

# East Central Illinois Natural Areas Stewardship Manual



Urbana Park District

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# **East Central Illinois Natural Areas Stewardship Manual**

Champaign County Forest Preserve District  
Grand Prairie Friends  
Urbana Park District

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Grand Prairie Friends would like to dedicate this manual to the memory of:

Gary Beland  
(1951-2008)

His enthusiasm and tireless work for natural areas stewardship  
and education in Illinois continues to inspire all of us.

## Preface

This manual provides ecological management information and leadership resources for East Central Illinois volunteer natural area stewards; it is a valuable guide for both first-time and established stewards alike. The Champaign County Forest Preserve District, Grand Prairie Friends, and the Urbana Park District have worked together to develop this manual for use not only within their own stewardship programs, but also as a resource for similar organizations within the East Central Illinois region.

Funding for this manual was provided through a Volunteer Stewardship Network (VSN) Grant administered by The Nature Conservancy, Illinois Chapter. VSN supports the efforts of volunteer groups working to protect and manage prairie, savanna, marsh, grassland, wetland, and woodland across the state of Illinois; as such, the network consists of thousands of individuals committed to preserving Illinois' native plants and animals in healthy, viable habitats.

VSN was also a tremendous resource in providing sample stewardship manuals from which this manual borrows significantly. Manuals used include *Volunteer Stewardship Network's Steward's Handbook* (The Nature Conservancy, Illinois Chapter), the draft *Forest Preserve District of Cook County Volunteer Stewardship Manual*, *McHenry County Conservation District Site Stewards Manual*, *Lake County Forest Preserve District Volunteer Stewards' Manual*, *Volunteer Stewardship Manual*, *The Nature Conservancy, Ohio Chapter*. This manual is also being made available in an electronic format complete with appendices and report forms that can be used electronically or reprinted for use by volunteers.

This manual is comprised of ten chapters:

Chapter 1: Introduction to our area's natural areas and their stewardship. Dan Olson (CCFPD), Derek Liebert (UPD), and James Ellis (INHS/GPF)

Chapter 2: Description of the volunteer stewardship program and potential volunteer positions. Derek Liebert (UPD)

Chapter 3: Ecological background information pertaining to stewardship, archeology, and stormwater: James Ellis (INHS/GPF), Al Smith (ECIMN), Alice Berkson (ECIMN), and Derek Liebert (UPD)

Chapter 4: Methodologies used in ecological restoration and natural area stewardship, including invasive species management, ecological management techniques, seed collection and dispersal, and natural area monitoring. James Ellis (INHS/GPF), Marilyn Ledger (ECIMN), and Dan Olson (CCFPD)

Chapter 5: Guidelines on planning and reporting, including forms to facilitate the development of natural area stewardship goals and additional report forms to assist in record keeping and communicating activities with land management organizations and agencies. Derek Liebert (UPD)

Chapter 6: Techniques for leading workdays and working with other volunteers to accomplish stewardship goals. Al Smith (ECIMN)

Chapter 7: Guidance on working with "the public," meaning both workday volunteers and the visiting public. Al Smith (ECIMN)

Chapter 8: Trail maintenance procedures, covering pruning techniques in detail. Al Smith (ECIMN)

Chapter 9: Discussion of tools available to volunteer natural area stewards and basic tool use and maintenance. Dan Olson (CCFPD)

Chapter 10: Coverage of safety issues inherent to volunteer natural area stewardship. Dan Olson (CCFPD), and Marilyn Ledger (ECIMN)

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Organizations:

CCFPD: Champaign County Forest Preserve

ECIMN: East Central Illinois Master Naturalist

GPF: Grand Prairie Friends

IDNR: Illinois Department of Natural Resources

IHNS: Illinois Natural History Survey

UPD: Urbana Park District

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## Chapter 1 Introduction

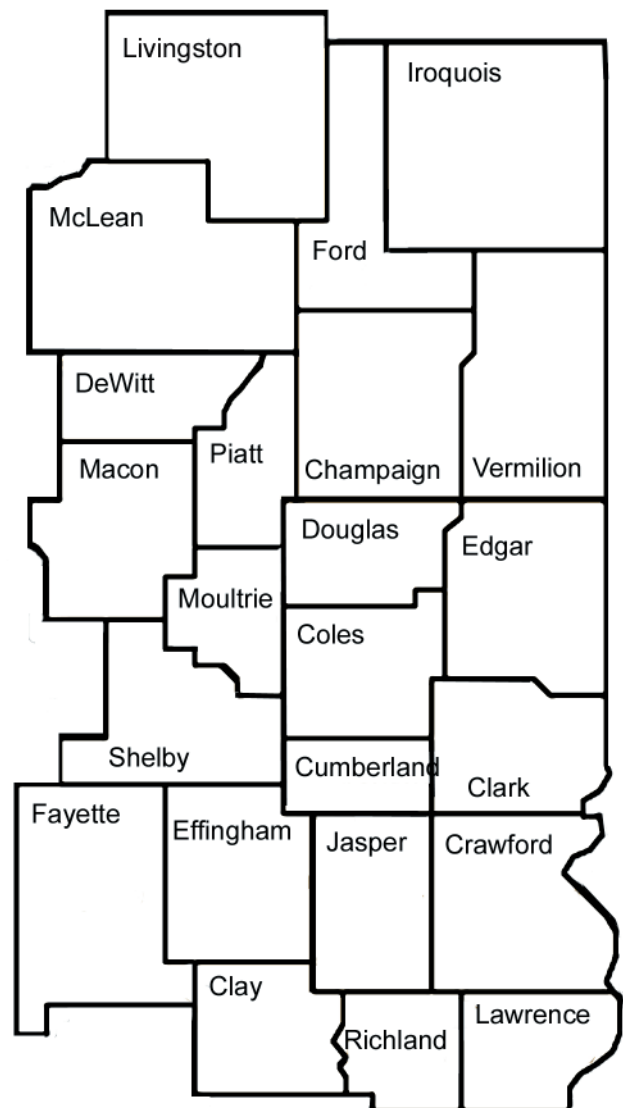
### Natural Areas of East Central Illinois

For the purposes of this manual, we will define the east central Illinois region as the twenty-three eastern most counties in the central part of the state. From the fragile sand prairies of Iroquois County to the unique wildlife at Prairie Ridge State Natural Area in Jasper County, the natural areas of east central Illinois are highly diverse. While the Grand Prairie Region dominates east central Illinois, it also contains portions of the very diverse and forested Wabash Border and Southern Till Plain Regions. The complete Illinois Regions map can be found in Appendix one.

Historically, each region contained vast prairies, savannas, woodlands, and wetlands. A portion of the east central Illinois region has been named the “Headwaters Region” by the Illinois Department of Natural Resources because it contains portions of five different major watersheds (Embaras, Vermilion, Sangamon, Kaskaskia and Mackinaw).

The state of Illinois has an official Natural Areas designation for certain lands that meet strict criteria. However, in this chapter, we use the term *natural area* to define all areas that have some natural components. These are often referred to as greenways, open spaces, preserves, parks, or other similar names. Appendix two (Natural Areas of East Central Illinois) is a list of such natural areas in east central Illinois giving their location and current ownership. The list is extensive, but not necessarily complete as new protections and designations are being established each year.

This list covers a wide range of natural areas that vary considerably in terms of floristic quality, habitat



**Figure 1.1:** East Central Illinois consists of twenty-three counties as shown on this University of Illinois Extension map

value, and public visitation. They also vary considerably in terms of how altered they are from their historic condition and the level of management they receive to bring them back into or maintain health. The terms *remnant*, *restoration* and *re-creation* are often used to describe such aspects of these areas.

Definitions for these specific natural areas descriptions vary, but generally, a remnant is an area that remains relatively undisturbed, that has seen no significant alteration of the soils or vegetation, and is typical of the ecosystem that has historically occurred in that area. A restoration is a degraded and disturbed remnant to which the principals of restoration ecology have been applied to bring it back into a state more typically representative of the area's natural history.

When conditions are significantly altered, the goal of a restoration may sometimes be achieving a state different from the historic community but improved in terms of diversity and ecological stability. A re-creation is an area that has been tremendously altered, sometimes to the extent that almost no site diversity occurs prior to restoration efforts. The goal here is to restore diversity and ecological stability to the area in a way that reflects some component of the region's natural history without necessarily re-creating the condition historically specific to that site.

Irreplaceable high quality remnants, heavily-visited urban re-creations, and expansive county forest preserves and state parks restorations all have important qualities for which they are valued by the public, volunteer stewards, and natural resource staff of our region. There are many who most highly value the high quality remnants of our natural history for their unparalleled diversity.

These areas are truly irreplaceable. Today, no recreations can compare to the ecological complexity of these carefully guarded remnants. These remnants are often areas that have avoided development because of an associated land use or because their topography or geology offers little to the industries of development and agriculture. In East Central Illinois, pioneer cemeteries, railroad rights of way, and steep ravines are some of the typical outposts of our highest quality remnants. Because they are often small and possess little or no buffer, these high quality remnants require vigilant stewardship and protection from surrounding impacts.

Many people place value on the scale and breadth of our forest preserves and state parks, many of which are some combination of remnant, restoration, and even recreation. Because of their scale, these larger sites prove more difficult to manage with the increasing intrusion of invasive species and are in critical need of stewardship. Their scale also makes them critical refuges of habitat in our otherwise less diverse East Central Illinois landscape. These large expanses of habitat are critical to the fauna that historically occupied less restricted ranges of habitat in our area. They become magnets of diversity in the otherwise relatively quiet surrounding landscape.

Urban natural areas, typically restorations and re-creations, although sometimes remnants, provide refuges of a very different sort. Because of their scale and the impacts associated with their location, urban natural areas rarely compare with remnants in terms of diversity, or with larger preserves in terms of the habitat they provide, but rather they are valued by the urban dweller seeking refuge from the daily bustle of the otherwise urbanized landscape. They are additionally important teaching tools, offering a nearby destination for organized school groups as well as curious budding naturalists who learn more and grow in appreciation of our region's natural history through visiting such areas. These areas offer an accessible living laboratory and provide alternate visions of sustainable land stewardship in our otherwise forgotten urban landscape.

Despite dramatic habitat loss since European settlement that began in the early 1800s, east central Illinois has many natural areas to offer Illinois residents—and these areas are in need of stewardship from eager, well-trained individuals. Care for the land is essential because many of the natural processes that were once commonplace have been absent from the land for many decades.

Most of our natural areas are small and separated from similar habitat by vast row-crop agriculture. Processes such as fire, grazing, and other natural disturbances are essential to maintaining the health of our ecosystems. Alterations to the food web have increased the number of herbivores in many areas to the point that regeneration of certain herbaceous and woody plants cannot occur. Further compounding the issues, these processes have also been impacted by habitat loss and fragmentation, an increase in the number and type of

invasive exotic species, increased pollution, and altered hydrology.

Many natural areas in Illinois are in need of further protection and stewardship. Sadly, Illinois ranks 48<sup>th</sup> out of 50 states for open space per capita. Additionally, Illinois spends far less annually on open spaces; it spends about \$2.67 per resident compared to neighboring Wisconsin that spends about \$9.80 per resident. Protected public open space in Illinois shows similar trends. For example, out of the 640,000 acres that make up Champaign County, approximately 3,610 acres are protected open space. That is approximately 20 acres per 1000 county residents.

The state's target is 49 acres per county resident. Champaign County should have about 2.5 times more protected open space than it currently has. Protected space is even lower in counties such as Ford and McLean. These statistics are alarming, but they articulate the need to protect and steward what little habitat remains.

Luckily, not all of the news is bad. East central Illinois has many unique plants and animals, some of which are state threatened or endangered. Our region hosts many neotropical birds and waterfowl that migrate and nest here. Resting and re-fueling areas for these birds are scattered throughout our region.

### **Natural Areas Land Ownership**

The natural areas in east central Illinois fall under five types of ownership, including federally owned land, state-owned land, county-owned lands, park district lands, and private ownership. Knowing the natural area ownership will give you an idea of the stewardship opportunities existing there.

#### **Federally Owned Land**

In east central Illinois, there is only one area that is federally owned. Lake Shelbyville and the area associated with it contain land owned and operated by the United States Army Corps of Engineers. This area was originally set up to control flooding along the Kaskaskia River, but it also provides ample outdoor recreational opportunities such as hiking, fishing, canoeing, and bird watching. In Illinois, most federal land is managed by the Illinois Department of Natural Resources through joint agreements.

### **State Owned Land**

**Parks and Recreation Areas.** Illinois state parks and state-owned natural areas fall under the jurisdiction of the Illinois Department of Natural Resources (IDNR). State parks, recreation areas and other IDNR-owned lands (State Natural Areas, Wildlife Areas, Fish and Wildlife Areas) are typically multi-use areas that cater to a variety of recreational opportunities, many of which have large lakes associated with them. In many cases, State Parks and Recreation Areas have large tracts of land set aside for wildlife and low impact recreation.

**State Designated Natural Areas and Nature Preserves.** State Natural Areas and Nature Preserves are very different from State Parks and Recreation Areas. The focus of State Natural Areas and Nature Preserves is typically on preservation rather than recreation. Nature Preserve Designations are made pursuant to the law and carried out by the Illinois Nature Preserves Commission (INPC) within the IDNR. In order to receive a Nature Preserve designation, the land must meet certain criteria set forth by the INPC.

Once designated, the INPC will offer guidelines on site management in order to maintain its designation. The Nature Preserve designation gives additional protections to the land and may restrict some uses of the land so unique resources will be preserved. Private or public land holdings held by any agency or person can be designated. Benefits of Nature Preserve designations include protection of natural features, management assistance and reduced taxes for the landowner.

Many dedicated Natural Areas and Nature Preserves were established once they were on the Illinois Natural Areas Inventory (INAI). The INAI is a statewide list of all known lands and waters (public or private) that have significant natural values by supporting high quality natural communities, endangered, threatened or relict species habitat, or possess other natural features of statewide significance. Although the inventory was first completed in 1978, it has been maintained and updated regularly. There is currently an effort underway to perform a comprehensive update to the INAI. It is likely that additional lands will be added to the INAI with the ultimate goal of protecting the natural resources on these lands. Potential additions

will be carefully evaluated to ensure they are of quality to warrant INAI designation.

**Colleges and Universities.** The University of Illinois, Parkland College, Heartland Community College and other educational institutions own land managed and protected as natural areas. These areas are often used for teaching and research. In many cases these areas are not open to the public (research may be in progress), but individuals may be permitted to steward the areas. Additionally, some fine natural areas such as Allerton Park near Monticello are open to the public and are already part of active volunteer stewardship programs.

### County Owned Land

Most county owned land in our region is held for the public in forest preserve districts and conservation districts. The Downstate Forest Preserve District Act of 1918 set up these districts. Four counties in our region (Champaign, Macon, Piatt and Vermilion) have these districts in place. County owned land is typically dominated by multi-use facilities but also have several protected areas with varying degrees of development. These four county agencies have thousands of acres of landholdings with a variety of stewardship opportunities in a number of habitat types.

### Park District Lands

Between 1893 and 1911, three acts were passed through which the majority of park districts in Illinois were formed. Commonly referred to as the Pleasure Driveway and Park Districts Act, the Submerged Land Act, and the Township Park Districts Act, Illinois legislation creating park districts did not necessarily create them for the protection of natural areas. However, Illinois park districts have become a role model for incorporating natural areas into municipal parks. Several older and important natural areas fall within park district ownership in our region. Early on, and in response to citizen urging, the Urbana Park District began offering environmental education programs and became involved in natural areas management. Today, a growing number of park districts in our region are beginning to restore natural areas and set aside some park land for restoration. These areas are typically open to volunteer stewardship.

### Private Ownership

As mentioned above, some designated natural areas fall under private. By ‘private ownership,’ we usually

collectively refer to all lands owned by private individuals, estates, trusts, corporations and non-governmental entities (private foundation or not-for-profit organizations); however, for the purpose of this manual not-for-profits are discussed separately below. In some cases, the private landowner seeks out special designation for his or her land as a Nature Preserve or Land and Water Reserve. The Illinois Nature Preserves Commission and landowner together choose the most appropriate designation for lands that qualify. These designations have criteria that must be met and upheld to receive and maintain the designation. The landowner retains ownership of the land but voluntarily restricts future uses of the land to preserve natural conditions.

Another option for private landowners is working with a land organization to put part of their property into a conservation easement. There are a number of options available for conservation easements and several public and not-for-profit agencies that can help establish easements on private land. This typically entails hiring legal counsel to make sure the landowner’s wishes are documented in perpetuity.

Remember that private land does not need to be a designated a natural area in order for it to be worthy of protection and management. There are many acres of privately owned land in east central Illinois in need of stewardship despite not having some sort of designation.

### Not-for-profit and Non-governmental ownership

Another kind of private ownership that welcomes volunteer efforts is land held by not-for-profit agencies. There are very few not-for-profit landowners in our region. Some well known NFP land trusts are Grand Prairie Friends (GPF), Parklands Foundation, Friends of the Sangamon Valley, Friends of the Kankakee, Land Conservation Foundation, and The Nature Conservancy (TNC) of Illinois. GPF owns several parcels of land, but they also help steward many other tracts throughout east central Illinois. The Nature Conservancy of Illinois is a very fluid land owner. For years, it has purchased natural areas when possible with the idea that the lands would eventually be leased to or donated to other local land management agencies. Although The Nature Conservancy of Illinois does not directly manage very much land in our area, it does have strong partnerships with land management agencies stewarding the land. Some areas originally protected by TNC

and then switched ownership include Patton Woods in Champaign County, Loda Cemetery Prairie Nature Preserve in Iroquois County and several acres of land around Prairie Ridge State Natural Area to name just a few. Additionally, Illinois Audubon has purchased and protected many acres around Prairie Ridge.

Appendix three (Conservation Agencies) lists local stewardship-based agencies and groups. Getting involved with these groups is a great way to get to know about the natural areas near you. Tours, workdays, and presentations by stewards are the easiest way to learn about the importance or uniqueness of an area.

Our natural areas need protection and stewardship no matter if they are a fraction of an acre or several hundred acres. In many cases, volunteer stewards are the first line of defense in the protection of critical habitat. The reasons to protect and steward our natural areas can be as simple as keeping areas for their aesthetic beauty or to maintain the systems that purify our air and water. For some, there is no better reason to steward these areas than to make sure they are intact for future generations.

## Challenges to Natural Areas

Illinois is often referred to as the prairie state, and while this designation is especially appropriate in East Central Illinois, where much of the area was once part of the Grand Prairie, our region has also historically been host to a variety of other valued ecological systems. Prairie groves and savannas were once abundant around our major stream and river systems. These same river and stream systems were also intricately linked to an abundance of wetlands—bottomland forests, wet prairies, sedge meadows and marshes. Given our region's prized agricultural heritage, it is both a blessing and a curse that the prairie, which once provided vast habitat, has come to provide some of the world's most valuable agricultural soils. As the agricultural heritage of our region grew, the prairies of our area gave way to the plow to such an extent that now only a few remnants of this once vast prairie system remain. Similarly, wetlands were tilled and drained to make way for agricultural productivity and development. Woodlands and riparian areas became favored locations for settlement. Trees fell for lumber and fuel.

Very little of the historic landscape of East Central Illinois remains today. What does remain protected is highly fragmented and patchy, increasingly prone to

disturbance from competing and adjacent land uses. The previously common notion, that once protected, nature would take care of itself with no help needed from people, has unfortunately proved not to be the case. Lands left alone have continued to degrade. As conversion to agriculture, settlement, and development occurred in East Central Illinois, restorative ecosystem processes critical to natural areas' health, such as periodic burns, were halted.

Natural water cycles were drastically altered. These changes have had a profound impact on the prairie, woodland, savanna and wetland species that evolved with and were dependent upon these processes. In addition, people, sometimes intentionally but often unintentionally, introduced new species from other continents to the land. These new species directly compete with existing ecological communities for resources. Today, land managers understand that preserving the biological diversity and ecological health of natural lands will occur only under active management. Similarly, there are increasing efforts to restore, recreate, and manage a wide array of diverse and healthy habitats.

As volunteer stewards who value the diversity of these natural systems, we are fortunate that citizens and biologists before us have taken note of the changes occurring on our natural lands. We realize that removing invasive species, performing prescribed burns and restoring the natural hydrology are necessary for the long-term survival of ecosystems. Today, we continue on in this legacy of stewardship as volunteer stewards, adopting natural areas to care for and working with land management organizations to preserve the natural history of our region.

## History of Volunteer Stewardship in East Central Illinois

Volunteer natural area stewards who care for the natural areas of East Central Illinois provide valuable services. In addition to providing much needed assistance in the management of these areas, they act as ambassadors for natural resource protection throughout East Central Illinois. For the purposes of this manual, the East Central Illinois region is being defined as the twenty-three eastern most counties in the central part of the state.

Volunteer stewards are the eyes and ears for many of our area's land management organizations, keeping careful watch over our region's valuable land resources.

The partnering organizations working to produce this manual have long histories of working with volunteer natural area stewards and hope this manual serves to further their legacies of stewardship in East Central Illinois.

The Champaign County Forest Preserve District (CCFPD) has benefited mightily from the services of volunteer stewards, perhaps most notably at Buffalo Trace Prairie, where stewards have been instrumental in restoring ever-increasing prairie acreage. Since 2000, Buffalo Trace natural area stewards have been progressively expanding the acreage under their oversight at this 276-acre property. More recently, the CCFPD has developed a trail stewardship program, which, with its focus on trails maintenance, has grown to cover invasive species removal from the CCFPD's expansive network of trails.

Grand Prairie Friends (GPF), founded in 1984, is an all-volunteer organization that actively stewards about forty different natural areas, mostly high quality remnants and a few prairie reconstructions. In addition to natural areas under their ownership, GPF membership and interns are involved in stewardship at other natural areas, where they assist area agencies and individuals in their separate restoration efforts. Late each winter, GPF hosts a volunteer stewardship luncheon where area volunteer stewards join together to share successes and challenges at their respective natural areas, learning from one another about how best to protect our region's strongholds of natural history and biological diversity. The luncheon is additionally an opportunity for area stewards to come together and enjoy the camaraderie typical of natural areas volunteerism.

The Urbana Park District (UPD) has four signature natural areas under its oversight, all of which benefit from some level of volunteer stewardship. Beginning with Champaign County Audubon assisted restoration efforts at Meadowbrook Park in 1977 and continuing through the VSN initiated management of Busey Woods in 1991, the legacy of volunteer stewardship carries on as the UPD continues to work with volunteers at its two most recent additions—the Perkins Road site wetlands and Weaver Park's woodlands and wetlands.

In addition to partnering on the development of this manual, all three of these organizations are active in the East Central Illinois Master Naturalist (ECIMN) program, which the CCFPD and the UPD sponsor along with the University of Illinois Extension.

Grand Prairie Friends is an active partner with these agencies, all of whom work closely with ECIMN trainees and certified Master Naturalists as they engage in volunteer service in support of our region's natural resources.

Several other agencies and organizations are active in the stewardship of East Central Illinois natural areas. They include, but are not limited to, the The Nature Conservancy, Illinois Department of Natural Resources, Illinois Nature Preserves Commission, Vermilion County Conservation District, Macon County Conservation District, Piatt County Forest Preserve District, Allerton Allies, and the Embarras Valley Stewards. It is hoped that many of these organizations will additionally benefit from the use of this manual. Appendix three, Conservation Agencies, provides additional information on these and many other area conservation groups and agencies.



**Figure 1.2:** “Prairie dock silhouette at Meadowbrook Park

## Chapter 2

# Overall Guidelines / Policies for Volunteer Stewards

### Role of Stewards

Volunteer stewards have been actively maintaining the health of our ecosystems for over thirty years. Currently, volunteers are working with a multitude of land owners and land management organizations, assisting with the control of invasive species, conducting scientific monitoring, collecting trash, collecting and dispersing seed, and carrying out prescribed burns. On any given weekend, one is likely to find a volunteer workday taking place at one of our region's many natural areas. Additionally, individual volunteer stewards are working independently or alongside co-stewards to care for natural areas as opportunities and management needs present themselves throughout the year.

Many East Central Illinois land management organizations support a volunteer stewardship program through which they engage volunteer stewards to work in their natural areas. Coming from all walks of life, volunteers ensure that our region's ecosystems remain a healthy legacy for generations to come. Volunteers are trained in the use of best management practices to carry out their activities. Stewards and volunteers also play a critical role in informing their community about the importance of ecological management and our natural resources. They can also act as the on-the-ground watchdogs for their respective land management organizations on what is happening at a local level in the field. Their experiences with both success and failure can be used for region-wide decision making regarding the management of our natural areas.

Volunteering as a natural areas steward can have a lasting benefit in one's life. Volunteer natural areas stewards can reconnect to natural lands in ways no casual visitor could possibly imagine. Natural areas stewards also become connected to a larger community of other stewards who care about natural lands and the

plants and animals depending upon them, all the while enjoying the ever-changing seasonality of nature.

### General qualifications and responsibilities

The following describes the general guidelines and qualifications for becoming a volunteer steward. Please note that the specific requirements are discussed in depth later in this manual. In addition, many of the land management organizations for which a volunteer steward can adopt a site have specific requirements beyond those described in this manual.

Volunteer and Volunteer Apprentice Stewards typically have a primary contact with whom they coordinate their activities. The volunteer steward's primary contact will share information relevant to the steward's activities with other pertinent individuals or departments within the land management organization.

Volunteer Stewards are recognized by their respective land management organization as the stewardship leaders for their specific natural areas. Volunteer Stewards adopt individual natural areas, which they visit regularly, assisting in the development of a management schedule, providing regular reports on their activities and observations, and acting as liaisons with other volunteers in helping to implement the management goals for the natural area. In addition, many stewards lead workdays and coordinate volunteer activities at their natural areas, including brush clearing, cleanups, planting, seed collection, and invasive plant control.

Apprentice stewards are stewards in training. Apprentice stewards work with experienced



stewards and land managers to learn restoration techniques and to build identification skills for the flora and fauna under their stewardship. Apprentice stewards are encouraged to work with one or more volunteer stewards who have significant experience and expertise in the realm of restoration for at least one year before taking on independent or co-stewardship of a natural area. Apprentice stewards with considerable existing field experience may shorten this commitment or become a volunteer steward outright.

Certain ecological management activities may be restricted under the guidelines of the volunteer steward's respective land management organization. Others may be permitted to occur only with the supervision of specific individuals or after a steward has completed further advanced training. Chainsaw use and prescribed burning are examples of activities that may be restricted. Stewards should check with their land management organizations to see what policies exist for such activities.

### **Volunteer Steward**

#### **Responsibilities:**

- assist with management schedule and management plan development
- clearly present the goals of land management practices to other volunteers and visitors to the natural area
- regularly make assessment visits to the natural area
- immediately report inappropriate uses of the natural area to landowner, or other authorities when appropriate
- schedule and supervise volunteer workdays
- promote volunteerism at the natural area
- orient new volunteers to the natural area
- communicate to volunteers the safety requirements set forth in the Volunteer Stewardship Manual and enforce compliance
- start workdays with a training/education session on the work to be performed
- report volunteer hours and activities on a regular basis

#### **Skills and Abilities:**

- assume a leadership role
- portray an enthusiastic and respectful attitude toward nature and people
- engage with volunteers and the public in a friendly, effective and tactful manner
- identify key plants and plant communities, as well as significant animals and animal communities
- work outdoors in a wide variety of weather conditions
- organize information and volunteers
- address safety concerns

#### **Requirements:**

- attend appropriate workshops and training sessions, including land management organization orientations
- maintain current Illinois Pesticide Applicator license if needed for site
- possess credentials that identify you as a volunteer steward while performing stewardship
- receive power equipment training before using any such equipment
- receive appropriate prescribed burn training before participation on burn crew
- understand and commit to the safety precautions in the East Central Illinois Stewardship Manual

### **Volunteer Apprentice Steward**

#### **Responsibilities:**

- assist volunteer stewards with management schedule and management plan development
- assist stewards with assessment visits to their natural area
- assist with the supervision of volunteer workdays
- assist with ensuring volunteers comply with the safety requirements set forth in the East Central Illinois Stewardship Manual.
- assist in starting workdays with a training/education session on the work to be performed

- assist in reporting volunteer hours and activities

#### **Skills and Abilities:**

- assume a leadership role
- portray an enthusiastic and respectful attitude toward nature and people
- engage with volunteers and public in a friendly, effective and tactful manner
- interest in learning to identify key plants and plant communities, as well as significant animals and animal communities
- work outdoors in a wide variety of weather conditions
- organize information and volunteers
- address safety concerns

#### **Requirements:**

- attend appropriate workshops and training sessions, including land management organization orientations
- maintain current Illinois Pesticide Applicator license if needed for natural area
- possess credentials that identify you as a volunteer steward while performing stewardship
- receive power equipment training before using any such equipment
- receive appropriate prescribed burn training before participation on burn crew
- understand and commit to the safety precautions in the East Central Illinois Stewardship Manual

### **Volunteer Trail Steward**

A Volunteer Trail Steward is very different from a Volunteer Steward. Where a Volunteer Steward cares

for the larger ecological health of a natural area, a Trail Steward aids a natural area by focusing on making the trails safe and pleasant. Although the focus of this manual is on natural areas stewardship, this description of the position of Volunteer Trail Steward is provided to inform Volunteer Stewards of other volunteer positions that may aid in their efforts. Trail Steward projects may include pruning back overhanging limbs, clearing branches and debris from trails after storms, removing invasive plants, posting signs as needed and approved, and participating in litter control.

#### **Responsibilities:**

- make regular assessment visits (every three to four weeks) to the trail
- immediately report inappropriate uses of the natural area to the landowner or to other authorities when appropriate
- complete any required reports as mandated by land management organization

#### **Skills and Abilities:**

- portray an enthusiastic and respectful attitude toward nature and people
- engage with public in a friendly, effective and tactful manner
- be outdoors in a wide variety of weather conditions
- recognize safety concerns

#### **Requirements:**

- attendance at appropriate workshops and training sessions, including land management organization orientations
- one year commitment
- possession of credentials that identify you as a volunteer trail steward while performing stewardship



## Chapter 3

# Understanding Your Natural Area

### Ecological Basis for Stewardship

The natural landscape of central Illinois has been degraded and diminished by almost two hundred years of intensive human use. Row-crop agriculture, roads, houses and other urban development have replaced the once vast acreage of prairie, woodland and wetland. We learned, almost too late, that valuable natural resources are not inexhaustible. Fortunately, many of us value nature and work to understand, protect and conserve our natural resources.

Natural areas in east-central Illinois tend to be small, isolated, degraded fragments of a once larger, interconnected ecosystem. These are places on the landscape where the forces of time and nature, rather than the forces of modern human culture, have shaped the land, flora and fauna. Because natural areas are small and degraded, protection of prairie, woodland and wetland natural area remnants is important, and active management becomes vital when these lands are disconnected from natural processes like fire that once sustained and shaped the plant and animal communities. Even recreated natural areas, like planted prairies, tend to suffer from this same disconnection.

How do we know what to manage, how to manage or even when to manage remnant or recreated natural areas? We can recognize and learn about the native fauna and flora based on our own observations and the past work of scientists, professional and amateur, who have made their life's work or life's passion documenting and describing what was originally present and what currently exists on the land. We also gain a great deal of understanding regarding the complexity of the natural world through the discipline of ecology.

**Ecology** is the science by which we study how organisms (animals, plants and microbes) interact in and with the natural world. The word *ecology* is taken

from the Greek *oikos*, literally meaning “house,” but now meaning our immediate environment. If we desire to manage organisms and their environment, we must understand how organisms live and interact with the natural world. Functioning natural systems can break down under certain stresses (i.e. fragmentation, altered hydrology, lack of pollinators). Ecological principles offer guidelines for the preservation of biodiversity and the management of the environment for sustained use.

From the scientific discipline of ecology come two interrelated subfields—conservation biology and restoration ecology. Conservation biology generally focuses on protecting and perpetuating particular organisms or manipulating and managing habitat for specific species of plants or animals. Restoration ecology usually takes a wider approach. The Society for Restoration Ecology defines its purpose this way: “...intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability.”

Based on our understanding of ecosystems and ecological processes, most small, isolated natural areas won't persist in the desired condition without some sort of intervention. We sometimes simply know that “nature is out of balance.” As natural area stewards, our desire is to manage and mimic natural conditions to the best of our knowledge. Leaving our prairie, wetland, savanna and forest sites alone is no longer an option in these natural areas.

Most of our Illinois wetlands have some sort of hydrologic disturbance, that is, too much or too little water, pollution, excess sediment, and so on. Many natural areas are invaded by non-native plant species that can alter ecosystem structure. For example, bush honeysuckle decreases light falling on the forest floor, thus “squeezing out” a diverse assemblage of native

plant species. Soil disturbance, mowing and pesticide drift at the edges of natural areas degrade the natural condition.

Once we recognize what is out of balance, we can take actions to modify or halt these negative forces. This often involves trying to enhance processes to increase biodiversity and limit factors that would decrease biodiversity.

Essentially, what we do as stewards is manipulate components or processes within a system to try to achieve a desired outcome. We learn to recognize damage to an ecosystem and try to return the ecosystem to a state that is better than what existed prior to stewardship—ideally to a condition that is structurally and functionally similar to its natural state.

This “natural state” might be based on historic information or existing examples of similar community types. Based on ecological research and a thorough knowledge of the natural history of an organism or a system, we devise a course of action: for example, remove unwanted plants from a prairie remnant, reintroduce desirable species into a forest, put meanders back into a straightened stream or manipulate how water flows through a marsh.

Restoration ecology also concerns itself with the practice of recreating systems; planting prairie seed into a field that had been used for agriculture or moving and shaping earth to direct water to create a marsh are examples of restoration ecology. Unfortunately, many attempts at recreating prairie or marsh haven’t been able to fully replicate native prairie or wetland remnants. Some components and processes of these recreations (e.g. habitat for wildlife like birds or flood water storage) can be achieved, but mimicking a fully functioning natural system is difficult. Patient, consistent efforts over time, by researchers and stewards alike, are essential in the effort to restore these ecosystem components.

Even with these challenges, recreating even a portion of the diversity typical of high quality natural areas on lands that would otherwise support significantly less diversity can reap major benefits. Recreated and restored systems alike provide benefits in terms of water and air quality, habitat improvement and opportunities for environmental education. Together, the restoration and maintenance of diversity within our recreated and remnant systems preserve some of the natural character

of our landscape that has been lost through the conversion of our region’s natural history to otherwise less diverse landscapes.

Within this manual, it is not feasible or practical to go into every detail of what we know about restoration ecology. Entire books and journals are devoted to understanding the ecological basis of stewardship! Suffice it to say, when confronted with a question of how or why, there are many resources available for reference, including resource professionals within the Illinois Natural History Survey, the Illinois Department of Natural Resources, the Urbana Park District, the Champaign County Forest Preserve District, Grand Prairie Friends and other agencies and not-for-profit groups.

## **Understanding the History and Ecology**

Prior to starting any ecological management work, it is essential to understand the natural history and ecology of the natural area, and from this understanding, make choices about what type of stewardship is necessary for promoting ecological health and returning the site to a sustainable and maintainable condition. Subsequently, this knowledge enables the steward to develop a plan for achieving goals for the natural area. This manual’s partners have adopted the use of the VSN Management Schedule for the purpose of volunteer steward management planning, although there maybe other management plans specific to the stewardship site’s land management organization. (The development of Management Schedules is covered in the Restoration and Planning section.) Information to gather and consider prior to beginning any ecological management at a natural area includes:

- identify existing plant community types
- locate or find out what invasive species are present
- locate or find out if there are any rare plants or animals present
- obtain information about the natural area’s pre-settlement vegetation (if available and desired)
- determine existing soils types
- learn about the current and original hydrology

Ecological management activities and priorities should be based on an assessment of the existing plant and animal community or communities at the natural area. For example, is the site a wetland, woodland or prairie? Are rare animals or plants present? Answering these questions will largely drive any ecological management work performed. After this initial information is gathered, make sure to consult with local experts, and if available, obtain a copy of any prior or existing management plans developed for the natural area as this will provide useful supplemental information about the site.

If rare, threatened, or endangered plants or animals are present, protecting and maintaining these populations will be a high priority. If a natural area is severely degraded, removing invasive plant species and deciding how then to reintroduce native plants will drive the site's management.

If the original remnant plant community is absent and it is not apparent what type of habitat originally occurred, the steward can examine any existing historical record if there is a desire to return the site to some pre-determined historic condition.

Documenting the historical record includes getting a copy of the Public Land Survey Records for the site as well as available information on the soil types. This will help determine if the site can be restored and managed as a certain type of habitat. Alternatively, it may be that conditions have been altered to a degree that historic conditions are no longer feasible or desirable as a restoration goal. Rather, it may be a more reasonable goal to restore the system to a more sustainable state under its current landscape conditions.

Setting management goals to accomplish tasks for the natural area and monitoring progress towards these goals will provide a baseline for the work to be done. Attainable goals are critical to keep volunteers (and even stewards!) motivated.

For further discussion on these concepts, please refer to the Restoration Planning and Reporting section, later within this manual.

### Archaeology

It is vital that you, and all stewards, maintain an awareness of both the natural and cultural features of the area for which they have accepted management responsibilities. In Illinois, archaeological materials

as old as several thousand years often can be found at or near the surface of the ground. There are more than 50,000 recorded archaeological sites in Illinois, but it is unlikely that all of them have been recorded and therefore it is possible one or more undiscovered sites exist in your natural area. As you walk over your area, *be aware* of the possibility of finding relics of the past. Naturally occurring changes, such as erosion, may reveal items of importance, so be on the lookout for them. Every place has the potential to contain archaeological material. Know that some information may be contained in the existing site plan or should be included in the development of a site plan for your natural area. Artifacts or features from the prehistoric period (before about 1673) may be present as well as items related to historic period activity, such as fragments of brick,

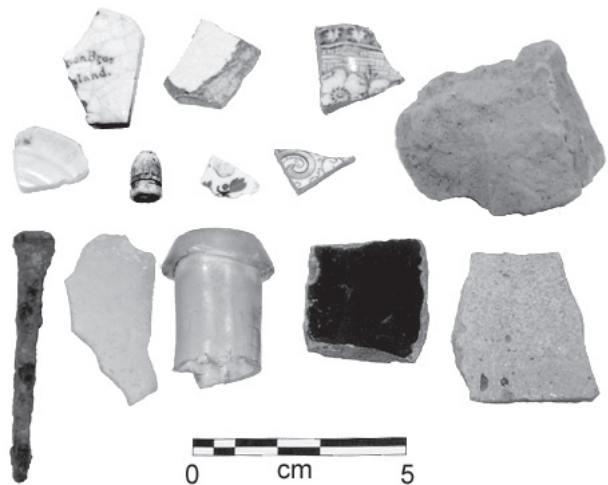


Figure 3.1: Historic Artifacts

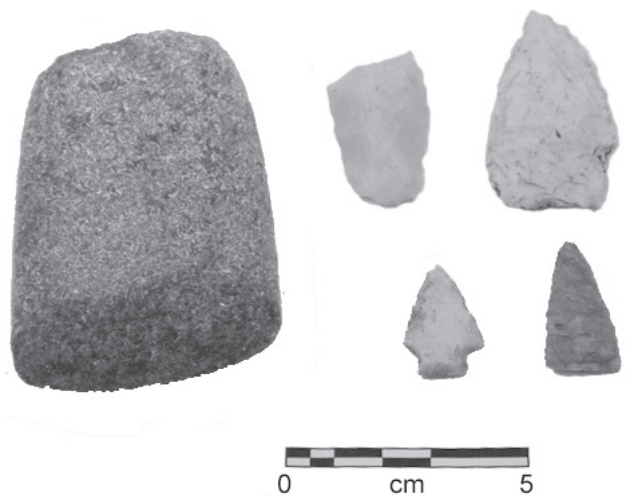


Figure 3.2: Stone Artifacts

ceramics, glass and metal. (Figures 3.1 and 3.2)

You are not expected to be or to become an archaeologist but you should *be aware* of the importance of archaeology on your site. You should be on the lookout for signs of human activity, such as sherds of clay pottery, flint (chert) tools or chips from their making, mounds, buried fire places, and similar signs of earlier human habitation. Finding standing structures or the remains of standing structures is not very likely, but it is possible. You should make your volunteer helpers aware of the possible archaeological features so they watch for indications of prior life, too. (Figures 3.3 and 3.4)

Your site may contain one or more cemeteries, graveyards or burial grounds. If so, make sure they are treated in ways that will not desecrate them. In all likelihood these special sites are already known and any special requirements may be cited on the site plan.

Make note of the conditions of grave markers, boundary fences, etc., and ask the landowner or manager to assist you in getting specialized assistance for dealing with them. Often these places will not look like the manicured, well-kept cemeteries we are accustomed to today; to the extent possible they should be maintained the way they would have looked in their own period. Remember, these burial places may be culturally significant to many. Respect both places and people!

You and other volunteer participants should not disturb possible archaeological items; even one artifact (made or used by man) can be an archaeological site. Do not collect the artifacts or other evidence. Accurately mark on a map (a USGS topographical map or an aerial photo is preferred) so specialists can find the spot without undue difficulty.

Please note some areas may have further protection of their archaeological materials. For example, many conservation and nature preserve districts contain museums and have ordinances for keeping, storing and displaying artifacts found on their lands. You should report the finding, in writing, to the land manager and be available to assist archaeologists in returning to the site.

You should not attempt to determine if the archaeological site is a significant site. A professional archaeologist should make that determination.

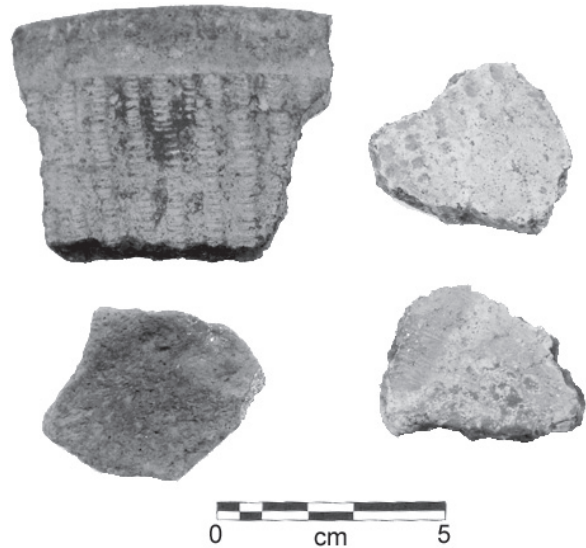


Figure 3.3: Sherds

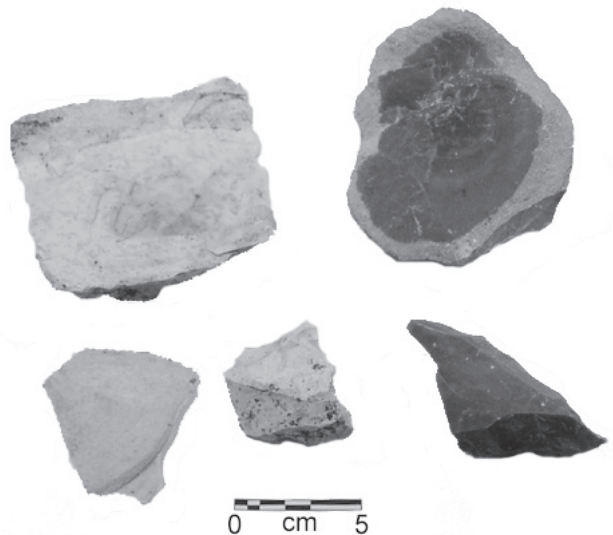


Figure 3.4: Chert

If your interest in the cultures of Illinois leads you to further reading, *Discover Illinois Archaeology* will provide much information on the depth and variety of Illinois cultures that may lie beneath your feet.

### Stormwater and Hydrology

Urbanization and development can dramatically alter the natural hydrologic cycle of an area. Understanding the impact of altered hydrology is crucial to management work at a site. (Figure 3.5) The hard work of stewards, volunteers and land management agencies in a natural area may prove ineffective if hydrological

problems are not identified and addressed. If hydrology issues cannot be addressed or restored to some natural regime, a different management goal may be necessary for the site (e.g. deep marsh instead of sedge meadow).

Development and the addition of buildings and roads have dramatically increased the area of land impermeable to rainfall and runoff. This can result in large volumes of water, often referred to as stormwater, being piped to waterways or into natural areas. When this results in dramatic change to an area's hydrology, many species are not able to withstand the change in water conditions. The water can also cause significant erosion, resulting in the formation of gullies that wash away the topsoil and essential nutrients required for plant growth and survival.

Stormwater often contains a suite of pollutants that negatively impacts natural areas. These include but are not limited to sediment, nutrients, metals, salts, petroleum products, and everyday trash. Solutions to this problem include piping the water around the natural areas and / or installing devices to slow down and clean water entering the land so as to minimize damage. Existing stormwater inputs and infrastructure can be retrofitted with these same devices in order to improve stormwater quality and slow its delivery. (Figures 3.6 and 3.7:)

While stormwater is often thought of as waste product for which the primary goal is further movement downstream, increased flooding and worsening water conditions down watershed have led to recent advances



**Figure 3.5:** Stormwater pipes can deliver surges of water that is typically polluted to impacted natural areas

**Figures 3.6 and 3.7:** Naturalized stormwater basins help cleanse stormwater before it is released into streams and rivers



in stormwater treatments in which the water is perceived as more of an amenity. Rain gardens, small sunken gardens that collect water from impervious surfaces and support wetland-associated wildflowers, sedges, and grasses, recently have grown in popularity.

Additionally, traditional detention and retention basins are being designed with more gentle embankments and are then being planted with native vegetation. The stormwater inputs to these basins are often delivered through a stormwater “treatment train” that consists of naturalized swales and pocket wetlands. The resulting water quality is often clean enough to support threatened and endangered fish species, as well as provide wetland habitat for wetland associated birds, dragonflies, butterflies, and more.

Another impact of altered hydrology can be too little water rather than too much. Former wetlands that were drained for agricultural purposes are no

longer functional wetlands. Much like the stormwater designed wetlands, these former drained wetlands historically acted much as kidneys for the land, removing pollutants and slowing the delivery of water through the watershed. Options for restoring the hydrology may include disabling drain tiles that are lowering the water table in formerly agricultural lands, re-meandering streams, or getting stormwater outlet pipes relocated.

In all of these examples, the goal is typically to slow the delivery or release of water so the land is more typical of the pre-development hydro-period. By slowing the flow of water, erosion is minimized, so there are fewer rapid changes in stream and river flows, resulting in a decrease in extreme flooding and less disturbance to the land overall. A reduction in disturbance to these ecosystems creates a natural system that is better able to withstand invasive species and provides a more diverse habitat.

## Chapter 4 Methods of Work

### Management of Invasive Plant Species

Weeds, invasive species, exotic pests, ecological invaders ... no matter what you call them, where they came from, or how you choose to define them, weeds are here to stay. The majority of the serious weeds in East Central Illinois are from other temperate ecosystems around the world. Some weeds are native, of course, but ecologically “weedy,” e.g., Canada goldenrod (*Solidago canadensis*) or gray dogwood (*Cornus racemosa*).

A few species are native to other areas of North America and have become naturalized in Illinois, such as Osage orange (*Maclura pomifera*). Many of the plants which natural area stewards battle were deliberately introduced to this country for economic purposes, including agriculture, horticulture, soil stabilization, medicine, or herb gardens.

Many of our current invasive nightmares are plants that were purposely brought to North America; for example, garlic mustard (*Alliaria petiolata*) was brought by European settlers for use in cooking and medicine, autumn olive (*Elaeagnus umbellata*) was brought and widely planted as an ornamental and as wildlife food and habitat, and kudzu (*Pueraria lobata*) was brought for erosion control and animal fodder.

Many species known to be ecologically invasive are still promoted and sold for landscape or ornamental use; the aforesaid autumn olive and the bush honeysuckles (*Lonicera* spp.) are examples of this. (Figure 4.1) Other weeds arrived here by accident in the solid ballast of ships, as contaminants in imported materials, or as “stowaways” on ships, trains, trucks, and planes.

#### Native vs. Non-native Species

Every species — plant, animal, fungus and bacteria — has a native range or home where its life has



**Figure 4.1:** Volunteer Steward leads other volunteers in removing invasive honeysuckle

been shaped by the natural forces of climate, moisture, storms, fire, soils, and species interactions. Over thousands of years these natural guidelines, in addition to other physical and biological factors, have determined species habitat and distribution. A native species is one living in a given area as a result of these processes without the direct or indirect assistance of human beings.

An organism is considered non-native when it lives outside its historically endemic range because humans have transported it there. Although many non-native species are currently found in the United States, most non-natives pose no threat to natural ecosystems. Only

certain species earn the name Invasive Pest or Invasive Exotic.

### Invasive Plants

Invasive species are one of the most critical problems facing our natural communities. In fact, nearly half the species currently listed under the Endangered Species Act are threatened by invasive species, and invasives are now considered the second most serious threat to biological diversity after habitat destruction.

Many invasive plants do not provide adequate food or habitat for native birds and other animals. Thus, a region once might have been home to a variety of native communities, each with its own native vegetation and associated creatures, but might now support only a few species because an invasive species has taken hold.

Alternatively, some invasive shrubs, such as buckthorns (*Rhamnus* spp.) and bush honeysuckles, provide a ready supply of food, good cover and attractive nesting sites. Unfortunately, these invasives displace native plants and make bird nests more vulnerable to predation. Since these two shrubs leaf out earlier in spring than native plants, birds take advantage of the early nesting sites, again increasing vulnerability. There has been recent evidence that, although these species provide a food source, the source is not as good for the animal and may cause problems with animal nutrition and physiology.

Invaders often arrived in North America without the natural predators with which they evolved. Because of this, in a new environment, invasives grow and spread unchecked. A wetland invaded by reed canary grass (*Phalaris arundinacea*) or non-native cattail (*Typha angustifolia*) will appear as a forest of tall swaying grass or a stout stand of brown spikes, respectively, leaving little room for other species. Invasive species frequently interrupt the natural processes that would occur in a natural area. Even when the invasive species is removed, desirable species may not be able to return due to the altered nutrient status, salinity, or pH of the soil; the presence of chemicals which interfere with germination or growth; or a large seed bank from the weed.

When they dominate natural areas, invasive species of all kinds (plant, animal, or pathogen) can interfere with ecological management goals. They are costly to remove or control, and aggressive invaders can thwart restoration efforts. Invasive species can permanently

change the character of natural communities in several ways. The most pervasive change is a disruption of ecological processes, such as natural fire frequency, sedimentation rates or nutrient cycling.

In addition, invasives can alter the area's physical structure, such as the herbaceous ground cover, shrub layer or tree canopy. They might change the composition of a given layer (for example, garlic mustard may exclude native wildflowers), or replace one with another (in eastern forests, bush honeysuckle can replace the wildflowers, sedges and ferns with a dense shrub thicket). Invasive species typically displace native plant and animal species by several methods, often by modifying the availability of food, cover, and nesting sites. Sometimes they hybridize with closely related native species.

Invasive exotics share many characteristics which define them as "invasive": rapid growth and maturity, growth earlier or later than native species, prolific seed production, highly successful seed dispersal with a high rate of germination and colonization, and vigorous vegetative spread through roots or rhizomes. Using these characteristics to their advantage, invasive pest plants are able to out-compete native plant species for space and resources. Since they are out of their native habitat, natural biological controls, such as insects and disease, are not present to keep their populations in check. Thus they expand at unnatural rates, using more than their share of the resources and shading out native plants. Organisms depending on native plants for food and shelter are left with a less than satisfactory, and often useless, alternative. Thus, all levels of an ecosystem are affected. The negative impact of invasive species on biological diversity has reached such an extent that some scientists now think it is second only to direct habitat destruction.

Invasive species have been both intentionally and accidentally transported beyond their natural ranges. Some examples of intentional movement include the introduction and cultivation of species such as autumn olive and purple loosestrife (*Lythrum salicaria*). Some accidental transports are the Chestnut Blight (*Cryphonectria parasitica*), which is believed to have arrived on imported Asian chestnut trees and the Balsam Woolly Adelgid (*Adelges piceae*), which hitched a ride with balsam firs from England. The detrimental effects of these two exotic pests continue to be felt across the USA.

## Invasive Grasses

A word needs to be said about invasive grasses. As monocots, they have characteristics unlike their dicot (broad-leaved) relatives. These differences need to be understood for effective control. Dicots grow from the tops of their stems and top-cutting usually leads to greater branching. Grasses grow from the base of the stem and cutting does not result in branching, but instead reduces their ability to produce and store energy. Seed production in grasses is generally quite high. Many grasses also spread through extensive rhizome systems (horizontal, underground stems that produce aerial shoots). Rhizomatous grasses, also called sod grasses, are quite different in growth habit from bunch, or tuft, grasses, which grow primarily from tillers (side shoots produced in auxiliary buds near the ground level) and form clumps of stems.

Several factors may give invasive grasses a competitive edge. There are two distinct photosynthetic pathways that occur in different plants. Warm season grasses, as well as many plants which thrive in hot, bright environments such as the tropics, use a type of photosynthesis that is more efficient at fixing carbon dioxide while conserving water. Plant physiologists know this as the  $C_4$  pathway.

Cool season grasses get a quick start in the spring, flower early, and go dormant by late summer. This is called the  $C_3$  pathway. Warm season grasses need longer days and higher soil temperature to germinate and reproduce. They also conserve water better than their cool season counterparts. Either type of plant can invade a natural area, and both native and invasive plants may be  $C_3$  or  $C_4$  plants. For non-native grasses, the lack of predators and pathogens from their native range also give them an advantage in new habitats.

Controlling invasive grasses works best when you understand how all these characteristics enable grasses to be so successful. Since grasses grow from the base of the stem, they can survive grazing and fires. Dense sod grasses can prevent other seeds from germinating. Burning usually favors warm season grasses since the elimination of leaf litter allows the soils to warm faster. Frequent cutting, or cutting when the flower stalks start to elongate, can reduce the plant's ability to store energy. Several seasons of intensive mowing or grazing may reduce populations of rhizomatous grasses.

Reeds are large, perennial members of the grass family. *Phragmites australis*, known as common reed, is a common and tenacious invasive plant that threatens other native wetland plants. It has been used in the southern U.S. as an ornamental and for erosion control. It establishes itself in disturbed wet areas and spreads through extensive rhizome systems. Dense stands of common reed are common near oil and gas wells, because phragmites thrives in the brines that are a byproduct of drilling.

The combination of cool and warm season invaders in the same natural area presents challenges and concerns. The proper timing of control can be tricky. Elimination by hand pulling is time consuming and may not work for some species. Selective spraying is effective in most cases, but some plants are not as susceptible to herbicides as others. Spraying also has the potential disadvantage of eliminating the species you are trying to protect. It can hamper the growth of warm season plants by eliminating organisms that decompose plant litter.

## Influence of Disturbance

Invasive species are known to occur when areas have been disturbed. Much like a successional species, invasive species are able to quickly take hold following a disturbance that opens the way for new species establishment. The difference is that successional species give way and allow less weedy species to establish and succeed. Invasive species do not. They persist following disturbance and prevent further species establishment and thereby the development of a diverse array of species.

We often see an invasion of exotic or weedy species following roads, trails, construction areas, abandoned lands, grazing pastures or other areas highly influenced by human activities. Invasive species, however, can also take advantage of natural disturbances such as floods, deer trails, or tree falls, and become established. This correlation between the presence of invasive species and both human and natural disturbance can give us clues as to where and when to look for new invasions.

Being vigilant and catching new invasions when the first invader arrives allows us to remove a handful of invaders before they become a fully established and very costly to remove colony.

## Invasive Species in Natural Areas

At one time, we thought it was sufficient to allow Nature to take care of herself—the “if it’s growing, it’s good” approach to land management. But as settlement continues, lands left alone start to degrade. Original natural processes, such as fire, are halted, and water cycles are drastically altered. These changes have had a profound impact on prairie, woodland, savanna and wetland species that have evolved and are dependent upon these processes.

Today, we understand that preserving biological diversity and maintaining the ecological health of natural lands will occur only under active management. A healthy, well-managed eco-system will resist invasion. Therefore, long-term control of problem species depends on restoring the natural processes that originally maintained the system—removing invasive species, performing prescribed burns and restoring the natural hydrology.

### “Exotic” does not equal “Invasive”

There’s a lot of attention being paid by the government, the media and private organizations, to the issue of invasives. Often exotic plants are cast as the epitome of evil, the wreckers of our precious ecosystems. But of all the exotics in the U.S., very few are invasive. Invasive species biologists often refer to the 10% rule: 10% of exotics establish of which 10% spread of which 10% go on to become invasive. This calculates to 0.1% of all exotics become invasive. The problem, though, is, it is difficult to predict which species will be the next big invasive.

In addition, there are a number of native species that are opportunistic and aggressive when the fundamental ecology of a system is thrown off balance. Once balance is restored, these plants cease to be a problem.

It is these exotic invasives and aggressive native plants that we target.

## Control of Invasive Species

Control of invasive species is a never-ending job, like house cleaning or maintenance on the car. Some invasive species can be kept under control by restoring natural regimens such as fire. Control methods will vary depending upon the site’s habitat type and level of threat. In some cases, herbicide applications will be necessary and should be used in combination with mechanical control and prescribed fire.

Control methods for trees and shrubs typically involve stem cutting using loppers, hand saws or chain-saws. Most invasive trees and shrubs will re-sprout if herbicides are not used and these re-sprouts will have to be treated numerous times over many years before the plant’s food reserves are depleted. Herbaceous plants can often be controlled by hand pulling, as long as the plants’ density is relatively low and the spread is not extensive. In some instances, when an invasive plant is very widespread and where impacts to non-target species are minimal, the use of foliar herbicide spraying may be a better option.

Biocontrol methods are available for a very few invasive species, such as purple loosestrife, where a beetle can be introduced that feeds primarily on this plant and does not harm the greater plant community.

The most important issue in developing an invasive species control strategy is correct identification of the target plant. It’s very important to pay attention to the details of identification. Many different plant species share common physical traits, so we rely upon a unique set of identifying characteristics for each species. Most of the time, the plants we wish to eliminate are growing among plants we wish to preserve, so we must walk lightly among them and choose the timing and methods of control wisely.

You probably have your own favorite field guides for plant identification. Mohlenbrock, Newcomb, and others are often the go-to resources for volunteer stewards wanting to identify a plant. Certain identifying characteristics are listed in the Invasive Plant Control chart and in the Illinois Nature Preserve Commission’s *Vegetation Management Manual*, included on a disk in your notebook. You may find additional resources among the books listed in Appendix 4, Stewardship Resources. Additionally, Appendix 5, Control of Common Invasive Plants, provides a compiled chart of control methods for many of East Central Illinois’ most common invasive plants.

There are many approaches to invasive species control. Our main methods are mechanical or physical, chemical (herbicides), incendiary (fire), or biological control management techniques.

### Mechanical Control

Mechanical control is the physical removal or killing of the plant, using tools, machines or elbow grease. This works most easily on annuals and biennials.

Occasionally, perennials can be controlled manually, although the long-lived root systems of perennials make them particularly hard to remove.

Hand pulling biennial garlic mustard or bush honeysuckle seedlings is effective. Small trees and mature shrubs are harder to control manually, since they often resprout from the portions of the root system left behind in the soil following pulling.

Repeated cutting and mowing can be effective methods for some perennials and biennials, particularly when mowing is performed at peak bloom and before seed maturity. This is especially true of sweet clover.

*Girdling* is a technique to kill trees without herbicides. The principle behind girdling is to cut the phloem (inner bark) but leave the xylem (sapwood) intact. When this technique is used, the roots will continue nourishing the top, but the top will be unable to send nutrients back down to the roots. Over time, the individual will gradually die from process similar to starvation.

Girdling is easiest and most effective in spring when new growth and the flush of nutrients makes separation of the bark from the sapwood much easier. Girdling during this season also prevents the root system from transporting or receiving nutrients that would be produced during the growing season. After girdling, the tree will take a year or two to fade out. Leaves will stay green and look healthy, but there will gradually be fewer of them. Treating the girdle region with herbicide will often speed the tree's death.

How to girdle a tree:

First survey the area around the tree to see if the girdled tree may fall onto a trail, roadway or structure. Trees girdled close to these areas need to be measured to make sure they do not fall into heavy use areas. If trees or shrubs pose a hazard, it is better to remove them completely. (Figure 4.2)

Using an ax, saw, or tree girdler tool, surround the trunk with two parallel cuts about 3 inches apart. These cuts should be just a bit deeper than the cambium layer. To determine where the cambium is, make two lines of sample cuts to start a girdle. Then whack the bark between them sharply with the back of your ax. After a couple of whacks, you'll notice that the outer bark and the phloem tend to pop off in one piece, leaving a smooth area where they separated from the wood of the trunk.

The cambium, which is too thin to see with the naked eye, is the layer between the bark and the wood. When you know approximately how thick the bark is, make your initial parallel cuts just that deep.

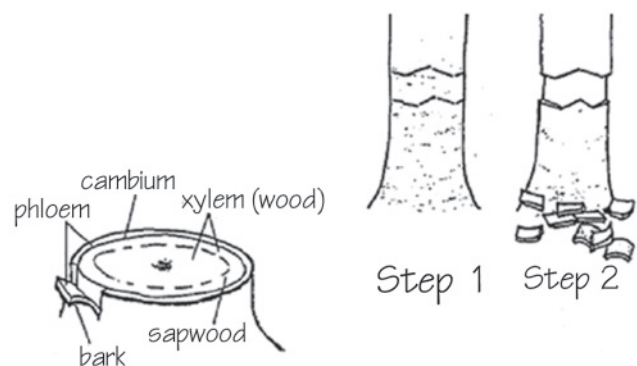
Using a blunt object, knock out the bark and phloem from between the cuts. Girdling performed near or at ground level will help limit suckering from below the girdle.

What to do with the tree? Dead standing trees, often referred to as snags, are a natural and picturesque feature of most landscapes. Additionally, there is an abundance of wildlife, many of which are cavity-nesting species, which depend upon snag habitat. But unless your goal is to maintain some standing structure such as in a savanna, live or dead standing trees should be evaluated for removal. They can serve as perches or roosting sites for birds that carry the seeds of exotic plants or aggressive native species. Dead trees may also scorch the prairie when a fire occurs.

### Herbicides and Chemical Control

The use of herbicides has become a recognized and widely accepted management tool, but only a licensed applicator or operator should initiate their use after critical consideration of the effects and with the approval of the landowner or manager. Herbicides are typically preferred when other control methods are prohibitively expensive or could cause more unintended damage than the herbicide itself or when the weed causes more damage than the herbicide.

Natural or mechanical methods of controlling exotic and invasive plant species (i.e., prescribed burning, mowing, cutting, or hand removal) are preferable to chemical control. Control of exotic species and



**Figure 4.2:** Illustration of tree girdling technique

invasive or opportunistic native species with herbicides should occur only when these other methods have been proven, or are known to be, ineffective or impractical.

The control method chosen often will depend on practical considerations and may include a combination of natural, mechanical and herbicide, the Integrated Pest Management approach.

### **Important considerations in the use of herbicides**

Never use herbicides unnecessarily. Most herbicides are used to control exotic or aggressive plants and/or to counter vegetative succession, such as woody plant invasion in a prairie.

In addition to considering restoration of ecological forces, consider other non-herbicide control methods when available. Mowing, cutting and/or girdling are effective controls for many plant problems. For example, multiple cutting during a growing season will kill smooth sumac and the mowing of sweet clover can prevent seed set. The final method chosen may include a combination of natural, mechanical and herbicide approaches.

Herbicides are often unnecessary to kill unwanted conifers in the Midwest. Small cedar and pine trees are easily killed with fire and large or small specimens are easily killed if cut below the lowest leafy branch

Use herbicides only when appropriate. For example, if woody stems are cut to reclaim an area where succession has replaced a desired grassland community with unwanted woody vegetation, apply herbicides to the stumps of sprout-prone species immediately after cutting unless fuel for fire or other ecological controls are adequate for follow-up maintenance. Clearing brush without adequate follow-up is often a waste of precious management resources.

Use of herbicide and timing of application should be as selective as possible for the target species. The objective is to kill the problem plant without injury to other plants or animals. Some herbicides are designed specifically to control either broadleaf (dicot) or grassleaf (monocot) plants. Others will kill herbs but not woody plants. These characteristics make it possible, for example, to select a herbicide for control of broadleaved herbs, such as sweet clover in a prairie. Since much prairie vegetation is composed of grasses (monocots), any accidental herbicide drift will not kill

them. However, caution in application would be required because chemical drift or accidental spray could kill native broadleaved prairie forbs.

Many exotic plants have annual cycles of dormancy different than our native vegetation. For this reason, many exotic species continue growing when our native plants go dormant for the winter and lose their leaves. These functional “evergreens” frequently are vulnerable to foliar herbicide application in late autumn and early spring when few, if any, native plants are vulnerable to foliar spray because of their lack of leaves. Thus, one can selectively kill the target species. Roundup is one herbicide that can be translocated by leafy plants and effectively kills many species of exotics in late fall.

On large stems, specific control of target species can be achieved by direct trunk application. Options include herbicide injection with specific injector tools, bark application with the appropriate carrier, frilling the trunk with an axe and applying herbicide in the frill, and cutting the stem and applying herbicide to the stump. Some herbicides that are non-selective when foliar sprayed can be injected directly safely into the target species.

Herbicide solutions are prepared according to the manufacturer’s label instructions. Concentrations are not to exceed manufacturer’s recommendations. Dye markers are useful to track sprayed plants. Always apply herbicide to the smallest area necessary for control. Do not spray adjacent plants or areas unnecessarily, and beware of overspray and drift. If a non-persistent herbicide will kill the target species effectively, it is preferred over a more persistent chemical. Once the decision to use a specific herbicide and application technique is made, keep in mind your goal of effective control of target species with minimum impact on other species in the ecosystem.

Apply herbicides safely. Follow all personal and public safety precautions and environmental requirements. It’s not only smart — it’s the law.

Through careful and well thought out herbicide application, a steward can restore and maintain a natural area with considerably less herbicide than is typically used to maintain many of other widely accepted landscapes of similar scale. The amount of herbicide used to maintain ten acres of ball fields or a ten acre-golf course is typically much more than the amount used in a ten-acre natural area. Furthermore, natural areas are

expected to require less herbicide over time as effective stewardship progressively directs them towards a more stable and diverse state.

### Herbicide Use – General

Always read herbicide labels and strictly follow the regulations as described on the herbicide label.

Wear protective clothing when mixing and applying herbicide. Personal protective equipment (PPE) should conform to label requirements. Restricted use herbicides are only to be applied by State of Illinois Licensed Pesticide Applicators and Operators.

Check with the property owner and/or manager for specific, local requirements. Informational signs may be required. Material Safety Data Sheets (MSDS) should be reviewed prior to spraying. If one is not available, MSDS for many products can be accessed on the web at [www.msdsonline.com](http://www.msdsonline.com).

Use the lowest concentration of solution that is effective and preferentially select herbicides that degrade and break down quickly.

Effective herbicide application can often be enhanced by the addition of penetrants, adjuvants, stickers, or spreaders. These are chemicals that allow for improved herbicide distribution and/or plant contact and thereby enhance herbicide activity. They are especially useful for some specialty herbicides such as Rodeo and Transline.

All bottles should be well labeled with the name of the herbicide and its concentration. It should be absolutely clear that the bottle contains or has contained a herbicide. This includes all containers and sprayers or applicators used for taking smaller quantities into the field.

### Methods of Herbicide Application

#### Herbaceous Plant Control

1. Spot-spraying (sprayer or squeeze bottle) — preferred method since it will minimize impact such as overspray exposure to adjacent plants in natural areas. Spot spraying is the focused application of herbicide in one spot, typically to one plant, to control that species while minimizing damage to surrounding vegetation. Typically a backpack sprayer or a hand held sprayer is used in this sort of application.

2. Foliar Application (to intact, green leaves) — Typically, a more extensive application than spot

spraying, foliar applications can be accomplished by broadcast spraying with a compression sprayer or more selectively by using a wick applicator (wiping the application onto leaves manually). Foliar applications are typically made in heavier infestations, sometime monocultures, of invasive native plant species (i.e., smooth brome fields or reed canary grass) in combination with other control methods (i.e., fire, hand pulling) or where other control methods are not successful. Foliar application should be employed, however, only after determining no threatened, endangered, or rare species are present within the target area. Foliar application should be used with great caution because this type of application can easily harm non-target species. (Figure 4.3)

Although foliar treatments are often most effective when applied to fully developed plant foliage during late spring or early summer (approximately late May through July), this timing is accompanied by great vulnerability of non-target species. Consequently, herbicide application during this time should be primarily used in degraded or buffer areas and should be avoided in high quality areas. During late autumn after a frost,



**Figure 4.3:** Compression backpack sprayers are often used by stewards for foliar applications to invasive species



or in early spring when most native vegetation is dormant, foliar application can be used when necessary in high-quality natural areas.

Late autumn foliar spray can be used to control exotic plants that retain green leaves in autumn, after most native vegetation has dropped its leaves. Thorough foliar coverage is necessary for control, but plants should not be sprayed to the point of runoff.

Take precautions against particle drift from the spray by not spraying when wind velocity is greater than 5 mph, by using low pressure, and by using large orifice nozzles. Do not use foliar application if damage to non-target species is probable.

The effectiveness of most foliar treatments will be reduced if rainfall occurs on the day of treatment. Check the treatment label for this information. Foliar treatments should be used only to control brush, brush-sized trees and herbaceous plants. Large trees should be treated by another method to improve control and reduce drift potential.

### Woody Plant Control

1. Cut surface application — more effective than basal-bark applications on woody stems greater than 5" in diameter or on thick-barked species. Diluted or undiluted herbicide is applied to the stump of a freshly cut plant or to frills or notches cut around the plant to a depth of at least 1" into the sapwood.

Make sure the bark, cambium, and sapwood are treated; these are the conducting tissues that will be affected. Water based herbicide should be applied to the cut surface immediately, before the exposed plant tissue dries. Oil based herbicides can be applied well after cutting. On larger trees [greater than 6" diameter at breast height (dbh)] girdling the tree trunk with a chain saw and applying herbicide to the cut surface is very effective.

Herbicide can be applied to a cut-surface with compression sprayer, spray bottle, wick-type applicator or brush. Extra care must be taken with brush application because an open container is necessary.

2. Basal bark application — useful in selectively controlling undesirable woody species, and treatment can be done during the dormant season when nearby herbaceous plants will not be harmed. Two basal bark application methods are recommended; conventional basal bark and thin line basal bark.

2A. Conventional basal bark application requires mixing the herbicide with a carrier (usually a vegetable based basal oil such as JLB oil) and applying the mixture to the base of the tree or shrubs stems from the ground up to about 12 to 15". Old or rough bark requires more spray than does young or smooth bark. Thorough coverage all around the stem is important, but it is recommended to stop just short of noticeable runoff. Garlon 4 or an equivalent is the herbicide typically used in basal bark treatment.

2B. Thin-line basal bark application offers a preferred alternative to conventional basal bark application. It requires applying a pencil-point thin line of full-strength or minimally diluted, bark-penetrating herbicide all around the basal parts of trees or brush. Because a relatively small amount of herbicide is used, potential damage to non-target species is reduced, and fewer refills are required. Care is still important when using the thin-line application, as it will still produce a 4 inch wide wet zone.

3. Other Methods — on large woody stems (i.e., trees greater than 4" dbh), injecting an appropriate herbicide directly into the stem with specialized injector equipment is an option for specifically controlling a target species. Traditional tree injectors are expensive and difficult to use, especially on hardwood trees; it is difficult to control the amount of herbicide injected and injectors work poorly in cold weather. A new product, the EZ Ject lancet, while still expensive, is much easier and effective to use. It delivers a pre-measured cartridge of herbicide into the bark of the target species. These are an increasing popular approach to woody control.

In most stewardship applications, aerial and/or soil application is not recommended.

### Safety and Herbicide Application

If one is using foliar application, make sure the weather conditions are favorable (low winds and no rain) and the near term forecast is for dry weather. Never apply herbicide any closer to standing water than the distance specified on the label. When applying herbicide at locations with standing water, the applicator is required to have an aquatic herbicide license and should only use aquatic-use labeled herbicides.

Let the pressure out of sprayers before storing. If using brushes to apply herbicide to stumps, foam

brushes are more controllable (less drip, better placement) and should be favored over bristle brushes.

Plants should not be sprayed to the point of runoff; this can harm non-target species. Frequently a brush application is preferred. Dye may be added to the herbicide so the applicator can keep track of application and others are aware that work has been done in the area.

Herbicide applicators should be properly fitted with Personal Protective Equipment recommended on the label. Arrange work parties so volunteers do not have contact with herbicide applicators or locations where chemicals have been applied. Be familiar with safety precautions associated with use of a specific chemical. This could include taking steps to provide water for rinsing chemical drift from the eyes, for rinsing exposed skin, or for giving antidotes should the chemical be accidentally swallowed — a concern that arises when inappropriately using unmarked bottles (see Transportation and Storage).

### **Transportation and Storage**

Herbicides should be stored in accordance with the label, and containers used to transport or apply the herbicide should be kept closed and properly labeled. This includes *all* containers used for storage or transport. We're all too aware of the temptation of transferring herbicides into unmarked spray bottles. Over time, the herbicide applicator may forget the formulation or even the type of herbicide in the bottle. And, of course, no one else knows what is in the bottle.

Herbicide must be transported in closed, properly labeled containers in a closed trunk or truck bed with a topper. It should not be transported in the passenger or back seat. For long-term storage, herbicide must be stored in a heavy plastic container. Milk jugs and other thin plastic will break down under long term storage and should never be used.

### **Disposal**

All containers that once had herbicide in them must be triple rinsed before disposal. Check label for additional disposal instructions.

### **Obtaining a Pesticide License**

To obtain a license for applying herbicide one must be certified by the Illinois Department of Agriculture. Classes are typically offered in the winter of each year and last all day. Independent training and certifica-

tion are available year round. Training manuals and workbooks may be purchased from the University of Illinois Extension.

**Operator License:** To be certified as an Operator (a person who uses herbicides and is sponsored by a licensed Applicator), volunteers must pass the General Standards Test.

**Applicator License:** To be certified an Applicator (the person in a group who is responsible for all operators with regard to the use of herbicides), volunteers must pass both the General Standards test and one or more category exams. Recommended exams for categories are Right-of-Way, Forest, and Aquatic pest control.

Volunteers are encouraged to get the Applicator License so they can work independently. You will need photo ID and a calculator for the testing session. Bringing lunch is also recommended.

Certified Applicators will find Appendix 6, Commonly Used Herbicides, a useful chart of the most frequently used herbicides in the stewardship of natural areas.

### **Use of Prescribed Fire**

This section on the use of prescribed fire does not constitute training and should not be considered a substitute for formal training in the prescribed use of fire. Rather, it is provided to give stewards background information on prescribed burning. Stewards are encouraged to contact their land management organizations about opportunities for formal prescribed fire training.

Fire is a natural process upon which a most of our native ecosystems have depended for thousands of years. Fire can be necessary to prompt the germination of many native plants, including a number of rare and endangered species. It also prevents the invasion of woody species.

Periodic, prescribed burns increase the height, abundance, and vigor of many prairie, savanna, and woodland species while also increasing available nutrients, removing plant litter and stimulating seed production. Fire is a vital ecological process that has since been removed from much of the landscape. As such, reintroducing the process of fire through prescribed burning is a critical management tool in Midwest ecosystems.

Invasive species have not developed under the same fire regimens and therefore may be at a disadvantage when fire is applied. This makes fire an effective method for controlling invasive species as well as for restoring native plant populations. For example, prescribed burns shorten the growing season for many non-native or cool-season plants that originated in the meadows of Europe. Bluegrass, quack grass, and brome grass are cool-season plants that can be serious weeds in prairies. These grasses are usually dormant during summer; studies have shown that warm soil causes the roots of some cool-season grasses to stop growing. As a result, the same fire that encourages warm-season plants discourages cool-season invaders by advancing the onset of warm soil temperatures. Fire also may induce water stress on drier prairies; and because prairie plants are better adapted to drought, they compete favorably with the meadow plants of Europe. Finally, a prairie burn in late April or early May is liable to burn off 3 to 8 inches of growth on the cool season plants before prairie plants have started growing.

Many animals, including some relatively rare species, use or depend on fire-dependent habitats and benefit from the application of prescribed fire. Short-eared owls, northern harriers, and grasshopper sparrows depend on the open character of grasslands for hunting and nesting. Voles depend upon grasslands for fuel. Through the use of prescribed burning, stewards promote the habitat upon which these animals depend to survive.

Prescribed burning is a tool used to help maintain natural processes. Prescription burning, where appropriate, helps restore soil fertility through nutrient recycling, increases light to promote understory growth, controls aggressive species, and enhances seed germination. The timing and amount of burning prescribed depends upon various factors including habitat type, extent of invasive species spread, and fuel loads.

Burns are designed to progress as predictably as possible, and crews are watchful for changing conditions. Prescribed fire is demanding work — lots of heat, flame, smoke, and potentially rugged terrain. The critical elements that distinguish a prescribed burn — and keep it from becoming a wildfire — are thorough planning before the burn, adequate equipment and personnel, and proper environmental conditions at the time of the burn.

## Environmental Conditions

Relative humidity — the quantity of water vapor actually in the air compared to the maximum possible quantity for a given temperature — is one of the main determinants of how fast and hot a fire will burn. A relative humidity between 25% and 60% is typically appropriate for a controlled fire. Humidity less than 20% is hazardous and humidity greater than 70% can prevent a fire from starting or may even extinguish a small fire. Relative humidity is usually highest in early morning and late evening when the air is coolest and is lowest mid-afternoon.

Temperature and relative humidity are closely associated. The rate of spread of fire increases exponentially between 70°F and 80°F. Above 80 degrees, prescribed burns are generally considered too hazardous.

Wind is most beneficial for prescribed burns when it is in the moderate range, typically from about 5 to 15 mph. Steadiness of the wind is perhaps a more important factor than windspeed; shifting or gusty winds can easily lead to control problems. Winds dictate how the fire will be ignited and held. Management of smoke from a prescribed burn is important when there are sensitive areas such as schools, hospitals, or major roads near the burn site.

Rain on burn day will probably mean postponement, but rain a day or two before may not hamper and may actually improve conditions on the planned day of a burn. Lightly dampened natural fuels can dry quickly if weather clears after the rain, and flammability of overly dry materials may be reduced to a manageable level in response to a light soaking. The fuels that carry the fire, called one-hour fuels, are usually grass, herbs or leaf litter, all of which respond rapidly to changes in relative humidity and temperature.

The life cycles of desirable native species, undesirable invasive species, and resident animals must be considered with regard to the timing and frequency of burns. Prescribed burning is both a science and a skill requiring an understanding of the interaction between weather, fire behavior, plant fuel types, and plant ecology.

## Preparations

Permitting — Open Burn Permits should be applied for from the Illinois Environmental Protection Agency

(IEPA) several months ahead of time. These permits must be renewed annually.

**Notification** — Several weeks before any planned burn, notify the local fire department to explain plans for the burn, obtain any necessary waivers and/or permits, and notify neighbors to give them fair warning about the impending burn, assuring them the fire will be closely managed.

**Monitoring Weather Forecasts** — Extended forecasts can help decide when to begin site preparations. Unfortunately, proper weather conditions for the actual burn cannot be predicted more than a few hours in advance; weather forecasts need to be checked the night before the scheduled burn and again on the morning of the burn.

It is especially important to be aware of passing fronts if a burn is planned or in progress. NOAA now has an hourly weather graph feature giving an estimate of what certain important factors will be throughout the day. You can see what the low humidity will be at 2:00 pm or if the winds will change direction and at what time: <http://forecast.weather.gov/MapClick.php?CityName=Le+Roy&state=IL&site=ILX&textField1=40.3416&textField2=-88.7647&FcstType=graphical>

**Preparing Firebreaks if Necessary** — A firebreak is anything that will stop a fire and contain it in a controlled area. Streams, roads and plowed fields can serve as firebreaks. Some firebreaks or potential firebreaks, such as mowed paths, must be maintained year round. Others, such as “blacklines” (pre-burned strips of land) must be prepared shortly before the burn.

The preparation of blacklines can be extremely tricky. It requires not only an experienced crew leader but also, in the case of large burn units, a crew of several people and several days time. In addition to black lines, the burn unit should be searched for trash or wildlife use. Leaves or high grasses should be cleared from around trees to be saved or around dead trees that are prone to catch fire.

**Contacting Pertinent Agencies Again on Day of Fire** — On the day of the burn, contact appropriate agencies, typically 911’s non-emergency line and the local fire department, providing them with a contact number for the person responsible for the burn. Any nearby smoke-sensitive populations or individuals should likewise be notified.

## **Day of the Burn**

The Burn Leader is responsible for coordinating and implementing the burn prescription and all burn crewmembers must know who that person is. Plans should show the nearest sources of emergency assistance, water and telephones. They should also address other safety concerns such as drift of smoke and proximity of the burn to private property and vehicles.

The Burn Leader should brief all volunteers about the areas to be burned and what volunteer responsibilities will be. If necessary, small demonstrations should be given about the use of various fire tools. Volunteers should be warned of the risks associated with prescribed burning.

The Burn Leader should insure that all volunteers are appropriately dressed. Leather shoes, long pants and long sleeved shirts made of natural fiber are required. Volunteers without appropriate clothing may not take part in a burn unless they are needed for support well away from the flames.

Prescribed burns can require strenuous physical effort. Carefully match assignments with the health and fitness level of each individual. People must be reminded that personal safety is of utmost importance.

**Starting and Spreading the Fire** — The Burn Leader will choose from one of several preplanned strategies, depending largely on wind directions. The designated igniters will start the fire in the place designated and spread lines of fire along the edges and within the burn area. Igniters use the wind, topography and different ignition patterns to direct fire behavior — the length, intensity, and rate of advance of flames — to desired levels and are always under the direction of the Burn Leader.

**Holding** — Holding crews direct the fire along the firebreaks and watch outside the area for spot fires resulting from drifting sparks or embers. This job involves plenty of walking along the firebreaks to monitor the fire unit (within the firebreaks), lots of watching around the outside of the unit for hazardous conditions or escaped fires, and frequent exposure to smoke.

**Coping with Escaped Fires** — In the event of an escaped fire, remain calm. Recognize that every situation is different. Take direction from your Burn Boss. Do not attempt to fight the fire head on and instead ensure personal safety by seeking safe zones as identi-

fied at the pre-burn meeting and/or your prescribed burn training.

**Mopping Up** — The crew inspects the area for smoldering hot spots, especially clumps of grass, stumps and dead snags. Most smoking material along the periphery of the unit is put out or thrown up to 100 feet into the interior of the unit where it will not be a hazard. The crew uses water tanks, fire rakes, flappers, and Pulaski axes to ensure all such areas are raked, turned over or otherwise exposed and doused. (Figure 4.4) One or more crewmembers should check the site the next day to see that nothing is still smoldering.

### Factors Contributing to Hazard of a Prescribed Burn

Getting burned or having a fire escape are the two most obvious hazards of working a prescribed burn; however, there are plenty of opportunities for injuries and accidents not directly related to the flames. Smoke inhalation is one of the greatest health hazards during burns. Certain site factors can greatly increase risks associated with a burn.

**Unusual Atmospheric Conditions** — As mentioned previously, relative humidity is a principal control on the rate of burning. An unexpected, precipitous drop in relative humidity in mid- to late afternoon can make an initially tame fire extremely difficult to control. Another atmospheric complication is a temperature inversion, which can occur on a calm evening as the sun disappears over the horizon; as air near the ground cools, it can form an interface with warm air above, holding smoke near the ground.

Approaching or passing weather fronts pose particular hazards to prescribed or wild fires. Updrafts, downdrafts, and shifting or gusty winds associated with weather fronts cause fire to shift direction erratically. This usually wreaks havoc on ignition and control plans and prescribed burns should not be conducted under these conditions.

**Terrain** — Fire behavior is directly affected by the slope and aspect of the terrain. Slope acts like wind upon a fire: the steeper the slope, the faster the fire will travel uphill, just as increasing wind speed causes fires to move more quickly. Fire whirlwinds, which can carry burning material and ignite new fires outside the burn unit, can result from thermal updrafts caused by fire burning up and around hills and knolls. Areas of



**Figure 4.4:** A flapper is useful during the burn and mop up to extinguish burning material

rocks and boulders are hazardous not only because of footing problems, but also because fires in rocky areas are sometimes difficult to extinguish as fire swatters do not work well around rocks. Extra water may be needed for such areas.

**Crew Fatigue or Complacency** — The long days required for prescribed burns or the attitude that a particular prescribed burn is progressing routinely can lead to inattention to fire behavior or hazardous situations. Fatigue, heat stress, smoke inhalation, and dehydration are all factors to contend with on long, hot burns. A tired crew may not pay sufficient attention to thorough mop-up or patrol of the fire line. These are common hazards for wildfire crews, but are equally important on prescribed fires.

**Certain Types of Woody Plants and Brush** — Woody invaders are sometimes best controlled by fire, but their combustibility can be a problem. Brush, for example, is prone to produce airborne embers that can ignite new fires outside the burn unit. Loose, dry leaf litter (oak litter in particular) can blow or float across the fire line and ignite spot fires outside the area. Dead, hollow trees in the path of a fire can ignite and behave like chimneys, sending sparks vertically or even horizontally into areas beyond the controlled burn. These “chimney trees” are exceedingly difficult, if not impossible, to put out and frequently need to be cut down and then extinguished. Even some live trees

may have significant hollowed out trunks that will burn in this way. When in doubt, create a localized firebreak around any potential ‘chimney tree.’

Woody or brushy areas containing poison ivy are an additional hazard because the irritating oil from poison ivy can be suspended in smoke and inhaled or coat clothing or exposed skin.

Structures — Watch structures such as telephone poles, railroad ties, fence posts, natural gas poles, and phone boxes closely. If the fire progresses across them, they can smolder undetected for a long time. In all cases, it is good practice within areas of concern to rake back leaves and other fuels to prevent ignition.

Utility lines, utility boxes, and roads — Special precautions should be taken when burning under or near utility lines, utility boxes and roads. Be sure to rake flammable vegetation away from the base of power poles and utility boxes (you may encounter these when burning railroad prairies). Use water to wet down the power poles before burning around them. Thick smoke lifting up and around power lines has the potential to cause power lines to arc and discharge electricity to the ground. When burning near or along roads, smoke can pose a hazard to motorists and cause car accidents. When burning near roads, plan to burn under wind conditions that blow the smoke away from the road whenever possible. Post smoke warning signs along any road where smoke may blow over the road.

Thick, Matted Grass — Fires in matted grass can be difficult to extinguish because the fire can burn below the surface. Vigorous swatting with flappers can sometimes do more to spread a matted-grass fire than to put it out. If the grass is green, it can create thick, harmful smoke. An additional problem occurs in the creation of blacklines on wet matted grass: clumps of dry but unburnt grass may persist unnoticed among the blackened surroundings and may later allow the real burn to breach the blackline.

Marshy Areas — These areas are more flammable than one might think, so they cannot be treated as a firebreak. On a warm day, the tops of grass clumps are dry even though water may be standing at their bases, so a fire can spread quickly through such an area. Cattails can be especially hazardous in or near a firebreak.

### Spot Burning

Spot-burning invasive weeds with a propane torch can be cheaper and easier than carrying out a

full prescribed burn, but it is only effective when the infestation is small and burning the natural area is not recommended. Spot burning can be used to burn individual plants, groups of plants in a small area, or to ignite brush piles.

Appendix 7, Fire Control on Selected Invasive Species, provides a chart detailing the effects of fire on many of East Central Illinois’ most problematic invasive species.

### Brushpile Burning

#### Personnel & Equipment Requirements

The minimum brush pile burn crew is two people on site during periods of low fire danger.

Crew must wear heavy leather gloves and leather work boots as well as non-flammable clothing. Minimum equipment for a small brush pile burn is a long-handled fire rake, a flapper, and a filled backpack water sprayer. Other case-specific equipment may be necessary depending upon the size, location and conditions of the brush pile to be burned.

#### Brushpile Burning Protocol

- Conduct pre-burn site inspection for installed firebreaks, safety hazards and review environmental parameters.
- Obtain any required permits.
- Minimize use of accelerants.
- Attend as long as there are active flames—piles must be reduced to embers, all borders raked clear of debris and flammable materials and embers scattered within the perimeter so as to preclude flame-up before the burn crew is permitted to leave.

### Biological Controls

Exotics become invasive, in part, because they do not bring their natural, biological predators with them. Therefore, potential candidates for biological control are not native to our area either. For biological control to succeed, an agent must be found that preys exclusively on the target plant, that does not harm other species, and that will reduce the invasive plant to acceptable levels without becoming a problem itself.

Some historical attempts at biological control backfired spectacularly. In an effort to reduce future mistakes in attempting biological control, stricter criteria

for biological control research are being enacted in the U.S. The invasive exotic must show clear potential for serious harm over a large area, and alternative means of effective control must have been tried and found to be ineffective. The potential biocontrol agents are subjected to intensive investigation before they are granted USDA permits for intentional release.

Unfortunately, non-native species for commercial use are more readily approved than biocontrol agents, and inspection of imported material, which might harbor potential new invaders, is unable to keep pace with accidental introductions.

### Illinois Nature Preserve Vegetation Management Guidelines

38 non-native and native aggressive plant species are in the Illinois Nature Preserve Commission's *Vegetation Management Guidelines (VMG)*, included on a disk in your notebook. Not all of the plants listed are ones we attempt to control, but they all bear watching for signs of increasing spread in natural areas.

Specific control recommendations are given in the VMG for the following plants:

Autumn olive — *woods and prairies throughout Illinois*  
 Black locust — *woods and prairies throughout Illinois*  
 Buckthorns (glossy and common) — *natural communities throughout northern Illinois, becoming more common downstate*  
 Bush honeysuckles — *natural communities throughout Illinois*  
 Canada thistle — *disturbed areas throughout Illinois*  
 Chinese yam — *forests in southern and central Illinois*  
 Crown vetch — *prairies and dunes throughout Illinois*  
 Fescue — *disturbed areas throughout Illinois*  
 Garlic mustard — *woods throughout Illinois*  
 Gray dogwood — *throughout Illinois*  
 Honey locust — *throughout Illinois*  
 Japanese honeysuckle — *throughout Illinois*  
 Japanese hops — *throughout Illinois*  
 Japanese stiltgrass — *floodplain forests in southern Illinois*  
 Johnson grass — *river banks and abandoned fields in southern Illinois*

Kentucky bluegrass — *disturbed areas throughout Illinois*

Kudzu — *disturbed areas southern Illinois*

Leafy spurge — *prairies in northern counties*

Moneywort — *moist areas throughout Illinois*

Multiflora rose — *woods and prairies throughout Illinois*

Osage orange — *low woods and river banks throughout Illinois*

Phragmites — *water's edge, wetlands*

Purple loosestrife — *open wetlands in northern and central Illinois*

Quaking aspen — *disturbed prairies in northern Illinois*

Reed canary grass — *wet prairies and wetlands throughout Illinois*

Round-leaved bittersweet — *woods and edges throughout Illinois*

Siberian elm — *woods and prairies throughout Illinois*

Sericea lespedeza — *throughout central and southern Illinois*

Smooth brome — *sunny locations throughout Illinois*

Smooth sumac — *prairies throughout Illinois*

Spotted knapweed — *disturbed areas, dry prairies, sand communities*

Sweet clover (white and yellow) — *prairies and glades throughout Illinois*

Teasel (cut-leaved and common) — *prairies in central and northern Illinois*

Tree-of-Heaven — *disturbed areas, forests, prairies*

White mulberry — *along roadsides, woods, old fields throughout Illinois*

White poplar — *prairies throughout Illinois*

Wild parsnip — *disturbed prairies and edges throughout Illinois*

Wintercreeper (climbing euonymus) — *woods in central and southern Illinois*

Successful control of invasive species is difficult, but not impossible. It requires persistence and vigilance, but success is achievable. It is always easier when species are detected early in the invasion, before they become greater problems. In general, invasive plant control efforts should address new invasive species on a site before treating existing, established ones.

Even though the body of research regarding controlling invasive plants species in natural areas is growing, it remains miniscule compared to research published on major agricultural or aquatic pests. Pesticide manufacturers and dealers are frequently unfamiliar with the special circumstances of herbicide use in natural areas, though more is being done in this area. Stewards have resorted to inventing specialized application equipment for field use. Anecdotal information about control efforts exists, but land managers are often in the ironic predicament of not having the resources to conduct formal, scientifically rigorous experiments. Site variables such as moisture, topography, aspect, local weather conditions, application technique, light availability, and quality of habitat significantly affect the outcome of a given control method. It falls upon the shoulders of land stewards to pay close attention to their control efforts, monitor the results, and communicate with one another about their successes and failures.

## **Seed Collecting, Cleaning, and Care**

Seed collection is a vital part of an organization's ability to do large-scale restoration and reconstruction at a minimal cost. Seed collection for restoration efforts is something that anyone can do with little training, experience, or cost to the individual. There is no single book or journal that lists best practices for storing, collecting or germinating seeds found in east central Illinois, but the following information explains the basics of collecting good native plant seed for future use.

Before any seed collection begins, it is imperative to understand why you need to collect, what you need to collect, where to collect, when to collect, and how to properly care for your collection. The purpose of your seed collection should be relayed to all individuals collecting for you.

### **Why do we need to collect?**

First, the question of why to collect must be answered and agreed upon by the individuals who will ultimately use the seed. The purpose and use of the collected seed directly affects how you collect, clean, store and plant the seed. Keep the following thoughts in mind while collecting.

If the collection is for restoration purposes large quantities of seed may be needed, and when acquir-

ing large quantities of seed, it is better to collect small quantities of seed from many different locations to ensure good genetic diversity. One must also know the goals of the restoration. In many cases, restorations are planted with local ecotypes of seed. Within a species, an ecotype is a genetically unique population that is adapted to its local environment. Should this be the case, the management plan for a restoration may only allow plant collections within a certain distance of the restoration site. This ensures that true plant genotypes are maintained within a population. This is especially important if certain subspecies of plants exist within a population. Mixing of populations may bring in genetics that are not "pure" to that area and change the genetics of the subspecies. It may be further advisable to only use seed of plants that are formerly known from the area of the restoration.

If the collection is for nursery or greenhouse growth, fewer seeds may be needed, but a larger number of species may need to be collected for greater plant selection.

If the seed is intended for seed banking, long-term storage, or research, the entity requesting the collection should supply guidelines as to how the collection should be gathered.

### **What are your collection needs?**

The primary seed collection goal is to make the highest quality collection possible. It is better to collect seed from numerous sites rather than collecting many seeds from one single area. Steps to ensuring that you are making the highest quality seed collection include:

- Correctly identify each species collected. Professionals and field guides should be your first resource in correct identification. It may also be useful to mark some species early in the season when they are more recognizable in flower. Some prairie species are visible early and then seem to disappear. Marking allows you to find them after the surrounding vegetation has grown up.

If you are new to seed collection or if you have many volunteers you cannot directly oversee during collection events, encourage volunteers to take several pictures of the plant from different angles, or to include as much of the plant as possible without doing harm inside the collection container. Remind volunteers to



write on the container that a plant specimen can be found inside. Extra notes written on the collection container about the location or habitat of the plant can also be helpful in identification. Please remember that plants should not be removed during collections if there is only one plant in the area or if you are in an area where there are known threatened or endangered species.

- Collect only healthy seed. Maximum germination, seedling vigor, and longest storage life is achieved when fully ripened, current season, pest-free seed is harvested. Checking for viable seed in the field can be done very easily. Good seed is plump, it easily separates from the stem or husk, and it is typically dark in coloration (but not dark from rot). Cutting the healthy seed open should reveal a white and moist endosperm. Some prairie seed may be too small to cut open in the field, but secondary characteristics such as a firm seed coat and the absence of seed insect predators are good signs.

Be aware of wildlife behavior in the area. If you notice that rodents avoid eating tree seeds such as oaks and hickories, they are most likely non-viable. Keep a hammer or nutcracker handy to break open several seeds at the beginning of collection to check for viability. This will save you a lot of time in the field.

Also, be aware that many tree species may abort a crop of non-viable seeds early in the season for different environmental reasons. Viability of many tree seeds can be tested with a simple float test in which the seeds are dumped into a large vat of water and those that float are considered un-healthy or non-viable due to pockets of air where endosperm should be found. This will give you a general idea of the viability of the crop.

- Determining the amount of seed needed for your purpose prior to collection will save time and money. Technical documents on proper seeding rates for prairie, grasses, and tree seed for a given acreage are available through a variety of sources. A list of these sources can be found in Appendix 4, Stewardship Resources. You should never overburden a population of plants by collecting too much seed. A general rule of thumb is that no more than 50% of the seed should be collected from perennial plants and no more than 10% from annual or biennial plants.

Be aware that some collection permits from federal, state, or county agencies may limit your collection even more. Plant seed production fluctuates dramatically

in different years. Environmental constraints such as drought or frost are not the only limiting factors to seed production. If you know the seed can store well, it may be a good idea to collect larger quantities during years when seed production is high. As a very, very general rule of thumb, uncleaned prairie seed contain between 25% and 95% seed by weight. Species such as *Monarda fistulosa* that have small seeds but relatively large seed heads may fall into the 25% range, while *Ratibida* species that pull away from the stem may be 95% seed. (Figure 4.5)

### Where should you collect?

Know your collection areas and research information about the area. In east central Illinois, many collections are done on public lands, but there are access agreements or permitting processes you may have to go through before collecting from or even entering an area. Make sure that access has been granted for you and your volunteers and that all permits cover all participants. Before collection, carefully read the terms, conditions, and restrictions stated in the collection permit or access agreement. Some agencies have restrictions, limitations, and additional reporting requirements that come with their permits. In addition, other permits issued by the state, federal agencies or other cooperative agencies may need to be obtained. In short, there may be two or more permits that need to be filled out for one collection area. Work with local agencies to find out what permits may be needed.

### When should you collect?

Included in this manual is a table with regional seed maturation times, Appendix 8: Seed Collection Dates of Common Plant Species for East Central Illinois. This table is the culmination of years of field experience from many individuals who collect native plant seed from around east central Illinois. Although general timelines for seed collection are given, climate, individual variability, disease, and microclimate can affect the timing to maturity, so keep in mind peak collection days may vary by as much as two weeks or more in any given year. The best way to determine when seeds need to be collected is to keep a constant vigil on the plant prior to seed maturity. Notes on when you have collected should be compiled and re-visited each year to save time in the field. Fall cooling or freezing events will oftentimes begin or speed up seed production or release. Warmer microclimates in a town or landscaped settings



**Figure 4.5:** Purchased seed (left) is generally much cleaner than seed collected by the volunteer (right) for planting.

may push seed maturity dates back when compared with plants in a country setting. Watch and note these events to better time your collection.

Collect seeds when dry. If seeds are collected wet, make sure they are laid out to dry before putting them into a bag or storage bin. Seeds are ready to be collected when they easily pull from the plant, when they shake in the pod, or when they are turning a dark color. For the most part, herbaceous plants will be ready for seed collection three to six weeks after peak flower bloom with some notable exceptions like golden alexanders. Keep in mind there are also many herbaceous plants that may have mature seed on them while still in flower, such as spiderwort. Collecting the early seeds while not disturbing the flower will allow for a longer collection period. In contrast, shrub and tree seed is highly variable, taking up to two to three months for seed to mature.

### How do you collect, store, and clean?

When collecting seed consider negative impacts that may occur with your collection techniques. Every seed collection event should strive to be low impact on the collection site. Do as little harm as possible by following general guidelines set forth by the collection permits and managers of the land. Sensitive areas should have limitations on whom and how many individuals are allowed to collect in the area.

Consider the plant population when collecting. Determine if the seed output can tolerate collection and

at what level. Collect seed from the innermost area of patches of plants. Plants on the edge of the patch should be left alone to help the species expand outward.

At some point, the steward may be faced with the destruction of an entire area due to urbanization, agricultural expansion, or other habitat destruction. In this case collection of 100% of the seed or plants is allowed. Very little planning is typically possible in these situations, so long-term storage is usually needed. Collecting from several different plants can capture a larger genetic diversity and greater adaptability from a site. One goal to set during collections would be to have the collector harvest seed from as many different individual plants as possible while collecting fewer seeds from each plant. Collectors often find that there is one plant that produces a lot of seed or is easy to collect from because of its general location. Although it is tempting to collect from these productive areas, it is important to collect a uniform quantity of seed from many individual plants.

### Collection Methods

Collection methods vary between herbaceous and woody plants. In general, dry seeds are hand collected into paper bags, envelopes, mesh bags or bins. Moist fruit can be collected into plastic bags, bins or buckets, but be aware that they may need airflow in order not to rot (e.g. strawberries and persimmons). Some fruit or seed may mature and disperse quickly, or it may need protection from wildlife. In those instances, many species of plant can have the seed pod or fruit covered with a bag and collected passively as the fruit or seed naturally falls from the plant. This technique can also be used on plant species like prairie phlox (*Phlox pilosa*) and flowering spurge (*Euphorbia corollata*) where the seeds pop from the fruit when mature. If done correctly, there is little impact on the rest of the plant. Although most seed is collected by hand, there are other tools and techniques for seed collection discussed in the Tools section of this manual.

Chaff is all of the extraneous material that is not seed but ends up in the bag during collection. Chaff consists of fruiting and flowering parts, small stems, leaves, and dispersal mechanisms. Minimizing the amount of chaff in collection bags helps make seed cleaning easier, reduces molds and pathogens, removes insects that may harm the seed, improves the drying

process, and allows for better planting distribution through seeding machinery.

Keep in mind that there is a balance to be achieved here: quickly and efficiently collecting seed in the field may involve gathering a lot of chaff, but may increase the cleaning time. (Some practitioners /biologists believe chaff may provide valuable nutrients or micro-organisms that enhance seed germination and plant growth)

Proper labeling of the collected seed is vital. Make sure all volunteers collecting seed know that the following information should be clearly labeled on the collection container. (Figure 4.6)

1. Collection date

2. Common and scientific name if known—many species have duplicate common names and the scientific name is therefore the best descriptor.

3. Site Name. For east central Illinois this may be Lake of the Woods Forest Preserve Mahomet, Kickapoo State Park, Meadowbrook Park, etc. This is often referred to as the Provenance of the seed.

4. Area name. This is typically the name of the area collected from. Examples may include Buffalo Trace Prairie, Route 47 Prairie, Tomlinson Cemetery, or Weaver Park. The Area Name would be the smaller area within the above listed Site. This may also be recorded as latitude and longitude if the collection area does not have a name or good description. GPS units can be useful for describing such locations.

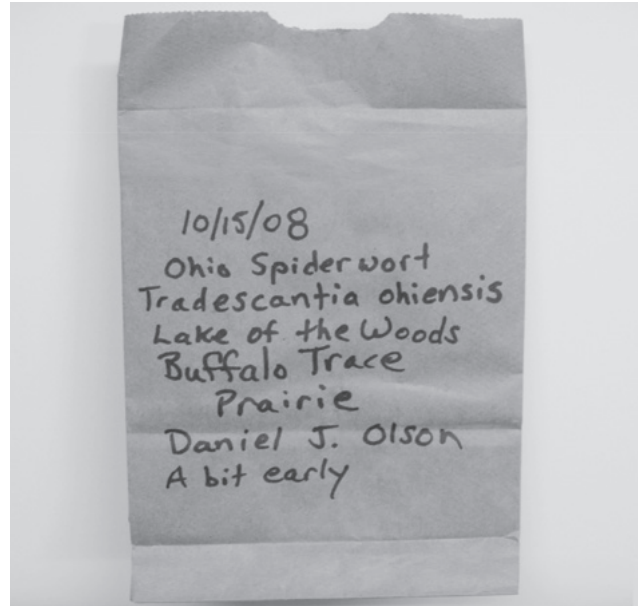
5. First and last name of individual collecting the seed.

6. Seed stage of the plants sampled. Examples may include early, ripe, or late, or good timing. This information helps in subsequent year collections.

7. Additional notes: Examples can be: “Plant specimen inside,” “Habitat type is...” and other observations or concerns.

### Storage Considerations

In order to maintain good viability, you must properly care for your collection after harvest. Moist or wet seed and fruits will ferment and mold within a couple days if they are not kept in a dry or cool area. Air circulation around the seed is important immediately after collection and during storage. This can be accomplished by keeping collections loosely packed



**Figure 4.6:** Proper labeling of seed is very important. Remember to list all components shown.

in their containers or stored in mesh bags. (Figure 4.7) Paper bags are popular storage containers for prairie seed. Be aware that paper bags can be treated with waxes and inks that make them less appealing for storage because of restricted air flow.

It is best not to store tree seeds more than a foot deep in containers as the decomposition process may begin and produce enough heat to kill off germplasm in the seed. Moist fruits are easiest to clean shortly after harvest. Constant temperature fluctuations can hurt the germination rate of any seed, so dry seed and fruits should be maintained under moderate temperatures and



**Figure 4.7:** Mesh bags are invaluable for short and medium length storage of tree seed and nuts

low relative humidity. Make sure to keep your collection protected from insects and rodents during storage. Individual species of plants may have better germination rates if you follow species-specific guidelines on storage and stratification. (Figure 4.8)

### Cleaning Seed

Cleaning seed is nothing more than separating the seed from the chaff. Most species of tree seed do not require much cleaning. For the most part caps and husks can be left on if the seed is to be direct seeded. Seed with fruit or moist husks will have to have fleshy parts removed or left to rot off the nut naturally. Husks of walnuts are best left to naturally slough off while contained within drying areas. Tree seed with multiple seeds per pod will need to be cleaned and separated for better dispersal. Most herbaceous seed cleaning is done by hand. Mesh screen racks can help in the separation process.

If you are lucky enough to own or are able to borrow a hammermill, or leaf shredder, you can make short work of seed cleaning by processing the seed through these devices. How clean to get the seed is determined by what you are going to use it for. Many restorationists only need seed cleaned to the point where all the material can pass through the device used to do the planting. Volunteer seed cleaning days can include several age groups and those with very little experience can join in. Don't be afraid to set aside some of your collection day for cleaning of seed.

### Seeding

In addition to collecting seed and clearing invasive species in preparation for seeding, volunteers are occasionally asked to plant seed. Because there are so many different aspects to consider, planting activities should be closely coordinated with the site's land management organization and the goals laid out for the land. This manual will not cover the elements of planting in detail but will encourage stewards to work with their land management organizations to coordinate seedings and plantings.

There are a variety of planting opportunities a steward can participate in. These plantings are done by hand and fall into a few categories: overseeding prairie or wetland areas with additional species, planting a recently prepared restoration site for the first time, planting tree nuts and saplings with a dibble bar, or planting prairie or wetland plugs. Such plantings often



**Figure 4.8:** Seed with fruit (such as this persimmon) can be messy to sort and store. Letting the fruit dry and then cleaning may be a better option

take many hands and make for good workday projects for a wide variety of age groups.

## Natural Area Surveillance and Monitoring

### Keeping Watch—Natural Area Surveillance

Keeping watch over a natural area is some of the most important work you can do as a steward. You are the eyes, ears and conscience for a larger community of people who care and value the natural area you steward, but who may not be able to visit very often or recognize threats. As a steward, you are familiar with the site, property boundaries and natural features. When you see or detect inappropriate or illegal activities on your site, such as mowing, timber cutting, hunting, plant poaching, vehicle trespass or garbage dumping, you can properly report these activities to the landowner or appropriate agency manager to remedy the situation.

Damage to the natural quality of the natural area from disturbances such as siltation, salt run-off and invasive species are more subtle and may be harder to detect, thus requiring more time and education. Spotting such threats may take the trained eye of an ecologist or professional land manager. Make sure to ask for help or to invite these people out to your site if you need help spotting ecological management problems, especially if you are not confident about your ability to assess potential problems.

Surveillance is fairly straightforward—visit and walk the natural area you steward on a regular basis. This is usually done monthly, but a more frequent interval, such as weekly, may be desirable, especially at certain times of the year. After a period of watching and observing the site, you'll fast become the expert for your area. Make notes or take photographs every time you visit – keep a field notebook. Walk the perimeter of the site, making note of broken fences, trash dumping, vehicular trespass, missing signs or other signs of misuse or damage. Walk the trails, if your area has any, and note potential problems.

Large natural areas may be difficult to fully inspect in one visit; you may want to invite someone else to help or you may want to concentrate on only a small portion of the site during each visit. Make notes of what works for you so you can pass that information on to other stewards.

Making notes becomes important when you are asked to report your activities. Keep a journal of your visits, observations and especially highlight things that should be reported to the landowner or agency manager. Landowners of natural areas, especially government agencies or conservation groups, will request a yearly report to keep track of management on site, including the number of volunteers and any problems that should be addressed by the landowner or management agency.

## Monitoring

Monitoring is an activity that is more involved and focused than the more general surveillance. In many instances actual data might be taken on plants or animals found at a natural area. When we manage an area, we either want to maintain the status quo or to manipulate the system to achieve some predefined target. This can be accomplished by modifying the processes that are fundamental to ecosystem structure and functioning—ecological restoration. Monitoring is defined as, the “intermittent recording of the condition of a feature of interest to detect or measure compliance with a predetermined standard.” Monitoring can inform the steward when the system is departing from the desired state, it can measure the success of management actions and it can detect the effects of perturbations and disturbances.

Stewards should work with ecologists and professional land managers to establish monitoring objec-

tives and protocols. These objectives and the protocols used to achieve them should be derived from the site management objectives. Specific questions should be developed prior to any monitoring so the information can be effectively utilized to direct management activities. A certain level of expertise or training may also be needed to correctly identify taxa and record data.

What do we monitor? Any organism of interest can be the target of a monitoring program. Frogs, butterflies, wildflowers, bees, fireflies, dragonflies or birds are some organisms of interest that can usually be identified and detected. Species can be identified and counted. Other data might include location, weather conditions, date, time of day, flowering condition, sex or any other metric of interest to the steward and researcher. Abiotic factors such as weather conditions, water levels, water flow or soil contaminants can also be part of a monitoring program.

A fairly powerful and simple way to monitor change in natural area condition over time is photomonitoring. Locations for taking photographs at a site are selected to record areas of interest. The person doing the monitoring then determines the direction to point the camera and when to take the photograph. This information should be carefully recorded. For example, you may decide to take a picture from the entrance of the preserve looking straight north on the first day of each month. This technique provides a consistent way to visually compare changes over time. You don't necessarily need to take a picture every month; even taking one picture on the same date each year will help you track changes over time.

Monitoring change over time for a specific part of the system is a good practice, but equally important is to keep track of the management activities conducted at a site. The basic who, what, where, when and why will become important in interpreting the eventual results of management as well as in interpreting data collected during monitoring. Being able to look back and see when and where a prescribed burn was conducted, how much honeysuckle was cut and sprayed or when garlic mustard was pulled will better inform future management decisions. Often landowners are more impressed when you can supply before and after photographs of work conducted on the natural area.

Please see Appendix 9, Monitoring Programs, for a description of many established monitoring programs available for evaluating your management unit. This list

is far from complete, but it does provide an introduction to the many established monitoring programs already available to a volunteer steward.



## Chapter 5

# Restoration Planning and Reporting

An effective course of action requires adequate and informed planning. In order to evaluate and plan for the restoration needs of your natural area, contact the landowner or land management organization to obtain a map, schedule a tour of the site, and formally discuss the needs of the site. Reconnoiter the natural area with map in hand so you learn the boundaries, the most ecologically valuable sections, and whether there are any major threats to the site.

Ask if there is a management plan or a list of long-term management goals for your natural area. Begin to set priorities to guide your course of work. You may also come up with suggestions to add to the management plan to submit for approval. Try to obtain any previous stewards' reports to see what work has been done.

Before you start work in natural areas, you need to think through the effects of your work on animal and plant communities. This might require consultation with other stewards or professionals with more experience. Which management methods and timing will cause the least disturbance and result in the greatest ecological benefit? This process should be repeated regularly, since your plans may need updating as work progresses or conditions change.

### Management Schedules

Management schedules are important tools stewards use to directly guide their efforts and actions. A management plan is a document, sometimes formally adopted by the site's landowner or land management organization, with actions to be taken to reach specific or general goals. A schedule is a more clearly defined list of when to take those actions. Most management activities have a biological basis and are very seasonal in nature. It's most effective to control sweet clover by mowing it when it flowers in June. You can plan for this action with a management schedule. Of course, as

a volunteer, you need to be realistic about your time and abilities to accomplish certain actions. Below are purposes of, and guidelines on, how to devise a management schedule.

#### Purposes:

- To allow for better exchange of restoration and public relations information and provide a basis for consultation with the land management organization and any other professional staff to whom you may be referred.
- To help stewards and land management organizations think comprehensively about the long- and short-term management needs of a natural area. Schedules help establish stewardship priorities and determine appropriate methods and length of time required for restoration projects.
- To put the management plan and long-term management goals, if they exist, into action.
- To provide a basis for meeting with the land management organization for an annual preserve checkup.

#### Management Schedule Guidelines

**Write out tentative restoration objectives and goals.** This is especially important if no management plan exists for your natural area. Discuss these with the land management organization. For example, if your restoration goal is to restore the plant community composition and structure to a condition similar to conditions at about the time of Euro-American settlement, then any information you can find on vegetation condition from the early 1800s will be helpful. The General Land Office surveyor maps showing pre-settlement vegetation are a good starting point. Soil survey maps might also be helpful.



**Set priorities; decide what is most urgent.** Some exotic species (see the exotic species section in this manual) are most effectively attacked in a particular month or even a particular week of the year. The Calendar of Typical Restoration Activities, Appendix 10, consists of seasonal restoration activities that may be useful in scheduling natural areas management. Determine the location of the higher quality sections of your natural area, as these should be inspected to determine whether any restoration is needed. Use a three to six month schedule for immediate work in conjunction with a more general, longer time span plan for major objectives. Update quarterly, or as needed, and be flexible, as conditions may change. Be realistic and practical about what can be accomplished in a given amount of time.

**Identify any restoration procedures requiring permits.** You can find out what these requirements are by consulting with the natural area's land management organization.

## Getting Started

**Obtain a map.** The land management organization may have maps showing vegetation management units for your preserve. If there is no vegetation map for your site, some of the resources listed in the Appendix 4 of this manual may help you divide your site into vegetation management units. You can also consult with the land management organization on this process. For the purpose of cross-referencing vegetation management units on the schedule and the map, it may be useful to give each unit a number or a symbol on the map.

**Review the Illinois Nature Preserve Commission's Vegetation Management Guidelines for Management of Illinois Nature Preserves.** The guidelines include methods of controlling many exotic and invasive weeds. Descriptions of the plants are very useful, and although some of the methods of control have changed since the guidelines were first developed, many of the guidelines have been updated to reflect current methodologies. These guidelines are included on this manual's accompanying CD.

**Refer to the Illinois Nature Preserves Commission Management Schedule Form.** As part of this manual, you will find the same form that the Illinois Nature Preserves Commission uses. Blank forms can be copied from Appendix 11, Management Schedule, or may be printed from the provided CD. The Calendar

of Typical Restoration Activities, Appendix 10, may be useful in filling out the schedule. A sample management schedule, Appendix 12, has also been included for your reference.

**Use map symbols to identify work areas.** Provide a key for symbols and acronyms. Enter these and the plant community in the left column of your schedule form. When planning for areas with Endangered, Threatened or Watch List species, list the designation along with their plant community to which it applies. Include important plant and animal habitats such as flatwoods or amphibian breeding grounds.

**Clearly state each management objective and methods to be used.** Number and list activities in chronological order. Be specific.

**Determine and list methods and equipment needed.** Detail herbicide type, method of application, areas to be treated and dates.

**List months when work will be done in the last column.** You can be more specific in terms of date if you wish.

### Submit your plan to the site's land management organization

Volunteer stewards are encouraged to submit plans as often as every quarter and at a minimum once a year. The land management organization will review these forms at least annually and should always approve any variations from the plan.

## Reporting

### Stewardship Activity Logs.

Activity Logs should be sent as soon as the workday or stewardship activity is completed. That way you don't forget to do it later! A paper copy of the log included in this manual, Appendix 13, Stewardship Activity Log and Report, may be submitted, or an electronic version can be copied into an email from the provided CD and sent to the land management organization.

In addition to submitting logs to the land management organization, stewards should keep a copy of the logs for their own records. These logs provide a useful mechanism for keeping track of your stewardship activities as well as communicating with the land management organization. Appropriate information to record includes location, quantities of any herbicides

used, any species removed or introduced, number of hours spent, weather, personnel present, effects noted of previous restoration, sightings of unusual flora or fauna, and additional offsite jobs (such as equipment or herbicide pickup, return, or maintenance, reports, planning conferences with land management organization, etc). These records become extremely valuable to subsequent stewards and land managers when you no longer steward a site.

### **Volunteer Steward Annual Report.**

Annual reports are used to summarize activities that took place on your natural area between January 1 and December 31. If you have been keeping track of work using the Stewardship Activity Logs, then filling out the annual report will be easy.

Please submit a report for your natural area by March 1<sup>st</sup>. Some organizations may have an online reporting form or other formal process that they would

like you to submit usually on an annual basis. For example, Grand Prairie Friends' annual report form can be found at the GPF website.

A copy of the annual report may be found in Appendix 14 of this manual or on the provided CD. Stewardship Activity Logs should be consulted when filling out your annual report. Additionally, you can use a copy of your management schedule and map to supplement your report. You can also use additional pages in your own format for other information, such as monitoring results or other special projects.

These reports are important to help guide the future management and conservation efforts of natural areas in east-central Illinois. The information collected on work accomplished and volunteer hours spent also helps to garner support from the public and may help secure grant money for future stewardship.



## Chapter 6

# Workday Management Techniques

### Managing Volunteers

Volunteer management often means recruiting and motivating people to feel a sense of purpose and solidarity with their fellow volunteers in the stewardship work they are doing. (Figure 6.1) As a manager, it is good to keep in mind the basic reasons people want to volunteer listed below. If a manager addresses these needs, the volunteer is more likely to stay involved over the long-term.

- Information. This is probably the single most important duty of the steward. Keep volunteers updated with organization newsletters and invitations to attend meetings and conferences.
- Success. The work should give volunteers a sense of accomplishment
- A sense of belonging. Think of the volunteers as a cohesive group. Many volunteers enjoy seeing the same core group of individuals on repeated days and working together to accomplish a goal.
- A sense of ownership. People like personal responsibility, their “own” project or their “own” site, but they want to be part of the big picture and see how their efforts are contributing to an end result, too.
- The authority to think and make decisions. People want to feel they are part of the decision-making process. Whether or not every suggestion is used isn’t nearly as important as the volunteer knowing the steward is sincerely listening.
- Obtainable goals. People want to see their efforts come to fruition. Realistic goals are important to keeping a sense of momentum



**Figure 6.1:** Why we do it – compass plant in bloom against prairie sky

and accomplishment among volunteers. They must be able to see progress.

- Purposeful, defined activity. Volunteers like to feel their efforts are accomplishing something worth their investment of time, talent and effort. They also want to know exactly what is expected: figure out in advance how much time a job requires.
- Challenges within abilities. An assignment should be challenging, but if it is totally beyond one’s abilities the person is likely to give up. Be available to give advice and to give volunteers periodic training in the tasks necessary to their assignments.

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Material adapted and adopted from the Lake County Forest Preserve District Volunteer Stewards’ Manual

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- **Confidence.** It takes patience to break in a volunteer with little experience and to build their confidence. As a steward, be confident and act confidently as a role model. The opposite may also occur when volunteers may have skills that exceed the steward's. In such cases, acknowledge their expertise and learn from them.
- **Recognition.** It takes only seconds to say, "Thanks for your help. I really appreciate it." No matter how self-effacing people appear, most appreciate a pat on the back. Think of ways to publicly thank volunteers as well. Realize that not all volunteers are going to stay. It's part of the process. But the recruitment process should be continuous.
- **Be respectful, genuine, nice, consistent, and, most importantly, have fun!**

First day experiences are the most important. Most volunteers are lost the first day of the "job," so it's important, even critical, to make new volunteers feel welcome and a part of the group.

Introduce new volunteers when they arrive. Let them know who is experienced and able to answer questions. Consider using nametags to help people learn each other's names. The buddy system is also a good way to introduce people to the group and to the natural area.

The steward can assign a specific person to take new people aside and talk about the organization and the why and what of the work being done. This allows experienced volunteers to get right to work and not have to hear the same talk every week. Similarly, an experienced volunteer or a co-steward can get experienced volunteers started on their tasks while the steward provides an introduction to new recruits.

Above all, it's important for you to speak with new people individually. Ask them how they heard about the group, how close they live to the natural area and if they have worked on a site like this before. Give special coaching if needed. Help eliminate fears or concerns the volunteer may have. New recruits should know they are not alone in their feelings. At other times, you may also schedule special, comprehensive tours of the natural area to show new volunteers the big picture. Training sessions often help volunteers grow into new jobs.

## Planning Workdays

Running a workday efficiently and smoothly takes planning and good organizational skills by the volunteer steward. Plan all workday activities in advance so they fit the larger framework of work to be done for the year. Breaking management activities into manageable tasks for each workday ensures the Annual Management Plan's goals are met and volunteers feel a sense of accomplishment for their hard work and time over the course of the year.

Stewards should be familiar with any land management organization's specific requirements for scheduling workdays, obtaining tools, burning brush piles, reporting, et cetera. Specific workday requirements for each organization and agency in east-central Illinois can be found within the appendices of this manual.

Remind existing volunteers of the upcoming workday at least five days in advance through e-mails or phone calls. Asking for an RSVP from the volunteers is essential for figuring out how many and what types of tools should be brought to the workday. New volunteers should be informed of what to expect from the experience as well as information on appropriate clothing for working, directions to the work site, and supplies, such as sunscreen and water, to bring with them.

The steward should plan in advance where and what type of tools will be needed for the upcoming workday and who will be picking them up.

### Guidelines for Group Projects

As stewards you need to ensure that youth and other groups who attend a workday—or volunteer to do a restoration project at an east-central Illinois natural area—work safely, learn about natural areas restoration, and enjoy themselves.

Below are tables including minimum age suggestions and adult-child ratios for workdays. Clearly, proper adult supervision and age-appropriate activities go hand-in-hand. These are intended to be useful guidelines that will help to match a group to a project and clarify for new groups the kind of adult supervision necessary. Each case is unique. Project supervisors may be land management agency/organization staff or members, volunteer stewards, or other volunteers. It may be helpful to suggest to group leaders that they determine when they can actually arrive at the natural

area and be ready to work, so staff and volunteers are not kept waiting unnecessarily.

**Suggested Adult-Child Ratios:**

- At least –
- 1 adult for every 10 youth aged 14-17
- 1 adult for every 5 children aged 8-13

Depending on the size of the group, previous experience with natural area restoration, and the children’s ages, the ratio may increase or decrease. *Stewards may make minor adjustments to these ratios at their discretion.* These guidelines help to ensure a safe work environment and age-appropriate supervision, under which children tend to learn more, have better hands-on learning, complete more work, pay more attention to safety rules, and have more fun.

**Minimum Age Suggestions**

*Stewards may adjust minimum age at their discretion.* These guidelines are designed to insure that children are competent and that they work safely. Work time should be adjusted to the age of the group. Younger children should not be expected to work longer than 45 minutes. Children younger than 8 usually do not have the coordination, stamina, or attention span needed to work on restoration projects. In order for them to thoroughly enjoy themselves and appreciate what they are doing, it is best to wait until they are at least eight years old.

<u>Activity</u>	<b>Suggested Minimum Age</b>
Garlic mustard pulling	8
Seed collecting	8
Planting plugs	10
Cutting brush with loppers	10
Cutting brush with bow saws	12
Roadside cleanups	12

**Day of Workday**

The following are tasks, regulations, requirements, and equipment that are vital for having a productive and successful workday.

A Sign-in Sheet for volunteers is an important item to bring to any workday. This allows the steward to calculate volunteer hours and value for work performed

at the site, while also collecting valuable contact information for re-contacting volunteers who might want to come back for the another workday. Each agency may have a volunteer sign-off sheet mandated by their insurance company. If this is the case, the sign-off sheets can act as Sign-in sheet and the information from them can be data-based for future use. A general Sign-in Sheet is provided as Appendix 15 of this manual but should not be used in lieu of the land management agency/organization specific one.

If a brush pile fire is planned, the volunteer steward must contact the local Fire and Police Departments. The call should be made before the fire is ignited. This will minimize the chance that the fire or police departments will respond unnecessarily to public reports of a fire at the site.

Most workdays are two to three hours long as this is a reasonable amount of time to accomplish work while not over taxing volunteers. Oftentimes workdays begin in the morning at 9 a.m. and for longer workdays may have a short break in the middle for a light snack and water. Working in the morning is usually preferred to avoid the heat; however, some groups meet at other times depending upon the interests of the group. Other workdays may be scheduled in the afternoon in order to enjoy the warmer afternoons during fall, winter, and spring seasons.

Schedule breaks as needed. Keep an eye out for anyone who is showing signs of fatigue, and tactfully change their activity to something less demanding, especially for newcomers. If some volunteers are not willing to take part in an activity they view as hazardous, provide another task or an opportunity for them to leave gracefully.

Give a short ecological tour at the middle or the end of the work session, if volunteers seem receptive. Volunteers should get a chance to enjoy the natural area and see what they are working for. In fact, this learning experience is why many people volunteer.

Bring extra water, insect repellent, sunscreen, work gloves, and long-sleeved shirts in case people forget. Bring snacks or treats for after work. This fellowship time allows stewards and volunteers to ask questions, get to know each other, and review the day’s accomplishments.

Volunteer stewards should take workday safety very seriously. Always know how many people are in attendance, who they are, and where they will be working. Account for all volunteers at the start and end of each workday. Make sure that volunteers, especially new ones, know how to use the tools provided appropriately and safely. Demonstrate the use of tools. Show how to use tools safely and in a manner that keeps them in good condition. Watch how tools are used and correct the volunteer's technique gently and quickly. Ask that each individual check in with you just before leaving so you know everyone is accounted for. This is especially helpful if someone is leaving early or if volunteers are spread out over a large area. Volunteers should be informed that workdays might be cancelled in the event of severe weather. When parking, remember that catalytic converters can be hot enough to ignite dry grass.

Show newcomers how to identify the plants they will be removing and be willing to repeat the information as often as necessary. Identify potential hazards before volunteers encounter them. Point out any poisonous plants to avoid. Be prepared to answer any questions about the use of herbicides.

Each stewarded area may have different restrictions on pesticide use. In Illinois, all stewards applying pesticides must be properly licensed by the Illinois Department of Agriculture. If herbicide application is to be done near a site border, use caution and coordinate any work with the site staff in advance. You should inform adjacent property owners if the herbicide application area is near sensitive plants or close to people or animals. Adjust your herbicide plans according to their concerns. It is better not to apply herbicide than to risk harming or antagonizing neighbors. The same caveat applies to brush cutting. Leave a 15-foot buffer zone at preserve boundaries.

Know the location of the nearest telephone and the safety policy of the land management agency or organization for which you are volunteering – many will provide a card containing the pertinent emergency numbers to you. Make certain you carry it! Cellular phones can provide reassurance in the field but reception and transmission should be verified for each site or area.

Cutting woody plants encompasses a substantial portion of the work done by stewards and volunteers during the year. It is the volunteer steward's responsibility to ensure volunteers are instructed in the proper and safe use of loppers and handsaws (see Chapter 8). Volunteers and stewards are typically authorized to remove invasive shrubs and trees that are six inches or less in diameter at breast height (DBH) using hand tools. The steward must also ensure that anyone using a chainsaw or other powered equipment is certified to do so in accordance with their land management agency or organization's policies. Chainsaw certified volunteers can remove trees and shrubs that are six inches DBH and larger. Stumps should be cut as nearly flush to the ground as possible to minimize tripping and the unsightly appearance of standing dead stems. All cut brush should be stacked in brush piles off of trails, not left scattered along the ground. The majority of this work is performed in the fall and winter when plants are dormant.

Currently, woody invasive plants have one of the greatest negative impacts on the ecological health of ECI natural areas. Therefore, considerable volunteer work is concentrated on woody brush removal. However, some herbaceous species are serious problems in natural areas and can be hand-pulled, cut or treated with herbicide. These species often need to be removed prior to dropping seeds and can be either removed and carried off-site in trash bags or collected and placed in a designated area where any seedlings that survive can be removed. In some instances, scythe or shears can be used for this work. Gloves may be necessary to protect hands from thorns or toxins produced by some plants. The majority of this work is performed in the spring, summer, and fall, during active growing seasons.

All woody plants removed by volunteers should be stacked in brush piles. Brush piles should be built and placed in locations that either can be left for brush pile habitat, can easily be removed by the land management agency or organization in question, or can be easily ignited without harming adjacent plants and trees. Most stewards like to stack the brush pile so stems are parallel to one another. This saves room and allows for the stack to hold more stems, which reduces the total area of soil and habitat impacted by the brush pile. Most importantly, it also facilitates removal and/or quick ignition of the pile and creates a hotter fire that reduces ash left after the burn. Any brush pile burn should be

in accordance with the land management agency or organization guidelines and safety policies.

Make sure to bring the appropriate herbicide and herbicide equipment to treat any cut stems or if foliar spraying is to be performed. Volunteers handling the herbicide are required to use Personal Protective Equipment (PPE) in accordance with the herbicide label, typically rubber or latex gloves, long pants and long-sleeved shirts, and rubber boots. If possible, apply the herbicide immediately after the stems are cut as this will increase the likelihood that the herbicide will be carried to the root to help minimize re-sprouts and the need to re-treat an area with more herbicide. Treating with herbicide at a later date is allowable but will be less effective. It is the steward's responsibility to ensure that only those with a license (licensed applicator or operator) apply herbicide. Dye markers should be used (unless prohibited by the manufacturer's label) so both volunteers and the public can see where the herbicide was applied and can subsequently avoid the area. By following these rules, the safety and effectiveness of herbicide usage is maximized.

Seeds collected at a natural area (with the appropriate permit) should only be used for that site unless given approval by the land management agency or organization's natural resources staff personnel to use at another site. Seeds from other locations should never be used unless permission is granted by the steward's contact.

Never collect seeds from state or federally endangered species without first obtaining the proper permits. If seeds are ripened and ready for collection, make sure

to bring the proper tools and equipment for collection and processing. Many seeds require drying or other treatments before they can be planted. Stewards should inform themselves about the requirements for ensuring viable seed prior to any seed collecting.

For many natural areas the use of fire is the best and most effective method for maintaining the biodiversity and health of the plant community. Prescribed fires can also save time and effort by removing or knocking back many invasive plants that would otherwise have to be cut manually by volunteers. Volunteers work closely with the ECI steward's contact to conduct prescribed fires. Only trained and properly equipped volunteers are allowed to assist in prescribed burns. Work with the land management agency or organization to obtain the Burn Plan for the natural area.

## **After the Workday**

After the workday, there are a few items to be completed by the Volunteer Steward. Volunteer Stewards must fill out and submit a workday report and submit it to the appropriate contacts in accordance with the site's land management agency or organization's policies. A general workday report form is provided in the appendices; however, the site's land management agency or organization may have specific forms to use in substitution within one week. Percent solution and amount of herbicide used are to be recorded on workday report forms.

It is always a great idea to thank the volunteers after the workday via email or a phone call.





## Chapter 7

# Working with Volunteers and the Public

### Acting as a representative

Stewards serve as the liaison between the agency they are working for and the public, which includes the volunteers with whom they work. Therefore, stewards should have the ability to convey the importance and reasoning behind ecological management both to volunteers and the public they encounter at their sites. This ability is important in order to both facilitate public understanding and support for ecological management and make stewardship efforts more effective.

In order to recruit and retain volunteers over the long term, it is essential that volunteers feel invested in the natural area and the work they are doing. Each volunteer's hard work must be appreciated and recognized by the steward and the management agency or organization so they will continue to volunteer. As discussed previously, there are various techniques and methods that can be used to increase volunteer recruitment and retention. These techniques and methods cannot be over-emphasized.

### Visitors and Neighbors, General Guidelines

Your contact with visitors may range from chance encounters to leading scheduled group tours. Regardless of the extent, your reception of visitors will affect their attitudes about the natural area and conservation efforts in general. Being courteous and friendly not only makes visits more enjoyable, it also fosters good community relations.

When visitors show an interest in activities at your work natural area, let them know what you are doing and why. If they are interested, you can explain further about the uniqueness of the area, its history and future plans, and opportunities to become a steward or volunteer. Furthermore, this contact may also lead to

visitors becoming more active in the natural area by giving financial or political support.

### Groups

You can make yourself and your site available to groups by notifying local scout groups, school districts, and other agencies or organizations to let them know help is needed at your natural area. Suggest themes for hikes and workdays and agree on appropriate dates and times. Be open to their ideas while considering your own goals for the site. Education and awareness should be directly linked with your management goals for the natural area. Here are some suggestions for leading a successful hike: (These guidelines also apply to workdays as well; see the Workday Management Techniques Section)

- Try to learn a little about a visiting group prior to giving a hike; you'll have time to think about tailoring your discussion to their interests. Adults learn differently than children. Adults regard themselves very much in the role of their professions, so find out what they do and relate to them in those terms. Rely on their experiences for assistance and draw on their expertise when possible. Most importantly, make sure your information is age appropriate.
- At the start of your hike, introduce yourself and the association to the group. Explain what is going to happen on the walk. Politely remind people not to smoke, litter or disturb plants.
- Visiting a preserve is a sensory experience; enhance that by encouraging people to touch plants that won't be harmed by it (and won't harm people) or by passing around a clump of soil to experience

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Material adapted and adopted from the Volunteer Stewardship Network's Steward's Handbook (The Nature Conservancy, Illinois Chapter)

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its richness or sandiness. Tell stories. Use maps, photographs, rock samples, acorns and other visual aids. Stop often just to listen. Encourage questions. Above all, make the experience fun and informative.

- Discuss the history of the natural area and its unique ecological features. Define ecological terms. Describe and point out rare plants and animals that live in the preserve, unless the preserve supports species so rare and attractive that their presence should be kept secret. Draw their attention to invertebrates and emphasize their importance, too.
- Take advantage of spontaneity and those "teachable moments." If you are talking about soil types and a gaggle of geese flies over, go with the moment. You can't compete with wild nature and you will never have a more captivated audience.
- End the hike with a conclusion. Summarize the information you've presented and thank the participants for coming. Most importantly, ask them for the support that will help you achieve your goals. Tell them about educational and volunteer opportunities, and then give them what they need to follow up and get involved. Brochures and volunteer applications can turn good intentions into action.

## Children

Children can be inspiring and enthusiastic visitors. The beauty of a natural area can have a great and lasting impact on their worldview.

But children can also be destructive and difficult to control. A flowery field is a good place to introduce groups of children to nature. Rather than having to say, "No, no, no," all the time, you can free them up to run around, touch and pick and collect, and catch frogs or crickets. Small, high-quality preserves are generally not recommended for children. It is important to realize children may not be as self-controlled as adults in their pursuit of nature. Therefore, it may be better to choose less sensitive areas in which they can explore and gather.

One of the best ways to harness children's energy and curiosity is with theme hikes requiring individual participation. Some ideas:

- Insect walks. Have children look for insects on plants, pointing them out to the group as they find

them. Then tell the children a little about what they have found.

- Weed pulling. Show children some undesirable weeds and briefly explain why they are a problem. Let them look for and pull out those weeds.
- Relating the fantasy of woodland fairy tales, such as "Jack in the Pulpit," to reality. Then have children construct their own tales, using plants and animals they see in the preserve as inspiration.

## Relations with Neighbors of Stewarded Areas

It is valuable to get to know owners of homes, businesses, or other properties that border the stewarded area. Let neighbors know what you're doing and why. If you're helping to protect adjacent areas, you're probably helping to protect their property as well. However, please remember that protecting natural areas may be at odds with many recreational activities, such as off-road driving, biking, or even hunting.

Emphasize that what benefits the preserve benefits the whole neighborhood. You should also ask for the neighbors' support. Get them involved in the management process. Ask them to notify you of problems or hazards they observe. Request that they do not drop grass clippings or other refuse in the preserve and recommend another site for lawn refuse disposal. Finally, support good will. Offer hikes in the preserve to show and explain what important natural features you are working to protect.

Keep these thoughts in mind when conducting prescribed burns:

- Be sensitive about prescribed burns. Burns can be a frightening prospect to a homeowner whose property isn't far from a planned burn area. This is one very good reason it is so important to conduct burns only under appropriate weather conditions and with an experienced crew. You need to judge how residents in your community may react to a burn.
- Clear the air about burns. Once a burn is held in an area, resident's fears will be quelled and they'll likely see little problem with future prescribed burnings. But first-time situations can be difficult, and are usually best handled through brochures and educational materials distributed to neighbors by mail or at a neighborhood meeting.

- Thoroughly explain reasons for burns—they are an important management tool for maintaining ecosystems and certain plant and animal species. Summarize the burn process, detailing the safety precautions and the expertise involved in tending a burn. Note that the fire department is alerted on the day of the burn. Finally, explain the notification process and follow through with it. At the start of the burn season, notify nearby homeowners by mail that a burn may take place during the next few weeks. On the day of the burn, you might place a card or flyer on individual doors of nearby homes.
- If many neighbors are likely to be concerned, be sure to post a representative on the day of the burn to answer questions and provide assurance. Have him or her hold a piece of fire-control equipment, such as a flapper or a backpack water pump. This person may be the most important member of the burn crew. He or she needs to be sympathetic, articulate, self-confident, and possess good public relations skills.

### Plans for Nearby Land Development

Development of land adjacent to a natural area can have serious implications for the preserve site. Often the bordering land acts as a buffer zone. Development may affect water quality or supply in the preserve. Consider taking action to influence plans for development by working with the county zoning committee or the municipality's planning board. Let them know about the ecological significance of the nearby land.

If you discover any plans for development near a dedicated Illinois Nature Preserve, and the proposed project could negatively impact the preserve, contact your Illinois Nature Preserves Commission field representative.

### Handling Trespassers, Misuse and Abuse

Specific policies regarding how to handle trespassers, etc., will vary depending on the land management agency or organization. Always refer to and comply with their policies. Each different agency or organization may provide you written guidance; follow it!

Deterioration of natural lands is sometimes caused by outright misuse and abuse. Stewards are not to police their areas with force. If visitors should become abu-

sive, tell them to call the natural area's land manager agency or organization and offer to provide a telephone number. If you find signs of misuse or abuse, tell your land management agency or organization contact. If emergency help is needed, call 911 first and then contact the land management agency or organization about the problem.

Any of the disturbances listed below should be reported in accordance with your site's land management agency or organization policies.

- **Off-Road-Vehicles and Snowmobiles.** These vehicles can cause serious harm to a natural area and are typically prohibited. If regular use is a problem, you should talk to the drivers of off-road vehicles if you spot them entering the preserve. Explain politely why such activity is not permitted. Remind them about paths in the area, if any exist, that are more appropriate for their activities, particularly if the drivers are teenagers who may or may not follow your directions. You might encourage landowners to erect signs and fences or barriers on their property to discourage trespassing.
- **Dumping of unwanted materials** has many implications from the spread of plant and wildlife diseases to prescribed burn hazards. Most agencies have ordinances against dumping wastes on lands. With the continuing waste disposal crisis, stewards can expect the trash assault on open lands to escalate. Dumping debris, including soil, construction waste materials, trees, etc., with the intent to "fill in" a wetland may be illegal. Check with the owner of the site immediately, and discuss boundaries. Report dumping of materials to site supervisors.
- **Be aware of other abuses.** Plant and animal collection and harvest may not be allowed in your area. It is a good idea to have a copy of the area's rules and ordinances. You should also know that some activities may be allowed with a special use permit; commonly, these are activities carried out by researchers and educational collectors. Know what these permits look like for your area.

Vandalism is a continual problem. If people found regularly loitering in the preserve seem connected to the disappearance of signs and the appearance of graffiti, report them to the site's land management agency or organization so police investigation can occur if desired.

It may add a sense of adventure for hikers, but wandering off trails can damage some fragile ecosystems and lead to trespassing on private property. In Illinois Nature Preserves that have a trail system, it is technically illegal to step off the trails. However, there are some areas where off-trail hiking is legal and encouraged. Knowing your natural area and the wishes of the owner will help you help others. As a steward, it may be up to you to report when off-trail

## Chapter 8

# Trail Stewardship and Maintenance – Pruning of Woody Plants

As stewards, our objectives are to create and maintain trails for a variety of purposes. We must ensure the trails' surfaces are appropriate for their intended use, that they are free of litter and trash and clear of impeding plant growth. One of the steward's and volunteers' main tasks in selective trail pruning and trimming is to be as unobtrusive as possible.

A basic objective to keep in mind for trail maintenance is to cut out only what must be removed to provide a safe trail and to leave the area looking natural. Only rarely might we prune trees and shrubs for structural improvement, crown or deadwood reduction, or shrub rejuvenation. Nonetheless, it is important to know how to prune trees and shrubs correctly to minimize injury and damage to the plants we are trying to preserve. In some cases, cutting shrubs and trees is to remove invasive species; see the Methods of Work Chapter.

### Introduction

This section provides information about the basics of pruning and trail trimming which are appropriate to stewarded areas. Its intent is to help you develop an awareness of fundamental concepts and approaches, although a short section like this is no substitute for more extensive readings and hands-on experience.

The proper care and maintenance of hand tools used for trail maintenance is discussed in the Stewardship Tools section. Many excellent references about pruning woody plants exist, a few of which are mentioned at the end of the section. In addition, volunteers who are knowledgeable about pruning may be available to provide education at sites where pruning is necessary.

Proper pruning benefits trees, shrubs and vines, and the associates of woody plants. Pruning mainly consists of **selectively** removing branches and stem parts (living and dead) from woody plants and can

range from pinching off a bud at the end of a twig to removing large limbs.

Most tree species evolved in competitive forest communities. Consequently, trees developed efficient branching systems to capture the energy of available light for photosynthesis. Woody plants also evolved the ability to get rid of inefficient energy resources by shedding shaded branches. A branch is naturally shed from its base. As natural shedding occurs, the wood tissue around the branch core within the stem protects against decay. ECIL stewards should make limb removal cuts, when necessary, to imitate natural branch shedding.

### Reasons for Pruning

The first rule in pruning is **DO NOT CUT WITHOUT A REASON**. Proper pruning is an effort to direct new growth rather than to “control” growth of living wood. Most pruning cuts on our stewarded natural areas are preventive or corrective to prevent hazards to humans. The reason for our pruning must be safety or ecologically based and not merely aesthetic. It is necessary to keep in mind that although you may be pruning at the right height for hiking, many of our trails are multi-use and should be pruned to safe heights for cyclists and horseback riders. Necessary actions include:

- clearing trails, access roads, and gateways by removing interfering limbs (crown reduction and/or crown raising).
- removing potentially hazardous limbs, stems, and deadwood (hazard reduction pruning), or
- providing access to more light for desirable understory plants (crown thinning).

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Material adapted and adopted from the Volunteer Stewardship Manual, The Nature Conservancy, Ohio Chapter

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## Plant Physiology as it Relates to Pruning

New branch tissues generated by the vascular cambium usually start growth before trunk tissues. As current-year branch tissue develops from branch ends toward the trunk, it turns abruptly downward at the branch base to form a **collar**. Trunk branch tissues grow later and form a trunk collar over the branch collar. Trunk collars and branch collars are called collectively, the **branch collar**.

The collar is where the wood and bark of the branch and the trunk come together, like an overlapping tissue “switching zone.” All true branches on woody plants have branch collars.

The **branch bark ridge** is raised bark developing in the branch crotch that shows the angle of the branch core in the tree. (Figure 8.1)

If a branch dies or is removed, the trunk collar continues to grow over the thin belt of branch tissue below the collar junction. The wood core of the branch is walled off (compartmentalized) in the trunk. (Figure 8.2)

**Callus** is tissue that grows at wound margins from the cambium. Callus differentiates into **woundwood** over time. A **complete** ring of callus and subsequent woundwood will develop around, and eventually over, proper cuts. On improper cuts (such as flush cuts), woundwood forms only to the sides, which means the collar and branch protection zone are damaged and the trunk is wounded. A proper pruning cut results in smaller wounded area, and more rapid callus and woundwood movement over the wound. Cuts on dead limbs that have trunk collars moving up the dead branch wood must also be made just outside the evident collar.

### Pruning Methods and Techniques

Proper pruning cuts (Natural Target Pruning) are relatively simple. The locations of the **branch bark ridge** and **branch collar** determines the location of a pruning cut. Cuts must be made **outside** the branch collar ridge, angling away from the trunk outward as close as possible to the collar.

- The proper angle for the cut depends on the shape of the collar.
- Conifers often have flat collars where a straight cut close to the collar is correct.

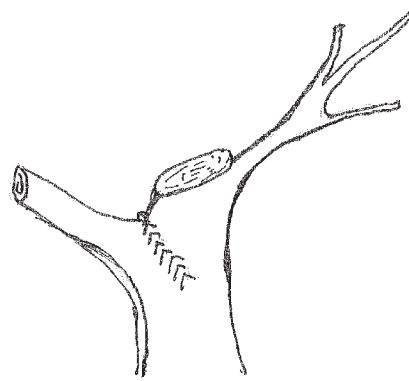


Figure 8.1: Branch bark ridge

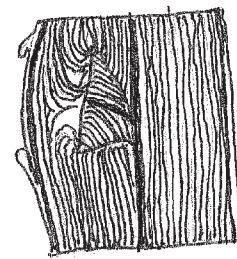


Figure 8.2: Compartmentalized branch tissue

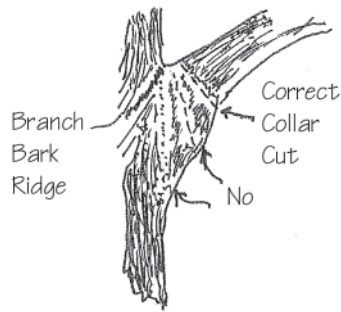
- Sometimes the angle of the cut will necessitate an upstroke cut with the saw.
- In many instances a small cut from the bottom of the branch (an undercut) is necessary in order to prevent bark peeling when the branch has been cut through.

Do not cut into the collar to stimulate callus production and rapid closure; such a cut promotes decay and future hazards. (Figure 8.3) **Never put a pruning tool behind the branch bark ridge.**

Whether a branch collar is obvious or not, the position of the finish cut should

- minimize the branch stub, which is an entryway for decay fungi;
- retain the natural decay protection present in the branch core (the intact branch collar is the first line of defense in preventing decay within the trunk)
- minimize the overall size of the pruning wound and direct damage to the stem.

For safety's sake in natural areas, some pruning cuts are best left to professional arborists. This is especially



**Figure 8.3:** Correct collar cut

true in the case of large, hazardous limbs. Always **stub cut** the branch first as shown in the following graphic. Limbs that cannot be controlled must be removed using at least **three** cuts. Roping of limbs may be necessary to prevent damage to other parts of the tree if they cannot be controlled by hand.

1. The first cut **undercuts** the limb 1 or 2 feet out from the parent branch or trunk. A properly made undercut will eliminate the chance of the branch's "peeling" or tearing bark as it is removed.
2. The second cut is the **top cut** which is usually made slightly further out on the limb than the undercut. This allows the limb to drop smoothly when the weight is released.
3. The third cut or **finish cut** is to remove the stub. (Figure 8.4)

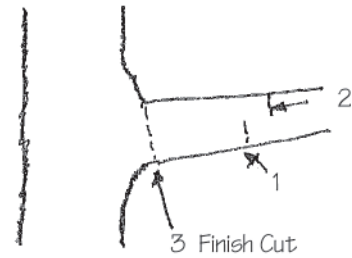
Each finish cut should be carefully made outside the branch bark ridge and the evident collar, leaving a smooth surface with no jagged edges or torn bark.

In some situations the cambium dies back beneath a branch collar even though a correct cut has been made:

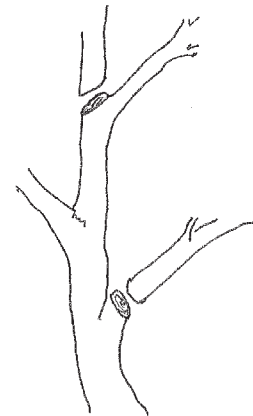
- the trunk collar did not join the branch directly below the branch (sunken spots under the branches are a sign of this condition)
- winter cuts may result in undercollar dieback
- the die-back problem tends to increase as the size of the branches removed increases

### Types of Pruning Techniques

There are two basic types of techniques in Natural Target Pruning. **Thinning** and **heading** cuts direct shape and growth.



**Figure 8.4:** Three cut approach



**Figures 8.5:** Thinning cut



**Figures 8.6:** Thinning cut

**A proper thinning cut removes a branch at its point of attachment, or back at the lateral branch large enough to assume a terminal role.** (Figures 8.5 and 8.6) Learn to foresee the need for removing live branches while they are small. Avoid large cuts. Direction can be influenced by the removal of short portions of growth or even by the removal of individual buds.



Thinning of lower branches can “raise” a limb. If, after raising, the remaining leaf material is insufficient for limb size, consider complete removal. Never perform excessive thinning, which is very stressful, especially to thin barked or young trees prone to sunscald. Any and all plants on natural area lands should have an absolute minimum of living branches removed.

**Heading, or Heading-Back pruning removes woody material back to buds.** Heading is appropriate only for small woody plants or one to two-year old branches (twigs, branchlets) on trees. Heading consists of cutting branches back to buds, bud nodes or a lateral branch too small to assume the terminal role. Cut back to a lateral bud or branchlet, slanting at a 45-degree angle above the bud node on alternately arranged branches and stems. (Figure 8.7) Two or more buds at a node (opposite or whorled) require a transverse cut just above the bud tips, or a 45-degree angle cut removing one of the buds and leaving the other(s) to elongate in the desired direction.

Resulting new growth from repeated heading-cuts at the same site can collectively form “witch-brooms” or a “high” shrub. Avoid tip-pruning and “haircut” heading. Always thin larger stems to varying lengths within a headed shrub canopy.

Cut  $\frac{1}{8}$ -inch higher above the bud tips when pruning in cold weather to prevent winter injury to the bud. Tissue around a winter cut can be vulnerable to desiccation (drying out).

Painting of Cuts – Painting of cuts with wound dressing is, in general, a questionable practice, and it is unjustified if proper cuts have been made. It is typically not practiced in natural settings. Wound dressings will not prevent decay; in fact, wound dressings have been found to often **promote** wood decay or cause cambium damage.

### Proper Times for Pruning

The ideal or optimal times to prune most woody plants are either in the dormant season or well into the growing season, after leaves are fully formed and expanded. Cuts or wounds in certain species during the growing season may attract insects that carry diseases or allow fungus invasion. For example, native oaks or elms should be pruned during dormant periods in regions where wilt disease conditions are known to exist. Dead, broken or weak limbs may be removed at

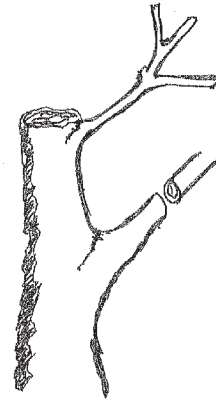


Figure 8.7: Heading-back pruning

any time with little effect, except in wilt-susceptible oaks and elms.

Pruning before the spring leaf bud break period can enhance stimulated growth and rapid wound closure. Pruning during the period **after** leaf expansion will result in suppressed growth and maximum “dwarfing.” Avoid pruning woody plants undergoing bud break and early leaf expansion.

Remember that on our natural areas, we generally prune only for trail maintenance, not for flower or fruit production. Nonetheless, thoughtful trail maintenance will ensure that we are not diminishing the reproductive capability of the trees and shrubs along our trails.

Recommended times for pruning woody plants are grouped in the four categories:

#### “Spring-Flowering” Shrubs and Small Trees

Generally those woody plants flowering before early summer do so from flower buds produced the **previous** growing season. These species will set new flower buds for **next** year on **this** year’s wood. Pruning should follow petal-fall as soon as possible (“summer pruning”) to maximize flowering for the next year if this is desired for reproductive criteria. Some examples of spring flowering species include:

- Amelanchier* spp. – shadblow, serviceberry, Juneberry
- Aronia* spp. – chokeberry
- Cercis canadensis* – redbud
- Cornus* spp. – dogwoods
- Corylus americana* – filbert, hazelnut

*Euonymus* spp. – burningbush, wahoo \* (see **invasive species removal**)

*Ilex* spp. – hollies

*Kalmia latifolia* – mountain-laurel (not native to IL)

*Lindera benzoin* – spicebush

*Lonicera* spp. – honeysuckles \* (see **invasive species removal**)

*Magnolia* spp. – magnolia (not native to EC IL)

*Physocarpus opulifolius* – ninebark

*Prunus* spp. – flowering cherry, plum

*Rhododendron* spp. – rhododendrons and azaleas

*Ribes* spp. – currant

*Sambucus canadensis* – elderberry

*Spiraea* spp. – steeplebush

*Vaccinium* spp. – blueberry

*Viburnum* spp. – arrowwood, black haw, etc.

### “Summer-Flowering” Woody Plants

Woody plants flowering after late spring usually do so on shoots grown the same year. Prune these late in the dormant season or early spring before new shoot growth begins (“winter-pruning”). Some examples of summer flowering species include:

*Hamamelis virginiana* – witch-hazel

*Hypericum* spp. – St. Johnswort

*Potentilla fruticosa* – shrubby cinquefoil

*Rhus* spp. – Sumacs

### Conifers

In pruning the “random-branching” conifer species *Thuja occidentalis* (arborvitae, northern white cedar) and *Tsuga canadensis* (hemlock) remember the following:

- The non-green area is a “dead zone.” Do not cut into this section of the wood!
- Most *Thuja* species are not capable of developing viable growth from latent buds.
- For *Juniperus virginiana* (red cedar) – inner laterals and side shoots - do not cut back to the same length.

In pruning the whorl-branching conifers *Larix laricina* (tamarack, larch) and *Pinus* spp. (pines) remember the following:

- Prune in late spring when new growth (“candles”) elongate. Don't prune beyond current season's growth into older wood if you don't have to.
- A strong central candle grows in line with the branch and is surrounded by up to six secondary candles. (Figure 8.8) Cut these to one-half their length to direct growth. Pinch by hand or cut with hand pruners before needles unfold. If pruned too late (after tissues in new stem have hardened off), considerable dieback can occur.

### Evergreen Broad-Leaved Shrubs

In pruning *Rhododendron* spp. and *Kalmia latifolia* (rhododendrons, mountain-laurel) that have become overgrown, unnaturally leggy, or extremely densely clumped, do the following:

- Cut to laterals or buds to stimulate new growth
- Pinch or tip-cut to direct growth
- Be aware that rhododendrons tolerate light pruning before leaf buds open. Make cuts above the bud scale scars so latent buds release.

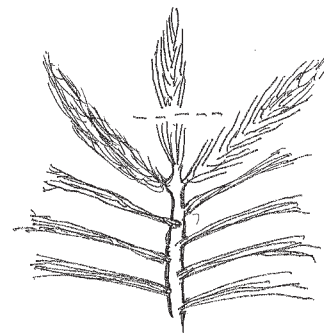


Figure 8.8: Conifer pruning



## Chapter 9

# Stewardship Tools

### Hand Tools

Although a myriad of hand tools are available on the market today, most stewards will find that only a few are needed to do a wide array of natural resources work. Each type of tool can be made in several ways so there are numerous options for you to choose from when it comes to a tool such as a shovel. If you trust and like the tool you are using, you and your volunteers are more likely to enjoy doing stewardship work. The following are a few things to keep in mind when choosing hand tools:

- Choose a tool that feels comfortable in your grip and is the correct length for your height. Remember that when you are using a shovel, the first 6 – 10 inches will be in the ground during most work, so you may want a longer handle than you would at first anticipate.
- Determine how often you will be using the tool. There are different grades of tools for different frequencies of work. Typically heavy-duty or contractor's grade tools are more expensive, but they are often worth the extra money.
- Wood, steel, or fiberglass handles are options on almost every type of tool. Fiberglass handles are 30 to 60% stronger than wood.
- Determine if transportability will be a big factor in your work. A folding saw may be less cumbersome to carry over long distances than large lopping shears, but each tool can do a different job more efficiently.

Despite the many features available in most tools, basic care remains the same for all tools. The following are some helpful hints.

- Just a few minutes of routine maintenance after use can add many years to the life of your tools. A drop of oil in the right pivot areas makes a great

deal of difference in the amount of force you have to put into cutting.

- Rust will permanently damage metal on tools. Dust attracts moisture so keep tools clean and dry. Damp storage sheds or basements may not be the best option for tools.
- If rust gets a foothold, spray with a penetrating lubricant and rub with a rough pad, such as a Scotch-Brite pad. Do not use sandpaper as it scratches metal. Wipe off excess lubricant and store properly.
- Fiberglass, wood and steel handles typically can't be repaired back to their original strength and form. If these handles are damaged, replacement is necessary. Repairs are never as strong or as safe as original handles.
- If sap builds up on metal, dip or wipe on kerosene or another solvent until clean. Wipe off excess solvent before using. Re-oil pivot points as most solvents will break down oils and grease.
- Try to maintain the original angle on the cutting edge. This keeps the blade from breaking and curling.
- Tool maintenance is often a good rainy workday activity that allows volunteers to gain more familiarity with the tools at their disposal. Additional maintenance of tools will be discussed under the specific tool type below.
- Proper storage will vary between each tool type. However, keeping tools out of excessive moisture and dirt, returning them to their pouch or sheath, and hanging them to protect them from getting bent, will help any tool.

### Shovels

There are many types of shovels on the market, and each has its own use. In general, the steward will

find that round-nose shovels are the most useful, with spades or tile spades coming in a close second. (Figure 9.1) The flat nose shovel and scoop are not often used in stewardship.

**Good Traits:** The most important stress point is where the handle meets the metal shovel head. Make sure this area looks and feels sturdy and tightly bound. Forged solid sockets or shovels with steel straps going up the handle are the sturdiest. There should be two or three rivets holding the head onto the handle.

**Proper use:** Shovels should never be used as a pry bar or as an axe. For safety purposes, never jump on the blade of a shovel to force it into the ground.

**Sharpening and other care:** Shovel noses can be sharpened with a hand file or grinder. Make sure all dirt and debris is removed and sharpen the shovel from one side only on a steep angle. Shovels with long, excessively sharp blades have edges that can easily curl, causing a very dull edge; this makes the shovel less efficient and more difficult to use.

### Hand Saws (Folding and Bow Saws)

**Good traits: Folding saws:** Folding saws are easily transportable and should have thick blades with sharp teeth. Folding saws can maneuver into a tree or shrub better than a bow saw. Folding saw injuries are typically from the blade folding back onto a hand, or from the saw being pushed too hard on the cutting stroke and the blade breaking. Therefore, it is a good idea to have a folding saw that locks into the open position, while having a thicker, stronger blade. Pole saws are essentially a folding saw on an extension pole; the same principles apply to pole saws as folding saws.

**Good traits: Bow Saws:** The bow saw is bulkier and may have trouble getting into tight places, but it can often handle larger diameter trees. Bow saw injuries are less likely to occur than folding saw injuries.

**Proper use: All Saws:** First note if the teeth are set to cut on the pull or push stroke and use the saw accordingly. When pruning, make sure the bark on the underside of the branch is cut first so bark stripping does not occur down the trunk. Many times, the saw will not be used for pruning, but rather it will be used to cut vegetation at ground level. This is especially true with woody exotic species. When using a saw to cut a plant off at ground level, be aware that the blade often becomes pinched as the shrub falls. This can lead to a



Figure 9.1: Tile spades (top) and round nosed shovels (bottom) are most useful in the field

break in the saw blade. Many times this can be avoided by determining the “lean” of the plant and cutting on the opposite side of the lean. If the blade becomes pinched, simply push the shrub straight backwards and remove the saw. Continue the cut from the opposite side.

**Sharpening and other care: All Saws:** Saw sharpening is very hard and should be left to those who have the proper equipment and know-how. In many cases, it is often cheaper to replace blades than to have them sharpened. For all saws, replacement blades should be kept on hand during workdays.

### Pruning Shears (one handed shears)

**Good Traits:** Make sure they are comfortable in your grip. Ratcheting pruners are easier on the hand and wrist if you have many cuttings to do. Check to make sure the pivot point does not have play side-to-side. This can keep the blades from meeting up correctly, producing a poor cut.

**Proper use:** Pruning shears are useful for removing branches and stems up to 1/2 inch in diameter. The anvil type (straight blade) is good for soft-tissue wood but can crush harder wood, making an uneven cut. Bypass pruners (hook and blade, scissors, drop-forge, curve blade) make closer cuts than anvil type pruners do and can be used on most types of wood. The bypass pruner cuts in two ways: a downward pressure supplied by the operator and a slicing action as the curved blade pulls through the wood.

**Sharpening and other care:** Open the shears as far as possible and secure the handles so they do not close during sharpening. Use a fine-toothed file or whetstone to sharpen. File only on the beveled edge, maintaining the blade’s original angle and moving

from the cutting edge back toward the thick part of the blade.

### Loppers (two-handed shears)

**Good Traits:** Long strong handles that connect deep into metal blade collars. Make sure there is no side-to-side play at the pivot point.

**Proper use:** Good lopping shears will remove branches up to 1¾ inches in diameter. They are also handy for taking out small invasive trees and shrubs at the base of the plant. The blade types discussed above hold true for loppers as well.

**Sharpening and other care:** See above.

### Pole Pruners

**Good Traits:** Make sure the extension pole is secure and not willing to bend when fully extended.

**Proper use:** Pole pruners are simply shears mounted on top of long poles and can typically cut no more than 1.5 inch diameter branches. To prevent bark peeling when the branch falls, it may be necessary to make several cuts further out on the limb to take weight off the branch point. In addition, it may be a good idea to cut into the bark on the underside of the branch so bark peeling won't occur.

The pruners should be positioned so the user has a straight pull on the rope and the lever arm freely swings its full range without hitting other branches. Both pole pruners and extension saws need to be treated with respect especially around power lines and other infrastructure. Look for hazards adjacent to and below the limb you are cutting. Never stand directly below the branch you are cutting.

**Sharpening and other care:** Care and sharpening for pole pruners is the same as the pruning shears above with additional care given to any pivot points on the blade and looking for wear along rope pulls that may break when in use.

### Axes (including brush axes and Pulaski Axes)

**Good Traits:** No pitting in the metal. Wooden handles are best to help absorb the shock of impact.

**Proper use:** Before taking cutting swings, take some practice swings to make sure you have the proper length handle to hit the target wood. Most axe injuries occur to the feet and legs. Axes should always be used

in some sort of downward motion. Pulaski and Brush axes are often used in a side-to-side swinging motion, but the swing should have some downward motion associated with it. Don't use an axe to prune a tree branch from the tree. It is dangerous and unhealthy for the tree and may cause serious injury to the operator.

**Sharpening and other care:** Axes are relatively easy to sharpen by hand, but gloves should always be worn when sharpening. Although it may be tempting to sharpen an axe with an electric grinding device, this is typically not needed. A hand file can quickly sharpen the blade of a well-maintained axe. Sharpen toward the handle from the sharp edge; file one way only, lifting the file from the work surface on the back stroke.

## Seed Collection Tools

Tree and prairie seed collection is a relatively easy process and can be done with virtually no equipment. Because of this, you can have many individuals helping with collection with very little investment in tools. However, there are a few tools worth mentioning that may make for more efficient workdays. For additional information on seed collection, please see the seed collection chapter of this manual.

### Cutters (a.k.a. deadheading tools)

Rose cutters, deadheading tools, and pruners can make a great addition to your prairie seed collecting tools. Although most prairie seed can be collected by hand, you may prefer the ease of cutting off the entire seed head for collecting. Some cutters are equipped with a simple pinching mechanism that holds the cut stem until you drop it in a bag. These tools are especially useful when collecting coneflowers that are hard on the hands, or on more fragile plants that may pull up from the roots when stripping seed.

### Nut Collection Tools

Although expensive for the volunteer, many agencies may have nut collection tools for loan. These are often referred to as nut wizards or bag-a-nuts. Different kinds are manufactured to collect a variety of sizes of nut from small black oak acorns to walnuts still in the husk, so there may be a need to have several sizes to collect different species. These tools make short work of nut collection and can save several hours of work. They are easy enough for children to use with adult supervision which can expand your workdays

to individuals who may have scout groups or smaller children.

## Pesticide Application Tools

### Pump Sprayers

**Good Traits** – Sturdy plastic and tough parts are needed to hold up to stewardship practices. Choose a brand that has replacement parts that are easily obtainable. The right sized sprayer for the job can save spills and money.

**Proper Use** – The most common type of herbicide applicator is a pump sprayer. These can be simple spray bottles or more complex backpack sprayers. In some areas, you may be able to use electronic pump sprayers that can be clipped onto a car or tractor battery. Spray bottles are good for small stump treatment. Backpack sprayers are useful when large areas need to be covered. They are also good for foliar spraying small shrubs or for spraying large areas of forbs such as garlic mustard, reed canary grass or purple loosestrife. Always relieve all pressure in the tank before taking off the tank's lid.

**Care** – Because pump sprayers are made entirely of plastic and rubber, it is important to clean them out often. Many adjuvants added to herbicides are acidic. Keeping them in sprayers for an extended period of time corrodes plastic and metal parts.

### Sponge and Wick Applicators

**Good Traits** – Wick and sponge applicators seem to change style and type quite often. Replacement parts are typically available, but only for a short time. Buy applicators that are sturdy, have few parts, and have a very durable sponge or wick. Sponge applicators can be used to target single stems or plants. In contrast, wick applicators are typically used in a non-target application by moving the wick over a larger area of vegetation. Two person wick applicators are sometimes used to control cattails in wetlands.

**Proper Use** – Most sponge applicators are for small projects. However, there are some applicators the size of paint rollers on the market today. Make sure herbicide coverage is complete on the plant. Wick applicators can be used by hand or behind a tractor. However, for the steward it will most likely be a one or two person wick wiped along the plants.

**Care** – Both types of applicators have a tendency to leak over time. This may lead to excess herbicide

dripping off the wick and causing damage to non-target species and increasing the overall cost of application.

## Prescribed Burning Tools

### Drip Torch and other ignition sources

Drip torches make short work of setting a fire line but can also be a source of accidents. Typically the flammable fuel used in a drip torch is unleaded gasoline mixed with diesel fuel. Gasoline to diesel fuel ratios should never exceed 1:3. That is to say, never use more than one part gasoline to less than three parts diesel fuel. Commonly, a 1:4 ratio is used in prescribed burning. A person must be vigilant to make sure no fuel is dripped on clothing or in non-burn areas. Heavy use of a drip torch can make the torch hot and expand liquid fuel out even when the tank is in the upright position. Never leave a drip torch on the ground since you never know where and when a fire might burn back towards it.

Propane torches are another ignition source that can be used. Self-striking torches can be found in hardware stores eliminating the need for lighters and matches. Currently, there are large torches on the market that can be hooked to a 20-pound propane tank. These may not be ideal for taking into the field, but they are good for setting brush pile fires. These large torches were originally developed for herbaceous weed control and are effective at doing just that.

### Flappers (and other smothering devices)

A well planned and executed burn can be put out with nothing more than flappers. Dirt can also be used to smother flames and is typically used on burns in east central Illinois.

### Rakes (McLeod and others)

Any metal rake will work well to make firebreaks and to clear debris from around infrastructure and trees. The McLeod rake has two advantages over a standard fire (Council rake) or leaf rake. First, one side has a flat scraper to clear debris down to bare soil, and the other side has very sturdy teeth and a metal handle which can be used to turn over logs and other material.

### Pulaski and Brush Axes

Details on axes are listed in the tools section. Brush axes can accomplish a lot of preparatory work on firebreaks, whereas Pulaski Axes are good for clean up work and fire suppression.

## Water Suppression Equipment

No matter how small the burn, a supply of water is needed. Backpack sprayers and Indian pump sprayers are common, but which kind of sprayer to use is up to the people doing the prescribed burning. Indian backpack sprayers come in hard and soft-shelled tanks. Many stewards prefer the ruggedness of the hard shell especially if burning among trees with many thorns. Foaming agents are sometimes used in these sprayers, but these agents are not necessary. Although labeled safe for the environment, there may be some biologically sensitive areas that do not allow excess chemicals.

## Power Tools

Chainsaws, brushcutters, and weed whip equipment can make shorter work of any job, but they mean increased danger to workers and increased tool maintenance. Still, that shouldn't stop you from using these tools.

**It is vitally important for you to know landowner policies regarding volunteer use of power equipment** as some agencies may not allow it at all, while others may allow it only with additional training. Anyone using power equipment should read and understand the equipment's safety manual before using the tool. If you are a steward, be sure to have this information available to anyone using power equipment.

There are many things to consider before using each type of power tool. However, no matter what the power tool may be, there are some basic traits to look for before using:

- Note the general condition of the tool prior to start-up. Visual inspections will reveal broken or unclean parts
- Test all safety features (blade guards, chain brakes, turn off switches, etc.) before taking into the field
- Make sure gasoline mixture is correct. Check to see if each place that requires lubrication is properly lubricated
- Blades and chains should be tight and sharp
- Clean, clean, and clean some more. Have what you need on hand to keep all parts free of debris
- When putting the tool away, make sure it is clean and in working order so the next volunteer can grab it and go. If the tool has something wrong with it,

make sure it is tagged so the next person using the tool does not get hurt

- Never use the power tool in any way that it was not intended for. Only use it on woody vegetation, not on masonry, metal, or plastic
- Keep the operating manual with the tool or in a designated place so anyone using the tool can easily find the manual

## Chainsaws

A small section in a steward guide does not give enough room to begin describing the safety needs of a chainsaw. Many professionals go through yearly chainsaw use training and so should stewards. Contact your local stewardship network about chainsaw safety workshops prior to using a chainsaw.

## Brushcutters and Weed Whips

When loading or picking up tools to do the job, give each tool a close visual inspection. Look for missing pieces, cracked handles, or other damage. If something doesn't seem right with the tool, do not use it. This can save a lot of time in the field.

With all tools, it is vital to let other volunteers know when a tool is not working correctly. Tag the tool with a description of what is wrong if you cannot fix it right away. Since many stewardship programs share tools, labeling them is necessary to prevent accidents, save time, and to keep the equipment running properly. On many occasions stewards have picked up a tool without looking at it only to discover, once they were in the field, that the tool was not usable.

If you are part of a stewardship program or network, there may be individuals assigned to the maintenance and upkeep of hand and power tools. As a volunteer, never be afraid to ask if there is someone in place who can do maintenance for you and your volunteers.

## Backpack Blowers

Backpack blowers are greatly underused by stewards. They are effective for prescribed burns because they can help remove litter to form firebreaks. They can be used to blow out small fires, eliminating the need for copious amounts of water, and they can be used to fan flames giving the fire more oxygen and causing a faster burn. Additionally, backpack blowers can be used to blow tree nuts into piles, or to blow small debris away





## Chapter 10

# Safety

As stewards it is your responsibility to assure the safety and well being of yourself and those who are working with you. It sounds like a large responsibility, but common sense and leadership will make each event safe and enjoyable. As a steward, you should keep on the lookout for potential problems and not be timid about pointing problems out. Be sure you and those working with you know the protocol for proper emergency procedures in case of injury. If you ever feel someone is a threat to his own or someone else's safety, you have the right to ask him to cease what he is doing, or to ask him to leave the workday.

### First Aid Kits

First aid kits are a must. In addition to a standard small first aid kit, you should also carry large absorbent pads; small gauze pads are fine, but they can't handle a mishap with a handsaw or chainsaw. Many arborists carry baby diapers with them as well because diapers are super absorbent and can be fashioned as a bandage around a wound. An eyewash bottle is also a necessity. Most steward activities create sawdust, small ash, or flying dirt particles, so particulate in the eye is a common problem. Other great additions to a first aid kit include a poison plant guide, insect repellent, poison ivy towelettes or wash and sunscreen. Remember, if you are having a workday with many individuals, spread out over a large area, it's a good idea to take more than one kit.

### Personal Protection Equipment (PPEs)

The most commonly used pieces of Personal Protection Equipment (PPE) are safety glasses (or goggles) and gloves. Most individuals prefer safety glasses to goggles and many safety glasses are designed to be worn over regular prescription glasses. Glasses and

gloves are inexpensive, allowing you to have several on hand during workdays. Eye and hand injuries from moving brush are common, so even if you aren't using tools, it is a good idea to have glasses and gloves on. These two items are the minimum protection that should be offered on any workday when hand tools are used. Most other types of PPEs are unique to the situation and will be discussed separately.

Power tool PPEs are regulated by entities such as the Occupational Safety and Hazard Administration (OSHA), but insurance carriers may require additional safety gear and training before you can use power equipment. Check with the landowner to see what his insurance agency requires for protection. Steel or composite toed shoes are one common PPE insurance carriers may request that you use.

### Chainsaws

Minimum Required Personal Protection Safety Requirements for Chainsaw use as set forth by OSHA are:

- Helmet
- Hearing Protection
- Safety glasses and/or face shield on helmet
- Chainsaw chaps
- Gloves
- Steel-toed shoes or boots

Note: Pole pruners are powered chainsaws on the ends of extension poles and should be treated as a chainsaw and the above mentioned P.P.E's should be worn. A helmet and safety glasses should always be used with extension saws even when the saws are not powered. Although not required by OSHA, chainsaw gloves and shirts are readily available and provide the same kind of protection as chainsaw chaps do.

## Brushcutters and Weed Whippers

Minimum Required Personal Protection Equipment for Brushcutter and Weed whip use are:

- Helmet
- Hearing protection
- Eye protection
- Long pants

Minimum Required PPEs when using pesticides are:

- Follow all PPE requirements listed on the pesticide label or MSDS
- Rubber, Latex or Nitrile gloves
- Safety Glasses
- Hat
- Long pants
- Long sleeved shirt

## Prescribed Fire

There are some statewide regulations for prescribed fire. First, you must obtain landowner permission prior to burning. Second, you must have a burn permit from the Illinois Environmental Protection Agency (IEPA). Additional information can be found at <[www.epa.state.il.us/air/permits/openburn](http://www.epa.state.il.us/air/permits/openburn)> or by calling the IEPA office in Springfield. Third, as enacted by Illinois Public Act 095-0108, volunteer stewards must have a Certified Prescribed Burn Manager at each burn, except for a prescribed burn on one's own property. A Certified Burn Manager is defined as an "Individual who successfully completes an approved training program and receives proper certification." Finally, local fire departments and 911 agencies must be informed of your burns.

Additionally, on any prescribed burns, make sure that you have several individuals with burn experience along with those who are learning and getting experience. Each landowner may have additional requirements for burn volunteers before they can be on a fire line. There are many great tips on how to correctly plan for a burn day in the "Planning a Workday" section of this manual.

Minimum Required PPEs for prescribed burning:

- Clothing made of natural fibers (cotton, wool, etc.) and leather boots
- Burn pants, and jacket or jumpsuit (Nomex)

- Burn Helmet
- Safety Glasses
- Natural fiber gloves

## Safety around Hazardous Plants

Stewards should make a reasonable effort to identify hazardous plants and teach these to volunteers. At a minimum, hazardous plants within the designated work area must be identified and discussed with new volunteers unacquainted with these plant hazards. To avoid contact with these plants, be conscious of where populations exist in your work area and take the time to educate volunteers about the plant and its identification.

Avoidance is always the best preventive. In the event of contact with a poison plant, the best way to lessen the severity of your symptoms is hygienic. There are products on the market you can use prior to, or immediately after, exposure to hazardous plants that are applied directly to the skin. These should be available to all volunteers. Washing and showering immediately after working will also lessen the severity of any exposure. **Remember, burning hazardous plants can cause the toxins to vaporize into steam or smoke and be inhaled, causing severe injury.**

Plant hazards come in three forms, plants that are poisonous or toxic to consume, plants that have contact toxins, and plants that may cause direct injury. Anyone can have a reaction to about any type of plant, but there are a few species in east central Illinois that stewards should be able to recognize as skin irritants. A partial list of hazardous plants includes hawthorns, black locusts, berries, poison hemlock, stinging nettles, poison ivy, and wild parsnip. Certain mushrooms should be avoided as well.

## Plants dangerous to contact

Where present, be especially diligent in educating people about the hazards of contact poison plants, such as poison ivy, poison hemlock, wild parsnip, and giant hogweed.

**Poison Ivy (*Toxicodendron radicans*).** All parts of this plant contain urushiol oils and should be avoided. Urushiol is pervasive and persistent. It can be transferred from a plant to a human by way of animals or by articles of clothing that have touched a plant, it can be carried in smoke from burning plants, and it often

remains on the surface of dead and decaying plants, even in winter. Specimens of urushiol oil several centuries old have been known to cause a rash in sensitive people, though one to five years is the normal time for the oil to remain active on plant material.

Poison ivy is common in Illinois. Wearing long pants, a long-sleeved shirt, and gloves will reduce exposure, but proper identification and avoidance are the best means of coping with the plant.

Keep in mind that sensitivity and reaction to these and other toxic plants usually increases with exposure. Upwards of 90% of all people are allergic to urushiol oil; reaction severity is a matter of time and exposure. If you didn't react to it last time you encountered it, you may react to it now.

If contact is known or suspected to have occurred, wash the exposed area with soap and water as soon as possible. Scrubbing the skin with alkali soap or washing with 70% alcohol should remove any residual urushiol. Remove clothing and wash separately in hot, soapy water.

After the urushiol has been removed, the rash cannot be passed from one person to another. Poison ivy rash may erupt up to ten days after exposure. It is this delay that has given rise to the myth of one person getting poison ivy from the contact of another person's blisters.

If a rash appears, several courses of action can provide relief. Hot water sprayed on the rash for 5 to 10 minutes will provide relief for several hours. Since this is an allergic reaction, an antihistamine can provide relief. A topical ointment or gel can also provide relief. For severe reactions, or for rash covering large portions of the body, consult your physician. The rash can last one to three weeks.

**Poison Hemlock (*Conium maculatum*).** Poison hemlock is the second most poisonous plant in the U.S., second only to the native water hemlock (*Cicuta maculata*). Hemlock contains the alkaloids Coniine, N-methylconiine, conhydrine, pseudoconhydrine, g-coniceine, and Atropine. The most important and toxic of these alkaloids is coniine, a neurotoxin that disrupts the workings of the central nervous system.

These alkaloids are found in all parts of the plant, but especially in the green fruits. The dead plant remains toxic and is capable of endangering people, livestock, and wildlife for several years. Ingestion of

Poison Hemlock *in any quantity* can result in respiratory collapse and death. These volatile alkaloids have been used as a poison since ancient times. Socrates was sentenced to drink the juice of poison hemlock in 329 BC after having been found guilty of subverting the youth of Athens.

Poison hemlock is a weedy, biennial, herbaceous plant that grows well in wet areas. Care must be taken to wear gloves and long sleeves when working around this plant.

**Wild Parsnip (*Pastinaca sativa*).** The sap of wild parsnip's green leaves, stems, flowers, and fruits contains a substance called psoralen which is photoreactive and can cause serious blisters and an intense localized burning sensation when exposed to UV light, a condition called phytophotodermatitis. Moisture from perspiration speeds the absorption of the irritating chemical. Blisters appear a day or two after exposure. Unlike poison ivy, wild parsnip can affect anyone, anytime.

Wear gloves, a long-sleeved shirt, and long pants to help protect against contact. Launder clothes and gloves immediately after exposure as the sap can remain active.

Skin discoloration from parsnip burns can last several months. Following any blistering, it is advisable to keep blisters intact and prevent them from rupturing for as long as possible. Following rupture, keep the area clean to avoid infection. Some report aluminum acetate powder and cloth compresses can help cool and dry seeping blisters. In extreme cases, medical assistance is advisable. Doctors might recommend a topical or systemic cortisone steroid for extreme cases.

**Giant Hogweed (*Heracleum mantegazzianum*).** Like wild parsnip, the sap of giant hogweed is photoreactive. If sap from the plant comes into contact with skin on a sunny day and the affected skin is later exposed to sun, large and sometimes-painful blisters will develop. In severe cases, affected skin areas may become blackened and scar. Eye exposure is of particular concern as it can result in temporary or permanent blinding. The photoreactive toxicity of the plant is highest while it is in bloom. Following any contact with the plant, it is advisable to get out of the sun, wash the area right away and then seek medical assistance.

### Plants Dangerous to Ingest

It is important for stewards to know if there are any poisonous plants in their areas which must not be

consumed. Teach young children never to eat anything in the wild. Even if the plant is edible, there is a chance the plant was sprayed with a pesticide. Also, even if you are certain the plant is entirely safe, remember that many edible plants are difficult to identify. A few plants found in Illinois that should be treated with caution are found in the table below.

### Some East Central Illinois Plants that are Dangerous to Ingest

Beardtongue (*Penstemon digitalis*)  
 Black Locust (*Robinia pseudoacacia*)  
 Bloodroot (*Sanguinaria canadensis*)  
 Buttercups (*Ranunculus* spp.)  
 Indian tobacco (*Lobelia inflata*)  
 Coneflower (*Echinacea* spp.)  
 Doll's Eyes (*Actaea rubra* and *A. pachypoda*)  
 Dutchman's Breeches (*Dicentra* spp.)  
 Goldenrods (*Solidago* spp.)  
 Green Dragon (*Arisaema dracontium*)  
 Iris (*Iris* spp.)  
 Jack-in-the-Pulpit (*Arisaema triphyllum*)  
 Jimson Weed (*Datura stramonium*)  
 May Apple (*Podophyllum peltatum*)  
 Milkweeds (*Asclepias* spp.)  
 Nightshade (*Solanum* spp.)  
 Oaks (*Quercus* spp.)  
 Pokeweed (*Phytolacca americana*)  
 Spurge (*Euphorbia* spp.)  
 Virginia creeper (*Parthenocissus quinquefolia*)  
 White Snakeroot (*Eupatorium rugosum*)

### Plants dangerous by Direct Injury

Finally, thorns, the sharp edges of limbs, or falling branches can cause direct injury. Vigilance around your work area and educating those you are working with is the best way to avoid direct injuries. Many people are injured and killed each year in what are known as "struck-by" accidents. These accidents encompass everything from a mishandled saw hitting someone to a large branch falling on a worker. Some common plants in Illinois with thorns or spines are listed in the table below.

### Common East Central Illinois Plants that May Cause Direct Injury

Autumn Olive (*Elaeagnus umbellata*)  
 Blackberries (*Rubus* spp.)  
 Catbriar (*Smilax hispida*)  
 Common buckthorn (*Rhamnus cathartica*)  
 Gooseberry (*Ribes missouriense*)

Hawthorns (*Crataegus* spp.)  
 Multiflora Rose (*Rosa multiflora*)  
 Osage Orange (*Maclura pomifera*)

### Other Safety Considerations

As a steward, you should always have emergency phone numbers on hand and a list of for volunteers to carry. Train your volunteers and stewards to recognize that if a serious emergency happens, they should call 911 immediately. It is, however, necessary to report an accident as soon as possible to the landowner. As a warning, there are still many stewarded sites in east central Illinois that do not get cellular phone signals. Know your natural area well enough to get to a location from which a signal can be sent.

Pocketknives, Swiss Army® knives, and Leatherman® tools can be very helpful for first aid uses in the field. They can help remove thorns and splinters, be used to fix loose or broken tools, and cut cloth or gauze.

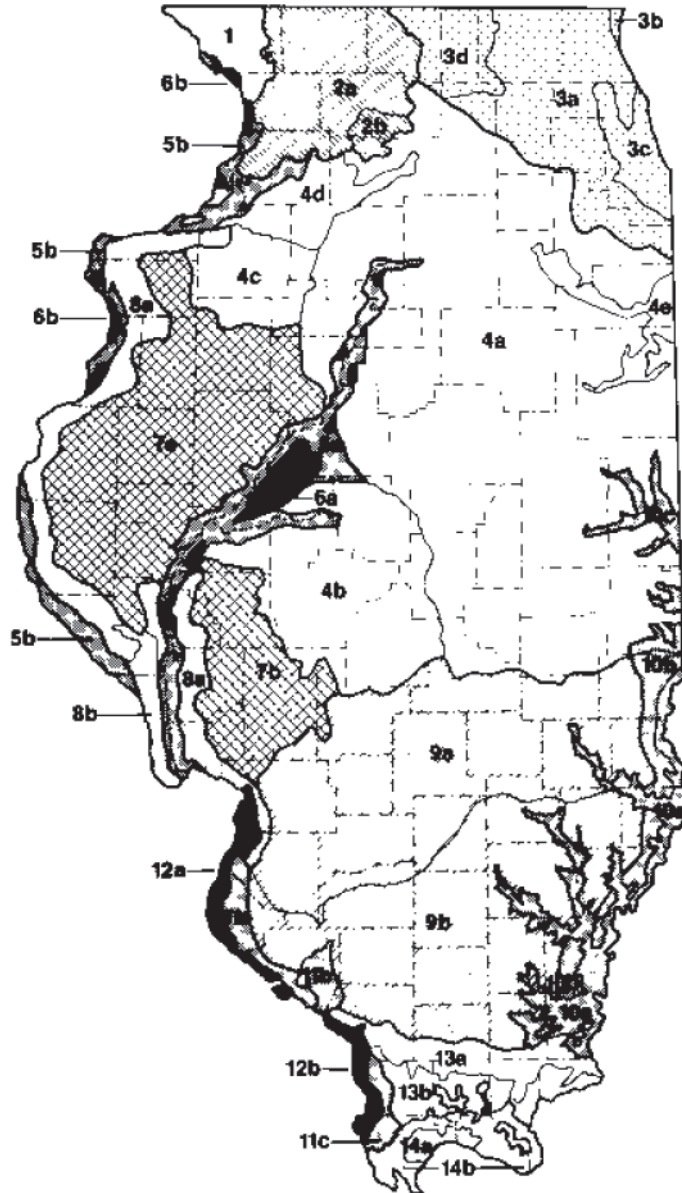
Many injuries and accidents can be avoided with a little pre-workday preparation. You may want to make an informational sheet that you can give to volunteers or leaders before the workday. Information may include proper dress attire (long pants, proper footwear, etc.), what to bring (water, snacks, equipment, etc.), how long to expect the event to last, and most importantly, any special needs for first aid, such as an asthma inhaler or Epi-pen.

Small handheld radios are very popular. They are relatively inexpensive and have ranges of up to fifteen miles. These are great tools for use between stewards so no one gets lost. They are also instrumental in keeping everyone safe and informed during a prescribed burn.

Automatic Electronic Defibrillators (AEDs) are common in many public areas. These are used on individuals experiencing cardiac arrest. Know if your site has an AED available and where it is located. Some areas are remote enough that emergency help may take several minutes to arrive and available AEDs have saved lives in such cases. First aid, CPR, and AED training is offered in many communities; consider getting certified as part of your stewardship.

When you oversee volunteers, be in tune with their needs. Watch for signs of fatigue, overexposure, and potential injury. You are in charge, and if someone needs to take a break, let him know it's okay to rest awhile.

Appendix I  
**Natural Divisions of Illinois Map**



1. Wisconsin Driftless Division
2. Rock River Hill Country Division
  - a. Freeport Section
  - b. Oregon Section
3. Northeastern Morainial Division
  - a. Morainial Section
  - b. Lake Michigan Dunes Section
  - c. Chicago Lake Plain Section
  - d. Winnebago Section
4. Grand Prairie Division
  - a. Grand Prairie Section
  - b. Springfield Section
  - c. Western Section
  - d. Green River Lowland Section
  - e. Kankakee Sand Area Section
5. Upper Mississippi River and Illinois River Bottomlands Division
  - a. Illinois River Section
  - b. Mississippi River Section
6. Illinois River and Mississippi River Sand Areas Division
  - a. Illinois River Section
  - b. Mississippi River Section
7. Western Forest-Prairie Division
  - a. Galesburg Section
  - b. Carlinville Section
8. Middle Mississippi Border Division
  - a. Glaciated Section
  - b. Driftless Section
9. Southern Till Plain Division
  - a. Wabash Border Division
  - b. Effingham Plain Section
  - c. Mt. Vernon Hill Country Section
10. Wabash Border Division
  - a. Bottomlands Section
  - b. Southern Uplands Section
  - c. Vermilion River Section
11. Ozark Division
  - a. Northern Section
  - b. Central Section
  - c. Southern Section
12. Lower Mississippi River Bottomlands Division
  - a. Northern Section
  - b. Southern Section
13. Shawnee Hills Division
  - a. Greater Shawnee Hills Section
  - b. Lesser Shawnee Hills Section
14. Coastal Plain Division
  - a. Cretaceous Hills Section
  - b. Bottomlands Section

## Appendix II

# Natural Areas of East Central Illinois

### **Guide to abbreviations:**

SRA (State Recreation Area)  
FP (Forest Preserve)  
SP (State Park)  
SNA (State Natural Area)  
IDNR (Illinois Department of Natural Resources)  
CCFPD (Champaign County Forest Preserve District)  
CP (County Park)  
CA (Conservation Area)  
UPD (Urbana Park District)  
GPF (Grand Prairie Friends)  
MCCD (Macon County Conservation District)  
VCCD (Vermilion County Conservation District)  
SFWA (State Fish and Wildlife Area)  
PCFPD (Piatt County Forest Preserve District)  
NC (Nature Center)



Name	County	Ownership	Stats and Highlights
American Beech Woods Nature Preserve	Within Lincoln Trail SP south of Marshall, Clark County	IDNR	20.5-acre, old second growth beech-maple forest with numerous wildflowers
Baber Woods Nature Preserve	About 6 miles southeast of Kansas, Edgar County	The Nature Conservancy	59-acre, oak-hickory woodland with over 210 types of plants
Ballard Nature Center	Effingham	Ballard Nature Center	A unique complex of wetland, upland forest and bottomland forest, and open fields. Open to the public and governed by a not-for-profit board. Most maintenance and management done by volunteers. Picnicking, bird watching, hiking.
Bonnie's Prairie Nature Preserve	North of Watseka, Iroquois County	Grand Prairie Friends	10.5-acre remnant sand prairie and sand pond.
Brownfield Woods	Champaign	University of Illinois	40 acre forest; remnant of the Big Grove
Busey Woods	North Urbana, Champaign County	Urbana Park District	59 acre forest; remnant of the Big Grove; boardwalk; Anita Purves Nature Center
Carl Flierman's River Nature Preserve	South edge of Georgetown, Vermillion County	IDNR	High-quality stream with high fish diversity and associated forest. This 23.4 acre nature preserve is within the larger 157-acre Georgetown addition to the Little Vermillion River Land and Water Reserve which preserves surrounding forest and grasslands
Clinton Lake SRA	Dewitt	IDNR lease w/ AmerGen.	On Clinton Lake, 9,300 acres of forest, lake, open fields; land owned by AmerGen; fishing, camping, swimming, hunting, bird watching
Crawford County SFWA	Crawford	IDNR	1,129 acres. 1,100 acres open to hunting. Huston Creek and adjacent bottomland forest cuts through the area. 75 acres have been declared a Natural Area for the forest ecosystem found there.

Doris Westfall Prairie Restoration Nature Preserve	Within Forest Glen Preserve northeast of Georgetown, Vermillion County	VCCD	40-acre reconstructed prairie with over 120 types of native plants and many spring wildflowers; one of best prairie reconstructions in Ill.
Douglas-Hart Nature Center	Coles	Douglas-Hart Nature Center	Nature Center with some surrounding natural area.
Eagle Creek SRA	Shelby	IDNR	On Lake Shelbyville, 11,100 acres of water, 250 miles of shoreline; camping, hiking, fishing, boating, resort, hunting
Fairchild Cemetery Prairie Nature Preserve	North of Kennekuk County Park, Vermillion County	Grand Prairie Friends	1.5 acre prairie and savanna remnant.
Forest Glen Preserve	Vermillion	VCCD	1,800 acres in total size. Many rare plant and animal types found here. The Illinois Native Plant Society and the Illinois Walnut Council are Headquartered here. Four registered Illinois Nature Preserve fall within these boundaries. Prairie, woodland, bottom-land in abundance.
Forest Glen Seep Nature Preserve	Within Forest Glen Preserve northeast of Georgetown, Vermillion County	VCCD	This seep and marsh supports a rich array of wetland plants including such notables as skunk cabbage and marsh marigold; 8 acres
Fort Daniel CA	Macon	MCCD	200 total acres. Mostly wooded. Multiple recreation opportunities. Lot's of historical education opportunities. MCCD has a volunteer coordinator to take your calls.
Fox Ridge SP	Coles	IDNR	2,064 total acres of river, woodland and open field. Large forested ravines. Hunting, hiking, bird watching, pavilion built by the Civilian Conservation Corps, fishing.
Friends Creek CA	Macon	MCCD	526 total acres. Many recreational areas and trails. Trails, fishing, hiking, cross country skiing and camping.

Funks Grove and Sugar Grove NC	McLean	Funk Family	Home of one of the largest old-growth forest remnants in central Illinois. Sugar Grove Nature Center. Stewardship and volunteer opportunities.
Gardner Prairie	Ford	Don Gardner	Dry-mesic prairie restoration.
Griswold CA	Macon	MCCD	80 total acres in a mix of recreational opportunities and some unique glacial kame and wildlife area.
Harry "Babe" Woodyard SNA	Vermilion	IDNR	1,104 total acres. Supports at least 12 state T and E species. Hiking, fishing, no pavilions or facilities. Special hunting areas.
Heron CP	Vermilion	VCCD	The newest VCCD landholding. Large wetland complex with large floating walkway found there.
Hidden Springs State Forest	Shelby	IDNR	1,200 total acres. Formerly known as Shelby State Forest. Different sections contain different habitat types. Name comes from having seven different springs on the property that settlers once drank from. Managed as a multiple use facility one of the uses being managed for timber harvest. Picnicking, hunting, camping, hiking.
Homer Lake FP	Champaign	CCFPD	830 total acres. Unique old state nursery. Large lake and small pond for fishing. Prairie restorations and wetland restorations. Upland and bottomland forest. Nature Center located here.
Horseshoe Bottom Nature Preserve	North of Kennekuk County Park, Vermilion County	Vermilion County Conservation District	52-acre seep, wetland, and floodplain forest.
Howard's Hollow Seep	Within Forest Glen Preserve northeast of Georgetown, Vermilion County	VCCD	A 1-acre seep opening lies nestled between the base of forested hills and beautiful Willow Creek

Iroquois State Wildlife Area	Iroquois	IDNR	2,480 total acres. Unique habitat of marsh, sedge meadow, sand prairie, and forest. Hunting, picnicking, trails.
Kennekuk CP	Vermilion	VCCD	3,000 acres. Bordered by the Middle Fork River—Illinois's only National and Scenic River. Oak hickory forest. Two registered Illinois Nature Preserves within its boundaries. 170 acre Lake Mingo for fishing.
Kickapoo SRA	Vermilion	IDNR	2,842 total acres. Clear ponds formed mostly from old mining operations and forested ridges and hillsides. Beautiful topography. Scuba diving, fishing, camping, hunting. Slated to be closed in fall of 2008 by the Illinois Governor.
Lake of the Woods FP	Champaign	CCFPD	900 total acres much in recreational areas. Sangamon River and a large lake for boating and fishing. Picnicking and hiking. Prairie restorations.
Lake Vermilion CP	Vermilion	VCCD leased from Aqua Illinois Inc.	1,000 acre lake with ramp and dock complex. Playground area. Fishing and boating opportunities.
Lincoln Trail Homestead State Memorial	Macon	IDNR	162 acres. Stewardship opportunities may be very limited here as much of the area is manicured. Camping for organized youth groups only, fishing, hiking.
Lincoln Trail SP	Clark	IDNR	1,023 total acres. Named after the Abraham Lincoln family venture from Indiana to Illinois. Lots of historic educational opportunities. Camping, fishing, hiking, small lake for boating.
Loda Cemetery Prairie Nature Preserve	Northwest of Loda, Iroquois County	Grand Prairie Friends	3.4 acre high-quality mesic prairie remnant; additional nine acres purchased in 2007 to expand prairie.

Lodge Park	Piatt	Bottomland and upland forest along the Sangamon River.	PCFPD	Bottomland and upland forest along the Sangamon River.
Meadowbrook Park	South Urbana, Champaign County	130 acre site, restored prairie and wetland; stream corridors	Urbana Park District	130 acre site, restored prairie and wetland; stream corridors
Middle Fork FP	Champaign	Over 1,600 total acres of land in marshes, wetlands, crop fields, upland and bottomland forest and prairie restorations. Hiking, camping, cross country skiing, bird watching. Two large waterfowl areas with a viewing platform.	CCFPD	Over 1,600 total acres of land in marshes, wetlands, crop fields, upland and bottomland forest and prairie restorations. Hiking, camping, cross country skiing, bird watching. Two large waterfowl areas with a viewing platform.
Middle Fork State Fish and Wildlife Area	Vermilion	2,700 total acres in grass, forest, and cropland. Many natural and historic features. Close to many county owned parks so several short trips can get you to several stewardship sites around the area.	IDNR	2,700 total acres in grass, forest, and cropland. Many natural and historic features. Close to many county owned parks so several short trips can get you to several stewardship sites around the area.
Middle Fork Woods Nature Preserve	West edge of Kickapoo State Park, Vermilion County	69-acre mesic upland forest.	IDNR	69-acre mesic upland forest.
Moraine View SRA	McLean	1,687 total acres. Name comes from many of the moraines that were left behind in the area as the glaciers retreated. 158-acre lake for boating. Slated to be closed Fall 2008 by Illinois Governor.	IDNR	1,687 total acres. Name comes from many of the moraines that were left behind in the area as the glaciers retreated. 158-acre lake for boating. Slated to be closed Fall 2008 by Illinois Governor.
Nance Woods	West of Neoga, Shelby County	14-acre dry-mesic upland forest.	Grand Prairie Friends	14-acre dry-mesic upland forest.
Nanny Tract	Champaign		University of Illinois	
Nettie Hart Woods	Champaign		University of Illinois	

Newton Lake SFWA	Jasper	IDNR	Approximately 1,500 acres that includes the 1,755 acre lake and 540 acres of shoreline. Much of the surrounding area is owned by and leased from CIPS (Central Illinois Public Service Company). Hunting, trails, picnicking.
Paxton Railroad Prairie	South of Paxton, Ford County	Canadian National Railroad	0.5 acre small, high-quality mesic prairie remnant.
Pellville Cemetery Prairie	West of Rankin, Vermilion County	Butler Township (?)	1 acre prairie remnant; bounded on two sides by Herschel-Workman Pheasant Habitat Area (IDNR).
Perkins Road Site	Northeast Urbana, Champaign County	Urbana Park District/UCSD	35 acre restoration of sedge meadow and prairie on floodplain of Saline Branch
Prairie Ridge State Natural Area	Jasper (Marion)	IDNR	4,101 total acres. Grassland and wetland natural area with very little public access. This area protects one of the last remaining populations of Greater Prairie Chickens in the Midwest. Special permission must be granted to enter the site.
Prospect Cemetery Prairie Nature Preserve	South edge of town of Paxton	Patton Township Board	5 acre, high-quality prairie remnant in historic, pioneer cemetery
Ramsey Lake SRA	Fayette	IDNR	1,815 total acres, forest, trails, horseback, picnicking
Red Hills SP	Lawrence	IDNR	967 total acres, 40 acre fishing lake, Chauncey Marsh Nature Preserve is a 627 acre satellite area home to rare marsh communities, prairie, and bottomland forest. Bird watching
River Bend FP	Champaign	CCFPD	275 total acres. 90-acre lake for fishing. Hard trail through much of the area. Bottomland forest.
Rock Springs CA	Macon	MCCD	More than 1,300 acres of a variety of habitat types here. Many trails here to steward. Nature Center with library and displays.

Rocky Branch Nature Preserve	Northeast of Clarksville, Clark County	Eastern Illinois University Foundation	151-acre preserve with oak-hickory forest on rugged hills and ravines and sandstone cliffs along streams
Russell M. Duffin Nature Preserve	Within Forest Glen Preserve northeast of Georgetown, Vermilion County	VCCD	160-acre, rich, beech-maple forest on steep slopes and ravines
Sam Parr SFWA	Jasper	IDNR	1,180 total acres with a 183-acre lake. Near the Embarrass River. Camping, hunting, and boating.
Sand Creek CA	Macon	MCCD	755 total acres. Hiking and horse trails. Prairie and floodplain forest.
Sangamon River FP	Champaign	CCFPD	180 total acres with crop fields and bottomland forest. Some reforestation efforts in progress here. Sangamon River transects the property. Facilities limited. Bird watching, hiking, river fishing.
Shelbyville SFWA	Shelby	IDNR	Along the Kaskaskia River. 6,000 plus total acres of grassland, lake, forest, and bottomland habitat. Boating, fishing, hunting, and trails.
Shortline Railroad Prairie	Between Gifford and Penfield, Champaign County	Grand Prairie Friends	6 acre, one-mile segment of abandoned rail line with dry-mesic prairie remnants.
Sibley Grove Nature Preserve	Southeast of Sibley, Ford County	The Nature Conservancy	50-acre mesic oak savanna, restored prairie and restored marsh
Spitler Woods SNA	Macon	IDNR	202 acres. Small with limited stewardship opportunities. Some natural area.
Stephen A. Forbes SRA	Marion	IDNR	3,103 total acres, large 585-acre lake with 18 miles of shoreline, 1,150 acres are forested areas. Swimming, hunting, horse trails
Tomlinson Pioneer Cemetery Prairie Nature Preserve	North of Penfield, Champaign County	CCFPD	1-acre savanna/prairie remnant in historic pioneer cemetery

Trelease Woods	Champaign	University of Illinois	
Upper Embarrass Woods Nature Preserve	Within Walnut Point State Park north of Oakland; Douglas County	IDNR	Old-growth oak forest with rich display of spring wildflower; 65 acres
Vermilion River Observatory	Champaign	University of Illinois	
Walnut Point SP	Coles	IDNR	671 total acres. Camping, hunting, fishing, cross-country skiing, hiking. Several recreational facilities, but also some natural area.
Weaver Park	East Urbana, Champaign County	Urbana Park District	60-acre site, restoration/recreation of Big Grove woods, savanna, prairie; naturalized wetland basin
Weldon Springs SP	DeWitt	IDNR	550 total acres. Wetland, forest, river bottom natural areas. Salt Creek runs in the area. Small lake for fishing and boating. Nature center and some historical education opportunities here.
Welles Cemetery Prairie	South of Penfield, Champaign County	Compromise Township	0.5-acre mesic prairie remnant.
Windfall Hill Prairie Nature Preserve	North of Kennekuk County Park, Vermilion County	Vermilion County Conservation District	32 acre high-quality hill prairie
Wolf Creek SP	Shelby	IDNR	Also on Lake Shelbyville near Eagle Creek site. Part of the whole Lake Shelbyville complex of natural areas.





Appendix III  
**Conservation Agencies**

A select list of east central Illinois agencies that may  
have volunteer or educational opportunities

(Updated Sept. Nov. 11, 2008)

Agency Name	Location	Phone	Website (www.)	Continuing Education	Volunteer Opportunities
Allerton Park	Monticello	217-333-3287	<a href="http://continuinged.uiuc.edu/allerton">continuinged.uiuc.edu/allerton</a>	Yes	Yes
Ballard Nature Center	Altamont	618-483-6856	<a href="http://ballardnaturecenter.org">ballardnaturecenter.org</a>	Yes	Yes
Champaign County 4 - H	Champaign and other Counties	See local Extension offices	<a href="http://web.extension.uiuc.edu">web.extension.uiuc.edu</a>	No	Yes
Champaign County Audubon Society	Urbana	217-367-6766	<a href="http://champaigncountyaudubon.org">champaigncountyaudubon.org</a>	Yes	Few
Champaign County Forest Preserve District	Champaign County	217-586-4389	<a href="http://ccfpd.org">ccfpd.org</a>	Yes	Yes
Champaign Park District	Champaign	217-398-2550	<a href="http://champaignparkdistrict.com">champaignparkdistrict.com</a>	Yes	Few
Douglas Hart Nature Center	Mattoon	217-235-4644	<a href="http://dhnature.org">dhnature.org</a>	Yes	Yes
Ducks Unlimited	Champaign Co.	217-352-2889	<a href="http://ducks.org/states/40/index.html">ducks.org/states/40/index.html</a>	No	Yes
East Central Illinois Master Naturalist	Champaign	217-333-7672	<a href="http://web.extension.uiuc.edu/champaign/mn">web.extension.uiuc.edu/champaign/mn</a>	Yes	Yes
Embarrass Volunteer Stewards	Edgar to Shelby County	(217) 345-6476	<a href="http://www.embarrassstewards.org/">http://www.embarrassstewards.org/</a>	No	Yes
Friends of the Sangamon Valley	Macon, DeWitt	217-525-1410	<a href="http://www.fosv.org/">http://www.fosv.org/</a>		Yes
Funks Grove / Sugar Grove Nature Center / Funks Grove Volunteers	McLean Co.	309-874-3360	<a href="http://iwu.edu/~psolowsk/website/Funks_Grove.html">iwu.edu/~psolowsk/website/Funks_Grove.html</a>	Yes	Yes
Grand Prairie Friends	Champ/Urbana	217-244-5695	<a href="http://grandprairiefriends.org/">grandprairiefriends.org/</a>	Yes	Yes
Heartland Pathways	Champaign area		<a href="http://heartlandpathways.prairienet.org">heartlandpathways.prairienet.org</a>	No	Yes

Illinois Arborist Association	statewide	See website for numbers	illinoisarborist.org	Yes	No
Illinois Department of Natural Resources	Gibson City	217-784-4730 ext. 225	dnr.state.il.us	No	Yes
Illinois Department of Natural Resources	Charleston	217-345-2420	dnr.state.il.us	No	Yes
Illinois Forestry Development Council	statewide	217-493-6736	ifdc.nres.uiuc.edu	Yes	No
Illinois Native Plant Society	Forest Glen Chapter	217-733-2660	ill-inps.org		
Illinois Natural History Survey	Urbana	217-333-6880	inhs.uiuc.edu	Yes	Few
Illinois Nature Preserves Commission	Sidney	217-688-2622	dnr.state.il.us/INPC	No	Yes
Illinois State Geological Survey	statewide	217-333-ISGS	www.isgs.uiuc.edu	Yes	Few
Illinois State Water Survey	statewide	217-244-5459	sws.uiuc.edu	Yes	No
Izaak Walton League - Champaign County	Champaign	N/A	www.iwla.org Link to local chapter available	Yes	Few
Macon County Conservation District	Macon Co.	217-423-7708	maconcountyconservation.org/	Yes	Yes
National Wild Turkey Federation	statewide	See website	illinoisnwtf.org	No	Chapter Projects
Natural Resources and Conservation Service – Champaign County – Illinois Earth Team	Champaign and statewide	217-352-3536	ccswcd.com	Yes	Yes

ParkLands Foundation	McLean, Woodford, Ford	(309) 531-7065	<a href="http://www.parklands.org">http://www.parklands.org</a>		Yes
Pheasants Forever	Champaign DeWitt Douglas Edgar McLean Piatt Vermilion, etc.	See website for each chapter contact	<a href="http://pheasantsforever.org/chapters/getChapter.php?st=IL">pheasantsforever.org/chapters/getChapter.php?st=IL</a>	No	Yes
Piatt County Forest Preserve District	Piatt County.	217-762-4531	None currently available	Few	Few
Prairie Rivers Network	Urbana	217-344-2371	<a href="http://prairierivers.org">prairierivers.org</a>	Yes	Yes
Public Service Archaeology Program	Urbana	217-333-1636	<a href="http://anthro.uiuc.edu/psap/default.html">anthro.uiuc.edu/psap/default.html</a>	Yes	Yes
University of Illinois Extension – Champaign County	Champaign	217-333-7672	<a href="http://web.extension.uiuc.edu/champaign">web.extension.uiuc.edu/champaign</a>	Yes	Yes
Urbana Park District	Urbana	217-367-1544	<a href="http://prairienet.org/upd/">prairienet.org/upd/</a>	Yes	Yes
Vermilion County Conservation District	Vermilion Co.	217-442-1691	<a href="http://vccd.org">vccd.org</a>	Yes	Yes
Volunteer Stewardship Network of the Nature Conservancy	statewide	866-VSN-LINE	<a href="http://nature.org/wherewework/northamerica/states/illinois/volunteer">nature.org/wherewework/northamerica/states/illinois/volunteer</a>	Yes	Yes
<i>For Students</i>					
Red Bison - U of I	Urbana	(217) 337-1500	<a href="http://netfiles.uiuc.edu/ro/www/RedBison">netfiles.uiuc.edu/ro/www/RedBison</a> email: <a href="mailto:redbison@gmail.com">redbison@gmail.com</a>	No	Few

<p>Volunteer Illini Projects - Environmental – U of I</p>	<p>Urbana</p>	<p>Contact changes frequently so please see web-site</p>	<p>volunteerilliniprojects.org</p>	<p>No</p>	<p>Yes</p>
<p>The Wildlife Society – U of I</p>	<p>Urbana</p>	<p>Contact changes frequently so please see web-site</p>	<p>netfiles.uiuc.edu/ro/www/WildlifeSociety,IllinoisStudentChapter</p>	<p>No</p>	<p>Yes</p>



## Appendix IV

# Stewardship Resources

### Books and Pamphlets

#### Restoration, Plant Identification, and Invasive Species

Czarapata, E.J. 2005 Invasive Plants of the Upper Midwest: An Illustrated Guide to Their Identification and Control. University of Wisconsin Press.

Kaufman, S. R. and W. Kaufman. 2007. Invasive Plants: Guide to Identification and the Impacts and Control of Common North American Species. Stackpole Books, Mechanicsburg, PA.

Kurz, D. 2004. Illinois Wildflowers, Cloudland.net Publishing, Cave Mountain, Arkansas.

Mohlenbrock, R. 2002. Vascular Flora of Illinois. Southern Illinois University Press.

Newcomb, L. 1977. Newcomb's Wildflower Guide,. Little, Brown and Company, Canada.

Packard, S. and Mutel (eds). 1997. The Tallgrass Restoration Handbook,

Weeds of the North Central States. University of Illinois, Publication #281. 1981.

#### Pruning of Woody Plants

Brown, G.E., 1972. The pruning of trees, shrubs and conifers. Timber Press: Portland OR.

Chevron Chemical Co. 1989. All about pruning. Ortho Books: San Ramon CA.

Coombs, D., P. Blackburne-Maze, M. Cracknell and R. Bently. 1992. The complete book of pruning. Ward Lock Ltd.: London.

International Society of Arboriculture. 1995. Tree-pruning guidelines. International Society of Arboriculture: Savoy IL.

Harris, R.W. 1994. Clarifying certain pruning terminology: thinning, heading, pollarding. Journal of Arboriculture 20(1):50-54.

Joyce, D. 1992. The complete guide to pruning and training plants. Simon and Shuster: New York.

Rakow, D.A. and R. Weir III. 1993. Pruning. Cornell Cooperative Extension Information Bulletin 23: Ithaca NY.

Shigo, A.L. 1986. A new tree biology. Shigo and Trees, Associates: Durham NH.

Shigo, A.L. 1991. Modern arboriculture. Shigo and Trees, Associates: Durham NH

Shigo, A.L. 1989. Tree pruning: a worldwide photo guide. Shigo and Trees, Associates: Durham NH

Sunset Books. 1983. Pruning Handbook. Lane publishing: Menlo Park CA.

U.S. Forest Service. 1995. How to prune trees. NESPF Publication NA-FR-01-95: Radnor PA.



## Websites

USDA Plants database

<http://www.invasivespeciesinfo.gov/plants/index.html>

Volunteer Stewardship Network

<http://www.nature.org/wherewework/northamerica/states/illinois/volunteer/art9844.html>

The Nature Conservancy Weeds – University of California at Davis – Global Invasive Species Team – *Weed Control Methods Handbook: Tools & Techniques for Use in Natural Areas*, and other resources  
<http://www.tncweeds.ucdavis.edu/>

Invaders Database System

<http://invader.dbs.umt.edu/default.htm>

National Park Service's invasives

[www.nps.gov/plants/alien/index.htm](http://www.nps.gov/plants/alien/index.htm)

The Nature Conservancy Invasives Initiative

<http://www.nature.org/initiatives/invasivespecies/>

The Nature Conservancy Fire Manual

<http://www.tncfire.org>

Midwest invasive plant network

<http://www.mipn.org/>

Society for Ecological Restoration

<http://www.ser.org/>

Natural Areas Association

<http://www.naturalarea.org/>

## Appendix V

# Control of Common Invasives

For more detailed information on the most commonly found invasive species in Illinois, refer to the Illinois Nature Preserves Commission's *Vegetation Management Manual* found at the website: [dnr.state.il.us/INPC/stewardship.htm](http://dnr.state.il.us/INPC/stewardship.htm) (click the link for management guidelines) or on the enclosed compact disk. The manual describes natural, mechanical and chemical control methods that can be used in high-quality natural areas and buffer or severely disturbed areas.

11/02/08

Common Name	Scientific Name	Description	Treatment
Tree of Heaven	<i>Ailanthus altissima</i>	Deciduous tree may grow to 90 ft tall and has large, pinnately compound leaves that have from 10 to 25 or more sharply-pointed leaflets. The small, greenish flowers that develop in June are very foul-smelling on the female trees. These flowers develop into flat, papery fruits that are wind dispersed. This tree is a prolific producer of root sprouts.	<p>The hack-and-squirt method is recommended during the <b>summer</b>. This method requires making downward-angled cuts into the sapwood around trunk and squirting a 100% concentration water-soluble Triclopyr (Garlon 3A — check label for changes in recommended usage) within a minute or two of the cut. A continuous line of cuts around the trunk would likely cause the tree to go into emergency response mode and react by producing basal sprouts and root suckers.</p> <p>Repeated burns can control Tree of Heaven.</p> <p>Another option is to use Triclopyr (Garlon 3A) at 100% treating only the outer 1/3 of the stump surface. Be prepared to follow-up with a foliar application the next year to control any stump sprouts or root suckers which emerge.</p> <p>Seedlings can also be treated with a foliar application. Spray entire plant without allowing herbicide to drip.</p>

<p>Garlic Mustard</p>	<p><i>Alliaria petiolata</i></p>	<p>Herbaceous, biennial plant with first year seedlings emerging in spring or summer, forming basal rosettes. Their ground-hugging nature makes them easy to overlook. Immature plants over-winter as basal rosettes. In the spring of the second year the rosettes produce flower stalks, 3 to 5 ft, set seed, and die. Basal leaves are kidney shaped with scalloped edges. Young plants can sometimes be confused with violets or creeping Charlie (<i>Glechoma hederace</i>) another, but currently less worrisome, invasive. Stem leaves are alternate, sharply-toothed and triangular. New leaves produce a distinct garlic odor when crushed. Flowers are white with 4 petals. This species is a major problem in woodlands and increasingly in more open areas.</p> <p>Can form a monoculture, eliminating native herbaceous plants. Seeds can survive for several years.</p>	<p>Best way to control garlic mustard is to prevent its establishment.</p> <p>Hand pulling is effective in light infestations anytime the soil is moist and workable and is preferable when native plants are present. Plants are capable of flowering and setting seed even after being pulled and therefore must be removed from the site. Shake the soil from the roots or the plant will continue to grow after being pulled if left on the ground</p> <p>Fall or early spring burning is an effective control treatment. Repeated burns over several years may be necessary to achieve adequate control and to eliminate the seed bank. Prescribed fires should be of sufficient intensity to burn the affected site thoroughly. Any isolated plants that are not burned should be removed by hand prior to seed set.</p> <p>Spot application of glyphosate (check label for concentration) to the foliage of individual plants is effective during spring and fall when most native vegetation is dormant.</p>
<p>Japanese Barberry</p>	<p><i>Berberis thunbergii</i></p>	<p>Japanese barberry is a compact, woody shrub with arching branches. Most commonly it is 2 to 3 feet high, but can grow to 6 feet in height. On the stems, there is a single spine below each rosette of wedge-shaped, un-toothed leaves.</p>	<p>Mechanical removal is recommended as it is one of the first plants to leaf out. The use of a hoe is suggested to uproot the entire bush and roots. Use gloves to protect hands from the spines. Plants growing in rock piles, which are difficult to dig out, can be treated with glyphosate.</p>

<p>Oriental Bittersweet</p>	<p><i>Celastrus orbiculatus</i></p>	<p>Deciduous woody vine with the outer surface of its roots being characteristically bright orange. Axillary buds are long, rounded and sometimes become spine-like. Leaves are glabrous, alternate and extremely variable in size and shape.</p>	<p>Mechanical and herbicide control is recommended with stems cut to the ground early in the growing season and allowed to resurge. Approximately one month later, foliar applications of an herbicide containing triclopyr result in essentially 100% root kill. Regular, weekly mowing will exclude plant.</p> <p>Large stems can be cut and treated with Triclopyr 16% during the dormant season</p>
<p>Canada thistle</p>	<p><i>Cirsium arvense</i></p>	<p>A tall (2 to 5 ft) rhizomatous forb with deep roots that has oblong, sessile leaves that are deeply divided, with prickly margins. Slender stalks, branching at the top with numerous small, compact rose-purpled or white flowers. Seeds are small, light brown, smooth and slightly tapered, with a tuft of tan hair loosely attached to the tip.</p> <p>This is a very difficult species to control. Efforts to prevent infestations are especially important for Canada thistle.</p>	<p>Repeated pulling, hand cutting or mowing before the flowers open will eventually starve the underground stems. This should be done at least 3 times in each season, in June, August, and September. Remove cuttings so flower heads do not bloom and set seed on site. It may need to be repeated for several years.</p> <p>Prescribed fire can be effective in controlling this species. Late spring burns are most detrimental. Early fires increase sprouting and rhizome formation. Burns should be conducted annually for the first 3 years.</p> <p>Spot application of 2,4-D or glyphosate can control this plant. Treat individual plants with a wick applicator or hand sprayer. Foliar application of clopyralid results in the death of both the roots and top-growth, while soil application will damage only the roots and may not kill the plants.</p> <p>Any type of plowing or cultivation produces root cuttings, each of which can form a new plant.</p>

<p>Poison Hemlock</p>	<p><i>Conium maculatum</i></p>	<p>Second most poisonous plant in the U.S. second only to native water hemlock (<i>Cicuta maculata</i>). Biennial herbaceous plant. Grows well in wet areas. All parts, especially green fruits, poisonous. 1 1/5 to 10 feet tall. Small white flowers common April through early July. Produces flowers and seeds in second year. Spreads primarily by seed.</p>	<p>Elimination of seed production is the goal. Hand pulling or grubbing is most effective before the plant flowers. Entire root need not be removed since it's a biennial. Care must be taken to wear gloves and long sleeves and to remove and properly dispose of plant material. Dead plant remain toxic and are capable of endangering wildlife and children for several years. No known biological controls, but herbicides (glyphosate, 2,4-D, dicamba) properly applied are effective.</p>
<p>Gray Dogwood</p>	<p><i>Cornus racemosa</i></p>	<p>Native shrub up to 8 feet tall with slender gray to light brown branches. Leaves are simple, opposite, and lanceolate. The flowers are small and creamy white. The fruit is a white drupe on a red pedicel and in red-stalked raceme-like clusters.</p>	<p>Management goals are often to reduce abundance to an acceptable level rather than to eradicate. Cut stump: cut shrub down, treat top and basal parts of stump with ester formulation of triclopyr in oil, with an oil-based dye. Foliar application: amine formulation of triclopyr in water. Spray entire plant. Pull seedlings.</p>
<p>Teasel (common or cut-leaf)</p>	<p><i>Dispacus sylvestris</i> <i>Dispacus laciniatus</i></p>	<p>Biennial that grows in the rosette stage at least 1 year, leaves vary from somewhat ovoid to large and oblong leaves that are quite hairy. The tap root may be over 2 feet deep. Cut-leaved teasel blooms from July to September; common teasel blooms from June to October. Flowering plants have large, opposite, sessile leaves that form cups (the cups may hold water) and are prickly. Stems are aggressively spiny. Flowering stems may reach 6-7 feet tall.</p>	<p>Rosettes can be dug up using a dandelion digger. As much of the root as possible must be removed to prevent resprouting. Flowering stalks can be cut and removed once flowering has initiated.  Prescribed burns in late spring probably work best in conjunction with other methods.  Foliar application of glyphosate or 2,4-D amine herbicide is recommended where cutting and removal or digging is not feasible. Spraying first year rosettes when native plants are dormant can be effective.</p>

Autumn Olive	<i>Elaeagnus umbellata</i>	Shrub or small tree to 20 feet. Leaves are silvery underneath, generally oval in shape and lack teeth. Flowers are light yellow, tubular, arise from leaf axils along twigs and bloom in May or June after first flowers appear, fragrant. The small (less than 1/4") fleshy fruits range in color from pink to red and are produced in abundance each year.	Seedlings and sprouts can be hand pulled in early spring when adequate ground moisture is present. Care should be taken to remove the entire root system. Herbicides offer more effective control and can be used for basal bark applications any time of the year. Cut-stump application of glyphosate is effective. Cutting without application of herbicide results in denser vegetation since it will readily resprout. Foliar sprays of glyphosate may be effective.
Burning Bush	<i>Euonymus alatus</i>	Deciduous shrub 13 – 20 ft tall. Bark is gray-brown and the stems have prominent, corky wings running along both sides. The leaves are opposite, elliptic with fine, sharp serrations on the margin. In autumn the leaves turn a brilliant purplish red to scarlet color. Fruit contains approximately 4 red to orange seeds.	Seedlings can be easily hand-pulled, especially when the soil is moist. Larger plants and their root systems can be dug out with a spading fork or pulled with a weed wrench. The stump must be ground out or the regrowth clipped. The cut stump can also be painted with glyphosate immediately after cutting, following label directions. Where populations are so large that cutting is impractical, glyphosate or an amine formulation of triclopyr may be applied as a foliar spray. This is most effective during the early summer months.
Giant Hogweed	<i>Heracleum mantegazzianum</i>	A tall herbaceous plant 8 to 14 feet tall. Its thick stems have purple blotches and coarse hairs. It is a dangerous, poisonous plant that should not be touched without protective clothing. Skin exposure to the plant's sap can cause serious blisters and burning if skin is subsequently exposed to sunlight (called photoreactive). It spreads by seed.	Avoid skin contact with toxic sap of the plant tissues by wearing gloves, sleeves, and long pants. Clear above ground leaf and stem material by hand (with gloves). Remove ground material of roots and seeds. Glyphosate is considered the most effective herbicide, but should be used with caution around desirable plants. Rodeo or its equivalent is recommended in wet areas.

<p>Japanese hops</p>	<p><i>Humulus japonicus</i></p>	<p>A rapidly growing annual, or in rare instances a short-lived perennial, herbaceous vine with stems that climb or trail along the ground and have small down-turned prickles. The leaves are opposite, 5 - 12.5 cm (2 - 5 inches) in length and palmately divided into 5 - 9 lobes that gradually taper to a point. The leaf margins have small forward pointing teeth. The leaves, like the stems, have rough, down-turned hairs that may cause dermatitis in sensitive individuals.</p> <p>Japanese hops flowers in July - August. Reproduction is by small seeds that are dispersed mechanically; usually by wind or water along rivers and streams, or vegetatively through fragmentation. Seeds may remain viable in the seed bank for three or more years.</p>	<p>Hand pulling prior to seed maturation in late summer, can be effective for small populations. To minimize re-sprouting, as much of the rootstock as possible should be removed. When possible, pulled plants should be removed from the area as leaf nodes that remain in contact with moist soil may develop adventitious roots before the plants completely die. Mowing, cutting with a brush cutter or other device, or burning with a torch will reduce aboveground growth and may prevent seed development if plants are cut or burned immediately prior to flowering. Re-sprouting is likely and additional treatments or cuttings may be necessary. To prevent spread by vegetative means, all Japanese hops plant material should be removed from rotary mowers prior to leaving an infested area.</p> <p>Apply 2 % Triclopyr (Garlon 3A/Tahoe 3A) solution to thoroughly cover the plants. Care should be taken to avoid spraying non-target plants. In degraded areas, 2.5 ounces glyphosate (Roundup, Rodeo) per gallon of solution can be similarly applied.</p>
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<p>Japanese Honey-suckle</p>	<p><i>Lonicera japonica</i></p>	<p>Hardy perennial. Slender, twining vine with a profusion of small, funnel-shaped, white to yellow, fragrant flowers. Inconspicuous berries are black when ripe. Lacks holdfasts or tendrils found on climbing vines such as Virginia creeper or grape. Oval-shaped, opposite leaves. Especially destructive to native communities. Can completely cover the ground, shrubs, and saplings, depriving them of sunlight and eventually excluding all competition below the main forest canopy.</p>	<p>Treatment is the same as bush honeysuckle.</p>
<p>Bush Honeysuckle</p>	<p><i>Lonicera maackii</i>  <i>Lonicera tatarica</i>  <i>Lonicera morrowii</i>  <i>Lonicera x bella</i></p>	<p>Long-lived, deciduous woody shrubs from 6 to 15 feet tall. The egg-shaped leaves are opposite along the stem and short-stalked. Older stems are often hollow. Pairs of fragrant, tubular flowers less than an inch long are borne along the stem in the leaf axils. Flower color varies from creamy white to pink or crimson in some varieties and are usually very fragrant. The fruits (clusters of 2 or 4) are red to orange, many-seeded berries. Bush honeysuckle is suspected to produce alleopathic chemicals in their roots that are toxic to native species.</p>	<p>Hand removal of seedlings or small plants may be useful for light infestations. Seedlings can be controlled with glyphosate sprayed onto the foliage or applied by sponge. Larger stands can be managed by cutting the stems to ground level and painting stumps with a slightly higher concentration of glyphosate. Triclopyr has been found only partially effective when used as a cut stump treatment.</p> <p>Plants will vigorously resprout when cut or burned and pieces of the roots will sprout if they are left intact after hand pulling or digging. Prescribed burns have shown promise for control in open habitats. In all instances, control should be initiated prior to the seed dispersal period (late summer to early autumn) to minimize reinvasion of treated habitats.</p>

<p>Purple Loosestrife</p>	<p><i>Lythrum salicaria</i></p>	<p>Perennial herbaceous, bushy plant 3 to 8 ft tall. The square stem can be glabrous to pubescent. The sessile leaves are opposite or in whorls with cordate bases. The rose-purple inflorescence is spike-like with 5-7 petals and typically blooms from June to September. Mature plants have dense, woody roots. A mature plant can have as many as 1 million tiny seeds a year.</p> <p>Early detection is critical because it is a serious, extremely rapid invader. Grows so thickly and spreads so quickly with such extensive roots that native wetland plants have no chance to survive.</p>	<p>Hand-removal is recommended for small populations and isolated stems. Plants should be pulled out before they have set seed. The entire rootstock must be pulled out since regeneration from root fragments is possible. Cutting plants will only cause vigorous resprouting.</p> <p>A combination of burning and application of glyphosate has been successful.</p> <p>Garlon 3A or Roundup is most commonly used for control but cannot be used over water. Spraying should be done after the period of peak bloom, usually late August. Over water use Rodeo herbicide.</p> <p>A biocontrol method (a small, root-mining weevil, 2 leaf-eating beetles, and a flower-eating beetle native to Europe have been released in North America and tests indicate they are host specific.) is available by introducing a beetle that only eats this plant. Sites should be scouted annually for any infestation and all plants removed and destroyed.</p> <p>Mowing, burning and flooding are ineffective.</p>
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<p>Sweet Clover (yellow and white)</p>	<p><i>Melilotus officinalis</i> <i>Melilotus alba</i></p>	<p>Sweet-scented annual or biennial legumes growing 1 to 5 ft. Develop extensive root system in late spring or summer after germination. First year plants can be found in late summer. During second year, plants may be seen in late April or early May. These plants have a strong taproot and root crown from which new shoots appear. Flowers bloom from late May through September, set seed and die. Flowers are crowded densely on the top 4 inches of an elongated stem, with younger flowers emerging nearest the tip. Each tiny flower is attached to the stem by a minute stalk. The small pea-like flowers are white or yellow. Leaves are alternate and trifoliate. Leaflets are finely toothed. Yellow is smaller and blooms earlier.</p>	<p>Hand-pulling is effective if done when ground is moist and most of the root can be removed so it doesn't resprout in the growing season. For large colonies cutting stems to ground with a scythe prior to seed set is effective.</p> <p>Prescribed fire can also be used by implementing a dormant season burn (late fall or early spring) to stimulate germination in the subsequent growing season, followed by a later spring burn the next season to eliminate the second year plants before seed set. Following a fall burn, hand spray individual seedlings with an amine formulation of 2,4-D according to label instructions in spring, before native prairie vegetation emerges.</p>
<p>Wild Parsnip</p>	<p><i>Pastinaca sativa</i></p>	<p>Aggressive, herbaceous biennial plant with a light green, hollow, deeply grooved stem that is 2 to 5 feet tall. Rosettes appear February through April. Leaves are alternate, pinnately compound and branched with saw-toothed edges. Each leaf has 5 to 15 leaflets. The small 5-petaled yellow flowers are arranged in umbels at the top of slender stems and branches, usually appearing in mid-May with seeds maturing by mid-July. The sap is a photoreactive and can cause serious blisters and burning if it comes into contact with the skin and is later exposed to light.</p>	<p>Avoid skin contact with the toxic sap of the plant tissues by wearing gloves, long sleeved shirt and long pants.</p> <p>Elimination of seed production is the goal.</p> <p>The best control is achieved mainly through hand pulling. Plants should be pulled and removed from the site. Mowing late enough so the plant does not resprout, yet before seed sets is effective. Remove any seed heads.</p> <p>Prescribed fire will eventually kill it, but may actually clear the way for wild parsnip to sprout.</p> <p>Application of glyphosate to basal rosettes and individual plants in late fall after most native vegetation is dormant is effective.</p>

<p>Reed Canary Grass</p>	<p><i>Phalaris arundinacea</i></p>	<p>Sod-forming, cool-season perennial grass that has hairless stems and is 2 to 6 feet tall. The ligule (collar around the stem at the base of the leaf) is prominent, membranous and rounded at the apex. The tapering leaf blades are wide, flat, and coarse. The panicles are erect or sometimes slightly spreading. Single flowers occur in dense clusters May to mid-June inflorescences are green or slightly purple but become tan. Grows so thickly that it eliminates native species, mostly in wetlands and wet prairies.</p>	<p>Goal is to contain &amp; gradually eradicate.</p> <p>Detassel when flowering starts, usually mid to late June. Cut &amp; remove stalks at flowering time. Mowing twice a year in early June and October removes flowers &amp; lets more light reach the ground to encourage native species.</p> <p>Prescribed fire in late fall or late spring for up to 5 years can help to control this species. Works best when combined with herbicide application.</p> <p>Spraying with Roundup or Rodeo in October when native plants are dormant in the morning after dew evaporates is very effective.</p> <p>Restoring water levels in artificially drained wetlands will also assist in control.</p>
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<p>Common Reed</p>	<p><i>Phragmites australis</i></p>	<p>A tall, perennial grass that can grow to over 15 feet. Flowers form bushy panicles in late July and August and are usually purple or golden in color. As seeds mature, the panicles begin to look “fluffy.” Spreads through vigorous rhizomes. Forms large dense colonies that shut out all native vegetation.</p>	<p>Hand-removal is recommended for small populations and isolated stems. Ideally, the plants should be pulled out before they have set seed. The entire rootstock must be pulled out since regeneration from root fragments is possible.</p> <p>Frequent mowing or mowing when the flower stalks start to elongate, can reduce the plants’ ability to store energy. Several seasons of intensive mowing may reduce populations.</p> <p>Prolonged deep flooding causes the roots of phragmites to rot, but native species could also succumb to flooding.</p> <p>A biocontrol method is available by introducing a beetle that only eats this plant.</p> <p>Roundup is most commonly used for control but cannot be used over water. Spraying should be done after the period of peak bloom, usually late August. Over water use Rodeo.</p>
<p>Japanese knotweed</p>	<p><i>Polygonum cuspidatum</i></p>	<p>Stout, bamboo-like stems with broad (2 – 5”) green leaves. Emerges early and grows 4 to 10 feet, shading out its competitors. In late summer, produces either male or female greenish-white flowers along top of plants. Most male plants in the U.S. are sterile. Reproduces primarily vegetatively through rhizomes. Grows well in wet to dry, poor to rich soils.</p>	<p>Repeated cutting of the stems, as often as 3 times in a season, and covering with black plastic may slow and eventually eliminate the plants. Elimination takes several years of labor-intensive work. Best to catch individual plants as they arrive at a site and eliminate them. Digging is not recommended since even small pieces of rhizomes can generate new plants. Reported that <i>P. cuspidatum</i> is resistant to most, if not all, herbicides.</p>

<p>Fig Buttercup, Lesser Celadine</p>	<p><i>Ranunculus ficaria</i></p>	<p>Herbaceous, perennial plant with a basal rosette of dark green, shiny, stalked, kidney-shaped leaves. Flowers have 8 glossy, yellow petals. Pale-colored bulblets are produced along the stems of the above ground portions of the plant, but are not apparent until late in flowering period.</p>	<p>The window of opportunity for controlling is very short, due to its life cycle. In order to have the greatest negative impact herbicide should be applied in late winter/early spring using Rodeo for wetland areas. It may be pulled by hand or dug using a hand trowel or shovel. It is very important to remove all bulblets and tubers.</p>
<p>Common Buck-thorn</p>	<p><i>Rhamnus cathartica</i></p>	<p>Deciduous shrub or tree 6 to 25 feet tall and 10 inches in diameter. Dull green leaves are ovate/elliptic, glabrous and minutely serrate. Leaves are alternate or sub-opposite. Bark and twigs have prominent lenticels. Twigs may be tipped with sharp stout thorns. Ripe fruit are black &amp; 1/4" diameter. Once buckthorns are large enough to shade the ground, fire cannot be used to control them because the ground beneath is bare, so there is no fuel to keep a fire going.</p>	<p>Controls include cutting, mowing, girdling, and burning. Fire is effective and is the preferred method. Burning yearly or every other year may be required for 5 to 6 years or more. Seedlings and saplings can be removed by hand or with a hoe. Seeds can survive 2 to 3 years in soil. Buckthorns readily resprout when cut and need to be treated with herbicide. Use Garlon 4 in oil as a cut stump or basal bark treatment or cut stumps and then spray resprouts with Garlon 4. Foliar spray Garlon 3 or Garlon 4 in water.</p>

<p>Glossy Buckthorn</p>	<p><i>Rhamnus frangula</i></p>	<p>Shrub or small tree to 20 feet tall. Branches have elongate lenticels. Thin glossy leaves are obovate or elliptic with entire or obscurely crenulate margins. They are glabrous or slightly pubescent beneath and usually alternate. Small pale yellow, 5-petaled flowers clustered in leaf axils. Fruits are one-seeded drupes and ripen from red to deep purple.</p> <p>In dormancy, it is possible to confuse glossy buckthorn with spicebush, speckled alder, and gray dogwood.</p> <p>Once buckthorns are large enough to shade the ground, fire cannot be used to control them because the ground beneath is bare, so there is no fuel to keep a fire going.</p>	<p>Controls include cutting, mowing, girdling, and burning. Fire is effective and is the preferred method. Burning yearly or every other year may be required for 5 to 6 years or more. Seedlings and saplings can be removed by hand or with a hoe. Seeds can survive 2 to 3 years in soil. Buckthorns readily resprout when cut and need to be treated with herbicide. Use Garlon 4 as a cut stump or basal bark treatment or to cut stumps and then spray resprouts with Garlon 4.</p>
<p>Black Locust</p>	<p><i>Robinia pseudoacacia</i></p>	<p>Large deciduous tree growing up to 80 feet tall. Older trees have furrowed dark brown bark with flat-topped ridges. Leaves are alternate, pinnately compound with 7 to 21 leaflets. Fragrant white flowers have a yellow blotch on the uppermost petal, and are born in drooping racemes. The seed pods contain 4 to 8 seeds.</p>	<p>Spread can be hindered by repeated cutting during the growing season. All stems should be cut and new stems removed in the same growing season. Basal bark treatment with Garlon 4 can be effective. Spray this mixture, using a hand sprayer to a height of 12 to 15 inches. Glyphosate can be foliar-sprayed on leaves as a control. For good control, all leaves on all shoots should be treated. Spray coverage should be uniform and complete.</p>

<p>Multiflora Rose</p>	<p><i>Rosa multiflora</i></p>	<p>Widely spreading shrub with long arching canes &amp; long curved thorns. Grow into impenetrable thickets which blanket and smother other vegetation. Feathery margins on the green stipules located at the base of each stalk. The many small white flowers distinguish it from the pink flowers of native roses. Relatively small hips in bunches.</p>	<p>Small plants can be pulled. Very heavy gloves are required, thorns can penetrate leather. New plants can grow from broken or cut roots. 3 to 6 mowings per year, repeated for 2 to 4 years, will help control them.</p> <p>Prescribed burns will slow the growth.</p> <p>Cut stump treatment with glyphosate or triclopyr is effective in late summer, fall or winter.</p>
<p>European High Bush Cranberry</p>	<p><i>Viburnum opulus</i></p>	<p>Shrub to 20 feet tall with yellow or white flowers. Leaves are opposite, 3-lobed and look "maple-like." It can be distinguished from native cranberry by petioles with concave or depressed glands.</p>	<p>Herbicide is recommended for control.. cut stems and treat with Garlon 4 has proven effective.</p>





## Appendix VI

# Commonly Used Herbicides

This is merely a sketch of current herbicides, target plants, and warnings to help you find a starting place for your particular invasive control needs. ***All herbicides are to be applied by Illinois State Licensed Pesticide applicators. In all cases, refer to the extended label for instructions before making a final decision on the appropriate herbicide for your specific needs.***

Check with the property owners to see if herbicide use by volunteers is allowed and if there is additional training specific to the site or agency. Each agency, by law, must have an area designated to display Material Safety Data Sheets (MSDS) of each herbicide. All applicators should know where that information is located.

Adapted from: *Weed Control Methods Handbook*,  
The Nature Conservancy  
11/02/08

\* Half-Life: Half-life is the time it takes for half of the herbicide applied to the soil to dissipate. The half-life gives only a rough estimate of the persistence of an herbicide since the half-life of a particular herbicide can vary significantly depending on soil characteristics, weather (especially temperature and soil moisture), and the vegetation at the site.

\*\* The behavior of an herbicide in water is dictated by its solubility in water. Salts and acids tend to remain dissolved in water until degraded through photolysis or hydrolysis. Esters will often adsorb (stick/cling) to the suspended matter in water, and precipitate to the sediments. Once in the sediments, esters can remain adsorbed to soil particles or be degraded through microbial metabolism. Highly acidic or alkaline waters can chemically alter an herbicide and change its behavior in water.

(Definitions from: *Weed Control Methods Handbook*,  
The Nature Conservancy)

11/02/08

Brand Name Examples	Chemical Name	Recommendations	Cautions
Navigate Class Weed-Pro Justice Trimec	2, 4-D	<p><b>Targets general broadleaf weeds. Can be used to control mustard, clover, spurge, thistles, ground ivy, burdock, wild parsnip, garlic mustard, poison hemlock among others. However, if any desirable broadleaf species are nearby then hand pulling is preferable.</b></p> <p>Mostly absorbed in 1/2 hour, so rain later in the day is not a problem. If there is frost after application, Trimec will be reactivated inside the plant to continue its work</p> <p>Inexpensive and common herbicide used for over 50 years.</p> <p>Average Soil Half-Life: 10 Days Average Half-Life in Water: varies from hours to months</p>	<p>Ester formulations are toxic to fish and aquatic invertebrates, but salt formulations are registered for use against aquatic weeds.</p> <p>Moderately toxic to animals; can accumulate in animals. Risk to browsing wildlife, however, is low.</p>
Reclaim Curtail Transline Stinger	Clopyralid	<p>Targets selected annual &amp; perennial broadleaf weeds in non-cropland areas, rights-of-way and wildlife openings including grazed areas, wild parkland and wildlife management areas. Can be used for forest spot applications adjacent to these sites.</p> <p>Especially for control of such weeds as Canada thistle (<i>Cirsium arvense</i>), musk thistle (<i>Carduus nutans</i>), sweet clovers (<i>Melilotus alba</i> &amp; <i>M. officinalis</i>), teasel (<i>Dispacus sylvestris</i> &amp; <i>D. laciniatus</i>). Little or no effect on the mustard family (<i>Brassicaceae</i>) and several other groups of broad-leaved plants. Effective against members of the <i>Asteraceae</i> (sunflower family), <i>Fabaceae</i> (legume family), <i>Solanaceae</i> (nightshade family), <i>Polygonaceae</i> (knotweed family), <i>Violaceae</i> (violet family).</p> <p>In the case of Canada thistle, foliar application results in the death of both the roots and top-growth, while soil application will damage only the roots and may not kill the plants.</p> <p>Passes rapidly into leaves and roots of plants and is rain-fast within 2 hours.</p> <p>Highly selective herbicide developed as an alternative to picloram.</p> <p>Average Soil Half-Life: 40 Days Average Half-Life in Water: 8 – 40 Days</p>	<p>Clopyralid does not bind with soils and is relatively persistent in soil, water, and vegetation. Has the potential to be highly mobile and a contamination threat to water resources and non-target plant species.</p> <p>Can cause severe eye damage if splashed into the eyes during application, but otherwise is non-toxic to fish, birds, mammals, and other animals.</p>

<p>Krenite</p>	<p>Fosamine</p>	<p>Targets trees &amp; bushes.</p> <p>When applied in late summer or early fall (usually 1 to 2 months before autumn leaf-drop), effects are generally not visible until the following spring when treated vegetation fails to bud-out.</p> <p>Average Soil Half-Life: 8 Days Average Half-Life in Water: stable in water</p>	
<p>RoundUp RoundUp Pro GlyPro Glyphomax Accord Rodeo AquaNeat</p>	<p>Glyphosate</p>	<p>Broad-spectrum, non-selective control of annual and perennial weeds, woody brush and trees. Little or no soil activity.</p> <p>Water-soluble herbicide for general spray use in the control of exotic plant species. Non-selective, it kills all green plants within a few days of spraying. Can be used as a foliar spray or for cut-stump application. Cannot penetrate woody bark.</p> <p>Harmless to most plants once in the soil because it is quickly adsorbed to soil particles; even when free, it is not readily absorbed by plant roots.</p> <p>Relatively non-toxic to birds and mammals. Certain surfactants or other ingredients in some formulations are toxic to fish and other aquatic species.</p> <p>Effective against bush honeysuckle (<i>Lonicera</i> spp.), common buckthorn (<i>Rhamnus cathartica</i>), glossy buckthorn (<i>Rhamnus frangula</i>), Japanese honeysuckle (<i>Lonicera japonica</i>), sweet clovers (<i>Melilotus officinalis</i> &amp; <i>M. alba</i>), bindweed (<i>Convolvulus arvensis</i>).</p> <p>Rodeo: Water-soluble liquid concentrate that is approved for use in wetlands. Can be sprayed on such plants as reed canary grass and purple loosestrife.</p> <p>In wetlands, effective against reed canary grass (<i>Phalaris arundinacea</i>), glossy buckthorn (<i>Rhamnus frangula</i>), common reed (<i>Phragmites australis</i>), purple loosestrife (<i>Lythrum salicaria</i>).</p>	<p>Wear nitrile gloves and take precautions against spray contacting either yourself or native plants.</p> <p>Some formulations are highly toxic for eye and skin exposure.</p> <p>Care must be taken in application to avoid desirable native plants, since glyphosate will likely kill them as well as the invasives.</p>

Dissipates rapidly in water through adsorption to suspended and bottom sediments. Glyphosate itself is moderately toxic to fish. Surfactants in some formulations are highly toxic to aquatic organisms; these formulations are not certified for aquatic use.

When glyphosate is used as an aquatic herbicide, do not treat the entire water body at one time. Treat no more than 1/3 to 1/2 of any water body at any one time, to prevent fish kills caused by dissolved oxygen depletion.

Average Soil Half-Life: 2 months

Average Half-Life in Water: 12 days – 10 weeks

<p>Poast Ultima Vantage Conclude Rezult</p>	<p>Sethoxydim</p>	<p>Active only for treating grasses with neither sedges nor broadleaf plants being affected. Rapid degradation by light and microbes can limit effectiveness. Can be highly mobile in environment. Relatively low toxicity to birds, mammals, and aquatic animals, and has little noticeable impact on soil microbe populations. The general consensus is that Sethoxydim is not effective on hearty perennials like reed canary grass, fescue, and brome. It works best on annuals and not so tough to kill perennials like red top and timothy. Average Soil Half-Life: 5 Days Average Half-Life in Water: hours in sunlight</p>	
<p>Garlon Remedy Access Tahoe 4E</p>	<p>Triclopyr</p>	<p>Selective, systemic herbicide targeting woody &amp; annual and perennial broad-leaf weeds in grazed lands, rights of way, fence rows, and for the establishment and maintenance of wildlife openings. Little or no impact on grasses. Comes in 2 formulations: an ester formulation sold as Garlon 4 that is diluted in basal oil and an amine formulation sold as Garlon 3A that is diluted with water  Ester formulation is diluted with basal oil. Does not freeze and can be applied any time of year. Used primarily to coat cut stumps, girdled stems or basal bark of exotic woody plants during the dormant season.  Aqueous solutions can be used for foliar spray of buckthorn resprouts. Ester formulations are especially effective against root- or stem-sprouting species such as buckthorns (<i>Rhamnus</i> spp.), ash (<i>Fraxinus</i> spp.), and black locust (<i>Robinia pseudoacacia</i>), because triclopyr remains persistent in plants until they die.  Plants controlled include tree-of-heaven (<i>Ailanthus altissima</i>), common and glossy buckthorn (<i>Rhamnus cathartica</i> &amp; <i>R. frangula</i>), European highbush cranberry (<i>Viburnum opulus opulus</i>), Siberian elm (<i>Ulmus pumila</i>), and Norway maple (<i>Acer platanoides</i>). Effective for treating plants of the Bean and Composite Families. It is used to control invasive plants such as crown vetch (<i>Coronilla varia</i>) and Canada thistle (<i>Cirsium arvense</i>).  Only slightly toxic to birds and mammals. *Average Soil Half-Life: 30 days **Average Half-Life in Water: 4 days</p>	<p>Do not apply to any open water or to stumps standing in water.  The ester formulation is highly toxic to aquatic organisms.  Wear nitrile gloves and safety glasses in addition to standard protective clothing. Garlon 3 can cause severe damage to the eyes.</p>



Appendix VII  
**Fire Control on Selected Invasive Species**

Adapted from: *Weed Control Methods Handbook*, The  
Nature Conservancy

11/02/08



Common Name	Scientific Name	Effects of Burning
Canada Thistle	<i>Cirsium arvense</i>	<ul style="list-style-type: none"> <li>• Fewer thistles seen in years following a burn than before or year of the burn</li> <li>• Late spring burns (May-June) are most detrimental — thistles may increase the first year following a May burn, but will decline within 2 growing seasons; immediate reductions in thistles occur following a June burn</li> <li>• Early spring burns can increase sprouting and reproduction</li> <li>• During first 3 years of control efforts, burning should be conducted annually</li> </ul>
Teasel	<i>Dipsacus sylvestris</i>	<ul style="list-style-type: none"> <li>• In sparse stands, late spring burns are effective</li> <li>• Little control is provided by burning in dense stands, because fire will not carry through</li> <li>• Burning works best in conjunction with other means of control</li> </ul>
Sweet Clover White & Yellow	<i>Melilotus alba</i> <i>Melilotus officinalis</i>	<ul style="list-style-type: none"> <li>• At least 2 burns are necessary for control</li> <li>• Increase in abundance in first year after burn</li> <li>• Burning in late spring of the second year as the shoots elongate, results in a kill of second year plants prior to flowering and seed set</li> <li>• Mulching was found to be more effective than late spring burning</li> <li>• Dormant season burns stimulate germination and increase the chance that plants will survive to produce seeds</li> <li>• Dormant season burns can be used in conjunction with mowing or clipping in summer of the following year as plants follow</li> </ul>
Wild Parsnip	<i>Pastinaca sativa</i>	<ul style="list-style-type: none"> <li>• Fire removes ground litter and standing litter, providing favorable conditions for the development of parsnip rosettes</li> <li>• Periodic burning may help maintain the vigor of native plants to allow them to better compete with parsnip</li> </ul>
Reed Canary Grass	<i>Phalaris arundinacea</i>	<ul style="list-style-type: none"> <li>• Growing season fires may reduce vigor and help control the spread</li> <li>• Growing season burns may give native species a competitive advantage</li> </ul>
Common Reed	<i>Phragmites australis</i>	<ul style="list-style-type: none"> <li>• Burning will not reduce growth unless the roots burn</li> <li>• Burning removes phragmites leaf litter, allowing seeds of other species to germinate</li> <li>• Burning in conjunction with chemical control has been found effective</li> <li>• Burn with caution, since spot fires can occur up to 100 feet from burning phragmites</li> </ul>
Cattail	<i>Typha</i> spp.	<ul style="list-style-type: none"> <li>• Fire provides little or no control unless the roots are burned</li> <li>• Drawdown followed by burning and then flooding to a depth of 8 – 18” will provide control</li> </ul>

## Appendix VIII

### Seed Collection Dates of Common Plant Species for East Central Illinois

Compiled From Collection Records by: Steve Buck, Daniel Olson, Mike Daab, Adam Rex, Paul Marcum and Jamie Ellis

#### Forbs including prairie, woodland, and wetland listed alphabetically by common name

Common Name	Botanical Name	Seed Collecting Dates	Notes
Bicknell's oval sedge	<i>Carex bicknellii</i>	Late June-early July	
Big bluestem	<i>Andropogon gerardii</i>	Late September-Early October	
Black-eyed Susan	<i>Rudbeckia hirta</i>	Late August to Late September	
Blood root	<i>Sanguinaria canadensis</i>	June	
Blue-eyed grass	<i>Sisyrinchium campestre</i>	Mid June-Early July	
Bottle gentian	<i>Gentiana andrewsii</i>	October	
Bottlebrush grass	<i>Elymus hystrix</i>	Mid July - Mid August	
Brown-eyed Susan	<i>Rudbeckia triloba</i>	October	
Butterfly weed	<i>Asclepias tuberosa</i>	Mid September-October	
Canada wild rye	<i>Elymus Canadensis</i>	Late September - Mid October	
Canadian Milk vetch	<i>Astragalus canadensis</i>	All September	
Cardinal flower	<i>Lobelia cardinalis</i>	All October	
Celandine poppy	<i>Stylophorum diphyllum</i>	Early - mid May	Vermilion County
Common boneset	<i>Eupatorium perfoliatum</i>	Early September-Early October	
Common Ironweed	<i>Vernonia fasciculata</i>	Early October - Mid October	
Common milkweed	<i>Asclepias syriaca</i>	Late September-October	Collect closed pods
Common mountain mint	<i>Pycnanthemum virginianum</i>	Early September-Late October	

Compass plant	<i>Silphium laciniatum</i>	Late September - Mid October	Short collection time once mature
Cream gentian	<i>Gentiana alba</i>	Early November	Not a common native in EC IL
Cream wild indigo	<i>Baptisia bracteata</i>	August-September	Collect early to beat the weevils
Culver's root	<i>Veronicastrum virginicum</i>	Early September - Early October	
Cup plant	<i>Silphium perfoliatum</i>	September	
Downy gentian	<i>Gentiana puberulenta</i>	mid-late October	
Downy phlox	<i>Phlox pilosa</i>	Mid June-July	Seed ballistic at maturity
Downy sunflower	<i>Helianthus mollis</i>	October	
Downy wood mint	<i>Blephilia ciliata</i>	Mid July	
Evening Primrose	<i>Oenothera biennis</i>	Mid October - Late October	
False Solomon's seal	<i>Smilacina racemosa</i>	Late July - August	
False sunflower (ox-eye)	<i>Heliopsis helianthoides</i>	Early August-September	
False toad flax	<i>Comandra umbellate</i>	July	
Flowering spurge	<i>Euphorbia corollata</i>	Mid August-Mid September	Seed shatters quickly when ripe
Foxglove Beardtongue	<i>Penstemon digitalis</i>	September	
Ginseng	<i>Panax quinquefolius</i>	September	
Golden Alexander	<i>Zizia aurea</i>	Mid August-Mid September	
Great blue lobelia	<i>Lobelia siphilitica</i>	October	
Heath aster	<i>Aster ericoides</i>	Mid October-early November	
Hoary puccoon	<i>Lithospermum canescens</i>	Early August	Seed ballistic at maturity
Hog peanut	<i>Amphicarpaea bracteata</i>	Mid-September	
Illinois tick-trefoil	<i>Desmodium illinoense</i>	Early August-Early September	
Indian grass	<i>Sorghastrum nutans</i>	Mid September-Mid October	
Indian paintbrush	<i>Castilleja coccinea</i>	Late July	
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>	All September	
Jacob's ladder	<i>Polemonium reptans</i>	Early July	
June grass	<i>Koeleria macrantha</i>	Late July - Early August	Not common in EC IL

Lead-plant	<i>Amorpha canescens</i>	Late August-September	
Little bluestem	<i>Schizachyrium scoparium</i>	Late September-Late October	
Marsh Blazing Star	<i>Liatris spicata</i>	Mid October	
Missouri goldenrod	<i>Solidago missouriense</i>	mid to late October	
Needle grass	<i>Stipa spartea</i>	Mid-Late June	Sheds seeds early and quickly
New England aster	<i>Aster novae-angliae</i>	Mid October-early November	
New Jersey tea	<i>Ceanothus americanus</i>	September-Mid October	Seeds burst quickly at maturity
Obedient Plant	<i>Physostegia virginiana</i>	Early September - Early October	
Ohio Spiderwort	<i>Tradescantia ohioensis</i>	Late July - Mid September	Flowers and fruits sequentially; seed matures while still in flower
Old field balsam	<i>Gnaphalium obtusifolium</i>	Mid-Late September	
Old-field goldenrod	<i>Solidago nemoralis</i>	Mid October-Early November	
Pale Indian-plantain	<i>Arnoglossum atriplicifolium</i>	All September	
Pale purple coneflower	<i>Echinacea pallida</i>	Mid August-early September	
Panic grass	<i>Panicum oligosanthes</i>	Late June	
Pasture Rose	<i>Rosa carolina</i>	Late August-Mid October	
Pasture thistle	<i>Cirsium discolor</i>	Late September	Considered weedy--check if needed
Prairie blazing star	<i>Liatris pycnostachya</i>	Late September - Mid October	
Prairie cinquefoil	<i>Potentilla arguta</i>	August-Early October	
Prairie cord grass	<i>Spartina pectinata</i>	October	
Prairie coreopsis	<i>Coreopsis palmata</i>	September	Collect when heads turn brown
Prairie dock	<i>Silphium terebinthaceum</i>	Mid September - Mid October	
Prairie dropseed	<i>Sporobolus heterolepis</i>	Early August-Mid September	
Prairie Rose	<i>Rosa setigra</i>	Early September - Mid October	

Purple coneflower	<i>Echinacea purpurea</i>	Mid September - Mid October	
Purple joe-pye weed	<i>Eupatorium purpureum</i>	Late September - Early October	
Purple milkweed	<i>Asclepias purpurascens</i>	August - September	
Purple prairie clover	<i>Dalea purpurea</i>	Late August-September	
Pussytoes	<i>Antennaria plantaginifolia</i>	Late May-Early June	Short collection time
Rattlesnake master	<i>Eryngium yuccifolium</i>	October	
Rosinweed	<i>Silphium integrifolium</i>	Early September-Mid October	
Rough blazing star	<i>Liatris aspera</i>	October	
Rough white lettuce	<i>Prenanthes aspera</i>	October	
Round Fruited St. John's wort	<i>Hypericum sphaerocar-pum</i>	Late September-October	
Round-headed bush clover	<i>Lespedeza capitata</i>	September-Early October	
Saw-toothed sunflower	<i>Helianthus grosseserratus</i>	Late September-Early October	
Sedge	<i>Carex rosea</i>	Mid July	
Shooting star	<i>Dodecatheon meadia</i>	Mid July - Late July	Seed drops quickly at maturity
Short green milkweed	<i>Asclepias viridiflora</i>	Mid-Late September	
Showy goldenrod	<i>Solidago speciosa</i>	October-Early November	
Showy tick-trefoil	<i>Desmodium canadense</i>	Late August-September	
Side oats grama	<i>Bouteloua curtipendula</i>	Late August-Early October	
Silky aster	<i>Aster sericeus</i>	Mid-Late October	Rare in EC IL
Sky-blue aster	<i>Aster oolentangiensis (A. azureus)</i>	Mid-Late October	
Smooth blue aster	<i>Aster laevis</i>	Late October	
Smooth phlox	<i>Phlox glaberrima interior</i>	Early September	Seed ballistic at maturity
Sneezeweed	<i>Helenium autumnale</i>	October	
Solomon's seal	<i>Polygonatum commutatum</i>	July - August	
Spiked lobelia	<i>Lobelia spicata</i>	Early August-mid October	

Spotted Joe-Pye-weed	<i>Eupatorium maculatum</i>	Early September-Early October	
Stiff gentian	<i>Gentianella quinquefolia occidentalis</i>	Mid-Late October	
Stiff goldenrod	<i>Solidago rigida</i>	Mid October-early November	
Sullivant's milkweed	<i>Asclepias sullivantii</i>	September	
Swamp betony (lousewort)	<i>Pedicularis lanceolata</i>	October	
Swamp milkweed	<i>Asclepias incarnata</i>	Mid September	
Sweet cicely	<i>Osmorhiza longistylis</i>	Mid July-Late August	
Switch grass	<i>Panicum virgatum</i>	Late September - Early October	
Tall bellflower	<i>Campanula americana</i>	October - November	
Tall Boneset	<i>Eupatorium altissimum</i>	October	
Tall coreopsis	<i>Coreopsis tripteris</i>	October	
Thimbleweed	<i>Anemone cylindrica</i>	October	
Turk's cap lily	<i>Lilium michiganense</i>	September	
Virginia wild rye	<i>Elymus virginicus</i>	Mid October-Early November	
White avens	<i>Geum canadense</i>	Mid August	
White baneberry (Doll's eyes)	<i>Actaea alba</i>	August	
White prairie clover	<i>Dalea candida</i>	Late August-September	
White wild indigo	<i>Baptisia alba</i>	Mid September - Mid October	Fruits attacked by weevils
Whorled milkweed	<i>Asclepias verticillata</i>	Early September - Late September	
Wild bergamot	<i>Monarda fistulosa</i>	Mid August-Late September	
Wild columbine	<i>Aquilegia Canadensis</i>	Mid June-Mid July	
Wild geranium	<i>Geranium maculatum</i>	Mid-Late June	
Wild hyacinth	<i>Camassia scilloides</i>	Late May - Early July	
Wild lupine	<i>Lupinus perennis</i>	Mid-Late June	Sand prairies in Iroquois County
Wild quinine	<i>Parthenium integrifolium</i>	Late September - Mid October	

Wood betony	<i>Pedicularis canadensis</i>	Early-Mid June	Seed drops quickly when mature
Wood lily	<i>Lilium philadelphicum</i>	Late September	Rare in EC IL
Yellow coneflower	<i>Ratibida pinnata</i>	Early September-Early November	
Yellow fox sedge	<i>Carex annectans</i>	Late June-early July	

**Forbs Including Prairie, Woodland and Wetland Listed Chronologically by Collection Date**

Seed Collecting Dates	Common Name	Botanical Name	Notes
Early - mid May	Celandine poppy	<i>Stylophorum diphyllum</i>	Vermilion County
Late May - Early July	Wild hyacinth	<i>Camassia scilloides</i>	
Late May-Early June	Pussytoes	<i>Antennaria plantagini- folia</i>	Short collection time
Early-Mid June	Wood betony	<i>Pedicularis canadensis</i>	Seed drops quickly when mature
June	Blood root	<i>Sanguinaria canadensis</i>	
Mid June-Early July	Blue-eyed grass	<i>Sisyrinchium campestre</i>	
Mid June-Mid July	Wild columbine	<i>Aquilegia canadensis</i>	
Mid-Late June	Needle grass	<i>Stipa spartea</i>	
Mid-Late June	Wild geranium	<i>Geranium maculatum</i>	
Mid-Late June	Wild lupine	<i>Lupinus perennis</i>	Iroquois County
Early July	Jacob's ladder	<i>Polemonium reptans</i>	
July	Common spiderwort	<i>Tradescantia ohioensis</i>	
Mid July	Downy phlox	<i>Phlox pilosa</i>	Seed drops quickly at maturity
Mid July	Downy wood mint	<i>Blephilia ciliata</i>	
Mid July	Sedge	<i>Carex rosea</i>	
Mid July - Late July	Shooting star	<i>Dodecatheon meadia</i>	Seed drops quickly at maturity
Mid July - Mid August	Bottlebrush grass	<i>Elymus hystrix</i>	
Mid July-Late August	Sweet cicely	<i>Osmorhiza longistylis</i>	
Late July	Indian paintbrush	<i>Castilleja coccinea</i>	
Late July - August	False Solomon's seal	<i>Smilacina racemosa</i>	
Late July - Early August	June grass	<i>Koeleria macrantha</i>	
Late July - Mid September	Ohio Spiderwort	<i>Tradescantia ohioensis</i>	Seed matures while still in flower
Early August	False sunflower (ox-eye)	<i>Heliopsis helianthoides</i>	
Early August	Hoary puccoon	<i>Lithospermum canescens</i>	



Early August	Spiked lobelia	<i>Lobelia spicata</i>	
Early August-Early September	Illinois tick-trefoil	<i>Desmodium illinoense</i>	
Early August-Mid September	Prairie dropseed	<i>Sporobolus heterolepis</i>	
August	White baneberry (Doll's eyes)	<i>Actaea alba</i>	
August - September	Purple milkweed	<i>Asclepias purpurascens</i>	
August-Late October	Prairie cinquefoil	<i>Potentilla arguta</i>	
Mid August	White avens	<i>Geum canadense</i>	
Mid August-Late September	Wild bergamot	<i>Monarda fistulosa</i>	
Mid August-Mid September	Flowering spurge	<i>Euphorbia corollata</i>	Seed shatters quickly when ripe
Mid August-Mid September	Golden Alexander	<i>Zizia aurea</i>	
Late August to Late September	Black-eyed Susan	<i>Rudbeckia hirta</i>	
Late August-Early October	Side oats grama	<i>Bouteloua curtipendula</i>	
Late August-September	Lead-plant	<i>Amorpha canescens</i>	
Late August-September	Purple prairie clover	<i>Dalea purpureum</i>	
Late August-September	Showy tick-trefoil	<i>Desmodium canadense</i>	
Late August-September	White prairie clover	<i>Dalea candida</i>	
Early September	Cream wild indigo	<i>Baptisia bracteata</i>	
Early September	Pale purple coneflower	<i>Echinacea pallida</i>	
Early September	Smooth phlox	<i>Phlox glaberrima interior</i>	
Early September - Early October	Culver's root	<i>Veronicastrum virginicum</i>	
Early September - Early October	Obedient Plant	<i>Physostegia virginiana</i>	
Early September - Late September	Whorled milkweed	<i>Asclepias verticillata</i>	
Early September - Mid October	Prairie Rose	<i>Rosa setigra</i>	
Early September-Early November	Yellow coneflower	<i>Ratibida pinnata</i>	

Early September-Early October	Common boneset	<i>Eupatorium perfoliatum</i>	
Early September-Early October	Spotted Joe-Pye-weed	<i>Eupatorium maculatum</i>	
Early September-Late October	Common mountain mint	<i>Pycnanthemum virginianum</i>	
Early September-Mid October	Pasture Rose	<i>Rosa carolina</i>	
Early September-Mid October	Rosinweed	<i>Silphium integrifolium</i>	
September	Canadian Milk vetch	<i>Astragalus canadensis</i>	
September	Jack-in-the-pulpit	<i>Arisaema triphyllum</i>	
September	Pale Indian-plantain	<i>Arnoglossum atriplicifolium</i>	
September	Foxglove Beardtongue	<i>Penstemon digitalis</i>	
September	Cup plant	<i>Silphium perfoliatum</i>	
September	Ginseng	<i>Panax quinquefolium</i>	
September	Prairie coreopsis	<i>Coreopsis palmata</i>	
September	Turk's cap lily	<i>Lilium michiganense</i>	
September-Early October	Round-headed bush clover	<i>Lespedeza capitata</i>	
September-Mid October	New Jersey tea	<i>Ceanothus americanus</i>	Seeds burst quickly at maturity
Mid September	Swamp milkweed	<i>Asclepias incarnata</i>	
Mid September - Mid October	Prairie dock	<i>Silphium terebinthinaceum</i>	
Mid September - Mid October	Purple coneflower	<i>Echinacea purpurea</i>	
Mid September - Mid October	White wild indigo	<i>Baptisia alba</i>	
Mid September-Mid October	Indian grass	<i>Sorghastrum nutans</i>	
Mid September-October	Butterfly weed	<i>Asclepias tuberosa</i>	
Mid-Late September	Old field balsam	<i>Gnaphalium obtusifolium</i>	
Mid-Late September	Short green milkweed	<i>Asclepias viridiflora</i>	

Mid-September	Hog peanut	<i>Amphicarpaea bracteata</i>	
Late September	Pasture thistle	<i>Cirsium discolor</i>	Considered weedy check if needed
Late September	Wood lily	<i>Lilium philadelphicum</i>	
Late September - Early October	Purple joe-pye weed	<i>Eupatorium purpureum</i>	
Late September - Early October	Switch grass	<i>Panicum virgatum</i>	
Late September - Mid October	Canada wild rye	<i>Elymus canadensis</i>	
Late September - Mid October	Compass plant	<i>Silphium laciniatum</i>	Short collection time once mature
Late September - Mid October	Prairie blazing star	<i>Liatris pycnostachya</i>	
Late September - Mid October	Wild quinine	<i>Parthenium integrifolium</i>	
Late September-Early October	Big bluestem	<i>Andropogon gerardii</i>	
Late September-Early October	Saw-toothed sunflower	<i>Helianthus grosseserratus</i>	
Late September-Late October	Little bluestem	<i>Schizachyrium scoparium</i>	
Late September-October	Bottle gentian	<i>Gentiana andrewsii</i>	
Late September-October	Common milkweed	<i>Asclepias syriaca</i>	
Late September-October	Round Fruited St. John's wort	<i>Hypericum sphaerocarpum</i>	
Early October - Mid November	Common Ironweed	<i>Vernonia fasciculata</i>	
October	Cardinal flower	<i>Lobelia cardinalis</i>	
October	Swamp betony (lousewort)	<i>Pedicularis lanceolata</i>	
October	Brown-eyed Susan	<i>Rudbeckia triloba</i>	
October	Great blue lobelia	<i>Lobelia siphilitica</i>	
October	Prairie cord grass	<i>Spartina pectinata</i>	
October	Rough blazing star	<i>Liatris aspera</i>	

October	Sneezeweed	<i>Helenium autumnale</i>	
October	Tall Boneset	<i>Eupatorium altissimum</i>	
October	Thimbleweed	<i>Anemone cylindrica</i> (C. virginiana)	
October - November	Tall bellflower	<i>Campanula americana</i>	
October-Early November	Showy goldenrod	<i>Solidago speciosa</i>	
Mid October	Dense gay-feather (Marsh Blazing Star)	<i>Liatris spicata</i>	
Mid October	Heath aster	<i>Aster ericoides</i>	
Mid-Late October	New England aster	<i>Aster novae-angliae</i>	
Mid-Late October	Silky aster	<i>Aster sericeus</i>	
Mid-Late October	Sky-blue aster	<i>Aster oolentangiensis</i> (A. azureus)	
Mid-Late October	Stiff gentian	<i>Gentianella quinquefolia occidentalis</i>	
Mid-Late October	Stiff goldenrod	<i>Solidago rigida</i>	
Mid October - Late October	Evening Primrose	<i>Oenothera biennis</i>	
Mid October - Late October	Rattlesnake master	<i>Eryngium yuccifolium</i>	
Mid October-Early November	Old-field goldenrod	<i>Solidago nemoralis</i>	
Mid October-Early November	Virginia wild rye	<i>Elymus virginicus</i>	
Late October	Smooth blue aster	<i>Aster laevis</i>	
Early November	Cream gentian	<i>Gentiana alba</i>	

## Trees and Shrubs Listed Alphabetically By Common Name

Common Name	Seed Collecting Dates	Botanical Name	Notes
Bitternut Hickory	Late September - Mid October	<i>Carya cordiformis</i>	
Black Oak	October	<i>Quercus velutina</i>	
Black Walnut	October	<i>Juglans nigra</i>	
Bladdernut	Mid September - Mid October	<i>Staphylea trifolia</i>	
Bur oak	Late September - Early October	<i>Quercus macrocarpa</i>	
Butternut	Late September - October	<i>Juglans cinerea</i>	
Buttonbush	Mid November - Early December	<i>Cephalanthus occidentalis</i>	Collect before falling from shrub
Chinquapin oak	Late September - Early October	<i>Quercus mullenbergi</i>	
Green and White ash	September - October	<i>Fraxinus sp.</i>	
Hawthorn species	September	<i>Crataegus spp.</i>	
Kentucky Coffee Tree	May	<i>Gymnocladus dioicus</i>	Seed falls off from previous year
Mockernut Hickory	Late September - October	<i>Carya tomentosa</i>	
Northern Red oak	Early September - Late September	<i>Quercus rubra</i>	
Ohio Buckeye	September	<i>Aesculus glabra</i>	Often confused w/ horse chestnut
Paw Paw	September	<i>Asimina triloba</i>	Collect quickly due to wildlife
Persimmon	After first fall freezing temps	<i>Diospyros virginiana</i>	Collect quickly due to wildlife
Pignut hickory	October	<i>Carya glabra</i>	
Redbud	Late September - October	<i>Cercis canadensis</i>	Collect from tree before seed falls
Shagbark hickory	Early September - Late September	<i>Carya ovata</i>	
Shingle Oak	October	<i>Quercus imbricaria</i>	

Swamp white oak	October	<i>Quercus bicolor</i>	
Wafer Ash	Mid September - Mid October	<i>Ptelea trifoliata</i>	Collect before falling from shrub
White oak	Mid September - Mid October	<i>Quercus alba</i>	
Wild Plum	September	<i>Prunus americana</i>	Collect quickly due to wild-life



## Appendix IX

# Monitoring Programs

There are several existing monitoring programs available to volunteer stewards. Many are based out of the North East Illinois area but would be equally applicable in East Central Illinois.

Frog Monitoring

<[www.habitatproject.org](http://www.habitatproject.org) >

Bird Conservation Network Monitoring

<[www.bcnbirds.org](http://www.bcnbirds.org)>

Plants of Concern

<[www.plantsofconcern.org/index.html](http://www.plantsofconcern.org/index.html)>

Illinois Butterfly Monitoring Network

<[bfly.org/](http://bfly.org/) >

Dragonfly Monitoring:

<[www.anisoptera.org/guideline.html](http://www.anisoptera.org/guideline.html)>





## Appendix X

# Calendar of Typical Restoration Activities

### JANUARY

Brush/tree clearing, treat shrub stumps with herbicide, brush pile burning, poison hemlock rosette herbicide treatment; install tree protectors on tree seedlings in reforestations; sow native seed.

### FEBRUARY

Brush/tree clearing, treat shrub stumps with herbicide, brush pile burning, wetland prescribed burns, poison hemlock and wild parsnip rosette herbicide treatment, start putting in firebreaks, sow native seed.

### MARCH

Shrub stump and garlic mustard herbicide treatment, sow prairie and woodland seed mixes, prescribed burn season, poison hemlock and wild parsnip rosette herbicide treatment, pre-emergent application of herbicides to reforestations.

### APRIL

Sow prairie and woodland seed mixes, prescribed burn season, plant tree seedlings, plant bare rootstock perennials, poison hemlock and wild parsnip rosette herbicide treatment

### MAY

Garlic mustard management, wild parsnip and poison hemlock management/seed removal, collect ripe native plant seed

### JUNE

Garlic mustard management, wild parsnip and poison hemlock management/seed removal, herbicide/mow white sweet clover and Canada thistle, begin harvesting and sowing seed of spring wildflowers, harvest and sow sedge seeds, herbicide stump re-sprouts, detassel reed canary grass; collect ripe native plant seed

### JULY

Sow seed of spring wildflowers, harvest and sow sedge seeds, spray herbicide/mow white sweet clover and Canada thistle, wild parsnip and poison hemlock management/seed removal, treat stump re-sprouts with herbicide, cut Phragmites to ground at flowering time, cut and remove flowering teasel stalks, collect ripe native plant seed

### AUGUST

Harvest and sow sedge seeds, collect ripe native plant seed, mow white sweet clover, spray herbicide on stump resprouts

### SEPTEMBER

Collect ripe native plant seed, herbicide stump re-sprouts, spray herbicide on reed canary grass

### OCTOBER

Collect ripe native plant seed, begin fall burn season, herbicide teasel rosettes, brush/tree clearing, stump herbicide treatment, spray herbicide on reed canary grass

### NOVEMBER

Fall burn season, sow native seed mixes, brush/tree clearing, stump and garlic mustard herbicide treatment, brush pile burning, prescribed burns in marshes, poison hemlock rosette herbicide treatment

### DECEMBER

Sow native seed mixes, cut and haul off teasel seed heads, brush clearing, stump herbicide treatment, brush pile burning, prescribed burns in marshes, poison hemlock rosette herbicide treatment



Appendix XI  
**Management Schedule**

Prepared by: \_\_\_\_\_

Site: \_\_\_\_\_ Time period (yrs): \_\_\_\_\_ Date: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_

Map Symbol: Management Unit (list all communities and any tracked E/T species in unit under unit name)	Management objective	Management activity	Schedule (month/year)	Key personnel/ Organization

Appendix XII  
**Sample Management Schedule**

**SITE MANAGEMENT SCHEDULE FOR ILLINOIS PRESERVES**  
**SITE NAME: Elbern Forest Preserve**

PREPARED BY: Mary A. Zander  
 DATE: 4/12/91 PAGE: 1 of 2

MAP SYMBOL: MANAGEMENT UNIT (list all communities and tracted F/T species in unit under unit name)	MANAGEMENT OBJECTIVE	MANAGEMENT ACTIVITY	SCHEDULE (months, year)	OTHER KEY PERSONNEL
I) General	Reduce foot traffic in west savanna	Mow saw path through less sensitive area	summer 1991	KCFP
A) Marsh grading to wet prairie	Reduce garbage at dump sites & throughout preserve	Post signs, seed with savanna mix collected on site, cease mowing	summer 1991	KCFP & volunteers
B) sedge meadow		Clean up workday		
C) R.R. Prairie		Cut with loppers and/or chain saw	spring 1991 & ongoing	KCFP & volunteers
D) South Savanna		Remove brush	winter 1991	KCFP & volunteers
E) West Savanna		Apply Garlon 4 to cut stumps with paint brush or wick applicator per label specs	winter 1992	
F) Oak-Hickory Woods		Girdle alders	spring 1991 spring 1992	volunteers
A) Marsh grading to wet prairie	Eliminate encroachment of alders	Apply Garlon to resprouts with paint brush or wick applicator per label specs	winter 1991 winter 1992	volunteers
B) sedge meadow		Cover patches with black plastic	spring-summer 1991	volunteers
	Reduce & eliminate road canopy grass	Remove seed heads of individual plants	June 1991 June 1992 June 1993	volunteers
	Enhance native herbaceous community, reduce woody plant encroachment	Conduct prescribed burns*	spring 1991 spring 1992 spring 1993	KCFP
		Sow sedge meadow, wet-mesic prairie seed collected on site and locally	following 1993 burn	volunteers & KCFP

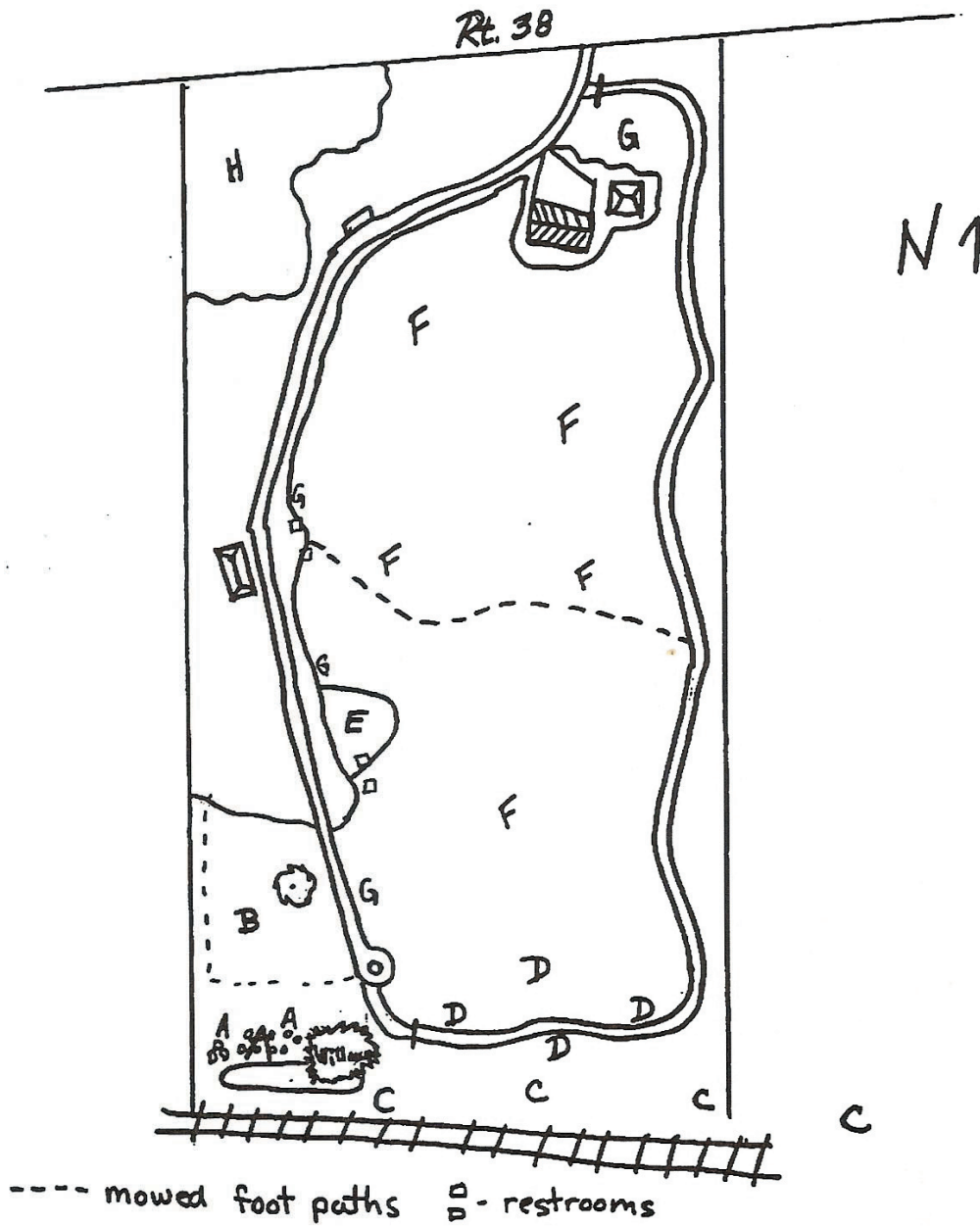
SITE MANAGEMENT SCHEDULE FOR ILLINOIS PRESERVES  
 SITE NAME: Elburn Forest Preserve

PREPARED BY: Mary A. Zander  
 DATE: 4/12/91 PAGE: 2 of 2

MAP SYMBOL: MANAGEMENT UNIT (list all communities and tracted F/T species in unit under unit name)	MANAGEMENT OBJECTIVE	MANAGEMENT ACTIVITY	SCHEDULE (months, year)	OTHER KEY PERSONNEL
C) R. Prairie	Eliminate encroachment of exotic woody plants (honeysuckle & buckthorn) Reduce encroachment of native woody plants (grey dogwood & cherry)	Cut brush and herbicide stumps with Garlon 4 (winter) or Garlon 3A (other seasons) applied with paint brush or wick applicator per label specs	winter 1991 winter 1992	volunteers
	Enhance and restore native herbaceous community	Conduct prescribed burns*	spring annually to biennially	KCFP
D) South Savanna E) East Savanna F) Oak-Hickory Woods	Reduce encroachment of exotic (buckthorn, honeysuckle) and native (cherry, grey dogwood) woody plants	Cut brush beginning at southern edge and herbicide stumps with Garlon 4 (winter) or Garlon 3A (other seasons) per label specs	winter 1991 winter 1992 winter 1993	KCFP & volunteers
	Reduce garlic mustard	Conduct prescribed burns	annually until controlled, then periodically	KCFP
	Remove selected large hawthorn & cherry trees to restore savanna habitat	Hand pull and/or cut in priority areas (south & west savanna)	spring 1991 spring 1992 spring 1993	volunteers
	Enhance native herbaceous community	Girdle 75% of large (6"+) cherries & hawthorns over a 3 year period	spring 1991 spring 1992 spring 1993	volunteers
		Seed with savanna mix collected locally and on site	following burns	KCFP & volunteers

\* See fire prescription and logistics plan, enclosed





- |                                  |                                       |
|----------------------------------|---------------------------------------|
| A - Marsh grading to wet prairie | E - West Savanna                      |
| B - Sedge Meadow                 | F - Oak-Hickory Woods                 |
| C - R.R. Prairie                 | G - Newly unmowed Savanna Restoration |
| D - South Savanna Restoration    | H - Old Wayside                       |

Appendix XIII  
**Stewardship Activity Log and Report**

<b>Site:</b>	<b>Date:</b>
<b>Steward Names:</b>	
<b>Weather Conditions:</b>	
<p><b>Description of Activities</b> (Include location, quantities of any herbicides used, and any species removed or planted. Also include any off-site preparation, i.e. picking up supplies. Please include maps of activities and volunteer sign-in forms as appropriate)</p>	
<b>Total # of Volunteers:</b>	<b>Total Volunteer Hours:</b>
<b>Total Volunteer Hours:</b>	
<p><b>Additional Comments (effects noted of previous restoration, unusual flora/fauna, ideas for future activities, etc):</b></p>	
<p>Please keep one copy for your files and send/email a second copy to site's stewardship coordinator.</p>	



Appendix XIV  
**Volunteer Steward Annual Report**



Total number of hours spent on administrative work  
(planning, recruitment, education, tours, meetings, etc.): \_\_\_\_\_

Did you have an adequate number of workdays? \_\_\_\_\_

Did you have an adequate number of volunteers? \_\_\_\_\_

If not, list other activities you would like to get done and estimate how many volunteer hours you estimate it would take to accomplish each activity:

Proposed Activity	# Hours

**Special Events:**

List any special events (nature walks, tours, workshops, etc) that took place between January 1 to December 31.

Special event	# Hours	# Attendees	Date(s)

**Problems on Site:**

Please provide a summary description and rating of any problems on the site. Indicate if the problem is a new one, or if you would like additional help from the land management organization or the Illinois Nature Preserves Commission.

Rating scale: 1 = no problem, 5 = very serious problem.

Problem description	Rating	Need help?
Boundaries and signage:		
Trails:		
Brush:		
Invasive species:		
Other:		

**Recruitment:**

List methods you used for recruiting volunteers, and how successful they were:

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**Miscellaneous:**

If you have any other suggestions or comments, please include them here:

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