TABLE 2.2
AQUATIC COMMUNITY TYPES IN THE CHICAGO WILDERNESS CLASSIFICATION SYSTEM

Stream Communities
Headwater Streams
- Continuous-Flow
  - o Coarse Substrate
  - o Fine Substrate
- Intermittent-Flow
  - o Coarse Substrate
  - o Fine Substrate
- Low-order Streams
  - o High-gradient
  - o Low-gradient
- Mid-order Streams
  - o High-gradient
  - o Low-gradient

Lake Communities
Natural Lakes
- Lake Michigan
- Glacial Lakes
  - o Kettle
  - o Flow-through
- Bottomland
- Vernal Pond
- Manmade Lakes
  - o Naturalized
  - o Other

For each individual community type, the following information is provided:

Description
Each individual community description is based primarily on the definitions in the *Biodiversity Recovery Plan*. The community types are listed in Tables 2.1 (for terrestrial communities) and 2.2 (for aquatic communities).

***Biodiversity Recovery Plan* Status Ranking**
A summary of the four assessment measures used to inform the ranking within the five tiers of conservation targets, the first tier being highest conservation priority (see Table 2.4).

Recent Recovery Efforts
Examples are provided of sites where management has resulted in a stabilization or recovery of biodiversity. Within some sections, sidebars provide overviews of select sites. It should be noted that many more sites have undergone or are undergoing active management, and these are but a few representative examples of such efforts.

Indicators
Each workshop of natural community experts was asked to identify indicators of community quality or health. It should be noted that the limited information provided underscores a *Report Card* recommendation to develop specific indicators, along with recovery goals and monitoring protocols, for each of the region's natural community types.

***Report Card* Condition Ranking**
The *Report Card* employs the following rankings to measure each natural community's condition. The first four are from the *Biodiversity Recovery Plan*:


Poor: rapidly losing biodiversity, or little of good quality remaining


Fair: quite a bit of biodiversity remaining, but declining or moderate amount remaining


Good: much biodiversity survives and is fairly stable, but not all of high quality


Excellent: much biodiversity survives and is fairly stable, much is high quality


Undetermined

Recommended Actions
Listed for each community type is an overview of potential avenues of research, monitoring and on-the-ground efforts, refining or building upon the recommended actions of the *Biodiversity Recovery Plan*. Principal among the recommendations is the call to develop a conservation design or similar instrument to provide specific, measurable recovery goals, indicators and monitoring protocols. In addition to providing management guidance, such instruments would provide a framework for measuring progress toward the recovery of the region's biodiversity.

A final note: Information could not be obtained about cliff, lakeshore and shrubland communities. These communities should be assessed in the next iteration of the *Report Card*.

Table 2.3
Sum of Acres in Protected Natural Areas and in Other Significant Natural Areas by Community Type—1999

Data are from Illinois and Indiana Departments of Natural Resources and County Forest Preserve/Conservation Districts and include only lands that had been identified by community type in 1999. Updated figures were not available at the time of publication of the *Report Card*. Even so, these data were not complete in 1999 and lack of acreage in a column does not imply zero acreage of a community type in a county. Minor variations between the *Recovery Plan* and *Report Card* versions are due to corrections.

Illinois Natural Areas Inventory Grades (Taft et al.):
Grade A: Relatively stable or undisturbed communities
Grade B: Late successional or lightly disturbed communities
Grade C: Mid-successional or moderately to heavily disturbed communities
Grade D: Early successional or severely disturbed communities
Grade E: Very early successional or very severely disturbed communities

Source: *Florisitic Quality Assessment for Vegetation in Illinois: a Method for Assessing Vegetation Integrity,* John B. Taft, Gerould S. Wilhelm, Douglass M. Ladd and Linda A. Masters, Illinois Native Plant Society (no date on publication).

	LAKE, IL[2]	COOK[1]	DUPAGE[2]	KANE[2]	LAKE, IN[3]	MCHENRY[1]	PORTER[3]	WILL[1]
FORESTED COMMUNITIES								
Upland forest								
Dry-mesic	739	374		101	5		20	496
Mesic	1157	350	452		18	22	75	350
Wet-mesic	32	10						30
Unclassified					30.0			946
Total	**1928**	**734**	**452**	**101**	**53**	**22**	**95**	**1822**
Floodplain forest								
Wet-mesic		34	59	10	20			304
Wet	544	80	766					43
Unclassified	605			78				179
Total	**1149**	**113**	**825**	**88**	**20**			**526**
Flatwood								
Northern	480	213	389	40				
Sand		135						
Unclassified	33							
Total	**513**	**348**	**389**	**40**				

Continued

	LAKE, IL[2]	COOK[1]	DUPAGE[2]	KANE[2]	LAKE, IN[3]	MCHENRY[1]	PORTER[3]	WILL[1]
Woodland								
Dry-mesic	386	428	1368	3		83		
Mesic	318	214		1308				
Wet-mesic	127							
Unclassified	909	76		103				55
Total	**1740**	**719**	**1368**	**1414**		**83**		**55**
TOTAL	**5330**	**1913**	**3034**	**1642**	**73**	**105**	**95**	**2403**
SAVANNA COMMUNITIES								
Fine-textured-soil savanna								
Dry-mesic	140	1111		44		20		24
Mesic	224	9		45	34			
Wet-mesic	14							
Unclassified	381		2362	10				35
Total	**759**	**1120**	**2362**	**99**	**34**	**20**		**59**
Sand savanna								
Dry	277				18		200	
Dry-mesic	142	202			450		31	60
Mesic								
Unclassified					130			79
Total	**419**	**202**			**598**		**231**	**139**
Unclassified savanna				457				31
Total				**457**				**31**
TOTAL	**1178**	**1321**	**2362**	**556**	**632**	**20**		**229**
SHRUBLAND COMMUNITIES								
Fine-textured-soil shrubland								
Wet-mesic fine-textured-soil 1								
Unclassified shrubland	2		410					44
TOTAL	**3**		**410**					**44**
PRAIRIE COMMUNITIES								
Fine-textured-soil prairie								
Dry	82		203	2				
Mesic	329	377	974	83	73	23		33
Wet	96	170	315	10	5	19		5

Continued

	LAKE, IL[2]	COOK[1]	DUPAGE[2]	KANE[2]	LAKE, IN[3]	MCHENRY[1]	PORTER[3]	WILL[1]
Unclassified	198			58		3		59
Total	**705**	**547**	**1491**	**153**	**78**	**45**		**97**
Sand prairie								
Dry	179				22			25
Mesic	603	147			27		33	95
Wet	375	178			183			26
Unclassified					141			30
Total	**1157**	**325**			**373**		**33**	**176**
Gravel prairie								
Dry		28	6	9		30		
Mesic		21						
Unclassified								
Total		**49**	**6**	**9**		**30**		
Dolomite prairie								
Dry				1				2
Mesic								118
Wet			49					14
Unclassified				2				115
Total			**49**	**3**				**249**
TOTAL	**1862**	**921**	**1547**	**165**	**451**	**75**	**33**	**522**

WETLAND COMMUNITIES

Marsh								
Basin	1375					554		
Streamside	965					190		
Unclassified	913	120	2481	377	301		100	471
Total	**3253**	**120**	**2481**	**377**	**301**	**744**	**100**	**471**
Bog								
Forested	149							
Graminoid	4					8		
Low shrub	12					10		
Unclassifed								
Total	**165**					**18**		
Fen								
Calcareous floating mat	76					51		
Forested	6		120	23			10	1
Graminoid	65	44	78	10		63		2
Unclassified	8			37	35		27	1
Total	**155**	**44**	**198**	**70**	**35**	**113**	**37**	**4**

Continued

	LAKE, IL[2]	COOK[1]	DUPAGE[2]	KANE[2]	LAKE, IN[3]	MCHENRY[1]	PORTER[3]	WILL[1]
Sedge meadow	355	317	520	254	40	417		89
Panne		67		73		1		
Seep and spring								
Neutral						4		
Calcareous		11		7		1		
Sand		1						
Unclassified	10			12			3	
Total	**10**	**12**		**19**		**5**	**3**	**2**
TOTAL	**4003**	**493**	**3272**	**719**	**377**	**1297**	**140**	**566**

CLIFF COMMUNITIES

Eroding bluff	5							
Dolomite		2		6				
TOTAL	**5**	**2**		**6**				

LAKESHORE COMMUNITIES

Beach	63							
Foredune	102							
TOTAL	**165**							

CULTURAL COMMUNITIES

Cropland	2258		1071	854		5		149
Tree plantation	469	3	677	146				
Turf grass	243	14		251				10
Unassoc. growth–grass	2934	601	2432	1608		28		291
Unassoc. growth–shrub	604	16	2331			39		
Unassoc. growth–tree	794		2278	60				
Unclassified unassoc. growth			508					65
Unclassified cultural						140		
TOTAL	**7301**	**634**	**9297**	**2919**		**212**		**515**

1 Data do not represent all natural areas in county.
Data include INAI sites and some forest preserve/conservation district sites.

2 Data include all FPD sites and INAI sites.

3 Data do not include all natural areas in county.

2.2 Forested Communities

2.2.1 Overview of Findings

In spite of several individual recovery successes, indications are that the majority of the region's forests are in poor condition, primarily due to the lack of management. The widening disparity between managed and unmanaged or under-managed areas underscores the principal recommended action of both the *Biodiversity Recovery Plan* and the *Report Card*, which is to increase the number of acres under management. Several new recommended actions expand upon and refine select recommended actions of the *Biodiversity Recovery Plan*. Primary among them are calls to establish specific, measurable, region-wide recovery goals, indicators of community health and monitoring protocols.

2.2.2 Condition of Data

Since the publication of the *Biodiversity Recovery Plan*, a number of key efforts were completed, which inform the *Report Card* assessment of the region's forested communities. The Chicago Wilderness Woods Audit, conducted in 2002 and 2003, surveyed the condition of the region's upland forests. Developed, in part, as a means to track progress toward the specific recovery goals outlined in the "Conservation Design for Woodlands" (summarized below), the audit provides the first quantified condition ranking of the region's upland forests and woodlands, as well as baseline information against which to measure future trends (Glennemeier 2002a).

Several site-specific studies provide key insights into the management of select forested community types (Apfelbaum *et al*. 2000; Bowles *et al*. 2000; Bowles *et al*. 2003).

Other data related to the region's forested communities have yet to be sufficiently compiled and analyzed. For instance, Illinois' Critical Trends Assessment Program and its sister volunteer program, Forest-Watch (until the latter was suspended in 2004 due to state budget cuts), have consistently monitored forest sites in the Chicago Wilderness region since 1997, but regional analysis of the data remains limited.

Table 2.4
Conservation Targets for Recovery Based on Status, Importance and Distribution

First (highest) Tier
- Woodland (all moisture classes)
- Fine-textured-soil savanna (all moisture classes)
- Mesic sand savanna
- Sand prairie (all moisture gradients in dune and swale topography)
- Dolomite prairie (all)
- Panne
- Graminoid fen
- Fine-textured-soil prairie (all moisture classes)

Second Tier
- Dry sand prairie
- Gravel prairie (all)
- Basin marsh
- Calcareous floating mat
- Calcareous seep
- Sand prairie (other than those in dune and swale topography)
- Northern flatwoods
- Streamside marsh

Third Tier
- Sand flatwoods
- Dry-mesic sand savanna
- Forested fen
- Sedge meadow

Fourth Tier
- Upland forest (all)

Fifth Tier
- Floodplain forest (all)
- Bogs (all)
- Sand and neutral seep

In spite of these advances in information, much of the *Report Card* assessment of the region's forested communities remains anecdotal. Data are needed to quantify the condition of all of the region's forested communities and to establish baseline data against which to measure future trends.

2.2.3 Community Description

The region's forested communities are divided into four types, each of which is further divided by subtype based on moisture content of the soil, except in the case of flatwoods. Members of the forested communities workshop group recommend the differentiation between maple-dominant and oak-dominant mesic upland forests. The classifications are:

Upland forest
- Dry-mesic
- Mesic
  - o Maple dominant*
  - o Oak dominant*
- Wet-mesic

Floodplain
- Wet-mesic
- Mesic

Flatwoods
- Northern
- Sand

Woodland
- Dry-mesic
- Mesic
- Wet-mesic

**These are additions to the community differentiations in the* Biodiversity Recovery Plan.

2.2.4 Long-Term Vision and Goals

The long-term vision and recovery goals for the region's forested communities are broadly stated in the *Biodiversity Recovery Plan*. Unique to forested communities, however, is that subsequent to the publication of the plan, a model policy and conservation design have advanced and refined goals for woodland communities, as well as recommended indicators and monitoring protocols. This progression of *post-Biodiversity Recovery Plan* follow-up is an example of the kind of effort needed for the balance of the region's natural communities.

The *Biodiversity Recovery Plan*

The Biodiversity Recovery Plan's vision for the region's forested communities is to improve conditions and restore natural processes to allow canopy tree species to regenerate (in viable numbers) and to maintain an appropriate continuum of canopy cover across the region to sustain viable populations of rare species and community assemblages. Broadly outlined goals include:

- Secure 50,000–100,000 acres of healthy forest and woodland complexes in the region, including as many as 20 good-quality sites larger than 500 acres and several 800- to 1,000-acres sites, with appropriate land forms (slope, soils and hydrology)
- Manage 90 percent of the highly fire-dependent forest and woodland communities with prescribed burns on a rotating schedule
- Reduce deer density in forests and woodlands to a level that, in combination with prescribed burns, would allow for the reproduction of canopy tree species and for the shrub and herbaceous understory layers to return to a healthy condition
- Implement active restoration regimens, including thinning, burning, weeding and planting, on many more forest and woodland sites

The Chicago Wilderness Conservation Design For Woodlands

Building upon the vision and goals of the *Biodiversity Recovery Plan*, which ranked woodlands in the first tier of conservation targets, the "Chicago Wilderness Conservation Design for Woodlands," (Glennemeier 2002a) a draft of which was completed in 2002, establishes specific benchmarks in five-year increments toward the realization of refined goals by 2025:

- By 2025, the region will include a mosaic of woodlands that sustains diverse communities and stable populations of the flora and fauna that constitute native woodland ecosystems
- By 2025, all woodlands will have been identified and prioritized according to their restoration, management and/or acquisition needs and potential. All woodlands that are currently healthy should receive highest priority
- By 2025, all healthy sites will be sustainable as such with a "maintenance level" of management that is much less labor and resource intensive than currently needed levels of restoration
- Healthy woodlands shall consist of mature trees with 50 to 80 percent cover, a nearly continuous herbaceous layer that includes conservative species, and a diverse assemblage of native animal and plant species overall

- By 2025, there will be a minimum of:
  - o 3,000 acres of flatwoods
  - o 15,000 acres of wet-mesic woodlands
  - o 25,000 acres of mesic woodlands
  - o 8,000 acres of dry-mesic woodlands

Conservation of Wooded Lands in the Chicago Region: A Model Policy

In November 2003, the Chicago Wilderness consortium approved a policy paper entitled, "Conservation of Wooded Lands in the Chicago Region: A Model Policy," (Frankel and Mariner 2003) which seeks to build consensus and foster implementation of the recommendations in the *Biodiversity Recovery Plan* that relate to the region's wooded communities. Specific management recommendations for all of the region's wooded communities include:

- Manage consistently a sufficient number of diverse sites for at least 20 years [to improve our understanding of these communities]
- Develop site-specific management plans for all managed and unmanaged sites, even if that means developing only a simple monitoring plan for an unmanaged area. Taking into account what community types were present historically on a site, land management plans should address:
  - o The control of invasive trees and other invasive plants
  - o The restoration of predator/prey balance
  - o The control of white-tailed deer
  - o The management of the spread of gypsy moths in such a way that does not threaten other Lepidoptera species
  - o The use of controlled burns
  - o The restoration of natural hydrology

2.2.5 Upland Forest

Description

Upland forests historically developed under 80 to 100 percent canopy cover. They have multi-layered structure with canopy, sub-canopy, shrub and herbaceous layers. Canopy tree species are well represented in varying size classes from seedling to canopy-sized individuals. There are three sub-types based on soil moisture: dry-mesic, mesic and wet-mesic.

***Biodiversity Recovery Plan* Status Ranking: Fair to Poor**

The *Biodiversity Recovery Plan* ranked all sub-types of upland forests in the fourth tier of conservation targets, with the footnote that upland forests dominated by oak stands are of higher concern than those dominated by maple stands. Dry-mesic upland forest rated fair for condition, but mesic and wet-mesic subtypes rated poor. All three sub-types rated of medium biological importance with good distribution in the region and elsewhere. With the exception of the wet-mesic sub-type, totaling only 72 acres in northeastern Illinois (Table 2.3), upland forests rated moderate risk for quantity. Identified threats included lack of fire, fragmentation, overbrowsing by excessive populations of deer, encroaching development and invasive species, particularly buckthorn.

Recent Recovery Efforts

Harms Woods in Cook County, Illinois and Maple Grove in DuPage County, Illinois are examples of well-managed sites, increasing in biodiversity.

Indicators

The experts convened in 2004 to assess the status of this community identified select species within the shrub layer, including American hazelnut, witch hazel, and viburnums, and oak reproduction, as possible positive indicators of quality for this community. In its draft quality index, the Chicago Wilderness Woods Audit combines the Floristic Quality Index, canopy cover and four measures of invasive species.

Specific, measurable indicators of quality need to be formally identified and adopted for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair to Poor**

According to Glennemeier (2004, p.18), "Overall, CW wooded lands [which include upland forests] were characterized by few high quality plots, an abundance of invasive species, and a changing character of the woodlands from oak-dominated to that dominated by invasive species." Taking into account floristic quality, canopy trees and four measures of invasive species, the audit rates 42 percent of the region's oak woods as poor, 38 percent as fair, 17 percent as good and only four percent as excellent. Of high concern is the degenerating shrub layer in mesic upland forests, and the fact that oak woods are being replaced by maple stands. Maple stands that derive from the degradation of natural oak communities lose the biodiversity characteristic of oak communities and do not

TABLE 2.5
COMPARISON OF ACRES IN CHICAGO WILDERNESS REGION BY COMMUNITY TYPE AND GRADE, 1999–2004

Data are from the Illinois Nature Preserves Commission Natural Areas Inventory, 2004. Grade D and E lands are not included, which explains why the sum of Grades A, B and C acres do not always equal the amount of total acres.

Illinois Natural Areas Inventory Grades (Taft et al.):
Grade A: Relatively stable or undisturbed communities
Grade B: Late successional or lightly disturbed communities
Grade C: Mid-successional or moderately to heavily disturbed communities
Grade D: Early successional or severely disturbed communities
Grade E: Very early successional or very severely disturbed communities

CW category	INAI community type	Total no. of acres	% Grade A	% Grade B	% Grade C
Lakeshore	Beach	63	76	24	0
	Foredune	102	84	16	0
Cliff	Dolomite cliff	7.5	73	27	0
	Dry-mesic barren	6	0	0	100
	Eroding bluff	11.4	91	9	0
Forested	Dry-mesic upland forest	1236.5	15	46	25
	Mesic floodplain forest	243	2	29	63
	Mesic upland forest	980	19	50	26
	Northern flatwood	92.9	0	93	2
	Sand flatwood	261	0	8	87
	Wet floodplain forest	32	0	100	0
	Wet-mesic floodplain forest	34	0	76	24
	Wet-mesic upland forest	50	0	100	0
Prairie	Dry gravel prairie	29	10	31	10
	Dry sand prairie	179.2	68	9	23
	Dry-mesic dolomite prairie	27	7	10	56
	Dry-mesic gravel prairie	3	33	33	33
	Dry-mesic prairie	19	26	53	21
	Dry-mesic sand prairie	370.3	63	12	17
	Gravel hill prairie	5.6	0	100	0
	Mesic dolomite prairie	18	11	33	56
	Mesic gravel prairie	22	41	41	14
	Mesic prairie	417.9	9	44	39
	Mesic sand prairie	477.1	22	18	39
	Wet dolomite prairie	5	0	100	0

Continued

CW category	INAI community type	Total no. of acres	% Grade A	% Grade B	% Grade C
	Wet prairie	214.1	7	33	57
	Wet sand prairie	293	27	25	33
	Wet-mesic dolomite prairie	91	0	16	65
	Wet-mesic prairie	277.5	11	22	58
	Wet-mesic sand prairie	69.4	25	12	63
Shrubland	Shrub prairie	78.5	0	38	12
Savanna	Dry sand savanna	277	40	4	23
	Dry-mesic sand savanna	388	11	27	42
	Dry-mesic savanna	3	0	0	100
	Mesic savanna	20	0	100	0
Wetland	Acid gravel seep	7	0	100	0
	Calcareous floating mat	169	62	36	2
	Calcareous seep	19.1	63	11	0
	Forested bog	107	29	64	0
	Forested fen	22.5	0	64	36
	Graminoid bog	7	71	29	0
	Graminoid fen	277.8	24	26	32
	Low shrub bog	34	62	24	0
	Low shrub fen	0.4	100	0	0
	Marsh	2098	14	70	13
	Panne	67	81	4	15
	Sedge meadow	1018.3	16	31	42
	Seep	28.6	41	35	10
	Shrub swamp	12	42	8	50
	Tall shrub bog	16	0	88	13

gain the biodiversity of healthy beech-maple forests. In spite of recent land acquisitions, many acres of upland forest—most in private holdings—remain unprotected and therefore threatened with development or further degradation. With the majority of both protected and unprotected areas unmanaged or under-managed, other threats remain unchanged and include lack of fire, fragmentation, overbrowsing by excessive populations of deer, and invasive species, particularly buckthorn. (The Woods Audit found more than 26 million buckthorn stems greater than 1 meter tall in the woods represented in the study, or an average of 558 stems per acre (Glennemeier 2004).)

2.2.6 FLOODPLAIN FOREST

Description

Historically rare in the Chicago Wilderness region, floodplain forests occur on the floodplains of rivers and streams. Developed under less than 80 percent canopy cover, they are shaped by the frequency and duration of flooding, by nutrient and sediment deposition and by the permeability of the soil. The understory in floodplain forests is more open due to the frequency of flooding. Floodplain forests also provide benefits to river systems by trapping sediment and improving water quality, as well as slowing floodwaters. The soil moisture classes include wet-mesic and wet.

Twenty-year Woody Vegetation Changes in Northeastern Illinois Upland Forests

The *Biodiversity Recovery Plan* ranked many of the region's woodlands in the first tier of conservation targets, a principal concern being that forest fragmentation and the absence of fire were allowing for an increase in maples at the expense of oaks and overall forest diversity. To test whether such changes were specifically occurring in upland forests of the Chicago Wilderness region, Bowles *et al*. (2000) resurveyed 28 high-quality forest stands originally studied by the Illinois Natural Areas Inventory in 1976.

In brief, their findings suggest that woody vegetation structural and compositional diversity have declined in both maple and oak stands in the past 20 years and that this condition is apparently linked to changes in forest structure that began when fire suppression began. Because these stands represent the communities' natural historical condition, they provide potential for restoring former structure and biodiversity. The researchers recommended that a high management priority should be to prevent further decline in oak stands by restoring natural disturbance processes and stand dynamics. They also recommended further research to determine if canopy-level disturbance is needed to maintain openings that will allow for the maintenance of shrub layer species and oak regeneration in these forests. Fire appears to be the management tool principally needed, but it may have positive and negative effects without supplemental control of non-native species and fire-resistant vegetation (Bowles *et al*. 2000).

Biodiversity Recovery Plan **Status Ranking: Fair**
Both sub-types of floodplain forest, wet and wet-mesic, ranked in the fifth tier of conservation targets. Both rated moderate risk for quantity, in fair condition, of medium biological importance and with good examples in the region and elsewhere. In 1999, a high percentage of remaining floodplain forests, totaling 2,722 acres (Table 2.3), were protected in forest preserve holdings. The principal threat identified was altered hydrology—more frequent floods of longer duration. Additional threats included sedimentation and the suppression of fire.

Recent Recovery Efforts
No well-managed floodplain forest sites have been identified.

Indicators
Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

Report Card **Condition Ranking: Fair**
There is no change in the ranking of the region's floodplain forests. The primary threat remains altered hydrology, with sediment loading contributing to their demise. Continued development is expected to exacerbate the frequency and duration of flooding, which, along with the suppression of fire, will further alter the composition of native plants and encourage the spread of non-native invasive species. Nutrient enrichment, including salt deposition, may foster the growth of invasive species such as reed canary grass and *Phragmites*.

2.2.7 Flatwoods

Description
Developed under 50 to 80 percent canopy cover or less, flatwoods historically occurred on level or nearly level soil that has an impermeable or slowly permeable layer, which causes a shallow, perched water table. Northern flatwoods are found within the Valparaiso, Tinley and lake border morainic systems on poorly drained, nearly level ground. Sand flatwoods, more typical in the southern portion of the region, developed on soils with a meter or more of acidic sand over silty clay. Flatwoods are key amphibian breeding grounds and provide habitat for

a number of threatened and endangered species, including purple-fringed orchid and dog violet. Vernal ponds within flatwoods support unique communities of aquatic invertebrates.

***Biodiversity Recovery Plan* Status Ranking: Fair**
Northern and sand flatwoods ranked in the second and third tier, respectively, of conservation targets. The Nature Conservancy ranked northern and sand flatwoods as critically imperiled globally and imperiled globally, respectively. Both sub-types rated high risk for quantity and of high biological importance, but widespread in distribution and in fair condition. Lack of fire, invasive species—particularly buckthorn—and an overabundance of white-tailed deer were identified as primary threats, along with changes in hydrology, as these communities are possessed of a delicate moisture balance.

Recent Recovery Efforts
In northeastern Illinois, northern flatwoods are responding well to management. Specific examples of well-managed flatwoods include MacArthur Woods, Harms Woods and Dunklee's Grove in Fischer Woods Forest Preserve (see sidebar).

Indicators
Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair**
There is no change in the ranking of the region's flatwoods. Threats, as identified by Glennemeier (2002a) in the "Chicago Wilderness Conservation Design for Woodlands," include:

- Excess shade and competition
- Fragmentation and loss of habitat
- Changes in hydrology and microclimate, including chemical loading
- Excessive browsing and grazing by overabundant deer
- Limited public understanding of the threats to woodlands
- Lack of knowledge about the ecology, status and means of restoration for Chicago Wilderness woodlands

Toward the conservation design goal of 3,000 healthy acres of flatwoods by 2025, the 2005 benchmark is 300 acres. In 2004, the Illinois Natural Areas Inventory rated a combined total of 107 northern and sand flatwoods acres as Grade A and B (Table 2.5). (Illinois Natural Areas Inventory Grades A and B are considered to be "healthy" with grades C – E progressively less so.) Data were not available on how many healthy flatwoods acres there may be in the Wisconsin and Indiana portions of the Chicago Wilderness region (Tables 2.5 and 2.6).

Given the 1,290 total number of protected flatwoods acres identified in the Chicago Wilderness region in 1999, the conservation design goal of 3,000 acres of healthy flatwoods by 2025 implies the need to markedly increase restoration management on protected flatwoods and to identify and target non-protected flatwoods for similar treatment. Since the publication of the *Biodiversity Recovery Plan*, at least 25,980 acres of natural lands have been acquired in northeastern Illinois, but most had not been classified by community type by the time this report was pub-

Table 2.6
Illinois Natural Areas Inventory Grades

Grade A
Relatively stable or undisturbed communities

Grade B
Late successional or lightly disturbed communities

Grade C
Mid-successional or severely disturbed communities

Grade D
Early successional or severely disturbed communities

Grade E
Very early successional or very severely disturbed communities

Dunklee's Grove in Fischer Woods Forest Preserve

Located along Route 83, south of Bensenville, Illinois, the Fischer Woods Forest Preserve was established with an initial 72 acres in 1971. Eventually expanded to more than 100 acres, much of the preserve is underlain with a poorly-drained clay subsoil, a hallmark of flatwoods. Dunklee's Grove within the preserve is a 68-acre flatwoods, one of only a few wet forest sites in DuPage County.

According to Scott Kobal, a plant ecologist for the Forest Preserve District of DuPage County, the site has been actively managed by a dedicated volunteer corps since at least 1989. Along with district staff, volunteers have cut and herbicided invasive trees and shrubs, and seeded and planted native herbaceous ground layer and native shrub species. Limited prescribed burning occurred in 1993 and 1999.

The site appears to be responding well to management efforts. District staff established two one-acre monitoring plots in 1979, and beginning in 1992 have periodically conducted additional random quadrat surveys. The data reveal a steady and sizeable increase in the number of native species and the percentage of groundcover, and smaller, but still steady, increases in the Floristic Quality Index (FQI). After a significant drop in the number of red oaks between 1979 and 1989, this characteristic flatwood species has been steadily increasing ever since.

Additional monitoring is conducted by a local volunteer steward as part of the Chicago Wilderness Plants of Concern (POC) monitoring program. POC species monitored include *Carex tuckermanii* and *Carex bromoides*, bent-seeded hop sedge and brome hummock sedge. In addition to these rare plants, the site boasts seasonal celebrations of color typical of healthy flatwoods. Every spring there are trout lillies, woodland phlox, spring beauties, wild geraniums and Dutchman's breeches. Summer and fall are accompanied by goldenrods and asters.

Kobal, who conducts much of the monitoring throughout the district's holdings, emphasizes the need for sound management. "It's simple. Where we manage, we see natural communities at least holding their own, many of them improving. Where we aren't able to manage effectively, we generally see a decrease in biodiversity—fewer native species, lowered FQI, more non-native invasive species. The effects of management vs. non-management couldn't be clearer" (S. Kobal 2004).

lished. Neither was information available about the amount of flatwoods acres that may have been acquired in the Wisconsin and Indiana portions of the Chicago Wilderness region.

2.2.8 Woodlands

Description

Woodlands developed historically under a canopy cover between 50 and 80 percent. This community may have had a well-developed shrub layer, which has become shade suppressed in modern times. A conservative woodland shrub and herbaceous layer may be present in the best quality remnants. Woodlands may differ from savannas in having significantly higher populations of spring ephemerals. Woodlands are particularly important for biodiversity, being species-rich in amphibians, reptiles, mammals, invertebrates and especially birds. The better and larger examples harbor a number of endangered and threatened plant species, including northern cranesbill, pale vetchling and buffalo clover. Woodland and savanna insect assemblages are potentially globally significant. Woodland sub-types are dry-mesic, mesic and wet-mesic.

***Biodiversity Recovery Plan* Status Ranking: Poor**
All three sub-types of woodlands are ranked in the first tier of conservation targets. The Nature Conservancy ranked wet-mesic woodlands as critically imperiled globally. Of moderate risk for quantity, all three sub-types rank in poor condition and of high biological importance.

Recent Recovery Efforts
Prime examples of woodland recovery efforts include Waterfall Glen in DuPage County, Illinois and Swallow Cliff in Cook County, Illinois.

Indicators
Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor**
The Chicago Wilderness Woods Audit results presented in the condition ranking for upland forests applies equally to woodlands: 42 percent of the region's woodlands rank poor, 38 percent fair and a combined 21 percent good or excellent. In spite of several notable recovery efforts, the majority of the region's woodlands remain unmanaged or undermanaged (Glennemeier 2004). Even in managed sites, however, there is concern about the lack of natural oak regeneration. Threats, as identified by Glennemeier (2002a) include:

- Excess shade and competition
- Fragmentation and loss of habitat
- Changes in hydrology and microclimate, including chemical loading
- Excessive browsing and grazing by overabundant deer
- Limited public understanding of the threats to woodlands

Toward the conservation design goal of a combined 48,000 healthy acres of woodlands by 2025 (15,000 wet-mesic, 25,000 mesic and 8,000 dry-mesic), the 2005 combined benchmark is 4,800 acres (1,500, 2,500 and 800, respectively, by sub-type). The Illinois Natural Areas Inventory does not identify woodlands as a forested community type. However, applying the percentage of excellent-rated (four percent) and good-rated (17 percent) oak wood plots, as determined by the Chicago Wilderness Woods Audit, to the 5,378 total acres of protected woodlands in the Illinois and Indiana portions of the region (Table 2.3), then there are approximately 1,130 acres of healthy woodlands within the Chicago Wilderness region—more than 3,600 acres short of the conservation design goal of 4,800. However, there may be more healthy woodland acres in the region, as the 14,595-acre figure does not include woodlands from Wisconsin, nor any that may have been acquired since the publication of the *Biodiversity Recovery Plan*.

Given the 5,378 total number of protected woodland acres thus far identified in the Chicago Wilderness region, the future goal of 48,000 total acres by 2025 of healthy woodlands implies the need to markedly increase restoration management on protected woodlands and to identify and target unprotected woodlands for similar treatment. Indications are that the majority of the region's remaining woodlands are hardly recognizable as woodlands because they are so overrun by invasive of trees and shrubs.

2.2.9 Recommended Actions

The primary recommendation is to increase the level of restoration management for the region's forested communities, in particular oak woodlands and forests. In the "Conservation Design for Woodlands," Glennemeier (2002a) recommends four principal management actions for each of the six identified threats:

- Re-open habitat through prescribed fire and invasive species control programs
- Identify potential land for protection or purchase; purchase or otherwise protect as much of this identified land as possible
- Develop specific hydrology restoration plans at each site; increase size of buffer area of woodland sites where possible
- Identify sites where deer are a problem and institute deer control programs; establish standard protocol for monitoring deer impacts

Cost estimates must become part of the recovery effort equation. Toward a goal of restoring 70 percent of the region's existing 42,574 acres of upland forest, woodland and savanna in northeastern Illinois and the Indiana Dunes area, Glennemeier (2004, p. 21) estimates the need for between $10 million and

Twenty-year Woody Vegetation Changes in Northern Flatwoods and Mesic Forest at Ryerson Conservation Area, Lake County, Illinois

Related to the research undertaken to test the maple, oak and overall forest diversity changes in upland forests, in 1997 Bowles et al. (2003) resampled flatwoods and mesic forest stands in the Ryerson Conservation Area, first sampled by the Illinois Natural Areas Inventory in 1976.

The findings suggest that the decline in mid-sized oaks and shrub layers species in the northern flatwoods are apparently due to canopy closure, a process that probably started when fire began to be suppressed in the local landscape. In the sugar maple-dominated mesic forest stand, the decline of oaks may be less closely linked with fire suppression, and the increase in maple saplings might have been triggered by more recent loss of canopy elms. Over-browsing by eastern white-tailed deer could have enhanced the decline of shrubs in both stands. The trends of increasing ash and maples in these stands indicate that they will become less diverse unless management can restore canopy structure that will maintain shrub layer species and allow oak regeneration. Restoration goals and applied research are needed to guide recovery. Controlled fire appears to be the principal tool, especially in flatwoods, but it may have positive and negative effects (including the promotion of some invasive species), and supplemental cutting of fire-resistant vegetation may be required (Bowles et al. 2003).

$48 million for restoration and recommends developing, "a solid, defensible estimate of restoration costs that we can use to seek large scale funding for wooded lands restoration."

Concurrent with stepped up levels of restoration management, the Chicago Wilderness consortium must establish specific, measurable, region-wide recovery goals, indicators and monitoring protocols for the region's forested communities. A region-wide database should be created to provide for up-to-date mapping of forested areas by forest community type, protected vs. non-protected and managed vs. unmanaged. The Chicago Wilderness Woods Audit or some comparable study should be expanded to include all forested community types and be repeated every five or 10 years in order to obtain trend assessments.

Glennemeier (2002a) further recommends the following:

- Educate public officials about woodland ecology and restoration; work with public agencies to improve water laws and regulations; develop a "forest preserve good neighbor" program
- Identify priority research questions; develop funding mechanisms to support priority research; connect professional scientists, natural resource managers and volunteers for sharing of knowledge and resources

Acknowledging the need to strengthen ties to the academic community, priority research recommendations include, but are not limited to these:

- Improve understanding of the fire history of forests in order to establish the most effective prescribed burn regimens
- Study the impacts of fire on fauna—whether or not to burn and when and how often to burn to avoid unnecessary injury to and increase benefits for animals
- Improve the understanding of shrub layers
- Research wet-mesic upland forest, a rare, distinctive community about which little is known
- Research floodplain forests and how they are impacted by forces beyond forest boundaries, namely development and stormwater management, to be able to recommend appropriate management plans

- Monitor amphibian, bird and insect assemblages for all forested communities
- Research lack of oak regeneration in managed forests
- Identify examples of all forest communities and their management in each county
- Monitor how fauna responds to fragmentation (Glennemeier 2002a)

2.3 Savanna Communities

2.3.1 Overview of Findings

In general, sand savannas continue to fare better than fine-textured soil savannas, primarily due to the fact that more sand savannas are managed. Nonetheless, among all savanna types there is a widening disparity in quality between managed sites and the balance of sites, which are unmanaged or under-managed. Considerably more sites need to be managed, at a minimum with prescribed burns. It is also imperative to establish region-wide consensus on savanna recovery goals, management strategies, monitoring protocols and research needs.

2.3.2 Condition of Data

The Chicago Wilderness Woods Audit includes savanna sites in its sampling, however not enough to be able to determine anything definitive about their condition region-wide. Various savanna-related data are available, including the work by Bowles and McBride (1998). This study identifies a possible management strategy for one of the few remaining tracts of original midwestern savanna at Wolf Road Prairie; components of which could provide "a necessary reference system for [savanna] community restoration." However, most savanna-related data have yet to be sufficiently compiled and analyzed to inform current region-wide status and trends. Consequently, the following condition rankings of savanna community types are based primarily on local experts' observations from the field.

2.3.3 Community Description

Historically maintained by fire, savannas are wooded communities with graminoid groundcover, which developed historically under an average tree canopy between 10 and 50 percent. A savanna may have shrubby areas and the tree canopy may locally be greater or less than the above limits. Savannas often have soils that are transitional between forest and prairie and they have distinctive plants and animals. They were once common across the Chicago Wilderness region, but few high quality stands remain. Many acres of savanna are so degraded that they are barely recognizable as savannas. All savanna types are biologically significant due to their species richness and numbers of rare species. Individual savanna sub-types are distinguished by soil moisture:

- Fine-textured soil savanna
  - o Dry-mesic
  - o Mesic
  - o Wet-mesic
- Sand savanna
  - o Dry
  - o Dry-mesic
  - o Mesic

2.3.4 Long-term Vision and Goals

Recognizing a responsibility to preserve both fine-textured and sand savannas—collectively one of the most rare natural communities on earth—the vision is to dramatically improve the condition and integrity of all remaining savanna types within the region. The *Biodiversity Recovery Plan* articulates not goals, per se, but a framework for determining future goals, which include 1) focusing on the health of savanna communities, their ability to regenerate and their role in a matrix of other natural community types, 2) the restoration of natural ecological processes, such as fire, and 3) securing savannas of sufficient size, and managing them properly to sustain viable populations of birds, reptiles and amphibians.

Without providing any parameters, the *Biodiversity Recovery Plan* acknowledges that small savannas can have value if managed properly, but conjectured that larger savannas would be most cost effective to manage and best able to allow landscape-scale processes, such as fire, to occur. To maintain viable populations of savanna reptiles and amphibians, the *Biodiversity Recovery Plan* recommends the establishment of multiple savanna sites of between 200 and 500 acres with functional connections for dispersal to other habitat types.

Vegetation Change after Thirteen Years of Fire Management of a Northeastern Illinois Oak Woodland

To assess the long-term effects of fire, especially on how repeated burning affects ground-layer composition, in 1986, Apfelbaum and others (2000) established permanent transects in the Reed-Turner Woodland, part of the Reed-Turner Nature Preserve in Lake County, Illinois. The results suggest that long-term (13 years) fire-management can change ground-layer composition and structure and can result in increased ground layer species richness in oak woodland. This increase did not reflect dramatic increases in most species, but rather small increases in many species. However, these cumulative changes led to important shifts in ground-layer structure, with increased graminoid and forb abundance, and decreased woody abundance.

This increase was not detectable after six years, after which removal of shrub-layer vegetation was initiated in treatment plots. Although an effect of shrub-layer removal could not be detected statistically, it may have contributed to the increase in plot richness, especially if supplemented by wide-scale removal of non-native shrubs. Removal of shrub-layer species may have caused the loss of a potentially important structural component of woodland diversity, and repeated burning has probably enhanced the persistence of invasive, non-native garlic mustard.

These results suggest that fire management to restore richness of oak woodland ground-layer vegetation requires long term efforts. Supplementary removal of shrub-layer species may enhance this process, but should focus on non-native species and tree saplings that have the capability of directly altering canopy structure. However, realistic goals for species composition and structure are not yet clear (Apfelbaum, et al. 2000).

2.3.5 Fine-Textured Soil Savanna

Description

Fine-textured soil savannas historically occurred as an ecotonal belt along streamside forests, as "islands" in prairie or forest and on extensive areas of hilly land. Three sub-types, based on soil moisture, are dry-mesic, mesic and wet-mesic.

Biodiversity Recovery Plan Status Ranking: Poor

All sub-types of fine-textured soil savannas ranked in the first tier of conservation targets. In 1999, there were 4,453 acres of fine-textured soil savanna in northeastern Illinois, but only 23 acres listed in the Illinois Natural Areas Inventory (Tables 2.3 and 2.5). In Indiana, there were only 34 total acres (Table 2.3). Although the three sub-types rated differently for quantity—wet-mesic being at the highest risk—all three rated in poor condition, of high biological importance and significant for global conservation. The Nature Conservancy ranked all fine-textured soil savannas as critically imperiled globally. Identified threats to savannas included fragmentation, altered hydrology, the absence of fire, deer grazing and the erosion of soils due to the presence of buckthorn and the shading of the ground layer.

Recent Recovery Efforts

Several recovery efforts are underway in the region. Among those in Illinois are Somme Prairie Grove and Bakers Lake Savanna in Cook County, Bluff Savanna at Waterfall Glen in DuPage County and Middlefork Savanna in Lake County.

Indicators

The 2004 workshop group did not identify specific indicators of quality for this community. However, one regional expert suggested that the following are some of the species that indicate the presence of a high-quality fine-textured soil savanna:

- *Aralia nudicaulis*
- *Arenaria lateriflora*
- *Corylus americana*

- *Danthonia spicata*
- *Luzula multiflora*
- *Panicum latifolium*
- *Pedicularis canadensis*

These indicator species should be reviewed and adopted if appropriate. In addition, other specific, measurable indicators of quality may need to be identified for this community. These are recommendations for future report cards.

***Report Card* Condition Ranking: Poor**

The Illinois Natural Areas Inventory reports an increase in the number of fine-textured mesic savanna acres, from 23 in 1999 to 80 in 2004, which may indicate a modest increase or improvement in management. Nonetheless, the vast majority of the region's remaining fine-textured soil savanna sites remain unmanaged or under-managed, and consequently in poor health. The threats to savanna sites continue to be fragmentation, altered hydrology due to the development of surrounding lands, the absence of fire, deer grazing, erosion and the presence of invasive species, including non-savanna trees.

2.3.6 Sand Savanna

Description

Characterized by sandy soils, sand savannas are associated with dune and swale topography and beach ridges. Historically not as prevalent as fine-textured soil savannas, sand savannas are among the most rare community types in the Chicago Wilderness region. Most of the region's remaining sand savannas are in southwestern Will County, Lake County, Illinois and northwestern Indiana. The herbaceous vegetation of a sand savanna is similar to that of sand prairies, with which it usually mixes. Three sub-types are distinguished by soil moisture: dry, dry-mesic and mesic.

***Biodiversity Recovery Plan* Status Ranking: Fair to Good**

The Nature Conservancy ranked dry-mesic sand savanna as imperiled globally. However, this subtype ranked in the third tier of conservation targets for the Chicago Wilderness region because of its relative abundance compared to other sand savanna types and the generally well-managed quality of remaining sites, which include Indiana Dunes, Illinois Beach State Park and Braidwood Dune and Savanna. In 1999, in the Illinois and Indiana portions of the Chicago Wilderness region, there were 885 acres of dry-mesic sand savanna, of which 388 were listed in the Illinois Natural Areas Inventory (Table 2.3 and Table 2.5). By comparison, there were only 495 acres of dry sand savanna, which ranked in the second tier of conservation targets. Mesic sand savanna ranked in the first tier. Although what little remains is well managed, it is historically rare and occurs in a specific type of hydrology within a specific topography. Identified threats to this and all remaining savannas included fragmentation, altered hydrology, the absence of fire, deer grazing, the erosion of soils due to the presence of buckthorn and shading of the ground layer, and the presence of other invasive plant species.

Middlefork Savanna

About 20 years ago, a 30-acre remnant savanna was "discovered" at the edge of a farm field along the channelized Middle Fork of the North Branch of the Chicago River. With funding provided by the Lake Forest Open Lands Association and the Lake County bond referenda to acquire open space, the protected site has grown to approximately 700 acres. During the past 10 years, forest preserve crews and a small army of volunteers have hand cleared a high-quality 25-acre core savanna area, cleared more than 150 acres of additional savanna acres, seeded more than 150 acres with native plants, restored the natural hydrology to 200 acres, intensively managed for teasel, reed canary grass and purple loosestrife and conducted a regular fire management plan. To date, more than 300 plant species have been identified on site, along with numerous species of fish, frogs and birds, including shorebirds, warblers and even bald eagles (Parker 2004).

Bluff Savanna, Waterfall Glen

Totaling more than 700 acres, this community is a forest/woodland/savanna complex on top of the south facing bluff overlooking the Des Plaines River. Management of the bluff started in 1984 with the clearing of a 20-acre section of the community. Since then, much of the bluff has been managed by a combination of clearing, herbiciding of invasive species (such as buckthorn), prescribed burning and deer control. During the last 20 years, burning of any one area has taken place approximately two of every five years. Management of deer has been ongoing since 1995. Two one-acre monitoring plots were established in 1985 and a third was added in 1986. Monitoring has included vegetative sampling (by quadrat and total vegetation), tree demography and light. The Bluff Savanna exhibited reasonably good quality (INAI grade C) when the monitoring began. Management during the last 20 years has lifted this quality to a grade B as exhibited in the overall quality rating. A slight dip in diversity was noted in the mid 1990s due to deer browsing. This was reversed with the advent of a deer management program (Lampa 2004).

Recent Recovery Efforts
Recovery efforts include sites at Illinois Beach State Park and Spring Bluff in Lake County, Illinois.

Indicators
The *Biodiversity Recovery Plan* offers the Karner blue butterfly, where it occurs, as a guide in defining management goals for sand savannas. Indicators of a lower-quality or less healthy site include the presence of buckthorn, alien honeysuckle, alien thistles, reed canary grass, teasel and garlic mustard.

A complete set of specific, measurable indicators of quality for this community need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor to Good**

In general, drier savannas rank in better condition than wet savannas. Although sand savannas are comparatively less susceptible to invasive species because their sandy soils are drier and less fertile, unmanaged sites nonetheless become overgrown, which alters the delicate moisture gradient and leads to a rapid loss of community structure and diversity. The drier environment, however, also makes it easier for fires to burn, rendering this savanna type well responsive to prescribed burning as a management tool. Sand savannas also are susceptible to erosion and loss of ground layer. The updated Illinois Natural Areas Inventory lists a total of 612 acres of dry-mesic sand savanna, an increase of 224 over the 1999 total (Table 2.5). However, although the number of acres is increasing, the general consensus among natural resource managers is that the status of these communities is declining.

2.3.7 Recommended Actions for Savannas

The *Biodiversity Recovery Plan* contains numerous recommendations for all terrestrial community types. Primary among them is the need to increase the number of acres under management on public lands and those outside of existing preserves. This remains the primary recommendation for savanna communities. At a minimum, more savanna sites should be managed with prescribed burns.

Equally important is the need to refine the *Biodiversity Recovery Plan's* broad savanna recovery vision and develop specific, measurable, region-wide outcomes. Key to this effort would be the development of a conservation design or similar instrument, along the lines of the "Chicago Wilderness Conservation Design for Woodlands" (Glennemeier 2002a), which would be a step in the right direction toward establishing measurable recovery benchmarks, management strategies and monitoring protocols. Part of this effort should include identifying, compiling and analyzing what savanna data exist. In order to be able to quantify the future status and trends of the region's savanna communities, all savanna areas should be inventoried.

2.4 Prairie Communities

2.4.1 Overview of Findings

There are no changes in the condition status of any prairie community type—overall, all prairie types remain in poor condition. As is the case with the region's other community types, there are examples of significant biodiversity recovery at select sites that are well managed. However, the majority of the region's prairie sites remain unmanaged or undermanaged, resulting in a further decline in quality. This decrease more than offsets the gains made at the comparative handful of managed sites. The primary recommendation, therefore, is to manage more prairie sites. Hand in hand with this recommendation is the need to develop specific indices of prairie health, recovery goals and monitoring protocols to be able to quantify progress toward region-wide recovery goals.

2.4.2 Condition of Data

There are several available data sets related to prairie communities. Among them are Ron Panzer's 20-year survey of insects in sand prairies and sand savannas (Panzer 2005), and Marlin Bowles' and Michael Jones' reinvestigation of 109 high quality prairie and wetland sites identified and sampled by the Illinois Natural Areas Inventory in 1976 (Bowles and Jones 2003). The Illinois Critical Trends Assessment Program (and its sister program PrairieWatch, until its suspension in 2004 due to state budget cuts) has been monitoring sites throughout Illinois, including the Illinois portion of the Chicago Wilderness region, since 1997. These and other data sets provide important information, but regional analysis of the data remains limited.

2.4.3 Community Description

Historically widespread throughout the Chicago Wilderness region, prairies have suffered more loss than any other community type. In Illinois, only one-hundredth of one percent of original high quality prairie remains (Critical Trends Assessment Project 1994). Prairies include many types, all of which are dominated by native grasses of differing heights and character on primarily mineral soils. They can be found on all substrates from clay to gravel and have soil moistures ranging from dry to wet. Trees may be present, but less than 10% of the area has a canopy cover. Prairies rate very high in biological importance due to their high levels of diversity, particularly of plants and insects. Throughout the region, prairies exist today mostly in small, isolated remnants, very few of which are high quality. Primary classification is by soil type, with sub-types determined by soil moisture:

- Fine-textured soil prairie
  - o Dry
  - o Mesic
  - o Wet
- Sand Prairie
  - o Dry
  - o Mesic
  - o Wet
- Gravel Prairie
  - o Dry
  - o Mesic
- Dolomite Prairie
  - o Dry
  - o Mesic
  - o Wet

2.4.4 Long-term Vision and Goals

The *Biodiversity Recovery Plan* outlines a broad vision to protect multiple examples of all indigenous prairie types, and to manage and restore them in such a way that landscape-scale natural processes—such as fire, hydrology and gene flow between populations—sustain viable populations of all area-limited species and formerly common species. The *Biodiversity Recovery Plan* calls for the active protection of all high-quality prairie remnants that are large enough to sustain native species far into the future, greatly increased and improved levels of management of all prairie remnants and other natural communities in a matrix of restored prairie and unrestored grasslands, and far more acreage of restored prairie. As there remain especially few examples of gravel and dolomite prairies, all sub-types of these prairie types should be protected. All remaining good-quality prairie sites, such as those listed by the Illinois Natural Areas Inventory as grade C or above, should be protected and improved. All prairie sites currently under protection should be vigorously managed and, where possible, expanded to make management more efficient.

2.4.5 Fine-Textured Soil Prairie

Description

Historically the most abundant of the four prairie types, fine-textured soil prairies are comprised of deep and fine-textured soils, usually silt loam or clay loam derived from loess or glacial till, although these prairies may also occur on alluvium. Soil moisture for these prairies ranges from dry to wet.

***Biodiversity Recovery Plan* Status Ranking: Poor**

According to the *Biodiversity Recovery Plan*, fine-textured soil prairies ranked in the first tier of conservation targets because 1) the region has so many relatively large, high quality examples and so much adjacent land that is restorable, and in many cases being restored, 2) the region has so many and such large restoration areas, 3) this prairie sub-type has suffered the highest proportional loss of high quality acreage and 4) it is especially important as a gene pool for agriculture since it produced the soils that are probably the Midwest's long-term most important natural resource.

Recent Recovery Efforts

There are several recovery efforts underway in the region, some long term, some more recent, including Somme Prairie, Markham Prairie, West Chicago Prairie and Midewin National Tallgrass Prairie in Illinois.

Indicators

Indicators of higher quality sites may include prairie drop seed and remnant-dependent insects like moths, butterflies and leafhoppers. A complete set of specific, measurable indicators of quality for this community need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor**

Altered hydrology, concentration of pollutants, habitat destruction, lack of management and the overpopulation of white-tailed deer remain the primary threats to these and all prairie types.

2.4.6 Sand Prairie

Description

Sand prairies form on coarse-textured (sandy) substrates: sand, loamy sand and sandy loam. However, prairies on sandy loam are considered sand prairie only if they are acidic enough to support characteristic plants. Historically, sand prairies probably never were large and occurred in complexes with dunes and other sand communities. They are found in sandy outwash plains, lake plains and valley trains. Sand prairie sub-types are classified by soil moisture, which varies from dry to wet. Remaining examples are concentrated in the Indiana Dunes area, Chiwaukee Prairie, Illinois Beach State Park and the Kankakee River Valley.

***Biodiversity Recovery Plan* Status Ranking: Poor**

All sub-types of sand prairies located in dune and swale topography ranked in the first tier of conservation targets. All other sand prairies ranked in the second tier. Along with fine-textured soil prairies, sand prairies rated very high risk for quantity, in poor condition, of high biological importance and as significantly contributing to global conservation.

Recent Recovery Efforts

Among the region's recovery efforts is Chiwaukee Prairie State Natural Area in Kenosha County, Wisconsin.

Indicators

Indicators of higher-quality sites might include the presence of small mammal species such as the prairie deer mouse. Indicators of lower-quality or degraded sites might include the presence of white-footed mice. A complete set of specific, measurable indicators of quality for this community need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor**

There are no changes in the condition ranking. According to the Illinois Natural Areas Inventory, between 1999 and 2004 there were slight decreases in the number of acres for two of the three sand prairie sub-types (Table 2.5). Altered hydrology, concentration of pollutants, habitat destruction, lack of management and the overpopulation of white-tailed deer remain the primary threats to these and all prairie types.

2.4.7 Gravel Prairie

Description

Naturally small and rare, gravel prairies formed on glacial deposits, which were never abundant in the region or elsewhere. Extensively quarried, the few remaining examples occur in the northern portion of the region, with no examples ever having occurred in Indiana. The gravelly, usually calcareous soils provide rapid permeability, with the resulting sub-types ranging from dry to mesic.

***Biodiversity Recovery Plan* Status Ranking: Poor**

Both sub-types of gravel prairie ranked in the second tier of conservation targets. There are fewer than 100 acres of gravel prairie identified in northeastern Illinois, only one acre of which is dry-mesic gravel prairie (Table 2.3). Both sub-types of gravel prairie rated poor in condition, of high biological importance and important globally. The Nature Conservancy ranked both sub-types as globally imperiled.

Recent Recovery Efforts

An example of a recovery effort is Chicago Ridge in Cook County, Illinois.

Indicators

The 2004 workshop group did not identify specific indicators of quality for this community. However, one regional expert suggested that the following are some of the species that indicate the presence of a high-quality gravel prairie:

- *Agoseris cuspidata*
- *Allium stellatum*
- *Anemone patens wolfgangiana*
- *Asclepias lanuginose*
- *Aster ptarmicoides*
- *Aster sericeus*
- *Carex richardsonii*
- *Cirsium hillii*
- *Linum sulcatum*
- *Panicum wilcoxianum*
- *Oenothera serrulata*

These indicator species should be reviewed and adopted if appropriate. In addition, other specific, measurable indicators of quality may need to be identified for this community. These are recommendations for future report cards.

West Chicago Prairie

This is a 305-acre site comprised of mesic, wet-mesic and wet prairie, as well as sedge meadow and marsh. The site is has been managed by prescribed fire and brush clearing for the last 25 years. In 1984, a monitoring transect, crossing all community types, was laid out west to east across the prairie (approximately one mile in length). The prairie was mostly a grade C/D when management began and generally a grade C when the monitoring protocol was established. (Grade A natural communities are relatively stable or undisturbed while Grade E communities have been severely disturbed; the other grades represent intermediate stages.) Management during the last 25 years has increased the quality of the monitored portion of the site to grade B, reflecting gains in the number of conservative species, the number of native species and overall floristic quality. The average quadrat quality values between 1984 and 2002 for the prairie are as follows: conservatism = +3 percent, native species = +68 percent, and FQI = +38 percent (Lampa 2004).

***Report Card* Condition Ranking: Poor**

There are no changes in the status of either gravel prairie sub-type. Altered hydrology, concentration of pollutants, habitat destruction, lack of management and the overpopulation of white-tailed deer remain the primary threats to these and all prairie types.

2.4.8 Dolomite Prairie

Description

The most rare prairie type in the region as well as across the United States, this community occurs where dolomite limestone is less than 1.5 meters below the surface. Certain common prairie plants are absent because of the shallow soils and high pH, but other species are restricted to dolomite prairies. Most

Midewin National Tallgrass Prairie

In 1993, the U.S. Army designated the 23,500-acre Joliet Arsenal as excess federal land. In 1996, 19,000 acres were designated as the Midewin National Tallgrass Prairie, the nation's first national tallgrass prairie, "to be managed as open space for ecosystem restoration and outdoor recreation" (Midewin National Tallgrass Prairie 2005). The recently adopted Midewin Land and Resource Management Plan calls for restoration, over 15 to 20 years, of the site's native prairie and woodland communities, including 4,020 acres of upland prairie. Among the 850 acres of prairie, savanna and wetland areas restored to date is the 460-acre South Patrol Road site. The Wetlands Initiative assisted the USDA Forest Service in returning the former crop fields to native habitat through invasive species control and the removal of field drain tiles, drainage ditches and old railroad beds. Fifty-three graminoid and 113 forb species have been planted, with additional species to be added through over-seeding and planting of plugs. Many of these species are cultivated at Midewin by a large corps of volunteers, which includes students in The Mighty Acorns program. More than 80 species of native plants are in production at Midewin, with volunteers playing a critical role in planting, collecting and cleaning the seed stock. As restoration efforts have moved forward at Midewin, increases in grassland and wetland wildlife have been noted. Grasslands at Midewin currently provide significant breeding and wintering habitat for birds such as upland sandpiper, bobolink, grasshopper sparrow, loggerhead shrike, northern harrier, and short-eared owls.

of the region's dolomite prairies occurred by the lower reaches of the Des Plaines River and often as patches within other prairies. Thus, they tend to be very small. Although the region retains some of the best remaining examples of dolomite prairie, most have been lost to mining and other development.

Biodiversity Recovery Plan **Status Ranking: Poor**
Ranked in the first tier of conservation targets, the vast majority of the region's remaining 301 acres of dolomite prairie is located in Will County, Illinois (Table 2.3). All sub-types rated very high risk for quantity, of high biological importance and of global importance. The Nature Conservancy ranked dry dolomite prairie, of which sub-type there is but one acre in the Chicago Wilderness region, as imperiled globally.

Recent Recovery Efforts
Lockport Prairie in Illinois is under active management. Also, at the Midewin National Tallgrass Prairie, where the vast majority of remaining dolomite prairie remains, the recently adopted Midewin Land and Resource Management Plan calls for restoration, over 15 to 20 years, of the site's native prairie and woodland communities, including 1,380 acres of dolomite prairie.

Indicators
Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.


Report Card **Condition Ranking: Poor**

There are no changes in the condition ranking for any of the region's dolomite prairie sub-types. Altered hydrology, concentration of pollutants, habitat destruction, lack of management and the overpopulation of white-tailed deer remain the primary threats to these and all prairie types.

2.4.9 Recommended Actions for Prairies

The primary recommendation is to manage significantly more prairie sites throughout the region at least with periodic prescribed burning to preserve what quality remains until such time as additional resources become available to affect more intensive restoration efforts.

Twenty-five Year Trends of Change in Prairie and Wetland Natural Areas in the Chicago Region of Northeastern Illinois

In 1978, Illinois became the first state to complete an inventory of its remaining natural areas. Of the areas identified during the three-year process, Category I natural areas—those of high quality, relatively undisturbed areas of land and water—totaled 25,700 acres. This number represents just seven-hundredths of one percent of the total land and water area of Illinois. Fully half of the areas surveyed were threatened with destruction from changes in land use (White 1978).

In 2001, Bowles and Jones (2003) reinvestigated 109 high-quality prairies and wetlands first sampled by the Illinois Natural Areas Inventory in 1976. The objectives of the resampling were to 1) determine their present condition, 2) assess floristic changes over time, 3) correlate changes with fire management histories, and 4) project vegetation trends and make recommendations on management needed to maintain these important natural areas.

Twenty-five years later, Bowles and Jones (2003) found that 77 percent of the reinvestigated natural areas remained intact and that the majority of sites were stable over time with respect to measures of native species richness. They also observed, however, negative changes in vegetation structure and floristic composition across most vegetation types: a decreasing abundance of characteristic graminoid and herbaceous prairie and wetland species, coupled with an increasing abundance of woody vegetation, both native and non-native.

Bowles and Jones (2003) primarily attribute the negative changes to the small proportion of prairies and wetlands being managed with controlled burns frequently enough to maintain their compositions and structures. Factors contributing to the negative changes may include increased browsing from eastern white-tailed deer, and altered wetland hydrology, water chemistry and sedimentation rates.

Underscoring the importance of natural area management, their data suggest that in order to maintain their compositions and structures, mesic and wet-mesic prairies should be managed with controlled burns at least every two years and that graminoid fens and sedge meadows require controlled burns at least once every five years. Additional research is needed to determine how combinations of fire management, supplemental woody vegetation removal, and control of other environmental factors could maintain high quality vegetation.

Equally important is the need for quantitative assessment of the region's prairies and the development of specific, region-wide recovery goals, indicators and monitoring protocols.

Refining and expanding upon the recommended actions for all terrestrial communities in the *Biodiversity Recovery Plan*, additional recommendations include:

- Identify all remaining unprotected prairie sites and plug them into regional land acquisition priorities
- Restore and recreate prairie on disturbed land to increase acreage of all types of prairie
- Improve species composition on low- and medium-quality prairies
- Initiate reintroduction of rare, threatened and endangered prairie plant and animal species (not just invertebrates)
- Designate high-quality prairie sites as nature preserves

Chiwaukee Prairie State Natural Area

Located on the Wisconsin/Illinois state line, the 250-acre Chiwaukee Prairie is characterized as a "beach ridge complex," a landscape alternating between dry, sandy ridges and wet swales. This combination of sand and clay soils gives Chiwaukee a rich and diverse vegetation that ranges from vast expanses of grassland, occasionally interrupted by small islands of open-grown oaks, to wet prairie plants in marshy shallows.

The protection and the recovery of the site stems from a nearly 40-year partnership between the Village of Pleasant Prairie, the University of Wisconsin–Parkside, The Nature Conservancy–Wisconsin, the Wisconsin Department of Natural Resources and the Chiwaukee Prairie Preservation Fund, the local preservation group that initiated the effort. Volunteer activism remains high, with 12 work parties scheduled each year and countless additional hours provided by a dedicated core of individuals.

Ongoing threats to the site include the disruption of hydrology due to surrounding development, the invasion of glossy buckthorn and the encroachment of native trees and shrubs. Controlled burns have proved an effective management tool to encourage native species vigor and seed production and to top-kill shrubs and trees. Pending the outcome of recent grant applications, the Wisconsin Department of Natural Resources and The Nature Conservancy-Wisconsin plan to spend $100,000 on tree and brush removal and additional controlled burning through 2006 (S.Richter 2004).

2.5 Wetlands

2.5.1 Overview of Findings

The majority of the region's wetland communities remain in fair to poor condition. The overriding threat continues to be altered hydrology due to development. In some instances, groundwater is being diverted from the site; in others, the principal concern is flooding, which brings with it the additional problems of nutrification and invasive species.

2.5.2 Condition of Data

Various data exist related to wetlands, but few have been sufficiently compiled and analyzed to inform the current region-wide status and trends of the region's wetland communities. For instance, the Illinois Department of Natural Resources' Critical Trends Assessment Program has monitored 29 wetland sites in northeastern Illinois since 1997, but analysis of the data remains limited. Perhaps the most informative of the recent studies is the work by Bowles and Jones (2003). They provide a recent assessment of condition status and trends of 109 high quality prairie and wetland sites first sampled by the Illinois Natural Areas Inventory in 1976. In the absence of additional quantitative data, the following *Report Card* assessments are based largely on expert anecdotal observations.

2.5.3 Community Description

In spite of the wholesale loss of wetlands throughout Chicago Wilderness, the region retains one of the most diverse assemblages of wetlands in North America. Wetland communities have saturated or flooded soils for all or most of the year. This condition excludes or greatly reduces oxygen availability to plant roots and soil-dwelling animals and decomposers. This oxygen deficiency is the most important factor determining the function and composition of wetlands. Primary factors differentiating the six recognized wetland communities are fire frequency, water sources, water chemistry and topographic location:

- Marsh
  - o Basin
  - o Streamside
- Bog
  - o Graminoid
  - o Low Shrub
  - o Forested

- Fen
  - o Calcareous
  - o Graminoid
  - o Forested
- Sedge Meadow
- Panne
- Seep and Spring
  - o Neutral
  - o Calcareous
  - o Acid

2.5.4 LONG-TERM VISION AND GOALS

The goals established in the *Biodiversity Recovery Plan* are to "preserve all wetland types in viable examples and to expand the amount of some wetland types for wildlife habitat and for the sake of other ecologically important functions" (Chicago Region Biodiversity Counci1 1999, p.60). Toward these goals, the plan calls for eliminating or aggressively controlling invasive species, improving hydrological conditions by managing surrounding lands in a manner that protects wetland integrity, fostering wetland complexes and embedding wetlands within a matrix of other natural areas, which is essential to their functioning.

2.5.5 MARSH

Description

Marshes are hydrologically cyclical wetlands dominated by emergent reed, graminoids, cyperoids and aquatic plants. Their structure and water levels are determined by the interaction of short-term precipitation patterns, muskrat activity and fire frequency. Spatial variation in vegetation and wildlife composition varies with water depth. The stages of the marsh cycle form a continuum from closed 100 percent cover by emergent vegetation to a ponded state in which open water covers all but the marsh's shallow edges.

***Biodiversity Recovery Plan* Status Ranking: Fair to Poor**

Both marsh sub-types ranked in the second tier of conservation targets. Although they rated differently for quantity, condition and distribution—streamside marsh of higher concern than basin marsh—both types rated high for biological importance. In 1999, within the eight-county Illinois and Indiana portions of Chicago Wilderness, there remained 7,847 acres of marshland, of which 2,098 acres in Illinois were listed in the Illinois Natural Areas Inventory (Tables 2.3 and 2.5). Basin marsh ranked in a higher tier than its status and importance otherwise dictated because it was receiving significant conservation attention in the region and there was a great opportunity to do more.

Recent Recovery Efforts

There are no specific recovery efforts identified.

Indicators

The presence of *Phragmites*, cattails and purple loosestrife indicate lower-quality or degraded sites. A complete set of specific, measurable indicators of quality for this community need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair to Poor**

There are no overall changes in the condition status of the region's marsh communities. Although more abundant than other wetland types—an additional 115 acres were added to the Illinois Natural Areas Inventory (Table 2.5)—hydrology remains a primary factor in the health of both marsh sub-types and needs to be managed both upstream of the site as well as at the marsh.

2.5.6 BOG

Description

Bogs are glacial relict wetlands restricted to hydrologically isolated kettles. Precipitation, naturally nutrient-poor, is the sole source of water. This factor, the cool basin microclimate and the nutrient- and water-absorption properties of its dominant groundcover, Sphagnum moss, combines to create a highly anaerobic, cold nutrient-deficient acidic substrate of Sphagnum peat and little biochemical decay. Prehistoric fires at bog edges and slow but gradual neutralization by calcareous seepages from mineral rich bordering glacial outwash have converted the rims and even interior portions of many bogs to marshes and sedge meadows. Historically rare, there remain fewer than 20 documented occurrences of bog within the region.

***Biodiversity Recovery Plan* Condition Ranking: Fair**

All sub-types of bog ranked in the fifth tier of conservation targets. Although exceptionally rare—only 183 acres of bog remained within the eight-county

Illinois-Indiana portions of Chicago Wilderness (Table 2.5)—bogs did not rate of higher conservation concern because it was determined that they are at the edge of their range within the Chicago Wilderness region. Additionally, it was determined that most of the remaining sites were protected, faring sufficiently well and were the wetland type least threatened by outside impacts due to their small watersheds.

Recent Recovery Efforts
There are no specific recovery efforts identified.

Indicators
Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.


***Report Card* Condition Ranking: Fair**

Due to the limited amount of information available during the development of the *Report Card*, there is no recommended change to the status of bog communities.

2.5.7 Fen

Description
Fens are created and maintained by the continuous internal flow of mineralized groundwater emanating from bordering upland calcareous sand and gravel glacial outwash formations. An impervious layer of till below the outwash gravel forces cold, oxygen-deficient mineralized groundwater to seep laterally at the base of upland slopes. Peat enriched with magnesium and calcium carbonates forms the fen substrate, which supports many plants adapted to high concentrations of dissolved alkaline minerals.

***Biodiversity Recovery Plan* Status Ranking: Poor**
Graminoid, or grassy, fens ranked in the first tier of conservation targets, calcareous floating mat in the second tier and forested fens in the third tier. Forested fen ranked lowest because it is at the edge of its range in the Chicago Wilderness region. All three sub-types rated high risk for quantity, in poor condition and of high biological importance. It was further observed that, in general, fens were being lost in the region at an alarming rate due to their exceptional sensitivity to hydrological changes.

Recent Recovery Efforts
Among the fen recovery efforts are those at Turner Lake Fen in Lake County, Illinois, Boone Creek Fen in McHenry County, Illinois and Bluff Spring Fen in Cook County, Illinois.

Indicators
The presence of cattails may indicate a lower-quality or degraded site. A complete set of specific, measurable indicators of quality for this community need to be identified, and this is a recommendation for future report cards.


***Report Card* Condition Ranking: Poor**

Making no distinctions between the three sub-types, all remain in overall poor condition. Although some fens continue to be discovered in the region, they continue to be lost directly and indirectly to development. The Illinios Natural Areas Inventory (2004) reports a loss of 117 acres of graminoid fen between 1999 and 2004 (Table 2.5). Additionally, fens are slower to recover, even with management, than other community types. Continuing threats include lack of fire, invasive species and altered hydrology.

2.5.8 Sedge Meadow

Description
Sedge meadows are sedge-dominated grasslands with wet prairie grass co-dominants on organic or sand substrates. Groundwater seepage and/or shallow flooding are their principal hydrological factors and frequent fire is needed to retain their open structures. They are structurally homogenous dense matrices of either tussock-forming sedges, which are often on calcareous organic substrates and grade into fens, or shallowly flooded rhizomatous sedge stands that grade into marshes.

***Biodiversity Recovery Plan* Status Ranking: Fair**
Sedge meadows ranked in the third tier of conservation targets. Of high biological importance and at high risk for quantity, sedge meadows rated in fair condition and were deemed fairly widespread within and beyond the region. In spite of the historical loss of sedge meadows throughout the region, compared to other wetland types, it was determined that many examples of sedge meadow remained and many were protected. In the eight-county Illinois and

Indiana portions of the region, there remained 1,992 acres, of which 1,018 were listed in the Illinois Natural Areas Inventory (Tables 2.3 and 2.5). Identified threats to sedge meadows included altered hydrology, the absence of fire and the difficulty in restoring degraded sedge meadow sites.

Recent Recovery Efforts
Boone Creek in McHenry County, Illinois is one example of a well-managed sedge meadow site.

Indicators
The presence of *Phragmites*, cattails and purple loosestrife may indicate a lower-quality or degraded site. A complete set of specific, measurable indicators of quality for this community need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair**

The Illinois Natural Areas Inventory reflects a loss of 25 acres of sedge meadow between 1999 and 2005 (Table 2.3). Still more abundant than most other wetland types, sedge meadows nonetheless remain at risk of decreasing quality, primarily due to the continued threat of altered hydrology. Other continuing threats include lack of fire and the presence of invasive species.

2.5.9 Panne

Description
Panne communities are unique interdunal wetlands on calcareous moist sands of the lake plain within one mile of Lake Michigan. Rhizomatous sedges and sedge relatives dominate this type of open-structured wetland, which has considerable florisitic overlap with fens and calcareous seeps.

***Biodiversity Recovery Plan* Status Ranking: Good**
Ranked in the first tier of conservation targets, the region's 10 known panne sites, totaling 141 acres, were stable in the short term, but highly threatened long-term (Table 2.3). Of the 67 acres of panne identified in the Illinois Natural Areas Inventory in 1999, most were protected and in good condition (Table 2.5). Even in a protected state, however, pannes are threatened by succession, lake erosion and Lake Michigan elevation changes. Because there are few, there is a high possibility of complete loss.

Bluff Spring Fen

Located in Elgin, Illinois, Bluff Spring Fen is one of the region's most successful recovery efforts. In 1979, the 90-acre site suffered from extensive gravel mining, illegal dumping and off-road vehicle abuse. Within a decade, it was dedicated an Illinois Nature Preserve. Recovery efforts by The Nature Conservancy and a dedicated volunteer corps, Friends of the Fen, have included extensive trash removal (including 10 cars), brush removal, controlled burns and the replanting of native species. In 1990, the fen gained nation-wide attention when Healy Road Prairie, which lay in the path of development, was "transplanted" to the site, further enriching the complex of habitat types that include fen, dry gravel prairie, mesic fine-textured soil prairie, sedge meadow, oak-hickory savanna and marsh. Visitors to the site today are greeted by an informational kiosk and season-specific brochures, inviting them to look for white lady slipper orchids, marsh marigolds, spring beauties, hepatica, Dutchman's breeches, rue, red trillium, trout lilies, silky aster, purple coneflower and marsh blazing star. The site provides breeding habitat for bird species such as willow flycatcher, ruby crown and golden crown kinglets, Eastern phoebe, red-headed woodpecker, woodcock, wood duck and yellow-breasted chat. Several species of dragonfly also inhabit the site, including the ebony jewel wing and the green darner. Butterflies seen at Bluff Spring Fen include purplish coppers, black swallowtail, viceroy, monarchs, spring azure and Eastern-tail blues. In 2002, 2003 and 2004, the Illinois critically endangered swamp metalmark butterfly was translocated to the site, where a small breeding colony has now been established (The Nature Conservancy 2004).

Recent Recovery Efforts
There are no specific recovery efforts identified.

Indicators
Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.


***Report Card* Condition Ranking: Poor**

Few in both the number of sites and total acres, it is the consensus opinion of the region's natural resource managers that panne communities continue to decline in quality. However, since the condition of pannes is tied to the level of Lake Michigan, the overall decline might be part of a natural cycle.

2.5.10 SEEPS AND SPRINGS

Description
This community occurs where groundwater flows to the surface. A seep is an open area with saturated soil caused by water flowing to the surface in a diffuse rather than concentrated flow. Seeps may have local areas of concentrated flow and the water usually collects in spring runs. Seeps are usually smaller than 0.1 acre and are most common along the lower slopes of glacial moraines, ravines and terraces. A spring, as opposed to a seep, has a concentrated flow of groundwater from a definite orifice. The various communities in this subclass are separated on the basis of water chemistry.

***Biodiversity Recovery Plan* Status Ranking: Fair to Poor**
Calcareous seeps ranked in the third tier of conservation targets, and sand and neutral seeps in the fifth tier. Although naturally small and the most rare wetland type in the region—in 1999 just 49 total seep acres remained in the eight-county Illinois and Indiana portions of the region—seeps did not rank higher for conservation concern largely because they are at the edge of their range in the region; and being small, they do not support distinctive faunal communities nor harbor many species (although calcareous seeps do support some restricted plants, including the forked aster, a candidate to be listed as a federally endangered species).

Recent Recovery Efforts
There are no specific recovery efforts identified.

Indicators
Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.


***Report Card* Condition Ranking: Fair to Poor**

Due to the limited amount of information available during the *Report Card* process, there is no recommended change in the status of seep and spring communities.

2.5.11 RECOMMENDED ACTIONS FOR WETLANDS

The primary recommendation is to compile and analyze existing wetlands-related data, and to develop specific measurable recovery goals, indicators and monitoring protocols. Further research is necessary to better define, understand, locate and map seep communities. As consideration is given to refining the classification system of the region's natural communities, seasonal wetlands should be considered as an additional class of wetlands.

2.6 STREAM COMMUNITIES

2.6.1 OVERVIEW OF FINDINGS

Since the publication of the *Biodiversity Recovery Plan*, there has not been a marked change in the overall condition of the region's streams. In general, most continue to suffer substantial degradation from increased urban development. The majority of streams in urban areas experience heavily altered hydrologic regimes, sedimentation and polluted runoff. Increased human populations, especially in the rapidly developing western area of the region, has brought and will continue to bring about the need to release more treated wastewaters. Increased development also has increased the proportion of impervious surface cover in the region. Most estimates suggest that a threshold exists for the latter at 10-20% cover, after which stream conditions begin a continuous decline.

On the positive side, dam removals are occurring in the region, as are efforts to increase the connectivity of the region's stream ecosystems. Although threat-

ened by urban sprawl, several good quality mid-order streams remain in the western areas of the lower Des Plaines, the Fox, the Kankakee and the Kishwaukee Rivers, where urbanization currently is less intensive. Large rivers, such as the Kankakee, Kishwaukee and lower Fox Rivers appear to have maintained a relatively natural aquatic fauna and provide better Hilsenhoff Biotic Index scores (a measure of organic enrichment) than do smaller reference streams in the region (DeWalt 2002, 2003). And in Illinois, the establishment of Conservation 2000 partnerships, a program of the Illinois Department of Natural Resources, has catalyzed numerous partnerships between public and private interests to protect watersheds through the development and implementation of ecosystem-based management plans.

2.6.2 Condition of Data

The *Biodiversity Recovery Plan's* condition assessment of the region's streams stems from a Chicago Wilderness project called "Stream Biodiversity Recovery Priorities" (Taylor 1998), which utilized four criteria: Index of Biotic Integrity, the presence of species of concern, Macroinvertebrate Biotic Index and abiotic indicators. Additional data exist that might have provided for a quantified *Report Card* assessment of the region's stream communities, but the majority of data have yet to be sufficiently compiled and analyzed. For instance, the Illinois Department of Natural Resources' Critical Trends Assessment Program has monitored 23 stream sites in northeastern Illinois since 1997, but analysis of the data remains limited. Until it was disbanded in 2004 due to state budget cuts, RiverWatch—the volunteer citizen scientist complement to the Critical Trends Assessment Program's stream monitoring—had likewise collected critical stream data from the region's streams since 1997, but not enough to be able to identify condition trends.

Absent available data, the *Report Card* stream community assessments are based primarily on expert observations. However, whereas the *Biodiversity Recovery Plan* assesses streams individually (and exclusively in Illinois), the *Report Card* takes a broader approach, assessing stream types within watersheds from throughout the entire region.

2.6.3 Vision and Recovery Goals in the Biodiversity Recovery Plan

The *Biodiversity Recovery Plan* vision for the region's streams is to achieve a desired biotic integrity and biological diversity. Of the 85 Illinois streams assessed in the *Biodiversity Recovery Plan*, the 34 streams receiving the highest rating are earmarked for the highest recovery priorities: protection and restoration. The remaining 46 streams are accorded lower priorities of rehabilitation and enhancement.

2.6.4 Community Descriptions

Streams

The region's streams fall into three general categories based on the number of tributaries. Within each group are sub-categories defined by flow, gradient and substrate:

- Headwater Streams
  - o Continuous-flow
    - ◊ Coarse Substrate
    - ◊ Fine Substrate
  - o Intermittent-flow
    - ◊ Coarse Substrate
    - ◊ Fine Substrate
- Low-order Streams
  - o High-gradient (relatively steep)
  - o Low-gradient (relatively flat)
- Mid-order Streams
  - o High-gradient
  - o Low-gradient

2.6.5 Headwater Streams

Description

Continuous-flow headwater streams are first-order streams with small drainage areas and little or no pool development. They are characterized by relatively stable, cool temperatures and consistent levels of dissolved oxygen. They have low habitat heterogeneity and low trophic complexity. Intermittent-flow headwater streams are first-order streams with highly variable flows and temperatures. They are inhabited by colonizer species with high reproductive rates or are largely abiotic.

Condition of Data

In general, there is not much data on intermittent streams. The Illinois Department of Natural Resources and Illinois Environmental Protection

Agency basin surveys for fish and macroinvertebrates seldom sample headwater streams. The Critical Trends Assessment Program uses a random sampling program and Ephemeroptera, Plecoptera and Trichoptera taxa to rate streams, but the number of sampled sites probably is insufficient to fully characterize the condition of headwaters streams in the sub-basins. A vast historical database for Ephemeroptera, Plecoptera and Trichoptera exists at the Illinois Natural History Survey, as do identification manuals for Illinois and surrounding states.

Recent Recovery Efforts
There are no recent, significant recovery efforts for headwater streams within the region.

Indicators
The *Biodiversity Recovery Plan* identifies the following species as characteristic of headwater streams:

- Continuous-flow
  - o Fish: sculpins, dace
  - o Macroinvertebrates: mayflies, stoneflies and caddis flies
  - o Plants: water cress, chara, water parsnip, berula
- Intermittent-flow
  - o Bluntnose minnow and striped shiner

Note that the 2004 workshop participants identified the following fish species as tending to be found in higher quality seepage-fed headwater stream habitats, although many can be found in lower quality habitats as well:

Redside dace	Northern redbelly dace
Longnose dace	Brook trout
Finescale dace	Slimy sculpin
Brook stickleback	Mottled sculpin

The 2004 workshop participants identified the following fish species as tending to be found in higher quality intermittent headwater stream habitats, although many can be found in lower quality habitats as well:

Redside dace	Brassy minnow
Blacknose dace	Creek chubsucker
Brook stickleback	Southern redbelly dace

Specific, measurable indicators of quality, such as perhaps substrate, water quality, species richness, and presence of species of concern need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking:**
Overall: Fair to Poor

In general, all types of headwater streams are highly impacted due to urban or agricultural runoff. Most are in tiles, grass runways or concrete drainage ways. They are more susceptible to toxins because there is less dilution. Seepage-fed headwater streams are at a higher risk due to groundwater removal, exotic invasive shrubs that steal water (e.g., buckthorn), sealing of watershed with impervious cover, and change in thermal regimes. The biggest factors affecting headwater stream communities are hydrologic change, channelization and urbanization. Because of wholesale hydrological changes in headwaters, downstream areas are experiencing a suite of problems: channel incision, bank erosion, inability to maintain woody debris in channels, and poor nutrient processing.

- **Des Plaines River Watershed–Upper Three-Quarters: Poor to Fair**
  Because of intensive urbanization, streams in this area no longer have natural watersheds, where heavy rains are stored in marshes and in forest litter before entering stream channels. Urbanization produces many flat, impervious surfaces that shed water to stream channels rapidly. In fact, many of these stream channels have their banks and channel bottoms encased in concrete. While concrete keeps banks from eroding, it provides little habitat for fish and invertebrates. While some exceptions can still be found, most small drainages do not really function as streams anymore. Without significant recovery efforts, streams in this region will continue to degrade. Those streams that currently support somewhat natural or unique communities, even if they are in or run through protected areas, are at a high risk of catastrophic and random events eliminating components of the community. Those areas that are not protected will decline further as development encroaches.

- **Des Plaines River Watershed–Lower Quarter: Fair to Good**
  Lower Des Plaines River streams run through more recently and less intensively urbanized areas, and

benefit from having an overall higher gradient, which allows for greater oxygenation of water than is found in the north. The addition of significant groundwater inflow to many of these streams contributes to a unique fauna, including sculpins and sensitive insect species. Mottled sculpins and Southern redbelly dace utilize cold and cool headwater streams in the region, but have recently been taken only in the lower quarter of the basin (Smith 2002). Many of the streams in this area will degrade because their watersheds have reached the limits of impervious surface cover (10 - 20 percent). Yet, development pressure will continue because of the availability of open land. Where impervious coverage has reached critical limits, extraordinary efforts (increasing and/or building the acreage of wetlands/retention ponds) might help to turn the tide. Efforts must be made to rehabilitate headwaters, even those that are currently in agriculture, so that they might protect stream communities. Rehabilitation of corridors from the headwaters to downstream areas is the best way to protect aquatic communities.

- **Fox River Watershed: Poor to Fair**
  There are some very high quality continuous-flow headwater streams in the Fox River watershed, however, they are threatened and their conditions are declining. Many are spring fed and their groundwater recharge areas are under threat from groundwater removal, increase in impervious cover, infiltration by agricultural and residential nutrients and pesticides.

- **Kankakee River Watershed: Undetermined**
  Most headwater streams within this watershed are highly impacted due to channelization and tiling of fields. Large, coarse-bottomed streams rate more highly for both fish and insects. Several sensitive taxa unique to the drainage still reside there. Biodiversity remains high. However, the watershed is highly threatened by urbanization and agricultural drainage that changes stream hydrology, promoting channel incision and subsequent bank erosion. The headwater streams in this watershed are experiencing development pressure in the vicinity of Peotone and Monee. It appears that the I-57 corridor may be completely developed residentially and commercially within the next decade. Many small streams will be lost to concrete-lined ditches, offering no refuge for headwater species.

- **Chicago River Watershed: Undetermined**
  Indications are that the condition of this watershed is similar in quality to the upper three-quarters of the Des Plaines River watershed. However, some observers point out that the East Fork of the North Branch receives the effluent from the Clavey Road public-owned treatment works, which should significantly degrade its quality and subject it to quite variable pollutant loads due to storm events. On the positive side, a number of watershed recovery projects and studies have been completed along the North Branch of the Chicago River (see sidebar).

- **Calumet River Watershed: Undetermined**
  Not enough information was available to make a ranking determination, however, indications are that the condition of this watershed is similar in quality to the upper three-quarters of the Des Plaines River watershed.

- **Lake Michigan Watershed: Poor**
  All streams in this category within the Lake Michigan watershed should be considered to be in poor condition. Human activity and pollution from runoff have severely degraded habitat and water quality in these streams.

2.6.6 Low-order Streams

Description

High-gradient, low-order streams are second- to fourth-order, small- to medium-sized creeks, often with distinct riffle and pool development. They have more complex habitats and trophic characteristics than headwater streams. They fall more than three feet per mile and have coarse substrates, mostly cobble, gravel and sand with some silt. Low-gradient, low-order streams are second- to fourth- order creeks that fall less than three feet per mile and have predominantly fine-textured substrates.

Condition of Data

The Critical Trends Assessment Program data are probably more reliable for this stream type than for headwaters, as this size probably has less variability

in condition. There are many more low-order stream data available from the Illinois Department of Natural Resources/Illinois Environmental Protection Agency basin surveys for fish and macroinvertebrates (Illinois Environmental Protection Agency 2005). The United States Geologic Service also has a good amount of data from its Upper Illinois River Basin study. Data for Ephemeroptera, Plecoptera and Trichoptera richness and threatened and endangered species in low-order Kankakee streams is readily available.

Recent Recovery Efforts
There are no recent, significant recovery efforts for low-order streams within the region.

Indicators
The *Biodiversity Recovery Plan* identifies the following species as being characteristic of low-order streams:

- High-gradient low-order streams
  - o Fish: darters, stonerollers, horneyhead chub, suckers, smallmouth bass
- Low-gradient low-order streams
  - o Fish: creek chub, bluntnose minnow, redfin shiner, sunfish
  - o Plants: sago pond weed, water star weed, American pond weed

Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking:**
Overall: Poor to Good

Overall, low-order, high-gradient streams represent the highest quality stream category and are very important to biodiversity. Unfortunately, the biggest impact from existing and planned sewage treatment plants occurs on low-order streams. These streams are also threatened by hydrologic modification, non-point source pollution, and poor water quality. Low-order, low-gradient streams are in worse shape and rated poor to fair. Their water velocity is slower, so sedimentation is greater. Additional threats include channelization, high nutrient loads, and urban and pesticide runoff.

- **Des Plaines River Watershed: Poor to Good**
  For high-gradient, low-order streams, the upper three-quarters of the watershed rate poor to fair and the lower quarter rates fair to good. Low-gradient, low-order streams throughout the Des Plaines River watershed rate as poor. High-gradient streams in the lower quarter of the watershed are not declining as rapidly as those in the upper three-quarters, due to the less intensive urbanization. Low-gradient streams generally are more vulnerable to threats like sedimentation and high nutrient loading. Many of the low-gradient streams have sewage treatment plants along them and tend to be more channelized. Threats include urbanization, hydrologic modification, organic enrichment (sewage treatment) and homogenization of communities.

- **Fox River Watershed: Poor to Excellent**
  Based on fish data, high-gradient, low-order streams in this watershed are of excellent quality. However, based on insect data, the streams are only rated fair to good. The discrepancy reflects the fact that as conditions have recovered from the effects of agricultural practices and the release of poorly treated domestic sewage, fish recolonized streams much faster than sensitive insects, which generally have poor dispersal abilities. Low-gradient, low-order streams generally are of lower quality—poor to fair—because low-gradient streams move more slowly, which exacerbates the threats of sedimentation, oxygen saturation level and nutrient loading. Additional threats include hydrologic disruption through channelization, an increase in impervious land cover and the addition of sewage treatment plants. The hydrology of these systems will become more variable with development. An increase in stream temperature may also occur due to groundwater removal and urbanization that could eliminate many of the cool-water fish species (e.g., sculpins).

- **Kankakee River Watershed: Good or Undetermined**
  Many high-gradient streams show the impacts of agricultural runoff with heavy algal growth and eroding banks. Most are channelized and the adjacent fields tiled, creating great fluctuations in

hydrology. However, several support luxuriant growths of *Elodea* and *Potamogeton*, excellent fish Index of Biotic Integrity scores and composition, and relatively high Ephemeroptera, Plecoptera and Trichoptera richness. A few of these streams, such as Trim and Baker Creeks, are listed as biologically significant streams for the presence of mussels such as the Creek Heelsplitter, Ellipse and Slippershell (Page et al. 1992). High-gradient streams are ranked stable. Insufficient information is available about low-gradient streams to determine their status and trends.

- **Chicago River Watershed: Undetermined**
  There was not sufficient information available to make a determination of this watershed's status, however, the consensus among local experts is that some tributaries of the Chicago River, such as Plum Creek, still hold good species richness of Ephemeroptera, Plecoptera and Trichoptera aquatic insects.

- **Calumet River Watershed: Undetermined**
  There was not sufficient information available to make a determination of this watershed's status.

- **Lake Michigan Watershed: Poor**
  It is the consensus of regional experts that the streams in this watershed are in poor condition, with the exception of the Dead River in Illinois Beach State Park. A very low-gradient stream caught between parallel glacial moraines/sand dunes, it and its surrounding marshes comprise the best example of a freshwater estuary in the region, historically supporting a unique assemblage of aquatic insects.

2.6.7 Mid-order Streams

Description

High-gradient, mid-order streams are fifth- to eighth-order, large creeks to medium-sized rivers with relatively stable flows and temperatures, and high habitat diversity. With coarse substrates and falling more than three feet per mile, they have the most complex habitats, are highest in species diversity and harbor abundant predators. Low-gradient, mid-order streams differ in that they fall less than three feet per mile and have finer substrates.

Condition of Data

The Illinois Department of Natural Resources and Illinois Environmental Protection Agency basin surveys (Illinois Environmental Protection Agency 2005) have tremendous amounts of fish data from the lower Fox River. However, the Critical Trends Assessment Program has no sites on the Fox River of this size and gradient type. The condition of data based on invertebrates cannot be assessed at this time.

Indicators

The *Biodiversity Recovery Plan* identifies the following species as being characteristic of mid-order streams:

- High-gradient
  - o Fish: smallmouth bass, northern hogsucker, redhorse
  - o Macroinvertebrates: *Orconectes propinquus*
- Low-gradient
  - o Fish: largemouth bass, bluegill, sunfish, pike, carpsuckers, channel catfish
  - o Macroinvertebrates: *Orconectes virilis*

Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking:**
Overall: Poor to Good

Most mid-order, high-gradient streams, like the Kankakee, Kishwaukee and lower Fox Rivers, are in fair to good condition and are diverse in fish, mussels and Ephemeroptera, Plecoptera and Trichoptera species. They are threatened by changes in headwater and low-order streams, by dams that prevent recolonization, and by acting as receiving waters for a wide range of discharges. Rivers in the heart of urbanized areas are, of course, in much worse condition. Mid-order, low-gradient streams are in worse shape and rated poor. Siltation, sags in oxygen concentration from high nutrient loads, and accumulation of pollutants are threats to these systems.

- **Des Plaines River Watershed: Poor**
  All of the fifth- through eighth-order streams in the Des Plaines River watershed are in very poor condition from the effects of heavy urbanization.

High-gradient streams are stable, but in very poor shape. Low-gradient streams are declining in quality.

- **Fox River Watershed: Poor to Fair**
  There are some high quality, high-gradient sections of the lower Fox River, based on fish communities, although much of it is generally poor to fair overall. These sections' conditions based on invertebrates can not be assessed at this time. Regarding low-gradient sections of the Fox River, pooled and impounded sections of the upper Fox River have poor Index of Biotic Integrity scores, while the tail water sections have good Index of Biotic Integrity scores. The mussel assemblage of the upper Fox River is poor. Overall, there have not been many improvements within this watershed since the *Biodiversity Recovery Plan* was published. A few dams are set for removal—North and South Batavia Dams and North Aurora Dam—which would increase river connectivity, perhaps improving both fish and especially mussel assemblages. However, the addition of sewage treatment plants with their increased loading of organic and inorganic nutrients is a continuing threat as the area becomes more urbanized.

- **Kankakee River Watershed: Undetermined**
  There was insufficient information available to make a determination of this watershed's status.

- **Chicago River Watershed: Undetermined**
  The North Branch of the Chicago River receives effluent from the water reclamation district's north side plant via the North Shore Channel. This discharge greatly increases the volume of water in the river below this junction and the materials in this effluent significantly change the character of the river below this point. In addition, much of the river is subject to unmonitored and uncharacterized effluent from combined sewer overflows and other discharges. While the combined sewer overflow discharges are intermittent and variable in volume, they can be very large when they occur, and they have a major effect on the quality of the river. At this time, they control the quality of water in the river, and their regular occurrence limits the extent of possible recovery of the river.

- **Calumet River Watershed: Undetermined**
  There was not sufficient information available to make a determination of this watershed's status.

- **Lake Michigan Watershed: Poor**
  It is the consensus of regional experts that all of the streams in this watershed are in poor condition, with the exception of the Dead River. The Dead River historically supported a unique assemblage of aquatic insects, especially large caddis flies, and is the best example of a freshwater estuarine, or nursery habitat, in the region. Because its watershed is protected within Illinois Beach State Park, it probably still supports this fauna, although it is time to reevaluate this assemblage. Otherwise, all of the other streams are impaired and have dams on them.

2.6.8 Recommended Actions for Streams

For future reporting purposes, the primary *Report Card* recommendation is to develop specific recovery goals for all of the stream types in each watershed throughout the entire region. It is also recommended that region-wide consensus be reached on indicators and monitoring protocols. Additionally, those recommended actions listed in the *Biodiversity Recovery Plan* remain in effect:

Reduce hydrological alteration

- Continue to identify watersheds with streams that have exceptional aquatic biological integrity to inform planning efforts and set priorities
- Limit development in some high-priority subwatersheds
- Direct development into areas that limit hydrological alteration
- Promote cluster development
- Require stormwater detention that effectively controls the full range of flood events
- As an alternative to storm sewers, promote natural drainage to increase infiltration
- Create buffer strips and greenways along streams
- Acquire additional land for conservation
- Develop stormwater management plans
- Enforce erosion control measures on new construction
- Create or restore streamside wetlands
- Educate decision-makers about development patterns and the effects of land uses on streams

Reduce deterioration of habitat quality
- Remove unnecessary dams
- Retain or restore emergent and near-shore vegetation
- Re-meander channelized streams
- Restore riffles, pools, sandbars and other elements of in-stream habitat
- Study the effects of riparian management
- Survey how people use aquatic resources and study the economic impacts of uses such as fishing and recreational boating
- Use bioengineering solutions to control streambank erosion

Reduce deterioration of water quality
- Rigorously enforce non-degradation standards
- Develop and implement best management practices to control soil erosion, sedimentation and stormwater runoff
- Find alternatives to new and expanded effluent discharges to high-quality streams
- Re-examine standards and practices for sewage treatment
- Promote effluent polishing through constructed wetlands for all discharges to moderate- and high-quality streams
- Encourage pollution-control regulators to use biocriteria for water quality standards
- Gain community support for watershed management
- Evaluate insects as indicators of water quality
- Evaluate the need for improved water quality standards
- Encourage volunteer monitoring

2.7 Lake Communities

2.7.1 Overview of Findings
The overall condition of the region's lakes ranges widely from poor to excellent to undetermined due to the lack of information. Regardless of their condition, the long-term health of all lake types is in jeopardy, primarily due to the increasing and intensified effects of development.

2.7.2 Condition of Data
In the *Biodiversity Recovery Plan*, individual lakes, and only those in Illinois, are rated as exceptional, important, restorable or other (unlikely to support sensitive species) based solely on the biodiversity in the lakes. The *Report Card* assesses lake types within watersheds throughout the entire Chicago Wilderness region. For the sake of consistency within the *Report Card*, lake types are ranked as excellent, good, fair or poor, which roughly correspond to the rankings utilized in the *Biodiversity Recovery Plan*. Assessments, although more broadly based than those of the *Biodiversity Recovery Plan*, remain largely driven by the observations of experts working in the field and underpinned by their familiarity with existing data. No specific data were referenced in the assessment of the region's lake types.

2.7.3 Community Description
The region's lakes fall into two broad categories: natural and manmade. Of the various sub-categories, The *Biodiversity Recovery Plan* identifies glacial lakes as the primary focus for conservation efforts due to their being the most biologically diverse lake type.
- Natural Lakes
  - o Lake Michigan
  - o Glacial Lakes
    - ◊ Kettle
    - ◊ Flow-through
  - o Bottomland
  - o Vernal Pond
- Manmade Lakes
  - o Naturalized
  - o Other

2.7.4 Long-term Vision and Goals
As reported in the *Biodiversity Recovery Plan*, the vision for lakes rated as exceptional (in excellent condition) is to manage all of them for maximum aquatic biodiversity. Goals include:
- No loss of native species, particularly endangered or threatened species
- No decline in condition
- Manage all as part of their watersheds

The vision for lakes rated as important (in good condition) is to manage all of them for maximum aquatic biodiversity and improve their conditions so that most of them move up to the category of exceptional lakes. Goals are the same as for exceptional lakes.

The goal for lakes rated as restorable (in fair condition) is to control invasive species and sources of

impairment effectively and improve their conditions so that most of them move up to the category of important lakes.

The vision for lakes placed in the "other" category (those of poor condition), from a biodiversity perspective, is to utilize them for recreational and cultural services that do not jeopardize the biodiversity goals for other lakes. A goal is to have all of them contribute positively to their watersheds' overall quality, either through water-quality or stormwater management.

2.7.5 Lake Michigan

Description

The second largest Great Lake by volume, Lake Michigan's drainage basin is twice as large as its 22,300 square miles of surface water. The basin includes portions of Wisconsin, Illinois, Indiana and Michigan. The Chicago Wilderness shoreline of Lake Michigan has been substantially filled and built up, eliminating coastal wetlands. Structures installed to protect harbors and lakefront development have, in many cases, interrupted movement of sand or deflected it into deep water where it is lost from the beach-nourishment process. Its fish communities are in a state of flux due to several factors, including the introduction of exotic species. Although some major pollution issues have been resolved, the bioaccumulation of persistent toxic substances in fish remains a problem for human health.

Recent Recovery Efforts

An electronic barrier currently is being erected in the Sanitary and Ship Canal to prevent the passage of several types of Asian carp, a particularly destructive exotic species, from entering Lake Michigan from the Illinois River. It is not known if this technical solution will work.

Indicators

Dominant species identified in the *Biodiversity Recovery Plan* include:

- Fish: sculpin, barbot, yellow perch salmonids (introduced and native species) ale wives (introduced) and smelt (introduced)
- Macroinvertebrates: zebra mussels (introduced)

Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair**

Lake Michigan holds many native fish and invertebrate species that occur in no other aquatic habitats in the Chicago Wilderness area. However, this system is under siege by a host of exotic species entering through ballast water in freight ships (e.g., round goby and river ruffe), through direct introduction for sport fishery (i.e., Pacific salmonids), or from aquaculture facilities (bighead and silver carp). Some exotic species, such as the spiny water flea, have gotten worse since the publication of the *Biodiversity Recovery Plan*, while some, such as the zebra mussel, have possibly declined in abundance. These exotic invasive species have a significant impact on native species through competition for food and spawning substrates or through outright predation. The longnose sucker and emerald shiner are two near-shore native species whose abundance has declined recently, possibly through interactions with exotic species. We can expect more introductions of exotic invasive species in the future.

2.7.6 Glacial Kettle Lakes

Description

Remnant glacial features, kettle lakes or pothole lakes, are found mostly in isolated basins in Lake County, Illinois and southeast Wisconsin, with smaller concentrations in select locations throughout the rest of the Chicago Wilderness region. Examples include Lake Elizabeth, Cedar Lake and Defiance Lake.

Recent Recovery Efforts

There are no recovery efforts identified.

Indicators

Dominant species identified in the *Biodiversity Recovery Plan* include:

- Fish: brown bullhead, lake chubsucker and warmouth
- Macroinvertebrates: *Procambarus*
- Plants: water shield, eel grass
- Reptiles and Amphibians: common map turtle, mudpuppy

Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Good to Excellent**

There is a wide range of conditions for kettle lakes, but generally they are in good to excellent shape. However, like all systems, they are experiencing serious threats such as urbanization, herbiciding to reduce aquatic vegetation, eutrophication, isolation due to water control structures, and habitat loss. Kettle lakes have been developed for a long time and so they are not experiencing as rapid a rate of change as other lakes. Being isolated, their diversity is less than flow-through lakes, but kettle lakes boast unique taxa and the highest number of imperiled fish species of any aquatic systems in the state.

2.7.7 FLOW-THROUGH LAKES

Description

Flow-through lakes differ from kettle lakes by being connected to a stream system and by having larger watersheds. Examples include Fox Chain O' Lakes and Loon Lake.

Recent Recovery Efforts

There are no recovery efforts identified.

Indicators

Dominant species identified in the *Biodiversity Recovery Plan* include:

- Fish: northern pike, largemouth bass, yellow bass, bluegill, pugnose minnow
- Macroinvertebrates: mussels
- Plants: lotus, grass-leaved pondweed
- Reptiles and Amphibians: Blanding's turtle

Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor to Good**

Widely variable in their conditions, all flow-through lakes are declining. Threats include organic and nutrient enrichment that lead to algal blooms, and dense stands of non-native, invasive vascular plants. Other non-native, invasive species (zebra mussels, Asian carp, rusty crayfish, etc.) have opportunities to enter these systems since they are connected to streams and because flow-through lakes are heavily used for recreational purposes.

2.7.8 BOTTOMLAND LAKES

Description

Bottomland lakes generally are associated with large floodplain rivers, such as the Mississippi and the Illinois Rivers. Historically, they had vast beds of aquatic macrophytes, providing habitat and promoting water clarity and nutrient cycling. Most, however, have been cut off from riverine flood pulses by levies. Examples within the Chicago Wilderness region include Lyons Marsh and Saganashkee Slough.

Recent Recovery Efforts

There are no recovery efforts identified.

Indicators

Dominant species identified in the *Biodiversity Recovery Plan* include:

- Fish: topminnows, pike bullheads, bowfin
- Macroinvertebrates: snails
- Plants: emergent plants, lotus, duckweed, algal blooms

Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor**

Many of these lakes are under public ownership and so their protection is generally good. However, having lost their historic connections to rivers (due to levies) during flooding, sediment has accumulated, reducing their overall depth. Exotic fish species have uprooted much of the vegetation, leading to turbidity and the dieback of plants. The hydrology of these systems has also been disrupted as their water levels have been controlled to maintain year-round waterfowl habitat.

2.7.9 VERNAL PONDS/POOLS

Description

Vernal ponds are generally small, seasonally inundated depressions. Historically they were viewed as

a nuisance and therefore drained. Due to their seasonal nature, they contain no fish, but they can support tremendous densities of invertebrates. They are also very important as breeding areas for amphibians, which are experiencing declines throughout the world. Examples remain in Ryerson Woods, Deer Grove, Busse Woods, Thorn Creek Woods and Plum Creek Greenway.

Recent Recovery Efforts
There are no recovery efforts identified.

Indicators
Dominant species identified in the *Biodiversity Recovery Plan* include:
- Macroinvertebrates: crayfish
- Plants: sedges, stranded aquatics, mermaid weed

Specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking:**
Undetermined

There was not enough information available during the development of this report to assess the overall condition of the region's vernal ponds and pools. What is known is that some of these ponds are publicly owned, but many are not, which places them at extreme risk. There is also some question as to whether vernal ponds on public lands are being managed. Anecdotal evidence suggests that many vernal ponds are likely filling in with buckthorn and other non-native species. It is important to maintain the natural hydrology of these ponds.

2.7.10 Manmade Naturalized Lakes

Description
Manmade naturalized lakes can function in a similar fashion to natural lakes, and as such can support aquatic communities that protect the biodiversity of the region. Many of the region's gravel pit lakes, for instance, have similar water quality and habitat conditions as natural glacial lakes. Additionally, gravel pit lakes often support similar species as glacial lakes, although overall diversity of fishes is typically lower. Some naturalized lakes have been used to culture threatened and endangered species for reintroduction elsewhere. Some created wetlands may be deep enough to mimic ecological functions of natural glacial lakes, although recent sampling of many mitigation wetlands in the region suggests that they support primarily tolerant species of fishes. The condition of these lakes is largely unknown because they are not monitored routinely.

Recent Recovery Efforts
There are no recovery efforts identified.

Indicators
The *Biodiversity Recovery Plan* indicates that manmade naturalized lakes are marked by a high diversity of amphibians. However, specific, measurable indicators of quality need to be identified for this community, and this is a recommendation for future report cards.

***Report Card* Condition Ranking:**
Undetermined

There is not enough information available to assess the condition of manmade naturalized lakes. However, it is assumed they are declining in condition, as are the region's other lake types.

2.7.11 Other Lakes

Description
There are approximately 10,000 to 20,000 retention ponds in the region. Unknown is how important they are to the biodiversity of the region. Certainly, they can support some species such as migratory birds, fish and amphibians. However, toxins from runoff also accumulate in these ponds. It therefore becomes difficult to assess their condition and trends. Retention ponds often are stocked with sport fish such as sunfish and largemouth bass, and may pose a threat to native stream fish communities in receiving waters by providing large numbers of juveniles during overflow periods. This potential threat has not been investigated fully. There have certainly been more ponds added since the publication of the *Biodiversity Recovery Plan*, but it is hard to say whether their conditions are improving or declining.

Recent Recovery Efforts
There are no recovery efforts identified.

Indicators
If retention ponds are determined to be important for biodiversity conservation, then specific, measurable indicators of quality need to be identified for this community, and this would be a recommendation for future report cards.

***Report Card* Condition Ranking: Undetermined**

There is not enough information available to assess the condition of retention ponds.

2.7.12 RECOMMENDED ACTIONS FOR LAKES

For future reporting purposes, the primary recommendation is to develop specific recovery goals for all of the lake types throughout the region. It is also recommended that region-wide consensus be developed on indicators and monitoring protocols. Additionally, those recommended actions listed in the *Biodiversity Recovery Plan* remain in effect:

- Develop specific recovery plans for species and lakes of concern
- Develop better mechanisms to control the invasion of non-native species
- Plan, protect and manage lakes at the watershed level
- Develop a region-wide process to track and study threats to lakes
- Conduct research to better understand the habitat requirements of aquatic species
- Investigate and mitigate the threat of salinization
- Investigate and prepare for the possibility of reintroduction of native species
- Strengthen laws protecting species and their habitats
- Integrate biodiversity concerns into laws, policies and guidelines
- Clarify ambiguous laws relating to lakes and their management
- Increase public understanding of lake biodiversity issues
- Increase public involvement in lake management and protection

Since Lake Michigan is significantly unique, the *Biodiversity Recovery Plan* lists these distinct recommended actions for it:

- Identify information gaps concerning the Lake Michigan shoreline in the region with respect to surviving habitat and opportunities for habitat restoration, so that practical guides can be developed
- Identify key site-specific aquatic habitat restoration opportunities to support local and lake-wide biodiversity
- Identify site-specific opportunities to provide shoreline protection that also provide improved habitat

Chapter 3
Animal Assemblages

3.1 Introduction

The region's animal assemblages rank from poor to good condition, with the majority tending toward the lower end of the spectrum. For some assemblages, there is a sufficient amount of information to provide quantified assessments. For most, however, the available data has yet to be sufficiently compiled and analyzed. The majority of animal assemblage assessments, like those of the region's terrestrial and aquatic communities, therefore, is largely anecdotal. It should be noted that a great deal of the currently relevant data is derived through volunteer efforts, underscoring a key objective of the *Biodiversity Recovery Plan*, which is to "maintain and strengthen volunteer participation in stewardship and research." The Butterfly Monitoring Network has been collecting butterfly data in the region since 1987. The Bird Conservation Network Census has collected region-wide bird data since the inception of Chicago Wilderness and is but one of a complementary array of local and national volunteer bird monitoring efforts that operate throughout the region.

The main focus of the *Biodiversity Recovery Plan* was to report on terrestrial and aquatic communities, with select information related to animal assemblages woven into the various community assessments. The *Report Card* accords each animal assemblage an independent assessment, utilizing information derived from animal assemblage taxonomic workshops held in 1997 and 2004.

In the 1997 taxonomic workshop on birds, participants used five criteria to assess the status of the region's various bird assemblages: condition of the habitat in the Chicago Wilderness region, condition of the habitat globally, distinctiveness of the avian community, perceived threats to the avian community, and the status of the community in Chicago Wilderness. Based on these categories, assemblages were ranked as globally critical, globally important or locally important (*Biodiversity Recovery Plan* Table 4.9). Taxonomic workshops for other animal assemblages followed a similar approach. Beyond a global/local ranking, however, the four 1997 taxonomic workshops yielded different terms for condition rankings. Bird assemblages were rated "poor," "suboptimal" and "optimal." In the *Biodiversity Recovery Plan*, only reptile and amphibian assemblages rated "declining" are listed. Similarly, only insect assemblages rated "of concern" are identified (*Biodiversity Recovery Plan* Table 4.8). The 2004 animal taxonomic workshops also yielded different terms for condition rankings. However, given their general correlation with a four-point assessment system (the "excellent" rating being seldom used), the following terms were used to provide consistency throughout the *Report Card*: poor, fair, good and excellent. This is intended to facilitate the relating of *Report Card* assessments to stakeholders and the general public.

The lack of a consistent ranking system is symptomatic of the lack of specific recovery goals, indicators and monitoring protocols for nearly all animal assemblages. The exceptions are for grassland birds and savanna herpetofauna, for which conservation designs have been completed. As discussed later in this chapter, these conservation designs, building upon the broad goals in the *Biodiversity Recovery Plan*, provide measurable recovery targets and measurable management strategies based on specific threats. Conservation designs or some similar vehicle are needed for each animal assemblage to guide management and data collection throughout the region, which in turn would allow for a quantified and more thorough assessment of the region's biodiversity.

In spite of the data limitations, the *Report Card* strives to provide the following information:

Overview of Findings

This chapter of the *Report Card* strives to provide the following information:

Condition of Data
For each assemblage type, this section provides a summary of the available data that informed the *Report Card* assessment. It should be noted that the majority of identified data were concentrated primarily in Illinois, although some Indiana data are referenced (relatively few data are referenced from Wisconsin). This underscores a *Report Card* recommendation to increase the data collection from all three states in the Chicago Wilderness region.

Assemblage Description
For each individual assemblage, the following information is provided:

Description
Each individual assemblage description is culled from information in various sections of the *Biodiversity Recovery Plan*, supplemented by feedback from experts on the region's animal assemblages.

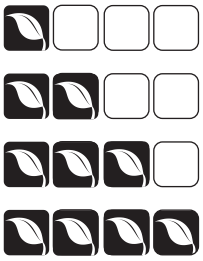
1997 Taxonomic Workshop Assessment
Because the *Biodiversity Recovery Plan* provides few details about the assessed condition of the various assemblages, information was derived primarily from the 1997 workshop minutes.

Biodiversity Recovery Plan Goals
A summary of the broad goals identified in the *Biodiversity Recovery Plan*'s chapter on terrestrial communities.

Recent Recovery Efforts
A list of efforts or sites where management has resulted in a stabilization or recovery of biodiversity. Within some sections, sidebars provide overviews of select sites. It should be noted that many more sites have undergone or are undergoing active management than are highlighted here.

Indicators
Each workshop of animal assemblage experts was asked to identify indicators. It should be noted that this was not always fully possible due to the lack of adequate data on certain assemblages. This underscores a *Report Card* recommendation to develop specific indicators, along with recovery goals and monitoring protocols, for each of the region's natural community and assemblage types.

Report Card Condition Ranking
Each animal assemblage was assigned a condition ranking of "poor," "fair," "good" or "excellent" to describe its current status as viewed by regional experts familiar with that assemblage. Due to the availability of data, the section on birds also includes trend assessments, which, in every determinable instance, is declining.



Recommended Actions
It should be noted that for each assemblage type, it is recommended that a specific instrument be developed, if one does not already exist, to gauge the status of the community and set specific recovery goals, based on the community's importance within the region in contributing to the conservation of local biodiversity.

A final note: As reported in the *Biodiversity Recovery Plan*, mammals do not aggregate into assemblages. Very little information was available about individual mammal species, with the exception of the Franklin's ground squirrel, which is briefly reported upon in this section. The next *Report Card* should include an updated assessment of all of the region's mammal species.

3.2 Bird Assemblages

3.2.1 Overview of Findings
The majority of the region's bird assemblages remain in poor or fair condition and are trending toward a decline in overall quality. This assessment mirrors national and, in some cases, global trends. The exceptions are wetland bird species, which are faring well nationally but not within the Chicago Wilderness region, due to the extensive local loss of wetland areas. For each bird assemblage, there are specific recommended actions. However, the overriding recom-

mendation for priority assemblages is the development of a conservation design or another tool that would include specific, measurable recovery goals, indicators and monitoring protocols, and against which progress could be measured over time.

3.2.2 Condition of the Data

During the past five years, the majority of data gathering and bird-related habitat recovery efforts—both planning and on-the-ground—have been guided by the prioritization of bird assemblages in the *Biodiversity Recovery Plan*, with grassland birds ranked of highest conservation concern. Recent national data has led to shrubland birds being identified as being of very high conservation concern, an observation seconded by local experts within the Chicago Wilderness region. Assessments of the region's bird assemblages are based on a considerable amount of data drawn from different sources. These include:

- Partners in Flight, a national partnership organization, which just published the "North American Landbird Conservation Plan." The plan contains national trend information and species prioritization based on a number of sources. (Rich et al. 2004).
- The Breeding Bird Survey, a long-standing national volunteer effort with a well-studied data set. The Breeding Bird Survey trends given in this report are for the entire state of Illinois. (Sauer et al. 2005).
- The Illinois Spring Bird Count, a day-long volunteer effort very similar to the Christmas Count. The Spring Bird Count is held in early May and the data gathered are compiled by county. Cook County results and statewide results were considered for this report. Although Spring Bird Count data are not specifically designed to measure breeding populations, for many species the vast majority of the birds counted on the Illinois Spring Bird Counts are from breeding populations. These patterns appear to correlate well with the breeding populations (Kleen 2003; Duane, unpublished; Stotz, unpublished).
- The Bird Conservation Network Census, a six-year point count, transect and checklist study of mainly protected lands, conducted primarily during the breeding season, within the Chicago Wilderness region (Bird Conservation Network 2004).

The Illinois Spring Bird Count data set and the Bird Conservation Network Census may pick up some trends that the Breeding Bird Survey misses because certain species are too rare, not found along roadsides or are otherwise poorly sampled. Additionally, the areas sampled are somewhat different. The Breeding Bird Survey routes are placed at random throughout the landscape. In Illinois, for the most part, this means agricultural land. In general, the Illinois Spring Bird Count and the Bird Conservation Network Census observations are focused on patches of protected land, and the matrix surrounding these habitat patches is under-surveyed. The extensive and complex data set of the Bird Conservation Network Census database would yield a wealth of information if a method of analysis were developed in conjunction with a wildlife statistician.

3.2.3 Assemblage Description

The *Report Card* identifies the following bird assemblages, ordered by level of threat, from highest to lowest:

- Birds of moist* grasslands without shrubs
- Birds of moist* grasslands with shrubs
- Dry grassland birds
- Savanna birds
- Open woodland birds
- Hemi-marsh birds
- Shoreline birds
- Closed upland woods birds
- Closed bottomland woods birds
- Pinewood birds

**Moist refers collectively to wet, wet-mesic and mesic*

3.2.4 Grassland Birds

Description

Historically, a mix of prairies and wetlands blanketed the region, supporting an abundance and diversity of grassland species. However, bobolinks, Henslow's sparrows, dickcissels and grasshopper sparrows, once very familiar residents, are now limited to hayfields and protected grasslands. The greater prairie chicken, once abundant, has vanished completely from the region. Upland sandpipers, once extremely common, now hang on in two locations. Regular residents of wet prairie habitats that have vanished from the region include swallow-tailed kites, long-billed curlews and whooping cranes. Currently, native

prairies large enough to support a highly diverse suite of grassland bird species do not exist.

Grasslands with shrubs provide habitat for a range of species, some preferring thickets and others clumps of shrubs. Studies suggest that the particular shrub species is not as significant as the overall structure. Historically, shrubland habitats were found in different areas at various points in time, as fire impacted woody growth, and the shrubland bird community was an important part of the avifauna. Loggerhead shrike, once a very common shrubland bird, is now only found in a very few locations.

1997 Taxonomic Workshop Assessment

- Birds of moist grasslands without shrubs: Poor/Globally Critical
  Nearly all characteristic species have declined in the Chicago Wilderness region. This is primarily the result of habitat destruction, along with intensification of agricultural practices. Nearly all native grassland habitats in the region have been destroyed. There are few high quality sites left. Some species can use agricultural lands, especially pastures and hayfields. However, these species are very sensitive to the management of the hayfields, and they fare poorly in these agricultural lands. A number of the species in moist grasslands are very sensitive to the size of habitat patches, and are absent from small ones. This means that few sites in the region have significant population sizes.

- Birds of moist grasslands with shrubs: Fair/Globally Critical
  Several shrub-using species are declining throughout their ranges, but other species associated with shrubby grasslands are doing rather well. There is little remaining habitat in the region. Characteristic species are relatively tolerant of degraded habitat.

- Birds of dry grasslands: Fair/Locally Important
  There is no specific information on trends in this region, but declines are not evident. There is little remaining habitat in the region, but it was relatively rare in this area even historically. Most of the remnant habitat is degraded. Characteristic species are relatively widespread, and most are tolerant of degradation.

***Biodiversity Recovery Plan* Goals**

The *Biodiversity Recovery Plan* does not differentiate between the three grassland sub-types, but calls for 10 to 12 large sites throughout the region, each approximately 3,000-4,000 acres in size, to sustain viable populations of grassland birds and other prairie species. These large sites should consist of native vegetation in mosaics of grasslands, savannas and wetlands in order to contribute to the conservation of all prairie community elements.

The conservation design (Glennemeier 2002b, pp. 1-2) states that through the management of currently protected grasslands, the acquisition or protection of additional grasslands, and restoration of newly protected grasslands, by 2025 the following acreage of grasslands can be achieved with high quality bird communities:

- At least 9,000 acres of dry and dry-mesic grassland (characterized by grasshopper sparrows), with at least 2,500 acres in individual sites of at least 500 acres
- At least 9,000 acres of mesic grassland (characterized by bobolinks and northern harriers), with at least 2,500 acres in individual sites of at least 500 acres
- At least 9,000 acres of wet and wet-mesic grassland (characterized by sedge wrens and king rails), with at least 2,500 acres in individual sites of at least 500 acres
- At least five grassland habitat complexes of at least 4,000 acres in size

For the following species of highest conservation concern, by 2025 the following can be achieved regionally:

- Henslow's sparrow–at least 500 breeding pairs
- Bobolink–at least 2,500 breeding pairs
- Upland sandpiper–at least 20 breeding pairs at Midewin National Tallgrass Prairie; at least one breeding population elsewhere
- Sedge wren–at least 1,000 breeding pairs
- Northern harrier–breeding in the region at least five years out of every 10
- Grasshopper sparrow–at least 2,500 breeding pairs
- King rail–at least 20 breeding pairs
- American bittern–at least five regularly breeding pairs
- Sandhill crane–at least 200 breeding pairs

Table 3.1
Terrestrial Animal Assemblages Identified for Conservation Planning

Bird Assemblages
Birds of moist grasslands without shrubs*
Birds of moist grasslands with shrubs*
Birds of dry grasslands
Open woodland birds
Hemi-marsh birds
Closed upland woods birds
Closed bottomland woods birds
Pinewood birds

Reptile and Amphibian Assemblages
Black Soil Savanna reptiles and amphibians**
Sedge meadow, fen and dolomite prairie reptiles and amphibians**
Forest and woodland reptiles and amphibians
Grassland reptiles and amphibians
Sand savanna and sand prairie reptiles and amphibians
Marsh reptiles and amphibians**
Panne reptiles and amphibians
High gradient stream reptiles and amphibians
River, lake and pond reptiles and amphibians

Insects Assemblages
Fen, wet prairie and sedge meadow insects**
Marsh insects
Dry and mesic sand prairie/savanna insects**
Foredune insects
Dry and mesic blacksoil/gravel prairie insects**
Bog insects
Blacksoil savanna and woodland insects**
Floodplain forest insects

Mammals
The mammals of the Chicago Wilderness region do not aggregate into assemblages.

**Recommended addition to classification system reported in the Biodiversity Recovery Plan*
**Identified as globally critical in the Biodiversity Recovery Plan*
***Identified as globally important in the Biodiversity Recovery Plan*

- Common snipe–breeding in the region at least five years out of every 10

Recent Recovery Efforts
Restoration of grasslands with a goal of increasing bird habitat has been an important focus of Chicago Wilderness consortium members' work during the last five years, and the results have been encouraging. Removal of woody vegetation has been successful in increasing numbers of birds. A number of projects are underway which study or experiment with herbaceous species composition that is beneficial for these species. On-the-ground examples of this include Midewin National Tallgrass Prairie, Springbrook Prairie, Spring Creek Valley, Rollins Savanna, and the Bartel and Orland Grasslands.

Indicators
The following species were identified during the 1997 and 2004 taxonomic workshops as being species of conservation concern:
- Birds of moist grasslands with shrubs
  - o Willow flycatcher, brown thrasher, field sparrow, yellow-breasted chat, bell's vireo
- Birds of moist grasslands without shrubs
  - o American bittern, northern harrier, king rail,

Table 3.2
Comparison between Chicago Wilderness Conservation Design for Grassland Birds 2025 population targets for conservative species of concern and 2004 estimated populations based on the 2004 Grassland Bird Blitz data.

Grassland Species of Conservation Concern	2025 Goal	2004 Estimate (based on Grassland Bird Blitz)
Henslow's sparrow	At least 500 breeding pairs	258 individuals
Bobolink	At least 2,500 breeding pairs	1,653 individuals
Upland sandpiper	At least 50 breeding pairs at Midewin; at least one breeding population elsewhere	14 individuals at Midewin, 7 elsewhere
Sedge wren	At least 1,000 breeding pairs	233 individuals
Northern harrier	Breeding in the region at least five years out of every 10	3 individuals
Grasshopper sparrow	At least 2,500 breeding pairs	457 individuals
King rail	At least 20 breeding pairs	0 individuals
American bittern	At least five regularly-breeding pairs	0 individuals
Sandhill crane	At least 200 breeding pairs	37 individuals
Common snipe	Breeding in the region at least five years out of every 10	1 individual

short-eared owl, sedge wren, savannah sparrow, Henslow's sparrow, grasshopper sparrow, dickcissel, eastern meadowlark, bobolink
- Birds of dry grasslands with shrubs
  - o Loggerhead shrike, vesper sparrow, lark sparrow
- Birds of dry grasslands without shrubs
  - o Upland sandpiper, horned lark, grasshopper sparrow, western meadowlark

Specific indicators of success for this assemblage, perhaps building on the goals of the conservation design, need to be formally identified and adopted. This is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair to Poor**

- Status
  - o Birds of moist grasslands with shrubs: Fair
  - o Birds of moist grasslands without shrubs: Poor
  - o Dry grassland birds: Fair
- Trends
  - o Birds of moist grasslands with shrubs: Declining
  - o Birds of moist grasslands without shrubs: Declining
  - o Dry grassland birds: Declining

Grassland bird numbers today are a tiny fraction of what they were a hundred years ago, in the Chicago Wilderness region and nationally. Despite many promising efforts, the region is full of examples of grassland habitat that is degrading and sites where bird populations have been declining. Invasive plants and urbanization are other significant problems for this group. Grassland habitat on the outer edges of the region has vanished in the development boom of the last 15 years.

The overall decline in numbers of birds in moist grasslands with shrubs is partly due to factors that are not well understood. Lack of clear research-based guidelines for maintaining the longer disturbance schedule these birds require may contribute to the problem. Recent national research has identified shrubland birds as the second-fastest declining group of birds in the country after grassland birds (Butcher 2004).

However, as evidenced by the grassland recovery efforts listed above, some grassland bird species gains are being realized, as Table 3.2 demonstrates.

In addition to these increases in conservative grassland species, the clay-colored sparrow, a shrubland species, has returned to the region in the last five years, establishing nesting sites at five local grassland preserves.

Toward the conservation design goal of having at least five grassland habitat complexes of at least 4,000 acres in size by the year 2025, as of 2004, there is one such complex at Midewin National Tallgrass Prairie.

Recommended Actions

- Develop a conservation design or a similar tool for shrubland bird species to develop recovery goals, indicators and monitoring protocols
- Designate shrubland birds, following the lead of the Bird Conservation Network, as a second species of conservation priority over the next five years
- Maintain sufficient amounts of habitat for both grassland and shrubland birds
- Consider leaving shrubland habitat in large grassland nesting sites
- De-emphasize large-scale restoration efforts of dry grassland habitat, a historically uncommon habitat in the Chicago Wilderness region and one that is more common in other areas of Illinois, Indiana and Wisconsin

Bartel Grassland

When the Forest Preserve District of Cook County acquired the 585-acre Bartel Grassland in Matteson, Illinois in the 1960s, the majority of the site was fallow farm field. Historically, much of the area had been wet-mesic prairie. Through a recent partnership between the Forest Preserve District of Cook County, Audubon-Chicago Region, CorLands, the U.S. Army Corps of Engineers, Thorn Creek Audubon and the Bartel Grassland Volunteers, drain tiles were disabled, more than five miles of interior fencerow trees removed and native prairie plant species seeded and planted. Although Eurasian and Asian grasses still dominate the site, surveys conducted in 2001 and 2002 reveal that the number of grassland birds has risen dramatically—populations of Henslow's, grasshopper, and savanna sparrows, as well as bobolinks, have risen between 30 and 300 percent. The goal is to continue to restore the native vegetation, which should further support the recovery of these grassland birds and other birds, amphibians and insects. In September 2003, the Illinois Nature Preserves Commission dedicated the site as a Land and Water Reserve (Forest Preserve District of Cook County 2004).

In addition to the recommended actions developed by the experts in the 2004 report card workshops, Glennemeier (2002b) includes in the "Chicago Wilderness Conservation Design for Grassland Birds," a summary of threats and management goals:

Threat: Habitat degradation and succession
Management Goal: Reduce groundcover by woody shrubs and trees, through prescribed fire and invasive species control.

Threat: Loss of breeding habitat from early mowing
Management Goal: Reduce or eliminate the practice of mowing grasslands before August 1.

Threat: Loss of large grasslands due to fragmentation, development and succession
Management Goal: Remove fencerows, prevent development within grassland habitats and increase the size of existing grassland habitats.

Threat: Herbaceous species composition that does not benefit grassland birds.
Management Goal: Determine the native herbaceous species assemblages that are most beneficial to grassland birds and increase the regional acreage planted with these assemblages.

In a paper from the Bird Conservation Network, Heaton (2000) provides a compilation of current best practice recommendations for grassland bird habitat in the region.

3.2.5 SAVANNA BIRDS

Description
Historically, savanna bird habitat was widely distributed throughout the region. Wild turkey and sharp-tailed grouse are two species that were common in this habitat. Although wild turkeys are returning to the region, the nearest sharp-tailed grouse population is in northern Wisconsin.

1997 Taxonomic Workshop Assessment: Fair/ Globally Important
In 1997, in general, populations of savanna birds in the Chicago region were assessed as being rather large. However, nest predation and parasitism may be limiting reproductive success of these birds. Oak-savannas were the predominant vegetation type in the Chicago region, and effectively none survive today. Small patches of oak-savanna have been restored, and significant tracts of additional habitat can be restored. Savanna birds for the most part have been able to survive in secondary habitats that mimic the structure of oak-savannas.

***Biodiversity Recovery Plan* Goals**
There were no bird assemblage-related recovery goals in the *Biodiversity Recovery Plan*, which nonetheless acknowledged that while fewer animal species, in general, depend on savannas than on other community types, savannas do have distinctive inhabitants, particularly birds, reptiles and amphibians. The plan calls to dramatically improve the region's savanna communities.

Recent Recovery Efforts
A study of the impacts of restoration on savanna birds in Illinois, including Chicago Wilderness region study sites, showed that restoring savannas by opening the canopy and reinstituting burning as a disturbance mechanism is a promising method for increasing savanna bird populations (Brawn, 1998).

Indicators
The following species were identified during the 1997 and 2004 taxonomic workshops as being species of conservation concern:

- With Shrubs
  - o Black-billed cuckoo, eastern towhee, blue-winged warbler, yellow-breasted chat, American goldfinch, red-tailed hawk, barn owl, red-headed woodpecker, northern flicker, eastern kingbird, eastern bluebird, Baltimore oriole, orchard oriole
- Without Shrubs
  - o Red-tailed hawk, barn owl, red-headed woodpecker, northern flicker, eastern kingbird, eastern bluebird, Baltimore oriole

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair**

- Status: Fair
- Trends: Declining, with the exception of the Baltimore oriole and the blue-gray gnatcatcher, which are increasing

One particularly interesting Chicago Wilderness region savanna resident is the Swainson's hawk, a species of great concern nationally. The small populations of this species in Kane and McHenry Counties, Illinois, are the only Swainson's hawks east of the Mississippi. Mirroring national trends, proposed housing developments are the principal threats to its limited habitat in Illinois, posing a serious threat of extirpation of this species from the region.

TABLE 3.3
NATIONAL, STATE. REGIONAL AND LOCAL TRENDS FOR SELECT SAVANNA BIRD SPECIES

	Partners in Flight	Bird Breeding Survey	Spring Bird Count Illinois	Spring Bird Count Cook Co.	Bird Conservation on Network Census
	National	**Regional**	**State**	**Local**	**Regional**
Black-billed cuckoo		Declining	Declining numbers	Low	Declining
Swainson's hawk	Watchlist		Low numbers	Low numbers	Low numbers
Red-headed woodpecker	Watchlist	Declining	Large declines	Large declines	Declining
Blue-gray gnatcatcher		Stable	Increasing	Large increases	Increasing
Blue-winged warbler	Watchlist	Increasing	Increasing	Increasing	Low numbers

Recommended Actions

- Develop a conservation design or similar instrument for savanna bird species to develop recovery goals, indicators and monitoring protocols (due to the overlapping nature of savanna and open woodland bird assemblages and their habitats, a joint instrument to set and measure goals for both savanna and open woodland birds might be advisable).
- Establish savanna study areas since savanna habitats are rare and therefore not always included in the current surveying methods.
- Undertake restoration efforts on even small savanna sites. Indications are that savanna bird species respond favorably to well-managed savanna recovery efforts.

3.2.6 OPEN WOODLAND BIRDS

Description

For birds, woodlands and savannas are the most important of the region's forested communities. Declining breeding species include black- and yellow-billed cuckoos, red-headed woodpeckers and blue-winged warblers. The woodlands of the Chicago Wilderness region also provide critical stopover habitat for landbird migrants, many of them declining neotropical species. Wooded communities with and without shrubs each provide habitat for an important group of birds. The open woodland bird community has suffered fewer losses than grassland or wetland species, however, formerly common open woodland species including ruffed grouse, wild turkey and redheaded woodpecker are absent or not

as common today. Conversely, a number of open woodland birds that are common today, including northern cardinal, Carolina wren and red-bellied woodpecker, were historically rare or absent.

1997 Taxonomic Workshop Assessment: Fair/ Globally Important
The removal of fire from the ecosystem has dramatically changed the distribution and aspect of the region's open woodlands. In the absence of periodic fires that maintained these communities for millennia, the region's woodlands have filled with invasive brush and lost much of their herbaceous understory, a food-rich vegetation layer that is an important resource for birds. Oaks, the primary trees of the woods, which provide food and shelter for breeding and migrant bird species, are slowly being replaced by less useful trees.

***Biodiversity Recovery Plan* Goals**
The goals are to maintain viable populations of woodland bird species, particularly sensitive species such as the red-headed woodpecker, as well as a number of locations that provide the structural habitat required by forest-interior species and populations of migrating birds.

Recent Recovery Efforts
Woodland restoration is taking place in many sites around the region. Efforts usually include removal of invasive shrubby vegetation, restoration of a diverse understory, and the return of light conditions adequate for oak reproduction. In the few cases where this has been studied, these changes appear to have a beneficial effect on bird species.

Indicators
The following species were identified during the 1997 and 2004 taxonomic workshops as being species of conservation concern:

- With Shrubs
  - o Blue-winged warbler, towhee, black-billed cuckoo, cooper's hawk, yellow-billed cuckoo, eastern wood-peewee, cedar waxwing, yellow-throated vireo, blue-gray gnatcatcher, rose-breasted grosbeak, Baltimore oriole
- Without Shrubs
  - o Cooper's hawk, yellow-billed cuckoo, red-headed woodpecker, great crested flycatcher, eastern wood-peewee, cedar waxwing, indigo bunting, yellow-throated vireo, blue-gray gnatcatcher, rose-breasted grosbeak, Baltimore oriole

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair**

- Status: Fair
- Trends: Declining

Although woodland bird communities have not shown the same overall decline as the grassland bird species, there is very serious concern about a number of these birds. The Cooper's hawk, blue-gray gnatcatcher and the Baltimore oriole have increased while the red-headed woodpecker and black-billed cuckoo have decreased. Blue-winged warbler numbers are low in the Chicago Wilderness region, and this bird is a Partners in Flight Watchlist species.

Condition of Data
Distribution and trend data appear adequate.

Recommended Actions

- Develop a conservation design or a similar tool for open woodland bird species to develop recovery goals, indicators and monitoring protocols (due to the overlapping nature of savanna and open woodland bird assemblages and their habitats, a joint savanna and open woodland conservation design might be advisable).
- Research the impacts of open woodland restoration on local breeding and migrant bird populations and develop best practices for habitat restoration.

3.2.7 HEMI-MARSH BIRDS

Description
Hemi-marshes exhibit a ratio of 1:1 open water to wetland vegetation. The large number of these and numerous other wetland types historically present in the Chicago Wilderness region once provided critical habitat for tens of thousands of migrant shorebirds. Now, these breeding birds and habitat has been all but lost. Sadly, some of the best shorebird habitat in the region is now found in sewage lagoons.

Wetland bird species are adapted to nesting in a particular part of the wetland community, from dense shoreline vegetation to emergent plants to mats of floating vegetation, and find food in a similar range of locations from muddy shores to the deep water at the middle of some wetlands. As weather conditions vary from year to year, habitat conditions change. Often nearby wetlands of varying sizes and depths function as a complex, affording habitat choices to species across years of very different weather conditions. Once common to the region, hemi-marsh birds such as Wilson's phalaropes and LeConte's sparrows have vanished as local breeders. Black rails, black terns, blue-winged teals, American bitterns, Wilson's snipe and Forster's terns are exceedingly rare.

1997 Taxonomic Workshop Assessment

- With Shrubs
  - o Good/Locally Important
- Without Shrubs
  - o Fair/Locally Important

The Lake Calumet complex historically was a vitally important site for hemi-marsh birds, but is now greatly degraded through pollution, habitat loss, invasion by exotic plants, and disruption of the hydrology. Elsewhere in the Chicago region, the various small to medium-sized marshes that previously maintained significant populations have also been badly degraded.

***Biodiversity Recovery Plan* Goals**

The *Biodiversity Recovery Plan* urged the increase of breeding populations of wetland birds and the improvement of wetland management, so that wetlands can sustain bird populations through droughts.

Recent Recovery Efforts

In the last five years, two wetland species that had been extirpated from Illinois have been restored, the osprey and the Forster's tern. Two pairs of osprey have nested to date, and platforms are in place in several other sites to encourage the populations to expand. Both recreational boating activity and great horned owl predation seriously threaten one Forster's tern colony. Another species, the little blue heron, has returned to the Chicago Wilderness region, establishing a nest site in the Lake Calumet area.

There are a number of successful examples of wetland restoration projects around the region that were planned with biodiversity in mind. Features include wetland creation or expansion, drain tile removal to restore natural hydrology, and removal of invasive species. Published in 2002, a first phase Ecological Management Strategy for the Calumet region, which includes some of the most ecologically significant wetlands in Illinois in spite of the industrial degradation, outlines specific recovery objectives related to the needs of wetland birds. Birds tend to respond conspicuously well to well-planned efforts. On the other hand, traditional wetland mitigation projects, as a general rule, tend to be of poor value for birds.

Indicators

The following species were identified during the 1997 and 2004 taxonomic workshops as being species of conservation concern:

- With Shrubs:
  - o Green heron, black-crowned night heron, willow flycatcher
- Without Shrubs:
  - o Pied-billed grebe, American bittern, least bittern, blue-winged teal, ruddy duck, Virginia rail, sora, common moorhen, American coot, black tern, Forster's tern, marsh wren, yellow-headed blackbird

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair**

- Status: Fair
- Trends: Declining

On a national level, wetland bird populations are fairly stable. However, there are few high-quality wetlands in the state of Illinois and many wetland species are on the Illinois endangered or threatened list. Many of the highest quality wetlands are in the Chicago Wilderness region. Blue-wing teal, which is experiencing serious national declines, is vanishing from the region along with the ruddy duck. The marsh wren is increasing.

Recommended Actions

- Develop a conservation design or a similar tool for hemi-marsh bird species to develop recovery goals, indicators and monitoring protocols

- Create clusters of wetlands to sustain populations of hemi-marsh birds through wet and dry years
- Maintain consistent water levels in hemi-marsh bird habitat as bird populations fluctuate with droughts and/or flooding, especially the Forster's tern
- Aggressively control habitat-reducing invasive species such as reed canary grass and purple loosestrife
- Consider establishing a few sites where water levels can be manipulated to provide habitat for migrant shorebirds, such as has been attempted with some success at McGuinness Slough

3.2.8 SHORELINE BIRDS

Description

Historically, common terns and the federally-endangered piping plover were once common along the shoreline, along with a wide variety of migrant shorebirds. Today, the Chicago Wilderness region shoreline is largely developed, but a few sections of natural beach remain. These are used by small numbers of migrant shorebirds and a few unique nesting species.

1997 Taxonomic Workshop Assessment: Fair/ Locally Important

A small number of bird species historically bred along the beaches of the Lake Michigan shore and on the shores of other area lakes. These habitats have been much altered by human activities and are subject to extreme levels of recreation-related disturbances, especially during the birds' breeding season. Only in areas especially protected from this disturbance can shoreline species exist. Increasing populations of mammalian predators have also taken a heavy toll on breeding populations. The consensus in the 2004 workshops was that the 1997 workshop assessment should have been poor rather than fair.

***Biodiversity Recovery Plan* Goals**

There are no *Biodiversity Recovery Plan* goals related to shoreline birds.

Indicators

The following species were identified during the 1997 and 2004 taxonomic workshops as being species of conservation concern: piping plover, spotted sandpiper, and common tern. Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

Recent Recovery Efforts

A section of Montrose beach in Chicago has been allowed to revert to more natural conditions and provides good shorebird habitat. In a cooperative effort between the Illinois Department of Natural Resources, volunteers and the United States Navy, the common tern has been restored to the state at Great Lakes Station. The piping plover last nested here in the 1970s. The Chicago Wilderness region lakefront is designated potential breeding habitat in the federal recovery plan for Great Lakes population of this species (U.S. Fish and Wildlife Service 2003).

***Report Card* Condition Ranking: Poor**

- Status: Poor
- Trends: Undetermined

The undisturbed shoreline that these birds need is almost non-existent, although common terns have become established in one location.

Recommended Actions

- Create additional undisturbed shoreline sites, where possible, for migratory birds
- Manage habitat to reduce disturbance to shoreline birds, thwart predation and maintain beaches in natural conditions
- Develop a specific recovery plan for the piping plover

3.2.9 BIRDS OF CLOSED UPLAND WOODLANDS

Description

Birds of closed upland woodlands, unlike those of open woodlands and savannas, require large blocks of habitat. Studies have shown that nest success is impaired by cowbird parasitism and predation in blocks of less than 500 acres. The success of bird populations in closed woodlands is better addressed in areas of the country with large forest tracts. Efforts in the Chicago Wilderness region will not contribute significantly to the future of this group of birds. Nonetheless, and no less significantly, all of the woodlands play an important role in sustaining birds on their migratory journeys.

1997 Taxonomic Workshop Assessment: Good/ Locally Important

This habitat likely has increased in the Chicago region during the past 50 years, as abandoned farmland and earlier successional-stage habitats have grown into this vegetation category. However, invasion of exotic species, and changes in species composition over time (because of disruption of natural ecological processes), have degraded many of the habitat tracts in the region. The birds that use this vegetation type are generally widespread, both geographically and ecologically. Nevertheless, because of habitat fragmentation, many birds of closed upland woodlands have poor reproductive success. The remaining closed upland forest blocks in the region are likely too small to sustain viable breeding populations of forest-interior birds.

***Biodiversity Recovery Plan* Goals**

The *Biodiversity Recovery Plan* recommends the maintenance of a number of locations that provide the structural habitat required by forest-interior (closed upland woodland) bird species, as well as for populations of migrating birds.

Indicators

The following species were identified during the 1997 and 2004 taxonomic workshops as being species of conservation concern: broad-winged hawk, hairy woodpecker, veery, wood thrush, rose-breasted grosbeak, scarlet tanager, ovenbird, and red-eyed vireo. Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

Recent Recovery Efforts

There are no recovery efforts identified.

***Report Card* Condition Ranking: Good**

- Status: Good, but not through local efforts
- Trends: No change

The region has had poor reproductive success with these bird populations, due to the fragmented nature of the closed forests. Populations of birds such as veery and wood thrush appear stable, but this is likely because of immigration of new birds into the region and not successful nesting.

Recommended Actions

- Restore upland forests to improve value to birds and other wildlife

3.2.10 BIRDS OF CLOSED BOTTOMLAND WOODLANDS

Description

The river valleys of the Chicago region provide habitat for a diverse array of species. However, most of the species that are characteristic of this habitat are widespread in various wooded habitats, or are near the northern limit of their breeding ranges.

1997 Taxonomic Workshop Assessment: Good/ Locally Important

The riverine woodlands of the Chicago region have largely been destroyed. Little primary woods remain. However, fairly tall woods have re-grown along portions of the floodplains of the Des Plaines and Fox rivers, and locally in other drainages. These woodlands are usually limited to narrow strips along the rivers. Immediately adjacent uplands have mostly converted to agriculture, industrial or residential development. Most major streams have been greatly altered hydrologically, disrupting natural flood regimes and affecting the vegetation of the floodplain forests. The avifauna of this habitat is largely intact in the Chicago region in the high-quality sites. Many of the bird species characteristic of this community also use closed upland woods, and are widespread in the Chicago region. However, habitat fragmentation has affected many species severely through cowbird parasitism and increased nest predation. It is likely that for most bird species breeding in this community, the Chicago region is a population sink maintained by immigration from less fragmented parts of their ranges. The consensus in the 2004 workshops was that the 1997 workshop assessment should have been fair rather than good.

***Biodiversity Recovery Plan* Goals**

There are no specific *Biodiversity Recovery Plan* goals related to this assemblage.

Recent Recovery Efforts

There are no known recovery efforts related to this assemblage.

Indicators
The following species were identified during the 1997 and 2004 taxonomic workshops as being species of conservation concern: red-shouldered hawk, barred owl, Acadian flycatcher, pileated woodpecker, hairy woodpecker, brown creeper, veery, cerulean warbler, American redstart, prothonotary warbler, and red-eyed vireo. Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.


***Report Card* Condition Ranking: Fair**

- Status: Fair
- Trends: Declining

Local habitat for this assemblage is increasingly damaged, and although closed bottomland woodland habitat hosts an interesting and unique variety of birds, because larger concentrations of this habitat exist outside of the Chicago Wilderness region, it is locally a lower priority for action.

Condition of Data
The few remaining examples of this habitat type in the region are not well monitored.

Recommended Actions
- Develop a specific instrument to set recovery goals, indicators and monitoring protocols
- Identify sites that still contain a large percentage of closed bottomland woodland indicator species and create specific management plans to safeguard the habitat

3.2.11 PINEWOOD BIRDS
Description
This assemblage is not native to the region. A variety of pine plantations dot the Chicago Wilderness region, which have attracted characteristic bird species.

1997 Taxonomic Workshop Assessment: Good/ Locally Important
Historically, there were few native pine woodlands in the Chicago Wilderness region. As a result, few regularly-breeding species in this region are associated with pines. Pine plantations have greatly increased the habitat available for this bird community. A number of species occur irregularly as breeders, south of their primary breeding ranges. There are no data on the condition of breeding populations in these habitats.

***Biodiversity Recovery Plan* Goals**
There are no *Biodiversity Recovery Plan* goals related specifically to this assemblage.

Recent Recovery Efforts
There are no known recovery efforts related to this assemblage.

Indicators
The following species were identified during the 1997 and 2004 taxonomic workshops as being species of conservation concern: cooper's hawk, chipping sparrow, and black-throated green warbler.


***Report Card* Condition Ranking: Fair**

- Status: Fair
- Trends: Not determined

Being non-native, this assemblage is a very low priority.

Condition of Data
The few sites that exist are not well monitored.

Recommended Actions
As this assemblage is non-native, the development of a dedicated conservation design for pinewood birds is not a high priority.

3.3 REPTILE AND AMPHIBIAN ASSEMBLAGES

3.3.1 OVERVIEW OF FINDINGS
According to the 1997 taxonomic workshop that assessed the condition of the region's reptile and amphibian assemblages, most were determined to be in a declining state. The current assessment finds no overall change, however declines may be regional, local or temporal (e.g. cyclic) in some species. The declining condition of local species mirrors the status of amphibians worldwide. As reported in the journal *Science*, a recent study provides new context to the well-publicized phenomenon of amphibian declines. Amphibians are more threatened, and are declining more rapidly, than either birds or mam-

mals. Although many declines are due to habitat loss and over-utilization, other, unidentified processes threaten 48 percent of rapidly declining species, and are driving species most quickly to extinction. Declines are non-random in terms of species' ecological preferences, geographic ranges and taxonomic associations, and are most prevalent among Neotropical montane, stream-associated species. The lack of conservation remedies for these poorly understood declines means that hundreds of amphibian species now face extinction (Stuart, et al. 2004).

As is the case with the other assemblage types, specific, measurable recovery goals and monitoring protocols need to be developed. A significant step in this direction is the "Chicago Wilderness Conservation Design for Savanna Herpetofauna," (Glennemeier 2002c) (summarized below) developed in 2002, which refines and augments the recovery goals and recommended actions broadly outlined in the *Biodiversity Recovery Plan*.

3.3.2 Condition of Data

The following assessments are based primarily on expert observations, underpinned by their familiarity with various data. There are several sources for reptile and amphibian data, but few, if any, have been sufficiently compiled and analyzed to inform region-wide status. Alan Resetar of the Field Museum, for instance, has approximately 3,000 data sheets, each containing detailed habitat and microhabitat information on one individual amphibian or reptile. Approximately 1,300 of these records are in a database (the remainder are not). Trends are difficult to establish due to the general lack of historical data. However, Audubon-Chicago Region, in coordination with the Chicago Wilderness Habitat Project, has begun conducting a Chicago Wilderness frog survey. Using trained volunteer monitors, this project will provide for the tracking of long-term trends by collecting data from the same sites, year after year. At the end of 2004, the project had amassed three years' worth of data from 47 frog monitoring locations. This figure compares favorably with the Glennemeier (2002c) goal of consistently monitoring 30 sites of at least 50 acres by 2005.

3.3.3 Description

The *Report Card* identifies the following reptile and amphibian assemblages:

- Fine-textured soil savanna reptiles and amphibians
- Sedge meadow, fen and dolomite prairie reptiles and amphibians
- Forest and woodland reptiles and amphibians
- Grassland reptiles and amphibians
- Sand savanna and sand prairie reptiles and amphibians
- Marsh reptiles and amphibians
- Panne reptiles and amphibians
- High gradient stream reptiles and amphibians
- River, lake and pond reptiles and amphibians

The species listed in each assemblage's "Indicators" section were selected as good indicator species for their assemblages because their presence generally indicates high quality habitat with a number of other species present. However, it is important to note that their absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich. It is also worth noting that over time richness may not change, but composition will, so composition must also serve as an indicator.

3.3.4 Fine-Textured Soil Savanna Reptiles and Amphibians

Description

The following species are found in fine-textured soil upland, lowland savanna and shrubland:

Eastern tiger salamander	American toad
Western chorus frog	Brown snake
Cope's gray treefrog	Milk snake
Northern leopard frog	Redbelly snake
Common garter snake	

1997 Taxonomic Workshop Assessment: Declining/ Globally Important

As of 1997, savanna assemblages appeared to be declining due to a lack of management, insufficient preserve size, and/or lack of connective habitat. Indications were, however, that trends could reverse quickly with proper conservation efforts. Some populations on managed areas appeared to be stable or increasing, but remained of conservation concern because only a small percentage of sites were being managed.

***Biodiversity Recovery Plan* Goals**
The *Biodiversity Recovery Plan* outlines the need for savanna sites of between 200 and 500 acres, the need for multiple sites with functional connections for dispersal, and the need for management to be undertaken to improve savanna quality and structure.

Following up on a key recommendation of the *Biodiversity Recovery Plan*, the "Chicago Wilderness Conservation Design for Savanna Herpetofauna" was completed in 2002 (Glennemeier 2002c). The plan calls for a suite of mosaics that sustain diverse communities and stable populations of herpetofauna, as well as the associated other fauna and flora that constitute native savanna ecosystems. By 2025, there are to be: 1) 100 monitored sites of at least 50 acres throughout the region, 80 percent of which are to experience no loss or decline in relative abundance for any of the 27 target species listed in the conservation design and 2) at least one large (800 acres or more) habitat complex—consisting of multiple habitat types—in each of the five Chicago Wilderness natural divisions: Grand Prairie, Western Morainal, Kettle Moraine, Lake Plain and Gary Lake Plain/High Dune/Ridge and Swale. The plan sets five-year benchmarks toward the attainment of these goals.

Also by 2025, 100 percent of savanna mosaic sites are to have written, approved, active plans to address invasive species, prescribed fire management, hydrology, and fragmentation and dispersal. Invasive plant coverage is to be controlled at 15 percent of all savanna acres. Fifty percent of sites are to have 25 percent of their acreage burned in four of the five previous years and 40 percent of the sites are to have an average Floristic Quality Index per quadrat of at least 10. There are additional 2005 benchmarks related to education, regulation, acquisition, large sites, fund raising, research and management.

Recent Recovery Efforts
Pursuant to the conservation design goal of preserving and maintaining at least one large habitat complex in each of the region's five natural divisions, the working group identified 1) the Plum Creek greenway in the Northeast Morainal Division, comprised of five sites, totaling approximately 2,200 acres, 2) Thorn Creek Woods, also in the Northeast Morainal Division, comprised of about 1,100 acres and 3) the Kankakee Sands areas in the Grand Prairie Division, consisting of three sites totaling nearly 1,200 acres. According to the Forest Preserve District of Will County, which owns the sites, more than 900 of the 4,500 total acres were acquired since the publication of the *Biodiversity Recovery Plan*.

Additionally, as more acreage has been acquired during the last five years, the oak savanna, marsh, sand prairie, high dune and associated anthropogenic grassland and wetland areas on the border of Lake and Porter Counties in Indiana have developed into a substantial-sized unit of approximately 2,200 acres. Contributing sites include Miller Woods, Inland Marsh, West Beach, Ogden Dunes, Woodlake Dune, the Savanna and Marquette Trail portions of the Indiana Dunes National Lakeshore, the John Merle Coulter Sand Prairie Nature Preserve, and the ISG (formerly Bethlehem Steel) restoration site.

Indicators
Indicator species identified in the 1997 taxonomic workshops include the Eastern tiger salamander and milk snake. These were selected as good indicator species for this assemblage because their presence generally indicates high quality habitat with a number of other species present. However, it is important to note that their absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich.


***Report Card* Condition Ranking: Fair**
In general, this assemblage is stable, as most savanna amphibians and reptiles are generalists and do not necessarily need savanna habitat. However, this ranking should not be taken as a reflection of fine-textured soil savanna habitat itself, which is ranked in poor condition.

3.3.5 Sedge Meadow, Fen and Dolomite Prairie Reptiles and Amphibians

Description
The following species are found in sedge meadow, calcareous floating fen, graminoid fen, low shrub fen and upland and lowland dolomite prairie:

American toad	Western chorus frog
Green frog	Pickerel frog

Status of Amphibians and Reptiles in Savanna Habitats and Savanna Mosaic Communities of the Chicago Wilderness Region

From May through October of 2004, several organizations within the Chicago Wilderness consortium conducted in-depth surveys of amphibians and reptiles at 15 savanna and savanna mosaic communities within the Chicago Wilderness region. They found 30 species of amphibians and reptiles, including 15 species that are considered to be of high conservation value. Most notably, they found Kirtland's snakes, spotted salamanders, smooth green snakes, and Eastern box turtles at one site, and cricket frogs at another. Other species of high conservation value included spring peepers (found at 12 sites), eastern gray treefrogs (at 10 sites), blue-spotted salamanders and Fowler's toads (each at four sites), blue racers and slender glass lizards (each at three sites), and eastern newts, bullsnakes, eastern hognose snakes and six-lined racerunners (each at two sites).

At two-thirds of the savanna sites, the presence and relative abundance of western fox snakes, eastern gray treefrogs, Fowler's toads, tiger salamanders, blue-spotted salamanders, bullsnakes, slender glass lizards, eastern garter snakes, and green frogs were associated with high amphibian and reptile biodiversity. The survey team suggests that these species are also indicators of high quality savanna habitat.

The data gathered will be used to determine the distribution and status of species and to provide baseline data that is necessary to design management plans to conserve and foster the recovery of native biodiversity in unique and threatened communities. The data will also be used as benchmarks to evaluate the success of the Chicago Wilderness conservation design for savanna amphibians and reptiles (Brodman et al. 2005).

Blanding's turtle	Northern leopard frog
Smooth green snake	Northern water snake
Queen snake	Brown snake
Common garter snake	

1997 Taxonomic Workshop Assessment: Declining/ Globally Important

It was determined in the 1997 workshop that this assemblage was declining overall, although there was a north/south division in how these species were faring. In the north part of the region (Lake and McHenry Counties, Illinois), they were faring better, perhaps even increasing, due to management and protection. Throughout the region, specialists within this assemblage were declining, with only a few species hanging on. This was primarily due to fragmentation, isolation and the presence of invasive species such as purple loosestrife, which eliminates needed habitat structure. Found in rare habitat types, species in this assemblage were of concern.

***Biodiversity Recovery Plan* Goals**

Because the complex life cycles of amphibians require several different habitats, the *Biodiversity Recovery Plan* calls for the establishment, protection and management of habitat mosaics, including marshes, bogs, fens, sedge meadows, pannes and seeps. Across the region, different wetlands should be at different stages at the same time. To benefit wetland reptiles and amphibians, as well as wetland birds, the plan also calls for the establishment of 1,000-acre natural area complexes, with several marshes of 100 acres or more and with smaller wetlands and ephemeral pools.

Recent Recovery Efforts

There are no specific assemblage recovery efforts identified.

Indicators

Indicator species identified in the 1997 taxonomic workshop include the northern leopard frog,

Blanding's turtle and the smooth green snake (or queen snake instead of smooth green snake for dolomite prairie). These were selected as good indicator species for this assemblage because their presence generally indicates high quality habitat with a number of other species present. However, it is important to note that their absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich.

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor**

With few changes since the publication of the *Biodiversity Recovery Plan*, this assemblage remains in poor condition.

3.3.6 FOREST AND WOODLAND REPTILES AND AMPHIBIANS

Description

The following species and one hybrid salamander are found in upland forest, floodplain forest, northern flatwoods, upland woodland and lowland woodland:

- Eastern newt
- Blue-spotted salamander
- Marbled salamander
- Smallmouth salamander
- Four-toed salamander
- Eastern rat snake
- Eastern milk snake
- Five-lined skink
- Northern redback salamander
- *Polyploid ambystomatids* (or *Amystoma* hybrid complex)
- Gray treefrog
- Spring peeper
- Wood frog
- Eastern box turtle
- American toad
- Ringneck snake
- Spotted salamander
- Tiger salamander

1997 Taxonomic Workshop Assessment: Declining/ Locally Important

As of 1997, forest species were fairly common at the extreme eastern periphery of the region, but occurred as relic populations elsewhere within the Chicago Wilderness region. Overall, this assemblage was declining and there was concern regarding the survival of the remaining small populations. The habitat was broken up into small, isolated patches and there were significant barriers to dispersal. Management was needed at the habitat level, particularly regarding invasive buckthorn, the presence of which unfavorably alters forest and woodland understory.

***Biodiversity Recovery Plan* Goals**

The *Biodiversity Recovery Plan* calls for a sustainable population of forest and woodland amphibians and reptiles with opportunities for gene flow among separate sub-populations. Goals include securing approximately 50,000 to 100,000 acres of healthy forest and woodland complexes, with as many as 20 good quality sites larger than 500 acres, and maintaining enough sites to provide for a wide range of quality breeding habitat (including a variety of wetlands within woodland sites).

Recent Recovery Efforts

There are no specific on-the-ground recovery efforts identified for this assemblage. However, beginning in October 2004, Indiana had banned the collection of eastern box turtles.

Indicators

Indicator species identified in the 1997 taxonomic workshop include the gray treefrog and spring peeper. These were selected as good indicator species for this assemblage because their presence generally indicates high quality habitat with a number of other species present. However, it is important to note that their absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich.

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair**

Most species in this assemblage do well in protected, managed habitats. Some have lost habitat or have become extirpated, or there is no information available on their status. The condition of select individual species is as follows:

- The eastern newt remains in isolated populations. Susceptible to infringement on habitat, this species is stable if its habitat is not lost.
- The blue-spotted salamander has benefited from increased habitat and is ranked in excellent condition.

- 2004 surveys conducted for the marbled salamander did not locate the species. David Beamer, Donna Resetar and Alan Resetar conducted the surveys at some of its historic locations in the Indiana Lake Michigan Coastal Zone.
- The four-toed salamander is a specialized species, susceptible to disturbance and intrusion on habitat, and more abundant in Indiana preserves. In Illinois, to date it has only been found in Will County.
- The northern redback salamander is stable in Indiana, and is being found at additional new sites in Lake County. Although it may be extirpated in northeastern Illinois, suitable habitat exists in extreme eastern Will County.

3.3.7 GRASSLAND REPTILES AND AMPHIBIANS

Description

The following species are found in upland and lowland prairies:

American toad	Western fox snake*
Western chorus frog	Smooth green snake
Plains leopard frog	Plains garter snake

**The western fox snake has been reclassified from the savanna assemblage.*

1997 Taxonomic Workshop Assessment: Declining/ Locally Important

This assemblage consists of three species that are generalists and in 1997 were considered stable, and three that are restricted and were determined to be in decline at that time.

***Biodiversity Recovery Plan* Goals**

To conserve all of the region's grassland reptiles and amphibians, the *Biodiversity Recovery Plan* recommends the creation of as many medium-sized (500-1,000-acre) grassland sites as possible. These sites should consist of core natural areas within a landscape that allows them to function as breeding habitat for these species. A priority should be to expand as many existing 80- to 200-acre prairie remnants as possible to 500- to 1,000-acre sites, providing opportunities for recolonization of species. These sites should be managed with a diversity of processes to create the variety of habitats needed by different species. An additional goal is to conserve the smooth green snake, which is restricted to grassland habitats.

Recent Recovery Efforts

There are no specific assemblage recovery efforts identified.

Indicators

Indicator species identified in the 1997 taxonomic workshop include the smooth green snake and plains garter snake. These were selected as good indicator species for this assemblage because their presence generally indicates high quality habitat with a number of other species present. However, it is important to note that their absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich.

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair to Poor**

There remains a disparity in the condition of grasslands throughout the region, with the majority being unmanaged or under-managed. The condition of amphibian and reptile assemblages generally mirrors the condition of their habitats. Particularly distressing are such instances as the pending development in Indiana of a site that harbors a sizable population of the green snake, an Indiana state-endangered species.

3.3.8 MARSH REPTILES AND AMPHIBIANS

Description

This species assemblage includes:

American toad	Western chorus frog
Green frog	Northern leopard frog
Snapping turtle	Painted turtle
Blanding's turtle	Northern water snake
Western ribbon snake	Graham's crayfish snake
Common garter snake	Tiger salamander
Spring peeper	Blue-spotted salamander
Bullfrog+	Plains leopard frog+
Newt+	Spotted turtle+

+*Additions recommended by 2004 workshop participants*

1997 Taxonomic Workshop Assessment: Relatively Stable/Globally Important

During the 1997 workshop, it was assessed that those reptile and amphibian species that can persist in monotypic habitats were surviving, while those that

need diverse habitats were declining. Principal threats to marsh reptile and amphibian species included the development occurring around marshes and the invasion of purple loosestrife and cattails. Species were suffering, too, under management regimes that prevented the cycling of water. It was questionable the extent to which wetland restoration sites were aiding the condition of amphibians.

***Biodiversity Recovery Plan* Goals**
Because the complex life cycles of amphibians require several different habitats, the *Biodiversity Recovery Plan* calls for the establishment, protection and management of habitat mosaics, including marshes, bogs, fens, sedge meadows, pannes and seeps. The *Biodiversity Recovery Plan* recommends that across the region, different wetlands should be at different stages at the same time. To benefit wetland reptiles and amphibians, as well as wetland birds, the plan also calls for the establishment of 1,000-acre natural area complexes, with several marshes of 100 acres or more and with smaller wetlands and ephemeral pools. To connect existing wetlands, the plan calls for many more relatively small wetland complexes, particularly in the southern and western parts of the region.

Recent Recovery Efforts
The National Park Service is conducting a large-scale project to restore the natural drainage to a former marsh complex (Great Marsh) in northern Porter County, Indiana.

The East Branch of the Grand Calumet River and the Indiana Harbor Canal System is poised to benefit from a $53 million settlement to restore natural resources injured by contaminants in the river and canal sediments. About 233 acres of land in western Lake County, Indiana will be set aside for habitat protection, including property containing marshes, sand prairies, sand savanna and pannes.

***Report Card* Condition Ranking: Fair to Poor**

Marsh areas have become more stabilized in the last five years because hydrology management has improved, but development and invasive species continue to threaten the long-term viability of this assemblage. Of particular concern is Graham's crayfish snake, which hasn't been recorded in multiple counties for nine to 15 years.

Indicators
Indicator species identified in the 1997 taxonomic workshop include the northern leopard frog and Blanding's turtle. These were selected as good indicator species for this assemblage because their presence generally indicates high quality habitat with a number of other species present. However, it is important to note that their absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich.

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

3.3.9 Panne Reptiles and Amphibians

Description
Panne is a distinct and globally rare plant community, but experts are not certain if there is a distinct reptile and amphibian assemblage found in pannes. According to the *Biodiversity Recovery Plan*, the following species comprise this assemblage:

Fowler's toad	Northern cricket frog*
Green frog	Western chorus frog
Blanding's turtle	Northern leopard frog
Northern water snake	Common garter snake

**The northern cricket frog has been reclassified from the marsh assemblage.*

At least one expert believes that there are distinct panne habitats in Indiana based primarily on topographic features. The assemblages listed below represent current occurrences in each habitat. The assemblages seem distinct but this may be an artifact of site histories (disturbance, origin, etc.), site size and the number of sites remaining.

High dune-associated pannes:

Fowler's toad	Western chorus frog
Green frog	Eastern hognose snake

Ridge and swale (Toleston Strandplain)-associated pannes:

American toad	Green frog
Western chorus frog	Eastern tiger salamander

Northern cricket frog	Eastern newt
Northern water snake	Blanding's turtle
Spotted turtle	Painted turtle

Illinois pannes:

Western chorus frog	Green frog
Northern leopard frog	Blanding's turtle
Northern water snake	Common garter snake
Painted turtle	Common snapping turtle
Tiger salamander	

1997 Taxonomic Workshop Assessment: Stable/ Locally Important

The 1997 workshop participants rated this assemblage as stable, but of conservation concern. There had been a number of historical losses—notably in Illinois Beach State Park and Lake County, Indiana—so the 1997 condition represented a depleted condition. The remaining examples of this assemblage were in preserves. Threats included human disturbance, especially collection.

***Biodiversity Recovery Plan* Goals**

Because the complex life cycles of amphibians require several different habitats, the *Biodiversity Recovery Plan* calls for the establishment, protection and management of habitat mosaics, including marshes, bogs, fens, sedge meadows, pannes and seeps. The *Biodiversity Recovery Plan* recommends that across the region, different wetlands should be at different stages at the same time. To benefit wetland reptiles and amphibians, as well as wetland birds, the plan also calls for the establishment of 1,000-acre natural area complexes, with several marshes of 100 acres or more, and with smaller wetlands and ephemeral pools. To connect existing wetlands, the plan calls for many more relatively small wetland complexes, particularly in the southern and western parts of the region.

Recent Recovery Efforts

There are no specific assemblage recovery efforts identified.

Indicators

Participants in the 1997 taxonomic workshop identified the Fowler's toad as an indicator species. This species was selected as a good indicator species for this assemblage because its presence generally indicates high quality habitat with a number of other species present. However, it is important to note that its absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich.

***Report Card* Condition Ranking: Fair**

The fact that a relatively substantial amount of the region's remaining acreage of panne habitat is under protection affords the related amphibian and reptile assemblage a degree of stability. However, encroachments persist. A proposed expansion of the Gary, Indiana airport would impact part of the core area of ridge and swale Toleston Strandplain-associated pannes.

3.3.10 SAND SAVANNA AND SAND PRAIRIE REPTILES AND AMPHIBIANS

Description

This species assemblage includes:

Eastern tiger salamander	Fowler's toad
Six-lined racerunner	Eastern racer
Western ribbon snake	Bullsnake
Common garter snake	Gray treefrog
Blue-spotted salamander	DeKay's snake
Eastern hognose snake+	Milk snake
Slender glass lizard	

+Addition recommended by the 2004 workshop participants

Species within two potential sub-assemblages, Kankakee sands and Lake Plain sands, include the following:

Kankakee sands:

Six-lined racerunner	Fowler's toad
Slender glass lizard	Bullsnake
Western ribbon snake	Eastern racer
Common garter snake	Ornate box turtle
Eastern hognose snake	Blanding's turtle
Eastern tiger salamander	
Blue-spotted salamander (Indiana)	

Lake Plain sands:

Eastern tiger salamander	Fowler's toad
Blue-spotted salamander	Gray treefrog
Six-lined racerunner	Slender glass lizard
Common garter snake	DeKay's snake

Western ribbon snake	Eastern racer
Eastern hognose snake	Blanding's turtle

1997 Taxonomic Workshop Assessment: Declining/ Locally Important
Reflecting the rare nature of sand savannas and sand prairies, the related reptile and amphibian assemblage was deemed equally rare during the 1997 workshop. Overall, it was determined that remaining habitat suffered from heavy fragmentation and isolation. Additional threats to species within this assemblage, particularly large snakes, included heavy collection at the best remaining sites.

***Biodiversity Recovery Plan* Goals**
Acknowledging that savannas support distinctive assemblages of reptiles and amphibians, the *Biodiversity Recovery Plan* outlines the need for savanna sites of between 200 and 500 acres, for multiple sites with functional connections for dispersal, and for management to be undertaken to improve savanna quality and structure. To maintain viable populations of prairie reptiles and amphibians, the *Report Card* calls for the creation of as many medium-sized (500- to 1,000-acre) grassland sites as possible. All sites should include functional connections for dispersal, i.e., powerline rights of way managed as habitat.

Recent Recovery Efforts
There are no specific assemblage recovery efforts identified.

Indicators
Indicator species identified in the 1997 taxonomic workshop included the eastern tiger salamander. This was selected as a good indicator species for this assemblage because its presence generally indicates high quality habitat with a number of other species present. However, it is important to note that its absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich.

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.


***Report Card* Condition Ranking: Fair**

There is a fair amount of habitat under protection. Of concern, however, are bullsnakes and racers, each of which requires large, at least 500-700-acre, sites. Racers have experienced higher road mortality near developed areas as well as at the Indiana Dunes in the autumn. The western ribbon snake, which is stable in Indiana, may be extirpated in Illinois. The spotted and Blanding's turtles are the targets of collectors at the best remaining sites in Indiana, and also suffer high road mortality. The slender glass lizard is more vulnerable to fire mortality than other species in this assemblage. Prescribed burns must be timed to periods when this lizard is in hibernation. Fires during its activity period, even on inclement days, can cause mortality, because the lizard may shelter under dried vegetation lying on the surface instead of in burrows. One formerly robust population of glass lizards in the Indiana Dunes National Lakeshore may have declined, as indicated by the failure to find individuals in a subsequent survey.

3.3.11 Reptiles and Amphibians of High-Gradient Stream Communities

Description
This species assemblage includes:

Green frog	Pickerel frog
Northern water snake	Queen snake
Southern two-lined salamander	

1997 Taxonomic Workshop Assessment: Declining/ Locally Important
It was determined in 1997 that some species within this assemblage, i.e. the pickerel frog, had been eliminated from the region. Some, including the two-lined salamander, were severely restricted in distribution and their populations stressed. Threats included siltation, urban runoff, pollution and groundwater alteration. There was a high potential of further decline for this assemblage.

***Biodiversity Recovery Plan* Goals**
There are no *Biodiversity Recovery Plan* goals specific to reptiles and amphibians of high-gradient stream habitats. Nonetheless, the following recommended actions for stream communities would impact this assemblage:

- Reduce hydrological alteration
- Reduce deterioration of habitat quality
- Reduce deterioration of water quality

Recent Recovery Efforts
There are no specific assemblage recovery efforts identified.

Indicators
Indicator species identified in the 1997 taxonomic workshop include the green frog where it is the dominant species and queen snake, which is very rare or localized. These were selected as good indicator species for this assemblage because their presence generally indicates high quality habitat with a number of other species present. However, it is important to note that their absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich.

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.


***Report Card* Condition Ranking: Fair**

Although threats to high-gradient stream habitat are severe, species within the related assemblage are not restricted to this habitat community.

3.3.12 River, Lake and Pond Reptiles and Amphibians

Description
This species assemblage includes:

Mudpuppy	Northern cricket frog
Green frog	Common snapping turtle
Bullfrog	Common musk turtle
Painted turtle	Common map turtle
False map turtle	Slider
Spiny softshell	Northern water snake
Queen snake+	Blanding's turtle+

+Addition recommended by the 2004 workshop participants

1997 Taxonomic Workshop Assessment: Stable, but not confirmed/Locally Important
During the 1997 workshops, most of the species within this assemblage were deemed common, but a few were of concern, particularly cricket frogs, Blanding's turtles, map turtles and queen snakes. Threats included ground water alterations and the release of non-native turtles, which are difficult to distinguish from native populations.

***Biodiversity Recovery Plan* Goals**
As is the case with the high-gradient stream assemblage, there are no river, lake and pond recovery goals specific to reptiles and amphibians in the *Biodiversity Recovery Plan*. Nonetheless, among the several recommended actions for the region's aquatic communities, the following are particularly relevant to this assemblage:

- Reduce hydrological alteration
- Reduce deterioration of habitat quality
- Reduce deterioration of water quality
- Develop specific recovery plans for species and lakes of concern
- Investigate and prepare for the possibility of reintroduction of native species

Recent Recovery Efforts
There are no specific assemblage recovery efforts identified.

Indicators
Indicator species identified in the 1997 taxonomic workshop include the mudpuppy, common map turtle (rare, but possibly increasing in some areas in the northern part of the region) and spiny softshell, which is found in habitats of varying quality. These were selected as good indicator species for this assemblage because their presence generally indicates high quality habitat with a number of other species present. However, it is important to note that their absence does not necessarily indicate that a given site is not important for the assemblage or not species-rich.

Specific indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.


***Report Card* Condition Ranking: Fair**

This assemblage appears stable, but additional research is needed. Woody plant succession on exposed banks used for ovipositon is a serious management issue. The effect of introduced invasive species such as the round goby should be monitored.

Potential effects on mudpuppies, anuran larvae and even hatchling turtles should be determined through dietary analysis at sites such as Wolf Lake in south Chicago and Hammond, Indiana.

3.3.13 Recommended Actions

Along the lines of the "Chicago Wilderness Conservation Design for Savanna Herptofauna" (Glennemeier 2002c), specific, measurable region-wide goals—along with monitoring protocols—need to be established for each of the region's amphibian and reptile assemblages. Other data and monitoring-related recommendations include:

- Analyze existing unpublished reports
- Share data across the region, preferably with some central repository
- Identify and fill data gaps, i.e., data are needed on the relationships of reptiles and amphibians to their habitats, and in particular, how dependent the milk snake may be on savanna habitat
- Monitor reptile and amphibian population health against restoration and management efforts
- Train more professionals to verify and analyze collected data
- Increase volunteer training in pertinent areas
- Monitor the same sites over time
- Expand presence/absence surveys to include population assessments, demography, etc.
- Conduct specialized surveys throughout the entire Chicago Wilderness region for species that are difficult to survey, such as mudpuppies, wood frogs, Graham's crayfish snakes and Kirtland's snakes
- Conduct rapid assessments over time intervals, perhaps two to five years, to get some baseline trend measurements

Recommended research actions include:

- Research the role of mitigated wetlands, because more wetlands are being restored or "created" and because mitigation design has changed
- Create habitat design parameters for target species that can be incorporated into mitigation or restoration designs
- Increase research on the effects of restoration on all wildlife, including reptiles and amphibians
- Research and demonstrate reptile, amphibian and other wildlife responses to restoration activities over long periods of time

To date, DuPage, Will, and Lake Counties, Illinois, have tailored management to accommodate the special needs of amphibians and reptiles. Management agencies throughout the region, however, need to fine-tune prescribed burn protocols to do the least harm to amphibians and reptiles while at the same time maintaining effective control over the open canopy habitats that some species need. A recent report on fire mortality in a prairie reptile and amphibian assemblage in Missouri is sobering. In this paper, Frese (2003), notes the following mortality observed during a 1999 post-fire survey of a 33-hectare site:

- 20 of 42 *Terrapene carolina*
- 4 of 7 *Terrapene ornata*
- 2 of 2 *Ophisaurus attenuatus*
- 3 of 3 *Coluber constrictor*
- 12 of 12 *Lampropeltis calligaster*

Pursuit of the various recommended actions for the region's terrestrial and aquatic communities would also benefit amphibian and reptile populations. Assemblage-specific recommendations include:

- Establish professional training for land managers on management protocols for reptiles and amphibians, similar to the Chicago Wilderness consortium's prescribed burn training. This training should cover such topics as basic identification, habitat needs, sources for gathering further information, and how to rigorously evaluate translocation proposals. It should help land managers further their basic understanding of our local species and provide a better understanding of why reptiles and amphibians are not distributed homogeneously over all "suitable looking" habitat. Furthermore, such training should provide more insight into some idiosyncratic aspects of vertebrate population ecology and behavior, especially as they apply to reptiles and amphibians.
- Conduct feasibility studies before species' reintroductions, and conduct ongoing monitoring of reintroduction successes, including an evaluation of the effects of reintroductions on source populations. An extremely important component of any feasibility study should be an investigation into whether a reintroduction is even appropriate for that time and place, because failed reintroductions can cause more harm than good.

- Establish a reptile and amphibian reintroduction task force within the Chicago Wilderness Natural Resource Management Team.
- Identify where opportunities exist to meet the *Biodiversity Recovery Plan* and conservation design goals related to the establishment of large habitat complexes.
- Evaluate the possibility of planting native shrubs in the restoration of wet-shrub savanna in relation to massasaugas, spotted turtles, five-lined skinks, Kirtland's snakes and eastern ribbon snakes. Kirtland's snake is found only in wet meadows, grasslands, and other habitats that have shrub components.
- Consider species such as mudpuppies, common map turtles, red-eared sliders, snapping turtles, spiny softshell turtles and perhaps the northern water snake in the Lake Michigan Action Plan currently being developed by members of the Chicago Wilderness consortium.

3.4 Invertebrate Assemblages

3.4.1 Overview of Findings

The *Report Card* advances a substantial revision of the terrestrial insect classification system used in the *Biodiversity Recovery Plan*. Experts who participated in the development of the *Report Card* concurred that the original 14 categories identified in the *Biodiversity Recovery Plan* are too narrow and do not correspond well with insect distribution in the region. Aquatic insects and other invertebrate species are not yet classified.

Unlike the other assemblages and communities, the *Report Card* provides a collective assessment of all insect assemblages rather than assessment by individual assemblage. This reflects the lack of data and analysis, and is the approach established in the 1997 taxonomic workshop for invertebrates, and therefore followed here. Additionally, there is no listing of individual species within each insect assemblage, primarily due to the sheer number of the region's insect species, estimated at between 5,000 and 6,000. Another reason is that the majority of insect species are fairly stable and ubiquitous throughout the region. It is recommended, therefore, that recovery efforts be focused on conservative insect species.

Overall, the ratings for the region's assemblages of conservative insect species range from poor to good. Although trends are difficult to quantify, indications are that populations of conservative insect species are stable but threatened. The development of specific recovery goals and monitoring protocols for each of the region's invertebrate communities—including those not classified in the *Report Card*—is necessary to guide recovery efforts and to be able to report more detailed, quantified assessments of individual invertebrate classifications in future report cards.

Condition of Data

There are two data sets of note: Northeastern Illinois University's 20-year study of insects on select sites throughout the Chicago Wilderness region, and survey records from the Illinois Butterfly Monitoring Network, which includes data from southeastern Wisconsin and Northwestern Indiana as well as northeastern Illinois.

Ron Panzer and his colleagues have surveyed one or more insect groups on 69 prairies and savannas within the greater Chicago Wilderness region. The data (roughly 20,000 element occurrences representing 2,300 species) reside in Panzer's personal database, and Northeastern Illinois University currently has roughly 12,000 voucher specimens (Panzer 2005).

The Illinois Butterfly Monitoring Network records date back to 1987. Each record is one Pollard walk (a standard method of counting butterflies). As of the end of the 2004 monitoring season, there were more than 5,000 records in the database. There are more than 150 sites entered into the database, however, fewer than 50 have data that run for 10 consecutive years or longer. There is also variation in the quality of the data, reflecting variant skill levels of the data collectors. The data resides in a database.

Long-term Vision and Goals

Although recovery goals for the region's insect communities fall within the parameters of recovery goals for the region's other species reported in the *Biodiversity Recovery Plan*, for point of information, the insect recovery goals identified during the 1997 taxonomic workshop process included:

- Establish more prairie community sites of at least 100 acres

- Expand existing prairie sites by 25 percent over the next 10 years

Assemblage Description

The insect assemblages identified in the *Biodiversity Recovery Plan* are:

- Dry and mesic fine-textured soil prairie insects*
- Dry and mesic sand prairie insects*
- Dry and mesic gravel prairie insects
- Wet prairie insects*
- Dry fine-textured soil savanna and woodland insects
- Wet fine-textured soil savanna and woodland insects
- Sand savanna insects*
- Fen insects
- Marsh insects
- Sedge meadow insects
- Bog insects
- Dry and mesic gravel prairie insects
- Marsh insects
- Floodplain forest insects
- Upland forest insects
- Foredune insects

**Those assemblages with an asterisk were identified as globally important in 1997.*

The revised *Report Card* categories are:

- Fen, wet prairie and sedge meadow insects
- Marsh insects
- Dry and mesic sand prairie/savanna insects
- Foredune insects
- Dry and mesic blacksoil/gravel prairie insects
- Bog insects
- Blacksoil savanna and woodland insects
- Floodplain forest insects

1997 Taxonomic Workshop Assessment

The following assemblages were ranked "of concern or in an overall declining condition" primarily because the plant communities on which they are based are threatened:

- Dry and mesic fine-textured soil prairie insects
- Dry and mesic sand prairie insects
- Wet prairie insects
- Sand savanna insects
- Fen insects
- Dry and mesic gravel prairie insects
- Marsh insects
- Dry and fine-textured soil savanna and woodland insects

Threats common to all insect assemblage types include:

- The suppression of fire results in an unfavorable change in structure and homogenization of fire-dependent plant communities, which negatively impacts insect habitat.
- Hydrology disruption is a problem for wetland-dependent communities and the assemblages that depend upon them.
- Introduced plant species may eliminate habitat and therefore threaten insect assemblages.
- Some invasive insects, such as the Chinese mantis, may be a problem, but more information is needed to determine how much of a problem non-native insects may be for native insects.
- Fragmentation is a problem in that small sites lose species.
- Lack of colonization is a long-term problem for insects—restored sites do not necessarily attract insects.
- Mosquito abatement is a potential threat, as may be gypsy moth control efforts.
- Infrastructure development practices often pose problems for insect communities, i.e., the placement of sewer and power lines often are incompatible with management practices.
- Light pollution is a threat to moths; sodium vapor and mercury vapor lights are a particular problem.
- Bug zappers may be a threat, but the extent of the problem is not sufficiently understood.

Recent Recovery Efforts

As described in various community sections, there have been a number of prairie and wetland restoration efforts throughout the region, which have recovered suitable habitat for conservative insect species. However, whereas many common species have returned, in general conservative species have not. In accordance with the *Biodiversity Recovery Plan* recommendation that translocation and reintroduction may be essential to establish prairie invertebrates successfully, the Peggy Notebaert Nature Museum has initiated several butterfly translocation efforts and the Indiana chapter of The Nature Conservancy has led an effort to re-establish a population of the federally endangered Karner blue butterfly on a site

where it had been extirpated by wildfire. A 2004 federal court ruling has paved the way for the mandated habitat protection plans for the federally endangered Hine's emerald dragonfly.

Indicator Species
Although the *Report Card* experts convened to assess the region's invertebrate assemblages, they debated the value of indicators for insect assemblages without arriving at a clear consensus. Potential indicators that emerged include butterflies, moths and leafhoppers. Of these three, butterflies may be the best candidates as they are diurnal, large, annual species that are easy to see and monitor. Additionally, 33 percent of all butterfly species in the region are conservative. A limiting factor is that conservative butterflies are often scarce or absent from important sites, particularly smaller ones.

***Report Card* Condition Ranking:**
Poor to Good

A majority of the insects that inhabit natural area remnants in the Chicago Wilderness region also occur, sometimes in large numbers, throughout the modern regional landscape and are relatively secure. However, many experts agree that several hundred species, comprising 15-20% of the local insect fauna, require reasonably intact prairies, savannas and other remnant habitats. These conservative species, along with conservative plants, comprise considerably more than half of the threatened biodiversity in this highly fragmented region.

Research initiated in 1982 suggests that approximately 95 percent of conservative insect species that once inhabited this region persist on at least a few Chicago Wilderness sites. Approximately one-third of the region's surviving remnant-requiring species have been recorded on at least 10 sites (in some cases, species can be found on as many as 40 sites) and are apparently secure. At the other extreme, 40% have been found on five or fewer sites and are considered to be imperiled. Many of these species are known to be uncommon or rare throughout much or all of their ranges (Panzer pers. comm.).

Trends among insect assemblages are difficult to establish. Butterfly populations, for instance, can vary widely from year to year based on a number of factors, such as spring weather conditions, which are not directly related to the ecological health of the assemblage. Nonetheless, the data from the Illinois Butterfly Monitoring Network reveal no discernable examples of species decline within the decade. On the contrary, there are a few instances of possible increases in populations of certain remnant-reliant species. However, the increases hover right at the limits of statistical significance, therefore it would be premature to report

The Hine's Emerald Dragonfly

In September 2004, a federal judge ordered the U.S. Fish and Wildlife Service to provide critical habitat designation for the Hines emerald dragonfly. This action not only compels the agency to develop a habitat protection plan for one of the most endangered species in the nation, it makes it far more difficult for remaining habitat to be developed. Extirpated from many of its historic locations due to fragmentation and destruction of habitat, the Hines emerald dragonfly was listed as an endangered species in Illinois in 1991 and a federally endangered species in 1995. Breeding populations remain in only a few select sites in northeastern Illinois, Missouri, Wisconsin and Michigan.

The Hines emerald dragonfly requires a particular complex of wetland habitat to sustain its life cycle. Larvae need cool, shallow, slow-moving waters, spring-fed marshes, and seepage sedge meadows. Mature larvae crawl from the water onto emergent vegetation to support them as the skin splits on the back of their heads and thoraxes, and the adult dragonfly emerges. After a few days, the young adult's brown eyes turn a bright, metallic emerald green. Nearby meadows and fields with scattered groups of shrubs in proximity to breeding habitat are preferred hunting grounds for adults, which feast on mosquitoes and other small flying insects (Illinois State Museum 2004; Matre 2004).

RESTORING THE BUTTERFLY TAPESTRY

In July, 2002, Doug Taron of the Peggy Notebaert Nature Museum collected six female swamp metalmark butterflies from fen remnants in east-central Wisconsin. These were to become the nucleus of a restored population near Elgin, Illinois. The swamp metalmark hadn't been recorded at the Elgin site since 1939, and the species disappeared from Illinois entirely in the mid-1980s.

That summer and the next, Taron and a team of scientists from the Peggy Notebaert Nature Museum collected fertile eggs from the female metalmarks, raised them and transferred more than 100 larvae to the new site. In July of 2003, the team spotted the first two adult metalmarks. In early spring of 2004, Taron found larvae in the rosettes of the swamp thistle on which the metalmarks feed, and the team remains hopeful that this is the beginning of an established population.

Such assisted reintroductions, or translocations, are important parts of butterfly conservation. Studies by researchers such as Ron Panzer at Northeastern Illinois University show that some butterflies, termed remnant-reliant species, require intact habitats like prairies and wetlands. But data from the Illinois Butterfly Monitoring Network suggest that remnant-reliant species do not spontaneously reappear, even after careful management improves a site's conditions to the point that it again becomes suitable habitat. Translocations, closely integrated with well-executed land management plans, physically place them in the few places they can still survive. As ecological restoration brings back more of these places in the Chicago Wilderness region, butterfly restoration can be expected to thrive as well.

Adapted from "Restoring the Butterfly Tapestry," by Doug Taron, Chicago WILDERNESS Magazine, Spring, 2004

an increase with confidence. Nonetheless, these trends do suggest compatibility of these species with current management techniques.

Based on the available data and expert observations, the following condition rankings apply:

- Fen, wet prairie and sedge meadow insects (Fair)
- Marsh insects (Poor)
- Dry and mesic sand prairie/savanna insects (Good)
- Foredune insects (Fair)
- Dry and mesic blacksoil/gravel prairie insects (Poor)
- Bog insects (Undetermined)
- Blacksoil savanna and woodland insects (Fair)
- Floodplain forest insects (Fair)

In addition to the negative effects inherent in continuing development, threats to the region's insect assemblages include the recent cutback in land management by some government agencies and non-profit organizations, and the effect of programs such as those targeted at controlling gypsy moths and the spread of West Nile Virus. Most of such programs have proven ineffective in achieving their pest control goals while proving injurious to populations of many beneficial insects.

Recommended Actions

As the condition of the region's insect assemblages is intimately linked to habitat, all terrestrial and aquatic fauna would benefit from implementation of the *Biodiversity Recovery Plan* recommended actions for terrestrial and aquatic communities. Affirming and expanding upon the sole insect-related recommended action of the *Biodiversity Recovery Plan*, it is important to re-establish conservative insect species on all habitat types, both remnant and restored.

To monitor the recovery of the region's invertebrate assemblages, it is critical to develop region-wide specific, measurable recovery goals and monitoring protocols for all of the region's invertebrate assemblages. Additional recommended actions include:

- Ascertain a complete list of invertebrates in the region
- Focus heavily on those species known to inhabit five or fewer sites in the region
- Review insect populations more thoroughly for potential listing as state endangered species

3.5 Fish Assemblages

3.5.1 Overview of Findings

In general, most fish assemblages are in poor condition. Although some assemblages appear relatively stable, no assemblage is improving, due to ongoing development and alteration of habitat, hydrology and surrounding watersheds. In general, pursuit of recovery goals for the region's wetlands, streams and lakes will benefit the region's various fish assemblages. The recommended actions for individual fish assemblages listed in the sections below represent a wide range of options. Yet to be developed are specific recovery goals for individual fish assemblages, which would guide the development of refined recovery action recommendations, indicators and monitoring protocols.

3.5.2 Condition of Data

No specific indicators or indices have been developed to assess the condition of the region's fish assemblages for the *Report Card*. The Illinois Natural History Survey, in conjunction with Northeastern Illinois Planning Commission, carried out detailed regional fishery surveys in 1978. Surveys were not specific to major habitat types but spatial coverage was extensive and covered all six Chicago area counties in Illinois (Brigham et al. 1978). Information about other data, as it relates to specific individual fish assemblages, is included in the sections below. In general, fish data exist, but an insufficient amount have been compiled and analyzed. Therefore the *Report Card* assessments for the region's fish assemblages are based primarily on the observations of experts working in the field.

3.5.3 Assemblage Description

The region's fishes are divided into the following assemblages:

- Glacial lake assemblage
- Wetland assemblage
- Intermittent headwater stream assemblage
- Seepage fed headwater stream assemblage
- Lake Michigan assemblage
- Small river assemblage
- Big river assemblage

Under each assemblage section below, the lists of fish species typical of each aquatic community type and indicator fish species should not be viewed as definitive. Within each list, there may be a lack of consensus about the listing of a few species.

3.5.4 Glacial Lake Assemblage

Description

The species within this assemblage include those adapted to the clear water, sandy substrates, and abundant submersed vegetation typically found in natural glacial lakes. Historically a common feature in northeastern Illinois and southeastern Wisconsin, the majority of the region's remaining glacial lakes have been drained or filled. Of the more than 30 glacial lakes left in Illinois, concentrated within the Fox River and Des Plaines River drainages, prime examples include Deep Lake, Cedar Lake, Wooster Lake, East and West Loon lakes, Little Silver Lake and Bangs Lake in Lake County; and Lake Defiance and Lake Elizabeth in McHenry County.

Longnose gar	Bowfin
Spotfin shiner	Golden shiner
Pugnose shiner	Blackchin shiner
Blacknose shiner	Sand shiner
Mimic shiner	Pugnose minnow
Bluntnose minnow	Fathead minnow
White sucker	Lake chubsucker
Black bullhead	Yellow bullhead
Brown bullhead	Tadpole madtom
Grass pickerel	Northern pike
Central mudminnow	Pirate perch
Banded killifish	Green sunfish
Starhead topminnow	Pumpkinseed
Warmouth	Bluegill
Largemouth bass	White crappie
Black crappie	Iowa darter
Least darter	Johnny darter
Yellow perch	

Recent Recovery Efforts
In 2000, Liberty Prairie Foundation, Integrated Lakes Management and the Illinois Department of Natural Resources cooperatively established a sanctuary for Illinois endangered and threatened fishes. From lakes within the Des Plaines River drainage, the team captured approximately 200 individuals of five separate species—banded killifish, blacknose shiner, blackchin shiner, pugnose shiner and Iowa darter—and translocated them to the three-acre Sanctuary Pond at Prairie Crossing. Predator species had been removed from Sanctuary Pond prior to transfer, and subsequent years of monitoring have confirmed robust population numbers in the thousands to tens of thousands for each of the translocated species.

While there have been some general and isolated habitat recovery efforts such as removing septic fields and sewer discharges from lakes, by and large there have been no major water quality, fringe zone or littoral zone restoration or protection efforts. It is anticipated that Integrated Lakes Management will do some additional stocking of lakes on the Des Plaines River drainage to expand the reintroduction of the five target species present at Prairie Crossing.

Indicators
In general, the following species tend to be found in higher quality habitats, although many can be found in lower quality habitats as well:

Longnose gar	Pugnose shiner
Blackchin shiner	Blacknose shiner
Pugnose minnow	Lake chubsucker
Brown bullhead	Banded killifish
Starhead topminnow	Iowa darter
Least darter	

Indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair to Poor**

With little active habitat management, the glacial lake fish assemblage continues to suffer from a reduction of submerged aquatic vegetation due to herbiciding, nutrient enrichment from septic systems and lawn fertilizer runoff, sediment disturbance from power boating, shoreline alteration (i.e., sheet piling and seawalls,) elimination of natural riparian and shoreline vegetation, lack of connectivity between lakes due to water level control structures (i.e., small dams and spillways), reduction in attached wetlands, and the introduction of exotic species, including common carp, Eurasian milfoil and zebra mussels. Although individual exceptions may occur, the higher quality glacial lakes are in southeastern Wisconsin and northeastern Illinois, and poorer quality lakes are at the southern end of Lake Michigan. As development continues to increase throughout the region, the effects of development decrease the ecological integrity of glacial lakes. Many of the glacial lake indicator species are rare and declining. A recent study comparing the historic and present locations of the blackchin shiner reveal that it is present in two-thirds of its historic locations that were surveyed (Burr et al. 2005).

Condition of Data
The condition of species within glacial lakes assemblage was and is difficult to determine quantitatively due to limited sampling in standard fisheries surveys and the scarcity of many of the indicator species. Private ownership of many glacial lakes in Illinois limits the ability of the Illinois Department of Natural Resources and other agencies to survey and manage these lakes. Illinois Natural History Survey reports indicate that the blacknose shiner, the pugnose shiner, the blackchin shiner and the banded killifish have not appeared in stream collections on the Des Plaines drainage for many years; lake records mirrored this condition (Page and Retzer 2002; Retzer 2005).

Max McGraw Wildlife Foundation and Southern Illinois University conducted life history work on blacknose and blackchin shiners and determined the conservation status in Illinois of the banded killifish, blacknose shiner and blackchin shiner. The distribution of all three species has declined in Illinois and other states in the Midwest. The most dramatic decline is that of the blacknose shiner, which has experienced major declines in rivers where it was found historically (Burr et al. 2005).

The University of Illinois–Chicago is also currently conducting a study of the genetic integrity of blackchin and blacknose shiners in Illinois.

Recommended Actions
- Develop indices to assess ecosystem integrity of glacial lake habitats
- Preserve high quality lakes
- Restore fringe and littoral zones
- Reintroduce glacial lake species if conditions are suitable
- Preserve or restore the delicate balance of minnows, sunfish and perches in glacial lakes, which would benefit other species, including bowfin, gar, pikes and catfish

3.5.5 Wetland Assemblage

Description

The wetland fish assemblage includes species adapted to living among very dense stands of submerged and emergent aquatic vegetation. Historically abundant, wetlands throughout the region were indiscriminately drained for conversion to human use, primarily as agricultural lands. The percentage loss of original wetlands in Indiana and Illinois is estimated at 85 and 90 percent, respectively. Examples of remaining high quality wetlands include Fish Lake Marsh and Broburg Marsh in Lake County, Illinois, Powderhorn Lake Marsh in Cook County, Illinois, Lake Elizabeth Marsh in McHenry County, Illinois, Kankakee River backwaters, and sloughs in Indiana and the Momence Wetland of the Kankakee River.

Wetlands that support large fish communities usually are connected directly to natural glacial lakes or streams. Whereas many species may use wetlands attached to lakes or streams as breeding and nursery areas, the following list of species are frequently associated with wetlands as adults:

Spotfin shiner
Pugnose minnow
Fathead minnow
Weed shiner
White sucker
Black bullhead
Brown bullhead
Grass pickerel
Northern pike
Starhead topminnow
Central mudminnow
Blackstripe topminnow
Largemouth bass
Golden shiner
Bluntnose minnow
Bluegill
Ironcolor shiner
Lake chubsucker
Yellow bullhead
Tadpole madtom
Pirate perch
Brook stickleback
Pumpkinseed
Green sunfish
Warmouth
White crappie
Black crappie
Least darter
Bluntnose darter
Banded killifish
Iowa darter
Johnny darter
Bowfin

Recent Recovery Efforts

No recovery efforts of any magnitude were identified during the development of this report.

Indicators

In general, the following species tend to be found in higher quality habitats, although many can be found in lower quality habitats as well:

Pugnose minnow
Ironcolor shiner
Brown bullhead
Starhead topminnow
Brook stickleback
Banded killifish
Weed shiner
Lake chubsucker
Iowa darter
Least darter
Bluntnose darter

Indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor**

There are only a handful of good quality wetlands in the Chicago Wilderness region and all of them are threatened by altered hydrology, pollution, reduced connectivity to large, deeper bodies of water, and the influx of invasive plants and animals. In spite of some isolated wetland restorations and wetland mitigation efforts, any site-specific gains have been more than offset by the continued draining or filling of these habitats and the prevention of fluvial geomorphic processes. The health of the wetland fish assemblage generally mirrors the health of its habitat.

Condition of Data

Few wetland fish data are available. Scientists from the Max McGraw Wildlife Foundation sampled fish, invertebrates, birds and herpetofauna at 38 mitigation and 18 natural wetlands in the Chicago Wilderness region (C. Paine and V. Santucci, in preparation). The Field Museum has records of fish samples from Kankakee River wetlands and backwater sloughs. The Illinois Department of Natural Resources has data from the Kankakee River near the Momence Wetland.

Recommended Actions

- Preserve functioning backwaters, side-stream wetlands and headwater wetlands
- Restore hydrologic and fluvial geomorphic processes of floodplains and headwaters
- Reduce unnatural effluent

3.5.6 INTERMITTENT HEADWATER STREAM ASSEMBLAGE

Description

This assemblage occupies first-order streams that seasonally run intermittently or completely dry. Spring freshets and summer storms are the primary sources of stream flow. The structure of intermittent headwater streams usually consists of terrestrial or wetland emergent plants due to seasonal hydrology; substrates of clay hard pan, gravel or cobble. The seasonal hydrology also accounts for their usually poorly developed stream channels. Historically a common and abundant riverine feature, intermittent headwater streams often were found on the outskirts of catchment valleys, usually in areas of little or no groundwater discharge. Remaining examples include most of the headwater (first order) streams of the Fox and Des Plaines Rivers.

The fish species listed below usually take refuge during dry periods in higher order streams or in isolated pools:

Central stoneroller	Redside dace
Largescale stoneroller	Brassy minnow
Spotfin shiner	Striped shiner
Common shiner	Hornyhead chub
Golden shiner	Bigmouth shiner
Southern redbelly dace	Bluntnose minnow
Fathead minnow	Blacknose dace
White sucker	Creek chubsucker
Black bullhead	Yellow bullhead
Tadpole madtom	Grass pickerel
Central mudminnow	Brook stickleback
Blackstripe topminnow	Green sunfish
Bluegill	Largemouth bass
Johnny darter	

Recent Recovery Efforts

There have been isolated restoration efforts, but nothing close to a general recovery of this habitat and its associated fish assemblage.

Indicators

In general, the following species tend to be found in higher quality habitats, although many can be found in lower quality habitats as well:

Redside dace	Brassy minnow
Southern redbelly dace	Blacknose dace
Creek chubsucker	Brook stickleback

Indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor**

A few first-order streams remain in good condition, but the vast majority are manipulated or highly degraded, which negatively impacts the related fish assemblage. The increasing rate of development poses a continued threat to this habitat and its assemblage type.

Condition of Data

In 1980, Dr. William Mitch did detailed condition rankings of five Chicago area intermittent streams, including Willow Way Brook and St. Joseph Creek (DuPage River), and Stony Creek and Crooked Creek (Des Plaines River).

Recommended Actions

- Develop indices for assessing headwater streams
- Keep developers from affecting the seasonality of these first-order streams
- Study the structural and functional characteristics of remaining and functioning first-order streams, assess their regulatory status and determine how best to preserve as many as possible
- Restore prairies and uplands where these streams originate
- Restore prairie slough channels and habitat

3.5.7 SEEPAGE FED HEADWATER STREAM ASSEMBLAGE

Description

This assemblage occupies small first order streams that are cold and clear all year round, nutrient-poor and groundwater-fed with riffle and pools present. Species within this assemblage require gravel and cobble or sand and vegetation to reproduce, and most importantly the upwelling of cold ground water. The

most rare fish assemblage in the region historically, it has become even more rare in the wake of intensive development of its habitat. Examples of good quality habitat today include tributaries to Dutch Creek, Jelkes Creek, Boone Creek (Fox River) and the Little Kankakee River headwaters.

Central stoneroller	Largescale stoneroller
Redside dace	Northern redbelly dace
Finescale dace	Blacknose shiner
Longnose dace	Creek chub
Brook trout	Brook stickleback
Mottled sculpin	Slimy sculpin
Fantail darter	Orangethroat darter
Johnny darter	

Recent Recovery Efforts
There are no specific assemblage recovery efforts identified.

Indicators
In general, the following species tend to be found in higher quality habitats, although many can be found in lower quality habitats as well:

Redside dace	Northern redbelly dace
Longnose dace	Finescale dace
Brook trout	Brook stickleback
Mottled sculpin	Slimy sculpin

Indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor**

The condition is due mostly to temperature warming, caused primarily by the removal of terrestrial vegetation, and development that utilizes these streams as a conveyance for stormwater. Given current development practices, this assemblage will continue to decline as development increases. European brown trout has replaced native brook trout in the majority of these streams.

Condition of Data
There are no specific data referenced for this assemblage type.

Recommended Actions
There are no specific recommendations for this assemblage type.

3.5.8 Lake Michigan Assemblage

Description
Lake Michigan is a large, inland freshwater sea formed by the retreating Pleistocene glaciers. Historically, its fish assemblage was not particularly diverse, but plankton and freshwater amphipods supported vast schools of select gamefood species, including whitefish and yellow perch. For more than a century, Lake Michigan and its resident fish assemblage have been altered extensively from their original condition by human activities, particularly the introduction of numerous non-native species of fishes and invertebrates and the filling of many of its shoreline wetlands.

Today, within the Lake Michigan assemblage are three distinct sub-assemblages: nearshore, pelagic and benthic. Nearshore species such as the smallmouth bass, pumpkinseed, and yellow perch inhabit the shallower waters of the lake's nearshore areas, harbors, and lagoons. Offshore species such as bloater, lake whitefish, lake chub, and lake trout inhabit the vast open water regions of the lake. Benthic fishes include the numerous species of sculpins, lake sturgeon, and longnose sucker. All species are adapted to cool or coldwater conditions.

Silver lamprey	Lake sturgeon
Lake chub	Emerald shiner
Spottail shiner	Sand shiner
Bluntnose minnow	Longnose dace
Longnose sucker	White sucker
Silver redhorse	Shorthead redhorse
Channel catfish	Longjaw cisco
Lake herring	Lake whitefish
Bloater	Deepwater cisco
Kiyi	Blackfin cisco
Shortnose cisco	Shortjaw cisco
Round whitefish	Lake trout
Northern pike	Troutperch
Great Lakes muskellunge	Mottled sculpin
Slimy sculpin	Spoonhead sculpin
Deepwater sculpin	Burbot
Pumpkinseed	Warmouth
Smallmouth bass	Black crappie

Yellow perch
Walleye
Spottail shiner
Logperch
Freshwater drum

Recent Recovery Efforts
In October 2004, the federal government approved 75 percent of the $9.1 billion needed to complete an electronic barrier in the Chicago Sanitary and Ship Canal in order to keep non-native Asian carp from entering the Great Lakes system. According to the U.S. Environmental Protection Agency, the increased funding means the permanent electric barrier under construction on the Chicago Sanitary and Ship Canal can be built as originally planned. It will stretch two rows of electrodes across the canal, which will pulse DC current into the water, and fishes will turn back rather than pass through the electric current. The funding will also cover construction of a second control house so that the two sets of electrodes—primary and backup—can be operated simultaneously. (U.S. Environmental Protection Agency 2004).

In November 2004, Illinois Governor Rod Blagojevich announced plans for Illinois to join the federal Coastal Management Program. Illinois is the only state among the 36 eligible to participate in the program that has not yet enrolled. By joining the Coastal Management Program, Illinois could stand to reap up to $2 million per year for protecting and enhancing its stretch of Lake Michigan shoreline. Potential projects could include protecting beach health and improving fish habitat.

Indicators
Some of the following species either are extremely rare or extirpated from southern Lake Michigan:

Silver lamprey
Lake chub
Lake herring
Bloater
Blackfin cisco
Great Lakes muskellunge
Trout perch
Slimy sculpin
Deepwater sculpin
Lake sturgeon
Longnose sucker
Lake whitefish
Kiyi
Round whitefish
Lake trout
Mottled sculpin
Spoonhead sculpin
Log perch

Indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

Report Card Condition Ranking: Fair

The current Lake Michigan fish community is very different from what it was originally. Although most of the deep lake species are still present, some have been reduced. The lake still supports a multi-billion dollar sport fishing industry and there are probably more species actually present in the lake than historically, however many of those are non-native. Of recent concern is the prospect of additional non-native species, namely Asian carp and the northern snakehead, which threaten to greatly alter the composition of the current assemblage. Trends for this assemblage are difficult to ascertain due to the consistent introduction of non-native species of fishes (e.g., sea lamprey, round goby, ruffe, alewife, smelt, and Pacific salmon) and invertebrates (e.g., zebra mussel and spiny water flea). Populations of species such as the smallmouth bass are experiencing population growth in Illinois waters. Yellow perch, lake whitefish, lake chub, longnose sucker, and lake sturgeon have experienced population declines and lake trout populations persist because of hatchery introductions. Native benthic species may be threatened by the exotic round goby.

Condition of Data
There are no specific data referenced for this assemblage type.

Recommended Actions
The large size of Lake Michigan, its economic importance to the shipping and transport industries, and its man-made interconnectivity with the Atlantic Ocean and Mississippi River combine to make managing this aquatic resource and its associated fish assemblage extremely difficult. For these reasons, the *Report Card* workshop group conjectured that perhaps only radical actions could have a positive impact. Such actions would be extremely difficult to achieve, but include:

- Stop stocking non-native Salmonids
- Start reducing the abundance of non-native species
- Restore coastal wetlands
- Remove coastal structures that impeded the littoral drift
- Pose heavy restrictions or stop commercial navigation
- Stop unnatural diversions

3.5.9 Small River Assemblage

Description

Historically abundant throughout the Chicago Wilderness region, this fish assemblage had different levels of diversity depending on the river system. The Fox and Kankakee River systems flowed over diverse geomorphology and topographic relief, providing a multitude of different habitats and flow velocities and therefore supporting more diverse fish assemblages. Streams in the Chicago Lake Plain such as the Upper Des Plaines, Chicago and Calumet River systems flowed over low topographic relief and did not have much habitat diversity, causing their fish assemblages to be less diverse. Examples of remaining good quality medium to high-grade streams include Big Rock Creek, Horse Creek, Dead River, Galien River and Brighton Creek.

Chestnut lamprey	Northern brook lamprey
Silver lamprey	American brook lamprey
Bowfin	Gizzard shad
Central stoneroller	Largescale stoneroller
Red shiner	Spotfin shiner
Steelcolor shiner	Brassy minnow
Striped shiner	Common shiner
Redfin shiner	Hornyhead shiner
Golden shiner	Bigeyed chub
Silverjaw minnow	Bigmouth minnow
Ozark minnow	Roseyface shiner
Sand shiner	Suckermouth minnow
Finescale dace	Northern redbelly dace
Bluntnose minnow	Southern redbelly dace
Fathead minnow	Blacknose dace
Creek chub	Quillback
White sucker	Creek chubsucker
Northern hogsucker	Golden redhorse
Greater redhorse	Black bullhead
Yellow bullhead	Channel catfish
Slender madtom	Stonecat
Tadpole madtom	Grass pickerel
Pirate perch	Central mudminnow
Mottled sculpin	Blackstripe topminnow
Rock bass	Green sunfish
Pumpkinseed	Warmouth
Bluegill	Orangespotted sunfish
Longear sunfish	Smallmouth bass
Largemouth bass	Black crappie
Mud darter	Rainbow darter
Iowa darter	Fantail darter
Least darter	Orangethroat darter
Banded darter	Johnny darter
Yellow perch	Logperch
Blackside darter	Slenderhead darter

Recent Recovery Efforts

The number of stream restoration efforts is increasing, but most of them appear not to be successful because they do not take site geomorphology into account. A successful effort is the remeandering of a channelized portion of the upper reaches of Nippersink Creek below Wonder Lake, led by The McHenry County Conservation District. Completed in 2001, this effort marks one of the most ambitious stream restoration projects in northeastern Illinois. While results are preliminary, indications are that there has been an increase in fish and macroinvertebrate diversity.

The United States Environmental Protection Agency, the Illinois Environmental Protection Agency, The Illinois Department of Natural Resources, the Illinois State Water Survey, the North Shore Sanitary District and the Waukegan Park District undertook a cooperative effort to address undermining of a sewage pipe that spanned the Waukegan River. The project involved the installation of various types of stream bank stabilization structures, reconfiguration of flood plain boundaries, installing riffle complexes and detailed monitoring. The Waukegan River project has been monitored extensively with some positive results for fish and macroinvertebrate biodiversity (White et al. 2003).

Indicators

In general, the following species tend to be found in higher quality habitats, although many can be found in lower quality habitats as well.

Chestnut lamprey	Northern brook lamprey
Silver lamprey	American brook lamprey
Brassy minnow	Bigeyed chub
Ozark minnow	Northern redbelly dace
Finescale dace	Slender madtom
Mud darter	Rainbow darter
Iowa darter	Least darter
Logperch	Slenderdarter

Indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Fair to Poor**

In the past several years, species within the small river fish assemblages have declined significantly, especially intolerant and specialized species and those that have a naturally low abundance. Streams, especially low-gradient ones, are becoming more and more degraded as development spreads and agricultural practices go unchecked. Small river fish assemblages in the Kankakee and the Fox River watersheds are in the best shape. Although the small river assemblage is rated excellent in the Kankakee watershed, the condition ranking is relative to other watersheds today, not to the Kankakee's original condition. The small river assemblage in the Lake Michigan watershed is stable, but in poor condition and not improving.

Condition of Data

There exist good data for certain Illinois Department of Natural Resources stations, but there are gaps, as data are not always collected from the same stations.

Recommended Actions

- Preserve sections of streams with intact active floodplains and fluvial geomorphic dynamics
- Remove fish passage blockages, i.e., dams and culverts
- Remove structures that prevent natural fluvial processes, i.e., levees and poorly designed bridges
- Prevent point source and non-point source discharge
- Restore less-degraded and degraded streams and active floodplains
- Enhance urban streams to improve water quality
- Control non-native fishes

3.5.10 Big River Assemblage

Description

The big river fish assemblage is found in the region's major rivers: the Des Plaines, the Illinois, the lower Fox and the Kankakee. Historically, the scale and rich diversity of the river system habitats made the big river assemblage the most diverse in the region. All of these rivers were flanked by vast floodplains comprised of wetland complexes and backwaters. Defining features of the rivers included very deep pools, large woody debris and large undercut banks. Their substrates were silt, detritus, sand, gravel, boulder and bedrock. Over-harvesting, and eventually dams and pollution, significantly altered the makeup of the associated fish assemblages and habitats. There remain no examples of free-flowing or unconfined large rivers in the region. Areas of high diversity occur on the Kankakee River below the Wilmington Dam and various other spots from the Indiana border to the confluence with the Des Plaines River due to better water quality and natural temperatures.

Chestnut lamprey	Northern brook lamprey
Silver lamprey	American brook lamprey
Lake sturgeon	Shovelnose sturgeon
Paddlefish	Spotted gar
Longnose gar	Shortnose gar
Mooneye	Goldeye
American eel	Skipjack herring
Gizzard shad	Central stoneroller
Spotfin shiner	Gravel chub
Silvery minnow	Pallid shiner
Silver chub	Hornyhead chub
Golden shiner	Emerald shiner
River shiner	Ghost shiner
Spottail shiner	Sand shiner
Mimic shiner	Suckermouth minnow
Bluntnose minnow	Bullhead minnow
Creek chub	River carpsucker
Quillback	Highfin carpsucker
White sucker	Northern hogsucker
Smallmouth buffalo	Bigmouth buffalo
Black buffalo	Silver redhorse
Black redhorse	Golden redhorse
Shorthead redhorse	Channel catfish
Stonecat	Freckled madtom
Flathead catfish	Northern pike
Troutperch	Blackstripe topminnow
White bass	Yellow bass
Rock bass	Green sunfish
Pumpkinseed	Warmouth
Bluegill	Orangespotted sunfish
Longear sunfish	Smallmouth bass
Largemouth bass	White crappie
Black crappie	Western sand darter
Rainbow darter	Banded darter
Yellow perch	Logperch
Blackside darter	Slenderhead darter
Walleye	Freshwater drum
River redhorse	

Recent Recovery Efforts
There have been no significant recovery efforts for this assemblage in the region.

Indicators
In general, the following species tend to be found in higher quality habitats, although many can be found in lower quality habitats as well.

Chestnut lamprey	Northern brook lamprey
Silver lamprey	American brook lamprey
Lake sturgeon	Shovelnose sturgeon
Mooneye	Goldeye
Western sand darter	American eel
Gravel chub	Silvery minnow
Pallid shiner	Silver chub
River redhorse	Freckled madtom
Trout perch	

Indicators of success for this assemblage need to be identified, and this is a recommendation for future report cards.

***Report Card* Condition Ranking: Poor to Excellent**

The big river fish assemblage within the Des Plaines River watershed is rated as poor. Within the Fox River watershed, the fish assemblage is rated fair to good, but channel confinement and dams restrict riverine functions. Additionally, nutrient loading is becoming a major issue because of the lack of treatment for phosphorus. The Kankakee River fish assemblage boasts a rating of excellent relative to the other assemblages, but is a faint echo of its historic condition.

Condition of Data
There are no specific data referenced for this assemblage type.

Recommended Actions
- Remove all dams, lock and dam structures and other structures preventing floodplain activity
- Restore riparian corridors through the active floodplains

3.5.11 Recommended Actions for All Fish Assemblages

As the condition of the region's fish assemblages is intimately linked to their habitats, all aquatic fauna would benefit from implementation of the *Biodiversity Recovery Plan* recommended actions for aquatic communities. It is also important to establish additional resources for the reintroduction of native species.

Additionally, specific region-wide recovery goals need to be developed for each fish assemblage within each watershed, with an emphasis on devoting resources and protection to aquatic communities that are already doing well. Too often, resources are applied to aquatic communities that are doing poorly. As a result, good aquatic communities decrease in quality and poor ones improve only slightly. In the end, there is a sort of homogenization of aquatic communities such that all are of only fair quality, without the continued health of some that are of exceptionally high quality. The same could be said of all the region's natural communities. In any case, a region-wide index by which to assess the health of fish assemblages and monitoring protocols need to be developed to be able to assess progress toward recovery goals.

3.6 Mammals

The *Report Card* team was unable to convene experts to assess the status of the region's mammal species. However, new information has been garnered on the Franklin's ground squirrel, which was added to the Illinois endangered and threatened species list in 2004.

The historic range of the Franklin's ground squirrel includes the northern two-thirds of the Chicago Wilderness region. It is now very rare because of habit loss and other unknown factors. A recent survey by the Illinois Natural History Survey verified only one population in the Chicago Wilderness region (O. Pergams 2004). There may be another population in the area, but this is currently unverified. There are only four to six known populations in the entire state, which led to its being added to the Illinois endangered and threatened list in 2004. It was added to the World Conservation Union's Red List in 2003. The first Franklin's Ground Squirrel Symposium was held at Brookfield Zoo in August 2004, and various conservation and research recommendations came out of the symposium. These are

1) comparing the life history of the Franklin's ground squirrel with the successful 13-lined ground squirrel, 2) studying its dispersal in view of habitat loss and fragmentation, 3) determining if there is a relationship between global warming and reduced foraging time, 4) determining its habitat preferences through a database approach, and 5) increasing public awareness through an education campaign. Management recommendations include 1) conducting surveys to determine its current distribution in the Chicago Wilderness region, 2) planning reintroductions using the closest large populations (probably from Minnesota) to appropriate sites in Chicago Wilderness as determined by research, and 3) involve Brookfield Zoo and/or Lincoln Park Zoo in captive breeding and education campaigns.

Chapter 4
Plant Species

4.1 Introduction

The *Biodiversity Recovery Plan* reports a total of 237 plant species, 15 percent of the region's total native plant species, as endangered or threatened. The plan also includes an index, based on Illinois and Indiana Natural Heritage databases, that divides endangered and threatened plant species into six priority groupings. The number of species within in each grouping appears parenthetically below. These categories are not mutually exclusive. Some species occur in more than one category.

- Globally rare (17)
- Great Lakes endemic species or those whose critical ranges are within the Chicago Wilderness region (8)
- Species that are disturbance dependent or do not fall within a well-defined community type (17)
- Species that have fewer than 50 percent of their known element occurrences in protected sites (37)
- Species with particular taxonomic or reproductive problems and/or needing life history research, and those whose survival or reproductive success is seriously compromised by external factors (26)
- Species that may be adequately protected or stable but are restricted to rare communities within the region (80)

The *Biodiversity Recovery Plan* acknowledges that some endangered and threatened species will always require special management attention, accompanied by well-designed monitoring programs. Additional recommended actions include:

- Acquire more public lands to increase the size and number of available habitats
- Enact stronger legislation for the protection of rare native plants
- Increase the levels of protection for unprotected or semi-protected sites with known occurrences of endangered and threatened species
- Work with private landowners to protect endangered and threatened species on their properties.
- Specifically address endangered and threatened species in management plans
- Design monitoring programs to provide feedback to adapt management activities and approaches
- Institute a region-wide monitoring program for rare species
- Expand *ex situ* programs for endangered and threatened species so that adequate seed or plant material is available for appropriate reintroductions as more sites are restored
- Develop recovery plans for both federally-listed species and state-listed species that have been identified as priorities

4.2 Plants of Concern

Chicago Wilderness has made progress toward the realization of several of the recommended actions for endangered and threatened plant species listed in the *Biodiversity Recovery Plan*, including 1) the acquisition of additional natural areas, some of which were discovered to contain previously unknown populations of threatened and endangered species only after the lands were acquired; 2) the ongoing development of *ex situ* programs for endangered and threatened species by the Center for Plant Conservation, a joint program of the Chicago Botanic Garden and The Morton Arboretum and part of a national network of America's leading botanical institutions, the purpose of which is to prevent the extinction of America's imperiled, native flora; 3) the Chicago Park District's increasing self-policing and protection of its sand dunes; and 4) model protection efforts of endangered and threatened species on private properties, including those owned by Abbott Labs, ComEd, the Boone Creek Alliance and several railroads.

The most notable progress toward the *Biodiversity Recovery Plan* goals for endangered and threatened species is the development of a region-wide monitoring program and common database for rare species. In 2001, a long-term Plants of Concern monitoring program was piloted, one that established standardized monitoring protocols for the region. During the next two years, the program was refined and expanded to provide managers with the scientifi-

cally-acquired information needed to address management problems on their sites and also to facilitate regional collaboration in developing and implementing management strategies to ensure the presence of these species on a sustainable basis.

Species chosen for monitoring were selected both for their position on the rare species priority list in the *Biodiversity Recovery Plan* and according to the individual priorities of regional landowners. The program incorporates five interrelated elements, all equally important to its success:

- Monitoring of rare plants (particularly state-listed species) over time to discern population trends within a community context (Level 1) and selected species targeted for more intensive demographic monitoring (Level 2)
- Monitoring of rare species in relation to management activities to form a feedback loop for adaptive management, leading to both short-term and long-term responses
- Using, for the first time, standardized protocols throughout the region to gain uniform data on a regional basis
- Training volunteers as citizen scientists to leverage significant opportunities to monitor rare species, at the same time creating an informed constituency
- Working collaboratively with public and private landowners, land managers and agencies to generate a shared approach to regional monitoring

Comparisons between pre-2001 data with data collected by the Plants of Concern program starting in 2001, even for the same populations, should be made with caution because different protocols were used and methods of counting plants may have been different.

At its most basic level, the Plants of Concern program gathers census data about the status and trends of individual populations. In its fourth year, already some trends are apparent. For example, of the 215 subpopulations of monitored plants, 106 showed increases while 109 showed decreases. When grouped into species, there are 57 that have measurable short-term trends—26 showing increases and 31 showing decreases. Since the Plants of Concern database contains certain records for select species from the early 1980s through the early 1990s, it is possible to identify some longer-term trends for 26 subpopulations representing 18 different species. Of the 26 subpopulations, 11 increased or remained the same, while 15 decreased in numbers. Of the species having measurable long-term trends, six showed numerical increases or remained unchanged, while twice that many showed decreases. As is the case with current trends, these are actual increases or decreases in each subpopulation, and are not the result of increases or decreases in Plants of Concern monitoring activity (Milde 2004).

The monitoring also provides census data about invasive species. When invasive species were lumped together by genus, the most commonly cited genera was *Rhamnus*, representing 24.5 percent of all invasive citations, up from 19 percent in 2002. *Lonicera* (6.7 percent) is the second most cited genus followed, by *Cornus* (5.2 percent), and *Rosa* (4.8 percent). Monitors identified 99 different species of invasive plants. Of all monitored subpopulations, 73.2 percent had at least one invasive species present in 2003 (Milde 2004).

As reported to the Chicago Wilderness consortium, "Management implications of Plants of Concern monitoring are already becoming apparent. At both individual population locations and region-wide, Plants of Concern is recording the types and levels of threats, including invasive species, which impact populations. This information has value for long-term planning on a regional basis; for example, the response of certain species to fire may help determine fire management for those species. It also has a short-term problem-solving benefit; for example, monitoring reports are helping managers respond to immediate problems, such as the protection of *Amelanchier* species from fire and deer browse or rerouting a trail around a *Tomanthera auriculata* population" (Masi, 2004, p.6).

Over time, the program is intended to correlate performance and trends of rare species with management of community types within the region. Although no strong conclusions can be made at this time, management appears to be on the rise. Based on monitors' observations, 51 percent of Plants of Concern populations showed evidence of management activity in 2003, up from 34 percent in 2002. Preliminarily, in some instances, as in the case with

Viola conspersa, which has increased 10.5 percent from 1999 to 2004 and 125 percent since the early 1980s, increases or decreases in subpopulations do not seem to correlate directly with any management activity or threat. However, monitors of significantly declining species, including *Triflolium reflexum* and *Arenaria patula*, which decreased 100 percent and 69 percent, respectively, surmise that the lack of fire or other management tools may be the reason for the precipitous decline in numbers.

4.3 Indicators

Regional experts convened in 2004 to assess the region's plants of concern. They identified the below as indicators of general status and trends for endangered, threatened, and other rare plant species:

- New occurrences
  - Arising new populations, due to natural spread or due to positive effects of management
  - New observations, which might occur during new land acquisitions or increased monitoring efforts
- Flowering/Reproductive status/Seed set and viability
- Redefining of historically lost sites
- General habitat improvement or degradation; more/less stabilized ecological interactions involving the species in question
- Loss/gain of habitat
- Loss of indicator species, for example:
  - *Cirsium muticum*
  - *Gentiana* spp.
  - *Festuca obtusa*
  - *Panicum* spp.
  - *Helianthus* spp.
  - *Aster* spp.
  - *Silene virginica*
  - Legumes
- Additional species that may indicate higher-quality sites include, by habitat:
  - Bogs
    - *Menyanthes trifoliata*
    - *Chamaedaphne calyculata*
    - *Vaccinium oxycoccus*
    - *Sarracenia purpurea*
    - *Drosera* spp.
  - Fens
    - *Cirsium muticum*
    - *Utricularia* spp.
    - *Cypripedium candidum*
    - *Eleocharis* spp.
    - *Triglochin* spp.
    - *Valeriana uliginosa*
  - Gravel Prairie
    - *Cirsium hillii*
    - *Ranunculus rhomboideus*
  - Dolomite Prairies
    - *Isoetes butleri*
    - *Arenaria patula*
    - *Dalea foliosa*
  - Remaining habitats were not covered
- Loss/gain of deer-sensitive species
  - *Trillium* spp.
  - *Platantera psycodes*
  - *Lilium philadelphicum var. andinum*
  - *Lilium michiganense*

4.4 Recommended Actions

- Clarify the *Biodiversity Recovery Plan* recommended action, "Rotate and diversify management treatments in order to maintain a variety of habitats needed by many species"
- Create a list made of the possible rare plants that can occur in the various Chicago Wilderness community types—this might help in selecting communities that are especially important to protect because of their rare plant potential
- Protect any plant community with a mean conservatism value of 3.8 or greater
- Create recovery plans for each rare, endangered or threatened species
- Reorganize and clarify the priority species list
- Create a watch list of all species in decline
- Define criteria for what additional non-rare, endangered or threatened indicator species should be added to the Plants of Concern monitoring program
- Determine which plant groups should be added to the *Biodiversity Recovery Plan*, i.e., lichens, liverworts, mosses, fungi and aquatic species
- Add an additional category to the priority species list: species that are rare and remnant but are common in restorations, (i.e., *Ratibida pinnata*, *Ratibida purpureum*, *Heuchera richardsonii*) and those which are commonly used but haven't done well in restorations, (i.e., *Baptisia leucophaea*)

Chapter 5
Ecological Management, Research and Monitoring

5.1 Introduction

A major conclusion of the *Biodiversity Recovery Plan* is that increased management of both protected and unprotected natural areas is essential to preserve this region's biodiversity. The *Report Card* findings reinforce the same conclusion. The member organizations of Chicago Wilderness are working on a variety of fronts to effect change, including increased management of natural areas. For example, since the publication of the *Biodiversity Recovery Plan*, the Chicago Wilderness Natural Resources Management and Science Teams, often working in conjunction with each other, have initiated a number of efforts in line with the management, research and monitoring actions recommended in chapter nine of the plan. After the brief overview of the Natural Resources Management and Science Teams below, there follows an overview of progress made toward these recommendations.

5.1.2 Chicago Wilderness Natural Resources Management Team

The mission of the Natural Resources Management Team is to promote, coordinate and facilitate the restoration and management of existing and future preserves, including the identification of stewardship priorities. The 100-member team currently oversees the work of two task forces. The aquatics task force was established in December of 2003 to promote the protection and management of the region's aquatic resources. The regional monitoring task force has been working to develop a comprehensive plan for ecological monitoring in the region.

Each year, the team holds a series of restoration roundtables, each a forum for natural resource professionals to exchange information on restoration techniques and view project sites throughout the region. Roundtables in 2004 included sessions on aquatic indices, aquatic invasive species, shoreline stabilization and restoration, stream re-meandering and ravine restoration. Sites visited included James Woodworth Prairie, Boone Creek Fen and Clark and Pine Nature Preserve.

A variety of projects have come under the auspices of the Natural Resources Management Team. Examples include the following:

- Plants of Concern
  A program that monitors threatened and endangered plant populations throughout the region, discussed below and in chapter four.

- Conservation Designs
  Since the publication of the *Biodiversity Recovery Plan*, which recommends the development of conservation designs for the region's natural communities and animal assemblages, conservation designs have been developed for woodlands, grassland birds, and savanna herpetofauna. These instruments outline recovery goals, threats, management strategies and monitoring protocols, which provide a framework for quantifying recovery progress and may facilitate management. Specific conservation designs are discussed in chapters two and three.

- Data Resources Inventory, Data Compatibility Assessment and Planning Process for a Regional Chicago Wilderness Information Management System
  This project established an online database of the region's ecological data sources. The system maintains metadata type information (i.e., database platform, type of data collected, years, etc.) on the ecological databases of contributing member organizations within the Chicago Wilderness consortium. The link is currently housed on the Chicago Wilderness member web site and allows users to search existing records or input and update their information.

- Chicago Wilderness Woodlands Audit
  This project gathered the first region-wide data on the condition of forests and woodlands throughout Chicago Wilderness, providing baseline data to establish future trends. This effort is discussed in chapter two.

- Historic landscape vegetation patterns of the Chicago Wilderness region based on U.S. Public Land Survey records
  This multi-staged project has created historic vegetation maps for DuPage, Will and Cook Counties. Maps are currently being prepared for Kane, McHenry and Lake Counties.

- Wetlands Conservation Strategy
  This project is creating a model to identify critical wetlands within the Chicago Wilderness region based on a number of criteria, such as wetland bird habitat and the distribution of amphibians and reptiles.

5.1.3 Chicago Wilderness Science Team

Closely linked to the work of the Natural Resources Management Team, the Science Team pursues a mission to:

- Provide scientifically sound input to assist decision-makers in devising policy and action concerning the protection, acquisition, restoration, and management of natural areas.
- Establish a research agenda to enhance and facilitate the protection of biodiversity of the Chicago Wilderness region.
- Foster region-wide communication and cooperation among the scientific community to expand our knowledge base and encourage understanding and appreciation of the region's biodiversity.

Currently, the Science Team's efforts are focused primarily on the development of a natural science research agenda that will identify and prioritize the consortium's scientific research needs related to biodiversity conservation. The invasive species task force also operates under the Science Team.

A partial list of the research efforts conducted by Science Team members and funded by the Chicago Wilderness consortium includes the following:

- Impact of European buckthorn on soil properties
  This project revealed that areas dominated by buckthorn have higher levels of carbon and nitrogen, higher pH values, and increased soil moisture. In addition, higher densities of buckthorn support larger populations of invasive earthworms, which rapidly incorporate buckthorn leaf litter into the soil, further altering other invertebrate populations.

- Long-term changes in Chicago region prairie vegetation
  This project re-sampled prairie stands originally sampled in 1976 by the Illinois Natural Areas Inventory. It also correlated changes in species richness, composition and structure with fire frequency to identify appropriate burning regimes. The results of this research are discussed in chapter two.

- Biodiversity and distribution of bats
  This project assessed the distribution of bat species within Cook and McHenry Counties. It also correlated landscape characteristics with bat activity to determine the effects of urbanization on bat biodiversity.

- Restoration effects in an oak-woodland community at Swallow Cliff Woods
  Using pre- and post-restoration inventories of a variety of taxonomic groups at an oak-woodland site, investigators examined the effects of cutting and burning on a variety of taxonomic groups.

5.2 Ecological Restoration and Management Guidelines

The *Biodiversity Recovery Plan* relates that the Chicago Wilderness Land Management Team (now known as the Natural Resources Management Team) had initiated the task of developing ecological restoration and management guidelines. Accomplished and adopted to date are model policies related to the management of woodlands (summarized in chapter two) and the use of prescribed burns (also known as controlled burns and summarized below). Currently in draft form are guidelines for native seed, covering the following issues: a philosophy of using wild seed, where and how seed should be collected, how it should be handled and processed and how its pro-

duction should be amplified. Also being drafted by Chicago Wilderness members is the Lake Michigan Action Plan, a supplement to the *Biodiversity Recovery Plan* that will address biodiversity conservation as it relates to the water and shores of Lake Michigan.

5.3 Controlled Burning

Most of the region's natural landscapes originally developed in response to regular, seasonal fires. The *Biodiversity Recovery Plan* identifies controlled burning as the single most important management technique at the disposal of the region's land managers. Several studies completed in the past few years support the importance of using controlled burns as a management tool. Apfelbaum et al. (2000) reported the beneficial effects of fire management in restoring the richness of oak woodland ground-layer vegetation; albeit over a long time period and perhaps in concert with the removal of shrub-layer species, specifically "[non-native] species and tree saplings that have the capability of directly altering canopy structure."

In their 2001 re-assessment of 109 grade A and B prairie and wetland stands originally sampled in 1976 by the Illinois Natural Areas Inventory, Marlin Bowles and Michael Jones determined that their data support the conclusion that fire is a critical factor in maintaining the composition and structure of midwestern prairies and graminoid wetlands (Bowles & Jones 2003). In a later publication they assert that controlled burning conducted roughly biennally is necessary to maintain the composition and structure of mesic and wet-mesic prairies, although few sites are burned at this rate, causing the long-term deterioration of many sites. They also propose that increased use of fire as a management tool will be needed to maintain local natural areas (Bowles and Jones 2004).

5.3.1 *Biodiversity Recovery Plan* Recommended Action: Develop a Training Program for Prescribed Burning

A Model Training Program

In 2001, the Chicago Wilderness Burn Training Task Force developed the Midwest Ecological Prescription Burn Crew Member Training program to increase the number of staff and volunteers qualified to participate in prescribed burns. This two-day course is modeled after the U.S. Forest Service 130 and 190 courses, but is modified to specifically focus on midwestern ecosystems as opposed to those in the West.

A Model Policy

In 2003, Chicago Wilderness developed and approved "Natural Fire and Controlled Burning in the Chicago Wilderness Region: A Model Policy" (Frankel 2003). Intended to aid decision-makers in developing and implementing controlled burn regimens, the model burn policy provides an overview of the scientific importance of fire to the region's natural communities and the resulting public benefits of healthy ecosystems. Controlled burns control invasive woody and herbaceous species, support fire-adapted native habitats, foster the survival of woodland trees and communities and benefit the soil. Healthy ecosystems significantly contribute to clean water and clean air, conserve soil, reduce global climate change, provide habitat for native species and aesthetic value for current and future generations.

In line with the *Biodiversity Recovery Plan*'s overall emphasis on developing region-wide standards and practices, the model burn policy outlines safety practices to minimize any negative impacts of controlled burning and regionally-accepted controlled burning procedures in the major habitat types. The policy recommends that any agency developing policies and procedures for controlled burns incorporate the following guidelines:

- Develop a controlled burn plan for each site
- Obtain all required permits and abide conscientiously to all related guidelines
- Follow the Illinois EPA air quality and safety regulations to protect the public
- Conduct controlled burns only when weather conditions fall within the range set in the site's fire plan
- Notify local police and fire departments in advance and again on the day of the burn
- Notify people living near natural areas scheduled for controlled burns
- Assign equipment and trained personnel commensurate with the size and condition of the controlled burn site
- Maintain detailed and accurate records of all controlled burns conducted on public lands
- Minimize the production of smoke and the drifting of smoke into residential and commercial areas

- Prohibit controlled burns on ozone action days in the summer

The policy also lays out a range of general controlled burn procedures, including the monitoring of all sites to document the effects of management, or lack thereof, and recommends controlled burn intervals for various habitat types, depending on their condition. The entire document is available online at www.chicagowilderness.org/biodiversity/policy/index.cfm.

A Nascent Database of Controlled Burns

Since 1999, *Chicago WILDERNESS Magazine* has published the number of acres burned per season on the region's public lands. This listing is not comprehensive and it fluctuates from year to year, depending on which agencies submit reports. Trends are not readily discernible due to the fact that the number of acres burned annually depends on weather conditions, which are highly variable. Nonetheless, on average the number of acres burned per year since 1999 is 7,351. This represents roughly 3.5 percent of the total acreage held in public trust in the region. A number of the *Report Card* working groups strongly recommended that significantly more acres be managed at a minimum with controlled burns until such time as additional resources become available to implement more comprehensive management.

5.3.2 Additional *Biodiversity Recovery Plan* Recommended Actions

The Natural Resources Management and Science Teams will be examining the the following *Biodiversity Recovery Plan* recommended actions as they relate to the Chicago Wilderness consortium's current strategic plan. The recommended actions will be evaluated to determine which, if any, fit into the broader spectrum of the strategic plan, and, if so, how each might be accomplished.

- Procure sufficient equipment and workforce so that enough natural areas can be managed with controlled burns within the appropriate time periods to achieve the goals of this plan
- Monitor and participate in the development of new legislation that affects prescribed burning in Illinois; work with state environmental protection agencies as they develop air-quality regulations to facilitate prescribed burns
- Develop outreach programs to educate local officials, fire chiefs, preserve neighbors, etc., about the use of fire in managing natural ecosystems
- Cooperate to improve knowledge about research questions such as:
  - What are the positive and negative effects of prescribed burning on endangered, threatened and watch species?
  - What is the optimum timing and frequency of fire to conserve designated ecological targets?
  - What are the effects of various prescribed-burning regimens on native shrubs?
  - What are the best uses of fire to control invasive species?

5.4 Restoration and Management of Hydrology

As development increases throughout the region, hydrology altered by draining land, increasing the amount and rate of runoff, and changing the flow of streams, becomes more of a central concern to the long-term health of the region's natural areas. As reported in chapter two, increased development has increased the proportion of impervious surface cover in the region. Most estimates suggest that there exists a threshold of 10-20 percent of impervious surface cover, after which point, stream conditions begin a continuous decline. Additionally, impervious surfaces prohibit rainwater from seeping naturally into the ground and recharging aquifers. Other human activities further alter the region's hydrology. A proposed mining operation adjacent to Bluff Spring Fen in Elgin, Illinois would seriously interrupt the hydrology to the highly sensitive site, an Illinois Nature Preserve and one of the region's premier ecological recovery stories.

Countering these negative effects are a number of wetland restoration efforts, many of which, as a first step, require the modification or disabling of drain tile systems. Beginning in the late 1800s, drain tiles were installed extensively throughout the midwest to drain wet acreage for agricultural purposes. As reported by Brown (2004, p.14), by "1935, farmers had laid enough drain tiles in Illinois to circle the world six times." Whereas in the beginning of the 20th century, hundreds of drainage districts were formed to move water off-site into drainage ways, streams and rivers as fast as possible, today "a grow-

ing number of communities and counties tax themselves to protect and restore open space that was once farmed. They seek to return water to the land in order to welcome back nature, recreating wetlands that once harbored egrets, black-crowned night herons, snakes, crayfish, and frogs; and the wet prairies that once favored northern harriers and short-eared owls" (Brown 2004, p.14).

At the Geneva Park District's Peck Farm, drain tiles are being removed by trenching. The Village of Sleepy Hollow has left drain tiles in place at its Jelkes Creek Wetland, but has plugged them at strategic points. The restoration of the Bartel Grasslands, detailed in chapter three, required drain tiles to be valved, which allows on-site soils to be rehydrated while allowing floodwaters to pass through to neighboring sites. As reported by Parker (2004), the Middlefork Savanna restoration effort in Lake County (detailed in chapter two) has included the removal of miles of drain tiles, allowing for the hydrological recovery of approximately 200 acres of wetland area. This effort, in concert with a suite of related recovery efforts, has resulted in the model reestablishment of a rare complex of wetland, prairie and savanna habitat.

As summarized in chapter three, the McHenry County Conservation District has remeandered a channelized portion of the upper reaches of Nippersink Creek below Wonder Lake.

5.4.1 *Biodiversity Recovery Plan* Recommended Actions

The Natural Resources Management and Science Teams will be examining the the following *Biodiversity Recovery Plan* recommended actions as they relate to the Chicago Wilderness consortium's current strategic plan. The following recommended actions will be evaluated to determine which, if any, fit into the broader spectrum of the strategic plan, and, if so, how each might be accomplished:

- Standardize methods for collection of hydrological data, including the use of remote data-sensing equipment
- Provide training to landowners and land managers in techniques for identifying hydrological disturbances, locating and removing agricultural field tiles and installing groundwater-monitoring wells
- Identify large, artificially drained wetlands and prioritize them for restoration
- Develop additional education and outreach programs on wetland ecosystems, making use of demonstration and restoration projects
- Address key research questions, such as:
  - How do off-site factors affect hydrology and what are best methods to restore hydrology?
  - What are the best methods for restoring hydrology, and when should they be implemented?
- Create a database of current hydrological data from restoration and mitigation projects
  - The Stream Restoration Assessment Project has inventoried and followed up on a variety of stream restoration efforts throughout the region with the goal of identifying factors for success.

5.5 Reestablishment of Native Species

The *Biodiversity Recovery Plan* advocates for the reintroduction of native species where natural dispersal patterns have been disrupted. Some species, such as birds and mammals, or select plants whose seeds have lain dormant in the soil, return unaided to restored natural areas. Conservative species, especially less mobile species such as insects, reptiles, amphibians and some plant species, often do not. As noted in chapter three, the translocation of rare butterfly species is in process at select Illinois sites. Chapter three also relates information about the translocation of five Illinois endangered and threatened fish species.

The Center for Plant Conservation, a joint program of the Chicago Botanic Garden and The Morton Arboretum, is part of a national network of America's leading botanical institutions, the purpose of which is to prevent the extinction of America's imperiled, native flora. In addition to monitoring rare, threatened and endangered plants, participating institutions conduct horticultural research and learn how to grow the plants from seed or from cuttings, which are then available for restoration efforts in the wild.

5.5.1 *Biodiversity Recovery Plan* Recommended Actions

The Natural Resources Management and Science Teams will be examining the the following *Biodiversity Recovery Plan* recommended actions as they

relate to the Chicago Wilderness consortium's current strategic plan. The following recommended actions will be evaluated to determine which, if any, fit into the broader spectrum of the plan and, if so, how each might be accomplished:

- Develop in-house native nurseries
- Expand seed and plant exchanges
- Donate or exchange the use of facilities to build up the number of available propagules
- Conduct propagation research
- Work with home gardeners to develop native nurseries

5.6 Control of Invasive Plant Species

The *Biodiversity Recovery Plan* attests that the invasion of aggressive species is an international conservation issue of the most serious concern, because it threatens native biodiversity across the globe. The Chicago Wilderness Woods Audit seems to substantiate this (Glennemeier 2004). It provides the estimate of 558 stems (sapling size) of buckthorn (Rhamnus cathartica and R. frangula) per acre, which translates into more than 26 million stems in the region's woodlands overall. Furthermore, the greatest number of buckthorn stems is located in Cook, DuPage and Lake Counties, suggesting a strong geographic pattern.

The *Biodiversity Recovery Plan* outlines three primary methods of invasive species control: physical, biological and chemical. Physical controls include controlled burns and certain types of hydrological restorations, which are addressed in preceding sections.

5.6.1 Physical Control

Throughout the Chicago Wilderness region, a variety of physical controls are utilized as part of management efforts—from schoolchildren hand-pulling garlic mustard to professional land managers utilizing earth moving equipment to remeander the flow of streams. Often times, physical controls are needed to complement other control methods. In their study, Apfelbaum et al. (2000) suggest that controlled burns alone may be insufficient to affect a positive change in the ground-layer composition and structure of woodlands. During the first six years of a 13-year study period, the management units at Reed-Turner Woodland Nature Preserve in Lake County, Illinois were only managed with controlled fire, with no resulting differences in plot species richness between treatment and control areas; and resprouting had actually increased shrub-layer stem densities. Only after the subsequent use of cutting and herbiciding to remove shrub-layer species was an increase in plot richness of native ground-layer species observed. "Although an effect of shrub-layer removal could not be detected statistically, it may have contributed to the increase in plot richness, especially if supplemented by wide scale removal of [non-native] shrubs" (Apfelbaum et al. 2000, pp. 6-7). As with many recovery efforts, the results of this study imply the need for additional research.

5.6.2 Biological Control

Aesthetically pleasing with its clusters of deep purple blossoms, but biologically destructive for its highly invasive nature, purple loosestrife (*Lythrum salicaria*) has come to dominate many of the region's wetland areas, which has significantly reduced their biodiversity. Introduced to the United States early in the 1800s, today it is found throughout the Chicago Wilderness region, but especially in Kane, Lake, McHenry, Cook and DuPage Counties in Illinois. To combat this non-native invasive species, two beetle species, which feed exclusively and voraciously on purple loosestrife, have been imported.

In 1998, the Illinois Natural History Survey, with partial funding support from the Chicago Wilderness consortium, developed an educational curriculum, which included the rearing of purple loosestrife beetle larvae and the releasing of adults into purple loosestrife-infested wetland areas. Since the development of this program, more than 350 educators have been trained in this curriculum, 325 in the Chicago Wilderness area.

Prior to the development of the program, the Illinois Natural History Survey began partnering with agencies throughout the state to institute purple loosestrife beetle release programs. In northeastern Illinois, the number of beetles released between 1994 and 2004 are listed in Table 5.1.

In general, the number of beetles sent by the Illinois Natural History Survey to northeastern Illinois partners is decreasing after having peaked in 1999 due to the fact that the beetles have reproduced successfully enough that they may be harvested from earlier release sites and released at new sites.

TABLE 5.1
THE NUMBER OF PURPLE LOOSESTRIFE BEETLES RELEASED IN COUNTIES WITHIN THE ILLINOIS PORTION OF CHICAGO WILLDERNESS, 1994–2004

	Cook	DuPage	Kane	Lake	McHenry	Will
1994	1,000		1,000	3,000	1,000	
1995	250		300	750	500	
1996	25,000	17,000	25,000	48,600	44,700	
1997	60,061	34,825	43,275	109,500	119,300	
1998	76,075	49,676	27,000	184,400	106,050	
1999	121,950	27,500	53,300	199,900	67,500	6,000
2000	94,730	20,100	26,000	122,160	44,775	2,000
2001	47,174	2,000	885	74,620	31,250	
2002	54,395			67,960	27,825	3,100
2003	1,200	5,300	53,630	3,000		
2004	18,950	3,000	40,000	4,200		
Total	**500,785**	**159,401**	**270,390**	**818,090**	**442,900**	**11,100**

Among the many sites where released beetles have had a significant effect in controlling purple loosestrife are: Lake Powderhorn and Beaubien Preserve in Cook County, Weingart Road Sedge Meadow Nature Preserve in McHenry County, and Fox Valley Preserve and Hosa Prairie in Lake County, Illinois.

Illinois Natural History Survey measurements of flower stems and dry weights over a several year period at Weingart Road Sedge Meadow reveal that purple loosestrife no longer flowers at the site and has just become a background plant, resulting in a rebound of native vegetation (Post 2004).

Key partners in the beetle release program have been the Illinois Department of Natural Resources, the Forest Preserve Districts of Cook, DuPage, Kane and Lake Counties, McHenry County Conservation District, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, St Charles Park District, Palatine Park District, Fox Valley Park District, Crystal Lake Park District, Bolingbrook Park District, Max McGraw Wildlife Foundation, Chicago Botanic Garden, Village of Lake Zurich, Harper College, Lake Bluff Open Lands, Lake Forest Open Lands, Chicago Department of the Environment, Glenview Airbase Redevelopment Office and several environmental consulting firms.

5.6.3 CHEMICAL CONTROL

As reported in the *Biodiversity Recovery Plan*, selective use of herbicides, most often in combination with physical or biological controls, is an effective means of establishing a balanced condition in which natural processes such as fire and competition by native plants are sufficient to control non-native species.

Interviews with several land managers suggested the need for a database that could be updated to reflect the development and application of new herbicide products.

5.6.4 Recommended Actions for Control of Invasive Species

The Natural Resources Management and Science Teams will be examining the the following *Biodiversity Recovery Plan* recommended actions as they relate to the Chicago Wilderness consortium's current strategic plan. The following recommended actions will be evaluated to determine which, if any, fit into the broader spectrum of the plan, and, if so, how each might be accomplished:

- Develop and share cost-effective protocols for controlling targeted invasive species
- Monitor species locally and regionally to identify and anticipate problems before they reach epidemic proportions
- Develop region-wide collaborative efforts to control invasive species on all public land, including utility and transportation rights of way
- Develop and promote native landscaping recommendations for residential and commercial properties that strongly discourage the use of potentially invasive species

5.7 Management of Problem Wildlife

On land and in the water, an overabundance of both native and non-native species can have a devastating effect on the region's biodiversity. The *Biodiversity Recovery Plan* identified several problem species, including the zebra mussel, round goby, rusty crawfish, common carp, Canada goose, brown-headed cowbird, white-tailed deer, feral cats, and even, in some instances, raccoons, skunks and opossums.

5.7.1 Lake County Forest Preserve District Deer Management Study

Pursuant to the white-tailed deer objectives of the *Biodiversity Recovery Plan* and the conservation design and model policy for woodlands, the Lake County Forest Preserve District in Illinois has established deer exclosures at a number of sites to help quantify the impact that deer have on vegetation and to monitor vegetation recovery following deer management. These exclosures are located within mature mesic forests at Ryerson Conservation Area, MacArthur Woods, Wright/Lloyd's/Half Day Woods and St. Francis Woods. These exclosures are monitored both inside (where only deer are excluded) and outside where deer are free to browse on vegetation. The district uses great white trillium (*Trillium grandiflorum*) as an index of deer browse pressure on mesic forests. Researchers record stem density, percent cover and proportion flowering (Anderson 1991).

Outside the exclosures the data are generally inconclusive on whether deer reduction programs have been sufficient to benefit the vegetation. This may be due to the short term of the study (three years) or the fact that extra deer may be attracted to the area because of the more lush growth within the exclosure, accounting for high herbivory on the trilliums outside. However, inside the exclosures, all parameters are significantly higher. This indicates that a greater reduction in deer numbers would lead to a significant recovery in vegetation. For the four sites, trillium stem heights average 32 percent greater within the exclosures. Relative importance values—a combination of relative cover and abundance—are 100 percent higher inside the exclosures (Anderson 1991).

Continued deer management over time likely would show an overall recovery of trillium and other species preferentially browsed by the deer throughout the sites. Studies in other counties show similar results.

5.7.2 An Electronic Barrier for Asian Carp

The fish composition of Lake Michigan is very different from what it was historically, and it remains in a near-constant state of flux due to the size of the water body and the steady spate of potential threats. The lake supports many non-native fish species, many purposefully introduced for food and sport, which support a multi-billion dollar commercial and recreational industry. Other non-native species, including the sea lamprey, round goby, zebra mussel and spiny water flea, have not been so beneficial. As reported in section 2, an electronic barrier is being erected in the Sanitary and Ship Canal to prevent the passage of yet another potentially destructive non-native fish species from entering Lake Michigan from the Illinois River. Experts predict that Asian carp, with

their voracious appetites and prolific breeding habits, could have a devastating impact upon the already stressed fish assemblage of Lake Michigan.

5.7.3 Other Recovery Plan Recommended Actions

The Natural Resources Management and Science Teams will be examining the the following *Biodiversity Recovery Plan* recommended actions as they relate to the Chicago Wilderness consortium's current strategic plan. The recommended actions will be evaluated to determine which, if any, fit into the broader spectrum of the plan, and, if so, how each might be accomplished.

Deer

- Harvest deer regularly until effective alternative methods become available, to support a balance that sustains a full range of native plants and provides diverse habitat for birds and other animals.
- Disseminate to land managers any new information on alternative control methods.
- Disseminate to land managers models that predict responses of deer populations to management and encourage their widespread use.
- Develop more effective deer census methods.

Zebra mussels and the round goby

- Support continued research on limiting the spread of zebra mussels and the round goby.
- Provide more public outreach and education calling for boat owners to take responsibility for cleaning boats and boating equipment prior to transporting them from one water body to another.

Feral cats

- Lead a public education effort explaining the problems caused by feral cats and advocating for feral cat control and keeping domestic cats indoors.

5.8 Natural Resource Management Plans

The *Biodiversity Recovery Plan* recognizes several tiers of management plans. At the broadest level, the *Biodiversity Recovery Plan* provides the overall management vision for the region. At the other end of the scale lie specific management plans for each individual site. In between may be a variety of plans by counties and other land managers based on their particular policies and needs.

To provide a region-wide cohesiveness in the management of the region's natural lands, the Chicago Wilderness consortium has approved model policies for the conservation of wooded lands and controlled burning. These policies are discussed in chapters two and five, respectively.

5.9 Research, Monitoring and Inventorying

The *Biodiversity Recovery Plan* reinforces the interrelated nature of research, monitoring and inventory and moreover, their collective linkage to management. Although the term conservation design may mean different things to different people, the plan asserts that as "a process for deriving conservation goals and strategies directly from assessment of biological values and the threats to those values," it is a means to focus the efforts of research, monitoring and inventorying "so that they contribute directly to conservation action" (Chicago Region Biodiversity Council 1999, p.113).

5.9.1 Conservation Design

As related in the community and assemblage sections, to date, region-wide conservation designs have been completed for grassland birds, savanna herpetofauna and woodlands—all ranked of highest conservation concern in the *Biodiversity Recovery Plan*. Essentially, these designs expand upon and refine the general goals and objectives in the *Biodiversity Recovery Plan*, setting specific targets for habitat, number of species and number of sites monitored in five-year increments over a 25-year period. The conservation designs also outline more specific threats and recommended management actions to counter threats, again with specific, measurable benchmarks in five-year increments over 25 years.

As should be evident in the community or assemblage sections, having measurable objectives, such as those provided by conservation designs, greatly facilitates the reporting process and ultimately allows land managers, elected officials and the general public to chart the progress of recovery efforts locally as well as on a region-wide basis. For example, in 2004, there were 1,216 breeding pairs of bobolinks

recorded in the region, nearly halfway toward the 2025 goal of 2,500 breeding pairs. On the other hand, with only 316 breeding pairs of grasshopper sparrows recorded in 2004, we are less than 13 percent toward our goal of 2,500 breeding pairs (Glennemeier 2002b; Audubon Chicago Region 2004). Such data may tell us that we are doing a good job managing for bobolinks, but that additional research and/or refined or even different management practices may be necessary to facilitate the recovery of grasshopper sparrows.

5.9.2 Indicators

There has been little progress made in the development of region-wide indicators. The *Biodiversity Recovery Plan* makes the case for utilizing indicators to "measure change toward a goal/objective or in completing a strategy/action. Outcome indicators show whether we are reaching our threat-related management goals and objectives; performance indicators show whether we actually have implemented the strategies and actions that we devised to accomplish these goals" (Chicago Region Biodiversity Council 1999 p.114). Although there may be occasions when a single indicator suffices to measure progress toward a goal, in most instances a suite of indicators would be the norm.

For each indicator, there are to be established thresholds, which, when crossed, trigger one or more responses from a pre-planned range of management options. Knowing what to look for and when to intervene should inform the design and implementation of sampling protocols and monitoring programs.

As is evident in the community and assemblage sections, to date no true indicators have been identified in accordance with the methodology outlined in the *Biodiversity Recovery Plan*. One of the challenges identified during the 2004 natural community and taxonomic workshops was the disparity of perceptions and opinions about what constitutes an indicator and what indicators' values are for the region.

For the purposes of this report, an indicator is defined as a type of information that tells us something about the conditions of concern. It is a tool that can provide information about the state of complex systems—such as the environment, the weather or even human health. It gives a clue about the "bigger picture" by looking at a small piece of the puzzle, or at several pieces together.

Atmospheric pressure is an indicator of the weather. To a doctor, blood pressure provides a clue about the overall health of the patient. To an economist, the Gross Domestic Product (GDP) gives a snapshot of the state of the country's economy. Each of these indicators provides information about conditions at a particular point in time. To be fully useful, however, we need indicators to give us information about trends over time. Is the barometric pressure rising, falling or remaining the same? Is our blood pressure higher or lower than the last time we checked? Is the GDP growing or shrinking?

One of the best ways to track trends in the condition of a system, such as an ecosystem, is through development of a suite of indicators. By looking at a number of indicators, together we can see in which direction a system is moving.

So why do we need indicators for biodiversity of the Chicago Wilderness region? Simply put, we need indicators to get the big-picture perspective for something as big and complex as our region and the state of nature within it. Developing a suite of indicators will enable the regional community—government and non-government organizations, industry and individual citizens—to work together within a consistent framework to monitor and assess changes in the state of the regional ecosystem.

Indicators can be used to:

- Assess changes in the state of the ecosystem and progress in protecting and restoring its biodiversity
- Gain a clearer understanding of existing and emerging problems and their solutions
- Better understand how our actions affect the ecosystem and biodiversity and to determine the types of programs, regulations, and policies needed to address problems
- Provide information that will help managers better assess the success of current programs
- Provide information that will help set priorities for research, data collection, monitoring and management programs

Additionally, looking at the Chicago Wilderness consortium's goal to protect the natural communities of the Chicago Region and restore them to long-term viability, a three-layer illustration helps to provide perspective in developing indicators (Figure 5.1).

The upper layer includes the health of living communities and species. Their numbers, genetic diversity and long term viability are the top measures of success.

The middle layer consists of habitats that provide essential support for the communities. Three kinds of habitats—physical, chemical and biological—provide the essential food and shelter required for survival.

- Physical habitat includes shelter, substrate, water, minimum spatial size and connectedness, which provides the means of dispersal
- Chemical habitat includes nutrients, pollution levels and the quality of air, water and soil
- Biological habitat includes non-native species, the food web, predation, disease and the biological activity needed to support various species. As habitat factors, these biological aspects are distinct from the health of communities and species included in the top layer

The bottom layer consists of human activities, which support or threaten long-term viability. The positive activities include those such as acquisition and management of natural areas, which are intended to support the goal. There are some activities, such as physical aspects of urban development, which have direct negative impacts. There are also a vast array of activities which have unintended indirect consequences, mostly negative.

Indicators are needed at each level in the three-layered model, ranging from living species through habitats to human activities. One view of this is that they must range from green (living) to gray (program) ends of the spectrum. Regardless of the nomenclature, it is not an either/or situation. Progress needs to be tracked at all levels.

Indicators can be simple facts, simple summaries of facts, or complex summaries, often based on mathematical models. At one extreme, a single data point can be said to indicate something. A series of data points can indicate a trend. But the system is very complex and multiple bits of information are needed to provide a reasonable picture of what is happening. One way of integrating large amounts of data and multiple variables is to create an index, which combines information into a simplified representation, usually a score of some kind.

A widely recognized index is the Index of Biotic Integrity (IBI), which combines multiple factors. As another example, the State of Illinois RiverWatch program (suspended in 2004 due to budget cuts) had boiled down its stream monitoring results for each segment into two scores: a biological (species/community) score and a habitat score. These scores combine other complex scores into a single comparative value. The biological score combines five factors: The Macroinvertebrate Biotic Index, taxa richness (based on 37 indicator taxa), EPT (Ephemeroptera, Plecoptera, and Trichoptera) taxa richness (based on the number of mayfly, stonefly, and caddisfly taxa present), taxa dominance, and percent worms. Glennemeier (2004) advances a draft definition of wooded lands quality, an index of wooded lands health, by assessing Floristic Quality Index (FQI), canopy trees and four measures of invasive species.

Creating indices that summarize and integrate multiple factors gives up precision, but has the advantage of vastly simplifying complex information. It also leaves room for much debate about the appropriateness of weighting given to various factors.

5.9.3 Region-wide Monitoring Efforts

Plants of Concern

The Plants of Concern project follows the *Biodiversity Recovery Plan* recommendation to institute a region-wide monitoring program for rare species. Over a four-year period, the program piloted and refined region-wide monitoring protocols and collected census data about not only the status and trends of rare species, but of invasive species, as well. The ultimate purpose of the program is to "provide managers with the scientifically-acquired information needed to address management problems on their sites and also to collaborate, on a regional scale, in adapting, developing and implementing management strategies that will ensure the presence of these species on a sustainable basis" (Masi 2004, p.3). As of 2004, the

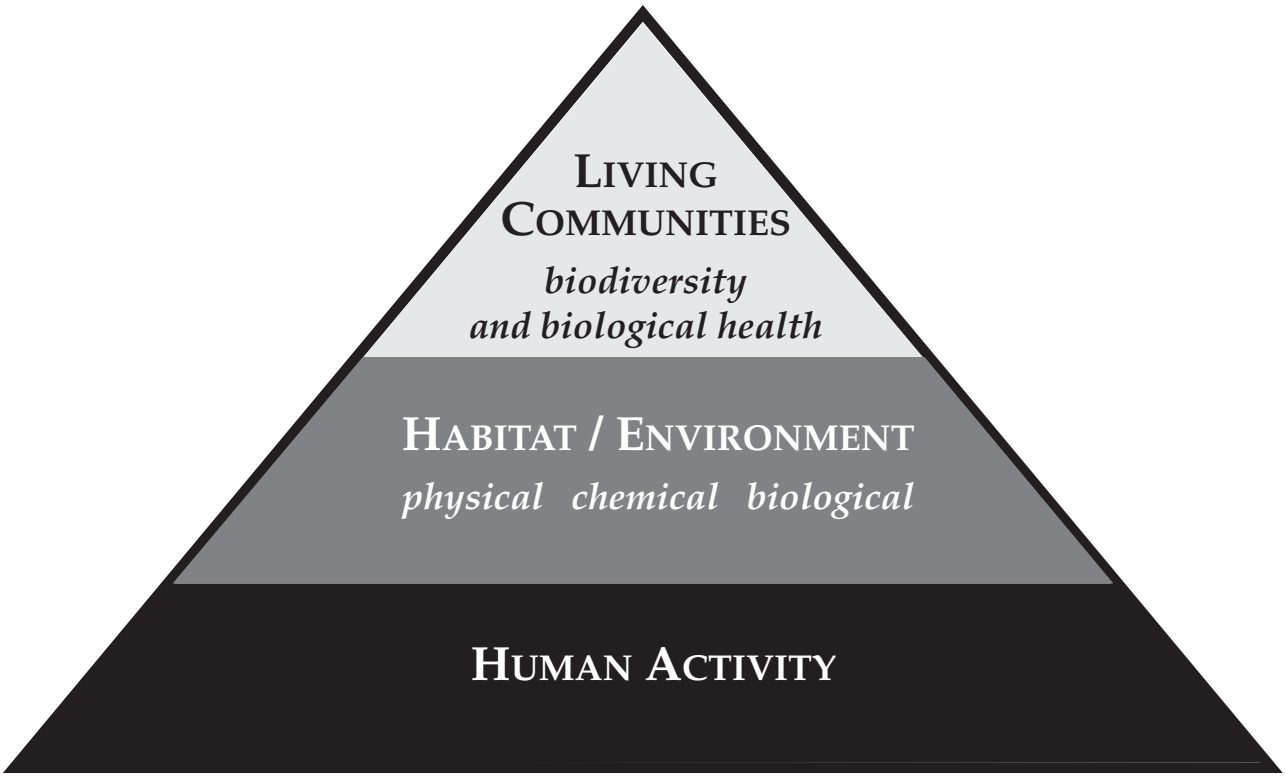


Figure 5.1. Three-layer illustration that places ecosystem health in the contet of human activity.

program had utilized 177 volunteers to monitor a total of 149 different species at 144 separate sites.

Among the information the project collects are:

- Population Information
  - o Number of stems
  - o Population size
  - o Percent reproductive
  - o Juveniles present
  - o Plant distribution
    - ◊ Uniform
    - ◊ Clustered
    - ◊ Random
- Associate species information (the most numerous dominant native plants within the population and within one to two meters of the population)
- Threats to the population
  - o Invasive species, including:
    - ◊ Invasive brush encroachment (one meter tall or less)
    - ◊ Invasive large brush/tree encroachment (greater than one meter tall)
  - o Deer browse
  - o Erosion
  - o Authorized/unauthorized trails
  - o Other types of threats, including insect damage, drought stress, human trampling, human theft/damage, damage from all-terrain vehicles, nearby development and other land uses that would negatively impact the population
- Management within the population
  - o Burning
  - o Buckthorn, brush, or invasive tree removal
  - o Herbaceous invasive plant removal
  - o Mowing
  - o Other

Critical Trends Assessment Program

According to the Illinois Natural History Survey's Critical Trends Assessment Program Web site, since 1997, the Critical Trends Assessment Program (CTAP) has monitored "the condition of forests, wetlands, grasslands, and streams throughout the state of Illinois. This project seeks to assess changes in ecological conditions as well as to serve as a baseline from which to compare regional and site-specific patterns throughout Illinois. This program is unique because it is the first-ever attempt at a state-wide

comprehensive assessment undertaken by a state natural resource organization" (Illinois Natural History Survey 2004). In undertaking this effort, CTAP has developed specific monitoring protocols, which could be used or adapted for the region's developing ecosystem monitoring efforts.

For forests, grasslands and wetlands, the CTAP measures:

- Plant species richness in ground layer, shrub layer and tree layer
- Dominant species percentage coverage in all layers
- Number of species and percentage coverage of introduced plant species
- Floristic Quality Index (FQI), the weighted average of individual plant species' coefficient of conservation value)
- Terrestrial insect species richness (Index of rarity and endemicity for leafhoppers, spittlebugs and treehoppers)
- Diversity and density of habitat dependent (e.g., wetland-dependent) and area-sensitive bird species that need a minimum area in which to breed
- Presence of threatened and/or endangered bird species

For streams, the program measures:

- EPT index, which is the number of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies)
- Hilsenhoff's Biotic Index or HBI, which is the weighted average of individual species' tolerances to organic pollution and general disturbance
- Habitat Quality Index, which includes 12 parameters measuring the ability of a stream to provide shelter and food for aquatic organisms
- Selected water chemistry parameters (temperature, dissolved oxygen, pH and conductivity)

Within the six-county region of northeastern Illinois, the CTAP has the following number of sites where data is collected:

- Plants
  7 Forest Sites:
    6 Dry-mesic upland forest
    Upland mesic-wet/mesic/dry-mesic
  5 Grassland Sites:
    2 Successional field
    1 Mesic prairie
    1 Cultural-developed land
    1 Wet prairie restoration
  11 Wetland Sites:
    2 Successional field
    9 Marsh

- Birds
  7 Forest sites
  6 Grassland sites
  29 Wetland sites

- EPT (Ephemeroptera, Plecoptera, and Trichoptera)
  23 stream sites:
    4 in Cook County (Willow, Long Run, Plum, Butterfield)
    6 in Kane County (Fox River, two at Ferson, Blackberry, tributary of Brewster, Tyler)
    2 in Lake County (Sequoit, Bull)
    3 in McHenry County (three at Kishwaukee River)
    8 in Will County (tributary of DuPage River, DuPage River, North Branch Rock Creek, Trim, Terry, two at Plum, Jackson)

Within the six-county region of northeastern Illinois, the EcoWatch Program had the following number of sites where data had been collected:

- ForestWatch
  21 in Cook County
  6 in DuPage County
  6 in Kane County
  3 in Lake County
  3 in McHenry County
  2 in Will County

- PrairieWatch
  4 in Cook County
  4 in DuPage County
  1 in Kane County
  6 in Lake County
  2 in McHenry County
  1 in Will County

- RiverWatch
  92 sites on 27 different streams in Cook County
  34 sites on 11 different streams in DuPage County

31 sites on 14 different streams in Kane County
39 sites on 16 different streams in Lake County
23 sites on 9 different streams in McHenry County
36 sites on 16 different streams in Will County

According to the CTAP Web site:

> Between 1997-2001 the CTAP professional scientists of the Illinois Natural History Survey (INHS) conducted surveys at 140 forest, 139 wetland, 126 grassland, and 149 stream sites. These 554 sites (approximately 30 sites per year per habitat) were randomly selected from across the state on both public and private lands. During this first five-year cycle, data on birds, insects and herbaceous and woody vegetation were collected. Several ecological indicators such as species richness, diversity, dominance of native vs. non-native taxa, and presence of threatened and endangered species were measured at every site. In the case of birds, we also collected data on cowbird abundance. In streams, aquatic insects were the primary assemblage used as indicators of quality. Currently, CTAP is in its second five-year cycle (2002-2006). During this cycle we will resample all the sites that were visited from 1997-2001. It was the initial intent of the program that a total of 150 sites (30 sites per year per habitat) be sampled per five-year cycle. During the second five year cycle, additional sites will be added to bring us up to this goal.
>
> The success of CTAP data collection depends on a cooperative effort between INHS professionals and EcoWatch citizen scientists. EcoWatch citizen scientists are part of the Illinois EcoWatch Network (RiverWatch, ForestWatch, PrairieWatch, and UrbanWatch) a statewide volunteer monitoring initiative collecting scientific data on Illinois streams, forests, prairies and urban green spaces. Protocols for this program are complementary to those of the professional scientists. The INHS professional scientists conduct detailed surveys at each habitat. The EcoWatch citizen scientists monitor more sites but conduct a subset of procedures done by the professionals, using less taxonomic resolution, at random and from volunteer-chosen locations. The combination of both data sets will allow us to have a better understanding of the quality and quantity of our habitats (Illinois Natural History Survey 2004).

Unfortunately, although CTAP survived recent state budget cuts, the EcoWatch program lost all of its funding in the 2005 fiscal year.

The Development of Region-wide Monitoring Standards

In early 2005, the Illinois Natural History Survey facilitated a process to further the development of a regional monitoring plan. Building upon previous efforts of the Chicago Wilderness consortium, including the *Biodiversity Recovery Plan*, the draft *Report Card* and the work of the Regional Monitoring Taskforce, goals of the process include:

- Develop a prioritized list of natural communities, species assemblages and species to be monitored in the Chicago Wilderness region, derived from the lists in the *Biodiversity Recovery Plan*
- Identify potential roles for professional scientists and volunteer citizen scientists in regional monitoring
- Initiate discussions of the indicators that will be monitored for each community, assemblage, and species, and protocols that could be used to monitor these indicators
- Gather information on monitoring already underway within the Chicago Wilderness region that can be used to address the priorities of the Chicago Wilderness consortium
- Identify individuals with expertise who can contribute to developing or reviewing the complete monitoring plan

Chapter 6
Education and Communication

6.1 Introduction

The community and assemblage assessments in the previous sections attest to the variety of pressures that continue to impinge upon the region's ecological health. Addressing biological issues alone is insufficient to meet these challenges. Reaching out to the general public and the full spectrum of decision-makers—those who establish policy priorities, devise ordinances and laws and allocate resources—is needed as well. Today, environmental issues compete with a seeming inexhaustible number of other issues, but people continue to consider environmental protection a priority. A recent Chicago Wilderness survey of the public's attitudes toward prescribed burns found that a core of support for natural area restoration exists in the greater region of southwestern Lake Michigan (Miller et al. 2002). The survey also found that a general understanding of ecosystem restoration and management issues is lacking among individuals who oppose controlled burns and furthermore, that there are not great differences in value orientations and attitudes between those who support or oppose controlled burning, so that the promotion of information on restoration and management can influence attitudes toward controlled burns (Miller et al. 2002). Education and communication, therefore, are key to recovering the biological health of the region.

Education and Communication Team

Starting out with a handful of dedicated educators in the late 1990s, the Chicago Wilderness Education and Communication Team now boasts more than 200 members and five active task forces. The team works to increase and diversify public participation in and the understanding of the region's biodiversity by developing collaborative education and communication programs, events and professional development opportunities. The goals of the team are to:

- Increase level of local biodiversity programming throughout the Chicago area.
- Develop a long-term process for evaluating the effectiveness of biodiversity education and outreach activities.
- Increase and diversify public participation in conservation activities, including stewardship, advocacy, and support for funding.
- Develop mechanisms for professional development opportunities and capacity-building for team members.

6.2 Long-term Education Goals

Although the Chicago Wilderness education and communication efforts often work hand-in-glove with each other, the *Biodiversity Recovery Plan* broadly outlined separate goals and recommended actions for each, divided primarily along the lines of timeframe; communication goals being more immediate and education goals more long-term.

Goal 1: Ensure that every student graduating from a school system in the Chicago Wilderness region is "biodiversity-literate."

Recommendation: Develop a commonly held definition of "biodiversity literacy"—what knowledge, skills, attitudes and experiences are essential to help people make informed decisions and participate in biodiversity protection.

The Education and Communication Team is engaged in the first part of a multi-phased study to establish a common definition of biodiversity literacy by surveying conservation professionals to determine how key elements of their knowledge, skills, attitudes, and behaviors contributed to their entering the conservation field. Other phases will include further data collection, research on various socio-economic groups and how they relate to environmental issues, and analysis and research of national and regional studies on environmental literacy to establish a common baseline definition. The team then plans to review Chicago Wilderness, regional, and national

public opinion data on environmental literacy to determine the areas of biodiversity-related topics most critical to present to various audiences. Existing Chicago Wilderness education and communication tools then will be evaluated to determine the effectiveness of current tools and to identify gaps in programming or audience(s).

Recommendation: Increase the visibility of biodiversity concepts and issues in state education standards to encourage teachers to integrate biodiversity content into other programs.

The Illinois learning standards, adopted by the Illinois State Board of Education in 1997, include extensive coverage of the aspects of the life, physical and earth/space sciences related to the environment and biodiversity. The science standards also make repeated reference to understanding the interconnection between human actions and the environment. In 2003, the Illinois State Board of Education published performance descriptors as a tool for helping teachers apply the Illinois learning standards to classroom curricula and instruction. The performance descriptors suggest many environmental and biodiversity-related examples.

Recommendation: Give school staff the incentive to devote precious instructional time to biodiversity topics by demonstrating to teachers how using biodiversity as a unifying theme can improve test scores.

The Education and Communication Team's teacher training hubs, discussed in more detail below, offer collaborative biodiversity-related professional development programs for teachers. Many of the programs model for teachers how to integrate environmental and biodiversity-related themes into standards-based math, science, social studies, art and reading and language arts curricula.

Recommendation: Support state plans that integrate environmental education into schools. In particular, work to support the passage of the Environmental Education Literacy of Illinois Master Plan. Develop best practices for teacher training, such as the package being produced for the Mighty Acorns youth stewardship education program.

The Chicago Wilderness Teacher Training Hub Project has established five regional collaborations of Chicago Wilderness member organizations that offer biodiversity-related teacher training programs and professional development workshops for education staff from Chicago Wilderness member organizations. Several workshops have been held regarding the integration of biodiversity-related best practices into the Chicago public schools' Reading and Math + Science Initiatives, Illinois learning standards and performance descriptors, and teacher recertification. Additionally, the Education and Communication Team hosts 12 workshops per year to build the professional capacity of the staff of Chicago Wilderness member organizations in biodiversity-related content, share current trends in educational research and policy, and provide exposure to various pedagogical techniques.

Goal 2: Expand the scope of existing and future programs in biodiversity education to include components for attitudes, skills and participation in curricular design.

Recommendation: Determine the effectiveness of existing biodiversity education programs for achieving biodiversity literacy, and use successful programs as models.

This recommended action is to be included in a future phase of the biodiversity literacy project and is outlined as a major goal in the Chicago Wilderness consortium's strategic plan.

Recommendation: Foster professional development for organizations inaugurating biodiversity education, and increase the number of pre-service and in-service opportunities for teachers to strengthen their qualifications to teach about biodiversity.

The Education and Communication Team hosts professional development and capacity building workshops on a variety of education and communication topics related to the goals outlined in the *Biodiversity Recovery Plan*. Workshops are held every other month and are hosted by member organizations of the Chicago Wilderness consortium. Additionally, the Interpretive Training Task Force has undertaken a multi-phased effort to train interpreters from

Chicago Wilderness member institutions on how to interpret regional biodiversity to various audiences. The teacher training hubs, described earlier, offer a variety of professional development opportunities for teachers regarding biodiversity-related topics. In 2000, the Education and Communication Team also hosted a two-day conference for Chicago Wilderness members on biodiversity education and the education goals of the *Biodiversity Recovery Plan*.

Another program that addresses this goal is the Mighty Acorns youth education program. Inaugurated in 1993, Mighty Acorns helps young people in the greater Chicago metropolitan area become land stewards and citizen scientists, as well as learn the value of biodiversity. The curriculum is comprised of three levels, for grades four through six, and meets Illinois state standards developed by the Illinois State Board of Education. Each level includes educational activities that take place before, during and after field visits to a Chicago Wilderness natural area. Each level involves discussion of biodiversity but there are key foci for each as well. Level one, for fourth graders, focuses on adaptations and interrelationships. Level two deals with competition and interdependence. Level three focuses on biodiversity: what is it, how we impact it both negatively and positively and how we value it. As of 2004, the Chicago Wilderness Mighty Acorns program had 16 active partners, located in the six collar counties of Chicago and northwest Indiana. The program serves approximately 8,000 students, taught by 325 teachers in 80 schools and involves more than 250 volunteers. The children in approximately 70 percent of participating schools are considered underserved or at risk.

Goal 3: Make biodiversity in Chicago Wilderness a component of the degree programs of local colleges and universities.

Recommendation: Survey existing course selections at local universities. Identify courses that effectively and thoroughly communicate key information about local biodiversity and work to increase their visibility. Develop a degree program in restoration ecology at a local university with an accompanying field station. Promote practicum opportunities by linking universities with professional land managers in the region.

The Education and Communication Team established a Higher Education Task Force in 2000 to address the above recommendation. To date, the team as a whole has made little progress in this area, although individual members, most recently the Chicago Botanic Garden, have had some success. The team acknowledges that developing a degree program involves working with science departments at area universities. The team has identified this goal as a collaborative endeavor with the Science Team, and this will be an area of future focus.

Goal 4: Expand and improve the use of existing tools for biodiversity education, and create new tools as needed.

Recommendation: Work toward the better distribution of existing tools by forming a distribution center and investing in publicity about the center.

Chicago Wilderness has published several documents designed for use by educators, decision-makers and interested members of the general public, such as the *Atlas of Biodiversity.* To date, more than 25,000 copies of the *Atlas* have been distributed to local elementary schools, high schools, colleges, and other institutions, as well as to individual members of the public. The publications are advertised through the Chicago Wilderness web sites, through the member organizations of the Chicago Wilderness consortium, and at various special events throughout the region. The Forest Preserve District of DuPage County, as a member of the Chicago Wilderness consortium, now serves as the distribution center for most Chicago Wilderness publications, including the *Atlas*.

Recommendation: Assess the effectiveness of tools for reaching their target audiences.

The Education and Communication Team has developed a matrix to map the five essential elements of environmental education as described in the *Biodiversity Recovery Plan* to determine the extent and types of tools to be offered. This matrix is intended to help identify further areas for tool development. It has been used to create new tools and areas of audience focus including the Asset-Based Community Development Project and the Biodiversity Basics curriculum project conducted in partnership with the

World Wildlife Fund. Work in this area will be linked to a future phase of the biodiversity literacy project.

A subsequent analysis of program breadth and depth of programs offered, as well as the diversity of audiences served, will be conducted in the future as part of the implementation of the Chicago Wilderness consortium's strategic plan.

Recommendation: Create new tools for groups starting community-based, non-school projects in biodiversity education. For example, create a biodiversity program primer with a list of potential partners.

The Community-Based Programs Task Force has created a manual for using the Asset-Based Community Development model to develop biodiversity-related programs in various communities. Also, the Volunteer Managers Task Force is producing a workbook for training volunteers on how to communicate on biodiversity. This workbook is a part of the task force's current project to train volunteers at Chicago Wilderness member organizations on common biodiversity content, messages, and strategies for communicating these messages.

Goal 5: Increase the number of communities being reached with non-school-based programs in biodiversity education.

Recommendation: Foster neighborhood and community-based programs aimed at improving the environment and biodiversity locally to unify different cultural groups for concerted community action.

The Community-Based Programs Task Force conducted a two-phase project to develop a biodiversity-related program in four diverse communities based on their respective resources and interests. The Asset Based Community Development model was used in Waukegan (IL), Bartlett (IL), Gary (IN) and Jackson Park in Chicago. Chicago Wilderness representatives and community leaders collaboratively planned and implemented biodiversity-related programming in each location. Now that the project is complete, the model needs to be expanded to other sites.

Recommendation: Devote more effort to recruiting citizen scientists from more diverse communities. Build effective tools to track the success of recruiting techniques, and use the effective techniques to expand the reach of volunteer-recruitment programs.

The Education and Communication Team established the Volunteer Managers Task Force to provide a venue for volunteer managers for sharing resources on recruiting and retaining volunteers. As mentioned above, the task force is currently involved in a project to better train volunteers from Chicago Wilderness member organizations in biodiversity-related messages and content.

Additional Recommendations to Achieve Goal 5:

- Create a diverse base of spokespeople, including professionals and volunteers, who can serve as ambassadors for biodiversity to a wider variety of communities.
- Produce tools and materials in multiple languages.
- Develop collaborations between Chicago Wilderness member organizations and cultural, ethnic, and arts and humanities organizations to foster the exploration of nature through cultural avenues.
- Improve the infrastructure within conservation agencies and organizations to better support community-based biodiversity conservation projects.
- Develop links between school-based biodiversity-related programs and community projects.
- Find new ways of providing urban populations with opportunities to become aware of and explore the region's natural communities (for example, a "biodiversity bus" to bring urban residents to outlying natural areas).
- Encourage the providers of non-formal education programs to recruit and employ professional educators who reflect the diversity of the communities they serve.

The Education and Communication Team will be examining these recommendations as they relate to the Chicago Wilderness consortium's strategic plan. The goals will be evaluated to determine which, if any, fit into the broader spectrum of the strategic plan, and if so, how each goal will be accomplished. It is important to note that many Chicago Wilderness member institutions conduct programs and activities that support each of these recommendations. Indeed,

the majority of the goals of the *Biodiversity Recovery Plan* are accomplished each day through the activities of individual member institutions. To better highlight the work of individual organizations in helping to achieve Chicago Wilderness' education and communication goals, a survey is currently underway to collect attendance data from each member who offers education programs. This information will be provided in future reports to augment the collective work of the Education and Communication Team and to identify specific leaders in cultural and ethnic communities who can inform educators and communicators and serve as partners for collaborative programs.

Goal 6: Measure local citizens' understanding of biodiversity by developing appropriate gauges for long-term effectiveness of education programs.

Recommendations: Create appropriate gauges and gather baseline data on targeted communities. Gather data at set intervals to measure long-term change. Disseminate findings to agencies and organizations involved in biodiversity education.

The Education and Communication Team established the Evaluation Task Force to focus on evaluating the effectiveness of biodiversity-related programming offered collaboratively and by individual member organizations. This is a future goal related to the implementation of the strategic plan and is related, in part, to a later phase of the biodiversity literacy project.

6.3 Chicago Wilderness Education & Communication Team Workshops and Programs

The Education and Communication Team provides multiple workshops and interpreter programs each year for the staff and volunteers of Chicago Wilderness member organizations. Workshops are held every other month and are designed to build capacity in relation to the education and communication goals outlined in Chapter 10 of the *Biodiversity Recovery Plan*. Interpreter programs, which highlight recent trends in the interpretive field, are three-hour mini-workshops open to all members. Table 6.1 summarizes the number of people who have attended team workshops or interpreter programs during the past five years.

TABLE 6.1
NUMBER OF PEOPLE ATTENDING CHICAGO WILDERNESS EDUCATION AND COMMUNICATION TEAM WORKSHOPS AND INTERPRETER PROGRAMS

Year	Number of Attendees at Workshops/Interpreter Programs	
	Education Workshops	Interpreter Programs
2000	94	N/A
2001	136	N/A
2002	141	N/A
2003	322	85
2004	148	77

6.4 Short-term Communication Goals

Public support is a critical component of conservation efforts, and is therefore crucial to successful implementation of the *Biodiversity Recovery Plan*. To foster public support, in 2001 the Chicago Wilderness Steering Committee approved a public communication plan that is based on, and expands upon, the communication goals set forth in the *Biodiversity Recovery Plan*. The public communication plan lists five key areas in which the consortium wishes to achieve communication results:

1. Increase understanding of our regional biodiversity: where it's found, why it's important, how it's threatened, and what people can do to help address the threats. Inform, involve and influence target audiences on regional biodiversity issues, including support for land management programs. (Knowledge goal)

2. Create a sense of regional pride, a sense of belonging, and feelings of connection to and valuing of our regional biodiversity. (Affective goal)

3. Provide opportunities for involvement and motivate target audiences to take part in local nature activities and conservation efforts. (Behavior goal)

4. Promote awareness within targeted audiences of the Chicago Wilderness consortium, its mission and activities. (Marketing goal)

5. Build the capacity of Chicago Wilderness member organizations to inform and engage their audiences with biodiversity-related information and activities. (Internal goal—strengthen the consortium's communication capacity)

To achieve these goals, the communication plan outlines five key areas of endeavor recommended for the Chicago Wilderness consortium:
- Create celebrations of biodiversity
- Conduct targeted outreach
- Build Chicago Wilderness members' capacity to communicate on issues of biodiversity conservation
- Create and maintain a communication infrastructure
- Evaluate communication programs and tools

Below are descriptions of much of the communication work that has been undertaken both in support of the goals outlined in the communication plan and of the recommendations within the *Biodiversity Recovery Plan*. However, since the *Report Card* is a measure of progress against *Biodiversity Recovery Plan* goals and recommendations, not all of the work undertaken in the Chicago Wilderness communication program is described within this document. For more information on Chicago Wilderness' communication activities, contact the Chicago Wilderness communication office at 708-485-0263, ext. 253.

Goal 1: Gain a better understanding of the views of a broader segment of the Chicago-area population on biodiversity issues such as ecological restoration.

Recommendations: Compile existing local market research, including that gathered through land-acquisition bond campaigns, to determine gaps in the understanding of public values and perceptions. Commission professional market research locally to better inform communication strategies and messages. Disseminate research findings to decision-makers and conservation agencies and organizations.

To address these recommendations, Chicago Wilderness members have engaged in two audience research projects. The first was the Chicago Wilderness Prescribed Burn Communication Project. The project involved conducting surveys and focus groups on area residents' attitudes and knowledge related to prescribed burns, as well as residents' preferred communication cues related to this topic. Survey results revealed that slightly less than three-fourths of respondents supported controlled burning in at least some cases, and more individuals support burning in all cases than total opposition combined. The greatest difference between those supportive and those opposed to prescribed burns was in their level of knowledge of restoration practices and management of natural areas, as well as experience with burns and other restoration activities. Moreover, burn supporters were more supportive of other restoration practices in general than were those opposed to burning. Individuals opposed to burning were more supportive of leaving natural areas alone and were more likely to see other restoration or management practices (such as the removal of non-native trees or shrubs) as degrading natural areas (Miller et al. 2002). The full research results are available on the Chicago Wilderness member web site and were shared during a daylong workshop held at DePaul University in 2002. The workshop also included presentations on public communication efforts related to restoration efforts at the Chicago Botanic Garden and The Grove National Historic Landmark. Workshop participants also engaged in message development sessions. The messages were later used to develop template communication tools, now available for Chicago Wilderness members to use in communicating about controlled burns.

In 2002, Chicago Wilderness members embarked upon a second and more expansive project, the Chicago Wilderness Audience Research Project. This project was designed to help Chicago Wilderness communicators be more effective in reaching their

target audiences, continually improve their communication processes and products, and measure their collective success in achieving the communication goals listed at the beginning of this section. The project is also designed to provide baseline audience characteristics that can be measured over time and reported as part of the *Report Card*.

The project has been conducted in several phases:
- A literature review of existing local audience research (completed)
- Identification of gaps and trends in existing research and recommendation of possible audience segmentations (completed)
- Development of an audience monitoring tool (completed)
- Refinement of the monitoring tool and periodic repetition of its use (currently underway)

As information from existing sources was collected and analyzed during the first two phases of work, some interesting trends emerged. Most notably, residents of the Chicago Wilderness region generally fell into one of four groups:
- The Core Supporters (16% of the total population)
  These people disagree a little or disagree strongly with the statement, "There is too much concern for the environment," and are members of, volunteers for or donors to conservation organizations.
- The Periphery (33% of the total population)
  These people disagree a little or disagree strongly with the statement, "There is too much concern for the environment," but are not members of, volunteers for, or donors to conservation organizations.
- The Uninterested (47% of the total population)
  These people agree a little, or neither agree nor disagree with the statement, "There is too much concern for the environment," and are not members of, volunteers for, nor donors to conservation organizations.
- The Anti's (4% of the total population)
  The people in this group strongly agree with the statement, "There is too much concern for the environment," and are not members of, volunteers for, nor donors to conservation organizations (The Moran Group 2003).

The next phase of the project was to create a survey tool to help fill in knowledge gaps and measure change in key benchmarks over time:

1. General awareness and attitudes toward biodiversity conservation issues

2. Perceived quality of life as it relates to nearby nature and open space

3. Level of participation/involvement in conservation events and activities

In September 2004, telephone interviews were conducted with 803 residents of the Chicago Wilderness service area (Richard Day Research 2004). The key findings are:
- Chicago Wilderness issues (those related to local biodiversity and its conservation) are rated somewhat important, but below some other issues facing area residents. Safety from crime is very important. Issues related to air and water quality are very important.
- In terms of awareness of biodiversity: 26% of those surveyed had heard about the issue of loss of biodiversity and were able to provide a definition, 19% said they have heard of the issue but were unable to define the term, and 55% had not heard of the issue of loss of biodiversity. This compares to a national study conducted by Belden Russonello & Stewart (2002): the percentage that had not heard of the loss of biodiversity was 80% in 1996 and 68% in 2002.
- In terms of self-reported knowledge: 49% of respondents said they were somewhat or very knowledgeable about plants and animals that live in this region. Of those, 35% said they were very proud to live here because of the region's nature, and 55% said they were somewhat proud to live in this region because of its nature.
- In terms of attitudes about nearby nature: 65% of area residents value the idea of having natural areas and open space "a great deal," and 27% say it matters "somewhat." Area residents support preserving open space by a substantial margin. Fifty-five percent of area residents strongly support preserving open space, 11% support it, but not strongly.
- In terms of attitudes about removing invasive species: When asked, " Do you support or oppose volunteers and staff at Forest Preserves and other conservation areas removing plants and animals that are not native to this area?" Forty-two per-

cent supported it, 38% opposed, and 20% were not sure. When those who opposed it were asked the follow-up question, "Would you support removing non-native plants and animals if it improves habitat for native plants and animals?" the numbers changed: 65% of respondents supported it, 11% were still opposed, and 24% were not sure.

- Respondents were segmented into one of four groups, depending on their degree of concern with Chicago Wilderness issues and whether or not they have acted environmentally (been a member, volunteer or donor to an environmental organization, or volunteered their time to help the environment through clean ups, restoration or recycling).

	Have Not Acted	*Have Acted*
Above Average Concern with Chicago Wilderness Issues	16%	9%
Less Concern with Chicago Wilderness Issues	52%	23%

- The 9% that are concerned about Chicago Wilderness issues and have acted are a committed group. People in this group tend to be very active outdoors, age 44-52, have a high income, and many are female Caucasians with no young children in the household.
- The 16% that are concerned about Chicago Wilderness issues and have not acted might be difficult to engage but provide an opportunity to build on their interest. Many people in this group are African-American or Hispanic females, age 53 or older, have lower levels of education, have an income under $50,000, and are renters who live in Chicago and Lake County, Illinois.
- The 23% that are not concerned about Chicago Wilderness issues but have acted are potentially a fruitful group. They tend to look like the committed group (higher income, suburban) but just don't care as much about Chicago Wilderness issues. These people tend to be very active outdoors, age 35-43, have some college education, have an income over $50,000, and live in McHenry County and suburban Cook County, Illinois.
- The 52% that are not concerned about Chicago Wilderness issues and have not acted would be the most difficult to reach. These people are typically the least active outdoors, are younger, have an income under $30,000, are African-American, are renters living in urban areas, and are not registered to vote. (Richard Day Research 2004)

Results from this study were presented at the Chicago Wilderness Congress in November 2004.

The survey instrument will continue to be modified to improve its ability to monitor knowledge, attitudes and behaviors related to biodiversity and Chicago Wilderness. Likely additions include more questions about the way different audiences value the natural world, and new ways to document environmental literacy that have been successfully used in other states.

Goal 2: Increase the public's understanding of the role of management in natural areas.

Recommendation: Craft a common lexicon that describes restoration efforts, and create methods to evaluate and adapt the messages to improve their effectiveness.

As mentioned earlier in this section, the burn communication project resulted in researched-based language and communication tools for use by Chicago Wilderness members. In addition, several workshops mentioned in this section have been conducted to improve teachers, volunteers and others' ability to communicate about biodiversity and its conservation. That said, there are opportunities to develop further specific language on a variety of restoration and natural resource management-related topics and further increase the use of a common lexicon by Chicago Wilderness members and volunteers.

Recommendations: Foster the delivery of essential message points not only through conservation agencies and organizations, but also through a broader range of institutions and channels. Engage and educate those who interpret conservation issues for the public, including community leaders, media, and elected officials.

Multiple projects have been targeted at these audiences. These are described in sections 6.2 and 6.3, and in chapter seven.

Goal 3: Improve communication with those immediately affected by management decisions.

Recommendations: Ensure that restoration efforts, particularly in new areas, include plans for communications to local residents, and that resources are available for efficient and appropriate communication efforts. Create a communication guide that restoration agencies can use to help develop these plans, including resources that already exist and successful examples from other agencies.

In 2001 and 2002, a Chicago Wilderness-funded project involved developing a public communication plan for wetland, prairie, and woodland restoration efforts scheduled to take place at The Grove National Historic Landmark. The project was successful in building public support for the restoration efforts and alleviating area residents' concerns through outreach and education, and culminated in a guidebook for communicating with nearby residents about restoration efforts at natural areas.

Recommendation: Conduct direct outreach to organizations in local communities, such as block clubs and religious groups that are interested in environmental work.

As mentioned in the education section above, the Community-Based Programs Task Force of the Education and Communication Team created a manual for using the Asset-Based Community Development model to develop biodiversity-related programs in various communities.

Recommendation: Engage advocacy organizations that work on environmental issues (such as air and water quality or sprawl) and educate them about biodiversity loss.

No projects yet have been undertaken to address this recommendation specifically.

Recommendation: Seek opportunities to inform journalists and increase media coverage of restoration and land management.

The Chicago Wilderness communication infrastructure includes a media relations program conducted by the communication staff members. The staff regularly works with local media outlets to increase and improve media coverage of restoration and land management topics, as well as other topics related to biodiversity conservation. More than 90 percent of the coverage resulting from these efforts has been positive in its approach.

Recommendation: Review current mechanisms for public involvement in land-management decisions and make improvements, using models that are successful in other arenas.

No projects yet have been undertaken to address this recommendation specifically.

Recommendation: Create a structure for collaborating partners not only to react quickly but also to anticipate issues that arise in the public forum.

In 2002, the Chicago Wilderness communication staff, in conjunction with an advisory group comprised of Chicago Wilderness members, created a crisis communication plan for the Chicago Wilderness consortium.

Goal 4: Communicate documented benefits of local restoration efforts, especially those of most value to humans.

Recommendation: Gather data on the results of restoration efforts, translating the data into easily understood benefits.

The *Report Card* is the best example of work being done to address this recommendation.

Recommendation: Create communications tools that connect restoration results to core values: the beauty and wonder of nature, our responsibility to future generations and the desire for a healthy environment.

The Chicago Wilderness Education and Communication team held workshops in 1998 and 2004 on values-based communication to build Chicago Wilderness members' capacity to communicate with the public on issues of biodiversity conservation. In

2002 the team held a similar workshop focused specifically on communicating about prescribed burns. All of these workshops included multiple presentations on why communicating through values is effective, audience research that's been conducted in this area, public communication techniques and message development exercises.

Recommendation: Include illustrations of restoration results in programs, nature walks, signs and other communication vehicles.

As described earlier, the last phase of the burn communication project involved producing images of prescribed burns and before and after shots of burn sites that demonstrate the value of controlled fire as a restoration and land management tool. Many Chicago Wilderness member organizations are using these and other types of illustrations in their programs, signage and other communication vehicles.

Recommendation: Develop innovative campaigns and programs that position habitat restoration in mainstream culture (such as museum exhibits, ad campaigns, and retail promotions).

In 2003, the Chicago Wilderness consortium's communication program sponsored several events centered on habitat restoration. These included a public celebration at Bartel Grassland and a restoration bus tour of Chicago parks. Both events included tours of natural areas that highlighted the benefits of restoration and active land management. Programs with similar themes are planned for the future.

Goal 5: Improve the credibility and public perception of the people involved in restoration efforts.

Recommendation: Seek trusted local spokespeople who represent the sound, scientific thinking behind restoration and/or exemplify the role of the local volunteer.

No projects yet have been undertaken to address this recommendation specifically.

Recommendation: Provide support for volunteers who interact with the public, and offer training in public speaking, ecological concepts, interpretation, etc.

As mentioned in the education section above, the Education and Communication Team established the Volunteer Managers Task Force to provide a venue for volunteer managers to share resources on recruiting and retaining volunteers. The task force is currently involved in a project to better train volunteers from Chicago Wilderness members in biodiversity-related messages and content.

Recommendation: Emphasize the public service provided by volunteers and the leverage of public funds through donated time. Ensure that decision-makers are aware of the value of conservation volunteers.

Much outreach has been conducted to decision-makers (see chapter seven) and key messages often include the value of volunteers' donated time.

Goal 6: Improve communication about biodiversity with key decision-makers such as elected officials and their staff, land managers, and planners.

Recommendations: Assess current tools and programs to inform key decision-makers for content, availability and effectiveness in increasing understanding of the importance of local biodiversity. Survey, as necessary, to assess key decision-makers' knowledge, attitudes and information needs.

In 2002, the Chicago Wilderness Sustainability Team convened an advisory group of Chicago Wilderness members and local elected officials to address the challenges in conducting outreach to elected officials and other decision-makers. The group conducted a survey of those target groups on their preferred methods of receiving information, and gained insight into the more effective ways of reaching out to these audiences.

Recommendation: Develop vehicles to keep decision-makers regularly informed, such as tours, literature, up-to-date scientific information and contacts for further information.

In 2001, Chicago Wilderness funded a full-time person to conduct outreach to local governments through presentations and consulting on specific projects.

In 2003, the Chicago Wilderness Sustainability Team convened a series of roundtables that brought together developers, elected officials, conservationists and others to develop a set of guidelines for promoting sustainable development in the region. The roundtables culminated in the publication of "Sustainable Development Principles for Protecting Nature in the Chicago Wilderness Region" (Chicago Region Biodiversity Council 2004), a guidebook containing eight key recommendations and corresponding implementation checklists. The publication is now available for use by Chicago Wilderness members as an outreach tool to local officials, land-use planners and developers.

In 2004 the team created a web portal featuring information to promote sustainable development in local communities. This online resource includes best practices, tools and techniques that individuals, businesses, governments and other organizations can implement in the areas of biodiversity and natural habitat conservation, conservation design, sustainable development, natural landscaping, and water resource protection.

The team also formed a Sustainable Watershed Action Team to provide technical assistance and guidance to local governments in implementing sustainable development principles.

Chapter 7
Sustainability

7.1 Introduction

The issue of sustainability is a complex one. There is no clear consensus on exactly what sustainability means, although most people agree with the definition, "meeting the needs of the present generation without compromising the ability of future generations to meet their own needs" (Brundtland 1987, p.43). Regardless of the definition, most experts also agree that sprawling development is one of the greatest threats to sustainability. It causes us to be overly dependent on automobiles, increasing pollution. It also destroys open space, natural areas and farmland, and contributes to a range of serious social problems, including the need for new infrastructure even as existing infrastructure is not fully utilized.

Throughout the Chicago Wilderness region, the amount of developed land is growing faster than the population. Figures 7.1 and 7.2 show the change in population and land coverage since 1970. As you can see, since 1970, the population in the Chicago metropolitan region increased approximately 16 percent, with today's population covering approximately 81 percent of the land. Additionally, since 1970 the acres of unpopulated land have decreased by 20 percent. Along with fewer areas with no population, the total land area comprising the highest level of density has also decreased.

The next series of maps demonstrate population projections through 2030. They examine the relationship between existing protected open space and both current and projected population. It is anticipated that an additional 1.7 million people—21.6 percent of the population—will live in the Illinois portion of the Chicago Metropolitan region, for a total of 9.8 million people in 2030. The maps in Figures 7.3, 7.4, and 7.5 demonstrate where existing protected lands are located, where population growth is expected to occur, and where existing protected lands are located and where preservation efforts may be most needed.

Openlands Project and the Metropolitan Planning Council recently released a report that examined how these population and land use changes affect just two factors that impact biodiversity: water quality and supply. The report, "Changing Course: Recommendations for Balancing Regional Growth and Water Resources in Northeastern Illinois," shows that despite improvements in wastewater treatment and combined sewer overflow control, the conditions in the majority of the region's streams are too disturbed to support high quality fish communities in urban and suburban stream watersheds (Goldstein et al. 2004). Given the population projections for the region, these conditions are likely to continue.

Another impact of population growth and sprawl is on the region's land cover, i.e. vegetation, bare soil, rock, sand and water. The state of Illinois analyzed land cover composition in 1995 and again in 2000, showing increased urbanization of the land in the Chicago metropolitan region. This analysis showed that:

- In 1995 agricultural land and & rural grassland (1 million acres, or 42 percent of total land) combined to be the highest types of land cover
- In 2000 urban built-up and urban open space (1.1 million acres, or 45 percent of the total land) had become the dominant land cover
- In 2000 agricultural land and rural grassland had fallen to 900,000 acres or 38 percent of the total land
- Between 1995 and 2000, the six-county area comprising the Illinois portion of the Chicago metropolitan region lost 53 percent of lands classified as wetlands (Luman et al. 1996; USDA National Agriculture Statistics Service et al. 2002)

Table 7.6 lists land cover types, with their changes over time.

Although the land cover classifications used by the state are broader than the Chicago Wilderness classification types, the general trends are significant in terms of biodiversity conservation. Additionally,

Table 7.6
Percentage Change in Land Cover by Type in the Six-County Illinois Portion of the Chicago Metropolitan Region from 1995–2000.

Land Cover Type	1995 Totals	2000 Totals	Raw Change	% Change
Agricultural Land	661,593	638,744	(22,849)	-3%
Rural Grassland	353,522	269,255	(84,267)	-24%
Forested Land	282,268	296,173	13,905	5%
Urban & Built Up Land	675,214	719,664	44,450	7%
Urban Open Space	265,487	359,476	93,989	35%
Wetland	106,733	49,934	(56,799)	-53%
Surface Water	52,610	56,318	3,708	7%
Barren and Exposed Land	4,854	8,087	3,233	67%

USDA National Agriculture Statistics Service, Illinois Department of Natural Resources, and Illinois Department of Agriculture. 2002. Land Cover of Illinois 1991–1995. Springfield, IL.

these data are collected regularly and thus provide the opportunity to track changes over time.

In response to these issues, one Chicago Wilderness project resulted in the publication of the "Sustainable Development Principles for Protecting Nature in the Chicago Wilderness Region" (Chicago Region Biodiversity Council 2004), endorsed by the Chicago Wilderness consortium in 2004. These principles, discussed more fully later in this chapter, focus broadly on the natural resource aspects of sustainable development, specifically land, water, habitat, and soils.

7.2 Sustainability Recommendations from the *Biodiversity Recovery Plan*

Sustainability is not afforded its own chapter in the *Biodiversity Recovery Plan*, but recommended actions related to sustainability run through several of the plan's chapters. These are summarized below.

Recommendations

- Preserve more land with existing or potential benefits for biodiversity. A high priority should be given to identifying and preserving important but unprotected natural communities, especially those threatened by development, and to protecting areas that can function as large blocks of natural habitat through restoration and management. High-quality remnants, even if small, however, are important reservoirs of genetic material for maintaining regional biodiversity. These areas should be preserved, where possible, by the expansion of public preserves, by the public acquisition of large new sites, or by the actions of private owners.
- Chicago Wilderness and the regions' land-owning agencies should develop a priority list of areas needing protection based on regional priorities for biodiversity conservation.
- Land acquisition plans of public agencies should give consideration to the presence of endangered and threatened species.
- Protect remaining high-quality streams and lakes, those that support high numbers of native and threatened species, through watershed planning, mitigation of harmful activities, and stormwater management, in order to conserve aquatic biodiversity.
- Local agencies should promote natural drainage, create buffer strips and greenways along streams,

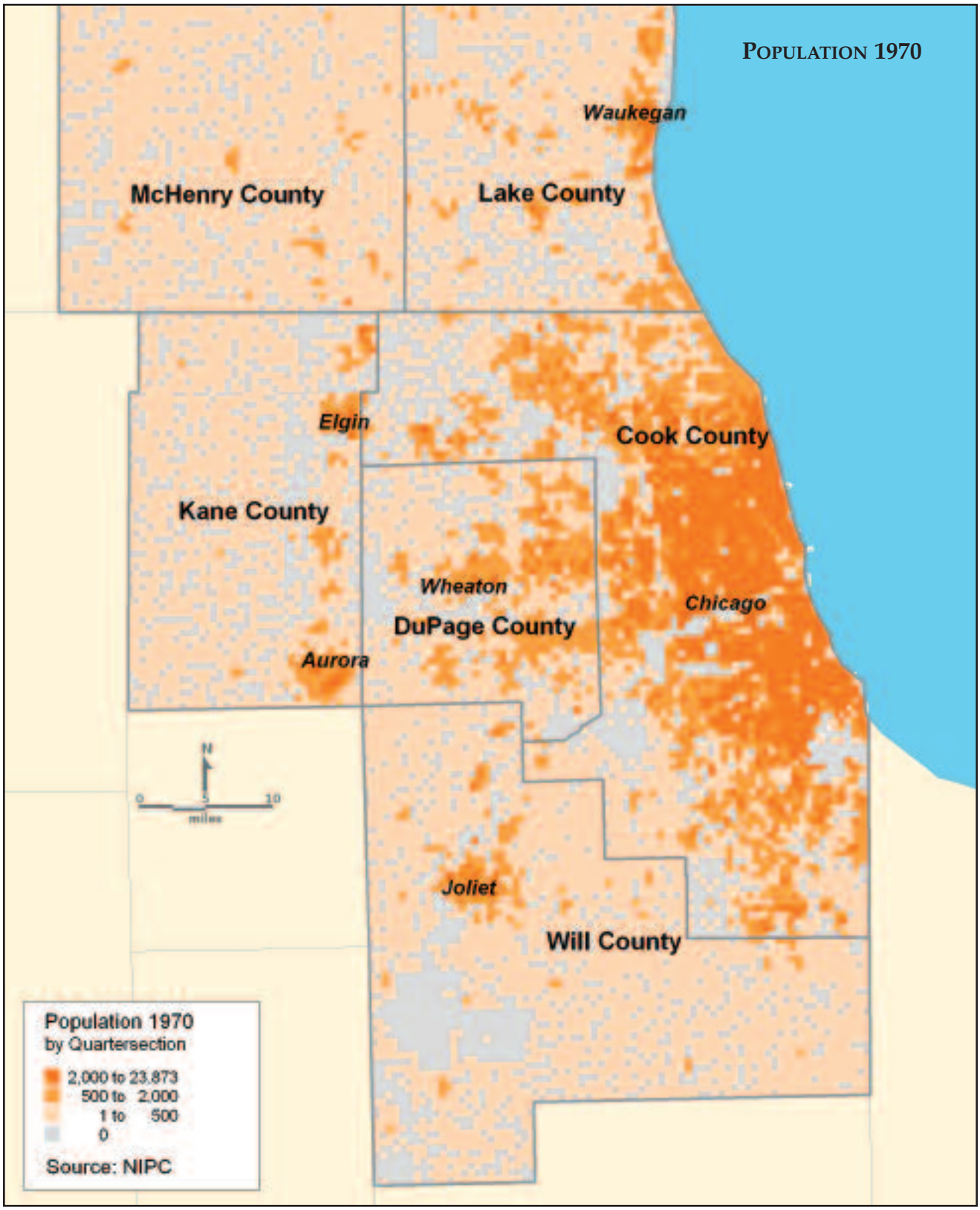


Figure 7.1. In 1970, this region's total population was approximately 7 million people, with 900 square miles of unpopulated land and 76 percent of the land populated (Center for Neighborhood Technology 2004).

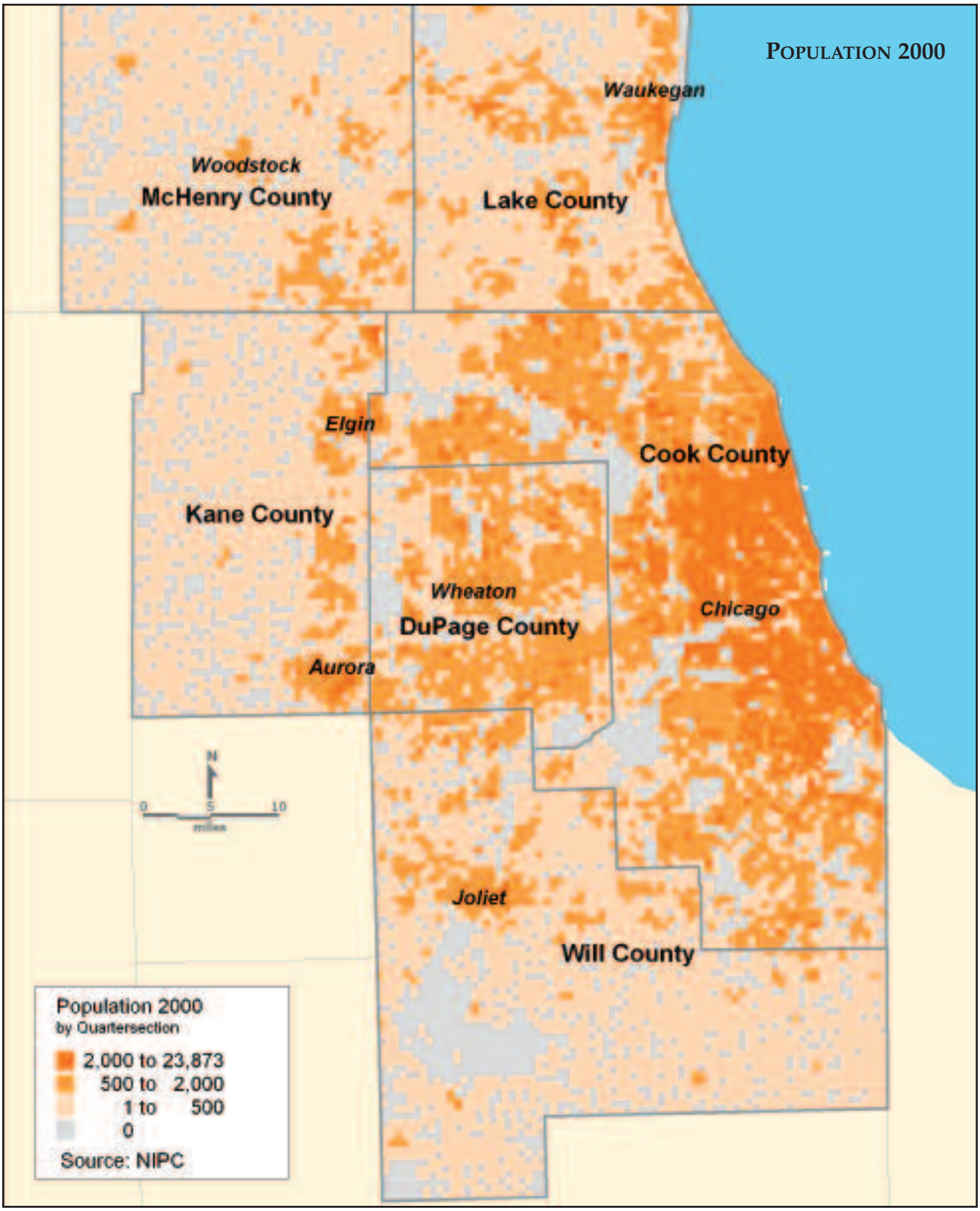


Figure 7.2. By 2000, the region's total population had increased to 8.1 million people; the amount of unpopulated land had decreased to 717 square miles, and 81 percent of the land was populated (Center for Neighborhood Technology 2004).

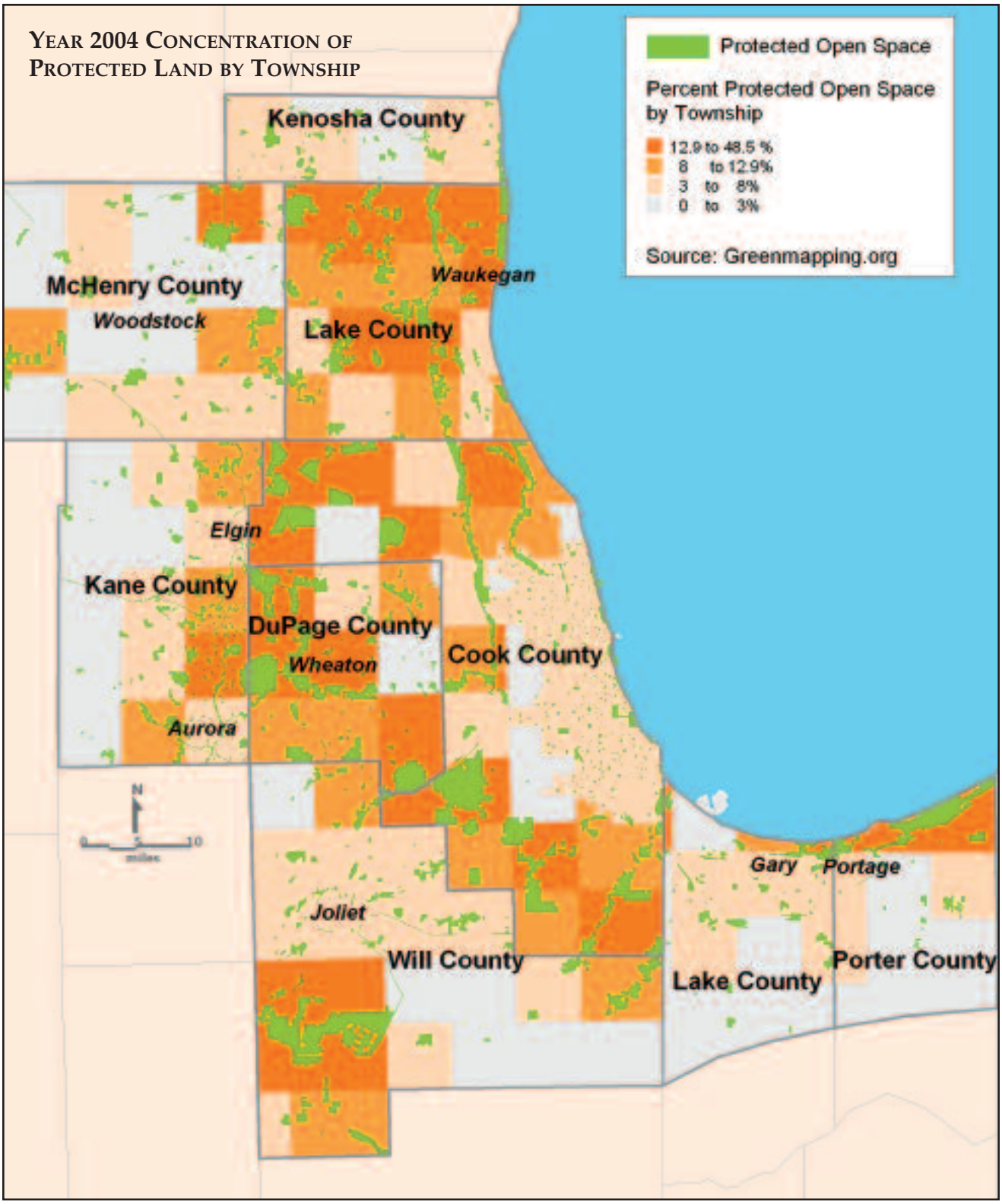


Figure 7.3. The location of and relative concentrations of protected lands today (Center for Neighborhood Technology 2004).

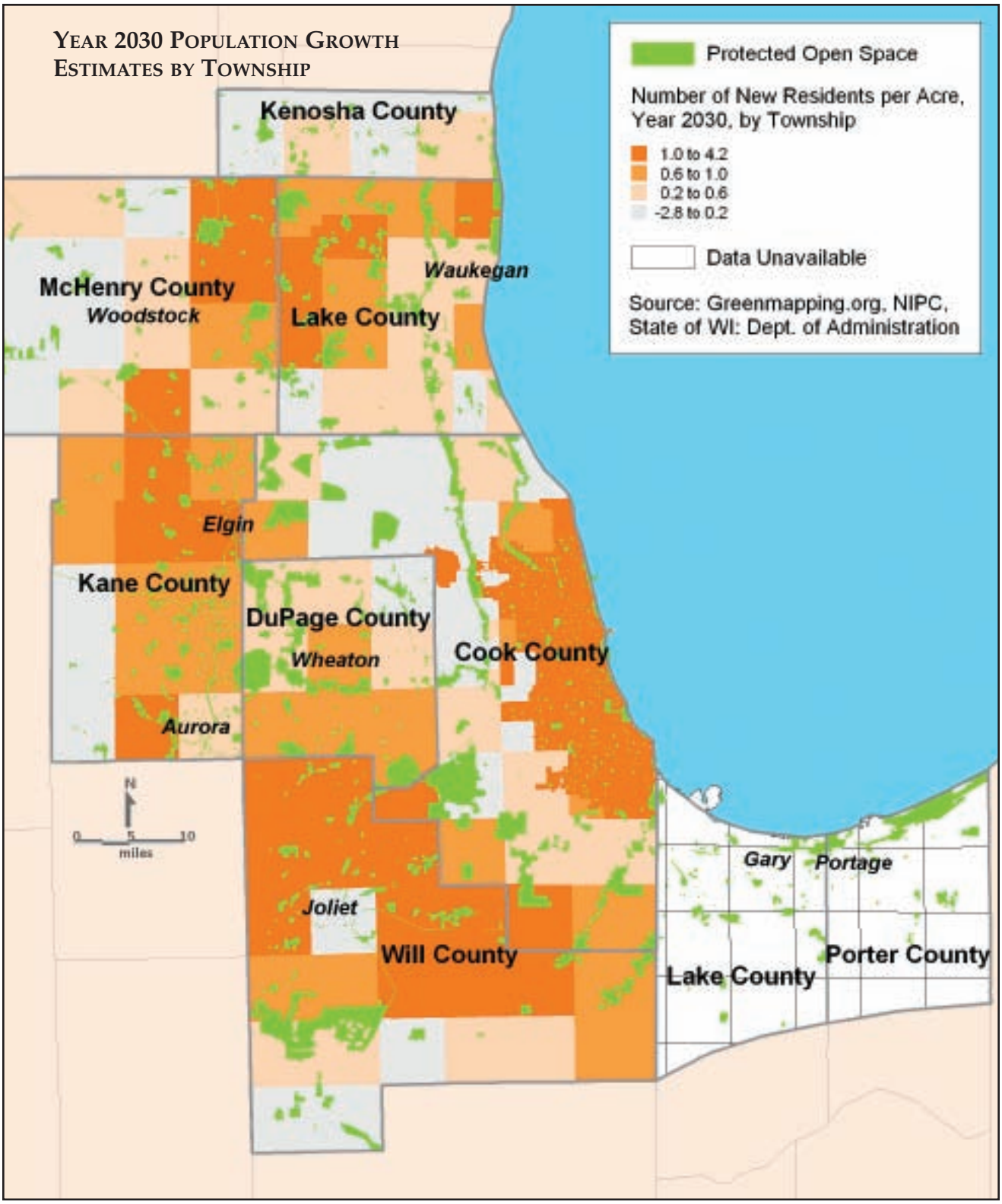


Figure 7.4. The projected population growth overlaid on top of the protected lands (Center for Neighborhood Technology 2004).

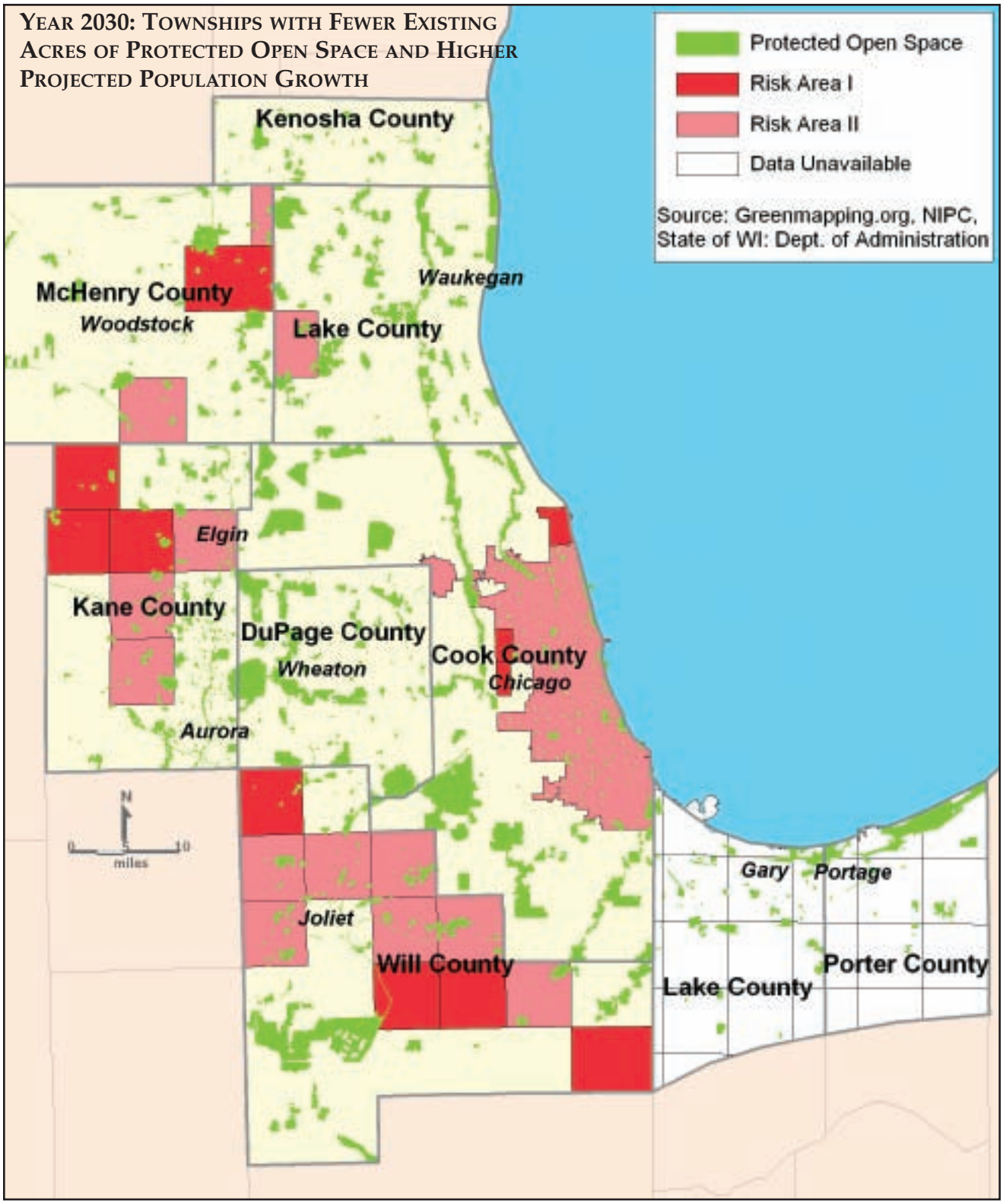


Figure 7.5. The township areas of concern as defined by the least amount of protected open space and the highest projected population growth (Center for Neighborhood Technology 2004).

Fig. 7.7. Comparison of Protected Natural Areas Between 1996 and 2004 (Center for Neighborhood Technology 2005).

Fig. 7.8. Opportunities for natural area protection, expansion, restoration and/or connection (NIPC 2004).

and create or restore streamside wetlands. Attention should be given to changes in groundwater levels for terrestrial communities and wetlands.
- Public agencies should adopt local and regional development policies that reflect the need to restore and maintain biodiversity.
- Counties and municipalities should amend their comprehensive plans, zoning ordinances, and other regulations to incorporate relevant recommendations contained in the *Biodiversity Recovery Plan*.
- State agencies responsible for major transportation infrastructure should incorporate biodiversity principles into their planning and implementation decisions.
- Support the Regional Greenways Plan for northeastern Illinois and the Natural Areas Plan for southeastern Wisconsin; plans that identify actions to protect and manage critical habitats for plants and animals and generally improve ecosystems in complement to the objectives of the *Biodiversity Recovery Plan*.
- Participate in the discussions of the Campaign for Sensible Growth and Metropolis 2020, which broadly promote actions to help the region develop in a manner that will protect its economic vitality, while maintaining its high quality of life.
- Support implementation of regional growth strategies by the Northeastern Illinois Planning Commission, the Southeastern Wisconsin Regional Planning Commission, and the Northwest Indiana Regional Planning Commission, insofar as these strategies seek to reduce the region's excessive rate of land consumption, preserve important open spaces, and promote improved water quality.

7.3 Highlights of Work Being Done to Address Sustainability Issues and the Recommendations of the *Biodiversity Recovery Plan*

Following are highlights of actions being taken that address the sustainability recommendations of the *Biodiversity Recovery Plan*. Many of these initiatives address multiple issues related to sustainability.

Note that the highlights are not meant to be a comprehensive representation of all efforts being undertaken to promote sustainability, but rather, they are a representative set of examples, gleaned from information that was accessible to the project team at the time the *Report Card* was developed.

Identification and Protection of High-Priority Natural Areas

It is useful to begin by looking at the overall progress made by members of the Chicago Wilderness consortium in identifying and protecting the region's natural areas. In 1996, the consortium inventoried the locations of federal, state, county, and privately-owned natural areas, nature preserves and scientific areas. This effort created an illustrative map of the location of these areas, but did not quantify specific acreage. In 2004, another project, entitled Natural Connections: Green Infrastructure in Wisconsin, Illinois and Indiana (a collaboration between Open Lands Project and the Center for Neighborhood Technology), resulted in a geographic information system database that mapped and quantified protected areas. As demonstrated in Figure 7.7, by overlaying these two efforts on top of each other, one can get a sense of how the amount of protected areas has changed.

In a separate project, entitled the Green Infrastructure Vision, Dreher (2004) defined areas where opportunities for protection, expansion, restoration and connection of resource-rich natural areas exist at the regional scale (see Figure 7.8).

In the Green Infrastructure Vision, Dreher (2004), identified areas that could and should be protected within the tri-state region of Chicago Wilderness. As defined in the project, a green infrastructure is the interconnected network of land and water that supports biodiversity and provides habitat for diverse communities of native flora and fauna at the regional scale. Green infrastructure may also include areas adjacent to and connecting natural communities that provide both buffers and opportunities for ecosystem restoration. The project resulted in three main products:

1. Mapped resource protection areas: Recommended resource protection areas totaling 1.8 million acres, extending from southeast Wisconsin, through northeastern Illinois and encompassing northwest Indiana (see number 2 below).

2. Recommended Protection Techniques: For each of the identified resource protection areas, project participants identified the special natural features of the area and recommended conservation approaches. Participants also made recommendations about appropriate development within resource protection areas, ranging from no new development to limited conservation development. These recommendations are detailed in the full report (Dreher 2004).

   Examples of the types of resource protection areas identified, and the recommended conservation strategies, include:
   - o Boone Creek Complex–McHenry County, Illinois: This recommended resource protection area is largely private land, but contains some of the most biodiverse landscapes in northeastern Illinois. It contains a large woodland/savanna complex, high quality fens and sedge meadows, and a high quality, cold-water stream with silt intolerant fish. While there has been some recent public acquisition of natural lands, this area is unique for its high concentration of conservation easements and dedicated nature preserves on private land. The recommended conservation approaches include additional acquisition and conservation easements, wetland restoration in large drained hydric soil zones, and identification and protection of ground water recharge zones for fens and sedge meadows. Recommended development controls call for low-intensity, conservation-designed residential development only, with no development in hydric soil zones. These recommendations are being promoted through a recently adopted watershed plan.
   - o Lake Calumet Region–Cook County, Illinois: This recommended resource protection area contains a complex mix of natural areas hosting threatened and endangered species, highly degraded habitats, and adjacent industrial land in the midst of a large urban complex. It has been the subject of a comprehensive, long-term planning process spearheaded by the City of Chicago and other members of the Chicago Wilderness consortium, in partnership with Calumet-based conservation and community groups and representatives of local industry. Conservation recommendations emphasize wetland and prairie restoration, greenway connections along the Calumet and Grand Calumet Rivers and to Wolf Lake, and additional public land acquisition. The recommendations also call for industrial redevelopment utilizing conservation design approaches that fully mitigate hydrologic and water quality impacts.

3. Guidelines for Conservation Development: Recognizing that development will continue to occur within many of the recommended resource protection areas, it was decided that recommendations were needed for conservation development that would be compatible with biodiversity protection and restoration. The recommendations are based on the premise that, in order to be truly sustainable, development must not only protect the natural environment but must improve systems degraded by past disturbances. The recommendations are:
   - o Minimize the total consumption of land, particularly the creation of impervious surfaces, by new development
   - o Utilize existing infrastructure by maximizing infill and redevelopment
   - o Maintain and reestablish functional natural systems: soils, plants, water
   - o Minimize disturbance of soil structure and topography
   - o Develop landscapes sustainably, utilizing a diversity of native plant species
   - o Manage precipitation as a resource close to where it falls, not as a disposable waste product
   - o Utilize the landscape to naturally filter and infiltrate runoff before it leaves the development site
   - o Eliminate adverse off-site and downstream effects of runoff and wastewater
   - o Maximize, interconnect, and restore natural open space
   - o Maximize opportunities for local access to open space
   - o Establish administrative and financial mechanisms for the long-term management of the natural elements of developed sites (Dreher 2004)

NATURAL AREA ACQUISITION

One of the key factors in preserving natural areas is how to pay for the acquisition of land. In the face of increasing development pressures, residents of northeastern Illinois have continued to pass bond referenda for the acquisition of open space, including natural areas. From 1997 through 1999, there were six successful bond referenda in northeastern Illinois, totaling $281.5 million for conservation (The Conservation Foundation 2004). Since 1999, at least 13 additional bond referenda have passed, totaling more than $259 million. According to the Trust for Public Land's LandVote web site, since 1999 there have been 856 open space bond referenda passed in 33 states, netting $17.99 billion for conservation purposes (The Trust for Public Land 2004).

For the following successful open space referenda in northeastern Illinois, the number in parentheses is the percentage by which the measure passed (The Conservation Foundation 2004):

- November 5, 2002–Lake Forest–$6 million (69%)
- November 5, 2002–Kendall County Forest Preserve District–$5 million (64%)
- March 19, 2002–Barrington Park District–$11.5 million (61%)
- April 3, 2001–McHenry County Conservation District–$68.5 million (52%)
- April 3, 2001–Lemont Township (Cook County)–$10 million (62%)
- April 3, 2001–Campton Township (Kane County) - $19 million (54%)
- November 7, 2000–Plainfield Township Park District–$6 million (71%)
- November 7, 2000–Orland Park–$20 million (57%)
- November 7, 2000–Lake County Forest Preserve District–$85 million (67%)
- March 21, 2000–Carol Stream Park District–$12 million (67%)
- March 21, 2000–Barrington Park District–$8 million (61%)
- March 21, 2000–Geneva Park District–$7.9 million (79%)
- April 13, 1999–Lake county Forest Preserve District–$55 million (66%)
- April 13, 1999–Homer Township (Will County)–$8 million (63%)
- April 13, 1999–Glen Ellyn Park District–$3.5 million (56%)
- April 13, 1999–Kane County Forest Preserve District–$70 million (66%)
- April 13, 1999–Will County Forest Preserve District–$70 million (51%)
- November 4, 1997–Forest Preserve District of DuPage County–$75 million (58%)

As a result of the bond referenda passed, county forest preserve and conservation districts in northeastern Illinois have significantly increased their land holdings (Table 7.9).

DESIGNATION OF NATURE PRESERVES

Acquisition of natural areas is not the only means of preserving them. The Illinois Nature Preserves Commission, in designating high-quality natural areas as Nature Preserves, provides them the highest level of permanent protection in the state. The voluntary program is available to private, corporate and government landowners, who continue to own the land but agree to restrict uses in perpetuity to preserve its natural state, and to perpetuate natural conditions. As of this writing, there are 323 dedicated Nature Preserves in 80 of Illinois' 102 counties, comprising 43,595 acres. Testament to the rich biodiversity in the Chicago Wilderness portion of the state, more than one-third of the preserves are located within the six collar counties of Chicago. Since the publication of the *Biodiversity Recovery Plan* in 1999, there have been eight new Nature Preserves dedicated within the boundaries of Chicago Wilderness, and additions to 30 others, bringing the total number of Nature Preserves in Chicago Wilderness to 116. The total acreage of these preserves is 18,472 (Illinois Nature Preserves Commission 2004).

The Illinois Nature Preserves Commission also offers a less restrictive designation, called Illinois Land and Water Reserve, to both public and private landowners. Statewide, there are 113 Land and Water Reserves in 53 counties, totaling 34,425 acres. Prior to the publication of the *Biodiversity Recovery Plan* in 1999, there were only five Land and Water Reserves, totaling 824 acres, in northeastern Illinois. Since 2000, 12 Land and Water Reserves comprising 2,874 acres have been added within the Chicago Wilderness region (Illinois Nature Preserves Commission 2004).

TABLE 7.9
THE AMOUNT OF LAND ADDED TO NORTHEASTERN ILLINOIS' FOREST PRESERVE AND CONSERVATION DISTRICTS AS A RESULT OF BOND REFERENDA SINCE 1997.

	FPD of Cook County	FPD of DuPage County	FPD of Kane County	FPD of Will County	Lake County Forest Preserves	McHenry County Conservation District
Acres owned in 1999[1]	67,700	23,000	8,000	12,000	20,794	10,800
Acres owned through 2004[2]	Data n/a	25,000	14,000	16,808	25,191	19,335
Percent increase	N/A	9%	75%	40%	21%	79%

[1] As reported in Table 11.1 of the *Biodiversity Recovery Plan*

[2] Data for 2004 were collected by Christopher Mulvaney in consultation with the Forest Preserve District of Cook County, the Forest Preserve District of DuPage County, the Forest Preserve District of Kane County, the Forest Preserve District of Will County, Lake County Forest Preserves, and the McHenry County Conservation District.

The Illinois Nature Preserves Commission recently developed an additional option for conservation designation: Natural Heritage Landmarks. This is a recognition program that introduces landowners to the concept of natural area protection and allows the state to assist with management of the natural area. It is a voluntary program that increases understanding of the value of natural areas and encourages their preservation by private landowners. An agreement document determines provisions and can be terminated by either party. Prior to 2000, there were only two Natural Heritage Landmarks, totaling 46 acres, in northeastern Illinois. Since 2000, an additional 78 acres within eight different sites have been designated as Natural Heritage Landmarks (Illinois Nature Preserves Commission 2004).

CONSERVATION 2000

In 1995, Illinois passed a bill establishing Conservation 2000, a comprehensive, six-year, $100 million initiative, designed to take a holistic, long-term approach to protecting and managing Illinois' natural resources. The Illinois Department of Natural Resources administers the Conservation 2000 program. In 1999, legislation was signed extending the four components of the program through 2009:

- Assessment and Monitoring
- Integrated Technical Assistance
- Ecosystem Project, Planning, and Support Grants
- Ecosystem Interpretation and Education

The voluntary Ecosystems Project, Planning and Support Grants is a critical component, the purpose

of which is to integrate the interests and participation of local communities and private, public and corporate landowners to enhance and protect watersheds through ecosystem-based management. According to the C2000 web site, "The Ecosystems Program is made up of Ecosystem Partnerships, which are coalitions of local stakeholders—private landowners, businesses, scientists, environmental organizations, recreational enthusiasts, and policy makers. They are united by a common interest in the natural resources of their areas' watersheds. Partnership designation brings financial and technical support, which is integral in addressing watershed concerns" (Illinois Department of Natural Resources 2004). Currently, there are 41 Ecosystem Partnerships, covering more than 84 percent of Illinois. Eleven are located all or partially within the Chicago Wilderness region. These are listed below, followed by the year in which each partnership was designated:

- Chicago Wilderness Ecosystem Partnership–1996
- DuPage River Coalition Ecosystem Partnership–1998
- Fox River Ecosystem Partnership–1996
- Kankakee River Ecosystem Partnership–1996
- Kishwaukee River Ecosystem Partnership–1996
- Lake Calumet Ecosystem Partnership–1999
- Lower Des Plaines Ecosystem Partnership–2000
- North Branch of the Chicago River Ecosystem–2000
- Prairie Parklands Ecosystem Partnership–1996
- Thorn Creek Macrosite Ecosystem Partnership–1997
- Upper Des Plaines Ecosystem Partnership–1996

By way of example, the goals of the Wisconsin-Illinois Upper Des Plaines River Ecosystem Partnership are:

- Wildlife habitat and open space protection and restoration
- Floodplain and stormwater management
- Water quality improvement and reduction of soil erosion
- Enhancement of recreational opportunities
- Demonstration of the feasibility of interstate and public/private partnerships

Building upon grassroots conservation efforts initiated in the early 1980s, the Lake Calumet Ecosystem Partnership was established in 1999 with the following goals:

CORLANDS: TAKING A CREATIVE APPROACH TO LAND ACQUISITION AND PRESERVATION

Corlands is the land acquisition affiliate of the Openlands Project. Working primarily in northeastern Illinois, Corlands has acquired 70 sites totaling approximately 4,000 acres on behalf of government agencies, which then acquired the sites when funding became available. Corlands has also provided technical assistance to government agencies and other organizations, facilitating their direct acquisition of an additional 5,800 acres. In addition to its acquisition work, Corlands has permanently preserved additional natural areas by securing 30 conservation easements on acreage totaling approximately 1,636 acres.

Among Corlands' recent acquisition efforts is the 408-acre Hoover Outdoor Education Center, located along nearly a mile of the Fox River in Kendall County, Illinois. The Forest Preserve District of Kendall County long had identified the property as important to preserve, and when the Boy Scouts of America decided to look for a conservation-minded buyer for the camp, the Forest Preserve District, along with the City of Yorkville, stepped forward. They turned to Corlands, which negotiated the acquisition in three roughly equal parts, acquiring and holding one parcel at a time until the Forest Preserve District can secure the funds to buy it from Corlands. Other partners in the effort include the Conservation Fund, LaSalle Bank, and Speaker of the U.S. House of Representatives, Dennis Hastert (R-Yorkville), who shepherded the passage of an appropriation of approximately $5 million toward the purchase price. The addition of the camp virtually doubles the Forest Preserve District's land holdings, and preserves for the residents of Kendall County and the region a prime riverfront site of oak-hickory woodlands, bluff savannas and ravines (R. Megquier 2004).

Stewardship of Sweet Fern: A Land and Water Reserve

Marianne Hahn initially acquired 60 acres of black oak savanna, sand prairie, flatwoods and farm fields in the Kankakee Sands area of Kankakee County, Illinois. Naming the site Sweet Fern for the presence of the sweet-scented and state-listed endangered native shrub, she gradually added 25 additional acres to the site. In 2001, the former faculty member of the Chicago College of Osteopathic Medicine enrolled 62.2 acres in the Land and Water Reserve program run by the Illinois Nature Preserves Commission. At the time of the enrollment, the site boasted more than 320 native plant species, including six state-listed endangered plant species: sweet fern, shore St. John's wort, Carey's smartweed, eastern blue-eyed grass, bristly blackberry and primrose violet.

An active conservationist in her retirement (among her many volunteer efforts, she is co-founder and current President of the Midewin Tallgrass Prairie Alliance), Hahn is active in the ongoing management of her private Land and Water Reserve. With support from the Illinois Nature Preserves Commission and the Illinois Department of Natural Resources, a drainage ditch on the west end of the property has been filled in to help restore the hydrological conditions in that area, and bare areas have been sown with seed from adjacent areas. Many invasive plant species have been removed or treated with herbicide, and in the spring of 2003, a controlled burn was conducted on 80 percent of the property.

Hahn carefully monitors the recovery of the sweet fern colony, as well as the reestablishment of native vegetation in areas formerly planted with corn or soybeans. There are now more than 400 native plant species on site, including 12 state-listed endangered plant species. And in the summer of 2004, Hahn reported an abundance of the state-listed Regal Fritillary butterfly. She also has documented the site's avifauna and reptile and amphibian populations, and supported a study by a University of Illinois graduate student on the resident red-headed woodpecker population.

Hahn acknowledges some tax benefits for having taken the land out of agricultural production and permanently protecting it. However, the most gratifying benefit, she says, is the pride she feels in actively recovering the sheer beauty of a rare ecosystem. "I love the scent of sweet fern as I walk through its leaves that glisten bright green in dappled sunlight. I love the diversity of the plants and the changes that occur among them from week to week, season to season, year to year. And the surprises! In September 2004, I discovered native plant number 411—*Polygonum sagitatum*, arrow-leaved tear thumb—a plant I'd never seen before now growing in an area that had supported a soybean crop in 1999. Absolutely thrilling!" (M. Hahn 2004).

- Restore the natural environment
- Interpret our history
- Foster a sustainable economy
- Revitalize our community
- Protect environmental health

Representative of the diversity of public and private partners in most, if not all, Ecosystem Partnerships, members of the Lake Calumet Ecosystem Partnership include:

- Acme Steel Company
- Bird Conservation Network
- Calumet Ecological Park Association
- Center for Neighborhood Technology
- Centrol Comunitario Juan Diego
- Chicago Audubon Society
- Chicago State University
- Citizens for a Better Environment
- City of Chicago Department of Environment
- Friends of the Parks
- Illinois Environmental Protection Agency
- Illinois-Indiana Sea Grant

- Illinois Audubon Society, Fort Dearborn Chapter
- Openlands Project
- Sierra Club, Illinois Chapter
- Southeast Chicago Development Commission
- Southeast Environmental Task Force
- U.S. Environmental Protection Agency
- U.S.D.A. Forest Service, North Central Research Station
- Veterans Park Improvement Association

To date, ecosystem partnership members throughout the entire state have raised approximately $37.8 million to match $29.9 million in project grants, for a total of $67.7 million. With these funds, the partnerships have protected nearly 6,000 acres through acquisition or conservation easements, and have restored more than 62,000 acres. In recognition of these achievements, in 2004 the program won honors from the National Association of Resource Conservation and Development Councils (Illinois Department of Natural Resources 2005).

USE OF CONSERVATION EASEMENTS AND OUTREACH TO PROPERTY OWNERS

Among the other tools for preserving natural areas are conservation easements, which the Land Trust Alliance describes as "legal agreement[s] between a landowner and a land trust or government agency that permanently limits uses of the land in order to protect its conservation values" (Land Trust Alliance 2004). According to the Alliance's web site, in 2004, "a record five million acres were protected through voluntary conservation easements, more than triple the amount (1.4 million acres) protected just five years ago" (Land Trust Alliance 2004).

Mirroring this national trend, a growing number of nonprofit land trust organizations in the region have been increasing the number of conservation easements held or negotiated on behalf of other agencies, by focusing their efforts on outreach to individual landowners of small- to medium-sized, high-quality natural areas.

For example, in 2003, the Land Conservancy of McHenry County identified high-quality natural areas under threat of development and/or with no plan by a public agency to protect them, based on information from the McHenry County Conservation District and the Illinois Natural Areas Inventories. Outreach to more than 200 landowners within these most vulnerable natural areas has resulted in the Conservancy accepting conservation easements at two of the sites and purchasing land at another site. Two additional sites were enrolled in the Conservancy's Land Heritage Registry program, a voluntary, non-binding program by which the landowner agrees to manage his/her natural area in accordance with sound conservation principles. To assist the landowners, the Conservancy offers to help draft a management plan for each site. To date, 119 acres at six sites have been enrolled in the program. Additionally, the Conservancy holds title to 33 acres of land and 16 conservation easements on 236 acres, bringing the total number of acres permanently protected to 269 (L. Haderlein 2004).

In another example, in 2004, the Fox Valley Land Foundation hired its first land protection specialist to implement a private landowner contact program. Guided by the Illinois Natural Areas Inventory, the Fox River Watershed Biodiversity Inventory and the Kane County Advanced Identification of Wetlands Inventory, the program targets privately-owned, high-quality natural areas with no formal protection, or those that would expand or buffer existing protected areas. As a result of outreach efforts, 14 sites, comprised of 307 acres, have been enrolled in the Foundation's Heritage Land Registry program, modeled after the program pioneered by the Land Conservancy of McHenry County. The Foundation holds six conservation easements, three of which are on privately owned land. The other easements permanently protect a Natural Areas Inventory site, expand an Illinois Nature Preserve and protect a rare, high-quality fen. Since 1999, the Foundation has raised nearly $1 million to acquire three adjoining land areas, or buffers, to protected natural areas and has donated them to public agencies. The foundation has also raised more than $900,000 to manage and restore more than two dozen protected natural areas, including 11 sites that contain the state-endangered eastern prairie fringed orchid (M. Nelson 2004).

In yet another example of the use of conservation easements, The Conservation Foundation currently holds 16 easements totaling 506 acres, of which 438 have been protected since 2000. The Conservation

Foundation has negotiated three additional easements, comprising 75 acres, on behalf of public agencies, including the nation's first conservation easement on a Girl Scout camp. Approximately half of the 135-acre Whispering Oaks Camp, located along the lower Fox River near Sheridan, Illinois, and home to the state-threatened northern white cedar, is now permanently protected (D. Lobbes 2004).

Regional Planning Initiatives

There are four major regional planning efforts in the Chicago Wilderness region:

- Common Ground, Northeastern Illinois Planning Commission (NIPC)
- The Metropolis Plan, Chicago Metropolis 2020
- Chicagoland Transportation and Air Quality Commission, the Center for Neighborhood Technology
- 2030 Regional Transportation Plan, Chicago Area Transportation Study (CATS)

With the exception of Common Ground, none mention the importance of restoring and protecting biodiversity, although each addresses the importance of natural areas.

In March 2003, Chicago Metropolis 2020 released "The Metropolis Plan: Choices for the Chicago Region." Although the plan does not explicitly address biodiversity, it does make three recommendations to protect natural areas, open space and farmland:

1. Use regional land use and transportation plans to set priorities for the preservation of natural areas, open space, and farmland.

2. Provide state funding for the acquisition and preservation of open lands and natural areas consistent with the state's goals for growth and the regional land use and transportation plans.

3. Provide state funding and technical assistance in order to map, inventory and preserve key natural areas and farmland in urbanizing counties (Chicago Metropolis 2020 2003, p.35).

Common Ground is led by NIPC. It is a comprehensive planning process that brings the six-county Chicago region together to create a shared vision for the common future. In June 2005, NIPC adopted its 2040 Regional Framework Plan. Participants identified a number of types of green areas they wanted to see preserved or protected by 2040. In addition to open space, water resources and agricultural land, participants identified biodiversity areas for protection along the Kankakee River in southwest Will County, along the Calumet River near the Indiana border, along the Chain-of-Lakes in Lake and McHenry Counties, and along the Nippersink Creek. Additional biodiverse areas were identified in the Des Plaines River area near the Palos/Sag Forest Preserves.

The Chicagoland Transportation and Air Quality Commission is a coalition of more than 200 organizations that work together to make recommendations to CATS on transportation-related issues. The Commission is led by the Center for Neighborhood Technology. Again, Commission participants do not always explicitly address the need to protect biodiversity, but in both McHenry and Lake Counties in Illinois, the need to protect natural areas and open space was the number one concern.

The CATS Policy Committee is designated by state and local officials as the Metropolitan Planning Organization (MPO) for the northeastern Illinois region. In October, 2003, CATS released the 2030 Regional Transportation Plan for Northeastern Illinois. One of the accompanying documents to the plan is an analysis completed by NIPC, "Natural Resource and Socio-Economic Impacts of 2030 Regional Transportation Proposals." (Northeastern Illinois Planning Commission 2003). NIPC's analysis identifies which proposed projects have the highest potential for negative impacts on natural resources. However, CATS did not include this analysis in its final plan for the region. CATS did note when a proposed project will cross high- quality streams, or transect forest preserves or agricultural areas. For example, NIPC identified the proposed Prairie Parkway as having a high natural resource impact, as it is located in a watershed identified as very high priority for protection and restoration, contains agricultural areas and passes the southeast side of Midewin National Tallgrass Prairie. CATS' plan mentions the project's location, but limits its recom-

mendation to "consideration of farmland protection is recommended" (Chicago Area Transportation Study 2003 p.190).

Note that as this report goes to print, CATS and NIPC are beginning a merger as recommended to the Illinois governor and General Assembly in an April 2004 report by the Northeastern Illinois Regional Transportation Task Force.

OUTREACH TO LOCAL GOVERNMENTS

In broad terms, it is safe to conclude that local government ordinances, plans and development policies are improving in the protections they provide for habitat and natural areas in the Chicago Wilderness region. In fact, the use of the term "conservation development" is becoming much more common and the list of developments meeting conservation design principles is growing steadily. There also appears to be an increasing acceptance of open space and habitat protection in many communities to enhance quality of life, as well as protect biodiversity. Some examples of positive trends in development ordinances include:

- An increasing acceptance of cluster development to protect open space and sensitive habitats
- An increasing number of development projects that incorporate habitat restoration, particularly of aquatic systems
- An increasing number of communities that require open space set-asides as part of development approval
- Improved, more holistic stormwater ordinances
- A growing acceptance of non-traditional, ecologically friendly stormwater drainage approaches.
- A growing acceptance of natural landscaping as an alternative to turf grass
- An evolving awareness of the need for effective management of preserved and created natural landscapes

There do not appear to be any negative trends, or weakening, of local development ordinances. However, there is at least one area in which ecosystem protections have been weakened due to changes in federal law and/or policy. Specifically, the elimination of federal regulation of isolated wetlands due to a decision of the U.S. Supreme Court has created a regulatory gap in our region. Fortunately, the State of Wisconsin, several countywide stormwater management agencies in northeastern Illinois, and some individual local governments have instituted their own protections for isolated wetlands. Nonetheless, there are numerous isolated wetlands in our region that are no longer protected.

It is important to specifically note the role that many members of the Chicago Wilderness consortium play in supporting improved development ordinances and programs. The consortium has financially supported the development of important publications and projects that directly support local government efforts in conserving biodiversity. These include:

- The Chicago Wilderness Green Infrastructure Vision Project
- The *Conservation Design Resource Manual*
- *Protecting Nature in Your Community: A Guidebook for Preserving and Enhancing Biodiversity*
- *Restoring and Managing Stream Greenways: A Landowner's Handbook*
- *Sustainable Development Principles for Protecting Nature in the Chicago Wilderness Region*
- The Ecological Planning and Design Directory: Resources for Developers, Local Officials and Stakeholders (an online resource)

Members of the Chicago Wilderness consortium are also directly involved in outreach and technical assistance to local governments. A new project—the Sustainable Watershed Action Team (SWAT)—is bringing the expertise of progressive conservation design engineers, planners and landscape architects into select communities. Their mission is to work with municipal officials and the consultants representing developers to find more sustainable design solutions for sensitive development projects. Combined with the efforts of Chicago Wilderness member organizations, these actions bode well for continued improvement in the sustainability of development in the face of relentless development pressures in the region.

Through the lens of the eight sustainable development principles adopted by the Chicago Wilderness consortium in 2004, what follows is an overview of the status of existing county and municipal ordinances:

1. **Promote infill development and redevelopment where transportation facilities and utilities already exist in order to minimize the development of open lands, such as natural areas and farmland. Encourage development that is compact and contiguous to existing community infrastructure.**

This principle is largely focused on improved comprehensive planning at the regional and local level, versus regulatory ordinances. However, zoning also can be used in ways to encourage and require more infill and contiguous development. Broadly, regional plans adopted by the Northeastern Illinois Planning Commission (NIPC), Northwest Indiana Regional Planning Commission and Southeastern Wisconsin Regional Planning Commission support this principle.

Locally, some county and municipal plans strongly support this principle. One of the best examples is Kane County's 2020 Land Resource Management Plan, which identifies three distinct zones in the county: an urban corridor, a critical growth corridor where natural resource protection is paramount, and an agricultural priority area where little development is foreseen (Kane County Regional Planning Commission 1996).

The Chicago Wilderness Green Infrastructure Vision (Dreher 2004) referenced earlier in this chapter, may provide additional leverage and information to communities desiring to support this principle. Zoning maps and regulations also can support this principle at the local level by designating the density and type of development for an area. Similarly, zoning ordinances could more aggressively restrict development to locations where appropriate transportation and infrastructure already exist; could require a heavy fee for "greenfield" development; or provide incentives to use the already built environment for new development. Unfortunately, very few communities in the high-growth portions of our region where biodiversity is at greatest risk utilize such innovative zoning approaches.

2. **Locate and plan new development in ways that protect natural resources and habitat and provide buffers between sensitive natural areas and intensive use areas.**

This principle encompasses a number of actions, some of which entail planning and inventories and others that involve ordinance approaches. Implementing this principle initially requires effective inventorying of natural resources and incorporating them into maps and comprehensive land use plans. NIPC recently conducted an inventory of the comprehensive land use plans in its region. It concluded that 77 percent of the municipalities have plans, although they range extensively in thoroughness and content, and many are outdated. Of these plans, just 49 percent gave moderate to high emphasis to protecting wetlands, greenways and forest preserves.

One of the most remarkable examples of biodiversity planning at the community level is the Village of Schaumburg's recently adopted Schaumburg Biodiversity Recovery Plan (Applied Ecological Services 2004). The plan includes an ecological assessment of natural areas in the village; natural area restoration recommendations; recommendations for conservation development; identification of greenway opportunities; identification of funding opportunities; and recommended ordinance changes. It also has residential and business guides for biodiversity-friendly practices. In Wisconsin, state laws require the development of comprehensive "smart growth" plans by local governments.

Beyond planning, the next logical step is the adoption of zoning and subdivision ordinance language that explicitly prevents development in and adjacent to sensitive natural areas. From an ordinance perspective, counties and municipalities in the Chicago Wilderness region have been relatively progressive in endorsing this principle. However, the ordinances have generally focused on a fairly limited range of habitat types—principally streams and wetlands—in their protections. The principal reason for this limited focus is that habitat protection, per se, is not a high priority to most local governments. Rather, streams and wetlands are offered protection primarily because of their importance to stormwater management and flood prevention.

In general, southeast Wisconsin communities are in much better shape with respect to wetland protection. This is largely due to protections provided through

statewide wetland regulations. In northwest Indiana, relatively few local governments offer stream and wetland protection through local ordinances.

Beyond streams and wetlands, there are other critical natural areas that need protection to preserve biodiversity. Included in this category would be remnant prairies, savannas, and woodlands, as well as sensitive groundwater recharge areas. The situation is much less favorable here. In general, very few local ordinances explicitly address these resources.

Finally, principally because of concerns over future water supplies, an increasing number of communities are requiring consideration of groundwater recharge zones in the development process. Within this realm, a few communities, like South Elgin and Yorkville in Illinois, also have begun to address protection of fen recharge areas.

3. **Use the development process to enhance and restore streams, wetlands and lakes, and to enhance their potential as recreational and aesthetic amenities.**

This principle involves a number of possible actions and is based on the premise that avoidance alone is not sufficient to ensure the long-term viability and value of aquatic ecosystems. Enhancement and restoration of aquatic ecosystems requires several things. There must be a clear understanding of hydrology and plant communities on the development site. There must be an appreciation of the ecologic and economic feasibility of potential restoration measures. And there must be an understanding of the value of such restoration—such as the recreational benefits of a stream greenway—to both the developer and the community.

Because of the complexity and site-specific nature of aquatic restoration projects, very few communities in the region have ordinances that formally address this issue. Rather, in the more ecologically progressive communities, or in projects involving progressive developers, restoration and enhancement are negotiated between the developer and the local government (and other relevant regulatory agencies, such as the U.S. Army Corps of Engineers).

Ordinances do have a role, however, in encouraging, if not requiring, restoration of streams, lakes and wetlands. A number of communities do have comprehensive ordinances protecting aquatic systems, which typically require protection of buffers adjacent to aquatic resources and mitigation of any direct impacts to the resource or the buffer. Another angle for enhancing recreation and access to aquatic systems via the development process is through land use plans and zoning codes that identify community greenways and trails. Encouragingly, many communities in the region have begun to use this approach to establish community greenways and "river walks," even though these improvements may not be explicitly mandated by the local ordinances.

4. **Preserve permanent open space as an integral part of new development to both protect critical natural areas and to provide opportunities for recreation and environmental education. Design developments to create open space linkages to adjacent and regional natural areas so that nature exists not as islands but as connected habitat.**

This principle is accomplished through a combination of good land use planning, coordination between local governments and developers, and ordinances that specify minimum open space requirements. According to NIPC's recent inventory of the comprehensive land use plans in its region, from a planning perspective, 75 percent of the municipal comprehensive plans in northeastern Illinois give moderate to high emphasis to parks and open space protection.

From an ordinance perspective, preserving permanent open space is commonly achieved by requirements for park donations and/or establishing minimum percentages of open space for different development types. Most communities in growth areas now require park donations or set-asides for new development. However, it isn't clear how many of these requirements are structured to protect natural land.

There is an increasing trend to require that a certain percentage of residential developments, specified by ordinance, be set aside as natural open space. Often,

this requirement is in addition to natural lands that are considered unbuildable (e.g., wetlands and floodplains). Examples of such requirements can be found in the plans and development ordinances of Kane, Lake and Will Counties in Illinois, where requirements typically range from 20 to 40 percent open space. Porter County, Indiana is presently considering the adoption of an open space ordinance. However, there is some variability in how open space is defined (i.e., it may not always have significant biodiversity value). Also, existing open space ordinances may not always be clear in specifying ownership and long-term management of such areas.

5. **Recognize the value of water as a resource and manage it to protect downstream water bodies and wetlands, prevent increased flooding, preserve groundwater resources and maintain natural hydrology.**

This principle entails the adoption of progressive ordinances and guidelines for the holistic management of stormwater runoff in development projects. Traditionally, stormwater ordinances have focused on end-of-the-pipe, engineered treatment options—typically catch basins and detention structures. Such approaches are very limited in their focus and do little to protect the hydrology and water quality of downstream wetlands, lakes and river systems.

Progressive approaches, in contrast, attempt to preserve, as much as possible, the natural hydrology of a site, and limit off-site water quality impacts. This is accomplished by limiting impervious areas, preserving natural drainage and storage features, routing runoff through "naturalized" swales and filter strips, and storing and filtering excess runoff in naturally landscaped detention basins.

As with most of the other principles, this can be accomplished by a combination of good site planning, design guidelines and prescriptive ordinances. More specifically, it is recognized that effective protection of water resources cannot be accomplished through the implementation and enforcement of traditional development ordinances alone. A more integrated approach is necessary, principally because conventional subdivision and zoning codes often conflict with at least some of the requirements of progressive water resource ordinances. In recognition of some of these concerns, NIPC and other members of the Chicago Wilderness consortium recently developed the Conservation Design Resource Manual, which is designed to help communities effectively update local plans and ordinances to be more amenable to conservation design practices.

As a development site is being planned, site layout and drainage system design are governed by the community's subdivision code, in combination with its stormwater ordinance. Regarding the latter, there has been tremendous progress in community approaches to stormwater management. NIPC, from an advisory perspective, has long-promoted progressive stormwater management approaches through its "Model Stormwater Drainage and Detention Ordinance" (Northeastern Illinois Planning Commission 1994). While individual communities have adopted the model ordinance, perhaps the biggest positive impact has been the action of countywide stormwater management commissions. Beginning in the early 1990s, these commissions have been adopting relatively progressive ordinances that are mandated for adoption by every municipality in the county as well as the county itself. To date, DuPage, Kane, Lake, McHenry and Will Counties in Illinois have adopted and are now enforcing county-wide ordinances.

Beyond the county-wide ordinances, individual communities in northeastern Illinois have adopted progressive stormwater ordinances as a condition for the expansion of wastewater facility planning areas or municipal wastewater treatment plants. In Wisconsin, community regulations are guided by new stormwater management requirements enforced and delegated through the Wisconsin Department of Natural Resources. Wisconsin has developed an aggressive model ordinance for construction activities that addresses hydrology, water quality and buffer strips on development sites.

While there has been substantial progress in the adoption of improved stormwater ordinances in the last 10 years, actual development practices often leave much to be desired. One of the biggest constraints to more effective stormwater and water resource management in most communities is the inflexibility of the conventional subdivision ordi-

nances. Traditional subdivision ordinances may be constraining in a number of areas, including requirements related to street widths, parking lots, curbs, gutters, storm sewers, landscape islands and impermeable paving.

6. **Minimize changes to natural topography, soils and vegetation to preserve land, water and soil relationships that are essential for sustaining plant and animal habitat. Where sites have been previously altered, attempt to restore natural conditions to the extent possible.**

This principle is focused on preserving and restoring the integrity of the soils and vegetation on a development site. Much of this can be accomplished by progressive ordinances, in combination with incentives and guidelines. The traditional approach to this issue has been a focus on nuisance soil erosion, but without consideration of the long-term implications of compacted soils. Traditional approaches also have failed to consider the consequences of landscaping sites with non-native, shallow rooted vegetation, with the conventional default being turf grass. Not only do such landscapes provide little local benefit to biodiversity, they also cause off-site impacts due to fertilizer and pesticide runoff and dewatering of local aquifers for irrigation.

A progressive response to these concerns is adoption of ordinances and guidelines that:

- Minimize the amount of soil disturbance and compaction on a development site
- Minimize soil erosion and off-site sedimentation during construction
- Protect remnant native vegetation
- Encourage the use of native vegetation for on-site landscaping

Fortunately, municipalities and counties have made significant progress in the recent past in requiring more progressive approaches, particularly in the area of soil erosion control. Unfortunately, significant problems remain. In most communities, the emphasis remains principally on avoiding sediment loss that causes a public nuisance or disrupts roadways and other infrastructure. Commonly, the more pervasive problems of elevated turbidity and silt loads reaching downstream aquatic systems receive much less attention.

Local government programs to preserve and expand native landscapes have expanded substantially in recent years. There have been some successes in protecting small remnant natural areas from development, but much improvement is needed in this area. Specifically, while many community and county ordinances now address the protection of wetlands, relatively few address remnant woodland, savanna or prairie communities.

More significant progress has been made in communities accepting, and even promoting, natural landscaping in lieu of conventional turf. It has now become commonplace, for example, to see native landscaping around stormwater detention facilities—something rarely observed only 10 to 15 years ago. It also is becoming more common to see natural landscaping on large corporate campuses and institutional properties. Nonetheless, many communities' subdivision ordinances, or separate "weed" ordinances, preclude natural landscaping in many residential and commercial development applications. Fortunately, the member organizations of the Chicago Wilderness consortium are making efforts to overcome these obstacles. For example, model ordinance language is available from NIPC's recently revised *Source Book on Natural Landscaping for Local Officials* (Northeastern Illinois Planning Commission 2004), and Openlands Project is spearheading the CorporateLands program to help corporations institute natural landscaping in office campus settings.

7. **Establish procedures that assure the ongoing management of natural areas within developments as part of an overall strategy for achieving sustainability.**

This principle recognizes that land protection, natural landscaping and related preservation efforts will not be successful in the long term without effective mechanisms for the restoration and management of natural areas. Implementation of this principle requires both effective education of landowners and ordinance requirements that stipulate clear responsibilities for long-term management.

Implementation of actions under this principle does not have a long history among local governments in the region. In particular, most local governments currently do not have clear ordinance directives to ensure that management and maintenance responsibilities will be met for natural areas and created natural landscapes. In most communities, it appears that maintenance and management responsibilities are determined on a project-by-project basis. These responsibilities are commonly negotiated between municipal staff and developers and their consultants.

Recent positive examples include the development of design criteria, performance criteria, monitoring guidelines and maintenance and management requirements adopted by the Butterfield Creek Steering Committee, a group of communities in southern Cook County. These communities took on a number of new natural landscaping and restoration projects and wanted assurances that the projects would be sustainable in the long term, both from the perspective of aesthetics and functionality. On another positive note, a number of park districts in the region have stepped up to the plate to provide ownership and management of natural areas. One of the leading examples is St. Charles Park District in Kane County, Illinois. The Park District has worked with the City of St. Charles to identify natural areas within new developments—including wetlands, stream corridors, and naturalized stormwater facilities—that are suitable for its management capabilities. The Park District also acquires land through purchase. In total, it manages more than 500 acres of natural land, including two dedicated Illinois Nature Preserves.

There are other entities that communities have approached to meet their needs for management of natural lands dedicated through the development process, including land trusts and similar local conservation groups and even forest preserve districts. One notable example is the Forest Preserve District of Kane County's management of parcels in the Mill Creek corridor that were set aside in a large conservation development project.

8. **Design development to achieve the broader sustainability of human and natural communities, including the social and economic dimensions of sustainability.**

This principle targets measures that improve sustainability at the regional and global scale. Such measures might include zoning to enhance access to public transportation and building codes that require energy efficiency and the use of recycled and recyclable materials. Such measures are important to the heath of the planet and can protect air quality and reduce sprawl. However, in comparison to the preceding principles, their benefits to biodiversity in the Chicago Wilderness region are less direct and not evaluated at this time.

Improvement of Water Quality

According to the Environmental Law and Policy Center web site:

> "Ammonia is discharged to Illinois waters from sewage treatment plants and from such industrial sources as fertilizer manufacturers and oil refineries. In addition, fertilizer runoff from farm fields is a major source of ammonia pollution. Ammonia is toxic to many forms of aquatic life. In fish, ammonia affects hatching and growth rates, and it can cause changes in tissues of gills, the liver and the kidneys. Many species of wildlife native to Illinois, such as smallmouth bass and fingernail clams, are sensitive to ammonia, and they are also an important part of the food chain for waterfowl and other wildlife. In addition to its toxicity, ammonia causes problems when it degrades, consuming oxygen needed by fish to breathe. Ammonia also degrades into nutrients that contribute to algae blooms, which further deprive waterways of oxygen" (Environmental Law and Policy Center 2004).

According to the Prairie Rivers Network, Illinois' only statewide river conservation organization, sometime in 1996, a discharge standard for ammonia nitrogen was adopted that was much stronger than the old standard but had a very large loophole—essentially that the standard would not apply if it was too difficult to implement. Environmental groups spent the next several years fighting that loophole and in 2000, new implementation rules were adopted for the ammonia standard that eliminated the loophole and provided significant benefits for aquatic life. Minor changes were made to the rules in 2002, but they

remain more protective than they were prior to the adoption of the implementation rules in 2000 (J. Flemma 2004).

In February 2002, new antidegradation regulations were adopted by the Illinois Environmental Protection Agency under the Clean Water Act after a two-year effort by Prairie Rivers Network, the Environmental Law and Policy Center and the Sierra Club. The new regulations are among the best in the country and enable clean water advocates to demand greater protection from new discharges to high-quality waters. Specifically, the new regulations require the Illinois Environmental Protection Agency and the discharger to 1) demonstrate that the socioeconomic benefits of the pollution outweigh the potential environmental degradation, 2) perform an analysis of possible alternatives to the discharge, and 3) ensure that the new discharges do not destroy existing beneficial uses of the receiving waters such as providing drinking water and supporting aquatic life.

A proposal by the Illinois Environmental Protection Agency to the Illinois Pollution Control Board would limit phosphorus levels to one milligram per liter in any case where a new or expanding discharge is proposed that would discharge at least one million gallons per day (a one milligram per liter limit means that each liter of water discharged by a polluter can only contain a maximum of one milligram of phosphorus). This proposal, if adopted by the Board, would reduce algae and bacteria growth that kills fish and other wildlife and can turn waters into green slime that is undesirable for swimming or other uses. While the proposal to limit new or increased sources of phosphorus is modest, it represents the first real requirement to reduce phosphorus discharges to streams in Illinois.

Chapter 8
Biodiversity Recovery Plan Progress

8.1 Introduction

The *Biodiversity Recovery Plan* contains numerous goals and recommended actions related to individual natural communities, animal assemblages and policy initiatives. Together they reflect the overall objectives expressed in the plan's executive summary. And the plan is meant to be a living document that evolves as new information becomes available. Already, some of the objectives listed below have been superceded by the evolving work of the Chicago Wilderness consortium's teams. Some objectives are addressed comprehensively within the preceding chapters. Some are difficult to assess due to their subjective nature and more than a few overlap with each other. Nonetheless, what follows are highlights of the progress made toward the *Biodiversity Recovery Plan* objectives, the "big picture" perspective on the Chicago Wilderness consortium's efforts to protect and restore the region's natural communities to long-term viability, in order to contribute to the conservation of global biodiversity and enrich local citizens' quality of life. The following examples reflect data available at the time this report was developed.

8.2 Involve the Citizens, Organizations and Agencies of the Region in Efforts to Conserve Biodiversity

a. Obtain broad-based and active public participation in the long-term protection, restoration and stewardship of the region's natural communities.

The Chicago Wilderness consortium, itself, is a prime example of involving a broad diversity of organizations in the preservation of the region's biodiversity. What began in 1996 as an exploratory idea by 34 organizations has blossomed a decade later into a diverse consortium of more than 180 public and private organizations, including universities, museums, municipalities, park districts, conservation organizations, federal agencies, state agencies, county agencies, and volunteer-based groups. Corporate interests participate by enrolling as members of the Chicago Wilderness Corporate Council and individuals—numbering more than 5,000—regularly volunteer their time and talents in hands-on restoration and monitoring of the region's natural communities.

b. Strengthen local government support by communicating with and involving officials in planning efforts and conservation programs.

In 2000, Chicago Wilderness funded a full-time position for one year, staffed by Dennis Dreher of the Northeastern Illinois Planning Commission, to conduct outreach to local governments through presentations and consulting on specific projects, namely those related to sustainable development. Dreher completed a comprehensive survey of local government ordinances as they relate to preserving the biodiversity of the Chicago Wilderness region, a summary of which is included in chapter seven. In general, Dreher finds that an increasing number of local government ordinances, plans and development policies are improving in the protections they provide for natural areas within Chicago Wilderness. In fact, the use of the term "conservation development" is becoming much more common and the list of developments meeting conservation design principles is growing steadily. There also appears to be a growing acceptance of open space and habitat protection in many communities in order to enhance quality of life, as well as protect biodiversity.

In chapter seven, Dreher points out the role the Chicago Wilderness consortium and its members have played in supporting the development of improved ordinances and programs. Direct outreach and technical support efforts include the publication of several development guidelines and the development of the Sustainable Watershed Action Team (SWAT), in which engineers, planners and landscape architects work with municipal officials and the consultants representing developers to find more sustainable design solutions for sensitive development projects.

c. Maintain and strengthen volunteer participation in stewardship and research.

Throughout the history of the nation's conservation movement, volunteers have played a pivotal role, a role that remains of vital importance today. Within the Chicago Wilderness region, substantial monitoring of natural communities is conducted by volunteers. Without volunteer monitors, much of the data available for the *Report Card* would not exist. Likewise, volunteers play an invaluable role in hands-on restoration work. The Habitat Project, which facilitates several regional volunteer initiatives, conservatively estimates the number of hours volunteered in Chicago Wilderness in 2003 at 66,043. Using a standard volunteer dollar valuation, that translates into a total service amount of $1,068,649—a number all the more significant in the current climate of reduced management budgets amongst state agencies and nonprofit organizations alike (K. Glennemeier 2004).

Established in 1999, the Chicago Wilderness Habitat Project coordinates the Bird Conservation Network Census and the Chicago Wilderness grassland bird blitz, manages the Chicago Wilderness Calling Frog Survey and the savanna reptile and amphibian study, and publishes a thrice-annual newsletter. The newsletter provides more than 700 volunteers with information about annual training opportunities, news, and monitoring and stewardship success stories. Coordinating these and other volunteer efforts on a regional basis, the Habitat Project is able to marshal quick responses to emergent issues, such as the 2003 outbreak of West Nile Virus. In that case, volunteers were mobilized to document the effect of the virus on the region's bird populations. This rapid response provided reliable, quantified information of great conservation value, but which also helped public health officials identify geographic "hot spots" of viral outbreak in the region.

Another highly significant volunteer program is the Volunteer Stewardship Network (VSN). Established in 1983 by The Nature Conservancy and the Illinois Nature Preserves Commission, the network is comprised of numerous independent volunteer groups operating throughout the state, including 27 in northeastern Illinois. These groups coordinate more than 5,000 volunteers who help public and private landowners maintain more than 300 high-quality natural areas (The Nature Conservancy 2005). The VSN is guided by a volunteer steering committee and supported by a coordinator employed by the Illinois chapter of The Nature Conservancy. In addition to providing outreach, education and training assistance, the coordinator facilitates communication among volunteers and network members via a listserve and a thrice-annual newsletter published by The Nature Conservancy.

Although there is no formal register of volunteer monitoring groups within the region, other important groups include the Bird Conservation Network, the Chicago Wilderness Calling Frog survey, Plants of Concern, Plant Community Monitoring, the Illinois Butterfly Monitoring Network and the Dragonfly Monitoring Network, to name some that are active within the Chicago Wilderness region.

d. Stimulate active private-sector involvement and integrate a broader range of stakeholders, including businesses and constituency organizations, into biodiversity conservation efforts.

Recognizing the profound effect that the business community has on the ecological health and biological diversity of the Chicago region through its people, land development practices, management practices, political activity and philanthropy, in 2002, the Chicago Wilderness consortium established the Chicago Wilderness Corporate Council. At the time of this *Report Card*'s publication, 27 businesses have joined the council, making a commitment to improve our region's environment.

In 2003 the Openlands Project, a member of the Chicago Wilderness consortium, launched its Corporatelands Program in partnership with the Clean Air Counts Campaign, a regional effort to reduce ozone-causing emissions. The Corporatelands Program helps corporations and large institutions, such as colleges and hospitals, design natural landscapes as a means to improve the environmental quality of their corporate campuses. Converting traditional turf grass landscapes into natural landscapes using native plants and grasses results in numerous benefits to the land owners and the region, includ-

ing the improvement of stormwater management and flood control, a reduction in landscape maintenance costs, an increase in regional biodiversity, and the reduction of air pollution.

Another program that encourages native landscaping is the Conservation and Native Landscaping Award Program, developed in 2000 by the U.S. Environmental Protection Agency–Region 5 and the Chicago Wilderness consortium. The program is designed to recognize developments, corporate campuses, industrial parks, public parks, schools, government complexes and other sites that creatively implement the use of native landscaping on their properties. Among the 2003 award recipients was the City of Chicago's Chicago Center for Green Technology, which sits on a former dump site from which 600,000 tons of construction and demolition debris were cleared. The site is now home to an environmentally sustainable facility where people can learn how to make their own homes and businesses more energy efficient and environmentally friendly. The site's landscape is planted entirely with native plants that are botanically diverse and provide a good food source for many native species of insects, birds and small mammals. The site also features a wetland, which has already become home to some native birds, as well as a variety of non-invasive insects. The parking lot features an absence of curbs so that driveway waste is filtered through bioswales before it reaches the detention pond.

A complete list of Conservation and Native Landscaping Award recipients and other information about natural landscaping may be found at www.epa.gov/glnpo/greenacres.

8.3 Improve the Scientific Basis of Ecological Management

a. Increase knowledge of species, communities and ecological relationships and processes.

As noted above and elsewhere in the *Report Card*, the region's numerous volunteer efforts are contributing invaluable data about the region's habitats and species. Since the publication of the *Biodiversity Recovery Plan*, the Chicago Wilderness consortium has supported numerous other research efforts. A representative few are listed in chapter five. Appendix A contains a complete list of projects funded by the Chicago Wilderness consortium through 2004.

b. Specify results to be achieved in biodiversity conservation and increased sustainability, including reliable indicators, baselines and targets.

A key recommendation of both the *Biodiversity Recovery Plan* and the *Report Card* is to develop specific, measurable recovery goals and indicators, along with monitoring protocols, as well as to establish baseline data. The *Biodiversity Recovery Plan* sets forth broad recovery goals for the region's plant communities and animal assemblages, but recognizes the need for more specific targets, standards and measures to allow for progress measurement. The conservation designs developed for grassland birds, savanna herpetofauna and woodlands—each rated of highest conservation concern in the *Biodiversity Recovery Plan*—are significant steps in the right direction. Although each varies according to the unique attributes and threats to the community or assemblage it addresses, each is a model of establishing measurable recovery benchmarks in five-year increments through 2025.

The "Chicago Wilderness Conservation Design for Savanna Herpetofauna" does not establish specific targets for individual species, but it does call for no loss or decline of 27 target species at 80 percent of 100 monitored sites throughout the region by 2025. It also calls for the preservation and management of at least one large (at least 800 acre) habitat complex—consisting of multiple habitat types—in each of the region's natural divisions: Grand Prairie, Western Morainal, Kettle Moraine, Lake Plain and Gary Lake Plain/High Dune/Ridge and Swale. Another indicator of progress is for 100 percent of monitored sites to have written, approved and active management plans in place. In response to identified threats, the conservation design calls for management plans to address controlled burns, hydrology, invasive species, groundcover, fragmentation and dispersal, acquisition and easements, and fundraising. Acknowledging that there are several knowledge gaps related to savanna reptiles and amphibians, the conservation design includes an appendix that outlines a number of research, inventory and policy questions to be addressed in the future. (Glennemeier 2002c).

The "Chicago Wilderness Conservation Design for Woodlands" calls for a minimum number of moderately large (400-800 acre) and large (at least 800 acre) sites that are healthy, publicly owned and ecologically managed, and a minimum total number of healthy acres for each of four woodland types: flatwoods; wet-mesic, mesic and dry-mesic woodlands. By 2025, 100 percent of sites are to be consistently monitored for health and biodiversity. One hundred percent of sites are to have written, approved and active management plans in place. In response to identified threats, the conservation design calls for management plans to address invasive species, controlled burns, groundcover, hydrology, deer control, land acquisition and fundraising. Regarding deer control, by 2025, the conservation design calls for 50 percent of woodland sites to have instituted deer control measures, resulting in a measured decrease in the percentage of 13 indicator species browsed and a decline in the number of car-deer collisions (Glennemeier 2002a).

The woodland conservation design also calls for all counties to have written, approved and active education and outreach plans related to woodland ecology and restoration. These should include specific, measurable targets for:

- The number of new policy papers addressing woodland issues
- The number of county workshops held and other educational products produced related to woodlands
- The number of water quality regulations introduced or improved for the region as a whole
- The number of classrooms per year (for grades 6-12) for whom an education unit on woodlands has been presented by a volunteer or professional ecologist
- The percentage of residential yards adjacent to natural areas that are planted with native vegetation and that minimize the use of herbicides, pesticides and fertilizer (Glennemeier 2002a)

In addition to an appendix that outlines research, inventory and policy questions to be addressed in the future, the conservation design establishes specific targets for the number of scientific research projects to be completed that examine priority questions for woodlands. It also includes specific targets for the number of restoration, management or acquisition projects that should be implemented, based on completed woodland priority research.

Whereas indicator species were identified only in relation to deer browsing, the conservation design in its appendix set general parameters for a possible woodland health index. This index includes the attributes:

- The ratio of young trees to mature trees
- A similar species diversity among seedlings, saplings and adults
- Per 1/4m^2 quadrat:
  - o A high Floristic Quality Index or other diversity index for the herbaceous layer
  - o A high number of herbaceous layer indicator species (yet to be determined)
  - o A high average cover of native, non-invasive species
  - o A low average cover of non-native, invasive species
- A high number of woodland bird, butterfly, reptile and amphibian indicator species (yet to be determined) (Glennemeier 2002a)

The "Chicago Wilderness Conservation Design for Grassland Birds" does provide specific targets for breeding pairs of 10 indicator species of grassland birds. It also specifies the targets of having a minimum of 9,000 acres of each of three grassland habitat sub-types: dry, mesic and wet. Within the 9,000 acres for each sub-type, 2,500 acres should be in individual sites of at least 500 acres. Overall, at least five grassland sites should be at least 4,000 acres in size (Glennemeier 2002b).

This conservation design also sets specific targets for the number of sites monitored, improved, and of a high quality; the number of indicator species whose conservation targets have been met; and the number of species whose regional abundance has not declined in three successive years.

Similar to the conservation designs for woodlands and savanna herpetofauna, the conservation design for grassland birds specifies that by 2025, 100 percent of sites are to have written, approved and active management plans in place. In response to identified threats, management plans are to address invasive

species, controlled burns, mowing, fragmentation, hedgerows and land acquisition. Fifty percent of moderately large sites (of approximately 500 acres) are to have written, approved, active plans to address research and monitoring of the effects of different plant assemblages on grassland birds. For all grassland sites, there is to be a 50 percent increase in the number of native prairie plants, with the composition of these plants reflecting the results of the research described above. The conservation design's appendix includes a number of research and inventory questions to be addressed (Glennemeier 2002b).

c. Evaluate the results of restoration and management alternatives based on data in order to address those alternatives' effects on target species and communities.

Among the research projects supported by the Chicago Wilderness consortium is the Bowles/Jones re-assessment of Grade A and B Illinois Natural Areas Inventory prairie sites. The re-assessment establishes a strong link between prairie quality and the frequency of controlled burns. Their data suggest that mesic and wet-mesic prairies be managed with controlled burns at least every two years and that graminoid fens and sedge meadows require controlled burns at least once every five years (Bowles and Jones 2003). The report acknowledges that "Multiple environmental factors may be interacting with fire to affect changes in native and alien species richness in both prairies and wetlands" (Bowles and Jones 2003, p.11), such as an increasingly larger deer population, altered hydrology, and increasing sedimentation and pollution rates.

Also, as outlined in chapter five, the Chicago Wilderness Science Team is in the process of establishing an agenda to address all areas of local biodiversity conservation research.

d. Clearly identify conservation priorities.

The *Biodiversity Recovery Plan* identifies conservation priorities for terrestrial and aquatic communities, as well as select animal assemblages. There are no changes in the plan's rankings. However, bird experts have recommended, in accordance with national bird conservation findings, that shrubland birds across all habitat types be added as a second priority area during the next five years.

Although the recovery of all of the region's communities and assemblages is encouraged, the purpose of identifying conservation priorities is to guide the allocation of efforts and resources toward those habitats and species of particularly critical importance. Accordingly, the three conservation designs developed since the publication of the *Biodiversity Recovery Plan* all focused on the communities or assemblages of highest conservation concern within their respective groupings.

e. Develop region-wide performance standards and monitoring techniques that can be implemented by land managers.

One of the benchmarks identified by Glennemeier (2002a) in the "Chicago Wilderness Conservation Design for Woodlands" is the development of two policy papers addressing woodland issues by 2005. In 2003, Chicago Wilderness approved "Conservation of Wooded Lands in the Chicago Wilderness Region: A Model Policy" (Frankel and Mariner 2003) and the more generally related, "Natural Fire and Controlled Burning in the Chicago Wilderness Region: A Model Policy" (Frankel 2003). Summarized in chapters two and five, respectively, these two papers build upon the information related in the *Biodiversity Recovery Plan*, providing expanded and detailed background information, as well as comprehensive standards to guide the development of individual site management plans.

Regarding monitoring techniques, Glennemeier (2002a) outlines parameters for a woodland health index. Glennemeier (2004) advances a more specific model as shown in Table 8.1.

As indicated in Table 8.1, four invasive species categories were averaged to get a 1-4 Invasives score. Then the FQI, Canopy Trees and Invasive categories were averaged to get an overall quality score. For the Canopy Tree category: The tree data are divided into the following size classes: 3-6-inch DBH, 7-9-inch, 10-12-inch, 13-19-inch, and 20-plus-inch. The 20-plus-inch size class determines which trees are considered the canopy species for that plot. Presence of the

TABLE 8.1
A DRAFT DEFINITION OF WOODED LANDS BASED ON DATA FROM *THE STATE OF OUR WOODED LANDS: RESULTS FROM THE CHICAGO WILDERNESS WOODS AUDIT*

	Data from Woods Audit Plot					
Quality Grade	Quadrat Floristic Quality Index (FQI)	Canopy Trees	Frequency of Invasive Species	Average Cover of Invasives in Quadrats	Average Number of Invasive Stems in 4x4 Subplots	Invasive Species Total Basal Area of 3-6-inch Diameter at Breast Height (DBH) Size Class
Excellent = 4	> 9	Present in 3-4 size classes	Present in 0 out of 9 quadrats	0%	0 stems	0 in
Good = 3	7-9	Present in 2 size classes	Present in 1-3 quadrats	1-4%	1-2 stems	9-46 in
Fair = 2	4-6	Present in 1 size class	Present in 4-6 quadrats	4-14%	2-9 stems	47-271 in
Poor = 1	< 4	Present in 0 size classes	Present 7-9 quadrats	14-50% (50=max)	9-57 stems (57=max)	272-1600 in (1600=max)

canopy species in the smaller size classes determines the quality rank. Invasives in quadrats and 4x4 plots are defined as *Rhamnus* sp., *Lonicera maackii*, *Lonicera tatarica*, *Alliaria petiolata*, and *Rosa multiflora*. Invasives in the 3-6 inch category are defined as the genera *Acer*, *Prunus*, *Lonicera*, *Rhamnus*, and *Fraxinus*. Grade cutoffs for the last three invasive species categories were based on the geometric means of exponentially distributed data.

The Plants of Concern program has also developed specific monitoring protocols, as discussed in chapter four. The region-wide adoptions of such protocols facilitate consistent assessments throughout the region, thereby providing for a true region-wide overview of the health and condition of the region's natural assets. A key recommendation of the *Report Card*, therefore, is to develop specific monitoring protocols, along with recovery goals and indicators, for all natural communities and animal assemblages.

8.4 PROTECT GLOBALLY AND REGIONALLY IMPORTANT NATURAL COMMUNITIES

a. Identify priority areas and elements for protection based on an assessment of their contribution to conserving biodiversity at global and regional levels.

In the Chicago Wilderness Green Infrastructure Vision, which was approved by the Chicago Wilder-

ness consortium in 2004, Dreher (2004) identifies 1.8 million acres of resource protection areas that could and should be protected within the tri-state region of Chicago Wilderness. Developed by more than 80 experts representing a broad diversity of Chicago Wilderness organizations and resource agencies, the vision is discussed at some length in chapter seven.

b. Protect high-quality natural areas in sufficient acreage to permit restoration and management for sustainability.

As reported in chapter seven, since the publication of the *Biodiversity Recovery Plan* in 1999, the Illinois Nature Preserves Commission has dedicated eight new nature preserves and expanded 30 others within the Chicago Wilderness region, bringing the region's total number of dedicated nature preserve acres 18,472. Also since 1999, county forest preserve districts and county conservation districts in Illinois have added more than 25,000 acres to their permanent holdings. In many cases the newly acquired acres serve to increase or connect existing preserves. The *Biodiversity Recovery Plan* calls for the establishment of habitat complexes of certain large minimum sizes to sustain certain communities of plants and assemblages of species. The conservation designs for woodlands, grassland birds and savanna herpetofauna refine these goals and set benchmarks in five-year increments through 2025.

As reported in chapter five, the 2005 conservation design benchmark for flatwoods is 300 acres, toward which goal 107 "healthy" acres of Grade A and B flatwoods have been identified in the Illinois Natural Areas Inventory. The number of woodlands of all moisture classes rated as excellent and good totals approximately 1,130 acres, according to Glennemeier (2004). This is almost 25 percent of the 2005 benchmark of a combined 4,800 acres of all woodland types.

As mentioned earlier in this chapter, Glennemeier (2002b) recommends that the following benchmarks be achieved by 2025:

- At least 9,000 acres of dry and dry-mesic grassland with at least 2,500 acres in individual sites of at least 500 acres each
- At least 9,000 acres of mesic grassland with at least 2,500 acres in individual sites of at least 500 acres each
- At least 9,000 acres of wet and wet-mesic grassland with at least 2,500 acres in individual sites of at least 500 acres each
- At least five grassland habitat complexes of at least 4,000 acres in size

The conservation design noted that there were already approximately 27,000 grassland acres in the region, with 7,200 acres in sites of 500 acres or more (Glennemeier 2002b). The emphasis during the past five years has been on grassland management, ranging from small sites such as Bartel Grasslands to large sites such as Midewin National Tallgrass Prairie.

In the "Chicago Wilderness Conservation Design for Savanna Herpetofauna," Glennemeier (2002c) recommends the preservation and maintenance of at least one large (at least 800 acre) habitat complex, consisting of multiple habitat types, in each of the region's five natural divisions by the year 2025. As related in chapter three, at least two large complexes of 1,100 and 2,200 acres each have been secured in the Northeast Morainal division and one complex of 1,200 acres secured in the Grand Prairie division. Nine hundred of the total 4,500 acres were acquired since the publication of the *Biodiversity Recovery Plan*.

c. Maintain existing quality of publicly owned, high-quality natural areas.

As documented in the community sections, the majority of the region's natural areas are under-managed or unmanaged. Indications are that sites receiving the most management appear to be those of higher quality. In their re-assessment of Illinois Natural Areas Inventory prairie sites, Bowles and Jones (2003) found that only one of 25 Grade A stands was lost, whereas 35 percent of Grade B sites had been destroyed. To the authors, this difference, in part, reflected a greater interest in preserving higher quality sites. This study also underscores the critical value of management beyond the use of controlled burns, as non-native species increased in abundance over time in Grade A and B prairies, regardless of fire frequencies (Bowles and Jones 2003).

d. Protect high-quality natural areas in private ownership.

Dreher (2004) identifies 1.8 million acres of resource protection areas that could and should be protected within the tri-state Chicago Wilderness region. This is a far cry from the 226,000 of protected natural areas currently documented. Although a diversity of open space advocates were successful in preserving two open space acquisition programs in the Illinois fiscal year 2005 budget, it is unlikely that government sources ever would be sufficient to protect the approximately 1.5 million available resource protection area acres. Therefore, individual landowners must be encouraged to protect and preserve their natural lands. Chapter seven outlines the three instruments offered by the Illinois Nature Preserves Commission to public and, increasingly, to private landowners to protect their natural lands. Chapter seven also chronicles a growing number of nonprofit land trusts concentrating their efforts on outreach to private landowners, encouraging them to place conservation easements on their natural lands, which ensures their permanent protection.

e. Mitigate factors with negative impacts that occur outside of natural areas but within watersheds or buffer zones.

Individual recovery efforts are of critical importance in the recovery of the region's biodiversity. However, off-site development can have negative effects on even the best restoration efforts. Several of the region's rare fen communities are threatened with off-site development that would significantly alter the water tables upon which the fens depend. At Churchill Prairie Nature Preserve in DuPage County, Illinois, road salt from I-355 has turned a Grade C prairie into a Grade D/E site at its eastern end, in spite of regular controlled burns and periodic brush removal. Chapter seven relates a range of efforts, from the adoption of individual municipal stormwater plans to statewide antidegradation regulations that can protect high-quality waterways, and that are designed to mitigate the negative effects of development.

8.5 Restore Natural Communities to Ecological Health

a. Reestablish the ecological health of the deteriorating high-quality natural areas.

b. Improve all natural areas, concentrating first on those that contribute most to global and regional biodiversity.

c. Provide corridors that link areas as needed.

d. Restore ecological processes that support sustainable systems.

e. Return natural communities to sufficient size for viable animal populations by restoring or recreating them.

Chapters two and three include examples of restoration efforts and reiterate a wide range of recommended actions to promote the recovery of the region's natural communities, animal assemblages and rare individual species. Across the board, those efforts and recommendations reflect the objectives listed above and more.

8.6 Manage Natural Communities to Sustain Native Biodiversity

a. Attain greater capability for ecological management within public entities.

b. Encourage the sharing of experience and resources among natural area managers in different jurisdictions.

c. Monitor the recovery progress and status of natural communities.

d. Demonstrate the feasibility of protection and restoration in fragmented, human-dominated landscapes, making use of such tools as prescribed burning, restoration of hydrology and removal of invasive species.

A key recommendation of both the *Biodiversity Recovery Plan* and the *Report Card*, one that can not be stressed enough, is the need to manage more natural areas. The *Report Card* confirms that the majority of the region's natural areas are unmanaged or under-managed, resulting in an overall decline in the region's biodiversity in spite of a number of significant recovery efforts.

Equally critical, as identified below, is the need to monitor recovery progress and the status of natural communities. To do this effectively, the *Report Card* further recommends strongly that specific, measurable recovery goals, along with indicators and monitoring protocols, be developed for each natural community and animal assemblage. The conservation designs developed thus far for woodlands, grassland birds and savanna herpetofauna provide potential examples to follow.

Chapter five details a full complement of management, research and monitoring activities and recommendations that include and build upon the above objectives.

8.7 Develop Citizen Awareness and Understanding of Local Biodiversity to Ensure Support and Participation

a. Form educational partnerships among citizens, organizations and agencies to promote awareness.

b. Build sufficient awareness of natural communities of the region and their global significance so that they become a recognized part of the culture of the region.

c. Develop programs to promote broad-based understanding of the global significance of the region's natural communities.

d. Design education strategies to meet the needs of all audiences at all levels.

e. Reach those not traditionally involved in natural history or conservation.

Chapter six provides a thorough review of the efforts of the Chicago Wilderness Education and Communication Team and the consortium's communication program in addressing these objectives.

8.8 Foster a Sustainable Relationship between Society and Nature in the Region

a. Integrate conservation of biodiversity into ongoing development and planning for land use, transportation and infrastructure.

b. Encourage major land users to adopt practices that promote biodiversity and its sustainability by integrating the beauty and function of nature into our neighborhood, corporate and public lands.

c. Encourage inclusion of biodiversity goals in local planning and implementation.

d. Identify and address factors that lead to sustainable use.

e. Regularly monitor indicators of biodiversity and sustainability throughout the region.

f. Support and encourage efforts of citizen scientists working to conserve biodiversity.

By 2030, the six-county northeastern Illinois region alone is expected to boast a population of 10 million—1.9 million more people than lived in the area in 2000 (Northeastern Illinois Planning Commission 2005). Almost every day, the effects of this explosive growth are evident in once-open spaces being converted to housing developments. Unchecked, conventional development practices will continue to have a negative effect on the region's remaining natural areas. The Chicago Wilderness consortium, however, has been aggressively advocating for a different kind of development. Sustainable development may be variously defined, but in general it strives for a balance between the built and the natural environment. Chapter seven provides a comprehensive review of the numerous sustainable development efforts occurring throughout the region, many guided by the Chicago Wilderness consortium's members and its Sustainability Team.

8.9 ENRICH THE QUALITY OF THE LIVES OF THE REGION'S CITIZENS

a. Increase opportunities for all citizens to experience the beauty and restorative powers of nature.

To some, the sight of prairie dropseed, big bluestem and Indian grass are dramatic reminders of our region's natural heritage. To others, they're just weeds. But a recent Chicago Wilderness survey, summarized in chapter six, reveals that the more people know about our natural heritage, the more they understand and appreciate its value. And the Chicago Wilderness consortium and its members provide a number of different avenues of entry into the natural world, from *Chicago WILDERNESS Magazine* to various volunteer opportunities.

It is not yet documented how many volunteer opportunities there are in the region, but it appears that the number is growing steadily, as is the number of volunteers. The work is often challenging, but with it comes a deep sense of accomplishment in the recovery of a living thing or a living community.

The Education and Communication Team and the consortium's communication staff, as outlined in chapter six, also actively pursue multi-faceted strategies to provide even more information and invitations to the region's diverse residents to learn about and participate in local biodiversity conservation.

b. Enhance human health through improved air and water quality, as well as protection from flooding, by restoring and maintaining the ecological integrity of natural communities.

Established in 1999, the publication year of the *Biodiversity Recovery Plan*, the Clean Air Counts Campaign is a voluntary, multi-year, regional initiative to improve air quality and reduce ozone-causing emissions. A collaborative effort between the Metropolitan Mayors Caucus, the City of Chicago, the U.S. Environmental Protection Agency–Region 5, the Illinois Environmental Protection Agency and the Delta Institute, the initiative seeks to achieve specific and significant reductions in targeted smog-forming pollutants and major reductions in energy consumption.

c. Identify strategies that promote economic growth while sustaining biodiversity.

Part of the rationale for the Clean Air Counts Campaign is to ensure the continued economic viability of the region. In response to repeated violations of the National Ambient Air Quality Standard for ground-level ozone (smog), the Chicago region was one of 10 areas in the country designated as a severe non-attainment area for one-hour ozone concentrations. With the recent implementation of the more stringent eight-hour standard, the Chicago region continues to be a non-attainment area. Not only does this affect the health of the region's residents, but it could have serious consequences for the region's economic health, such as a more restrictive, federally-imposed regulatory environment, which could compromise the output of existing business and discourage new businesses from moving into the region. Through partnerships with the Clean Air Counts Campaign, the Corporatelands Program, and the Chicago Wilderness Corporate Council, members of the Chicago Wilderness consortium seek to work in pursuit of the long-term environmental, social and economic health of the region.

Any long-term view of the region must acknowledge that the population of the region is expected to increase markedly. Chapter seven details a range of strategies, led by the members of the Chicago Wilderness consortium and by its Sustainability Team, to manage growth in ways that support economic development that is ecologically sustainable as well.

Chapter 9
Report Card Recommendations

The objectives of this *Report Card* are to assess changes in the condition of the region's natural communities since the publication of the *Biodiversity Recovery Plan*, document the condition of available data, measure progress toward achieving *Biodiversity Recovery Plan* objectives and make recommendations for future report cards. The preceding chapters evidence that the Chicago Wilderness consortium has made progress in recovering the biodiversity of the region. However, there is much work left to do. To facilitate that work and the process of developing the next report card, the recommendations of this *Report Card* to members of the Chicago Wilderness consortium are:

1. **Aggressively spur the development and region-wide adoption of specific recovery goals, indicators and monitoring protocols for each Chicago Wilderness community and assemblage type.**

2. **Utilize these goals, indicators and monitoring protocols to guide site-specific management plans and the collection of data.**

3. **Develop baseline data for each of the region's communities and assemblages.**

As noted in the preceding sections, the *Biodiversity Recovery Plan* outlines broad recovery goals and objectives. This, of course, was an enormously significant advance for the region's conservation community, but as the plan is intended to be a living document that will continue to evolve as new ideas and information arise, the next step of creating refined, specific, measurable recovery goals is at hand. The three conservation designs accomplished to date—for woodlands, grassland birds and savanna herpetofauna—serve as examples of the type of refined, region-wide guides needed for the development of site-specific management plans, and the type of guides that will ultimately allow for more effective progress reporting. The development in 2001 of regional plants of concern monitoring protocols is also a step in the right direction toward developing indicators. Additionally, the Chicago Wilderness Woods Audit marks an important advance in developing a monitoring protocol for the region's upland forests, woodlands and savannas, and establishes baseline data for quantifying future trends.

Refined recovery goals, along with the development of region-wide indicators and monitoring protocols, should also guide the future collection of data. Currently, there are any number of research and data collection efforts underway throughout the region, however it is unclear the extent to which many relate specifically to Chicago Wilderness biodiversity recovery goals. The region would greatly benefit from region-wide consensus about how to monitor, and specifically what is to be monitored over what period of time, toward the goal of establishing reliable, quantified baseline data from which future trends may be discerned.

4. **Develop a repository for the region's data.**

5. **Coordinate the region's data collection and reporting.**

The process of future reporting would be greatly facilitated by the development of a repository for data and analysis. Hand in hand with this is the need for dedicated resources for the coordination of data gathering. During the *Report Card* process, many experts provided generously of their time to fulfill information requests, but much of the information gathering took several months, and in many cases, data were not available. Coordinated data collection would greatly aid future reporting and perhaps assist natural resource management agencies and organizations in partnering in the implementation of region-wide practices and standards.

6. **Secure more broad-based participation throughout the region.**

The *Biodiversity Recovery Plan* and *Report Card* remain primarily Illinois-centric. The Indiana portion of

Chicago Wilderness is somewhat represented in the data and the Wisconsin portion of the region decidedly less so.

7. Clarify and potentially refine the boundaries of the Chicago Wilderness region.

Chicago Wilderness is defined as a regional nature reserve that includes more than 225,000 acres of protected natural areas located in Kenosha County, Wisconsin; in Cook, DuPage, Kane, Lake, McHenry and Will Counties in Illinois; and in Lake and Porter Counties in Indiana. The Chicago Wilderness region was originally defined by natural area features and intended to help organizations work across geo-political boundaries.

Currently, there is discussion within the Chicago Wilderness consortium as to whether or not the boundaries of the Chicago Wilderness region should be expanded and more clearly defined, either again by geographic features or perhaps by county boundaries. In line with the *Report Card* recommendations to be specific in the development of recovery goals, etc., it is also the recommendation of the *Report Card* project team that the Chicago Wilderness consortium refine and clarify its boundaries. This would facilitate the collection of data from land-managing agencies, aid in the analysis of that data, and further the consortium's ability to measure its own progress in conserving local biodiversity.

8. Come to region-wide consensus on a natural community classification system.

In the course of the *Report Card*'s natural community workshops, there was debate about the current natural community definitions. There is a fundamental need to achieve consensus on how the various natural communities within the region are classified. Upon this hinges the critical recommendation to develop specific recovery goals, indicators and monitoring protocols.

9. Articulate specific goals for non-biological objectives.

Just as specific goals are recommended for the region's biological objectives, so, too, are the development of specific goals recommended for the various non-biological objectives, including education, communication and sustainability. Annual workplans, outlining specific process and outcome measures, would allow for more precise, targeted reporting in future iterations of the *Report Card*.

10. Schedule the development of the next *Report Card* to aggressively spur the completion of the above recommendations.

Above all, the development of the *Report Card* has been a learning process. It marks another significant step in the Chicago Wilderness consortium's model effort to recover the long-term health of the region's natural resources.

Finally, there is little doubt that our region will continue to increase in population, and that means even more pressures on our remaining natural areas. To promote a balance between continued growth and the preservation of our natural heritage, the recommendations of this *Report Card* to members of the Chicago Wilderness consortium, state and local governments, and other local decision-makers are:

1. Significantly increase the number of natural areas under active management.

2. Acquire or otherwise protect additional natural areas to balance sustainable growth with the conservation of local biodiversity.

These last recommendations are further discussed in the *Summary Report–The State of Our Chicago Wilderness: A Report Card on the Health of the Region's Ecosystems,* published as a supplement to this document.

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Appendix A
Projects Funded by the Chicago Wilderness Consortium, 1998 – 2004

1998 Midwestern Rare Plant Conference and Task Force Meeting
1999 Unionid Mussel Survey and Conservation Program
A Baseline Inventory of Soil Microarthropods from Three Remnant Oak Woodland Communities in Northeastern Illinois
A Framework for Regionwide Ecological Monitoring
A Model for Engaging High School and College Students in Biodiversity Research on Chicago Wilderness
A Model for Managing Overabundant Deer Populations in the Natural Areas of the Chicago Wilderness
A Multi-organizational Effort to Revitalize the Ecology of the Calumet Region
A Multi-organizational Effort to Revitalize the Ecology of the Calumet Region: Phase II
Abundance and Nesting Productivity of Wetland-Dependent Birds in Northeastern Illinois
Accessing and Assessing Local Government Decision Maker Needs to Enhance Natural Resource Protection and Sustainable Watershed Planning
Advanced Prescribed Fire Use Training for Chicago Wilderness Member Organizations
Analysis of the Northeastern Illinois Wetland Bird Survey: 25 Years of Change
Baseline Survey of Invertebrates at Indian Ridge Marsh, Indian Creek and Hegewisch Marsh
Biodiversity and Distribution of Bats in the Chicago Wilderness
Biodiversity Extension Service
Biodiversity Summer Camps at Indiana Dunes Environmental Learning Center
Bird Conservation Network Conference (1999)
Breeding Birds of Cook County 1985-1997
Building Capacity in Teacher Training and Testing a Model for a Chicago Wilderness Teacher Training Network
Calumet Partnership Workshop
Certified Interpretive Training Workshop
Change in Physical Stream Parameters Related to the Dechannelization of a Section of Nippersink Creek
Chicago Lake Plain Prairie Insect Survey
Chicago Region Birding Trail Guide
Chicago Region Sustainability Indicator Project
Chicago Wilderness Audience Research Project
Chicago Wilderness Education and Outreach Workshop on Research-Based Biodiversity Message Points
Chicago Wilderness Good Neighbor Focus Group Project: Discovering How Homeowners Become Good Neighbors
Chicago Wilderness Grassland Audit
Chicago Wilderness Green Infrastructure Vision
Chicago Wilderness Green Infrastructure Vision Phase II: Product Dissemination
Chicago Wilderness Mighty Acorns Program
Chicago Wilderness Mighty Acorns Program: A Self-sustaining Future
Chicago Wilderness Outreach Materials: Putting Conservation into the Hands of Developers and Municipalities
Chicago Wilderness Prescribed Burn Communication Strategy Development
Chicago Wilderness Regional Monitoring Plan Development Workshop
Chicago Wilderness Restoration Video: Creating a Compelling Tool to Demonstrate the Benefits of Ecological Restoration
Chicago Wilderness Teacher Training Hubs: Building on Success
Civic Community Outreach in a Developing Suburban Watershed
Conservation Design
Conservation Design Model Ordinance
Conservation Policy Initiatives
Cost Analysis of Conservation Versus Conventional Development in Northeastern Illinois and Northern Indiana
Crafting a Common Lexicon: Nature's Recovery Campaign

Crane Chronicles: Critical Thinking About Human Activity & Wetland Health
Creating an Interactive Green Infrastructure Database for the Chicago Wilderness Region
Creating More Effective Web-Based Communication Tools for the Chicagoland Environmental Network and Chicago Wilderness
Data Resources Inventory, Data Compatibility Assessment, and Planning Process for a Regional Chicago Wilderness Information Management System
Developing a Natural Science Research Agenda for Chicago Wilderness
Development of a Uniform Scientific Relational Database Management System for Land Management Agencies in Northeastern Illinois
Development of Ecological Inventories Using Geographical Information System
Direct Outreach to the Professional and Development Communities on Sustainable Development for Biodiversity Benefits
Early Warning and Rapid Response Invasive Species Program
Ecological Investigation of Invertebrate Populations of Spring Bluff, Elm Road Forest, and Grainger
Ecological Monitoring of the MacArthur Wood Habitat Restoration Project
Ecosystem Restoration and the Viability of Bird Populations in the Chicago Wilderness
Ecosystem Restoration within Four Illinois Nature Reserves Owned by the Illinois Department of Natural Resources
Eden Place: Biodiversity Training for Responsible Stewardship
Education Materials about Biological Control of Purple Loosestrife in Illinois Wetlands
Education, Outreach, and Monitoring Northwest Indiana's Avifauna
Effective Bird Monitoring for Conservation in the Chicago Wilderness Region: Devising a Standardized Protocol and Creating an Immediate Data Bank
Effective Vegetation Monitoring in a Management Context: Taking the Pulse of the Wilderness
Enhancing the Chicago Wilderness Prescribed Burn Training Manual
Evaluation of Diversity of Nongame Fish Species in Lake County, Illinois
Experimental Restoration of Oak-Savanna in the Indiana Dunes National Lakeshore
Ferson/Otter Creek Restoration Project
Finalizing the Chicago Wilderness Interactive Bird Data Entry Process
Fox River Biodiversity Inventory Phase-II GIS Development
GIS Land Cover Map and Ecological Model of the Savannas, Woodlands, and Forests of Will and Cook Counties
GIS Products and Analyses for the Chicago Wilderness Recovery Plan
Glacial Park Headwater Restoration
Green Gary 2004: Celebrating Our Natural Spaces
Guiding Families Towards Recovery (Nature's Recovery)
Habitat Base Map for Ecological Restoration Planning in the Butterfield Creek Watershed
Historic Landscape Vegetation Pattern, Composition, and Structure of McHenry and Lake Counties, Illinois
Historic Vegetation Pattern, Composition, and Structure of Kane County, Illinois as reported by the U.S. Public Land Survey
Identifying the Characteristics of Biodiversity Literacy
Illinois Biodiversity Basics Revisions
Illinois Biodiversity Basics: A Program for Formal and Non-formal Educators
Impact of European Buckthorn on Aspects of Ecosystem Structure and Functioning in Woodlands Around Chicago
Impact of Nitrogen Deposition on Macrofungi in Chicago Wilderness
Impact of Prescription Burns on Prairie Spiders
Impacts of Deer Herbivory Upon Natural Areas Restoration in the Chicago Wilderness
Implementation of the Chicago Wilderness Strategic Plan
Indian Boundary Prairies Wetland Restoration Project
Influence of Excessive Deer Browsing on Prairie Forbs
Influencing Public Infrastructure Design and Implementation Phase I
Interaction of Armillaria Root Rot, Canker Disease and Prescribed Burning on Woodland Structure and Health

Interpretive Skills Training Workshop
Interpretive Skills Training Workshop, Step 2: Thematic Development
Invasive Plants: Global Issues, Local Concerns
Lake Michigan Action Plan
Lake Michigan Urban Aquatic Habitat Restoration Initiative
Land Use Media Guide
Life History and Current Status of State of Illinois Endangered and Threatened Fish Species From Glacial Lakes and Marshes of Northeastern Illinois
Linking Watersheds Conference: Creating a Network for Watersheds within Chicago Wilderness
Marketing of and Technical Assistance on the Conservation Design Resource Manual
Metropolitan Natural Landscaping Initiative
Midwest Ecological Burn Training
Mobilizing a Community's Assets
Mobilizing a Community's Assets Phase 4: Implementation
Monitoring Northeastern Illinois Forest Diversity: Interactions Between Dendrochronological History
Natural Area Volunteer Stewardship in Chicago Parks
Natural Community GIS Mapping Project
Natural Landscaping Video: Managing Large Land Parcels for Increased Biodiversity and Other Benefits
Natural Science Research Agenda Project Phase 2
Nature and Culture: A Multicultural Pilot Project in Uptown and Edgewater
Nippersink Creek Remeandering Project
Nippersink Creek Subwatershed Project
Northwest Indiana Mighty Acorns Program
Northwest Indiana Teachers' Hub Initiative
One Year Natural Resources Data Specialist Term Position with the Lake County Forest Preserve District
Outreach and Technical Assistance to Local Government Officials and Decision-Makers
Planning Conference to Address the Environmental Education Goals of the Biodiversity Recovery Plan
Planning for Teacher Training in Biodiversity Education
Planning for the Chicago Wilderness State of the Region Report Card
Plant-Pollinator Associations in Reconstructed Prairies
Plants of Concern
Plants of Concern: Scientific Data Gathering and Volunteer Vegetation Monitoring Training
Plants of Concern: Scientific Data Gathering & Volunteer Vegetation Monitor Training Year Two
Plants of Concern: Standardized Rare Plant Monitoring Using Trained Volunteers
Plants of Concern: Training Volunteers to Conduct Standardized Rare Plant Monitoring on a Regional Scale
Preservation Partners: Applying Problem-Solving Skills to Restoration Activities
Program Evaluation Plan for Indiana Dunes Environmental Learning Center
Programming for the Indian Ridge Marsh Environmental Center and the Calumet Region
Promoting Sound Policies for Grassland, Shrubland and Migratory Bids
Reed-Turner Woodland Illinois State Preserve-Vegetation Sampling and Analysis
Regional Conservation Design
Relocation, Mapping and Assessment of Cook County's Endangered and Threatened Plant Species: Updating former records - Phase II
Relocation, Mapping and Status Assessment of Cook County's Endangered and Threatened Plant Species: Updating former records
Restoration Alternatives for Large Waterways: A Design Charette and Handbook
Restoration and Interpretation of The Grove National Historic Landmark Glenview Park District
Restoration and Interpretation of the Mary Mix McDonald Woods
Restoration Effects in an Oak-Woodland Community at Swallow Cliff Woods
Restoration Effects in an Oak-Woodland Community at Swallow Cliff Woods III
Restoration of Sterne's Graminoid Fen
Restoring Oak Savanna Community Structure Through Manual Removal of Woody Species
Revisions to Chicago Wilderness Community Classification Systems
Science in the City
State of the Region Report Card
Status and Temporal Change in Chicago Region Prairies, Savannas, and Wetlands Sampled by the Illinois Natural Areas Inventory
Status of Amphibians and Reptiles in Savanna Habitats and Savanna Mosaic Communities of the Chicago Wilderness Region

Strategies for Survival: The ExSitu Plant Conservation Symposium
Stream Restoration Inventory
Stream Restoration Inventory, Phase 2
Sustainable Calumet Network
Sustainable Watershed Action Team (SWAT)
Sustainable Watershed Action Team Enhancement: Regulatory Coordination
Sustaining and Expanding Regional Volunteer Monitoring Through the Chicago Wilderness Habitat Project
Targeted Natural Landscaping Outreach for Biodiversity Benefits
The Biodiversity Education Through Action Program: Project Evaluation and Dissemination
The Correspondence of Soil Types with Plant Community Types in the Natural Areas of McHenry County, Illinois
The Establishment of Long-Term Research at Chiwaukee Prairie
The Habitat Project: Monitoring for Adaptive Management
The Habitat Project: Region-wide Monitoring for Chicago Wilderness
The Impacts of Eurasian Earthworm and Invasive Shrubs on Chicago Woodland Ecosystems: Surveying Distribution and Evaluating Potential Ecosystem Damage
The Regional Transportation Plan and Biodiversity
The Science of Natural Landscaping: Quantifying the Benefits
The Use of Hyperspectral Remote Sensing Imagery for Monitoring Prairie Ecosystem Restoration
Thirty-First Natural Area Conference: Emerging Issues–Possibilities and Perils, Chicago, Illinois
Training Chicago Wilderness Volunteers to Communicate on Biodiversity
Training/Technical Assistance for Local Government Officials on Biodiversity Protection Techniques
Update of Natural Landscaping for Local Officials: A Source Book
Use of Macroinvertebrate Functional Groups to Assess Ecosystem Attributes in the Restored Area of Nippersink Creek, McHenry County, Illinois
Using Doppler Radar to Quantify Habitat Use by Forest Dwelling Migratory Songbirds
Wetland Conservation Strategy Model Development
Wolf Road Prairie Buffer Restoration
Wolf Road Prairie Eco-Literacy Project
Woodland and Savanna Communities in Chicago Wilderness and Their Current Conditions: Identification and Mapping Through Integration of Landsat and Transection Data
Woodlands Audit Pilot Project
Yellow-Headed Blackbird Conservation in Northeast Illinois

Appendix B
Members of the Chicago Wilderness Consortium
185 Member Organizations as of February 2006

Alliance for the Great Lakes
Association for the Wolf Lake Initiative
Audubon–Chicago Region
Barrington Area Council of Governments (BACOG)
Batavia Plain Dirt Gardeners
Bird Conservation Network
Boone Creek Watershed Alliance
Broadtree Adventures in Education
Brookfield Zoo
Butterfield Creek Steering Committee
Calumet Ecological Park Association
Calumet Environmental Resource Center
Campaign for Sensible Growth
Campton Historic Agricultural Lands, Inc.
Campton Township
Canal Corridor Association
Cary Park District
Center for Neighborhood Technology
Chicago Academy of Sciences/Peggy Notebaert Nature Museum
Chicago Audubon Society
Chicago Botanic Garden
Chicago Herpetological Society
Chicago Ornithological Society
Chicago Park District
Chicago Wilderness Corporate Council
Chicago's Green City Market
Chicagoland Bird Observatory
Chiwaukee Prairie Preservation Fund, Inc.
Citizens for Conservation
City of Chicago, Department of Environment
City of Park Ridge
City of Rolling Meadows
Clarendon Hills Park District
Coffee Creek Watershed Conservancy
College of DuPage
The Conservation Foundation
The Conservation Fund
Conservation Research Institute
CorLands
Crystal Lake Park District
DePaul University, Environmental Science Program
Downers Grove Park District
Ducks Unlimited–Great Lakes/ Regional Office
DuPage Birding Club
Eden Place Nature Center
Elmhurst Park District
Emily Oaks Nature Center
Environmental Law and Policy Center of the Midwest
Evanston Environmental Association
Faith in Place
The Field Museum
Flagg-Rochelle Community Park District
Forest Preserve District of Cook County
Forest Preserve District of DuPage County
Forest Preserve District of Kane County
Forest Preserve District of Will County
Fox Valley Land Foundation
Friends of the Chicago River
Friends of the Forest Preserves (Cook County)
Friends of the Morton Grove Forest Preserves
Friends of the Parks
Friends of Ryerson Woods
The Garden Clubs of Illinois, Inc.
Garfield Park Conservatory Alliance
Geneva Lake Conservancy
Geneva Park District
Glenview Prairie Preservation Project
The Grove National Historic Landmark
Homewood Izaak Walton Preserve, Inc.
I&M Canal National Heritage Corridor Civic Center Authority
Illinois Audubon Society
Illinois Audubon Society, Ft. Dearborn Chapter
Illinois Butterfly Monitoring Network
Illinois Department of Natural Resources
Illinois Endangered Species Protection Board
Illinois Natural History Survey
Illinois Nature Preserves Commission
Illinois Ornithological Society
Illinois-Indiana Sea Grant College Program
Indian Creek Watershed Project, Ltd.

Indiana Department of Natural Resources
Indiana Dunes Environmental Learning Center
Indiana University Northwest
Irons Oaks Environmental Learning Center
Jurica Nature Museum
Kane-DuPage Soil & Water Conservation District
Kendall County Forest Preserve District
Lake Bluff Open Lands Association
Lake County Forest Preserves
Lake County Health Department–Environmental Health Services
Lake County (IN) Parks and Recreation Department
Lake County Soil & Water Conservation District
Lake County (IN) Solid Waste Management
Lake County Stormwater Management Commission
Lake Forest College
Lake Forest Open Lands Association
Lake Katherine Nature Preserve
Land Conservancy of McHenry County
Land Trust Alliance
Land Trust of Walworth County
Liberty Prairie Conservancy
Lincoln Park Zoo
Long Grove Park District
Loyola University, College of Arts and Sciences
Max McGraw Wildlife Foundation
McHenry County Conservation District
McHenry County Conservation Foundation
McHenry County Defenders, Inc.
Metropolitan Water Reclamation District
The Morton Arboretum
Naperville Park District
National Association for Interpretation–Region 5
Natural Land Institute
The Nature Conservancy–Illinois Chapter
NiSource Environmental Challenge Fund
North Branch Restoration Project
North Cook County Soil & Water Conservation District
Northbrook Park District
Northeastern Illinois Planning Commission
Northeastern Illinois University
Northwest Indiana Forum Foundation, Inc.
Northwestern Indiana Regional Planning Commission
Northwestern University Environmental Council
Oakbrook Terrace Park District
Openlands Project
Palos-Orland Conservation Committee
Palos Park Tree Foundation
Park District of Highland Park
Portage Park and Recreation Department (IN)
Porter County (IN) Plan Commission
Prairie Club
Prairie Club Conservation Education Fund
Prairie Crossing Homeowners Association
Prairie Woods Audubon Society
Prairies Forever
Pringle Nature Center
Purdue University Calumet
Resurrection Center
Richardson Wildlife Sanctuary
River Forest Park District
Save the Dunes Conservation Fund
Save the Prairie Society
Schaumburg Park District
John G. Shedd Aquarium
Shirley Heinze Land Trust
Sierra Club, Illinois Chapter
Southeast Environmental Task Force
Spring Brook Nature Center
St. Charles Park District
Sustain, The Environmental Information Group
Taltree Arboretum and Gardens
Thorn Creek Audubon Society
The Trust for Public Land
Town Square Condominium Association
University of Illinois at Chicago
University of Illinois Extension, Northeast Region
University of Illinois at Urbana–Champaign
US Army Corps of Engineers, Chicago District
US Dept. of Energy, Argonne National Laboratory
US Dept. of Energy, Fermi National Accelerator Lab
US Environmental Protection Agency, Region 5
US EPA Great Lakes National Program Office
US Fish & Wildlife Service
USDA Forest Service
USDA Natural Resources Conservation Service
USDI National Park Service
Village of Brookfield
Village of Deer Park
Village of Frankfort
Village of Glenview
Village of Hoffman Estates Environmental Commission
Village of Homer Glen

Village of Lake Barrington
Village of Lincolnshire
Village of North Barrington
Village of Orland Park
Village of Riverside
Village of Schaumburg
Waukegan Harbor Citizens' Advisory Group
Wayne Park Commission
The Wetlands Initiative
Wheaton Park District
Wild Ones Natural Landscapers, Ltd.
Wild Flower Preservation Society of Illinois
Woodland Savanna Land Conservancy

Members of the Chicago Wilderness Corporate Council
27 Members as of February 2006
Agrecol Corporation
Applied Ecological Services, Inc.
ARAMARK Facility Services
BP America, Inc.
The Care of Trees
Christopher B. Burke Engineering, Ltd.
ComEd
Futurity, Inc.
Hitchcock Design Group
HSBC North America
JFNew
Kabbes Engineering, Inc.
Kirk Homes
LaSalle Bank
McGinty Brothers
Midwest Generation
Motorola
Nicor Gas
NiSource, Inc.
Northern Trust Corporation
Parsons Corporation
Pizzo and Associates, Ltd.
Prairie Holdings Corporation
RRM Foundations/Cantigny
Skidmore, Owings & Merrill LLP
V3 Consultants
WRD Environmental

CHICAGO WILDERNESS

A Regional Nature Reserve

Chicago Wilderness is a regional nature reserve that includes more than 225,000 acres of protected natural areas. It stretches from southeastern Wisconsin, through northeastern Illinois and into northwestern Indiana. The protected lands and waters of Chicago Wilderness include county preserves, state parks, federal preserves, and privately owned areas. There are also many unprotected natural areas within Chicago Wilderness.

The Chicago Wilderness consortium is an alliance of more than 180 organizations working to study, restore, protect and manage the natural ecosystems of the Chicago region in order to contribute to the conservation of global biodiversity and enrich local residents' quality of life.