

RS-15-159

10 CFR 20.2002

June 8, 2015

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Dresden Nuclear Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: Supplemental Information Related to Proposed 10 CFR 20.2002 Disposal
Procedure

References:

1. Letter from P. R. Simpson (Exelon Generation Company, LLC (EGC)) to NRC, "Request to Dispose of Slightly Contaminated Soil In Accordance With 10 CFR 20.2002," dated March 18, 2014
2. Email from B. Mozafari to M. Mathews, "FW: Draft-Dresden_RAIs_20 2002 Request," dated April 20, 2015
3. Letter from P. R. Simpson (EGC) to NRC, "Response to Request for Additional Information Related to Proposed 10 CFR 20.2002 Disposal Procedure," dated May 20, 2015

In Reference 1, EGC requested to dispose of slightly contaminated soil onsite at Dresden Nuclear Power Station, Units 2 and 3 (DNPS). Specifically, EGC requested permission to spread the current inventory of approximately 6,000 cubic meters (m³) of soil, and approval to conduct future disposal operations onsite within the bounds of a radiological dose assessment, not to exceed a total volume of 20,000 m³. This request was submitted in accordance with 10 CFR 20.2002, "Method for obtaining approval of proposed disposal procedures." During the course of its review of the Reference 1 request, the NRC determined that additional information was required for it to complete an Environmental Evaluation of this request. The additional information was requested in Reference 2, and provided by EGC in Reference 3.

During a teleconference between EGC and the NRC on May 20, 2015, it was agreed that supplemental information was required to clarify certain EGC responses provided in Reference 3. The supplemental information is provided in Attachment 1.

Additionally, a 2006 report developed by the Wildlife Habitat Council has been included as Attachment 2. This report documents an evaluation of the wildlife habitat at DNPS, and was discussed in Reference 3.

There are no regulatory commitments contained within this letter. Should you have any questions concerning this letter, please contact Mr. Mitchel A. Mathews at (630) 657-2819.

Respectfully,

A handwritten signature in black ink, appearing to read "Patrick R. Simpson", followed by a long horizontal flourish.

Patrick R. Simpson
Manager – Licensing
Exelon Generation Company, LLC

Attachments:

1. Supplemental Information Related to Proposed 10 CFR 20.2002 Disposal Procedure
2. Wildlife Habitat Council Report, "Site Assessment and Wildlife Management Opportunities for Exelon Corporation's Dresden Generating Station," dated October 2006

ATTACHMENT 1
Supplemental Information Related to Proposed 10 CFR 20.2002 Disposal Procedure
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During a teleconference between the NRC and Exelon Generation Company, LLC (EGC), on May 28, 2015, it was agreed that supplemental information would be required for the NRC to complete its Environmental Assessment of the March 18, 2014, request to dispose of slightly contaminated soil onsite at Dresden Nuclear Power Station (DNPS) in accordance with 10 CFR 20.2002, "Method for obtaining approval of proposed disposal procedures." Specifically, the NRC requested the quantity of vegetation including herbaceous, shrub, and especially woody species and percent coverage of vegetation on the proposed disposal site shown in Figures 1 and 2 below. Figures 1 and 2 are recent photographs that were taken from the southeast of the proposed soil disposal site.

Additionally, a clarification regarding the amount of ground disturbing activity that will be required to support the proposed disposal procedure and the quantity of trees and other threatened and endangered species habitat that will need to be removed in support of this effort was requested.



Figure 1: Recent Side View of Proposed Disposal Site Taken from Southeast of the Proposed Disposal Site Looking North

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Figure 2: Recent Side View of Proposed Disposal Site Taken Southeast of the Proposed Disposal Site Looking Southwest

To this end, an onsite survey of the proposed disposal site and surrounding EGC property was conducted by Dr. Daniel W. Smith, Ph.D of Conestoga-Rovers and Associates. Additionally, photographic vouchers of plant specimens identified onsite were reviewed by Mr. Scott E. Bush, P.W.S., who is a recognized botanical expert in the area of plant species identification. The vegetation and habitat were assessed by walking down the proposed disposal site and surrounding areas. The percent coverage by species and the dominant species on the proposed disposal site were visually estimated at numerous locations during the survey. The following paragraphs summarize the survey and its conclusions.

The survey determined that the proposed disposal site is currently highly disturbed. It is an elevated plateau of clean fill previously taken from other areas of EGC property and placed at the proposed disposal site over the last 10 years or so. The proposed disposal site has been graded and is now roughly level, but it may slope upward to the west and/or the underlying topography may slope slightly downward to the west. Thus, the fill plateau is about eight to 10 feet above the surrounding land in the eastern portion of the proposed disposal site, but maybe 10 to 15 feet or more above the surrounding land to the west. Because the proposed disposal site is relatively flat and elevated above the surrounding land, the existing soils were well drained.

The proposed disposal site is surrounded by relatively undisturbed land and vegetation. It is surrounded to the west and north by moderate-sized, mature cottonwood trees. To the east, the land is vegetated with groups of small brushy trees, mostly autumn olive but also honey locust and mulberry. To the south, the surrounding landscape is mostly grasses. The proposed disposal site is surrounded, at the base of the fill, by a silt fence. EGC does not intend to remove any of the existing soil from the proposed disposal site, and the additional fill, as proposed, is not expected to change the current footprint of the site. EGC will level the proposed disposal site in preparation for the receipt of the slightly contaminated soil and, will limit excavation activities to less than or equal to one foot below current grade level. Tree

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clearing will be unnecessary since the proposed disposal site is of sufficient size to accommodate the 100 meter (m) by 100 m disposal field including a five foot offset from the existing tree line. Therefore, these contiguous natural areas are not expected to be adversely impacted by the proposed disposal procedure.

A review of historical Google Earth photographs revealed that clean fill has been placed at the proposed disposal site at various times since about 2005. However, the fill was graded as recently as 2012, as the proposed disposal site is in its current shape and un-vegetated in aerial photos from 2012. Since 2012, the proposed disposal site has been colonized by early successional grasses and forbs. The height of the vegetation varies, from between six inches to approximately four feet, based on the dominant plant species present, consistent with newly colonized disturbed areas. Vegetation currently covers more than 90 percent of the soil on the proposed disposal site. There is currently a very small, very sparsely vegetated area in the middle of the proposed disposal site where EGC vehicles have utilized the proposed disposal site to turn around. Except for a few seedling trees and bushes, which are mostly autumn olive, the vegetation on the proposed disposal site is essentially all grasses and forbs typical of recently disturbed areas. There is effectively no woody vegetation on the proposed disposal site.

In most locations, the vegetation on the proposed disposal site was dominated by about five species: yellow sweet clover (*Melilotus officinalis*), perennial rye (*Lolium perenne*), white clover (*Trifolium repens*), crown vetch (*Coronilla varia*), and Canada thistle (*Cirsium canadensis*). Based on a visual survey, the first two species each made up about 20% of the total vegetation on the proposed disposal site, while the latter three species each made up approximately 10% of the plant coverage. Species distributions on the proposed disposal site were patchy (e.g., thistle and especially crown vetch occasionally dominated small areas of the proposed disposal site but were absent elsewhere).

Other species found in lesser amounts were: Canada goldenrod (*Solidago canadensis*), reed canary-grass (*Phalaris arundinacea*), snake root (*Eupatorium* sp.), orchard grass (*Dactylis glomerata*), timothy (*Phleum pratense*), bull thistle (*Cirsium vulgare*), field pennycress (*Thlaspi arvense*), field peppergrass (*Lepidium campestre*), English plantain (*Plantago major*), squirrel tail barley (*Hordeum jubatum*), and common dandelion (*Taraxicum officinalis*).

There was evidence of whitetail deer bedding activity in some of the denser vegetation. However, no small mammals or reptiles were noted. Although a formal census of local birds was not conducted, some common species such as cardinal, robin, red-wing blackbird, and sparrows were noted or heard during the course of the survey.

The potential presence of threatened and endangered species was considered in terms of whether the proposed disposal site presented suitable habitat and whether any were observed during the survey. The entire proposed disposal site was observed to have been very recently disturbed and subsequently colonized by common pioneering herbaceous species. This habitat type is unlikely to serve as important habitat for threatened and endangered species because natural plant communities are absent and the present community lacks complex structure.

Prior to the field visit, the potential threatened and endangered species that could occur at the proposed disposal site were investigated by searching the Illinois and U. S. Fish and Wildlife

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Service (USF&W) databases (i.e., Information for Planning and Conservation (IPaC) Trust Resource Report), and determining the preferred habitats for these species. This search determined that many of the state and federal listed species of concern are aquatic and semi-aquatic species. Suitable habitat for these species is absent since there are no wetlands or waterbodies on the proposed disposal site. Many of the State-listed threatened and endangered plants are also woodland species. Since there are no woodlands on the proposed disposal site, suitable habitat for these species is also absent.

The IPaC listing for the proposed disposal site has four terrestrial species that should be considered: eastern prairie fringed orchid (*Platanthera leucophaea*), the rattlesnake-master borer moth (*Papaipema eryngii*), the Indiana bat (*Myotis sodalist*) and northern long-eared bat (*Myotis septentrionalis*). As currently proposed, the soil will be deposited in the same area as the recently deposited clean fill; therefore, no impacts to woody vegetation or trees, and by extension, either bat species is expected. The proposed disposal site is too dry and too disturbed to serve as habitat for the prairie orchid, and none were observed during the survey. Rattlesnake-master borer moths are obligate residents of undisturbed prairie and woodland openings; hence, they are not expected to occur in a disturbed habitat like the proposed disposal site.

A large number of migratory bird species are listed as species of "conservation concern" by USF&W's IPaC. The proposed disposal site is too highly disturbed and too small to constitute critical habitat for any of these species.

Based on the review of the State's threatened and endangered species, only a few of the State-listed plant species could potentially occur in the habitats present on the proposed disposal site: false mallow (*Malvastrum hispidum*), slender sandwort (*Minuartia patula*), and ear-leafed foxglove (*Tomanthera auriculata*). However, given the disturbance on the proposed disposal site, none of these species is likely to occur on the site, and none of these species were observed during the field investigation.

In terms of the State's threatened and endangered animals, the early succession herbaceous habitat afforded by the proposed disposal site provides poor habitat for the threatened and endangered species that could potentially occur near the proposed disposal site. The surrounding cottonwood trees may not be large enough to be suitable for use by eagles as nest sites. Additionally, the proposed disposal site is close to existing warning sirens, which are extremely loud and periodically tested, which may deter nesting activities. Nonetheless, the trees in the areas surrounding the soil stockpile were searched for eagle nests. No evidence of eagle nesting activities was found. It was therefore concluded that the soil disposal project, as proposed, will not impact eagles or their habitat.

In summary, the proposed disposal area is a small graded pile of clean soil taken from the main plant area. The pile has been built up over the last decade or so, and has been graded flat and was essentially devoid of vegetation three years ago. Since then, the proposed disposal site has been colonized by early successional grasses and forbs (e.g., clovers, grasses, and thistles) that typically occur in these highly disturbed ecosystems. Given the proposed disposal site's small area and highly disturbed nature, this area will not likely serve as habitat for any threatened and endangered species or species of concern.

**Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25**

ATTACHMENT 2

Wildlife Habitat Council Report, "Site Assessment and Wildlife Management Opportunities for
Exelon Corporation's Dresden Generating Station," dated October 2006



**SITE ASSESSMENT AND
WILDLIFE MANAGEMENT
OPPORTUNITIES
FOR
EXELON CORPORATION'S
DRESDEN GENERATING STATION**

Report submitted to:

DRESDEN GENERATING STATION
EXELON CORPORATION
Dresden, Illinois

Report submitted by:

WILDLIFE HABITAT COUNCIL
8737 Colesville Road, Suite 800
Silver Spring, Maryland 20910 USA
Phone: (301) 588-8994
Fax: (301) 588-4629
E-mail: whc@wildlifehc.org
Internet: www.wildlifehc.org

OCTOBER 2006

This report was prepared by:

KATHLEEN A. KOELBL-CREWS, WILDLIFE BIOLOGIST
TANYA LUBANSKY, RESEARCH ASSISTANT

With further assistance from the staff of the Wildlife Habitat Council

The Wildlife Habitat Council (WHC) commends EXELON CORPORATION for its commitment to improving habitat for wildlife through the initiation of a wildlife habitat enhancement program at the DRESDEN GENERATING STATION.

We thank Jim Bolte and Edward Rowley for their hospitality during WHC's site visit.

The **WILDLIFE HABITAT COUNCIL (WHC)** is an independent, nonprofit assemblage of corporations, conservation organizations, and individuals dedicated to protecting and enhancing wildlife habitat.

Created in 1988 and based in the greater Washington DC area, WHC strives to promote responsible environmental stewardship within the corporate management culture through the provision of expertise and resources to companies concerned with the protection of wildlife habitat on private landholdings. Over 2 million acres of private land is currently managed for wildlife through WHC-assisted projects in North America and around the world.

WHC also works to broaden understanding of wildlife values through the incorporation of environmental education, volunteer participation, and community outreach programs.

This report is intended solely as a guidance tool for implementing wildlife habitat enhancement programs on corporate sites. WHC therefore cannot assume responsibility for local, state, and federal regulatory programs and authorizations. WHC strongly recommends that site managers consult with state and federal experts with regard to regulatory requirements in the region prior to implementing any activity in a regulated habitat. WHC can assist with the identification of appropriate regulatory contacts, if necessary.

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EXECUTIVE SUMMARY

The Wildlife Habitat Council's (WHC) *Wildlife at Work*SM program focuses on involving company employees, community members, conservation organizations, and government agencies in the long-term, active management of company property to improve wildlife habitat and raise environmental awareness. Exelon Corporation and other private landowners play a significant role in species conservation. It has recently been estimated that traditional reserves such as parks, wildlife refuges, and other designated natural areas will, at best, secure roughly five percent of the world's species. Creation of wildlife habitat in and around areas that also feature economic activities can promote biodiversity conservation at local, regional, and even global scales.

Exelon Corporation joined the Wildlife Habitat Council as a one-year member in March 2005, further exemplifying its commitment to investigating and improving wildlife habitat conditions through the enrichment of pre-existing habitat and the establishment of new habitat on the company's landholdings. The Dresden Generating Station is the seventh site to begin participation in WHC programs. The following excerpt is taken directly from the Exelon Corporation web site:

“Exelon understands that being a business leader involves more than being a reliable provider of energy services. It also means being an important part of the communities we serve and working to sustain our environment. We recognize the importance of balancing the need for reliable energy with our responsibility to ensure that the quality of our environment is preserved. We have partnered with many environmental stakeholders to create and support environmental preservation initiatives, we are committed to using technology to more effectively utilize our limited natural resources and to minimize the production of waste, we continuously seek to improve our work practices to further ensure the integrity of the environment, and we are pursuing how we can create value for our shareholders through environmental performance in order to ensure economic growth and environmental sustainability for future generations.”

Induction into the *Wildlife at Work* program will enable the Wildlife Habitat Council to assist employees at the Dresden Generating Station in their efforts to improve wildlife habitat at the site. Furthermore, partnership with WHC provides Exelon Corporation with an opportunity to demonstrate responsible corporate environmental stewardship by formulating and implementing a balanced and operative wildlife management program.

To assist in the development of a biodiversity assessment and wildlife habitat management plan, representatives from the Dresden Generating Station invited a WHC biologist to visit

the site on July 20, 2006. This report, *Site Assessment and Wildlife Management Opportunities for Exelon Corporation's Dresden Generating Station*, was created with information compiled from the site visit, discussions with employees, and independent research. It is intended to present and outline historical and current information pertaining to the ecological communities at the Dresden Generating Station, focusing on a review of critical habitats and species on site, while outlining opportunities for future enhancement recommendations that are designed to augment food, water, cover, and space resources – the four basic components species require from their habitat. The Wildlife Team may choose to implement some or all of these projects and is furthermore encouraged to explore additional habitat enhancement opportunities. Projects suggested for the Dresden Generating Station Wildlife Team to consider in the future include:

- Prairie restoration
- Control of exotic/invasive species
- Enhance habitat for bats
- Enhance habitat for raptors
- Nest box program
- Pollinator gardens
- Manage ROW's in prairie/shrub scrub habitat

The Dresden Generating Station will be eligible to apply for Habitat Program Certification with WHC when at least one habitat enhancement project has been implemented and monitored for a minimum of one year. WHC's *Corporate Wildlife Habitat Certification/International Accreditation* program is designed to recognize exceptional corporate wildlife habitat programs and supply third-party credibility for environmental stewardship. As WHC certification review procedures are rigorous, the Dresden Generating Station Wildlife Team is advised to keep textual and photographic documentation of site habitat enhancement projects and public outreach programs in order to increase its prospects for certification.

Wildlife habitat enhancement, employee participation, and public outreach are the primary objectives of the *Wildlife at Work* program. WHC is confident that employees at the Dresden Generating Station can achieve these goals through the development of a wildlife habitat management plan and the implementation of the proposed enhancement projects.

The staff of the Wildlife Habitat Council commends employees at the Dresden Generating Station for their demonstrated commitment to protecting biodiversity and improving site wildlife habitat through the implementation of a team-designed wildlife management plan and anticipates the formation of a sustained association with site participants. Please contact Kathleen A. Koelbl-Crews or WHC staff with inquiries regarding the wildlife management plan, additional habitat enhancement opportunities, and WHC certification procedures.

1. OVERVIEW

WHC requires a site visit by a staff wildlife biologist prior to recommending a wildlife habitat management plan. The purpose of the site visit is to accurately assess the current habitat conditions of the site and to subsequently determine which habitat enhancement projects would be most appropriate for these particular conditions in accordance with management objectives. Therefore, it is standard procedure during the site visit that the visiting WHC biologist meet with company personnel to ascertain the objectives of the site's wildlife program and to present initial habitat enhancement opportunities. This overview contains the proceedings of the site visit, as well as a detailed site description and review of local area history.

1.1 SITE VISIT

On July 20, 2006, WHC Wildlife Biologist Sue Wolinsky and WHC Wildlife Biologist Kathleen Koelbl-Crews met with Exelon Corporation representatives Jim Bolte and Edward Rowley to discuss site biodiversity and wildlife habitat opportunities at the Dresden Generating Station. The three met in the station's training center building at approximately nine a.m. on Thursday morning. Following introductions, Mr. Bolte, Mr. Rowley, Ms. Koelbl-Crews and Ms. Wolinsky conducted a comprehensive tour of the Dresden Generating Station property. The group walked and drove a majority of the property, discussing the layout of the buildings and operations in relation to the undeveloped, potential habitat areas.

1.2 SITE DESCRIPTION

Exelon Corporation's Dresden Station is located on over 1,600 acres in Grundy County, Illinois. It is located in northeast Illinois in the city of Morris, which is approximately 78

miles southwest of Chicago. The site is situated at the junction of the Illinois, Des Plaines, and Kanawha Rivers. It is bordered to the east by the Kanawha River, to the north by the Illinois and Des Plaines Rivers, and to the south and west by Goose Lake State Park.

The station employs approximately 680 permanent employees and 160 permanent contractors. Beginning operation in 1960, the Dresden Generating Station's Unit 1 was the nation's first, full-scale, privately financed, nuclear power plant. In 1978, after 18 years of operation, the unit was shut down and has since been designated a Nuclear Historic Landmark by the American Nuclear Society. The station's Units 2 and 3 began operation in the early 1970's. These units are licensed to operate through 2029 and 2031 respectively. While Unit 1 was capable of generating 210 megawatts of electricity, Units 2 and 3 are each capable of generating 870 megawatts of electricity and can together serve the needs of over one million homes.

Habitat types present on the Dresden Generating Station property include old field and early successional grasslands, oak savanna, island and open water, shrub scrub, riparian, and forest edge habitats. Of the sites total acreage, over 1,200 acres consist of open water lake habitat.

1.3 SITE HISTORY AND COMMUNITY BACKGROUND

Exelon Corporation's Dresden Generating Station is located in the city of Morris, which is the county seat of Grundy County, Illinois. Although relatively small in size, Grundy County has historically played a significant part in the agriculture and commerce of Illinois. Numerous streams, including the Illinois River, flow through the region, providing the county with approximately 45 miles of waterway. The county was named after Felix Grundy, a famous politician and criminal lawyer from Tennessee. As of 2000, Grundy County had a population of 37,535.

The city of Morris was first settled in 1831 and officially incorporated on April 12 of 1842. It was named for Isaac Newton Morris, the commissioner of the Illinois & Michigan Canal. The town sits on the north bank of the Illinois River, 12 miles south of the Kanawha River

and DesPlaines River junction. Morris soon became a large transportation center because of its proximity to these water systems and the Chicago metropolis. The area still offers excellent transportation while maintaining a quaint and historic atmosphere. Surrounded by bluffs, beautiful river banks, prairies, and lakes, the city of Morris remains a very popular destination for the people of Illinois.

2. BIODIVERSITY ASSESSMENT OF THE DRESDEN GENERATING STATION

Preservation of natural biodiversity has long been a global priority, and WHC supports Exelon Corporation's desire to understand site biodiversity and create an effective wildlife habitat management and biodiversity protection plan. Biodiversity is defined in general as the number and variety of living organisms, and is often assessed by documenting the species composition and defining characteristics of a habitat.

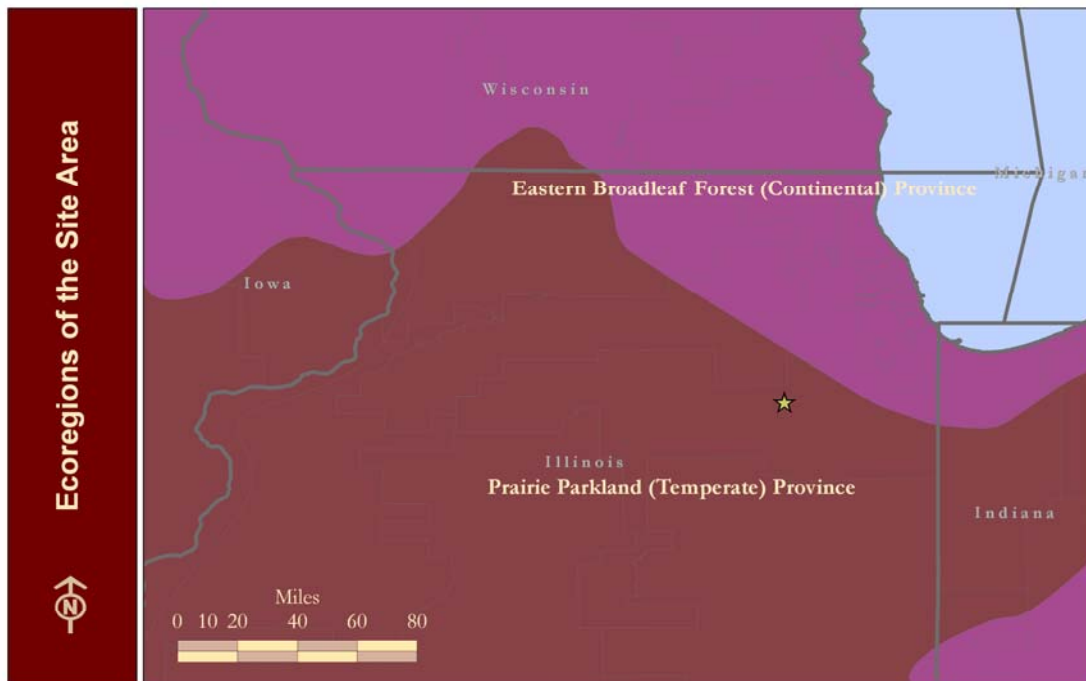
2.1.1 Description of Ecoregion

Exelon Corporation's Dresden Generating Station lies within what *Terrestrial Ecoregions of North America: A Conservation Assessment*, published by Island Press, identifies as the Central Forest-Grassland Transition Ecoregion. The Central Forest-Grassland Transition Zone encompasses much of Illinois, extending across Missouri into eastern Kansas, Oklahoma, and Texas. According to information in "Terrestrial Ecoregions of North America: a Conservation Assessment, the total area of the ecoregion is more than 146,718 square miles, making it one of the largest savanna-dominated areas in North America, although little of the acreage is preserved as native habitat. This ecoregion is recognized as significant due to its large size and unique location between forested and grassland ecoregions. Unique soil and climate conditions allow woodlands to develop, often in conjunction with an understory of tallgrass prairie species. Throughout the region, oaks and hickories are the most dominant species in the canopy. The diversity of habitat types and conditions in this transition zone support select species that have adapted to the neighboring Great Plains and hardwood forests. This significance of habitat is further demonstrated through the ecoregion's rank among the top ten for diversity of bird, reptile, butterfly, and tree species.

In addition to the aforementioned classification, the United States Department of Agriculture's (USDA) Forest Service (FS) adopted its own policy and subsequent

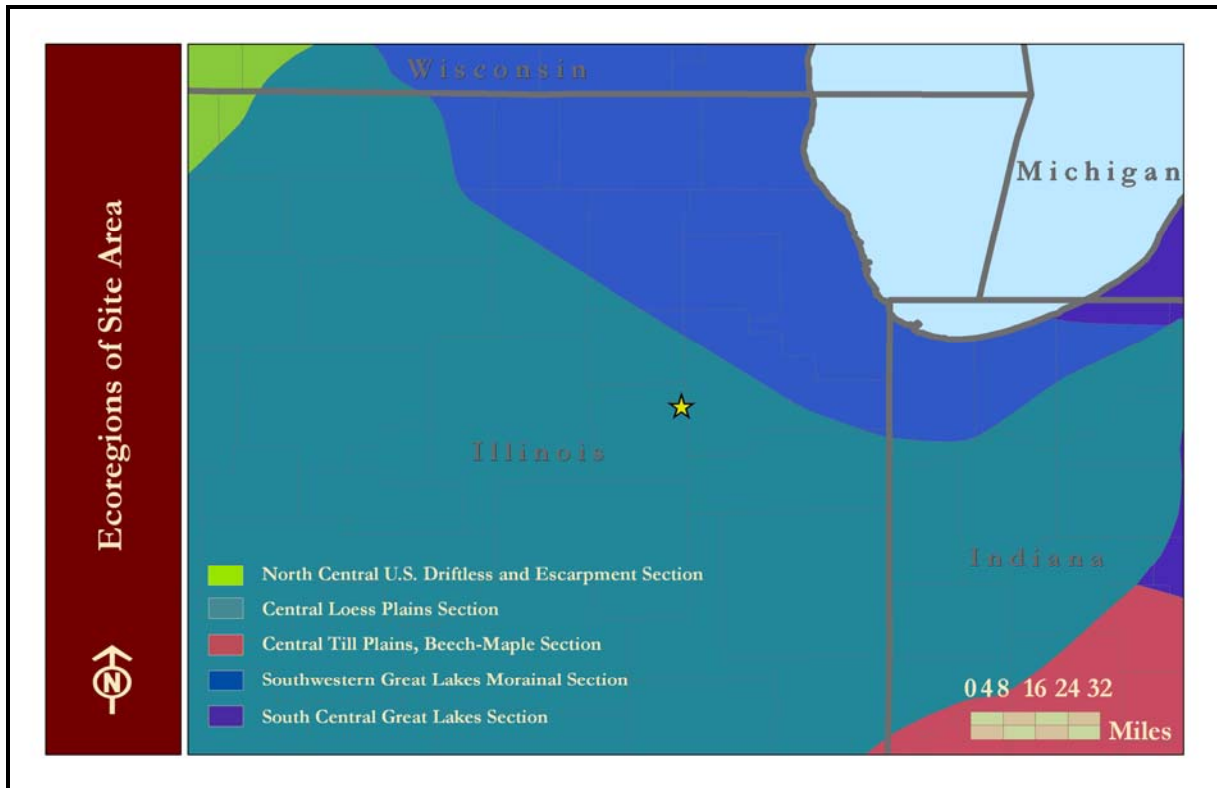
classification of ecosystem types in the publication *Ecoregions of the United States*, which was compiled by Robert G. Bailey and revised in March 1995; this publication classifies land based on forest cover types, grasslands, and other data from ongoing research programs. Under the Forest Service's classification, the Dresden Generating Station lies within the Prairie Parkland Province, near the border of the Eastern Broadleaf Forest Province (**Figure 1**). These provinces are further divided into specific sections by the Forest Service, which includes the Central Loess Plains, South Central Great Lakes, Central Dissected Till Plains, and Beech-Maple Sections (**Figure 2**). A list of wildlife species common in this ecoregion, and in the transitional ecosystems that occupy this particular area, is provided in **Appendix II** of this report, although partial species lists are provided throughout the subsections of **Section 2**.

FIGURE 1. ECOREGION PROVINCE OF THE DRESDEN GENERATING STATION



Map by Tanya Lubansky/WHC

FIGURE 2. ECOREGION SECTION OF THE DRESDEN GENERATING STATION



Map by Tanya Lubansky/ WHC

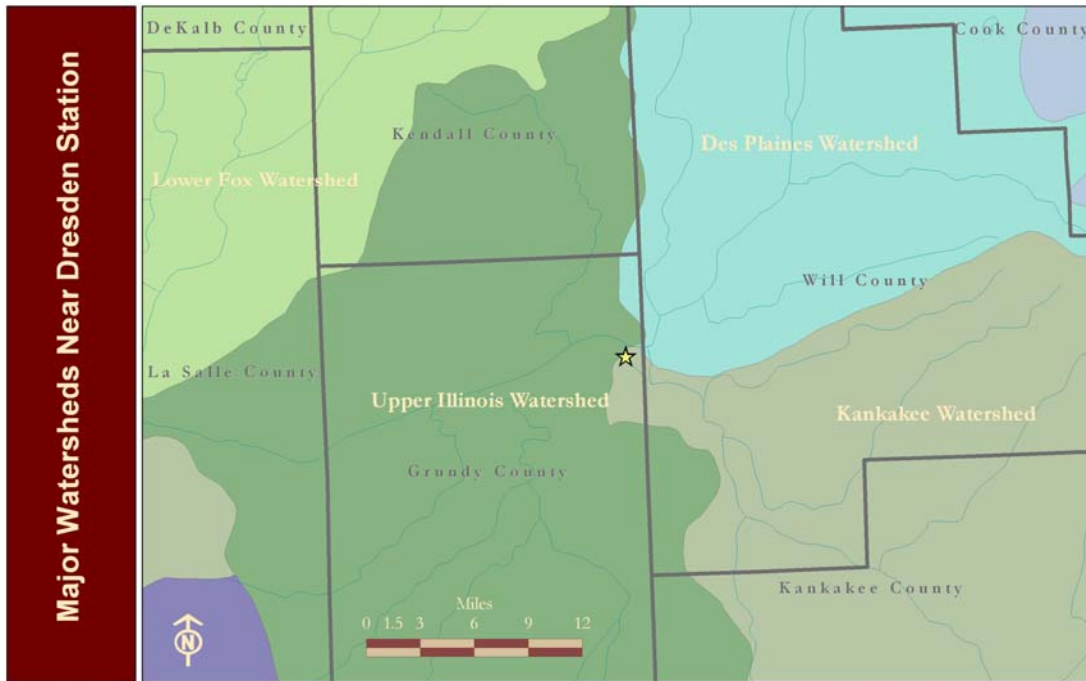
This Central Forest-Grassland Transition Zone separates the forested regions of the east from the tallgrass, mixed prairies of the plains, and therefore exhibits some of the characteristics of each of the ecoregions that surround it. Regional habitats within this transition zone are distinct in that they display a higher density of trees and shrubs than the prairies and savannas to the west, as well as a more diverse mosaic of savanna and prairie habitats than the hardwood forested zone to the east. In addition, the ecoregion is unified in soil type and general climate conditions. The mix of native grassland, forestland, and wetland habitats in this ecoregion was historically maintained by regular disturbances from periodic droughts and fires. Precipitation throughout the ecoregion reportedly ranges between approximately 20 to 45 inches annually. Areas that receive greater precipitation naturally support a greater diversity and density of tree and shrub species, while drier areas support a greater diversity of grassland savanna species and fewer woody plants.

2.1.2 Watershed Description

In addition to being located in the Central Forest-Grassland Transition Zone, Exelon Corporation's Dresden Generating Station site is situated on the boundary of the Kankakee, Des Plaines, and Upper Illinois Watersheds. A watershed, or catchment, is an area of land where water drains to a common point. These regions are controlled and defined by topography, bedrock, and soil permeability. Knowledge of watersheds is necessary for industrial development as the condition of groundwater at one site affects the water for wildlife and human consumption in the entire drainage area.

The Dresden Generating Station is located within the Upper Illinois subregion of the Upper Mississippi Drainage region. This subregion consists of 10,900 squared miles throughout Illinois, Indiana, Michigan, and Wisconsin. As shown in **Figure 3**, this subregion is divided further into smaller units of land, each draining into specific stream branches. Watershed management should be a community effort, as the regions are so intricately connected. The Illinois Watershed Association provides incredible resources for the development of partnerships and management plans. Contact information can be found in **Appendix III**.

FIGURE 3. WATERSHEDS OF THE DRESDEN GENERATING STATION



Map by Tanya Lubansky/ WHC

2.1.3 Climatic Conditions

The Central Forest-Grassland Transition Zone lies within what scientists have termed the Humid Temperate Domain. Climatic conditions in this region are generally classified as humid continental, with hot and humid summers and often severely cold winters. Last year, Morris reported approximated average temperatures of about 30° Fahrenheit during fall and winter months, and average temperatures of about 73° Fahrenheit during the spring and summer months. **Figure 4** provides a graphic representation of the average temperatures recorded in the Morris area. The tornado activity level in the region is also 85 percent higher than the overall US average.

FIGURE 4. AVERAGE TEMPERATURES OF MORRIS, IL

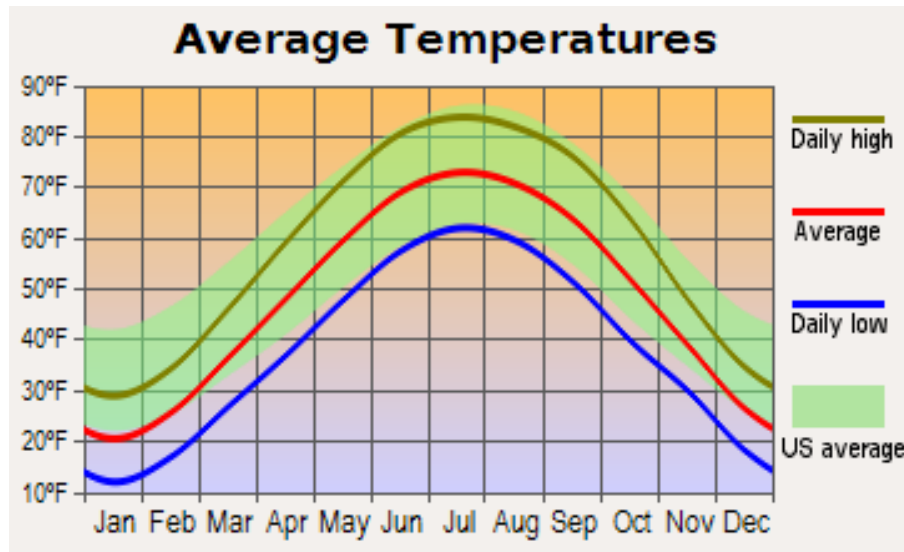
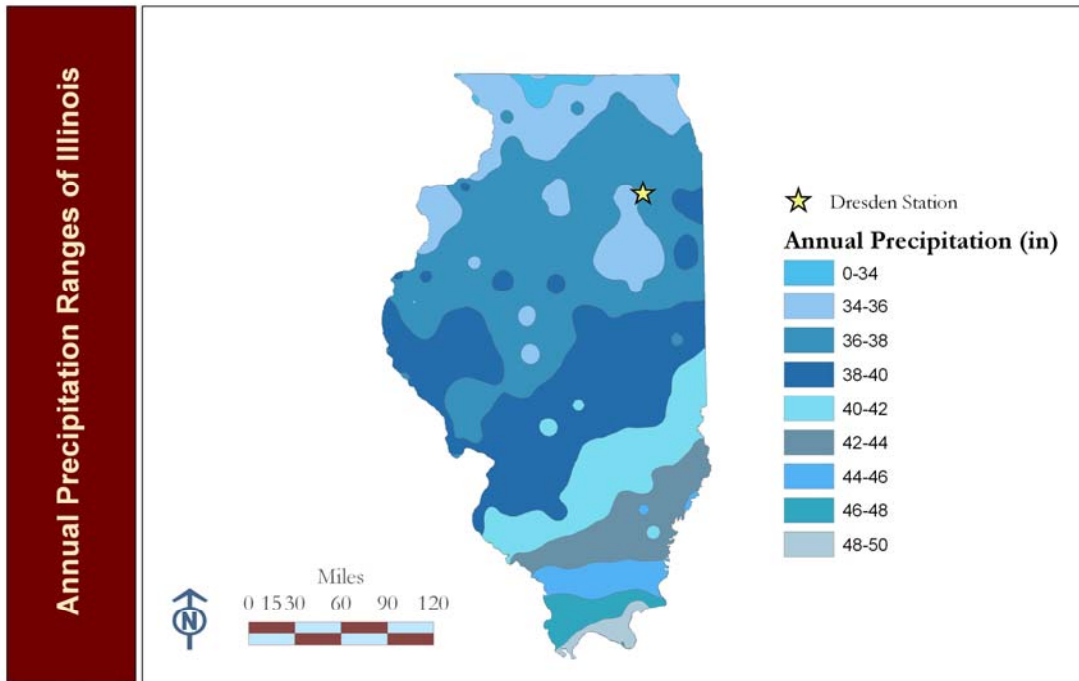


Chart from City-Data.com

Furthermore, the USDA places most of Illinois within Plant Hardiness Zone Five. The USDA's Plant Hardiness Zones are determined based on each area's average minimum winter temperature. Zone Five reportedly has average minimum winter temperatures of between -20° Fahrenheit and -10° Fahrenheit. The American Horticultural Society (AHS) has also developed a system to identify plant hardiness and make planting recommendations based on the determination of heat zones within the nation. Heat zones are calculated based on the average number of days the temperature exceeds 86° Fahrenheit each year. This system places northern and central Illinois in AHS Heat Zone Six, meaning that the area typically experiences between 45 and 60 days each year that exceed 86° Fahrenheit. Knowing both the USDA Plant Hardiness Zone and AHS Heat Zone for a given area can assist planners when determining what type of plant species will most readily adapt and thrive on site.

While it is important to understand and consider area temperatures and soil condition, the diversity of vegetative communities will also depend on precipitation amounts, which vary regionally. The state of Illinois typically receives 35 to 45 inches of precipitation each year. However, the annual averages are widely varied throughout the state (Figure 5). The city of Morris receives the bulk of its precipitation during the rainfalls common throughout summer months (Figure 6).

FIGURE 5. PRECIPITATION PATTERNS OF ILLINOIS



Map by Tanya Lubansky/ WHC

FIGURE 6. PRECIPITATION OF MORRIS, IL

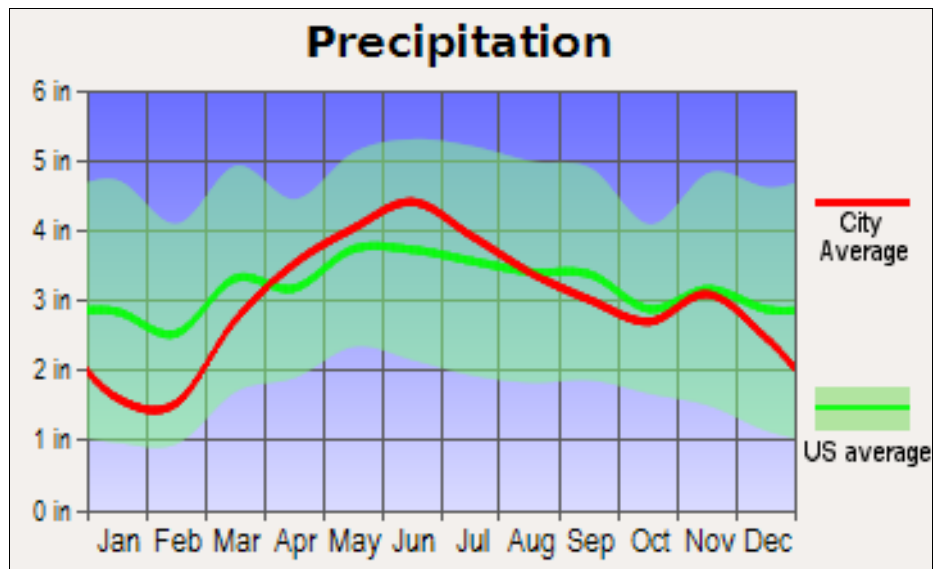


Chart from City-Data.com

2.1.4 Soil Conditions

There are eleven major soil groups recognized in the world soil classification system that are characterized, described, and mapped based on the presence or absence of distinctive horizons, or layers, commonly present in the soil for any given location. Mollisols are the predominant soil order in the Prairie Parkland Temperate Province ecoregion, whereas Alfisols are predominant in the northern portions of the Eastern Broadleaf Forest (Continental) Province. In this transition zone between forest and prairie, soils of both orders would be present. Mollisols are characterized by the presence of a mollic epipedon, which is a thick, nutrient-rich organic layer within the topsoil. Alfisols represent a young forest and are typified by a layer of rich clay.

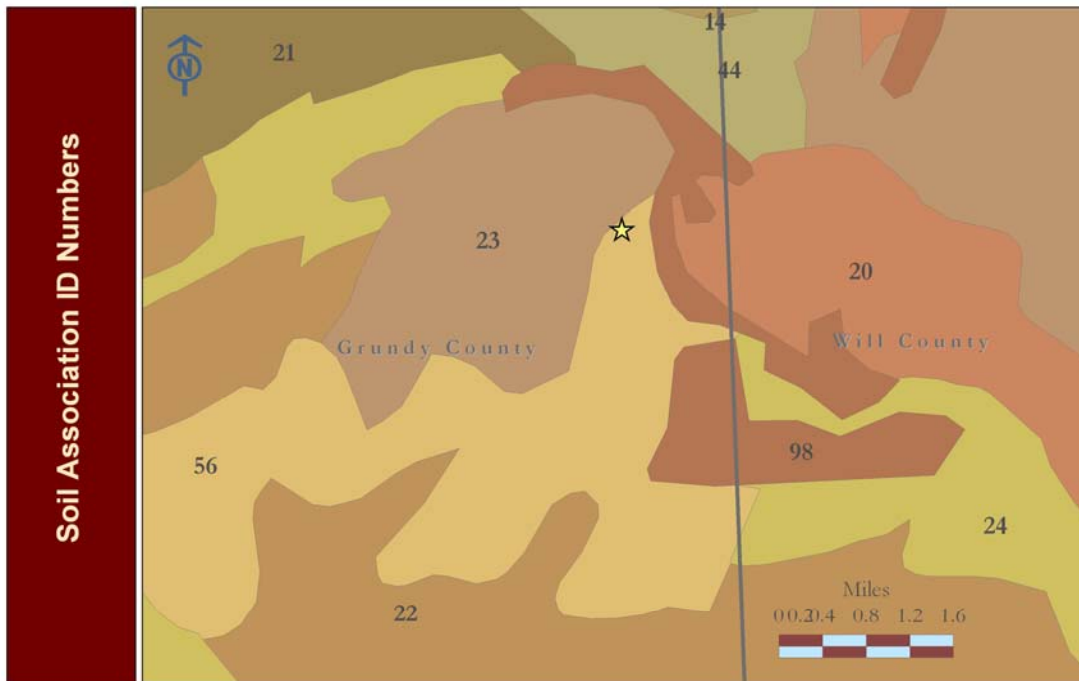
These orders include some of North America's most productive and well-structured soils. Because of their high fertility, many areas characterized by this soil order are converted for use in agricultural production or as rangelands. One reason that these soil orders are so fertile may be due in part to the development of dense root mats within the A horizon (topsoil layer), which, when allowed to decompose naturally, release nutrients into the soil.

Nearly 25 percent of soils in the United States are classified as Mollisols; throughout the world, approximately 4.1 percent of the land area is comprised by this order. Mollisols are generally described as having thick, dark subsurface horizons that are high in organic matter and with regard to base saturation. The mollic epipedon exists over mineral material, and experiences a base saturation of 50 percent or more when measured at pH 7. There are several suborders of Mollisols, which are further described based on their dominant horizons, which may be considered argillic, natric, albic, cambic, gypsic, calcic, or petrocalcic, and include a histic epipedon, or a duripan, but typically do not feature an oxic or spodic horizon. Mollisols in the local area are further classified as Udolls. According to information available from the Soil Science Society of America, Mollisols that have a soil moisture regime described as udic typically have a mean annual soil temperature of at least 46° Fahrenheit. In addition, Udolls, a suborder soil classification of Mollisols, have no calcic (calcium-rich) or gypsic (gypsum-rich) horizon, and are not saturated with water for periods long enough to limit their use for most crops.

Alfisol soils are also common throughout the United States, as they account for 13.9 percent of the total land area. This order of soil develops in humid conditions under temperate forests of midlatitude regions. Because of the minimal leaching and high abundance of water, alfisols are also fertile. The subsurface layer of clay, known as the argillic horizon, contains an abundance of nutrients including calcium, magnesium, potassium, and sodium. In general, these soils contain relatively little humus (a nonliving organic material) and calcium carbonate buildup, which are both typically abundant in the similar order of Mollisol. Alfisol soils are divided into the five suborders of Aqualfs, Cryalfs, Udalfs, Ustalfs, and Xeralfs. The Dresden Generating Station is located in the region typified by the Udalf suborder. Udalf soils are usually found in regions that receive a well-distributed rainfall.

The state of Illinois divides its land by soil association classifications. A soil association is “a group of related soil series that generally occur in a characteristic pattern of landscapes that have identifiable topographic features, slopes, and parent materials” (Illinois State Geological Survey). The Dresden Generating Station soil associations (ID # 23 and 56) are categorized by a parent material of loess (a thin wind-blown silt material) and loam (a gritty mixture of sand, silt, and clay) over interbedded sandstone, siltstone, and shale.

FIGURE 7. ILLINOIS SOIL ASSOCIATIONS SURROUNDING THE DRESDEN GENERATING STATION



Map by Tanya Lubansky/ WHC

2.1.5 Ecological Communities Described On Site

The Central Forest Grassland Transition Zone supports both grassland and forestland habitats. Because of the diversity in conditions, the ecoregion supports a wide variety of native wildlife species, including many small mammals such as shrews and mice, as well as larger mammals such as white-tailed deer, bobcat, and coyote. Although elk, bison, and prairie wolf historically roamed this area, these populations were decimated by the late 1800s. Other common mammals include opossum, cottontail, and fox. Avian species associated with the region include Cooper's hawk, barred owl, northern harrier, chickadees, and swallows. Common amphibian species include the Illinois chorus frog, the Plains leopard frog, and bullfrog, while common reptiles include box turtle, snapping turtle, mud turtle, and bull snake. Butterflies include the question mark, monarch, zebra swallowtail, cabbage white, orange sulphur, striped hairstreak, southern dogface, pearl crescent, and common wood nymph.

Within Exelon's corporate landholdings at the Dresden Generating Station, there is a diversity of habitat types including early successional grasslands and shrub-scrub communities, oak savanna, forest edge, riparian and creekside habitats, lake-edge, and island and open water habitats. As a result, many opportunities also exist to restore and enhance these habitats for the benefit of wildlife.

2.1.5.1 Early Successional Grassland & Old Field Habitats

Vegetative succession is a natural process by which ground cover plants are gradually replaced over time by different plant communities. Succession begins with the first ground covers that establish in a region. Decline in ground cover species occurs when more aggressive or adapted vegetation moves in and out-competes initial colonizers. Early successional plants include both annuals and perennials that are typically herbaceous and are readily adaptable to bare-ground colonization. Typical examples of early successional vegetation include the native grasses and forbs (wildflowers) of prairies and shrub-scrub communities containing a mix of prairie species and scattered native shrubs. Many prairie species have wind-borne seeds that are able to survive drought and long periods of dormancy in the soil. Early successional ecosystems provide many values to wildlife, including nesting cover and highly nutritious forage.

Many early successional habitats in the United States, particularly within Illinois, have been converted to agricultural fields and altered other land uses, resulting in a decline in the species that rely on these communities, such as bobwhite quail. According to research compiled by the United States Geological Survey (USGS) Northern Prairie Wildlife Research Center, much less than one percent of the state's original 21 million acres of prairie habitat remains. According to the Illinois Department of Natural Resources (IL DNR), the grasslands that currently cover 19 percent of the state are in poor condition. Periodic disturbance, such as the use of prescribed fire, is required to maintain and sustain early successional plant communities. However, fire is rarely used to maintain existing remnants, as it can leave them in poor condition. These remaining parcels experience limited success in providing sustainable habitat and resources to wildlife species.

Early successional habitats, including both grassland and shrub-scrub communities, occur in a mosaic pattern throughout the Exelon property, and can be found in areas such as the powerline rights-of-way (ROW) and land surrounding the meteorological tower.

FIGURE 8. GRASSLAND HABITAT NEAR THE METEROLOGICAL TOWER



Photo by Kathy Koehl-Crews/ WHC

FIGURE 9. ROW HABITAT ON SITE PROPERTY



Photo by Kathy Koebl-Crews/WHC

A large portion of these habitats is managed in an early successional state to comply with property management needs and functions. For instance, the area within a radius of 400 feet surrounding the tower must be kept free of trees to ensure proper functioning of the tower. Levees and dikes throughout the property must also be kept free of trees and other deep-rooted vegetation to prevent roots from compromising the clay-lined banks. Burrowing animals, such as muskrats, must also be controlled to prevent damage to levees and dikes.

FIGURE 10. LEVEES AND DIKES ON SITE



Photo by Kathy Koebl-Crews/WHC

Portions of the banks along the station's cooling water intake and discharge canals, and the islands in between, are currently maintained in an early successional grassland state as well. These canals are cut into natural bedrock, and require no clay lining. However, these areas lie within the station's primary security area and therefore require the maintenance of low-growing vegetation. In addition, the area surrounding the station's sewage treatment plant is routinely mowed to maintain a grassland state.

FIGURE 11. CANALS ON SITE



Photo by Kathy Koebl-Crews/WHC

FIGURE 12. SEWAGE TREATMENT PLANT ON SITE PROPERTY



Photo by Kathy Koebl-Crews/WHC

The restoration of native ecosystems, particularly of regionally specific grassland and prairie ecosystems, has long been a goal of many agencies, organizations, and individual landowners in Illinois and other portions of the Midwest. Exelon Corporation has also partnered with Pheasants Forever and participated in grassland establishment projects at the nearby LaSalle County Station. Common ecological problems associated with prairie and native grassland restoration projects include fragmentation, suppression of fire and drought regimes, the spread of exotic and/or invasive species, as well as habitat loss due to land development, and overall resource degradation. Since the publication of their Comprehensive Wildlife Management Plan (CWMP) in 2005, the state of Illinois has been working to counteract the destruction of regional prairies and restore grasslands to native conditions. By the year 2025, the state hopes to have created and enhanced an additional 400,000 acres of grassland habitat. According to the plan, this will be accomplished by establishing additional treeless areas wider than 0.5 miles, removing and preventing the spread of invasive species,

reintroducing native species, moderating disturbance regimes, and promoting inter-agency cooperation and communication.

WHC suggests that the Dresden Generating Station consider restoring these on-site grassland areas to Illinois native tallgrass prairie to benefit wildlife such as grassland nesting birds, raptors, and pollinators. According to the Illinois CWMP, the primary focus of restoration efforts should be to promote diversity. Thus, the established prairies will need continued monitoring and maintenance to prevent the establishment of exotic and/or invasive species and to promote a diverse community of native grasses. Suggestions for long-term maintenance methods include the extensive removal of invasive species and implementation of prescribed burns.

Invasives can be eradicated through a combination of mechanical, chemical, and biological methods, as described in **Section** . Prescribed burns will require a high level of planning by professionals who possess knowledge of fire behavior, the range of environmental effects created by fire and site-specific fire requirements. A prairie with diverse vegetation can in turn support diverse wildlife populations, including indicator grassland species such as the prairie king snake, fox snake, common garter snake, bobolink, northern harrier, dickcissel, vesper sparrow, horned lark, eastern meadowlark, kestrel, song sparrow, American goldfinch, sedge wren, and prairie vole. Emphasis should be placed on the preservation of critical avian grassland species such as the northern bobwhite, American woodcock, and field sparrow.

2.1.5.2 Oak Savanna

Savanna habitats are the intermediate between prairie and woodland. A savanna can be defined as a plant community with scattered fire and sun tolerant trees that grow among a complex understory of grasses, flowering plants, and shrubs. Although definitions vary widely, savannas typically have canopy cover of about ten to 50 percent, whereas a forest typically has a closed canopy (canopy cover close to 100 percent). The State of Illinois Natural History Survey characterizes savannas within the State of Illinois as having a canopy cover of greater than 10 percent to less than 80 percent. Understory layers of savannas thus receive a mixture of both sun and shade, resulting in a wide diversity of understory species.

Historically, the oak savannas of Illinois have been fire-controlled ecosystems. Occasional to frequent, low-intensity fires moderated the growth of shrubs and trees, keeping woody species at lower densities by killing off seedlings and some saplings. Bison and elk grazing may have also played a part in keeping the savannas open. However, settlement of the Midwest greatly reduced the occurrence of natural low-intensity fires and grazing, and the savanna communities eventually grew into denser, more wooded communities with much more canopy cover and fewer grasses and forbs in the understory. Savanna habitat in the Midwest is estimated to have been reduced by 99.98 percent since the early 19th century (NRCS 2003). Approximately 615,000 acres of Illinois are still classified as open woodland, but only 1,500 of these acres include healthy savanna ecosystems. The state of Illinois is currently working to restore these habitats by identifying degraded areas, implementing sustainable forestry practices (timber harvesting, prescribed fires, and invasive species control), and maintaining understory diversity.

Extremely minimal savanna habitat still remains in regions surrounding the Dresden Generating Station. However, some of the forested regions throughout the property, such as those near the sewage treatment plant and outside of the meteorological tower radius, display oak savanna characteristics with a fairly open understory, consisting mainly of grasses and forbs.

FIGURE 13. SAVANNA HABITAT NEAR TREATMENT PLANT



Photo by Kathy Koebl-Crews/WHC

WHC suggests that the Dresden Generating Station maintain savannas to benefit species such as the karner blue butterfly, Swainson's hawk, yellow-billed cuckoo, and barn owl. These areas of savanna may require some restoration efforts, such as the clearing of undesirable brush from the understory and the thinning of trees to restore the open-canopy that is typical of native savannas. Desirable tree species typical of savannas in this ecoregion include a variety mast-producing oaks and hickories. An inventory of species is also recommended to identify any exotic and/or invasive species such as European buckthorn, multiflora rose, and exotic honeysuckles. Subsequent control measures are also recommended for these species.

FIGURE 14. SAVANNA HABITAT NEAR METEROLOGICAL TOWER



Photo by Kathy Koebl-Crews/WHC

WHC also suggests that the Dresden Generating Station consider snag (dead, standing tree) management to benefit cavity nesting species. It is also recommended that coarse, woody debris be managed to provide habitat for various rodents, herps, and insects. Lastly, WHC suggests that savannas be enhanced by supplementing woodland openings with native wildflower species, such as perennial lupine to benefit species such as the endangered karner blue butterfly. WHC also suggests that the Dresden Generating Station consider pursuing a Safe Harbor Agreement with the US Fish and Wildlife Service before managing for any threatened or endangered species. Safe Harbor Agreements allow for the management of listed species on private lands without imposing severe restrictions upon the property owner.

2.1.5.3 Forested Creekside & Riparian Habitats

Riparian areas are the transition zones between a stream and an upland area. These areas are crucial to maintaining overall watershed health. A well-vegetated stream bank will act as a

buffer between aquatic and upland areas, decreasing the velocity of floodwater during extreme rain events, as well as limiting downstream flooding and peak flows of surface runoff. Wet-soil plants act as vegetative buffer strips around water bodies. Plants function to stabilize the soil banks, allowing for less erosion and consequently, less water turbidity. Fast-growing riparian species such as willows are especially effective for erosion control, and can have a high wildlife value. Even grasses can serve to contribute to the root mat and absorb nutrients; warm-season grasses in particular have very deep root systems that extend three to twelve feet below the surface.

Plants also function to filter out pollutants, maintain appropriate water temperature for aquatic life, and provide organic material to preserve the structural diversity of the ecosystem. A high-quality stream bank provides valuable habitat for a distinct community of species including a wide variety of birds and mammals, as well as salamanders, frogs, and turtles, many of which are declining at alarming rates. The overhanging trees create shade, lowering the stream temperature and raising the oxygen content for a variety of fishes and aquatic organisms. The resulting leaf litter adds nutrients and cover for macroinvertebrates such as caddis flies and mayflies. The leaf litter also acts as a sink for phosphorus, and helps decrease the toxicity from metals and pesticides.

The streams of Illinois have been severely degraded within the last century. Due to growing pressures from developers and traditional agricultural practices, many riparian buffers have been removed or severely altered, and streams that once meandered have been converted into straight channels. Less than 240 acres of healthy stream habitat remain. To counteract the decline in stream habitat quality, the Illinois Comprehensive Wildlife Management Plan has focused on the restoration and protection of riparian buffers. The revegetation of banks will decrease the amount of sediment transported by streams, improving the conditions for fish, invertebrates, and aquatic plants. The trees will also provide shade, cooling the waters to an appropriate temperature to support aquatic insects. Critical species to protect in Illinois stream habitats include wading birds such as the black-crowned night heron and American bittern, reptiles and amphibians such as the hellbender and Massasauga rattlesnake, and mammals such as the Indiana bat. As a stream is impacted by activities throughout its entire watershed, caution is also recommended when considering the

application of nutrients (a common non-point source of water pollution), as well as in the construction of impervious surfaces, which contribute to the ability of pollutants such as motor oil and road salt via stormwater runoff.

Forested creekside habitats occur along portions of the Dresden Generating Station's cooling water intake and discharge canals. These areas lie outside of the primary security area, where vegetative height is not as much of a security issue. Canals outside the primary security area are maintained in a more natural state of forested creekside habitat, with various species of trees and shrubs lining the banks.

FIGURE 15. RIPARIAN HABITAT ON SITE PROPERTY



Photo by Kathy Koebl-Crews/WHC

WHC suggests that the Dresden Generating Station Wildlife Team maintain these riparian and creekside buffers, as they help to improve water quality by filtering sediments and other pollutants and preventing erosion of the banks. As a result, riparian buffers at the Dresden Generating Station will provide food and cover for a wide variety of wildlife species. Dense

vegetation on banks also provides substrate on which aquatic insects can reside and provides shading to cool the water and enhance conditions for aquatic organisms and other species of wildlife. Cool water contains a higher dissolved oxygen content than warm water, and can therefore support greater numbers of aquatic insects. Aquatic insects in turn are a valuable food source for many species of wildlife that hold higher positions on the food chain.

WHC also suggests that an inventory of species be undertaken within these habitats in order to identify and begin control activities for any exotic and/or invasive species that may be present. Supplemental plantings of native mast-producing shrubs are also recommended in areas where invasive species have been removed. Enhancement activities such as the maintenance of snags and the installation of nest boxes are also suggested to improve conditions for cavity nesting species, such as the wood duck (*Aix sponsa*). In addition, bat roosting boxes can be placed near the water's edge where mosquitos are abundant.

2.1.5.4 Forest Edge and Shrub-Scrub Habitats Surrounding Dresden Generating Station Right-of-Ways (ROWS)

Forest edge habitat is the transition zone between woodland and grassland. Many species of wildlife dwell in these unique areas which simultaneously provide both open space and quick cover. These edges can be abrupt shifts in vegetation, where a cross-section would show a line of trees immediately followed by short grass. This type of habitat is known as a "hard" edge. Conversely, a "soft" edge is a gradual shift in vegetation from forest to grassland, incorporating both shrubs and tall grasses into the landscape (**Figure 16**). Soft edge habitats offer more suitable protection for wildlife and also provide a larger selection of food. The quality of edge habitat is critical to the health and diversity of an ecosystem (Best et al 1990).

FIGURE 16. EXAMPLE OF SOFT EDGE HABITAT



Photo courtesy of Virginia Department of Game and Inland Fisheries

Forest edge habitat occurs throughout the Dresden Generating Station property in areas adjacent to the site's ROWs and at the edge of mowed regions such as the sewage treatment plant. WHC suggests that the Dresden Generating Station consider softening hard edge transitional zones by planting mast-producing shrubs along the forest edges, thereby creating a gradual transition zone. WHC also suggests that the site consider allowing snags to remain along forest edges wherever possible in order to provide hunting perches for raptors and natural cavities for cavity nesting species.

Shrub scrub habitat serves as a transitional link in soft edges, and these habitats occur within the Dresden Generating Station property adjacent to the meteorological tower site, along portions of the cooling water intake and discharge canals, and in areas adjacent to the Goose Lake lift station. Shrub scrub habitat is categorized as an early to mid successional habitat that contains woody vegetation averaging less than six yards in height. Although little is known on the status of shrub scrub habitats in Illinois, the decline of avian species that depend upon these habitats has been well-documented. The state of Illinois is aiming to

identify the extent of shrub scrub habitats in the state and develop monitoring systems to classify conservation and management needs.

FIGURE 17. EARLY SUCCESSIONAL HABITAT ON SITE PROPERTY



Photo by Kathy Koebl-Crews/WHC

WHC recommends that the Dresden Generating Station manage and protect the site's shrub scrub habitat for critical species including the northern bobwhite, field sparrow, and brown thrasher. Shrub scrub habitats on site should contain a diversity of plant species, including larger shrubs and grasses. Invasive species should be removed and replaced with native vegetation. WHC encourages the establishment of mast-producing shrubs, which provide nutrition for wildlife.

Special considerations must be made when managing the early and mid-successional habitats along the powerline ROWs that traverse the site. While the primary goal of ROW management is to ensure of the safe and reliable transmission and distribution of energy

resources in response to power demand, special considerations may be made to manage these areas for wildlife interests as well. One way to encourage wildlife usage of ROWs on site is to employ Integrated Vegetation Management (IVM) strategies within the ROW.

The goal of IVM is to use site-specific, ecosystem-sensitive, economically sensible, and socially responsible treatments whose consequences lead to attainment of management objectives. The objective of this vegetation management approach is the same as that of traditional ROW management, whose goals are, in short to reduce the threat that trees pose to the safe and effective transmission of electricity. IVM techniques also put forward the combination of that goal with another one: to increase the quality and extent of wildlife habitat.

In order to manage ROWs for scrub-shrub habitats, the following best management practices are recommended:

- Selectively use herbicides to control tall-growing species in order to maintain a shrub community of 12 feet or less in height. Selective basal application or low-volume basal application is indicated in this situation.
- After herbicide application, pruning must be done. Desirable species must be topped if grown more than 10 to 12 feet in height. The whole plant should be cut down if more than one-third of it is to be removed.
- When corridors are first cleared, avoid a clearing and grubbing operation in which all vegetation is cut down and soil and roots are disturbed. Leave shrubs and preferred low-growing trees.
- Along the ROW edges, tall trees need only to be topped enough so they do not represent a danger of hitting the power lines. Trunks should be girdled to kill the trees.
- Trees cut down during clearing or maintenance activities should be placed along the corridor edge to form brush piles. Canopy branches are ideal for this operation. Log piles are also of wildlife value.
- If chipping occurs, it can be left on site but at a rate no thicker than 2 to 3 inches in any area.
- It is important to establish forested wildlife corridors, or areas where woody vegetation is allowed to grow, wherever topography allows. They should be wide as possible.

2.1.5.5 Island and Open Water Habitats

Healthy, open water habitats can support an enormous diversity of natural communities. There are several different zones that can be identified when assessing the habitat value of any open water habitat. Determining the health of open water habitats, specifically lake

habitats, requires the assessment of the littoral, limnetic, and profundal zones. The littoral zone is defined as the shallow, marginal zone that is characterized by a diversity of vegetation. This zone includes, from shorelines towards open water, emergent, floating, and submergent vegetation. Emergent plants include cattails and bulrush, floating plants include water lilies and duckweed, and examples of submergent vegetation include milfoil and pondweed. This zone also provides habitat for insects, amphibians, reptiles, waterfowl, and fish.

The limnetic zone is defined as the region of open water beyond the littoral zone. This zone includes all open water to the depth that the sunlight is able to penetrate. Oxygen available in this zone is dependent upon the photosynthetic activity of phytoplankton and from the atmosphere directly above the water's surface when it is disturbed by wind or wave action. Phytoplankton and zooplankton present in this zone are consumed by tiny organisms such as crustaceans, thereby forming the basis of the aquatic food web.

The profundal zone lies beneath the limnetic zone and extends to the bottom of the lake. Although no sunlight penetrates this zone, there is abundant activity from bacteria and fungi that continually decompose organic matter that collects on the lake bottom.

State efforts have been focused on maintaining the productive capacity of each of these zones in open water habitat. This goal will be realized through projects aimed at reducing loading in lakes, preventing the establishment of aquatic nuisance species, and through educating residents of the watershed.

Island and open water habitats exist on the Dresden Generating Station cooling water intake and discharge canals, within the cooling lake, and on the Kankakee and Des Plaines Rivers. In order to augment the value of the open water and surrounding island habitat areas, WHC suggests that managers consider installing basking features for turtles and installing raptor perches adjacent to open water areas where snags do not exist. Allowing existing snags to remain standing, or creating snags by girdling, is suggested to provide natural perches for raptors, such as the bald eagle and osprey, and to provide cavities for cavity nesting species. However, care should be taken in choosing sites for creating snags. Areas which are

frequented by people should be avoided, such as roadsides and picnic areas, due to the potential hazard of falling trees. Island habitat, which exists between the intake and discharge canals, can be enhanced by supplementing existing vegetation with warm-season grasses and forbs that are beneficial to grassland nesting waterfowl species and pollinators. Establishing taller warm-season grasses on these island habitats will also deter nuisance species, such as Canada geese, which prefer shorter, cool-season grasses. Additionally, the roots of native warm season grasses will slow the erosion of canal banks, reducing sedimentation of the water and maintaining shoreline habitat resources for wildlife. WHC also suggests that the Dresden Generating Station consider further enhancing habitat for bald eagles by installing one or two nesting platforms in remote areas on the banks of the Kankakee and Des Plaines Rivers. Other raptors, such as the osprey, may be enticed to use nesting platforms near the rivers as well. Other enhancements for waterfowl, such as the placement of mallard nesting tubes, can be conducted in areas where adjacent grasslands are not suitable for nesting.

FIGURE 18. OPEN WATER HABITAT AT DRESDEN GENERATING STATION



Photo by Kathy Koebl-Crews/WHC

2.1.6 Species to Consider Before Formulating Management Plans

2.1.6.1 Identify and Manage Non-Native, Exotic, Invasive, and Nuisance Species—

Invasive plant species are among greatest threats to the world's biodiversity, and the issue of controlling them has become a priority for the scientific community. Several federal acts, such as the Federal Noxious Weed Act of 1974 and the Alien Species Prevention and Enforcement Act of 1992, have been passed to direct the control of invasives. In 1999, President Clinton signed Executive Order 13112 to address the challenge that invasive species present to the nation's environment and economy, and to create a National Invasive Species Council.

While native species are those that have naturally and historically been found in a particular locale, Executive Order 13112 defines invasive species as those species not native, or exotic, to a particular ecosystem that, upon introduction, are "likely to cause economic or environmental harm or harm to human health". Species are introduced in a variety of ways to areas in which they do not historically occur. Some have been introduced intentionally for ornamental or commercial use; others have been accidentally brought from foreign countries because they were mistaken for native plants that are similar in appearance. The vast majority of plant species introduced from other regions of the world do not become established outside their native ecosystem simply because the conditions they require and find in their native environments are not found in their new locations. The few species that do manage to survive, however, can aggressively invade and threaten native ecosystems.

Exotic invasive species can spread quickly due to a combination of two major factors. First, they possess a suite of life history traits that allow them to spread rapidly. Invasive plants can be prolific seed producers, and they may develop extensive underground seed banks and root systems so that they can spread vegetatively. They are often successful in areas with poor soil quality, and are thus able to out-compete native species that are more "selective". The second factor is that exotic species are, by definition, colonizers from elsewhere. Often,

these plants spread to new areas of the world, but their primary competitors, predators, and diseases from their native ecosystems do not follow them, making their establishment and success all the more likely.

As their populations grow out of control, they can have devastating ecological and economic impacts. The natural and economic damage caused by encroachment of invasive species can be matched only by that resultant from floods, hurricanes, earthquakes, mudslides and wildfires. Invasive species often come to dominate local ecosystems, reducing diversity and crowding out native species. When a plant community is dominated by one species, the diversity of food sources decreases and thus native birds, mammals, and other animals can suffer. Furthermore, less diverse communities are more susceptible to environmental stresses and are less resilient to disturbance than healthy, native ecosystems that contain a wide variety of vegetation.

According to the Illinois native Plant Society, “there are approximately 100 million acres of land in the United States that are dominated by invasive, non-native plants species and the current yearly increase is estimated at 14 percent. Invasive plant species become the dominant vegetation on approximately 4,600 acres of public land each day in the United States; this accumulates to nearly three million acres each year, or a land area that is the approximate size of Connecticut.”

Two techniques can be employed to mitigate the problems associated with exotic invasive plants: prevention and eradication. Unfortunately, preventing spread is often difficult. The seeds of invasive plants frequently migrate to new areas via roadways, in seed mixtures, or are carried by the birds and mammals that consume them. Eradication often requires repeated action and monitoring to achieve success, but can be accomplished if the problem is addressed while populations are still manageable. **Table 1** provides a list of common invasive species in Illinois according to the Illinois Department of Natural Resources.

TABLE 1. INVASIVE PLANT SPECIES IN ILLINOIS

COMMON NAME	SCIENTIFIC NAME
Norway maple	<i>Acer platanoides</i>
Tree-of-heaven	<i>Ailanthus altissima</i>

COMMON NAME	SCIENTIFIC NAME
Mimosa	<i>Albizzia julibrissin</i>
Japanese barberry	<i>Berberis thunbergii</i>
Autumn olive	<i>Elaeagnus umbellata</i>
Burning bush	<i>Euonymus alata</i>
Rose-of-Sharon	<i>Hibiscus syriacus</i>
Common privet	<i>Ligustrum vulgare</i>
Hybrid honeysuckle	<i>Lonicera × bella</i>
Amur honeysuckle	<i>Lonicera maackii</i>
Morrow's honeysuckle	<i>Lonicera morrowii</i>
Tatarian honeysuckle	<i>Lonicera tatarica</i>
White mulberry	<i>Morus alba</i>
Princess tree	<i>Paulownia tomentosa</i>
White poplar	<i>Populus alba</i>
Sawtooth oak	<i>Quercus acutissima</i>
Common buckthorn	<i>Rhamnus cathartica</i>
Smooth buckthorn	<i>Rhamnus frangula</i>
Black locust	<i>Robinia psuedo-acacia</i>
Multiflora rose	<i>Rosa multiflora</i>
Siberian elm	<i>Ulmus pumilia</i>
Wayfaring tree	<i>Viburnummlantana</i>
European highbush cranberry	<i>Viburnum opulus</i>
Oriental bittersweet	<i>Celastrus orbiculatus</i>
Crown vetch	<i>Coronilla varia</i>
Chinese yam	<i>Dioscorea batatas</i>
Purple wintercreeper	<i>Euonymus fortunei</i>
English ivy	<i>Hedera helix</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Kudzu	<i>Pueraria lobata</i>
Bittersweet	<i>Solanum dulcamara</i>
Periwinkle	<i>Vinca minor</i>
Chinese wisteria	<i>Wisteria sinensis</i>
Garlic mustard	<i>Alliaria petiolata</i>
Smooth brome grass	<i>Bromus inermis</i>
Nodding musk thistle	<i>Carduus natans</i>
Canada thistle	<i>Cirsium arvense</i>
Bull thistle	<i>Cirsium vulgare</i>
Cut leaved teasel	<i>Dipsacus laciniatus</i>
Common teasel	<i>Dipsacus sylvestris</i>
Leafy spurge	<i>Euphorbia esula</i>
Tall fescue	<i>Festuca arundinacea</i>
Creeping Charlie	<i>Glechoma hederacea</i>
Dame's rocket	<i>Hesperis matronialis</i>
Sericea lespedeza	<i>Lespedeza cuneata</i>
Bird's foot trefoil	<i>Lotus corniculatis</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Moneywort	<i>Lysimachia nummularia</i>

COMMON NAME	SCIENTIFIC NAME
White sweet clover	<i>Melilotus alba</i>
Yellow sweet clover	<i>Melilotus officinalis</i>
Japanese grass	<i>Microstegium vimineum</i>
Eurasian water milfoil	<i>Myriophyllum spicatum</i>
Parsnip	<i>Pastinaca sativa</i>
Reed canary grass	<i>Phalaris arundinacea</i>
Common reed	<i>Phragmites australis</i>
Kentucky bluegrass	<i>Poa pratensis</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>
Johnson grass	<i>Sorghum halepense</i>

2.1.6.1.1 General Management Options for Controlling Invasive Species

When designing an invasive species management plan, it is important to consider options that will both fit with current landscape management practices as well as minimize the impact of invasive plants. Any attempts to control vegetation must be based on the major factors that control vegetative forces in the area, such as available light, water, inorganic nutrients, and growing space. Therefore, a successful management plan will include a strategy for increasing the amount of available space and resources for desirable, native plants while limiting the space in which invasives can take over. There are several different types of management strategies to consider when formulating an invasive species management plan; these methods include physical controls and manual removal, chemical controls, biological controls, and integrated methods that combine various control methods. Those integrated programs that utilize a coordinated effort to control and eradicate invasives are typically more effective than using one method in an attempt to achieve total control.

2.1.6.1.1.1 Physical Control Methods

Physical methods of control and removal include manual pulling and digging of individual invasive plants, using heavy equipment to destroy or remove individuals, mowing, cutting, and clipping. The manual removal of individual invasive species can be effective, but it is generally only realistic to employ when dealing with small, isolated areas of infestation. Furthermore, there are few cases in which removing individual plants by pulling and digging will ultimately control the growth of an invasive. In addition to hand pulling, other physical removal methods, such as pulling with a tractor, can be effective in removing individual trees and mature shrubs. The most important objective when employing physical removal

methods to remove individual invasives species is to remove as much of the root structure as possible, as remaining material may allow the individual invasive to re-establish. Therefore, the degree of measurable success in invasives control when using the pulling or digging method will depend on the thoroughness of individual plant removal.

Other physical control methods, such as cutting and mowing, can be effective in limiting the growing space and resources available to invasive plants. These methods impose limited success in controlling invasives because the act of cutting and/or mowing will effectively remove the food-producing portion of individual plants, thereby limiting their ability to take over an area. However, because root and stem portions of the plant remain, invasives will likely resprout and continue to spread with time. Therefore, cutting and mowing are most effective as control techniques when coupled with selectively applied chemical controls.

Cutting may be more effective because managers can selectively target invasive plants, while mowing will reduce the growing ability of all plants in an area. Cutting is reportedly most effective when attempting to control invasives in moderately to heavily wooded areas. This is because the surrounding woodland vegetation will assist control efforts by reducing the amount of resources available to the cut invasive. The cut plant must, therefore, rely on resources stored in the roots for repair and refoliation efforts, significantly weakening the plant's ability to effectively spread for a period of time. Cutting is reportedly less effective in controlling invasives in open areas and edge habitats, where repeated cutting would be required to obtain minimal controls. Cutting is most effective when performed in late fall and winter months. When including cutting as part of an invasive species management plan, managers are advised to plan on re-evaluating cut areas annually to assess the need for repeated control efforts.

Mowing is less selective and will effectively put all plants in an area on an equal basis to compete for sunlight, water, and other essential resources. The effectiveness of mowing is difficult to assess because individual plant species have differing growth rates and responses to disturbance. Therefore, mowing will favor those species that are most prolific in refoliating and spreading quickly, which includes many invasive plants. Mowing can be an effective control, particularly when coupled with chemical controls, in open areas where

manual plant removal is not an option. Initial treatment with mowing may require the individual, manual removal of those species that are too large to mow. Mowing should be conducted on a regular basis, and the growth rates and spread of invasives should be closely monitored.

Fire can also be used in conjunction with other physical and biological controls of invasives. Whenever possible, prescribed fire should be considered as a component of an invasive species management plan. Throughout the evolution of the Illinois native landscape, fire has played an important role in the establishment and distribution of native vegetation. Therefore, one of the benefits of using fire as a control technique is that it gives a distinct advantage to the native grasses, trees, and shrubs that have evolved in the region. Drawbacks of using prescribed fires to manage invasive species include a perceived lack of acceptance among citizens and local governments; however, many local fire departments and county and state extension services are prepared and willing to assist with such control options. In addition, public education regarding the importance of fire as a natural management tool and concerning the planned burn strategy can help in alleviating opposition. In order to be effective, prescribed burns must be executed only when specific weather and plant fuel conditions are met, and should only be carried out by trained professionals.

2.1.6.1.1.2 Chemical Controls

Chemical controls of invasive plants include the selective use of herbicides that are designed to effectively kill weed species. However, it is important to note that most herbicides will also negatively impact desirable, non-target vegetation, and should be used and applied in a responsible and selective manner. The long-term, exclusive use of herbicides is not generally considered to be an effective control technique for most invasive plants for several important reasons. First, coupled with the exclusive use of herbicides is a short-term, “once and over” attitude that simply does not fit with a long-term management plan, which is essential for successful invasive species removal and control. In addition, the inherent, toxic nature of herbicides can impair an individual’s ability to successfully deliver a required amount of chemical to the correct area of a plant during the appropriate time in its growing cycle, without posing a potential risk to neighboring vegetation and wildlife resources.

However, when safely administered and monitored, and used in conjunction with other physical or biological control methods, herbicides can be an essential component to an invasive species management plan.

To safely administer herbicides in an infested area, it is recommended that personnel first remove as much of the above ground plant material as possible before applying chemicals, unless the targeted species dictates a foliar application. To control small invasive trees, shrubs, and vines, first cut stems and after about two weeks, apply an herbicide with glyphosate directly to the re-sprouting stems and/or stumps and monitor plants in the weeks to come. To eradicate individual, mature trees, cut the tree in the fall or winter and apply herbicide, such as RoundUp[®] or Garlon[®], directly to the fresh cut stump. For control of invasive vegetation in larger, open areas, moderate infestations may be controlled through use of a broadleaf herbicide, such as Banvel[®] or 2-4-D[®]. Severe large-scale infestations may require mowing coupled with herbicide application, followed with plowing, discing, and an additional herbicide application. If this intensive method is required to remove invasive plants, it will be important to quickly establish desirable, native plants following the last discing of the site in order to reduce the likelihood that invasives will successfully reestablish.

2.1.6.1.1.3 Biological Controls

Biological controls involve the use of other living organisms to control invasive species, such as planting and interseeding native plants, or introducing biological control agents, such as insect pests, in an effort to control and manage invasive species for the long term. For example, the planting of trees and shrubs to further vegetate wooded areas may help to effectively limit the availability of resources to invasive species in the area. In addition, the interseeding of meadows and fields with native grasses and wildflowers can help minimize the establishment and further spread of invasive vegetation. It is likely that this method, coupled with long-term monitoring, cutting and mowing, can severely limit the impact of a moderate invasive species infestation over the period of a few years.

Furthermore, the establishment of native plants immediately after physical or chemical removal methods will significantly reduce the ability of an invasive species to resprout. Evergreen trees are especially effective in producing fast shade to reduce the ability of

invasive plants to reestablish, particularly when planted along south and westward facing forest edges where invasive species are often most prolific. Planting additional evergreen tree and shrub species will also serve to diversify wildlife habitats on site. Following the addition of trees and shrubs to the landscape, managers should continue to mow invasive undergrowth regularly for several years, until the new plants are well established. Other biological control measures include the use of pest populations to control invasive species. These methods often rely on other invasive or genetically engineered pest species that are known to selectively target the non-desirable invasive. Much of the technology surrounding this method is used for the control of invasive and nuisance species that plague large-scale agricultural production.

2.1.6.1.2 Specific Invasive Species Management Options

2.1.6.1.2.1 Eradicate Spotted Knapweed

Typical of semiarid range lands in the west, spotted knapweed (*Centaurea biebersteinii*) also infests roadsides, fields, and disturbed sites in the eastern US, as well as undisturbed areas such as dry prairie sites, oak and pine barrens, lake dunes, and sandy ridges. Economic losses due to its effects on grazing lands (cattle as well as wildlife) and the reduction in native plant species in areas infested with the weed increase the need for control of this exotic, invasive species.

Introduced from Central Asia and Europe via contaminated alfalfa and hay seed, spotted knapweed made its way into the United States in the 1890's. It is easily spread by hay and vehicle undercarriages. Once established, the plant will quickly eliminate surrounding native plants by secreting a natural herbicide (phytotoxin), called catechin, into the soil via its root system. Research indicates that simply tapping the leaves of the knapweed plant will stimulate it to release this toxin into the soil. Once released, the chemical will kill competing plant cells causing the entire plant to die within a week. The knapweed plant, however, is unable to reabsorb the chemical once released, thereby protecting it from its own toxin. It is unknown how long the toxin remains in the soil; catechin is currently being studied for use as an herbicide.

Spotted knapweed is a rather short-lived, perennial plant that spreads solely from wind-blown seed. The thistle-like flowers are purple and borne on stalks one to three feet tall. The flower heads are enclosed by black-tipped bracts, which are actually comb-like fringes, giving it a spotted look, and thus its name, spotted knapweed. The lower leaves are rough, and alternate, with leaf margins being divided approximately halfway to the midrib, and with upper leaves being more linear in their shape. Flowering occurs in late June through August. Flower bracts reopen after approximately twenty days, releasing seeds with short tufts of bristles at their tips. These bristles aid in wind dispersal. Seedlings emerge in autumn then overwinter as a rosette and resume growth in the spring.

2.1.6.1.2.2 Eradicate Common Reed

Common reed, also commonly referred to as *Phragmites* from its scientific name of *Phragmites australis*, is a wetland grass frequently found throughout North America. Although it prefers freshwater habitat that is neither particularly acidic nor basic, its ability to grow and spread under substandard conditions allows it to dominate compromised habitats, such as those with brackish (between salt and fresh), alkaline, and acidic waters. Areas with high nutrient concentrations, particularly nitrates, as well as areas near roads that receive salt runoff, are commonly invaded. Common reed is also tolerant of anoxic conditions (conditions in which oxygen is absent).

Common reed is identified by its characteristic stalks, which can grow up to 13 feet tall, and by its feathery inflorescence. It spreads rapidly by rhizomes, which form a thick mat under the soil surface, crowding out other plants. These rhizomes can reach a depth of nearly six feet, allowing the plant to use moisture stored deep in the soil. A build-up of litter underneath the plant also prevents other species from colonizing the area.

FIGURE 19. COMMON REED



Photo by John M. Randall, The Nature Conservancy

Although found in North America for thousands of years, it is believed that the more invasive, exotic strains of common reed have colonized only recently. While it does have some value to wildlife and not all strains of common reed are unmanageable and invasive, it is nonetheless viewed as problematic because it spreads quickly and usually forms a dense monoculture, displacing other native vegetation that has greater wildlife value. A stand of common reed is deemed invasive if it has invaded an area characterized by habitat alteration or pollution, or if the stand continues to expand at the expense of other wetland vegetation.

Common reed sets seed between July and September, and the seeds are dispersed between November and January. Subsequently, nutrients are translocated down to the rhizomes and leaves drop off for the winter. Seeds are an important mechanism of dispersal to new sites, but once a site has been invaded, spreading occurs primarily by vegetative means. Therefore, common reed control must combine methods that destroy both the above- and below-ground portions of the plant. .

2.1.6.2 Migratory, Forestland, Grassland, and Wetland Avian Species Management

Throughout the nation, many historically common avian species have experienced significant declines. According to research compiled by the USGS Northern Prairie Wildlife Research Center, most of the declines of avian species within Illinois can be attributed to specific land use practices such as the removal of forestlands, land clearing for agriculture, mining, urban development, reservoirs, highway construction, and the placement of power lines which have all contributed to severe fragmentation of local avian habitats.

Exelon Corporation's Dresden Generating Station lies within the Mississippi Flyway, which is one of four major North American flyways. This flyway includes migration routes that extend eastward through the peninsula of southern Ontario to western Lake Erie and southwest across Ohio and Indiana to the Mississippi where routes clearly follow the river to its mouth. The western boundaries are less clearly defined and mix into the Central Flyway in eastern Nebraska and western Missouri and Arkansas. The longest known migration route reportedly passes through this flyway; passing from the north on the Arctic shore of Alaska south to the southern tip of Patagonia. Besides being located within an important migratory route, the Dresden Generating Station may provide habitat for a number of resident songbirds and important grassland and forestland species.

Research has shown that habitat size, shape, and the amount of edge present in forestland and grassland habitats all greatly affect the success of breeding birds in this region. For this reason, the USGS Northern Prairie Wildlife Research Center has compiled a list of area requirements for forestland and grassland nesting birds based on their ability to successfully adapt to surrounding fragmentation. A partial version of this list is provided in **Table 2** and **Table 3**, and includes those species that have moderate and low sensitivities to fragmentation, as these species would be most likely to utilize habitat available within and around the Dresden Generating Station property.

**TABLE 2. FORESTLAND BIRDS OF ILLINOIS AND THEIR TOLERANCE OF
FRAGMENTATION**

SENSITIVITY	COMMON NAME	SCIENTIFIC NAME
Moderately sensitive	Tufted titmouse	<i>Baeolophus bicolor</i>
Low sensitivity	Northern cardinal	<i>Cardinalis cardinalis</i>

SENSITIVITY	COMMON NAME	SCIENTIFIC NAME
Moderately sensitive	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Moderately sensitive	Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
Low sensitivity	Eastern wood pewee	<i>Contopus virens</i>
Low sensitivity	Blue jay	<i>Cyanocitta cristata</i>
Moderately sensitive	Yellow-throated warbler	<i>Dendroica dominica</i>
Moderately sensitive	Acadian flycatcher	<i>Empidonax virescens</i>
Moderately sensitive	Wood thrush	<i>Hylocichla mustelina</i>
Low sensitivity	Northern oriole	<i>Icterus galbula</i>
Low sensitivity	Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Low sensitivity	Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Low sensitivity	Great crested flycatcher	<i>Myiarchus crinitus</i>
Moderately sensitive	Kentucky warbler	<i>Oporornis formosus</i>
Moderately sensitive	Northern parula	<i>Parula Americana</i>
Low sensitivity	Indigo bunting	<i>Passerina cyanea</i>
Low sensitivity	Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Low sensitivity	Downy woodpecker	<i>Picoides pubescens</i>
Moderately sensitive	Hairy woodpecker	<i>Picoides villosus</i>
Low sensitivity	Rufous sided towhee	<i>Pipilo erythrophthalmus</i>
Moderately sensitive	Scarlet tanager	<i>Piranga olivacea</i>
Moderately sensitive	Summer tanager	<i>Piranga rubra</i>
Low sensitivity	Black capped chickadee	<i>Poecile atricapilla</i>
Moderately sensitive	Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
Low sensitivity	Common grackle	<i>Quiscalus quiscula</i>
Moderately sensitive	Louisiana waterthrush	<i>Seiurus motacilla</i>
Moderately sensitive	White-breasted nuthatch	<i>Sitta carolinensis</i>
Low sensitivity	Carolina wren	<i>Thryothorus ludovicianus</i>
Low sensitivity	House wren	<i>Troglodytes aedon</i>
Low sensitivity	American robin	<i>Turdus migratorius</i>
Moderately sensitive	Red-eyed vireo	<i>Vireo olivaceus</i>

There are also several avian species that are characteristic in Illinois grassland and prairie ecosystems, although populations that rely on these types of habitat have suffered dramatic declines following the conversion of grasslands and native tallgrass prairie to agricultural row crops. In recent years, population declines have increased due to changes from mixed agricultural lands to production of one crop, expanding hay fields and livestock management activities.

**TABLE 3. GRASSLAND BIRDS OF ILLINOIS AND THEIR TOLERANCE OF
FRAGMENTATION**

SENSITIVITY	COMMON NAME	SCIENTIFIC NAME
Low sensitivity	Red-winged blackbird	<i>Agelaius phoeniceus</i>
Moderate sensitivity	Grasshopper sparrow	<i>Ammodramus savannarum</i>

SENSITIVITY	COMMON NAME	SCIENTIFIC NAME
Low sensitivity	American goldfinch	<i>Carduelis tristis</i>
Moderate sensitivity	Sedge wren	<i>Cistothorus platensis</i>
Low sensitivity	Northern bobwhite	<i>Colinus virginianus</i>
Low sensitivity	Common yellowthroat	<i>Geothlypis trichas</i>
Low sensitivity	Song sparrow	<i>Melospiza melodia</i>
Low sensitivity	Vesper sparrow	<i>Pooecetes gramineus.</i>
Low sensitivity	Dicksissel	<i>Spiza Americana</i>
Low sensitivity	Field sparrow	<i>Spizella pusilla</i>
Moderate sensitivity	Eastern meadowlark	<i>Sturnella magna</i>
Moderate sensitivity	Western meadowlark	<i>Sturnella neglecta</i>

Many of the grassland nesting birds that were considered common and had stable populations at the turn of the century are now critically imperiled and increasingly rare. One such progression is evident when studying greater prairie chickens, whose population peaked at an estimated ten million individuals. Current population estimates include fewer than 80 birds in Illinois. A partial list of grassland breeding birds of Illinois, provided by the USGS Northern Prairie Wildlife Research Center, can be found in **Table 4**.

Table 4. Grassland Breeding Birds of Illinois

COMMON NAME	SCIENTIFIC NAME
Red winged blackbird	<i>Agelaius phoeniceus</i>
Henslow's sparrow	<i>Ammodramus henslowii</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Blue winged teal	<i>Anas discors</i>
Mallard	<i>Anas platyrhynchos</i>
**Short-eared owl	<i>Asio flammeus</i>
**Upland sandpiper	<i>Bartramia longicauda</i>
American goldfinch	<i>Carduelis tristis</i>
Killdeer	<i>Charadrius vociferous</i>
Lark sparrow	<i>Chondestes grammacus</i>
Common nighthawk	<i>Chordeiles minor</i>
**Northern harrier	<i>Circus cyaneus</i>
Sedge wren	<i>Cistothorus platensis</i>
Northern bobwhite	<i>Colinus virginianus</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Horned lark	<i>Eremophila alpestris</i>
Common yellowthroat	<i>Geothlypis trichas</i>
*Loggerhead shrike	<i>Lanius ludovicianus</i>
Swamp sparrow	<i>Melospiza georgiana</i>
Song sparrow	<i>Melospiza melodia</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Ring necked pheasant	<i>Phasianus colchicus</i>

COMMON NAME	SCIENTIFIC NAME
Vesper sparrow	<i>Poocetes gramineus</i>
Dicksissel	<i>Spiza americana</i>
Field sparrow	<i>Spizella pusilla</i>
Eastern meadowlark	<i>Sturnella magna</i>
Western meadowlark	<i>Sturnella neglecta</i>
** Greater prairie chicken	<i>Tympanuchus cupido</i>
Mourning dove	<i>Zenaida macroura</i>

**Indicates the species is endangered in Illinois.

*Indicates the species is threatened in Illinois.


Native prairie, pasture, and old-field habitats on the Dresden Generating Station property can potentially provide excellent habitat for grassland birds. However, many grassland birds are declining in numbers due to conversion of grasslands to agriculture, habitat fragmentation, and suburban development. According to results from the North American Breeding Bird Survey, grassland birds exhibited the most consistent, widespread, and steepest declines of any bird habitat group. Of the 28 grassland bird species in the US, only ten percent have shown positive population trends. In comparison, more than 50 percent of forest bird species have shown an increase since the survey first began in 1966. The plight of grassland birds has been described as America's most neglected conservation problem. The bobolink has declined by 37 percent since 1966; the eastern meadowlark is down by 53 percent, and the grasshopper sparrow has been reduced by 66 percent. In general, management strategies aimed at preserving grassland bird populations focus on protecting and establishing large contiguous habitat blocks, providing structurally diverse habitat, eliminating mid-season mowing, reducing edge, and controlling the encroachment of woody vegetation. There are three primary management techniques available for managing grassland habitat: prescribed burning, grazing, and mowing.

In addition to preserving and enhancing grassland habitats on site, managers can also increase habitat suitability for native cavity-nesting birds by constructing, placing, and monitoring nest boxes. Cavity-nesting bird populations have also been declining in recent decades due to habitat loss and the concomitant decrease in availability of suitable nesting cavities. Most natural nest cavities are located standing dead trees, known as snags. The combination of current forest treatment practices and loss of woodlands has contributed to a decrease in naturally occurring snags. Providing and maintaining nesting structures

through a nest box program can help increase native bird populations. Attracting several native bird populations will increase the biodiversity on the site and the surrounding area. WHC recommends placing nest structures for mallards, tree swallows, purple martins, woodpeckers, owls, and American kestrels, which will readily colonize artificial boxes. Beyond initial nest box placement, maintenance and monitoring of the nest boxes is very important for a successful program. A list of cavity-nesting species common in Illinois is provided in **Table 5**. Information concerning cavity-nesting raptor and owl species is outlined in the following sections. For additional information on constructing and placing nest boxes, please contact the Wildlife Habitat Council.

TABLE 5. EXAMPLES OF CAVITY NESTING BIRDS OF ILLINOIS

COMMON NAME	SCIENTIFIC NAME
Northern saw-whet owl	<i>Aegolius acadicus</i>
Wood duck	<i>Aix sponsa</i>
Northern flicker	<i>Colaptes auratus</i>
Red headed woodpecker	<i>Melanerpes erythrocephalus</i>
Eastern screech owl	<i>Otus asio</i>
Prothonotary warbler	<i>Protonotaria citrea</i>
Eastern bluebird	<i>Sialis sialis</i>
White-breasted nuthatch	<i>Sitta carolinensis</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
Bewick's wren	<i>Thryomanes bewickii</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Barn owl	<i>Tyto alba</i>

In addition to grassland and forestland avian species, habitats available at the Dresden Generating Station provide habitat for a diversity of wetland-dependent birds. Wetland species common to this region are listed in  le XX.

2.1.6.2.1 Raptor Habitat Management Options

“Raptor” is a general term that refers to birds of prey. In general, raptors are fairly large, possess strong beaks and talons, and have sharp hearing and eyesight. These birds are often at the top of the food chain in ecological systems, and because of their value state and federal laws protect raptors. Raptors include hawks, eagles, falcons, harriers, kites, accipiters, and buteos. Although many raptor species have shown decline, in large part due to their tendency to accumulate biotoxins, which result in egg thinning and severe reductions in

reproductive success, efforts to conserve viable raptor habitat and the banning of certain chemicals have allowed some raptor species to begin to recover.

Illinois has several species of hawks, which, like eagles are diurnal, hunting during daylight hours. They feed primarily on small mammals, birds, fish, amphibians, reptiles, and insects, although some also feed on roadkill and other carrion. Most hawks can be observed in woodland habitats, in agricultural fields and edge habitats, wetlands, prairies and grasslands, and sometimes even in residential areas. The red-shouldered hawk, which was taken off the state's threatened species list in 2003, prefers forested wetland habitats adjacent to rivers and streams. The red-tailed hawk is one raptor commonly seen in Illinois, often spotted on utility poles, dead standing trees, or available perches. Accipiters, including Cooper's and sharp shinned hawks, are birds of the woodlands and are able to navigate through the canopy chasing smaller birds.

TABLE 6. COMMON BIRDS OF PREY IN ILLINOIS

COMMON NAME	SCIENTIFIC NAME
Cooper's hawk	<i>Accipiter cooperii</i>
Northern saw whet owl	<i>Aegolius acadicus</i>
Golden eagle	<i>Aquila chrysaetos</i>
Short eared owl	<i>Asio flammeus</i>
Long eared owl	<i>Asio otus</i>
Great horned owl	<i>Bubo virginianus</i>
Red tailed hawk	<i>Buteo jamaicensis</i>
Rough legged hawk	<i>Buteo lagopus</i>
Red shouldered hawk	<i>Buteo lineatus</i>
Broad winged hawk	<i>Buteo platypterus</i>
Turkey vulture	<i>Cathartes aura</i>
Northern harrier	<i>Circus cyaneus</i>
Peregrine falcon	<i>Falco peregrinus</i>
American kestrel	<i>Falco sparverius</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Mississippi kite	<i>Ictinia mississippiensis</i>
Snowy owl	<i>Nyctea scandiaca</i>
Eastern screech owl	<i>Otus asio</i>
Osprey	<i>Pandion haliaetus</i>
Barred owl	<i>Strix varia</i>
Barn owl	<i>Tyto alba</i>

Falcons, which include the commonly seen American kestrel, are generally considered to be small, to medium sized birds of prey that rely on fast, strong flight abilities to hunt prey. Kestrels are often spotted perching on or around utility poles and standing dead trees, scanning grasslands below for rodent and insect prey. The northern harrier, another hawk of Illinois, prefers grassland and marsh habitat for hunting prey. Ospreys are another example of a raptor common in the state; these birds occupy wetland and upland areas along rivers, lakes, and coastal areas. The Mississippi kite is the only member of its family that is found in Illinois, and it usually inhabits the extreme southern portion of the state, although they sometimes appear in northern regions during the periodic return of certain cicadas. Turkey vultures, which are commonly viewed soaring and circling in groups, are considered to be the most common raptors found in Illinois.

The common owl species of Illinois, which are also listed in **Table 6**, are found most often in their preferred nesting habitats, which include woodlands, open meadows and field habitats, and edge areas. Owls can be most easily identified during the nesting season, when they are more actively hunting and subsequently more vocal.

2.1.6.3 Bat Habitat Management Options

Despite the many misconceptions people have about them, bats are actually a unique group of mammals that play a vital role in natural ecosystems. There are more than 1,100 different kinds of bats throughout the world, amounting to approximately ¼ of all mammal species. Many people have the mistaken idea that contact with a bat will result in rabies contraction. In fact, research indicates that the incidence of rabies is only about 0.5 percent in bat populations. Bats will not usually bite unless threatened, and since most of those bats that do contract rabies exhibit the paralytic form of the virus, a rabid bat is unlikely to attack humans.

Bats are important in seed dispersal and pollination of both wild and agricultural plants, and are a major predator of night-flying insects, including mosquitoes; approximately 70 percent of all bats are considered to be insectivorous. A single bat can eat up to 1,000 or more insects in an hour, potentially reducing the need for pesticides and lowering the risk of insect-borne diseases such as West Nile Virus.

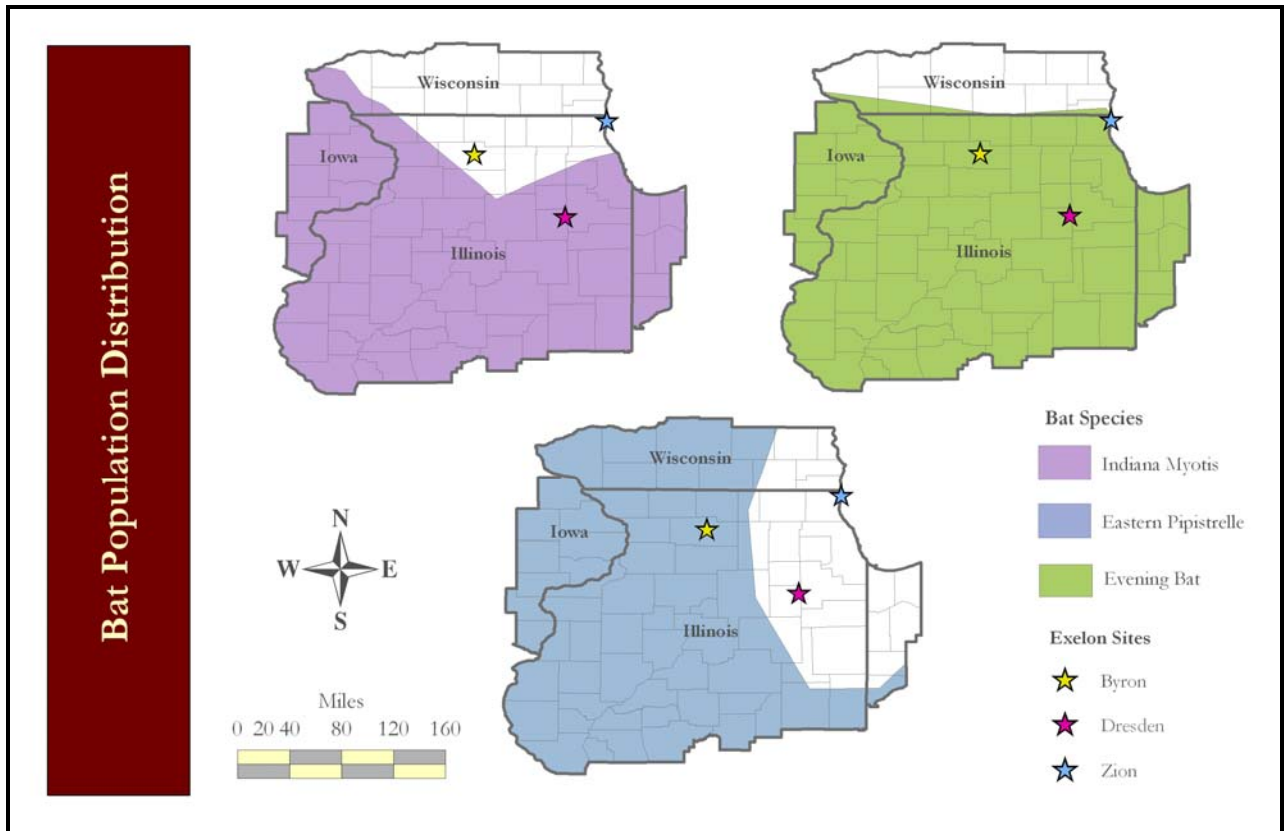
Of the more than 1,000 bat species throughout the world, only twelve species live in Illinois all or part of the year. All of them are insect eaters and feed on mosquitoes, as well as many crop damaging corn border and cutworm moths. Therefore, Illinois bats generally hibernate or migrate when insect populations begin to dwindle. Bats common in the region are generally small, only two to four inches in length with average wingspans of up to twelve inches and often weigh less than one ounce.

In spite of their beneficial and relatively innocuous nature, more than half of the bat species in America are considered to be endangered or in rapid decline. Pesticide use, habitat destruction, and disturbance of colonies during hibernation and breeding are among the biggest threats to these populations. Placing and monitoring artificial roosting structures are steps that the Dresden Generating Station can take to support bat populations and to help slow or even reverse, their downward population trend. **Table 7** provides a list of the bats species that are commonly observed in Illinois. In addition, **Figure 20** demonstrates the habitat ranges of local bat species in relation to regional Exelon site locations.

TABLE 7. BATS COMMON IN ILLINOIS

COMMON NAME	SCIENTIFIC NAME	STATUS
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	State Endangered
Big brown bat	<i>Eptesicus fuscus</i>	Common, hibernate in winter
Silver-haired bat	<i>Lasionycteris noctivagans</i>	Migratory, only in summer
Red bat	<i>Lasiurus borealis</i>	Migratory, only in summer
Hoary bat	<i>Lasiurus cinereus</i>	Migratory, only in summer
Keen's bat	<i>Myotis keenii</i>	Uncommon
Southeastern bat	<i>Myotis austroriparius</i>	State Endangered
Gray bat	<i>Myotis grisescens</i>	Federal Endangered
Little brown bat	<i>Myotis lucifugus</i>	Common, hibernate in winter
Indiana bat	<i>Myotis sodalist</i>	Federal Endangered
Evening bat	<i>Nycticeius humeralis</i>	Migratory, only in summer
Eastern pipistrelle	<i>Pipistrellus subflavus</i>	Common, hibernate in winter

FIGURE 20. RANGES OF LOCAL BAT SPECIES



Map by Tanya Lubansky/ WHC

Bat boxes may be used for establishment of nursery colonies during the summer months, for roosting, or for hibernating. Once a location is established, bat populations will generally return to the same bat box every year. The bats can be monitored by looking up into the box during the day with a flashlight to count the number of occupants, and by counting the number of bats that emerge in the evening. To count pups, wait until the adults have emerged in the evening, and then use a flashlight to attempt to count the pups remaining. Each breeding female usually has one pup per year. The pups are born hairless and unable to fly, and are dependent on the mother for protection and milk. The mother will leave the pup alone in the colony at night to feed, but will return to nurse. The young will begin to leave the colony for short flights when six to eight weeks old, usually in late July.

Although bats are not usually aggressive, they should never be handled. Occasionally young may fall from the roost, or adults may be injured when hit by cars. While less than half of

one percent of the population carries the rabies virus, as noted above, any downed bat should be treated as a potential carrier. To capture an injured bat, wear gloves, place a coffee can over the bat, and then slide a piece of cardboard under the can. An obvious juvenile can then be placed back in the box as long as the person does not come into direct contact with the bat. For injured or ill bats, contact the health department or a local wildlife rehabilitator. If there are any issues with this, WHC and the other partners can be contacted for help. Additional information can be found in the Bat Habitat Management Section of the **Technical Reference Documents**.

2.1.6.4 Pollinator Habitat Management Options

The steady decrease in native pollinators is of great concern within the scientific community because of their important role in propagating both agricultural and wild plant species; while some plants are pollinated by the wind or self-pollinated, most flowering plants require a pollinator in order to set fruit and seed. Butterflies and hummingbirds are both important groups of pollinators, but bees are the group responsible for pollinating the greatest number and diversity of native plants. On a typical foraging trip, a bee may visit hundreds of flowers, pollinating each of them inadvertently while drinking nectar. Native bees are fundamentally responsible for maintaining the vigor of natural plant communities and the wildlife that depend on them.

Loss of nesting habitat and nectar sources, combined with widespread pesticide use, has led to a decline in bees and other pollinators that has caused alarm amongst the scientific community. The drastic decline in domestic honeybees in the last few years due to mite parasitism has led to further cause for concern in protecting native bee populations. There are more than 3,500 species of bees native to North America.

TABLE 8. BUTTERFLIES OF GRUNDY COUNTY

COMMON NAME	SCIENTIFIC NAME
Delaware Skipper	<i>Anatrytone logan</i>
Least Skipper	<i>Ancyloxypha numitor</i>
Hackberry Emperor	<i>Asterocampa celtis</i>
Sachem	<i>Atalopedes campestris</i>
Meadow Fritillary	<i>Boloria bellona</i>
Silver-bordered Fritillary	<i>Boloria selene</i>
Spring Azure	<i>Celastrina "ladon"</i>

COMMON NAME	SCIENTIFIC NAME
Summer Azure	<i>Celastrina neglecta</i>
Common Wood Nymph	<i>Ceryonis pegala</i>
Gorgone Checkerspot	<i>Chlosyne gorgone</i>
Silvery Checkerspot	<i>Chlosyne nycteis</i>
Orange Sulphur	<i>Colias eurytheme</i>
Clouded Sulphur	<i>Colias philodice</i>
Eastern Tailed-Blue	<i>Cupido comyntas</i>
Monarch	<i>Danaus plexippus</i>
Silver-spotted Skipper	<i>Epargyreus clarus</i>
Wild Indigo Duskywing	<i>Erynnis baptisiae</i>
Two-spotted Skipper	<i>Euphyes bimacula</i>
Black Dash	<i>Euphyes conspicua</i>
Dion Skipper	<i>Euphyes dion</i>
Dun Skipper	<i>Euphyes vestris</i>
Variegated Fritillary	<i>Euptoieta claudia</i>
Zebra Swallowtail	<i>Eurytides marcellus</i>
Common Buckeye	<i>Junonia coenia</i>
American Snout	<i>Libytheana carinenta</i>
Viceroy	<i>Limenitis archippus</i>
Red-spotted Purple or White Admiral	<i>Limenitis arthemis</i>
'Astyanax' Red-spotted Purple	<i>Limenitis arthemis astyanax</i>
Gray Copper	<i>Lycaena dione</i>
Purplish Copper	<i>Lycaena bellioides</i>
Bronze Copper	<i>Lycaena hylus</i>
American Copper	<i>Lycaena phlaeas</i>
Little Wood Satyr	<i>Megisto cymela</i>
Dainty Sulphur	<i>Nathalis iole</i>
Mourning Cloak	<i>Nymphalis antiopa</i>
Spicebush Swallowtail	<i>Papilio cresphontes</i>
Eastern Tiger Swallowtail	<i>Papilio glaucus</i>
Black Swallowtail	<i>Papilio polyxenes</i>
Spicebush Swallowtail	<i>Papilio troilus</i>
Pearl Crescent	<i>Phyciodes tharos</i>
Cabbage White	<i>Pieris rapae</i>
Broad-winged Skipper	<i>Poanes viator</i>
Long Dash	<i>Polites mystic</i>
Crossline Skipper	<i>Polites origenes</i>
Peck's Skipper	<i>Polites peckius</i>
Tawny-edged Skipper	<i>Polites themistocles</i>
Eastern Comma	<i>Polygonia comma</i>
Question Mark	<i>Polygonia interrogationis</i>
Gray Comma	<i>Polygonia progne</i>
Little Yellow	<i>Pyrisitia lisa</i>
Acadian Hairstreak	<i>Satyrium acadica</i>
Coral Hairstreak	<i>Satyrium titus</i>
Eyed Brown	<i>Satyrodes eurydice</i>

COMMON NAME	SCIENTIFIC NAME
Aphrodite Fritillary	<i>Speyeria aphrodite</i>
Great Spangled Fritillary	<i>Speyeria cybele</i>
Regal Fritillary	<i>Speyeria idalia</i>
Southern Cloudywing	<i>Thorybes bathyllus</i>
Northern Cloudywing	<i>Thorybes pylades</i>
European Skipper	<i>Thymelicus lineola</i>
Red Admiral	<i>Vanessa atalanta</i>
Painted Lady	<i>Vanessa cardui</i>
American Lady	<i>Vanessa virginiensis</i>
Northern Broken-Dash	<i>Wallengrenia egeremet</i>
Southern Dogface	<i>Zerene cesonia</i>

The majority of North American bees are solitary and should not to be confused with honeybees, which nest in colonies and were introduced into the U.S. The distinction between native, solitary bees and introduced, social bees is important for public awareness of bee conservation because only social bees swarm to protect their hive; native pollen bees on the other hand rarely ever sting and when they do, the sting tends to be mild. Native bees can generally be categorized as either soil dwellers or wood dwellers. Among the soil-dwelling bees are the bumble, sweat, digger, squash, alkali, and polyester bees. Wood-dwelling bees include orchard mason, horn-faced, leafcutter, and carpenter bees. In their natural habitat, wood-dwelling bees will excavate their nests in the soft central pith of stems and twigs, abandoned beetle borrows, or in dead standing trees. Soil-dwelling bees dig their nests in bare soil or construct domed nests out of mud. Please refer to the Pollinator Friendly Practices in **Technical Reference Documents** section of this report for more information on how WHC can assist the Dresden Generating Station in establishing, maintaining, and enhancing pollinator habitats on site.

2.1.6.5 Herptile Habitat Management Options

“Herptile” is jargon that is typically employed to collectively refer to both amphibian and reptile groups. These two groups are often lumped together when discussing habitat because it is largely accepted that reptiles evolved from amphibians. Both reptiles and amphibians are cold-blooded animals that lay eggs; however, there are also several important differences between the two groups, and among individual species of each group. Amphibians generally inhabit damp or wet environments such as marches, swamps, bogs, ponds, and larger water bodies. This is because two of the stages of amphibian

metamorphosis, the egg stage and the tadpole stage, require aqueous environments. The major groupings of amphibian species include frogs and toads, and salamanders. Frogs and toads are commonly confused with one and other; however, toads generally have shorter legs than frogs, and their movements are described as hopping rather than the leaping common among frogs. In addition, toads generally do not live in as close proximity to water resources as frogs typically do, although both require aquatic environments for successful reproduction. Salamanders, the other common type of amphibian, are generally recognizable by their long, slender bodies and presence of four legs, making them easily distinguishable from toads and frogs.

Frogs and toads can be most readily identified through their calls, taking into consideration overall size, color, and markings. Some amphibian species common in Illinois include the spring peeper, which is less than one inch in size; chorus frog, which is dark olive or black and similar in size to the peeper; cricket frog, which is common in central and southern Illinois; eastern wood frog, which is gray to green in color and inhabits wooded areas; green frog, which is a medium-sized frog; and the deep-toned bullfrog, American toad, and Fowler's toad.

Reptiles, the other component of the term "herptile," are often separated into four main categories for study: crocodiles, lizards, snakes, and turtles. Reptile development and overall lifecycles are very different than those common among amphibians. Reptiles generally spend their lives in terrestrial environments and young do not go through an extended metamorphosis; rather they are born as miniature versions of adults. The crocodile category of reptiles includes the American alligator, while the "lizard" classification includes iguanas, geckos, skinks, and chameleons. Snakes, which are further described as legless reptiles that live in the ground, trees, or water, include earth snakes, common garter snakes, and copperheads. Turtles, which are the only reptiles with an external shell, include bog turtles, painted turtles, map turtles, and stinkpots. Now only a remnant of a formerly large group, reptile's today number just about 6,000 species worldwide, much less than during the time when reptiles dominated life on this planet.

The lack of vernal pools and other appropriate terrestrial and aquatic reptile and amphibian habitat resources across the country, which is due to the encroachment of developments and

the conversion of acreage to agricultural and residential lands, is partly responsible for the alarming decrease of reptiles and amphibians worldwide. Herptiles have been declining in increasing numbers throughout the last century. An ongoing monitoring project can help the Dresden Generating Station Wildlife Team to determine the status of herptile populations at the site and the quality of habitat resources available for these sensitive species, while also contributing to important regional and national monitoring efforts, such as the compilation of research through the National Wildlife Federation and USGS-sponsored Frogwatch USA program. Frogwatch USA relies on volunteers to collect information regarding amphibian populations in neighborhoods across the nation. Monitoring activities such as this will not only benefit amphibians and reptiles, but they can present an opportunity for community outreach as well. Frogs and toads can be most readily identified through their calls, taking into consideration overall size, color, and markings. Reptiles are often easier to identify based on habitat types and other identifiable characteristics. **Table 9** provides a list of the reptile and amphibian species that are native to Illinois.

TABLE 9. ILLINOIS NATIVE REPTILE AND AMPHIBIAN SPECIES

TYPE	COMMON NAME	SCIENTIFIC NAME
Amphibian	Northern cricket frog	<i>Acris crepitans</i>
	Jefferson salamander	<i>Ambystoma jeffersonianum</i>
	Spotted salamander	<i>Ambystoma maculatum</i>
	Marbled salamander	<i>Ambystoma opacum</i>
	Tiger salamander	<i>Ambystoma tigrinum</i>
	Green salamander	<i>Aneides aeneus</i>
	American toad	<i>Bufo americanus</i>
	Fowler's toad	<i>Bufo fowleri</i>
	Dusky salamander	<i>Desmognathus fuscus</i>
	Mountain dusky salamander	<i>Desmognathus ochrophaeus</i>
	Two lined salamander	<i>Eurycea bislineata</i>
	Longtail salamander	<i>Eurycea longicauda</i>
	Spring salamander	<i>Gyrinophilus porphyriticus</i>
	Four-toed salamander	<i>Hemidactylium scutatum</i>
	Spring peeper	<i>Hyla crucifer</i>
	Eastern newt	<i>Notophthalmus viridescens</i>
	Redback salamander	<i>Plethodon cinereus</i>
	Northern ravine salamander	<i>Plethodon electromorphus</i>
	Slimy salamander	<i>Plethodon glutinosus</i>
	Striped chorus frog	<i>Pseudacris triseriata</i>
	New Jersey chorus frog	<i>Pseudacris triseriata kalmi</i>
	Mud salamander	<i>Pseudotriton montanus</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Amphibian	Red salamander	<i>Pseudotriton ruber</i>
	Bullfrog	<i>Rana catesbeiana</i>
	Green frog	<i>Rana clamitans</i>
	Pickerel frog	<i>Rana palustris</i>
	Northern leopard frog	<i>Rana pipens</i>
	Coastal plain leopard frog	<i>Rana sphenoccephala</i>
	Wood frog	<i>Rana sylvatica</i>
	Eastern spadefoot	<i>Scaphiopus holbrookii</i>
Reptile	Copperhead	<i>Agkistrodon contortrix</i>
	Smooth softshell	<i>Apalone mutica</i>
	Spiny softshell	<i>Apalone spinifera</i>
	Worm snake	<i>Carphophis amoenus</i>
Reptile	Snapping turtle	<i>Chelydra serpentina</i>
	Northern painted turtle	<i>Chrysemys picta</i>
	Spotted turtle	<i>Clemmys guttata</i>
	Kirtland's snake	<i>Clonophis kirtlandii</i>
	Black racer	<i>Coluber constrictor</i>
	Timber rattlesnake	<i>Crotalus horridus</i>
	Ringneck snake	<i>Diadophis punctatus</i>
	Rat snake	<i>Elaphe obsoleta</i>
	Blanding's turtle	<i>Emys blandingii</i>
	Coal skink	<i>Eumeces anthracinus</i>
	Five-lined skink	<i>Eumeces fasciatus</i>
	Broadhead skink	<i>Eumeces laticeps</i>
	Wood turtle	<i>Glyptemys insculpta</i>
	Bog turtle	<i>Glyptemys mühlenbergii</i>
	Map turtle	<i>Graptemys geographica</i>
	Eastern hognose	<i>Heterodon platirhinos</i>
	Eastern mud turtle	<i>Kinosternon subrubrum</i>
	Common kingsnake	<i>Lampropeltis getula</i>
	Milk snake	<i>Lampropeltis triangulum</i>
	Smooth green snake	<i>Liophorophis vernalis</i>
	Northern water snake	<i>Nerodia sipedon</i>
	Rough green snake	<i>Opheodrys aestivus</i>
	Redbelly turtle	<i>Pseudemys rubriventris</i>
	Queen snake	<i>Regina septemvittata</i>
	Eastern fence lizard	<i>Sceloporus undulatus</i>
	Eastern massasauga	<i>Sistrurus catenatus catenatus</i>
	Stinkpot	<i>Sternotherus odoratus</i>
	Brown snake	<i>Storeria dekayi</i>
	Redbelly snake	<i>Storeria occipitomaculata</i>
	Eastern box turtle	<i>Terrapene carolina</i>
	Shorthead garter snake	<i>Thamnophis brachystomus</i>
	Eastern ribbon snake	<i>Thamnophis sauritus</i>
	Common garter snake	<i>Thamnophis sirtalis</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
	Smooth earth snake	<i>Virginia valeriae</i>
	Mountain earth snake	<i>Virginia valeriae pulchra</i>

2.1.6.5.1 Eastern Massasauga, or Swamp Rattlesnake

The eastern massasauga rattlesnake (*Sistrurus catenatus*) is a Federal candidate species, which means that information regarding its biological status and threats is sufficient to propose it for listing as endangered or threatened under the ESA but for which a proposed listing has not yet been developed due to higher priority activities. As such, continued population decline could lead to a future listing under the ESA, but it currently receives no legal protection. However, the eastern massasauga is listed as an endangered species in the state of Illinois.

Massasaugas are small snakes, gray or light brown with brown blotches on their backs and sides, marbled dark gray or black bellies, and heads marked by a narrow white stripe. These snakes utilize both wetlands and adjacent uplands; however, because they do not travel long distances, developments such as roads, farms, and towns prevent them from moving between these two areas. Urban development and the draining of wetlands have greatly reduced their habitat and affected their numbers. It should be noted that these snakes are venomous, although they generally bite only when cornered or threatened. Many people fear snakes, though, and the very knowledge that massasaugas are poisonous has led some to actively seek them out and kill them, regardless of the snake's true behavior.

In Illinois, massasaugas can be found wintering in low woods, bogs, and marshes; summer habitat is often characterized by drier, grassy ground with low shrubs. Woody vegetation control is one management option that can be used to protect the snake's habitat. The Dresden Generating Station wildlife team should further investigate working with the Fish and Wildlife Service (FWS) to develop a Candidate Conservation Agreement, described in the following section for eastern massasaugas.

2.2 PLANTS AND WILDLIFE IDENTIFIED AT THE DRESDEN STATION

Table 12 lists some of the wildlife species that have been observed at the Dresden Station. Comprised of species directly observed by the visiting WHC biologist as well as those identified previously by site and contract employees, the list is intended to be used as a foundation for the development of a comprehensive inventory of plants and animals at the site. To facilitate the development of a species inventory, a sample list of species characteristic of the ecoregion in which the Dresden Station is situated is provided alphabetically by scientific name in **Appendix II** of this report.

TABLE 10. PLANTS AND ANIMALS IDENTIFIED AT THE DRESDEN STATION

TYPE	COMMON NAME	SCIENTIFIC NAME
Plant	Foxtail	<i>Alopecurus geniculatus</i>
	Common milkweed	<i>Asclepias amplexicaulis</i>
	Chicory	<i>Cichorium intybus</i>
	Nightshade spp.	<i>Circaea spp.</i>
	Vervain	<i>Glandularia canadensis</i>
	Bushclover spp.	<i>Lespedeza spp.</i>
	Common reed	<i>Phragmites australis</i>
	Spotted knapweed	
	Wild carrot	
	Side oats grama	
	Crown vetch	
	Daisy fleabane	
	Indian hemp	
	Curled dock	
	White clover	
	Duckweed	
	Poison ivy	
	Creeping wood sorrel	
	Common dandelion	
	Autumn olive	
	Wild quinine	
	Yellow foxtail	
	Canada thistle	
	Cattail	
	Hoary plantain	
	Raspberry	
	Wineberry	
	Cottonwood	<i>Populus deltoides</i>
	Red oak	<i>Quercus rubra</i>
	Sumac spp	<i>Rhus spp.</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Birds	Yellow sweet clover	<i>Trifolium aureum</i>
	Common mullein	<i>Verbascum thapsus</i>
	Wild grape spp	<i>Vitis spp.</i>
	Great egret	<i>Ardea alba</i>
	Great blue heron	<i>Ardea herodias</i>
	Canada goose	<i>Branta canadensis</i>
	American goldfinch	
	Mourning dove	
	Common nighthawk	
	Turkey vulture	
Mammals	Wild turkey	
	Red winged blackbird	
	White-tailed deer	<i>Odocoileus virginianus</i>
Insects	Muskrat	<i>Ondatra zibethicus</i>
	Common wood nymph	
	Cabbage white	
Fish	Monarch	
	Catfish	

2.3 THREATENED AND ENDANGERED SPECIES

There are 478 species that have been listed as endangered or threatened within the state of Illinois, and 24 of these are also given such designations by the federal government. Examples of animals that were once common in Illinois that have been extirpated include bison, elk, black bear, passenger pigeon, Carolina parakeet, and Sampson's pearly mussel. Of the total number of endangered and threatened species designated in the state, 367 are plants and 111 are animals. The two most common causes of the species decline that ultimately leads to state and federally listing species are habitat degradation and loss. According to research compiled by Illinois DNR, the state has lost "more than 90 percent of natural wetlands, 80 percent of forests and 99 percent of the original prairie. This habitat loss has had a substantial effect on wildlife populations and has been the primary factor in the endangerment of 478 species of Illinois plants and animals." An Illinois DNR pamphlet describing the history and status of the protection of endangered species goes on to state that "more than 20 percent of the freshwater mussel species ever recorded in Illinois are no longer found in the state, and another 26 percent are considered to be endangered or threatened."

Table 11 provides a summary of the types of species that are considered to be threatened and endangered in Illinois while **Table 12** lists Illinois State and Federal listed threatened and/or endangered species, not all of these species are found within Grundy County. More information is available about these species, and the federal and state programs designed to protect them, on the Illinois DNR web site: <http://dnr.state.il.us/espb>.

TABLE 11. SUMMARY OF THREATENED AND ENDANGERED SPECIES IN ILLINOIS

TYPE	ENDANGERED	THREATENED	TOTAL NUMBER
Fish	21	10	31
Reptile	8	7	15
Amphibian	3	4	7
Bird	26	8	34
Mammal	5	3	8
Invertebrate	39	13	52
Plants	265	66	331
Total	367	111	478

The Illinois Endangered Species Protection Board is the governing agency within the state charged with the power to designate endangered and threatened species, and subsequently with providing advisement to Illinois DNR regarding the management, protection, and conservation of these species. The list of threatened and endangered species is reviewed internally at a minimum of once every five years; the following table was last updated in 2004.

TABLE 12. THREATENED AND ENDANGERED SPECIES IN ILLINOIS

TYPE	COMMON NAME	SCIENTIFIC NAME	STATUS
Fish	Lake sturgeon	<i>Acipenser fulvescens</i>	State Endangered
	Western sand darter	<i>Ammocrypta clarum</i>	State Endangered
	Eastern sand darter	<i>Ammocrypta pellucidum</i>	State Threatened
	Longnose sucker	<i>Catostomus catostomus</i>	State Threatened
	Cisco	<i>Coregonus artedii</i>	State Threatened
	Gravel chub	<i>Erimystax x-punctatus</i>	State Threatened
	Bluebreast darter	<i>Etheostoma camurum</i>	State Endangered
	Iowa darter	<i>Etheostoma exile</i>	State Threatened
	Harlequin darter	<i>Etheostoma histrio</i>	State Endangered
	Banded killifish	<i>Fundulus diaphanous</i>	State Threatened
	Starhead topminnow	<i>Fundulus dispar</i>	State Threatened
	Cypress minnow	<i>Hybognathus hayi</i>	State Endangered

TYPE	COMMON NAME	SCIENTIFIC NAME	STATUS
Fish	Bigeye chub	<i>Hybopsis amblops</i>	State Endangered
	Pallid shiner	<i>Hybopsis amnis</i>	State Endangered
	Northern brook lamprey	<i>Ichthyomyzon fossor</i>	State Endangered
	Least brook lamprey	<i>Lampetra aepyptera</i>	State Threatened
	Redspotted sunfish	<i>Lepomis miniatus</i>	State Threatened
	Bantam sunfish	<i>Lepomis symmetricus</i>	State Threatened
	Sturgeon chub	<i>Macrhybopsis gelida</i>	State Endangered
	River redhorse	<i>Moxostoma carinatum</i>	State Threatened
	Greater redhorse	<i>Moxostoma valenciennesi</i>	State Endangered
	River chub	<i>Nocomis micropogon</i>	State Endangered
	Pugnose shiner	<i>Notropis anogenus</i>	State Endangered
	Bigeye shiner	<i>Notropis boops</i>	State Endangered
	Ironcolor shiner	<i>Notropis chalybaeus</i>	State Threatened
	Blackchin shiner	<i>Notropis heterodon</i>	State Threatened
	Blacknose shiner	<i>Notropis heterolepis</i>	State Endangered
	Taillight shiner	<i>Notropis maculatus</i>	State Endangered
	Weed shiner	<i>Notropis texanus</i>	State Endangered
	Northern madtom	<i>Noturus stigmosus</i>	State Endangered
	Pallid sturgeon	<i>Scaphirhynchus albus</i>	State, Federal Endangered
Amphibian	Jefferson salamander	<i>Ambystoma jeffersonianum</i>	State Threatened
	Silvery salamander	<i>Ambystoma platineum</i>	State Endangered
	Hellbender	<i>Cryptobranchus all eganiensis</i>	State Endangered
	Spotted dusky salamander	<i>Desmognathus conanti</i>	State Endangered
	Eastern narrowmouth toad	<i>Gastrophryne carolinesnsis</i>	State Threatened
	Four toed salamander	<i>Hemidactylium scutatum</i>	State Threatened
	Bird voiced treefrog	<i>Hyla arivoca</i>	State Threatened
	Illinois chorus frog	<i>Pseudacris streckeri</i>	State Threatened
Reptile	Spotted turtle	<i>Clemmys guttata</i>	State Endangered
	Great Plains ratsnake	<i>Elaphe emoryi</i>	State Endangered
	Illinois mud turtle	<i>Kinosternon flavescens</i>	State Endangered
	Alligator snapping turtle	<i>Macrochelys temminckii</i>	State Endangered
	Coachwhip	<i>Masticophis flagellum</i>	State Endangered
	Broad banded watersnake	<i>Nerodia fasciata</i>	State Endangered
	River cooter	<i>Pseudemys concinna</i>	State Endangered
	Eastern massasauga	<i>Sistrurus catenatus</i>	State Endangered
	Kirtland's snake	<i>Clonophis kirtlandi</i>	State Threatened
	Timber rattlesnake	<i>Crotalus horridus</i>	State Threatened
	Blanding's turtle	<i>Emydoidea blandingii</i>	State Threatened
	Western hognose snake	<i>Heterodon nasicus</i>	State Threatened
	Mississippi green watersnake	<i>Nerodia cyclopion</i>	State Threatened
	Flathead snake	<i>Tantilla gracilis</i>	State Threatened
	Eastern ribbon snake	<i>Thamnophis sauritus</i>	State Threatened
	Lined snake	<i>Tropidoclonion lineatum</i>	State Threatened

TYPE	COMMON NAME	SCIENTIFIC NAME	STATUS
Bird	Short eared owl	<i>Asio flammeus</i>	State Endangered
	Upland sandpiper	<i>Bartramia longicauda</i>	State Endangered
	American bittern	<i>Botaurus lentiginosus</i>	State Endangered
	Swainson's hawk	<i>Buteo swainsoni</i>	State Endangered
	Piping plover	<i>Charadrius melodus</i>	State, Federal Endangered
	Black tern	<i>Chlidonias niger</i>	State Endangered
	Northern harrier	<i>Circus cyaneus</i>	State Endangered
	Little blue heron	<i>Egretta caerulea</i>	State Endangered
	Snowy egret	<i>Egretta thula</i>	State Endangered
	Mississippi kite	<i>Ictinia mississippiensis</i>	State Endangered
	Black rail	<i>Katerallus jamaicensis</i>	State Endangered
	Swainson's warbler	<i>Limnothlypis swainsonii</i>	State Endangered
	Yellow-crowned night heron	<i>Nyctanassa violacea</i>	State Endangered
	Black-crowned night heron	<i>Nyctanassa nycticorax</i>	State Endangered
	Osprey	<i>Pandion haliaetus</i>	State Endangered
	Wilson's phalarope	<i>Phalaropus tricolor</i>	State Endangered
	King rail	<i>Rallus elegans</i>	State Endangered
	Least tern	<i>Sterna antillarum</i>	State, Federal Endangered
	Forester's tern	<i>Sterna forsteri</i>	State Endangered
	Common tern	<i>Sterna hirundo</i>	State Endangered
	Bewick's wren	<i>Thryomanes bewickii</i>	State Endangered
	Greater prairie chicken	<i>Tympanuchus cupido</i>	State Endangered
	Barn owl	<i>Tyto alba</i>	State Endangered
	Tallow headed blackbird	<i>Xanthocephalus xanthocephalus</i>	State Endangered
	Henslow's sparrow	<i>Ammodramus henslowii</i>	State Threatened
	Cerulean warbler	<i>Dendroica cerulea</i>	State Threatened
	Peregrine falcon	<i>Falco peregrinus</i>	State Threatened
	Common moorhen	<i>Gallinula chloropus</i>	State Threatened
	Sandhill crane	<i>Grus canadensis</i>	State Threatened
	Bald eagle	<i>Haliaeetus leucocephalus</i>	State, Federal Threatened
	Least bittern	<i>Ixobrychus exilis</i>	State Threatened
	Loggerhead shrike	<i>Lanius ludovicianus</i>	State Threatened
Mammal	Gray/timber wolf	<i>Canis lupus</i>	State, Federal Threatened
	Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	State Endangered
	Southeastern myotis	<i>Myotis austroriparius</i>	State Endangered
	Gray bat	<i>Myotis grisescens</i>	State, Federal Endangered
	Indiana bat	<i>Myotis sodalis</i>	State, Federal Endangered
	Eastern woodrat	<i>Neotoma floridana</i>	State Endangered
	Golden mouse	<i>Ochrotomys nuttallii</i>	State Threatened
	Rice rat	<i>Oryzomys palustris</i>	State Threatened
	Franklin's ground squirrel	<i>Spermophilus franklinii</i>	State Threatened
Snail	Iowa Pleistocene snail	<i>Discus macclintocki</i>	State, Federal Endangered
	Hydrobiid cave snail	<i>Fontigens antroecetes</i>	State Endangered

TYPE	COMMON NAME	SCIENTIFIC NAME	STATUS
Mussel	Slippershell	<i>Alasmodonta viridis</i>	State Threatened
	Spectacle case	<i>Cumberlandia monodonta</i>	State Endangered
Mussel	Purple wartyback	<i>Cyclonaias tuberculata</i>	State Threatened
	Fanshell	<i>Cyprogenia stegaria</i>	State, Federal Endangered
	Butterfly	<i>Ellipsaria lineolata</i>	State Threatened
	Elephant ear	<i>Elliptio crassidens</i>	State Threatened
	Spike	<i>Elliptio dilatata</i>	State Threatened
	Snuffbox	<i>Epioblasma triquetra</i>	State Endangered
	Ebonyshell	<i>Fusconaia ebena</i>	State Threatened
	Pink mucket	<i>Lampsilis abrupta</i>	State, Federal Endangered
	Wavy rayed lampmussel	<i>Lampsilis fasciola</i>	State Endangered
	Higgins eye	<i>Lampsilis higginsii</i>	State, Federal Endangered
	Black sandshell	<i>Ligumia recta</i>	State Threatened
	Orangefoot pimpleback	<i>Plethobasus cooperianus</i>	State, Federal Endangered
	Sheepnose	<i>Plethobasus cyphyus</i>	State Endangered
	Clubshell	<i>Pleurobema clava</i>	State, Federal Endangered
	Ohio pigtoe	<i>Pleurobema cordatum</i>	State Endangered
	Fat pocketbook	<i>Potamilus capax</i>	State, Federal Endangered
	Kidneyshell	<i>Ptychobranhus fasciolaris</i>	State Endangered
	Rabbitsfoot	<i>Quadrula cylindrical</i>	State Endangered
	Salamander mussel	<i>Simpsonaias ambigua</i>	State Endangered
	Purple lillput	<i>Toxolasma lividus</i>	State Endangered
	Rainbow	<i>Villosa iris</i>	State Endangered
	Little spectacle case	<i>Villosa lienosa</i>	State Threatened
Dragonfly	Elfin skimmer	<i>Nannothemis bella</i>	State Threatened
	Hine's emerald dragonfly	<i>Somatochlora hineana</i>	State, Federal Endangered
Leafhopper	Leafhopper	<i>Paraphlepsius lupalus</i>	State Endangered
Butterfly/Moth	Arogos skipper	<i>Atrytone arogos</i>	State Endangered
	Swamp metalmark	<i>Calephelis muticum</i>	State Endangered
	Cobweb spider	<i>Hesperia metea</i>	State Threatened
	Ottoe skipper	<i>Hesperia ottoe</i>	State Threatened
	Hoary elfin	<i>Incisalia polios</i>	State Threatened
	Karner blue butterfly	<i>Lycæides melissa samuelis</i>	State, Federal Endangered
	Eryngium stem border	<i>Papipema eryngii</i>	State Endangered
Crustacean	Isopod	<i>Caecidotes lesliei</i>	State Endangered
	Isopod	<i>Caecidotes spatulata</i>	State Endangered
	Anomalous spring amphipod	<i>Crangonyx anomalus</i>	State Endangered
	Packard's cave amphipod	<i>Crangonyx packardi</i>	State Endangered
	Illinois cave amphipod	<i>Gammarus acherondytes</i>	State, Federal Endangered
	Indiana crayfish	<i>Orconectes indianensis</i>	State Endangered
	Kentucky crayfish	<i>Orconectes kentuckiensis</i>	State Endangered
	Shrimp crayfish	<i>Orconectes lancifer</i>	State Endangered

TYPE	COMMON NAME	SCIENTIFIC NAME	STATUS
	Bigclaw crawfish	<i>Orconectes placidus</i>	State Endangered
	Iowa amphipod	<i>Stygobromus iowae</i>	State Endangered

2.3.1 Identify Endangered, Threatened, and Candidate Species

Corporations play a fundamental role in determining the fate of America's endangered species. One study, conducted by the Association for Biodiversity Information (now NatureServe) and The Nature Conservancy in 1993, found that half of the species listed under the Endangered Species Act (ESA) have 80 percent or more of their habitat on private lands. Exelon Corporation's Dresden Generating Station property may provide habitat that supports state and/or federal listed species, although none have been documented.

Table 13 lists the state listed threatened and endangered species that occur in Grundy County.

**TABLE 13. GRUNDY COUNTY POTENTIAL OCCURRENCES OF STATE LISTED
THREATENED AND ENDANGERED SPECIES**

COMMON NAME	SCIENTIFIC NAME
Redveined Prairie Leafhopper	<i>Aflexia rubranura</i>
Henslow's Sparrow	<i>Ammodramus henslowii</i>
Forked Aster	<i>Aster furcatus</i>
Upland Sandpiper	<i>Bartramia longicauda</i>
American Bittern	<i>Botaurus lentiginosus</i>
Grass Pink Orchid	<i>Calopogon tuberosus</i>
Northern Harrier	<i>Circus cyaneus</i>
Narrow-leaved Sundew	<i>Drosera intermedia</i>
Blanding's Turtle	<i>Emydoidea blandingii</i>
Queen-of-the-prairie	<i>Filipendula rubra</i>
Common Moorhen	<i>Gallinula chloropus</i>
Sandhill Crane	<i>Grus Canadensis</i>
Pallid Shiner	<i>Hybopsis amnis</i>
Least Bittern	<i>Ixobrychus exilis</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
False Mallow	<i>Malvastrum hispidum</i>
Slender Sandwort	<i>Minuartia patula</i>
River Redhorse	<i>Moxostoma carinatum</i>
Greater Redhorse	<i>Moxostoma valenciennesi</i>
Bigeye Shiner	<i>Notropis boops</i>
Eryngium Stem Borer	<i>Papaipema eryngii</i>

COMMON NAME	SCIENTIFIC NAME
Eastern Prairie Fringed Orchid	<i>Platanthera leucophaea</i>
King Rail	<i>Rallus elegans</i>
Regal Fritillary	<i>Speyeria idalia</i>
Ear-leafed Foxglove	<i>Tomanthera auriculata</i>

2.3.2 Develop Agreements for Listed or Candidate Species if Identified On Site

Many private landowners are concerned that identifying endangered or threatened species on their property will result in heavy land use restrictions being imposed upon them, and therefore avoid managing their property in ways that would enhance habitat and benefit these species. Protecting species is not, in fact, a punishment. Several programs, such as Safe Harbor and Candidate Conservation Agreements, have been specifically developed to address landowner concerns.

2.3.2.1 Safe Harbor Agreements

Safe Harbor Agreements are voluntary agreements between the US Fish and Wildlife Service (US FWS) and private landowners specifying management actions that will result in a “net conservation benefit” for the covered endangered or threatened species. Such benefits may include reducing habitat fragmentation, increasing population numbers, or establishing buffers for protected areas. Prior to entering into a Safe Harbor Agreement, US FWS will determine a baseline for population levels or habitat, which conditions must not fall below. Any non-federal landowner can request the development of a Safe Harbor Agreement, and agreements do not impose significant restrictions in land use or future activity.

As an incentive for complying with Safe Harbor Agreements, US FWS will issue an “enhancement of survival” permit that allows the landowner, at the end of the agreement’s term, to use the land in any otherwise legal way as long as baseline conditions are maintained. Under section 10(a)(1)(A) of the Endangered Species Act (ESA), US FWS will also authorize landowners to “take” (incidentally harm) individuals or modify habitat in order to return the land to the baseline conditions at the end of the agreement. Before entering into a Safe Harbor Agreement, the US FWS must be assured that the endangered or threatened wildlife species covered by the agreement will receive a measurable benefit from management practices imposed. For example, the US FWS looks for projects that

demonstrate some of the following benefits: reductions in habitat fragmentation, maintenance, restoration or enhancement of existing habitat areas, increases in habitat connectivity, reductions in the effects of catastrophic events, the creation or enhancement of buffers that border protected areas, and establishment of areas dedicated to the development of new wildlife management techniques.

2.3.2.2 Candidate Conservation Agreements with Assurances

These formal agreements essentially serve as an effort to prevent species from actually becoming endangered or threatened, thereby eliminating the need for future ESA protection as well as the costs and restrictions to landowners resulting from that status. Candidate Conservation Agreements for the Dresden Generating Station would be made between the US FWS and Exelon Corporation. The US FWS would provide technical assistance in developing the agreements, which would outline specific actions that Exelon Corporation is voluntarily willing to commit to that which will eliminate or reduce the threats to candidate and proposed species. These actions must, however, contribute significantly to removing the need to list the species.

As with Safe Harbor Agreements, landowners that commit to Candidate Conservation Agreements are provided assurances that no additional restrictions will be imposed above those outlined in the agreement. Section 10(a)(1)(A) of the ESA allows landowners complying with Candidate Conservation Agreements to incidentally take individuals or alter habitat in order to return the land to the conditions outlined in the agreement, provided that the overall goal of precluding the need to list species is adhered to. The US FWS can provide further information on these programs. Contact information is provided in **Appendix III**.

3. USING WHC'S TEAM KIT TO DEVELOP A COMPREHENSIVE HABITAT ENHANCEMENT PROGRAM

The Dresden Generating Station may wish to purchase a WHC Team Kit to assist with the development of a comprehensive, employee-based habitat enhancement program. Information regarding volunteer recruitment tools, outreach ideas, guidance on writing a wildlife management plan, and WHC programs such as the *Corporate Wildlife Habitat Certification/International Accreditation Program* are included with the WHC Team Kit.

3.1 BUILD A WILDLIFE TEAM

Creating a Wildlife Team is an important part of a successful habitat enhancement program. Employee participation increases interest and enthusiasm among workers and strengthens extended commitment to the enhancement program through the expansion of a sense of involvement, connection, and proprietary pride. The development of a site Wildlife Team is also an effective tool for promoting environmental awareness through active contribution.

WHC recommends that the Wildlife Team be structured with one team leader and several subcommittees for specific projects. Subcommittees can be created based on the individual interests of Wildlife Team members. A team structure in which subcommittee leaders communicate with the team leader facilitates information transfer between team members, team leaders, and site management. The *Wildlife at Work* Team Kit provides Dresden Generating Station employees with information and materials that can be used to establish a Wildlife Team.

3.2 CONDUCT A WILDLIFE INVENTORY

Conducting a thorough inventory of the plants and animals present at the site should be a priority of the emerging Wildlife Team, as an initial inventory will help the Dresden Generating Station Wildlife Team members to become familiar with some of the plants, animals, and various habitats found at the site. A fundamental understanding of the natural characteristics of the site will, in turn, facilitate decision-making regarding the implementation process of projects described in this report and increase the confidence of participant employees. Furthermore, conducting a preliminary inventory will provide baseline data useful for comparison with ensuing data, thereby providing the Wildlife Team with a benchmark from which project success can be evaluated. Such information is also invaluable in shaping the future track of the site habitat enhancement program as a whole, and is essential for the development of environmental outreach and education programs.

The wildlife inventory should be a methodical and ongoing process. Essentially, the goal of the inventory is to identify as many plants and animals as possible, using seasonal inventories conducted in the spring (April), summer (July), and fall (September) to provide a relatively comprehensive list of resident and transitory (including migratory) species. **Appendix II** provides a list of characteristic species associated with the predominant ecoregion of the site locale. This list is not intended to be definitive, but rather it should be used as an indicator of the types of species that participants in the site inventory may encounter.

Resources the Dresden Generating Station Wildlife Team may find useful in conducting a site inventory include knowledgeable employees, local natural resource professionals, and conservation organizations. The Wildlife Team or WHC can contact outside organizations, such as the Natural Resources Conservation Service (NRCS), for possible assistance with inventories. Contact information for organizations that may provide assistance is included in **Appendix III** of this report. Ensure that external experts assisting in species inventories understand the importance of providing educational experiences for employees new to wildlife identification concepts.

3.3 WRITE THE SITE WILDLIFE HABITAT MANAGEMENT AND BIODIVERSITY PROTECTION PLAN

The probability of success for any habitat enhancement program is largely dependent on the formation of a comprehensive strategy; as such, the development of a wildlife habitat management and biodiversity protection plan (in conjunction with the site inventory) should be the most fundamental task of the Dresden Generating Station Wildlife Team. The wildlife habitat management plan outlines the goals of the wildlife habitat program, describes projects to achieve these goals, makes provisions for monitoring projects, and presents implementation and review schedules. WHC recommends that the wildlife management and biodiversity protection plan be holistic in scope by encompassing the entirety of the site. Although the primary goal of the wildlife habitat program is to enhance wildlife habitat, WHC further recommends that additional goals, such as the implementation of an education component or achieving WHC certification, as well as all projects associated with each goal, be included in the wildlife management and biodiversity protection plan.

WHC recommends that the Wildlife Team begin by identifying site habitat and biodiversity program objectives and setting target dates for achievements. In addition, the team should outline how program success will be measured and how performance will be assessed. Habitat projects should be prioritized and clearly defined before beginning projects. In addition, Dresden Generating Station employees should work to involve community volunteers and knowledgeable professionals in the management and biodiversity plan development and implementation phases.

3.4 IMPLEMENT THE FIRST TEAM PROJECT

Implementing the first team project is especially important for building a solid volunteer program. Simple projects with high visibility, such as establishing artificial nesting structures and a monitoring schedule, are ideal first projects for the Dresden Generating Station Wildlife Team. The first year of the program at the Dresden Generating Station should be geared toward projects that provide learning experiences for Wildlife Team members, generate additional enthusiasm and volunteerism, and demonstrate to the community and

non-participant employees that Exelon Corporation is committed to enhancing wildlife habitat at its facility. WHC recommends undertaking more complex and intensive habitat management projects after the team gains experience and greater support from the site management and community.

4. RECOMMENDED WILDLIFE HABITAT ENHANCEMENT PROJECTS

The individual habitat enhancement projects recommended in this section are provided as a resource for developing the wildlife management plan and were chosen based upon ease of implementation, high visibility, and relative likelihood of success. The Wildlife Team may choose to implement some or all of these projects and is furthermore encouraged to explore additional habitat enhancement opportunities. Projects suggested for the Dresden Generating Station Wildlife Team members to consider in the future include:

- Identify and manage any invasive, exotic species on site;
- Use Best Management Practices on Right-of-Ways that cross the site,
- Partner with neighboring land managers to enhance early successional, grassland habitats for local wildlife species including birds and pollinators,
- Enhance forested creekside and riparian habitats by managing snags and installing bat roosts,
- Enhance island habitats in cooling water canals for nesting waterfowl, and pollinators,
- Consider a nest box monitoring program for cavity nesting species including songbirds, waterfowl, raptors and bats,
- Plan and initiate enhancement projects to benefit native amphibian and reptile species, such as managing for coarse woody debris and installing basking structures, and
- Consider managing for the bald eagle and other raptors by installing eagle nesting platforms along the Kankakee and Des Plaines Rivers, and raptor perches in grassland areas, where snags are not available.

As the wildlife program develops and interest among employees – participant and non-participant alike - increases, WHC recommends that the Dresden Generating Station pursue additional projects to maintain momentum and continue expanding the program, thereby producing additional opportunities for wildlife habitat enhancement on the site facility, which in turn will further generate exposure and attention to the program. WHC encourages employee and managers associated with the Dresden Generating Station to give these initiatives careful consideration as they arise.

In addition to unforeseen opportunities for employees to contribute positively to wildlife conservation within wildlife management areas, WHC recommends exploring additional areas of the site that can be restored or enhanced to provide habitat. Please contact WHC for additional information concerning project recommendations.

5. RAISING ENVIRONMENTAL AWARENESS AMONG EMPLOYEES AND MEMBERS OF THE LOCAL COMMUNITY

An important aspect of a wildlife program is the benefit it provides, through active participation and environmental education, to employees, their families, and to members of the local community. As such, a wildlife program initially based on employee participation that is expanded to engage community organizations for assistance in program implementation holds great potential for the inclusion of public outreach and environmental education components. WHC recommends the following activities for consideration when developing and fostering relationships with the local community and using site enhancement projects as a tool for furthering environmental and conservation education, awareness, and outreach efforts.

- Create a nature trail to highlight habitat areas and wildlife viewing places.
- Establish a *Corporate Lands for Learning* program.
- Hold an employee and program volunteer wildlife photography contest.
- Create a Wildlife Team newsletter to inform employee and the community about the program.
- Work with local scouting and school groups as much as possible when planning, designing and implementing enhancement projects.

6. WHC'S CORPORATE HABITAT CERTIFICATION/INTERNATIONAL ACCREDITATION PROGRAM

WHC's *Corporate Wildlife Habitat Certification/International Accreditation Program* is designed to provide recognition to corporate entities for the successful implementation of substantial wildlife habitat management programs. Sites that demonstrate a long-term commitment to managing habitat for wildlife are bestowed with WHC certification in recognition of such efforts. Awardees are also distinguished through the publication of habitat enhancement program descriptions on WHC's web site, and through the dissemination of site-approved press releases to local and national news sources. Sites certified by WHC also receive an award plaque and are honored at WHC's annual symposium.

The Dresden Generating Station could be eligible to apply for WHC certification in 2008 if at least one site habitat enhancement project is implemented prior to July 31, 2007. Habitat enhancement projects must be implemented, documented, monitored, and maintained for a minimum of one year prior to eligibility. Furthermore, WHC requires the submission of appropriate documentation relating to habitat enhancement projects conducted on-site in order for the site to be considered for certification. Additional factors, such as employee participation in the program and community outreach activities, are also reviewed and greatly reinforce the application. Overall, the Dresden Generating Station wildlife management program is judged for WHC certification on the basis of a demonstrated commitment to responsible corporate environmental stewardship. A panel of independent wildlife biologists will review submitted documentation to determine if the program meets the criteria of WHC certification.

As outlined on the certification application form found under the “About the Wildlife Habitat Council” section of the **Report CD**, the following items should be included for submission:

- An inventory of the animal and plant species found on the site;
- The Wildlife Team’s wildlife habitat management plan;
- The Wildlife Team’s activities log, showing when meetings were held, when projects were implemented, and what management techniques were used; and
- Documentation of maintenance and monitoring activities to demonstrate that the program is ongoing. (Documentation should include before-and-after photographs, number and species of any plants used, success of nest boxes, dates of projects, and records of those involved.)

WHC requires certified sites to apply for re-certification two years after initial certification, and every two or three years thereafter. The re-certification process allows WHC to ensure that the site is committed to the responsible management of its natural features indefinitely, as well as to review the site’s efforts, provide recommendations for continued habitat enhancement, and for the recognition of new projects.

For further information about the certification process and associated awards, contact WHC’s Certification Coordinator, Emily Powell, by phone at (301) 588-8994 or by e-mail at epowell@wildlifehc.org. Additional information can be found in **Appendix IV** of this report.

7. ADDITIONAL OPPORTUNITIES FOR PROGRAM DEVELOPMENT

The success of the Dresden Generating Station *Wildlife at Work* program depends in large part upon the levels of expertise, labor, and funding available for projects. Thus the potential for success of the site's *Wildlife at Work* program will be significantly increased through the formation of partnerships with an assortment of specialized organizations that may assist in the provision of such factors. Collaborations with local, regional, and national organizations, including non-profits, community groups, schools, youth groups, private landowners, and government agencies, may prove beneficial for the realization of program implementation.

Effective programs for the Wildlife Team to meet conservation and environmental education objectives through partnerships include:

- The **Corporate Campaign for Migratory Bird Conservation**
- The **North American Bird Conservation Initiative (NABCI)**
- The **North American Pollinator Protection Campaign**
- WHC's ***Corporate Lands for Learning (CLL)* Program**
- The U.S. Fish and Wildlife Service's **Joint Ventures Program**
- The **Five-Star Restoration Program**

7.1 PARTNERSHIP DEVELOPMENT

The survival of many species, in particular those with extended ranges or that exhibit migratory behavior, depends on coordinated conservation efforts among a number of stakeholder entities. As a result, functional collaboration among various groups is becoming increasingly common as a way of dealing with environmental issues. Such stakeholder affiliations address pressing conservation issues on a landscape scale while allowing individual partner groups to continue working at the local level. As such, individual site

programs such as that instituted at the Dresden Generating Station are generally more effective when partnered with organizations working for conservation at broader scales.

7.2 THE CORPORATE CAMPAIGN FOR MIGRATORY BIRD CONSERVATION

The Corporate Campaign for Migratory Bird Conservation is a new program developed by the Wildlife Habitat Council. The fundamental goal of this program is to increase migratory bird populations through habitat expansion by means of engaging corporations and other private landowners in conservation activities. Four major bird plans - North American Waterfowl Management Plan, Partners in Flight, Waterbird Conservation Plan, and the U.S. Shorebird Conservation Plan - will serve as guides for habitat management activities in order to combine local efforts and maximize international effects.

7.2.1 Why Focus on Birds?

Birds perform a variety of functions vital to maintaining ecosystem vitality, including roles in seed dispersal, pest control, pollination, and furthermore are an important link in the trophic (food) chain. Moreover, bird populations serve as highly visible indicators of habitat quality; the presence or absence of an assemblage of bird species can be used to gauge overall ecosystem health. When management activities create, restore, or maintain indigenous habitat types for birds, many other species benefit as well.

7.2.2 Why Should Corporations Participate?

Corporations are in a unique position to greatly impact bird conservation due to the nature, size, and location of their facilities. Involvement with the Corporate Campaign for Migratory Bird Conservation gives corporations an opportunity to demonstrate concern for their communities and the environment. The program will also provide participating sites with scientific guidance from WHC as well as state and federal agencies, including Joint Ventures. Expert advice will reduce the number of economic pitfalls that can accompany new environmental projects and facilitate consultation and cooperation with stakeholders. Corporations are given the opportunity to build and strengthen community relations by creating wildlife habitat and providing environmental education at their sites. Moreover,

they will be able to expand efforts at their sites across the region, country, continent, and eventually the Western Hemisphere by working with local Joint Venture initiatives (see below).

7.3 THE NORTH AMERICAN BIRD CONSERVATION INITIATIVE

Many migratory bird species of North America must cross international political boundaries during their bi-annual journey. As such, countries with incongruent environmental, biological, and conservation legislation and practices must therefore formulate a standard medium with which to facilitate cooperation for attaining the common goal of bird conservation in order to overcome such disparities in national conservation regulations and programs.

The North American Bird Conservation Initiative (NABCI) was formed to facilitate coordination and cooperation among Canada, the United States, and Mexico in order to address the conservation of migratory bird species that span the continent. Formally,

“...NABCI is a statement of principles and approaches shared by individuals, organizations, agencies, and programs working for the conservation of birds and their habitats in Canada, the United States, and Mexico.”

- NABCI website.

NABCI is not a regulatory instrument, but rather acts as a forum designed to facilitate the flow of ideas and information among concerned organizations and to provide a mechanism for the dissemination of information to a non-specialized audience.

7.4 NORTH AMERICAN POLLINATOR PROTECTION CAMPAIGN

According to the eighty partners working together in the North American Pollinator Protection Campaign (NAPPC), pollinating species such as native and managed bees, beetles, butterflies, moths, bats, and birds ensure productive harvests and seed set for many important food, oil, and fiber crops throughout the world. In the U.S. alone, the USDA

estimates that pollinators are responsible for providing reproduction services to \$40 billion worth of agricultural products each year.

Pollinators are also essential for maintaining healthy, natural ecosystems by pollinating native plants important to many species of insects, wildlife, and fish. For example, approximately 25 percent of all songbirds include fruit or seeds as a major part of their diet, while other animals eat the leaves, roots, nuts, pollen, and/or nectar of pollinated plants. Additionally, many species of birds, mammals, and fish rely on the adult or larval forms of pollinators as an important source of protein.

Unfortunately, pollinator populations are rapidly declining worldwide. The USDA Council on Sustainable Development and other agencies recognize that the continuing decline of pollinator populations is becoming "...a significant conservation and sustainability issue", and the National Academy of Sciences has recently begun a study, spearheaded by NAPPC, to determine the status of pollinators in North America.

According to NAPPC, the major threat to most pollinators is the destruction and fragmentation of habitat, in addition to the misuse of pesticides and introduced diseases. Pollinator habitat has been, in many areas, degraded to small, isolated patches that oftentimes are dominated by invasive plants and grass that serves little ecological purpose. This has led to a loss of wildflowers required for nectar and pollen, in addition to a lack of nesting sites and host plants so important for ensuring the reproduction of pollinating species. The extensive use and misuse of pesticides also severely impacts both pollinators and their habitats, decimating many beneficial insects and contaminating soil and water for wildlife, fish, and humans. With so much at stake, WHC calls its corporate partners to action to help conserve this diverse and valuable group of species known as pollinators.

The Pollinator Friendly Practices (PFP) guidelines were developed in 2002 by WHC and NAPPC partners, The Xerces Society for Invertebrate Conservation and the Coevolution Institute. Adopted by NAPPC, PFPs are used in support of existing land management practices in schools, private industries, public spaces, agricultural plots, forests, and home landscapes. The guidelines augment existing land use incentives and are to be used by

organizations in promoting pollinator-friendly land use practices. WHC is the first organization to promote the PFPs, offering an opportunity for formal recognition, through the “NAPPC WHC Pollinator Protection Award,” for institutions implementing pollinator-friendly activities. The award is granted annually to the one certified WHC site that best implements PFP guidelines through specific land management practices that both promote pollinator populations and habitats, and provide outreach education to surrounding communities.

The NAPPC Pollinator Friendly Practices guidelines consider six different areas of land use management: Foraging Habitat, Reproduction, Shelter, Invasive/Exotic Species, Chemical Use, and Monitoring. For each topic, there is a central question to be addressed, followed by a detailed approach to the subject. The complete guidelines, as well as a program registration form, are found in the “About the Wildlife Habitat Council” section of the **Report CD**. For more information, please contact Josianne Bonneau, WHC Director of Biodiversity and Technical Programs, at (301) 588-8994.

7.5 CORPORATE LANDS FOR LEARNING (CLL)

The Wildlife Habitat Council and the National Environmental Education and Training Foundation (NEETF) co-developed the *Corporate Lands for Learning (CLL)* program to facilitate the coordination of corporate resources with local schools to form functional partnerships based on the foundation of environmental education and outreach. The goal of the program is to maximize the use of human and natural resources of the corporate site to benefit the educational needs of the local schools. An environmental education program would allow students from the local community to use the Dresden Generating Station as an outdoor classroom for practical and applied experience in environmental issues. *CLL* offers the opportunity to create a nationally recognized environmental education partnership between corporations and the communities in which they exist.

The first steps in initiating an environmental education program are to evaluate the needs of the local community and the resources available at the site. Site representatives then meet

with representative individuals from local schools and environmental education groups in the community to identify constraints and opportunities. Following these two steps, WHC will provide the site with a report that outlines the types of activities possible, recommendations for implementation, an overview of state mandates, and a suggested curriculum that can be accomplished on the site to meet these mandates. WHC will then develop and deliver a two-day training workshop designed to teach and train employees, educators, and others how to build partnerships and use the provided educational programs and curriculum.

The Dresden Generating Station can apply for WHC *Corporate Lands for Learning* Certification in addition to *Corporate Habitat Certification* following the addition of an environmental education component to the wildlife management program. To be eligible for *CLL* certification, the site must provide:

- A detailed education program description and curriculum.
- Evidence demonstrating that the site hosted a minimum of 8 program days per year.
- Three letters of reference from teachers or community members.

For more information regarding WHC's *Corporate Lands for Learning* program and *CLL* certification, contact Thelma Redick, WHC Education and Outreach Program Manager, at (724) 695-8844 (thelma.redick@verizon.net) or refer to the included *CLL* brochure on the **Report CD**.

7.6 U.S. FISH AND WILDLIFE SERVICE'S JOINT VENTURES

U.S. Fish and Wildlife Service's Joint Ventures are non-regulatory, voluntary public/private partnerships "...composed of individuals; corporations; conservation organizations; and local, state, and provincial agencies drawn together by common conservation objectives." (U.S. Fish and Wildlife Service). The U.S. Fish and Wildlife Service is involved with NABCI and is incorporating international conservation ideas into their Joint Ventures programs. These regional partnerships are part of a larger Bird Conservation Initiative, components of which include the North American Waterfowl Management Plan, Partners in Flight, the Western Hemispheric Shorebird Reserve Network, and others. Joint Ventures implement

the goals of the North American Waterfowl Plan by developing and funding hands-on conservation projects for the benefit of obligate and facultative wetland species.

Many regional Joint Ventures have broadened their efforts to include more than just wetland creation, restoration, and conservation and waterfowl that breed in or migrate through wetland habitats. Joint Venture projects may consider maintaining or enhancing the quality of wetland vegetation, other wetland wildlife (including invertebrates, migratory songbirds, amphibians, and mammals), and associated upland habitats and wildlife species. These projects not only improve wildlife habitat but also enhance natural resource quality, such as reducing soil erosion and flood potential and filtering pollutants in ground water.

7.6.1 Additional Information and Assistance

More information about the Corporate Campaign for Migratory Birds, regional Joint Ventures, Management Boards, projects, goals, and corporate benefits can be found on-line at www.wildlifehc.org/managementtools/waterfowl.cfm.

7.7 FIVE-STAR RESTORATION PROGRAM

The Dresden Generating Station can further demonstrate its commitment to watershed protection by participating in the Five-Star Restoration Program. The Five-Star challenge grant program – a partnership between WHC, the U.S. Environmental Protection Agency, the National Fish and Wildlife Federation, the National Association of Counties, and the National Oceanic and Atmospheric Administration – focuses on community-based watershed restoration projects. Each year, approximately \$500,000 is given in grant awards to 70 projects, which are typically matched five-fold by the partners in each project. Since the program's inception in 1998, 70 miles of stream buffers have been planted, 7,000 acres of wetlands have been restored and over 10,000 volunteers have participated. Five-Star is a unique opportunity that allows corporations to reach out to their communities and involve local governments, non-profit organizations, small businesses and a wide range of citizen groups. Each organization contributes cash or services and becomes a “partner” who makes a permanent commitment to maintain the restored or enhanced waterway.

WHC is pleased to promote corporate participation in Five-Star, and we spotlight their work on the WHC web site, in our quarterly newsletters, and at our annual Symposium. So far, 19 WHC members have been involved with Five-Star by organizing their own projects on corporate land or making in-kind and cash donations to support projects in their neighborhoods. Further information about the Five-Star Restoration Program can be found on-line at <http://www.wildlifehc.org/fivestar>.

8. SUMMARY AND CONCLUSIONS

WHC has developed the information and recommendations in this report to best describe and supplement existing habitat types in correlation with Exelon Corporation goals: habitat enhancement, employee and community involvement, and public recognition of environmental commitment.

There are several important factors to keep in mind during the development of the wildlife program. First, employee involvement is crucial and can lead to increased morale, productivity, and improved environmental performance. Positive changes to the natural setting where employees work often leads to an improvement in worker morale. Most importantly, by implementing productive habitat enhancement projects at the facility, the Dresden Generating Station will help protect biodiversity: Increasing site biodiversity should be the overall goal of the wildlife programs initiated at the two facilities. With this in mind, WHC has recommended several enhancement projects for various areas of the site, including:

- Identify and manage any invasive, exotic species on site;
- Use Best Management Practices on Right-of-Ways that cross the site,
- Partner with neighboring land managers to enhance early successional, grassland habitats for local wildlife species including birds and pollinators,
- Enhance forested creekside and riparian habitats by managing snags and installing bat roosts,
- Enhance island habitats in cooling water canals for nesting waterfowl, and pollinators,
- Consider a nest box monitoring program for cavity nesting species including songbirds, waterfowl, raptors and bats,
- Plan and initiate enhancement projects to benefit native amphibian and reptile species, such as managing for coarse woody debris and installing basking structures, and
- Consider managing for the bald eagle and other raptors by installing eagle nesting platforms along the Kankakee and Des Plaines Rivers, and raptor perches in grassland areas, where snags are not available.

WHC can provide technical assistance regarding project implementation, maintenance, and recommendations for future projects throughout the formulation and development stages of the Dresden Generating Station wildlife habitat enhancement programs. WHC staff is also available to participate in team meetings, species inventories, special events, and strategic planning of the program.

WHC is pleased to have been given the opportunity to assist employees at the Dresden Generating Station in the development and implementation of a long-term wildlife habitat management program and encourages Exelon Corporation to continue its leadership in this pursuit.

APPENDIX I

INFORMATION SOURCES

These resources provide additional information about the habitat enhancement projects discussed in this report. Information can also be obtained from the Natural Resources Conservation Service (NRCS), your state Department of Environmental Quality (DEQ). General resources are listed first, followed by a selection of recommended field guides.

Best, Louis B., Robert C. Whitmore, Gary M. Booth. 1990. *Use of Cornfields by Birds during the Breeding Season: The Importance of Edge Habitat*. American Midland Naturalist, Vol. 123 (1), pp. 84-99

Virginia Department of Game and Inland Fisheries. 2006. *Field Borders for Wildlife*.
http://www.dgif.virginia.gov/wildlife/habitat_partners/infosheets/field_borders.html

Internet Resources

USDA, NRCS. 2004. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>).
National Plant Data Center, Baton Rouge, Louisiana.

NatureServe. 2004. NatureServe Explorer: An online encyclopedia of life. Version 4.0 (<http://www.natureserve.org/explorer>). NatureServe, Arlington, Virginia.

General Habitat Enhancement Resources

Adams, George. 1994. *Birdscaping Your Garden: A Practical Guide to Backyard Birds and the Plants That Attract Them*. Rodale Press, Emmaus, Pennsylvania. 208pp.

Bailey, Robert G. 1995. Description of the ecoregions of the United States. 2d. ed. Rev. and expanded (1st ed. 1980). Misc. Publ. No. 1391 (rev.), Washington D.C. USDA Forest Service. 108 p.

Benyus, Janine, M. 1989. *The Field Guide to Wildlife Habitats of the Western United States*. Simon & Schuster Inc. New York, New York. 336 pp.

Biebighauser, Thomas R. 2003. *A Guide to Creating Vernal Ponds*. USDA Forest Service. 33pp.

Bookhout, Theodore A., ed. 1994. *Research and Management Techniques for Wildlife and Habitat*. 5th ed. Wildlife Society, Bethesda, Maryland. 740pp.

Cowardin, Lewis M., Virginia Carter, Francis Golet and Edward LaRoe. 1979. *Classification of Wetland and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service FWS-OBS-79/31. 103pp.

Decker, Daniel J. and John W. Kelly. 1988. *Enhancement of Wildlife Habitat on Private Lands*.

- Dennis, John V. 1988. *The Wildlife Gardener*. Alfred A. Knopf, New York, New York. 293pp.
- Ehrlich, Paul R., David S. Dobkin and Darryl Wheye. 1988. *The Birder's Handbook: A Field Guide to the Natural History of North American Birds*. Simon & Schuster Inc. New York, New York. 784pp.
- Ellefson, Connie, Tom Stephens and Doug Welsh. 1992. *Xeriscape Gardening: Water Conservation for the American Landscape*. Macmillan Publishing Company, New York, New York. 323pp.
- Ellis, Barbara W. and Fern Marshall Bradley, eds. 1992. *The Organic Gardener's Handbook of Natural Insect and Disease Control*. Rodale Press, Emmaus, Pennsylvania. 534pp.
- Flink, Charles A., Peter Lagerwey, Diana Balmori and Robert M. Searns. 1993. *Trails for the Twenty-First Century: Planning, Design, and Management Manual for Multi-use Trails*. Edited by Karen-Lee Ryan. Island Press, Washington, D.C. 213pp.
- Grimm, William Carey. 1993. *The Illustrated Book of Wildflowers and Shrubs*. Stackpole Books, Harrisburg, Pennsylvania. 637pp.
- Hammer, Donald A. 1992. *Creating Freshwater Wetlands*. Lewis Publishers, Inc., Chelsea, Michigan. 298pp.
- Harker, Donald, Gary Libby, Kay Harker, Sherri Evans and Marc Evans. 1999. *Landscape Restoration Handbook*. 2nd ed. Lewis Publishers, Ann Arbor, Michigan. 145pp.
- Henderson, Carrol L. 1987. *Landscaping for Wildlife*. Minnesota Dept. of Natural Resources, St. Paul, Minnesota. 110pp.
- Henderson, Carrol L. 1992. *Woodworking for Wildlife: Homes for Birds and Mammals*. 2nd ed. Minnesota Department of Natural Resources, St. Paul, Minnesota. 111pp.
- Henry, Peggy. 1995. *Gardening to Attract Birds and Butterflies*. Avon Books, New York, New York. 79pp.
- Hotchkiss, Neil. 1972. *Common Marsh, Underwater and Floating-leaved Plants of the United States and Canada*. General Publishing Co., Ltd. Toronto, Ontario. 124pp.
- Hygnstrom, Scott, Robert Timm and Gary Larson. 1994. *Prevention and Control of Wildlife Damage*. Vol. 1-2, Texas.
- Jones, Samuel B. and Leonard E. Foote. 1990. *Gardening with Native Wildflowers*. Timber Press, Portland, Oregon. 195pp.
- Kusler, Jon A. and Mary E. Kentula, eds. 1990. *Wetland Creation and Restoration*. Island Press, Washington D.C. 594pp.

- Lee, David S., Carter S. Gilbert, Charles H. Hocutt, Robert E. Jenkins, Don E. McAllister and Jay R. Stauffer, Jr. 1980. *Atlas of North American Freshwater Fishes*. North Carolina State Museum of Natural History., North Carolina. 867pp.
- Lincoln, Roger, Geoff Boxshall and Paul Clark. 1998. *A Dictionary of Ecology, Evolution and Systematics*, 2nd ed. Cambridge University Press, Cambridge, UK. 361pp.
- Magee, Dennis W. 1981. *Freshwater Wetlands: A Guide to Common Indicator Plants of the Northeast*. The University of Massachusetts Press, Amherst, Massachusetts. 245 pp.
- Martin, Laura C. 1986. *The Wildflower Meadow Book: A Gardener's Guide*. East Woods Press, Charlotte, North Carolina. 303 pp.
- McComas, Steve. 1993. *Lake Smarts: The First Lake Maintenance Handbook*. Edited by Rachel Reeder. Terrene Institute, Alexandria, Virginia. 215pp.
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- Packard, Stephen and Cornella F. Mutel. 1997. *The Tallgrass Restoration Handbook for Prairies, Savannas, and Woodlands*. Island Press, Washington, D.C. 463pp.
- Parrow, Martin R. and Anthony J. Davy, eds. 2002. *Handbook of Ecological Restoration, Volume 1: Principles of Restoration*. Cambridge University Press, Cambridge, UK. 444pp.
- Parrow, Martin R. and Anthony J. Davy, eds. 2002. *Handbook of Ecological Restoration, Volume 2: Restoration in Practice*. Cambridge University Press, Cambridge, UK. 599pp.
- Payne, Neil F. 1992. *Techniques for Wildlife Habitat Management of Wetlands*. McGraw-Hill, Inc., New York, New York. 549pp.
- Payne, Neil F. and Fred C. Bryant. 1994. *Techniques for Wildlife Habitat Management of Uplands*. McGraw-Hill, Inc., New York, New York. 840pp.
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- Randall, John M. and Janet Marinelli, eds. 1996. *Invasive Plants: Weeds of the Global Garden*. Brooklyn Botanic Garden, Inc., Brooklyn, New York. 111pp.
- Rodiek, Jon E. and E.G. Bolen., eds. 1991. *Wildlife and Habitats in Managed Landscapes*. Island Press, Washington, DC. 201pp.
- Russo, Monica and Robert Dewire. 1976. *The Complete Book of Birdhouses and Feeders*. Drake Publishers, New York, New York.

- Schenk, Marcus. 1990. *Butterflies, How to Identify and Attract Them to Your Garden*. Rodale Press, Inc., U.S.A. 160pp.
- Sibley, David Allen. 2001. *The Sibley Guide to Bird Life and Behavior*. Alfred A. Knopf, New York, New York. 607pp.
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- Stokes, Donald and Lilian. 1989. *The Hummingbird Book: The Complete Guide to Attracting, Identifying, and Enjoying Hummingbirds*. Little, Brown and Company, Boston, Massachusetts. 87pp.
- Tacha, Thomas C. and Clait E. Braun, eds. 1994. *Migratory Shore and Upland Game Bird Management in North America*. Allen Press, Lawrence, Kansas. 223pp.
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- Treepeople, Andy and Katie Lipkis. 1990. *The Simple Act of Planting a Tree*. Jeremy P. Tarcher, Inc., Los Angeles, California. 236pp.
- U.S.D.A. Forest Service. 1984. *Standard Specification for Construction of Trails*. EM-7720-102. U.S.D.A., Forest Service, Washington, DC. 105pp.
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- Whitson, Tom D., ed., Larry C. Burrill, Steven A. Dewey. David W. Cudney, B.E. Nelson, Richard D. Lee and Robert Parker. 1996. *Weeds of the West*. 5th ed. Pioneer of Jackson Hole, Jackson, Wyoming. 630pp.
- Xerces Society, The. 1990. *Butterfly Gardening: Creating Summer Magic in your Garden*. Sierra Club Books, San Francisco, California. 192pp.

Recommended Field Guides

- Boyd, Howard P. 1991. *A Field Guide to the Pine Barrens of New Jersey*. Plexus Publishing, Inc., Bedford, New Jersey. 423pp.
- Bull, John. 2000. *The Audubon Society Field Guide to North American Birds: Eastern Region*. Revised ed. Alfred A. Knopf, New York, New York. 800pp.

- Burr, Brooks M., Lawrence M. Page, and Tory Peterson. 1998. *A Field Guide to Freshwater Fishes: North America North of Mexico* (Peterson Field Guides). Houghton Mifflin Company, Boston, Massachusetts. 541pp.
- Burt, William H. 1998. *A Peterson Field Guide to the Mammals of North America North of Mexico*. Houghton Mifflin Company, Boston, Massachusetts. 367pp.
- Capula, Massimo. 1989. *Simon & Schuster's Guide to Reptiles and Amphibians of the World*. Edited by John L. Behler. Simon & Schuster Inc., New York, New York. 256pp.
- Clark, William S. and Brian K. Wheeler. 2001. *A Peterson Field Guide to Hawks of North America*. 2nd ed. Houghton Mifflin Company, Boston, Massachusetts. 328pp.
- Conant, Roger and Joseph Collins. 1998. *A Field Guide to Reptiles and Amphibians of Eastern and Central North America*. 4th ed. Houghton Mifflin Company, Boston, Massachusetts. 634pp.
- Covell, Charles V., Jr. 1984. *A Peterson Field Guide to Moths of Eastern North America*. Edited by Roger Tory Peterson. Houghton Mifflin Company, Boston, Massachusetts. 496pp.
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- Kricher, John C. 1998. *A Peterson Field Guide to Eastern Forests*. Houghton Mifflin Company, Boston, Massachusetts. 506pp.
- Little, Elbert L. Jr. 1980. *The Audubon Society Field Guide to North American Trees: Eastern Region*. Chanticleer Press, New York, New York. 716pp.
- McKenney, Margaret, and Roger Tory Peterson. 1998. *A Peterson Field Guide to Wildflowers: Northeastern and Northcentral North America*. Houghton Mifflin Company, Boston, Massachusetts. 448pp.
- Murie, Olaus J. 1998. *A Peterson Field Guide to Animal Tracks*. Houghton Mifflin Company, Boston, Massachusetts. 400pp.
- Newcomb, Lawrence. 1989. *Newcomb's Wildflower Guide*. Little, Brown and Company, Boston, Massachusetts. 490 pp.
- Opler, Paul A. and Vichai Malikul. 1998. *A Peterson Field Guide to Eastern Butterflies*. Houghton Mifflin Company, Boston, Massachusetts. 503pp.
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- Petrides, George A. 1998. *A Field Guide to Eastern Trees*. 2nd ed. Houghton Mifflin Company, New York, New York. 441pp.

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Silberhorn, Gene M. 1999. *Common Plants of the Mid-Atlantic Coast: A Field Guide*. Revised ed. The Johns Hopkins University Press, Baltimore, Maryland. 295pp.

Theiret, John W., William A. Neiring, and Nancy C. Olmstead. 2001. *National Audubon Society Field Guide to North American Wildflowers: Eastern Region*. Alfred A Knopf, Inc., New York, New York. 896pp.

White, Richard E., and Donald J. Borror. 1998. *A Peterson Field Guide to Insects: America North of Mexico*. Houghton Mifflin Company, Boston, Massachusetts. 448pp.

Williamson, Sheri L. 2002. *A Peterson Field Guide to the Hummingbirds of North American*. Houghton Mifflin Company, Boston, Massachusetts. 275pp.

APPENDIX II

The term ‘ecoregion’ may be loosely defined as a unit of land or water, usually relatively large in extent, which exhibits a distinguishing assemblage of distinct and often discrete natural communities and species. The list of species contained in this table is offered to provide the site Wildlife Team with a representation of plant and animal species indicative of the ecoregion that is prevalent for the site location, and therefore to provide a sampling of species that may be encountered when compiling the site species inventory. Please note that this list is not meant to be definitive.

TYPE	COMMON NAME	SCIENTIFIC NAME
Mammals	Coyote	<i>Canis latrans</i>
	American beaver	<i>Castor canadensis</i>
	Red-backed vole	<i>Clethrionomys</i> sp.
	Star-nosed mole	<i>Condylura cristata</i>
	Rafinesque’s big-eared bat	<i>Corynorhinus rafinesquii</i>
	Big brown bat	<i>Eptesicus fuscus</i>
	Big brown bat	<i>Eptesicus fuscus</i>
	Shrew	Family Soricidae
	Northern flying squirrel	<i>Glaucomys sabrinus</i>
	Silver-haired bat	<i>Lasionycteris noctivagans</i>
	Red bat	<i>Lasiurus borealis</i>
	Hoary bat	<i>Lasiurus cinereus</i>
	Snowshoe hare	<i>Lepus americanus</i>
	Northern river otter	<i>Lutra canadensis</i>
	Bobcat	<i>Lynx rufus</i>
	Striped skunk	<i>Mephitis mephitis</i>
	Keen’s bat	<i>Myotis keenii</i>
	Southeastern bat	<i>Myotis austroriparius</i>
	Gray bat	<i>Myotis grisescens</i>
	Little brown bat	<i>Myotis lucifugus</i>
	Indiana bat	<i>Myotis sodalis</i>
	Evening bat	<i>Nycticeius humeralis</i>
	White-tailed deer	<i>Odocoileus virginianus</i>
	Cotton mouse	<i>Peromyscus gossypinus</i>
	White-footed mouse	<i>Peromyscus leucopus</i>
	Deer mouse	<i>Peromyscus maniculatus</i>
	Eastern pipistrelle	<i>Pipistrellus subflavus</i>
	Chipmunk	<i>Tamias</i> sp.
	Grey fox	<i>Urocyon cinereoargenteus</i>
	Red fox	<i>Vulpes vulpes</i>
Birds	Cooper’s hawk	<i>Accipiter cooperii</i>
	Sharp-shinned hawk	<i>Accipiter striatus</i>
	Spotted sandpiper	<i>Actitis macularia</i>
	Northern saw-whet owl	<i>Aegolius acadicus</i>
	Red-winged blackbird	<i>Agelaius phoeniceus</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Birds	Wood duck	<i>Aix sponsa</i>
	Henslow's sparrow	<i>Ammodramus henslowii</i>
	Grasshopper sparrow	<i>Ammodramus savannarum</i>
	Northern pintail	<i>Anas acuta</i>
	Blue winged teal	<i>Anas discors</i>
	Mallard	<i>Anas platyrhynchos</i>
	Golden eagle	<i>Aquila chrysaetos</i>
	Ruby-throated hummingbird	<i>Archilochus colubris</i>
	Great egret	<i>Ardea alba</i>
	Great blue heron	<i>Ardea herodias</i>
	Short-eared owl	<i>Asio flammeus</i>
	Long eared owl	<i>Asio otus</i>
	Canvasback	<i>Aythya valisineria</i>
	Tufted titmouse	<i>Baeolophus bicolor</i>
	Upland sandpiper	<i>Bartramia longicauda</i>
	Canada goose	<i>Branta canadensis</i>
	Great horned owl	<i>Bubo virginianus</i>
	Red-tailed hawk	<i>Buteo jamaicensis</i>
	Rough legged hawk	<i>Buteo lagopus</i>
	Red shouldered hawk	<i>Buteo lineatus</i>
	Broad winged hawk	<i>Buteo platypterus</i>
	Sanderling	<i>Calidris alba</i>
	Northern cardinal	<i>Cardinalis cardinalis</i>
	American goldfinch	<i>Carduelis tristis</i>
	Turkey vulture	<i>Cathartes aura</i>
	Belted kingfisher	<i>Ceryle alcyon</i>
	Killdeer	<i>Charadrius vociferous</i>
	Black tern	<i>Chlidonias niger</i>
	Lark sparrow	<i>Chondestes grammacus</i>
	Common nighthawk	<i>Chordeiles minor</i>
	Northern harrier	<i>Circus cyaneus</i>
	Sedge wren	<i>Cistothorus platensis</i>
	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
	Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
	Common flicker	<i>Colaptes auratus</i>
	Northern bobwhite	<i>Colinus virginianus</i>
	Rock pigeon	<i>Columba livia</i>
	Eastern wood pewee	<i>Contopus virens</i>
	Blue jay	<i>Cyanocitta cristata</i>
	Tundra swan	<i>Cygnus columbianus</i>
	Yellow-throated warbler	<i>Dendroica dominica</i>
	Bobolink	<i>Dolichonyx oryzivorus</i>
	Pileated woodpecker	<i>Dryocopus pileatus</i>
	Acadian flycatcher	<i>Empidonax virescens</i>
	Horned lark	<i>Eremophila alpestris</i>
	Peregrine falcon	<i>Falco peregrinus</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Birds	American kestrel	<i>Falco sparverius</i>
	Wilson's snipe	<i>Gallinago delicata</i>
	Common loon	<i>Gavia immer</i>
	Common yellowthroat	<i>Geothlypis trichas</i>
	Bald eagle	<i>Haliaeetus leucocephalus</i>
	Wood thrush	<i>Hylocichla mustelina</i>
	Northern oriole	<i>Icterus galbula</i>
	Mississippi kite	<i>Ictinia mississippiensis</i>
	Loggerhead shrike	<i>Lanius ludovicianus</i>
	Herring gull	<i>Larus argentatus</i>
	Hooded merganser	<i>Lophodytes cucullatus</i>
	Red-bellied woodpecker	<i>Melanerpes carolinus</i>
	Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
	Wild turkey	<i>Meleagris gallopavo</i>
	Swamp sparrow	<i>Melospiza georgiana</i>
	Song sparrow	<i>Melospiza melodia</i>
	Great crested flycatcher	<i>Myiarchus crinitus</i>
	Snowy owl	<i>Nyctea scandiaca</i>
	Kentucky warbler	<i>Oporornis formosus</i>
	Eastern screech owl	<i>Otus asio</i>
	Osprey	<i>Pandion haliaetus</i>
	Northern parula	<i>Parula americana</i>
	Savannah sparrow	<i>Passerculus sandwichensis</i>
	Indigo bunting	<i>Passerina cyanea</i>
	Double-crested cormorant	<i>Phalacrocorax auritus</i>
	Ringed-necked pheasant	<i>Phasianus colchicus</i>
	Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
	Downy woodpecker	<i>Picoides pubescens</i>
	Hairy woodpecker	<i>Picoides villosus</i>
	Rufous sided towhee	<i>Pipilo erythrophthalmus</i>
	Scarlet tanager	<i>Piranga olivacea</i>
	Summer tanager	<i>Piranga rubra</i>
	American golden-plover	<i>Pluvialis dominica</i>
	Black-capped chickadee	<i>Poecile atricapilla</i>
	Carolina chickadee	<i>Poecile carolinensis</i>
	Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>
	Vesper sparrow	<i>Poocetes gramineus</i>
	Prothonotary warbler	<i>Protonotaria citrea</i>
	Common grackle	<i>Quiscalus quiscula</i>
	Louisiana waterthrush	<i>Seiurus motacilla</i>
	Eastern bluebird	<i>Sialia sialis</i>
	White-breasted nuthatch	<i>Sitta carolinensis</i>
	Dicksissel	<i>Spiza Americana</i>
	Field sparrow	<i>Spizella pusilla</i>
	Barred owl	<i>Strix varia</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Birds	Eastern meadowlark	<i>Sturnella magna</i>
	Western meadowlark	<i>Sturnella neglecta</i>
	Tree swallow	<i>Tachycineta bicolor</i>
	Carolina wren	<i>Thryothorus ludovicianus</i>
	House wren	<i>Troglodytes aedon</i>
	American robin	<i>Turdus migratorius</i>
	Greater prairie chicken	<i>Tympanuchus cupido</i>
	Barn owl	<i>Tyto alba</i>
	Red-eyed vireo	<i>Vireo olivaceus</i>
	Canada warbler	<i>Wilsonia canadensis</i>
	Mourning dove	<i>Zenaida macroura</i>
Amphibians & Reptiles	Northern cricket frog	<i>Acris crepitans</i>
	Copperhead	<i>Agkistrodon contortrix</i>
	Jefferson salamander	<i>Ambystoma jeffersonianum</i>
	Spotted salamander	<i>Ambystoma maculatum</i>
	Marbled salamander	<i>Ambystoma opacum</i>
	Tiger salamander	<i>Ambystoma tigrinum</i>
	Green salamander	<i>Aneides aeneus</i>
	Smooth softshell	<i>Apalone mutica</i>
	Spiny softshell	<i>Apalone spinifera</i>
	American toad	<i>Bufo americanus</i>
	Fowler's toad	<i>Bufo fowleri</i>
	Worm snake	<i>Carphophis amoenus</i>
	Snapping turtle	<i>Chelydra serpentina</i>
	Painted turtle	<i>Chrysemys picta</i>
	Northern painted turtle	<i>Chrysemys picta</i>
	Spotted turtle	<i>Clemmys guttata</i>
	Kirtland's snake	<i>Clonophis kirtlandii</i>
	Black racer	<i>Coluber constrictor</i>
	Timber rattlesnake	<i>Crotalus horridus</i>
	Dusky salamander	<i>Desmognathus fuscus</i>
	Mountain dusky salamander	<i>Desmognathus ochrophaeus</i>
	Ringneck snake	<i>Diadophis punctatus</i>
	Eastern rat snake	<i>Elaphe obsoleta</i>
	Rat snake	<i>Elaphe obsoleta</i>
	Blanding's turtle	<i>Emys blandingii</i>
	Coal skink	<i>Eumeces anthracinus</i>
	Five-lined skink	<i>Eumeces fasciatus</i>
	Broadhead skink	<i>Eumeces laticeps</i>
	Two lined salamander	<i>Eurycea bislineata</i>
	Longtail salamander	<i>Eurycea longicauda</i>
	Wood turtle	<i>Glyptemys insculpta</i>
	Bog turtle	<i>Glyptemys mublenbergii</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Amphibians & Reptiles	Map turtle	<i>Graptemys geographica</i>
	Spring salamander	<i>Gyrinophilus porphyriticus</i>
	Four-toed salamander	<i>Hemidactylium scutatum</i>
	Eastern hognose	<i>Heterodon platirhinos</i>
	Spring peeper	<i>Hyla crucifer</i>
	Gray treefrog	<i>Hyla versicolor</i>
	Eastern mud turtle	<i>Kinosternon subrubrum</i>
	Common kingsnake	<i>Lampropeltis getula</i>
	Milk snake	<i>Lampropeltis triangulum</i>
	Smooth green snake	<i>Liochlorophis vernalis</i>
	Mudpuppy	<i>Necturus maculosus</i>
	Northern water snake	<i>Nerodia sipedon</i>
	Common water snake	<i>Nerodia sipedon sipedon</i>
	Eastern newt	<i>Notophthalmus viridescens</i>
	Rough green snake	<i>Opheodrys aestivus</i>
	Redback salamander	<i>Plethodon cinereus</i>
	Northern ravine salamander	<i>Plethodon electromorphus</i>
	Slimy salamander	<i>Plethodon glutinosus</i>
	Striped chorus frog	<i>Pseudacris triseriata</i>
	New Jersey chorus frog	<i>Pseudacris triseriata kalmi</i>
	Redbelly turtle	<i>Pseudemys rubriventris</i>
	Mud salamander	<i>Pseudotriton montanus</i>
	Red salamander	<i>Pseudotriton ruber</i>
	Bullfrog	<i>Rana catesbeiana</i>
	Green frog	<i>Rana clamitans</i>
	Pickerel frog	<i>Rana palustris</i>
	Northern leopard frog	<i>Rana pipens</i>
	Coastal plain leopard frog	<i>Rana sphenocephala</i>
	Wood frog	<i>Rana sylvatica</i>
	Queen snake	<i>Regina septemvittata</i>
	Eastern spadefoot	<i>Scaphiopus holbrookii</i>
	Eastern fence lizard	<i>Sceloporus undulates</i>
	Lesser siren	<i>Siren intermedia</i>
	Eastern massasauga	<i>Sistrurus catenatus catenatus</i>
	Stinkpot	<i>Sternotherus odoratus</i>
	Brown snake	<i>Storeria dekayi</i>
	Redbelly snake	<i>Storeris occipitomaculata</i>
	Eastern box turtle	<i>Terrapene carolina</i>
	Shorthead garter snake	<i>Thamnophis brachystomus</i>
	Eastern ribbon snake	<i>Thamnophis sauritus</i>
	Common garter snake	<i>Thamnophis sirtalis</i>
	Smooth earth snake	<i>Virginia valeriae</i>
	Mountain earth snake	<i>Virginia valeriae pulchra</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Butterflies	Common roadside skipper	<i>Amblyscirtes vialis</i>
	Least skipper	<i>Ancyloxypha numitor</i>
	Tawny emperor	<i>Asterocampa clyton</i>
	Sachem	<i>Atalopedes campestris</i>
	Io moth	<i>Automeris io</i>
	Pipevine swallowtail	<i>Battus philenor</i>
	Meadow fritillary	<i>Boloria bellona</i>
	Brown elfin	<i>Callophrys augustinus</i>
	Juniper hairstreak	<i>Callophrys gryneus</i>
	Henry's elfin	<i>Callophrys henrici</i>
	Hoary elfin	<i>Callophrys polios</i>
	Red-banded hairstreak	<i>Calycopis cecrops</i>
	Common wood nymph	<i>Cercyonis pegala</i>
	Silvery checkerspot	<i>Chlosyne nycteis</i>
	Orange sulphur	<i>Colias eurytheme</i>
	Clouded sulphur	<i>Colias philodice</i>
	Monarch	<i>Danaus plexippus</i>
	Northern pearly eye	<i>Enodia anthedon</i>
	Silver-spotted skipper	<i>Epargyreus clarus</i>
	Wild indigo duskywing	<i>Erynnis baptisiae</i>
	Variegated fritillary	<i>Euptoieta claudia</i>
	Little yellow	<i>Eurema lisa</i>
	Sleepy orange	<i>Eurema nicippe</i>
	Zebra swallowtail	<i>Eurytides marcellus</i>
	Eastern tailed-blue	<i>Everes comyntas</i>
	Leonard's skipper	<i>Hesperia leonardes</i>
	Fiery skipper	<i>Hylephila phyleus</i>
	American snout	<i>Libytheana carinenta</i>
	Viceroy	<i>Limenitis archippus</i>
	Red spotted purple	<i>Limenitis arthemis</i>
	American copper	<i>Lycaena phlaeas</i>
	Mourning cloak	<i>Nymphalis antiopa</i>
	Giant swallowtail	<i>Papilio cresphontes</i>
	Eastern tiger swallowtail	<i>Papilio glaucus</i>
	Black swallowtail	<i>Papilio polyxenes</i>
	Spicebush swallowtail	<i>Papilio troilus</i>
	White hairstreak	<i>Parrhasius m-album</i>
	Common sootywing	<i>Pholisora catullus</i>
	Pearl crescent	<i>Phyciodes tharos</i>
	Cabbage white	<i>Pieris rapae</i>
	Hobomok skipper	<i>Poanes hobomonke</i>
	Zabulon skipper	<i>Poanes zabulon</i>
	Peck's skipper	<i>Polites peckius</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Butterflies	Tawny edged skipper	<i>Polites themistocles</i>
	Eastern comma	<i>Polygonia comma</i>
	Question mark	<i>Polygonia interrogationis</i>
	Grizzled skipper	<i>Pyrgus centaureae</i>
	Common checkered skipper	<i>Pyrgus communis</i>
	Striped hairstreak	<i>Satyrrium liparops</i>
	Aphrodite fritillary	<i>Speyeria aphrodite</i>
	Great spangled fritillary	<i>Speyeria cybele</i>
	Regal fritillary	<i>Speyeria idalia</i>
	Gray hairstreak	<i>Strymon melinus</i>
	Northern cloudywing	<i>Thorybes pylades</i>
	Painted lady	<i>Vanessa cardui</i>
	American lady	<i>Vanessa virginiensis</i>
	Southern dogface	<i>Zerene cesonia</i>
Wildflowers	Yarrow	<i>Achillea millefolium</i>
	Sweetflag	<i>Acorus calamus</i>
	Bishop's goutweed	<i>Aegopodium podagraria</i>
	Pale mountain dandelion	<i>Agoseris glauca</i>
	Corncockle	<i>Agrostemma githago</i>
	Pigweed	<i>Amaranthus retroflexus</i>
	Common ragweed	<i>Ambrosia artemisiifolia</i>
	Pearly everlasting	<i>Anaphalis margaritacea</i>
	Indian-hemp	<i>Apocynum cannabinum</i>
	American spikenard	<i>Aralia racemosa</i>
	Common burdock	<i>Arctium minus</i>
	Dutchman's pipe	<i>Aristolochia macrophylla</i>
	Heartleaf arnica	<i>Arnica cordifolia</i>
	Dusty miller	<i>Artemisia stelleriana</i>
	Mugwort	<i>Artemisia vulgaris</i>
	Common milkweed	<i>Asclepias syriaca</i>
	Blue wild indigo	<i>Baptisia australis</i>
	Tickseed sunflower	<i>Bidens aristosa</i>
	Noding bur marigold	<i>Bidens cernua</i>
	Field mustard	<i>Brassica rapa</i>
	Hummock sedge	<i>Carex stricta</i>
	Indian paintbrush	<i>Castilleja coccinea</i>
	Blue cohosh	<i>Caulophyllum thalictroides</i>
	American bittersweet	<i>Celastrus scandens</i>
	Spotted knapweed	<i>Centaurea biebersteinii</i>
	Yellow star thistle	<i>Centaurea solstitialis</i>
	Chicory	<i>Cichorium intybus</i>
	Poison hemlock	<i>Conium maculatum</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Wildflowers	Horseweed	<i>Conyza canadensis</i>
	Garden coreopsis	<i>Coreopsis tinctoria</i>
	Flixweed	<i>Descurainia sophia</i>
	Flat-topped white aster	<i>Doellingeria umbellata</i>
	Pale purple coneflower	<i>Echinacea pallida</i>
	Storksbill	<i>Erodium cicutarium</i>
	Rattlesnake master	<i>Eryngium yuccifolium</i>
	Trumpetweed	<i>Eupatorium fistulosum</i>
	Late boneset	<i>Eupatorium serotinum</i>
	Sweet fennel	<i>Foeniculum vulgare</i>
	Wild strawberry	<i>Fragaria virginiana</i>
	Sneezeweed	<i>Helenium autumnale</i>
	Cow parsnip	<i>Heracleum maximum</i>
	Water pennywort	<i>Hydrocotyle americana</i>
	Orange jewelweed	<i>Impatiens capensis</i>
	American water-willow	<i>Justicia americana</i>
	Oxeye daisy	<i>Leucanthemum vulgare</i>
	Honesty	<i>Lunaria annua</i>
	Whorled loosestrife	<i>Lysimachia quadrifolia</i>
	Common moonseed	<i>Menispermum canadense</i>
	Tall bluebells	<i>Mertensia paniculata</i>
	Wall lettuce	<i>Mycelis muralis</i>
	True forget-me-not	<i>Myosotis scorpioides</i>
	Common evening-primrose	<i>Oenothera biennis</i>
	Devil's tongue	<i>Opuntia humifusa</i>
	Sweet Cicely	<i>Osmorhiza claytonii</i>
	Wild ginseng	<i>Panax quinquefolius</i>
	Downy phlox	<i>Phlox pilosa</i>
	Common plantain	<i>Plantago major</i>
	Saltmarsh fleabane	<i>Pluchea odorata</i>
	May-apple	<i>Podophyllum peltatum</i>
	Swamp smartweed	<i>Polygonum hydropiperoides</i>
	Common buttercup	<i>Ranunculus acris</i>
	Black-eyed Susan	<i>Rudbeckia triloba</i>
	Fringe-leaf wild petunia	<i>Ruellia humilis</i>
	Slender glasswort	<i>Salicornia maritima</i>
	Northern pitcher plant	<i>Sarracenia purpurea</i>
	Starry Campion	<i>Silene stellata</i>
	Canada goldenrod	<i>Solidago canadensis</i>
	Wood poppy	<i>Stylophorum diphyllum</i>
	Skunk cabbage	<i>Symplocarpus foetidus</i>
	Yellow goatsbeard	<i>Tragopogon dubius</i>
	Red clover	<i>Trifolium pratense</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Wildflowers	Coltsfoot	<i>Tussilago farfara</i>
	Stinging nettle	<i>Urtica dioica</i>
	Blue vervain	<i>Verbena hastata</i>
	Tall ironweed	<i>Vernonia gigantea</i>
	Periwinkle	<i>Vinca minor</i>
	Sand violet	<i>Viola affinis</i>
	White mule's-ear	<i>Xanthium strumarium</i>
	Adam's needle	<i>Yucca filamentosa</i>
	Meadow zizia	<i>Zizia aptera</i>
Trees	Balsam fir	<i>Abies balsamea</i>
	Black maple	<i>Acer nigrum</i>
	Horse-chestnut	<i>Aesculus hippocastanum</i>
	Bog rosemary	<i>Andromeda polifolia</i>
	Wormwood	<i>Artemisia ludoviciana</i>
	Common pawpaw	<i>Asimina triloba</i>
	Common barberry	<i>Berberis vulgaris</i>
	Paper birch	<i>Betula papyrifera</i>
	American chestnut	<i>Castanea dentata</i>
	Gray dogwood	<i>Cornus racemosa</i>
	American hazelnut	<i>Corylus americana</i>
	Pear hawthorn	<i>Crataegus calpodendron</i>
	Northern bush honeysuckle	<i>Diervilla lonicera</i>
	Autumn olive	<i>Elaeagnus umbellata</i>
	Glossy buckthorn	<i>Frangula alnus</i>
	White ash	<i>Fraxinus americana</i>
	Common juniper	<i>Juniperus communis</i>
	Eastern red cedar	<i>Juniperus virginiana</i>
	Tamarack	<i>Larix laricina</i>
	Sweet crabapple	<i>Malus coronaria</i>
	Black chokeberry	<i>Photinia melanocarpa</i>
	Atlantic ninebark	<i>Physocarpus opulifolius</i>
	White spruce	<i>Picea glauca</i>
	Jack pine	<i>Pinus banksiana</i>
	American sycamore	<i>Platanus occidentalis</i>
	Eastern cottonwood	<i>Populus deltoides</i>
	American plum	<i>Prunus americana</i>
	Sweet cherry	<i>Prunus avium</i>
	Northern pin oak	<i>Quercus ellipsoidalis</i>
	Smooth sumac	<i>Rhus glabra</i>
	Prickly rose	<i>Rosa acicularis</i>
	Highbush blackberry	<i>Rubus allegheniensis</i>
	Wild red raspberry	<i>Rubus idaeus</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
Trees	Pussy willow	<i>Salix discolor</i>
	Sassafras	<i>Sassafras albidum</i>
	Meadowsweet	<i>Spiraea alba</i>
	Common snowberry	<i>Symphoricarpos albus</i>
	Canada yew	<i>Taxus canadensis</i>
	Eastern hemlock	<i>Tsuga canadensis</i>
	Slippery elm	<i>Ulmus rubra</i>
	Moosewood viburnum	<i>Viburnum edule</i>

APPENDIX III

CONTACT INFORMATION

Association of Illinois Soil and Water Conservation District

2520 Main Street
Illinois State Fairgrounds
Springfield, IL 62702
Phone: 217-744-3414
Fax: 217-744-3420

Illinois USDA Natural Resources Conservation Service

1691 N 31st Road
Ottawa, IL 61350
Phone: 815-433-0551 Ext. 3
Fax: 815-433-0665

Illinois Department of Natural Resources

Office of Resource Conservation
600 N. Grand Ave. West
Springfield, IL 62706

Office of Land Management and Education

Illinois Department of Natural Resources
524 South Second Street
Springfield, IL 62701-1787,
Phone: 217-782-6752

Office of Mines and Minerals

Illinois Department of Natural Resources
524 South Second Street
Springfield, Illinois 62701-1787

Wetlands Program

Contact: Lisa McCauley
Phone: 217-557-0658

Division of Fisheries

Contact: Mike Conlin
Phone: 217-782-6424

Division of Forest Resources

Phone: 217-782-2361

State Forester

Division of Forest Resources
2005 Round Barn Road
Champagne, IL 61821
Contact: Stewart Pequignot
Phone: 217-278-5773
Fax: 217- 278-5763
Email: spequignot@dnrmil.state.il.us

State Conservationist

USDA Natural Resource Conservation Service
1902 Fox Dr.
Champaign, IL 61820-7335
Contact: William Gradle
Phone: 217-353-6600
Fax: 217-373-6675
Email: bill.gradle@il.nrcs.usda.gov

Department of Agriculture

Contact: Ken Towles
Phone: 630-584-7961 ext. 105
Contact: Tom Ryterski
Phone: ext. 104

Illinois Department of Natural Resources

Contact: Ray Eisbrener
Phone: 815-675-2385

Department of Energy

Fermilab, Chicago
Contact: Bob Lootens
630-840-3303

US Fish & Wildlife Service

St. Charles
Contact: John Rogner
Phone: 847-381-2252 ext. 212

Botanical Expert

Bill McClain
Natural Areas Stewardship Program Manager
Illinois Department of Natural Resources
524 south 2nd street
Springfield, IL 61701
Phone: 217-785-8774
Fax: 217 785-8277

Division of Wildlife Resources

524 South Second Street

Springfield, IL 62701

Phone: 217-785-8774

Division of Natural Heritage

Contact: Glen Kruse

Phone: 217-785-8774

Illinois Department of Conservation

100 W. Randolph
Suite 4-300
Chicago, IL 60601
Phone: 312-814-2070

Endangered Species Protection Board

Illinois Department of Conservation
524 South Second Street
Springfield, IL 62701
Contact: Sue Lauzon, Coordinator for Endangered Species and Wildlife Diversity Program
Phone: 217-785-8277
Fax: 217-785-8277

Illinois Environmental Protection Agency

1021 N. Grand Ave. East
P.O. Box 19276
Springfield, IL 62794

City of Chicago Department of Environment

North Park Village Nature Center
5801 North Pulaski Road
Chicago, Illinois 60646
Phone: 312-744-5472

U.S. Fish & Wildlife Service

Chicago Illinois Field Office
1000 Hart Road, Suite 180
Barrington IL 60010

**Northeastern Illinois Planning
Commission (NIPC)**

222 South Riverside Plaza, Suite 1800
Chicago, IL 60606
Phone: 312-454-0400

**Illinois Department of Natural Resources
Northwest Region**

2660 East 2350th Road
Marseilles, IL 61341
Phone: 815-357-1608
Web site: <http://dnr.state.il.us>

Illinois Natural History Survey

607 East Peabody Drive Champaign, Illinois 61820
Phone: 217/333-6880 (general information)
Fax: 217/333-4949

Organizations

Grand Prairie Friends

P. O. Box 36
Urbana, IL 61803-0036
Web site: [www: www.prairienet.org/gpf](http://www.prairienet.org/gpf)
Email: gpf@prairienet.org

Chicago Botanic Garden

Chicago Botanic Garden
1000 Lake Cook Road
Glencoe, IL 60022
Email: cbglib@nslsilus.org
Phone: (847) 835-5440
Fax: (847) 835-4484
Web Page URL: <http://www.chicagobotanic.org>

Plant Conservation Alliance

Bureau of Land Management
1849 C Street NW, LSB-204
Washington, DC 20240
Phone: (202) 452-0392
Email: plant@plantconservation.org

Nature Preserves Commission

524 South Second Street
Springfield, IL 62701
Phone: 217-785-8774

Illinois Historic Preservation Society

500 E Madison
Springfield, IL 62701

Chicago Audubon Society

5801-C North Pulaski Road,
Chicago, IL 60646-6057
Contact: Karen Anderson
Phone: 773-539-6793

Calumet Ecological Park Association

12932 S. Escanaba Avenue
Chicago IL 60633
Phone: 773-646-4773

Illinois Natural History Survey

607 East Peabody Drive
Champaign, Illinois 61820
Phone: 217-333-6880
Fax: 217-333-4949

Chicago Herpetological Society

2060 North Clark Street
Chicago, Illinois 60614

Chicagoland Environmental Network

Brookfield Zoo,
North Park Village Nature Center
5801 North Pulaski Road
Chicago, IL 60646
Phone: 312-744-547

Association of Illinois Soil and Water Conservation Districts

2520 Main Street
Springfield, IL 62702
Phone: 217-744-3414
Fax: 217-744-3420
Contact: Renee Sager, Information/Education Coordinator

Illinois Chapters of The Nature Conservancy

Chicago Office
8 South Michigan Avenue, Suite 900
Chicago, Illinois 60603
Phone: 312-346-8166
Fax: 312-346-5606

Grand Prairie Field Office of The Nature Conservancy

1201 S. Main Street
Eureka, Illinois 61530
Phone: 309-467-4662
Fax: 309-467-4664

Northern Illinois Field Office of The Nature Conservancy

4 Crystal Street, 1st floor
Cary, Illinois 60013
Phone: 847-462-9789
Fax: 847-462-9819

University of Illinois

Office of Extension and Outreach
214 Mumford Hall, MC-710
1301 W. Gregory Dr.
Urbana, IL 61801
Phone: 217-333-5900

Illinois Watershed Association

President: Greg Sherwood
PO Box 278
Martinsville, IL 62468
Phone: 217-849-3762
Email: erma@rr1.net
Web: <http://www.watershed.uiuc.edu/>

Pheasants Forever

2880 Thunder Road
Hopkinton, IA 52237
Contact: Matthew O'Connor
Phone: 319-926-2357
Email: niapfmatt@n-connect.net

Izaak Walton League, Illinois Division

P.O. Box 22, RR #1
Mason City, IL 62664
Phone: 217- 482-5144

Chicago Botanic Garden

1000 Lake Cook Road
Glencoe, Illinois 60022
Phone: 847-835-5440

Prairie Rivers Network

809 S. Fifth St.
Champaign, IL 61820
Phone: 217-344-2371

Prairie Grove Volunteers

P.O. Box 2577
Champaign, IL 61825
Email: pgv@prairienet.org

Midewin National Tallgrass Prairie

Nature Preserve
30071 South State Highway 53
Wilmington, Illinois 60481
Phone: 815-423-6370

Fax: 815-423-6376

Illinois Audubon Society

P.O. Box 2418
Danville, IL 61834
Phone: 217- 446-5085

Sierra Club Foundation

200 N. Michigan Av.
Suite 505
Chicago, IL 60601
Phone: 312- 251-1680
Web Site: <http://www.sierraclub.org>

Sierra Club's Northern Plains Office

23 N. Scott, Room 25
Sheridan, WY 82801
Phone: 307-672-0425
Email: nt-wy.field@sierraclub.org

Trout Unlimited, Illinois Council

P.O. Box 1280
Oak Brook, IL 60522
Phone: 312- 409-3800
Web Site: <http://www.tu.org>

Illinois Environmental Council

Education Fund
319W. Cook St.
Springfield, IL 62704
Phone: 217- 544-5954

Illinois Association of Park Districts

211 E. Monroe St.
Springfield, IL 62701
Phone: 217- 523-4554

Illinois Conservation Foundation

100 W. Randolph, Suite 4-300
Chicago, IL 60601
Phone: 312- 814-7237
Web Site: <http://dnr.state.il.us/icf>

Nature of Illinois Foundation

701 Devonshire Dr., #209
Champaign, IL 61820
Phone: 217- 355-6437

Web Site: <http://natureillinois.org>

Natural Land Institute

320 S. 3rd St
Rockford, IL 61104
Phone: 815- 964-6666

Chicago Area Council

1218 West Adams St.
Chicago, IL 60607-2802
Phone: 312-421-8800
<http://www.chicagobsa.org>

Save the Prairie Society

10327 Elizabeth
Westchester, IL 60154
Phone: 708-865-8736
Web Site: <http://savetheprairiesociety.org>

Madison Arboretum

University of Wisconsin
1207 Seminole Highway
Madison, WI 53711
Phone: 608-262-5209

Illinois Native Plant Society

Forest Glen Preserve
20301 E. 900 North Road
Westville, IL 61883

American Society of Landscape Architects

Illinois Chapter
1N141 County Farm Road
Winfield, IL 60190
Phone: 630-752-0197

Seed Sources

Mason State Nursery

17855 N. Co. Rd. 2400 E.
Topeka, IL 61567
Phone: 309-535-2185

Union State Nursery

3240 State Forest Rd.
Jonesboro, IL 62952
Phone: 618-438-6781

Possibility Place Nursery

7548 W. Monee-Manhattan Road
Monee, Illinois 60449
Phone: 708-534-3988
Fax: 708-534-6272
Web Site: www.possibilityplace.com

Berthold Nursery

434 E. Devon
Elk Grove Village, IL 60007
Phone: 847-439-2600

Genesis Nursery

Rural Route 1, Box 32
Walnut, IL 61376
Phone: 815-438-2220

Chicago Botanic Garden

A Bloomin Sale
1000 Lake cook Road
Glencoe, IL 60022-0440
Phone: 847-835-5440

Aquatic Nursery

38 West 135 McDonald Road
Elgin, IL 60123
Phone: 847-741-7678

Bluestem Prairie Nursery

Route 2, Box 106A
Hillsboro, IL 62049
Phone: 217-532-6344

Midwest Flowers

PO Box 64
Rockton, IL 61072

Prairie Patch

Rr1, Box 41
Niantic, IL 62551
Phone: 217-668-2409

Purple Prairie Farm

Route 2, Box 176
Wyoming, IL 61491
Phone: 309-286-7560

Heinz Brothers Greenhouse and Garden Center

2010 East Main Street
St. Charles, IL

Tom Huddleson

Huddleson/McBride Drainage
drain tile installation and removal
St. Charles Phone: 630-513-0757
Rochelle Phone: 815-562-6007