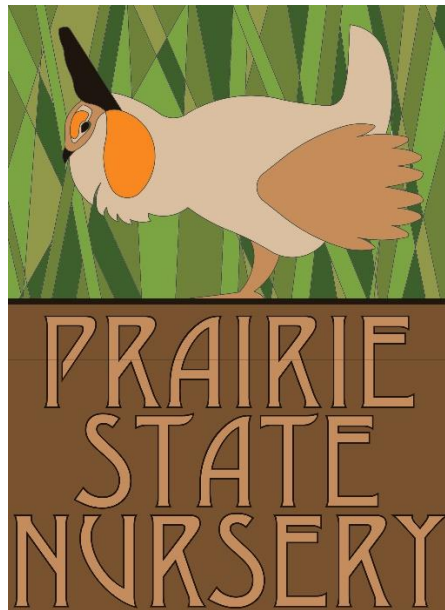


THE BASICS: ECOLOGICAL RESTORATION INSTALLATION & STEWARDSHIP

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Natural areas are established and maintained by allowing natural physical and biological processes to operate. Examples of those natural processes include species dispersion (e.g. spreading of seed via wind, water, animals), fire, herbivore predation by top predators, and others. With today's highly fragmented native landscape and the introduction of non-native species, these natural processes have been altered or stopped altogether. Seeds may no longer be able to spread naturally, wildfires are suppressed, and wildflower-loving deer run rampant without top predators to keep their numbers in check. Human intervention is required to establish and maintain our natural areas by controlling invasive species, restoring biodiversity, and implementing prescribed fire. Following is a primer on the basics of ecological restoration installation and management, following this process should yield a quality natural area restoration.

NATURAL AREAS INSTALLATION

There are four basic components to ecological restoration: site assessment and planning, site preparation, installation (including erosion control if necessary, and stewardship (maintenance & monitoring).

1. Site Assessment & Planning: The results of any ecological restoration project will only be as good as the plan; therefore, it is highly recommended that adequate time and resources be spent on this stage of the process.

Site assessment is easy if dealing with an agricultural field, a pasture, or a fallow field... there may be little to actually assess in these situations. Difficult sites to assess include those that may have remnant populations of native plants already present. A remnant population is a group of native plants remaining from a time prior to European settlement. These remnants often occur along railroads, adjacent to natural waterways, in areas too wet to farm, on soils or slopes that are too difficult to farm, or in old-growth wooded areas. Because of the amount of land in Illinois that has been converted to agriculture, there are very few remnant areas left... making any that remain extraordinarily important and a priority for conservation. Therefore, the ability to identify an area as having remnant systems or not is the most important step in site assessment. If you are unsure, contact a professional ecologist before moving to the planning process.

The second step to assessing the site is to take measurements of the planting areas and research available site data, such as the soils and the historic vegetation, so that seed or plant mixes can be designed. Soils can be researched through the United States Geological Survey (USGS), historic vegetation can be researched by accessing the Historic Land Plats of Illinois and historic aerial photos of Illinois.

Once the assessment has been completed, plan the restoration work by delineating planting areas on a print of a plat map or aerial photograph of the site. By analyzing the collected data, determine what type of natural areas would have likely existed at the site and prepare seed or plant mixes for the planting areas that attempt to replicate those systems as closely as possible. Build a list of species that are known to have been native to the County in which the site is located by accessing the Biota of North America Program (BONAP). For additional tips on building seed or plant lists, see the plant installation section of this document.

A professional ecologist or landscape architect can assist with the assessment and planning phase of restoration projects.

2. Site Preparation: Site preparation begins with the removal of undesirable woody and/or herbaceous plant materials. Brush and trees may be removed by hand or with mechanized equipment. To minimize impact on soil structure, integrity of existing vegetation, and restoration potential, *clearing and brush cutting should be performed when soils are dry and/or frozen*. General vehicle traffic in natural areas should be restricted as much as possible. Hand removal typically involves the use of chainsaws, hand saws, and loppers. Mechanized removal typically involves the use of large wheeled or tracked vehicles equipped with large mowing or grinding implements. All cut stumps should be treated with an

appropriate herbicide by a certified herbicide applicator immediately following cutting, making sure that the herbicide is applied to the cambium layer of the woody plant.

Herbaceous plant material should be treated with an appropriate herbicide by a certified herbicide applicator. *Herbicides used should be appropriate for site conditions, target species, and have a low environmental impact.* If possible, avoid mixing herbicides inside a natural area, rather mix them offsite prior to the application. If it's not possible, mix them over a protective ground cover onsite. It is recommended that a Spray Pattern Indicator (SPI) be added to herbicide mixtures to make it easier to tell where an herbicide has been applied. These are temporary marker dyes that will degrade over a few days. Tough to control species, such as Canada thistle or reed canarygrass, may require two or more herbicide applications. The best herbicide for site preparation is typically glyphosate (brand name: RoundUp or RoundUp Custom if applying in or near water); it is an effective herbicide that kills anything green, spreads to the roots, has minimal residual, and is relatively safe when applied correctly. Every site is different, so herbicides other than glyphosate could be better suited for certain sites and/or situations... but in general glyphosate is a good choice for site preparation.

Following successful herbicide results, the remaining dead plant material should be removed as well as possible by mowing or burning. The purpose of removing this material is to expose the soil to sunlight and to allow easy access to newly emerging weed species for spot herbicide applications. Typically two to three weeks after mowing or burning, any re-sprouting and/or seed germination will have occurred and a second application of herbicide may be applied. If mowing, cut existing vegetation to a height of 18"-24" utilizing a rotary or sickle-type mower. Two or more passes may be required; do not allow large amounts of thatch to accumulate due to mowing. Ensure vegetation is fully cut at the desired height and that it is not just knocked over or matted down. If the area contains saturated soils or standing water, they may be mowed with a walk-behind brush hog or hand-held brush cutter. Alternatively, they may be mowed in the winter when soils are frozen solid.

An alternative to utilizing herbicides for site preparation is to till or disk the soil repeatedly. This approach typically takes an entire season, as it may expose a seed bank of weed seeds and some of the plants that are tilled under may re-establish through their displaced root systems. Disking or plowing is preferable to tilling (tilling can cause some soil compaction), but ultimately either will work. Once the area has been disked several times and re-growth/seed germination appears to be minimal, the area should be prepared for seeding by eliminating large clods using a Harley Rake or similar equipment. When planting an area that has been in agricultural production the previous growing season, additional site preparation is typically not needed... former crop sites can typically be broadcast seeded in the fall without any soil work. Site preparation through disking or tilling does increase the risk of soil erosion, appropriate steps should be taken to minimize erosion issues.

3. Plant Installation: The installation of native plant species involves the planting of seed and/or plugs.

a. **Seeding** is the main approach to restoration because it is economical, however it takes three to five years before good results are achieved and visible... it takes lots of PATIENCE! For quicker establishment, areas may be plugged with established live plants as discussed in the following section. Seeding times are typically April through June for spring installations, October through February 15th for fall/dormant installations.

Whenever possible, native seed should be installed with a drop seeder that is designed to plant native seed, such as the Greenscape Conservation drop seeder. A no-till drill seeder designed for native seed is also acceptable, such as a Truax drill seeder, however drills do not achieve as good of seed coverage as a drop seeder and it is easy to bury the seed too deep. Native seeders contain three separate seed boxes: one for small seed, one for large seed, and one for fluffy seed. In a seeder designed for turf seed there is only one seed box – if you were to put all three types of native seed together in the single box, they would become separated as the seeder

bounces around during installation, with the fluffy seed coming to the top, the small seed settling at the bottom, and the large seed somewhere in between...this would result in a patchy distribution of seed.

In order to use a native seeder as designed, seed should be ordered and delivered as individual species so that it can be separated and mixed appropriately. Do not order native seed that arrives pre-mixed, unless you are using a reputable vendor that will mix the seed specifically for the seeder you are using (i.e. a bag mixed for the small seed box, a bag mixed for the large seed box, and a bag mixed for the fluffy seed box). Success in natural areas restoration will also be dependent upon the native plant's ability to outcompete weedy/invasive species for sunlight, nutrients, and water. This means that the more native seed put down, the better the chances for positive results. We highly recommend native seed rates at approximately 20 lbs per acre or more; however mixes should be customized to maximize the number of seeds per square foot (goal of 65-120 seeds/SF or more) based on the needs of each individual site. If measuring seed mixes by seeds/SF the weight of the seed mix will vary significantly. Mixes with a majority of species with very small seeds (many wetland mixes) may only weigh 6 or 7 lbs/acre... prairie mixes with large seeds and fluffy grasses may weigh in excess of 25 lbs/acre. Be wary, some suppliers may include cover crops in their plant lists and include these in their seeds/SF totals... desirable mixes have 65-120 seeds/SF or more of native seeds only!

If the site is not accessible or unable to be seeded with a tractor (e.g small areas, transitional buffers), it will need to be tilled or scarified and seeded by hand. Seeding in sensitive areas, such as wetlands, should be done by hand to minimize the impact on soil structure. If the seed is separated by species, group together species into two categories: small and large. Mix each group of seed with an inert material such as wheat bran at a minimum 2:1 (inert material: seed) ratio... higher rates of inert material may be required depending upon the application. Calibrate the seeder (see below) and ensure that every square foot of the site has been adequately covered. The inert material will help mark which areas have already been seeded. Start off with a "light hand" to avoid running out of seed too quickly! For small seed, it is especially important to mix the seed/inert material within the bucket every few minutes to prevent all the small seeds from sifting to the bottom of the bucket.

i.) *Calibration of a Broadcast Seeder:* Calibrate broadcast spreaders by using a small container, such as a coffee can, to take a scoop of the inert material used as a carrier and place it in the spreader. Spread the inert material within the planting area in as straight a line as possible and then measure the amount of area that was covered by the small container full of inert material. For example, if the spreader ran out of inert material after 20 feet and it cast a spread of 10 feet, it can be assumed that the small container will cover 200 SF of planting area at the spreader's current setting. Therefore, if the total area to be planted is 2,500 SF it will take 12.5 small containers of seed mix (seed mixed with inert material) to adequately cover the site using the spreader's current setting.

It is recommended that when broadcasting seed the site be covered twice in perpendicular directions, i.e. spread in an east-west orientation, then again following a north-south orientation. Continuing with the scenario above of needing 12.5 small containers of seed mix to cover the site, a total of two times that amount would be required to cover the area twice... so a total of 25 small containers of seed mix would be required to cover the site twice. Additionally, it is recommended to add at least 10% to the total number of containers of seed mix required, doing so ensures there is extra seed mix to hand-seed around structures and along planting area edges. This would mean adding an additional 2.5 containers to the 25 containers that has been figured to cover the area twice... for a total of 27.5 containers of seed mix needed. By looking at

the amount of seed mixture available, estimate the number of small containers of seed mix that there are. Alternatively, the remaining seed mixture could be physically measured to determine exactly how many small containers of seed mix remain, however this can be very time consuming depending on how big of an area is being seeded... visual estimates typically work fine. If it is estimated that there are likely only 10 small containers of seed mix, either add more inert material to the seed mix until there are an estimated 27.5 small containers available; or, adjust the spreader's settings so that less seed mix is distributed. If the spreader is adjusted additional test runs can be made using inert material until the spreader is calibrated for the amount of seed available. Keep in mind that some of the native seeds are large enough (like prairie dock or swamp milkweed), that restricting a spreader's opening too far may make it difficult for these larger seeds to be spread.

With any method of seeding, it is imperative to achieve good seed to soil contact while maintaining a seeding depth of no greater than 1/4" for proper germination. Many flower seeds are small and do best when directly surface sown into a prepared bed with little-to-no soil covering them.

Pay special attention to the edges of your planting area. Often times it is difficult to seed directly along the edge of a bed if using a tractor, and if broadcasting the seeder is typically kept away from the edge for fear of flinging valuable native seed into areas outside of the planting zone or if seeding while windy the seed may be blown back away from the edge. We recommend that approximately 5% of the seed be reserved for installation along the edges of your planting area. This can be achieved by simply applying the seed along the edges by hand or by using a walk-behind drop seeder (a drop-seeder is preferable and will mitigate issues caused by wind). Remember to mix this seed with a carrier as described earlier for broadcast seeding. If the edges are not seeded appropriately there will be less native plants present to compete with weeds and these areas may become dominated with weeds or cool-season grasses, the edges of the prairie planting are the most visible and should be given additional care.

A cover crop is recommended for most native seeding projects, cover crops can be used as a partial carrier when broadcasting or added to the large seed box of mechanized seeding equipment. Cover crops are annual plants that germinate quickly and do not reproduce, in the Spring use seed oats (*Avena sativa*) at 40 lbs/acre with the native seed and in the fall use ReGreen (Wheatgrass X Winter Wheat hybrid) at 20 lbs/acre. A cover crop will reduce the potential for erosion by stabilizing the soil while the native plants establish.

b. **Plugs** are live native plants often sold in trays of 32, 38, 50, or 72 plants; they can also be purchased in individual quarts or gallon size containers. Situations that may warrant the installation of plugs include, but are not limited to: areas with saturated soil or submerged soil situations where seeding is difficult or impossible, to establish species that have difficulty germinating from seed (such as shooting star or prairie dropseed), to diversify or repair established natural areas, or in a landscape situation where control over plant location is desired.

The most efficient way to plant plugs is to utilize a power auger with a 2" auger bit (or 6" auger bit if planting gallons). The auger can be used to plant plugs through erosion blanket if done with care, however utilizing the sharp end of a pick axe to puncture the blanket and create a planting cavity is typically more effective. The most inefficient way to plant plugs is by using hand tools, such as planting trowels or shovels, however hand tools are fairly inexpensive and can be easily and safely used by inexperienced workers.

Plug plantings in wetland environments are often impacted by geese, muskrats, or by grass-eating carp. An "exclosure" netting consisting of 2" x 2" wooden stakes, chicken wire or plastic

snow fencing, zip ties, and nylon string can be erected to effectively keep geese away from newly planted areas. Goose exclosures are temporary structures and are typically only necessary throughout the first growing season and can be taken down once the plants become established. These structures are not effective at keeping fish or muskrats away from newly planted areas however, and additional actions must be taken to eliminate damage from these species such as trapping for muskrats and fish-kills for carp. Muskrats need only be trapped and removed from each site until the plants become thoroughly established, typically once the plants become established minimal damage is done through browsing. If populations become high and plant populations are being severely damaged, trapping should be reinstated.

4. Erosion Control: Temporary erosion control structures should be installed over any areas with exposed soils. The two commonly used materials in restoration are erosion control blankets and coir fiber logs. Erosion control blankets are recommended any time planting is being conducted on bare soil. Blankets should be composed of temporary biodegradable products and are typically made of straw, coconut fiber, or a combination thereof. Most applications can use single-net straw blankets, such as the S-75 products manufactured by North American Green. These blankets do use synthetic materials and can cause injury to some wildlife, particularly birds and reptiles. In sensitive areas where injuries to wildlife should be avoided, consider a product with natural fibers, such as the S-75BN products manufactured by North American Green. They cost more than the synthetic material blankets, but are made with a biodegradable netting that is less likely to entrap wildlife. Blankets with double nets and/or coconut fiber materials may be required if installed on steeper slopes or where direct water contact is anticipated, to be effective the proper product must be selected. Permanent “Turf Reinforcement Mats” should not be used; these products leave permanent thick plastic netting on the soil that will make supplemental seeding/planting efforts difficult if needed at a future date. After soil preparation, install the native seed, install an appropriate erosion control blanket according to the manufacturer, and finally install plugs through the blanket, if necessary, ensuring not to damage the blanket.

Coir fiber logs are dense logs constructed of coconut fiber and are installed along shorelines to buffer wave action. These products are temporary structures degrading over a 36 month period and are typically utilized in stream restoration projects where the water is consistently moving. Coir logs are very expensive and are typically not necessary for shoreline restorations conducted on ponds and lakes.

NATURAL AREAS STEWARDSHIP

Natural areas stewardship is the maintenance of existing or restored natural areas. Failure to maintain or inadequately maintaining a natural area will result in project failure.

1. Implementation: If possible, and because of its importance, stewardship should be conducted by a professional ecological restoration firm, particularly during the 3-5 year establishment period after restoration efforts. The stewardship program must be aggressive, dynamic, and site-driven. Stewardship actions typically consist of mowing, selective herbicide applications, seed collection & supplemental seeding/planting, prescribed fire, and monitoring. It is referred to as “stewardship” because the program needs to adapt to site conditions and may be different month to month or year to year, whereas maintenance is generally considered static.

2. Mechanical Methods: *Invasive and weedy species should not be allowed to reproduce on any site at any time*, mowing and/or hand pulling these plants before they are able to set seed is an efficient method of control. Some invasive species such as Canada thistle spread by underground rhizomes (root like structures) and will continue to colonize even if not allowed to set seed... in cases like these follow-up herbicide treatments are required to permanently control the weed.

Mowing is typically conducted by tractor with a large mowing implement keeping the vegetation cut to a height of 6-8” (reaching a maximum height of 12” before mowing) throughout the first growing season

and a height of 10-12” (reaching a maximum height of 18-24” before mowing) throughout the second growing season. During the first two years of restoration the main reason for mowing is to allow sufficient light to the small native seedlings. If a site is inaccessible by tractor it can be mown by hand with push mowers and/or brush cutters. Make sure to go back to any areas around structures (trees, sign posts, etc.) that cannot be cut by mower and trim them with hand-held brush cutters. Ensure that the mower is clean before using it in a natural area. Mowing the entire site with a tractor can typically be halted in year 3 and beyond unless significant weed problems persist. Continue spot mowing as needed.

Hand pulling annual and biennial species before they produce seed can be an effective method of control. The spread of perennial species can be slowed and somewhat controlled by this method in most cases, however herbicide application is the only way to eradicate perennial plants.

3. Selective Herbicide Application: When applied in accordance to the manufacturer’s recommendations by a certified herbicide operator or applicator that has been trained in plant identification, herbicide has proven to be a safe and extremely effective tool for natural areas stewardship. Herbicides may be selective or non-selective products. Selective herbicides only affect certain types of plants, e.g. only broadleaf plants, only grasses, etc. Non-selective herbicides affect any plant that it is applied to, regardless of type. A colored dye should be added to any herbicide that is to be applied within a natural area, these dyes are called “Spray Pattern Indicators” or SPI. This allows the applicator to see where they have applied the herbicide so they do not over apply. It also allows the owner to see where the herbicides have been applied, including any overspray.

The standard application method of herbicide for stewardship is by backpack sprayer, such as an Iris 15 AT3, manufactured by Birchmeier. An even more selective method of application is hand-wicking, a process where the applicator wears a rubber glove under a cotton exterior glove onto which herbicide is applied. The applicator then applies the herbicide to individual plants by grasping them with a saturated glove. This is an extremely effective application method for very small weed infestations. The following are a few of the more common herbicides utilized in natural areas stewardship work:

Chemical Name	Brand Name(s)	Description
Glyphosate (Aquatic approved)	RoundUp Custom, Aquaneat, Rodeo	Non-Selective, will kill anything green if sprayed on leaves or stems
2,4-D (Amine or Choline)	Platoon (Amine), Freelexx (Choline)	Broadleaf Selective, will kill any broadleaf if sprayed on leaves or stems
Aminopyralid	Milestone	Broadleaf Selective, will kill any broadleaf if sprayed on leaves, stems, or adjacent soil
Triclopyr (Amine or Choline)	Garlon 3a (Amine), Vastlan (Choline)	Broadleaf Selective and formulated for woody plants (trees, brush, and vines), will kill any broadleaf if sprayed on leaves, stems, or adjacent soil
Clethodim	Intensity	Grass Selective, will kill any grass if sprayed on leaves. Will not kill sedges or broadleaves

There are many other products that may be useful in natural areas restoration, however those listed above are the most common. The applicator is responsible for reading and following the product label when using any herbicide.

To become a certified herbicide operator or applicator, individuals must pass an exam proctored by the Illinois Department of Agriculture. For natural areas work, it is recommended that individuals take the General Standards and Rights-of-Way exams. Schedule an exam or find out more information by visiting <https://www2.illinois.gov/sites/agr/Pesticides/Pages/in-person-testing.aspx>

4. Seed Collection & Supplemental Seeding/Planting: Supplemental seeding or planting may be implemented for a variety of reasons: in areas where the original restoration seeding did not perform, to improve plant diversity, or after a disturbance such as extended flooding or site abuse.

Once a natural area becomes established, seed collection should become a regular part of stewardship. Native seed should be collected at appropriate times (June/July for sedges and other spring wildflowers, fall for most other species).

Disperse collected seed over the site after the prescribed fire is conducted and/or utilize it to fill any voids. Seed collection and dispersal is an activity that can be conducted easily and safely by volunteer groups.

5. Prescribed Fire: Fire was a frequent part of pre-settlement native ecosystems and served to maintain the integrity of our natural areas by stimulating plant growth, preventing brush encroachment, and recycling nutrients. In ecosystem restoration, prescribed fire will perform these functions while helping to manage many invasive species. Fire alone is typically not sufficient to manage natural areas and should be used in conjunction with stewardship throughout the year.

Newly seeded areas should be allowed to establish for 2-3 growing seasons prior to prescribed fire application. Controlled burns are typically conducted between the months of November and April. The fire should be planned to minimize ecological impacts to species such as fire-sensitive plants, nesting birds, reptiles, amphibians, or other sensitive wildlife. Once the planting is well-established, an alternating burn schedule can be implemented in order to maintain unburned areas for wildlife refuge.

Prescribed fire should be conducted by highly trained personnel with appropriate permits, following an approved and site-specific burn plan, and overseen by an Illinois Certified Prescribed Burn Manager. We recommend that all personnel on the burn line be certified through the National Wildfire Coordinating Group's (NWCG) S130/S190 training. The burn boss should have additional training in ignitions and fire behavior and extensive prior burn experience.

Anyone wishing to conduct prescribed fire on their property must have an Open Burn Permit for their property. Apply for an IEPA open burn permit using this web address:
<https://www2.illinois.gov/epa/Documents/epa-forms/air/permits/open-burning-permit-app.pdf>

6. Monitoring: Natural areas monitoring is a very helpful tool in tracking the progress of a restoration or the ecological health of an established natural area.

Based on the data gathered, an annual report can be formulated to inform the property owner with a summary of the year's restoration and stewardship activities, native and invasive species presence and coverage, herbivory, erosion, aesthetic issues, other potential problems, and recommendations for improvement.

OTHER RECOMMENDED RESOURCES

All information given below was as of 02/21/2022, changes may have occurred since the writing of this document. These are the main resources used by The Prairie State Nursery, LLC when developing seed mixes or providing consultation for restoration planning.

BOOK: *A Practical Guide to Prairie Reconstruction, Second Edition* (2013) by Carl Kurtz and published by Bur Oak Books. Carl has written a beautiful, straight to the point book on prairie restoration. He has been installing prairies in Iowa for 30+ years and does a good job of simply explaining his proven process. He describes methods and equipment, he also provides a brief summary of the natural history of prairies. It is a short book (80 pages) with 30 high quality pictures and graphics. It can be purchased for around \$20.00 directly from the publisher <https://www.uiipress.uiowa.edu/books/9781609381684/a-practical-guide-to-prairie-reconstruction>

BOOK: *Flora of the Chicago Region* (2017) by Gerould Wilhelm & Laura Rericha. This is a resource for those who want to really “geek out” on native Illinois plants. While this book is focused on the Chicago Region it can be applied across the State when used in unison with the BONAP website (see below). It is a comprehensive synthesis on the Flora of Illinois whose main benefit is a listing of known associates for each species when found in specific habitats. This is extremely valuable for building seed and plant lists. It can be purchased from the Indiana Academy of Science for \$125.00 <https://www.indianaacademyofscience.org/publications/item-detail?id=134&nodeid=302#>

WEBSITE: Illinois Wildflowers is a website created and maintained by Dr. John Hilty and is a great resource for learning physiological facts about different Illinois native plant species, such as flower color, flower time, flower size, plant size, where it grows (habitat size), what wildlife use it, etc. www.illinoiswildflowers.info

WEBSITE: The Biota of North America Program is a website where users can discover the county-specific native status of any species of plant www.bonap.org

WEBSITE: The Federal Township Plats of Illinois are historical documents of when the surveyors first came through Illinois in the 1800s. The maps were created using the surveyor field notes and are a good resource for determining the basic ecological history of a site... i.e. was it prairie or wooded (or marsh). <http://idaillinois.org/digital/collection/IllinoisPlats/search/>

WEBSITE: Historic Illinois Aerial Photography is a government website that houses all of the first aerial photographs flown over Illinois from 1939-1941. This is another critical website used to determine the historic ecosystems that likely occurred on a site. These were flown prior to development expansion following WWII and can be a good indicator of whether a site was prairie (most shown as agriculture) or woods. <https://prairie-research.maps.arcgis.com/apps/webappviewer/index.html?id=a251e0a92bd84f978e46a0b2f3b5a50f>

WEBSITE: Web Soil Survey is a government website where the mapped soils of a site can be determined. Knowing the soil characteristics of a site allows an ecological restoration designer to understand how well a site drains and what the typical physical makeup is of a soil so that appropriate species can be selected for the restoration work. The soil series name is also needed for use in finding the Official Soil Series Description, where the historic vegetation that typically grew on that soil type can be found. <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

WEBSITE: The Official Soil Series Descriptions is a government website that provides additional soil description data for different types of soils. Data found here that is not provided by the Web Soil Survey include, detailed pedon data, descriptions on soil permeability and descriptions of historic vegetation. <https://soilseries.sc.egov.usda.gov/osdname.aspx>

WEBSITE: The Ecosystem Dynamics Interpretive Tool is a newer government/education website where users can retrieve in-depth ecosystem data for their site. There is a mapping tool that utilizes the USDA soil maps to

determine what type of ecosystem would have occurred on that soil type. Glacial history, soil formation, hydrology, and dominant plant species are all provided. <https://edit.jornada.nmsu.edu/catalogs/esd>

OTHER RESOURCES THAT MAY BE HELPFUL

There are endless resources available for native plant identification, “Native Gardening”, prairie restoration, etc... just Google “books on native plants” and see the results! What have been provided above and below are resources that the practitioners at The Prairie State Nursery, LLC have found to be the most impactful in applying them to actual restoration planning and implementation. Please take a look at other resources too, you may find something that explains what you’re looking for better than what we’ve provided here... never stop learning!

BOOK: *Wildflowers of Wisconsin and the Great Lakes Region: A Comprehensive Field Guide* (2009), by Merel R. Black & Emmet J. Judziewicz is a well-developed field guide with good photos, and it is small enough that it can be easily carried in the field. This resource is organized by plant family, so it may take a little plant knowledge or flipping through the index in order to utilize the book. One of the best “starter” books for field plant ID available. It can be purchased online for around \$30.00.

PDF: *Central Region Seedling ID Guide for Native Prairie Plants* (2005) is a free publication available through the Natural Resources and Conservation Service (NRCS) through the US Department of Agriculture (USDA). It can be helpful for those new to restoration trying to identify native seedlings the first year following an installation. Fair warning, even with a guide like this the identification of native seedlings in a new prairie is quite difficult for the untrained eye. https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/mopmcpu6313.pdf

BOOK: *The Tallgrass Prairie Center Guide to Seed and Seedling Identification in the Upper Midwest* (2010) by Dave Williams and published by Bur Oak Guides. This publication includes some weed species as well as native species. It can be helpful for those new to restoration trying to identify native seedlings the first year following an installation. Fair warning, even with a guide like this the identification of native seedlings in a new prairie is quite difficult for the untrained eye. It can be purchased for \$14.00 direct from the publisher <https://www.uiopress.uiowa.edu/books/9781587299025/the-tallgrass-prairie-center-guide-to-seed-and-seedling-identification-in-the-upper-midwest>

BOOK: *Bringing Nature Home: How You Can Sustain Wildlife with Native Plants, Updated and Expanded* (2009) by Douglas W. Tallamy. This book is required reading for those wondering “Why” they should plant native species. Doug is a Professor of Entomology and Wildlife Ecology at the University of Delaware and does an excellent job explaining (in layman’s terms) the scientific relationship between our native wildlife and native plants, making the argument that if we want more wildlife, it begins with our plant choices and that every square foot counts. The book is 360 pages, however the back half of the book contains plant/insect profiles that can be used for reference... so it really is a pretty quick read. It can be purchased online for \$16.00

BOOK: *The Tallgrass Prairie Center Guide to Prairie Restoration in the Upper Midwest* (2010) by Daryl Smith, Dave Williams, Greg Houseal, Kirk Henderson and published by Bur Oak Guides. To be clear, we recommend “A Practical Guide for Prairie Reconstruction” by Carl Kurtz over this publication. That being said, this publication goes into greater detail on theory and methods used in ecological restoration. It can be purchased for \$27.50 directly from the publisher <https://www.uiopress.uiowa.edu/books/9781587299162/the-tallgrass-prairie-center-guide-to-prairie-restoration-in-the-upper-midwest>

PDF: *The Village of Lemont Native Planting Guidelines* (2016) is a good overall resource for understanding the modern application of native species in development and urban or suburban spaces. This publication was developed using over 30 years of practical application experience and can provide a great baseline for any native planting project. It is free to download. <https://www.lemont.il.us/home/showpublisheddocument/3400/637225477570970000>

BOOK: Steyermark's Flora of Missouri, Volume 1, 2, & 3 (1999) by George Yatskievych. Although focused on Missouri, there is a lot of overlap of native species between Illinois and Missouri. This publication typically provides better habitat descriptions than Flora of the Chicago Region that can be helpful as a secondary resource for species list development and may prove to be a valuable resource for projects in the Southern Illinois Region. Unfortunately this is a 3 volume set, all three books are required to be used as species are spread between all 3 volumes. This resource would be considered a "deep-dive" and should only be considered by those wanting to consider every possible data point when making species selections. They can be purchased online for \$65.00 (Volume 1), \$48.00 (Volume 2), and \$65.00 (Volume 3).