



State University of New York College of
Environmental Science and Forestry



Restoration
Science Center

CONVERTING LAWNS TO MEADOWS

A POCKET GUIDE FOR CNY LANDOWNERS

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Converting Lawns to Meadows A Landowner's Pocket Guide

Lawns are ubiquitous features of American landscapes, but these monocultures of exotic plants contribute to many environmental problems and can be expensive to maintain. Converting lawns to meadows composed of beautiful native plants can be an attractive alternative for homeowners who want to promote biodiversity, protect water quality, and even save money on lawn care. This pocket guide serves as a quick reference for Central New York landowners interested in converting their lawn to meadow.

TABLE OF CONTENTS

Establishing a Meadow.....	1
Phase 1: Defining your Objectives.....	2
Phase 2: Clearing Vegetation.....	6
Phase 3: Establishing the Meadow.....	9
Phase 4: Monitoring and Maintenance.....	14
Weed Identification Guide.....	18
Identification.....	20
Lifecycle.....	20
Control.....	22
Common CNY Weeds	23

ESTABLISHING A MEADOW



Phase 1: Defining Your Objectives

Phase 2: Clearing Vegetation

Phase 3: Establishing the Meadow

Phase 4: Monitoring and Maintenance

Phase 1: Defining Your Objectives

A meadow, also known as a grassland, is a plant community dominated by herbaceous plants, such as grasses, with few to no woody species.

Landowners may choose to convert some or all of their lawn to meadow for many reasons like the desire to protect water quality, enhance habitat for wildlife, save money on lawn care, and the aesthetic appeal of this beautiful landscape feature. The size of a meadow is among the most important factors for determining the “best” purposes for establishing this plant community. Some of the wildlife that depend upon meadow habitat such as grassland birds require dozens of acres. Most landowners are working with less than one acre of space, therefore they should prioritize objectives that can be met by smaller meadows. Promoting beneficial insects like pollinators, or creating a vegetative buffer to protect water quality are examples of goals that can be achieved by establishing meadows even in very small areas.

Growing conditions at the site serve as the first filter in selecting appropriate plant species (e.g., if the site is dry, plants that require wet soil will fail). Landowners should also select meadow plants that are native to their region because these species normally perform best and have the most associations with local wildlife like butterflies. Most companies that sell meadow plants and seeds will list the optimum growing conditions and native range for each species, and when possible will assist in selecting plant materials grown nearby. After developing a list of meadow species that are ecologically appropriate for a site the next step is to further refine the list based on the desired aesthetic. Vegetation height, plant spacing, and bloom color are all important elements for landowners to consider.



1. Scale

What is the size of your potential meadow? The scale of the area you are working with dictates important considerations like how to most efficiently clear existing vegetation and establish the meadow plants.

- a. Sites less than 1 acre in size can support beneficial insects
- b. 1-10 acres can provide food and shelter for small birds
- c. Meadows over 10 acres can support some grassland specialists



2. Site Features

What are the site conditions (e.g., light availability, soil moisture?) Are there sensitive features nearby such as waterbodies? Other factors to consider include:

- a. Topography of the site (i.e., steep vs flat)
- b. Surrounding features such as wetlands and forests
- c. Climate (i.e., cold hardiness zone)



3. Objectives of the Meadow

- a. Ecological objectives are dictated primarily by the potential size of the meadow. For example, a meadow less than 1 acre in size will not support breeding grassland birds, but can provide food for songbirds. The following section on designing meadows to generate ecosystem services can help identify the possible ecological values of your meadow.
- b. Aesthetic objectives relate to personal preferences for color, vegetation height, and other elements of landscaping's appearance. These are features you can select for when designing your meadow.



“Grasslands are among the most imperiled ecosystems in the United States. Restoring these plant communities is one of the most valuable contributions private landowners can make to preserve and support the wildlife that depend upon them.”

Sam Quinn

Research Assistant & Instructor
Conservation on Private Lands Initiative RSC

Ecosystem Services Provided by Meadows

Meadows can generate ecosystem services, which are services nature provides for free such as pollination and protecting water quality. Replacing lawn with meadow can support ecosystem services that directly benefit people as well as biodiversity. Some examples of ecosystem services provided by meadows include:

1. Services that directly benefit landowners such as foods, medicines, and decorations derived from meadow plants.
2. Supporting services that include soil formation and retention, creating habitat for biodiversity, and enhancing water quality.
3. Contributing to processes that benefit people such as providing a home for the insects that pollinate our plants, purifying water, reducing soil erosion, and regulating floods.
4. Providing cultural services, which are the nonmaterial benefits people enjoy from their meadow. These services include beautifying a landscape, the educational value of learning about ecology through managing a meadow, and the pleasure of watching the butterflies and birds that you support by creating a meadow.

These are just a few examples of the benefits one can expect from converting lawn to meadow. Before beginning this process it is essential to determine what you hope to accomplish and to proceed accordingly.

Phase 2: Clearing Vegetation

Inadequate clearing of vegetation prior to meadow establishment is the most common reason meadows fail. Removing lawn vegetation can be a challenge, especially if the area is near sensitive features like waterbodies. There are many options available for clearing vegetation. The choice of technique comes down to balancing efficacy, safety, and cost. As meadows increase in size, techniques like hand pulling weeds become impractical, while methods such as the use of herbicide are limited near sensitive areas. Importantly, all of these techniques can be complicated to apply, and can be destructive if done incorrectly. Consulting professionals is essential before engaging in any of these activities. Following is a list of the most common vegetation clearing techniques for converting lawn to meadow:

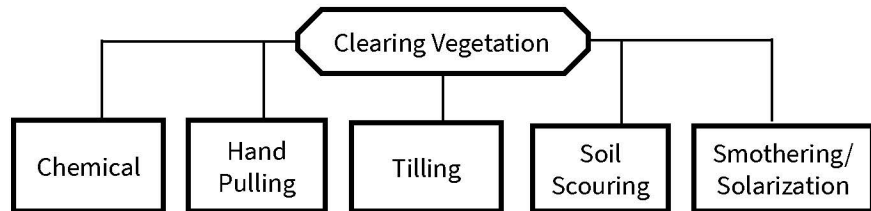
- 1. Chemical:** Herbicides can be used to remove vegetation on areas of any size. Backpack sprayers are appropriate at small sites, while in large areas vehicles equipped with a boom sprayer become necessary. Choice of herbicide and the method of application can minimize potential environmental risk.
- 2. Hand Pulling:** In small sites weeds can be uprooted by hand or with simple hand tools. This can be a cost-effective method and requires the least technical expertise but is only practical at small scales. This technique may be most appropriate near sensitive areas.
- 3. Tilling:** Tilling the soil shreds and uproots vegetation. Tilling more than once is normally necessary. Some sites must be tilled 1-2 times per month

from spring through mid-summer to sufficiently kill existing vegetation and the weed seeds that will germinate following soil disturbance.

4. Soil Scouring: Scraping away the top layer of soil will eliminate both existing plants and weed seeds in the soil. Normally the top 2-6 inches of soil are removed. Unless working on a very small site, use of machines is necessary.

5. Smothering/Solarization: In small sites it is possible to smother the vegetation using plastic or tarp material. It is preferable to use permeable material such as landscape fabric to allow precipitation to pass into the soil. Check beneath the cover every few weeks to determine the status of the vegetation. Once most plants are dead, remove the cover to allow weed seeds to germinate. If many seedlings emerge, re-cover the area and repeat until weed pressure is minimal (i.e., easy to clear by hand pulling).

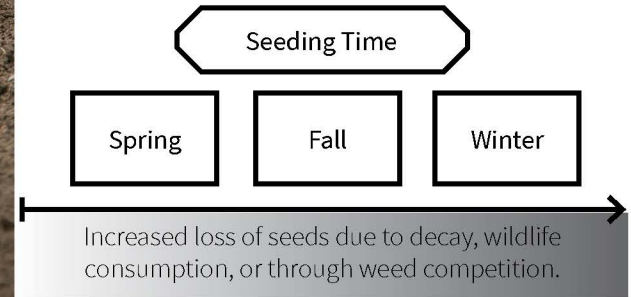




Phase 3: Establishing the Meadow

Choose a Seeding Time

There are multiple appropriate times of year to sow meadow seed. Many plants naturally drop their seeds in fall, therefore seeding a meadow during this time is the most “ecologically natural” option. However, seeding during fall can lead to loss of seeds to wildlife, frost heaving, soil erosion, and decay. If seeding during fall, it is best to do so just after the first killing frost and before heavy snow. The easiest seeding time for most landowners is spring (May-June in CNY) when most seeds will begin germinating within weeks. Seeds can also be sown in winter (frost seeding) but this method is least preferred because it is normally associated with higher seed loss.





Seed Dispersal Method

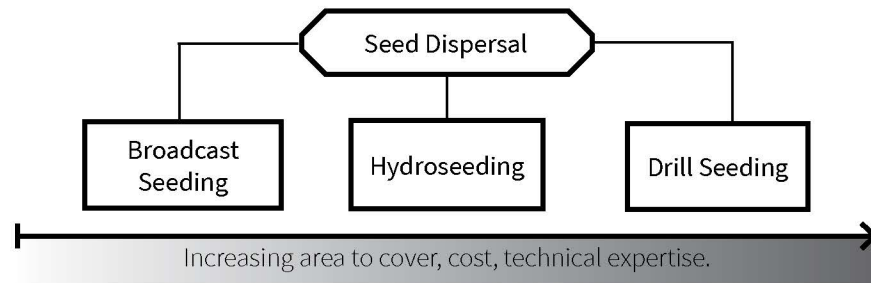
Various seed dispersal methods are available. Selecting the most appropriate technique depends on site area, cost, technical expertise, and proximity to sensitive areas. We recommend the following options starting from the least costly, smallest area, and requiring the least technical expertise.

1. Broadcast Seeding: The cheapest method, and easiest for smaller areas, in which one evenly casts the seeds onto the soil surface by hand or by using a device that disperses the seed at a calibrated rate. Adding bulking material

such as clay-based cat litter to the seed mix aids in uniform dispersal. To achieve uniform germination it is important to press seeds into the soil following broadcast seeding. A lawn roller, culti-packer or similar device can be used for this purpose. If this equipment is unavailable, driving over the area can achieve a similar result by using the tires to press seeds into the soil.

2. Hydro Seeding: This technique involves spraying a mixture of meadow seeds and a slurry that binds to the soil to protect the seeds until they germinate. This option is especially attractive on steep sites to aid in erosion control and does not require additions like mulch to protect the seeds.

3. Drill Seeding: The most effective method for sowing meadow seed is through use of a specially designed tractor implement that precisely positions seeds in shallow furrows. This method is best for seeding large areas but may be prohibitively expensive at smaller sites. Drill seeding rarely requires mulch because the seeds are positioned beneath the soil surface.





Select Seed Covering Methods

If broadcast seeding, then covering the site is necessary to protect the seeds from erosion and wildlife. Several techniques are available:

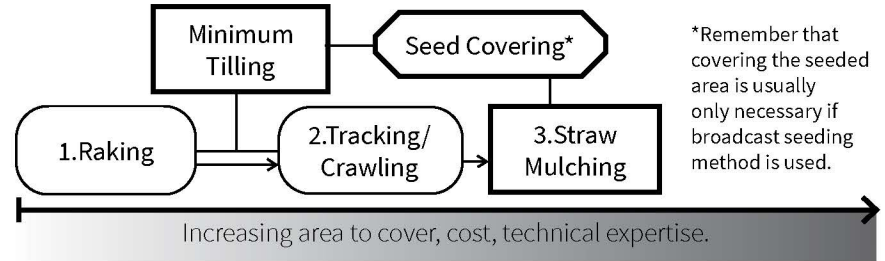
1. Minimum Tilling: After spreading the seeds light tilling ensures that seeds are covered by soil. Methods include:

a. Raking: a garden rake can be used to lightly till the soil up to 1/4 inch deep in order to ensure proper soil to seed contact and seed depth in the soil.

b. Tracking/Crawling: using either specially designed implements to create depressions in soil that capture seeds, or simply driving over the site with an ATV to create a similar effect using the tires.

2. Straw Mulching: After pressing the seeds into the soil, straw can be applied to the area. Only a thin layer (soil still visible) is needed, and it is critical to use mulch free of weed seeds. Application of a tackifier

(a sticky substance that glues the straw together) is important to prevent the straw from blowing or washing away. Some commercially available straw mulch has built in tackifier. On steep sites mats of straw or jute may be necessary to prevent erosion.



Phase 4: Monitoring and Maintenance

Meadows are dynamic ecosystems that change from year to year, from season to season, and even throughout the course of one day. While much less work than maintaining a lawn, there are necessary tasks to steward a meadow, such as occasional weeding. Monitoring the wildlife a meadow was intended to support also helps ensure the meadow is meeting your goals to support these animals. Maintaining a list of butterflies or birds is a great way to track the wildlife your meadow supports.

Stay Connected by Monitoring Meadows

Your objectives for creating a meadow can inform how to most effectively monitor the area to make sure it is functioning as intended. For example, if increasing insect diversity was an objective then counting the species of bees or butterflies at the site before the meadow is established and comparing to numbers recorded in the years following meadow establishment is a fun and easy way to monitor success.



Managing Meadows

In most areas of the Northeastern US, unmanaged meadows will eventually become forests as trees and other woody vegetation invade.



Annual Management

1. Years 1 and 2

Depending on seed mix composition, most of the meadow plants will begin to grow in the first two years. Monitor the meadow for weeds and remove them as appropriate. In small sites hand pulling is likely sufficient. In larger areas one may need to consider using tools like a weed whacker or spot treatment with herbicide to eliminate unwanted plants. In the first one to two years it is necessary to cut the whole meadow whenever it reaches approximately 18 inches in height until late summer when cutting can cease. Cutting is done to ensure light reaches the smaller, slower growing meadow plants, and to remove the seed heads from





annual weeds before they mature.

2. Year 3 and onwards

As the meadow matures, it should be cut every three to five years to control invading woody plants and reduce the build up of dead plant material. The best time to cut is early spring. The traditional way to manage meadows is with fire, but this is impractical for most landowners. Cutting is used as a substitute for this more natural form of disturbance.



Site-based Management

We recommend the following maintenance techniques based on a meadow's location and size:

1. Residential/Small Sites

For small meadows or in residential

areas the combination of hand pulling weeds and periodic cutting is the best approach.


1. Hand pulling weeds
2. Periodic cutting (cut to a height of 10 inches or taller)
 - a. Weed Whacker
 - b. Tractor/Rotary Mower

2. Large Sites

For larger meadows in non-residential sites, the vegetation can be managed through prescribed fires, grazing, cutting or a combination of these techniques.

1. Prescribed Fire
2. Grazing: using livestock
3. Cutting: using tractor-mounted mowing implements





WEED IDENTIFICATION GUIDE

Identification

Lifecycle

Control

Common CNY Weeds

Weed Identification Guide

The Weed Identification Guide contains a selection of common Central New York lawn weed species. This guide is designed to help landowners identify and assess removal strategies appropriate for the weeds they may encounter. Importantly, a **weed is simply a plant that grows where it is unwanted**. Most of these species are beneficial plants in many settings.

Identification

The weeds are categorized into three types based on growth habitat. Plants are also labeled as exotic or native to CNY.



Lifecycle

Plants can be annual, biennial, or perennial. Understanding how these species spread and grow will aid in learning how to control them.

1 Annual weeds complete their lifecycle within one year. The seeds of annuals tend to germinate best where the soil is disturbed. These weeds are divided into two general types based on growing season. Summer annuals germinate in spring or early summer as the soil warms and are the toughest to manage because these species grow during the same season as most meadow plants. Examples include knapweeds and crabgrasses. Winter annuals begin

to germinate in early fall or late spring. These plants may live through the winter and soon die in the summer heat after they set seed. Examples include annual ryegrass and common chickweed.

2 Biennial weeds live for two years. The plant forms a rosette of leaves in the first year and flowers the following year. Examples include garlic mustard and many thistles. The spread of most biennial weeds can be controlled by cutting seed heads before they mature.

∞ Perennial weeds live for two or more years. Some perennials grow in clumps such as plantains and dandelions. Other perennials spread through rhizomes (underground stems) or stolons (above ground stems) that expand outward from the plant. Examples include yellow nutsedge, Canada golden-rod, and white clover.

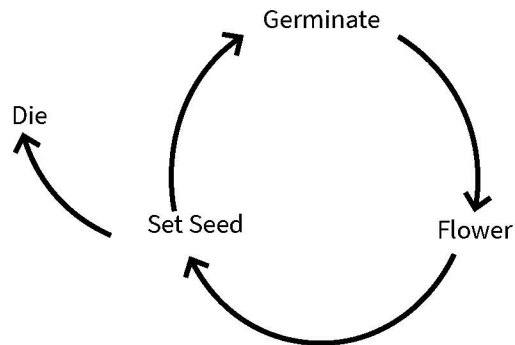


Figure showing a general lifecycle of plants from germination till death.

Weed Control

The following decision-making tool will help you select appropriate methods of removing weeds on your land.

Chemical

Herbicides (organic or conventional) can be applied over any size area. At large scales vehicles equipped with a boom sprayer may be necessary.

Unless lots of help is available to pull weeds, herbicide may be necessary to control perennial plants in larger meadows. Many annual and biennial weeds can be managed through cutting.

Hand Pulling

Can be uprooted by hand or with simple hand tools.

Most annuals and many biennials can be eliminated by uprooting the plant

It is possible to hand pull some young perennials or dig out their root systems. Hand pulling can be used in combination with other methods like regular cutting.

Soil Scouring

Scraping away the top 2-6 inches of soil will eliminate both currently growing plants and weed seeds in the soil.

All types of weeds can be removed by soil scouring, but the growth of meadow plants may be slowed because the exposed soil will be less fertile. Lower fertility is usually beneficial to meadow development because weeds are less adapted to invading poorer soils.

Common CNY Weeds

B Broad-leaf



Common Plantain
Plantago major **E** ∞



English Plantain **E** ∞
Plantago lanceolata



Yellow Pimpernel **N** ∞
Taenidia integririma



Dandelion **E** ∞
Taraxacum officinale

Note: The images are not to scale.



E ∞ White Clover
Trifolium repens



Creeping Yellow Wood Sorrel
E ∞ *Oxalis corniculata*



Moneywort (Creeping Jenny)
E ∞ *Lysimachia nummularia*



Ground Ivy (Creeping Charlie)
E ∞ *Glechoma hederacea*



E ∞ Lawn Daisy
Bellis perennis

B Broad-leaf



Common Blue Violet
Viola sororia **N ∞**



E 2 Lesser Burdock
Arctium minus



N 1 Smartweeds
Persicaria spp.



N ∞ American Brooklime
Veronica americana



N ∞ Tall Goldenrod
Solidago gigantea



E 2 Broad-winged thistle
Carduus acanthoides ssp. *acanthoides*



N ∞ White Milkwort
Polygala alba



E 1 Common Lamb's-Quarters (Pigweed)
Chenopodium album



E ∞ Knapweed
Centaurea stoebe



E ∞ Common Periwinkle (Myrtle)
Vinca minor

Note: The images are not to scale.

B Broad-leaf



E ∞ Common St. John's Worts
Hypericum perforatum ssp. *perforatum*



N 1 Common Jewelweed
Impatiens capensis



N 1 Common Ragweed
Ambrosia artemisiifolia



N ∞ Common yarrow
Achillea millefolium



E ∞ Bird's-foot Trefoils
Lotus corniculatus



E ∞ Purple Loosestrife
Lythrum salicaria



E 2 Yellow Sweetclover
Melilotus officinalis



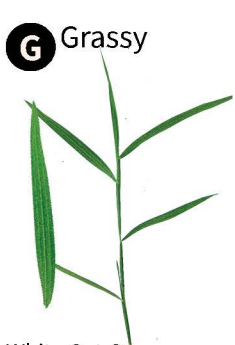
E ∞ Indian Strawberry
Potentilla indica



E 1 Purslane
Portulaca oleracea

Note: The images are not to scale.

G Grassy



White Cut Grass
Leersia virginica **N** **∞**



Crab Grasses
Digitaria spp. **E** **1**



Oval-leaved Knotweed
Polygonum arenastrum
ssp. *depressum* **E** **1**



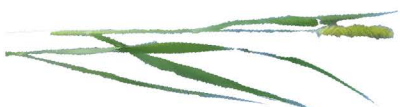
Common Kentucky Blue Grass
Poa pratensis ssp. *pratensis* **E** **∞**



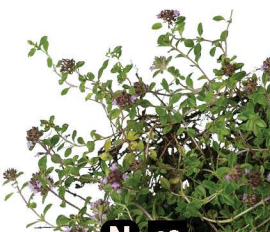
Bedstraws
Galium spp. **N** **E** **∞**



Tall Fescue **E** **∞**
Schedonorus arundinaceus
Note: The images are not to scale.



Foxtail **E** **1**
Setaria



N **∞** Heal-all
Prunella vulgaris

W Woody



Virginia Creeper **N** **∞**
Parthenocissus quinquefolia



Common Buckthorn **E** **∞**
Rhamnus cathartica



E **∞** Black Locust
Robinia pseudoacacia



Devil's Beggartick **N** **1**
Bidens frondosa



Blackberries and Raspberries **N** **∞**
Rubus spp.



N **∞** Staghorn Sumac
Rhus typhina

Note: The images are not to scale.

Additional Resources

- Leopold D.J. 2005. Native Plants of the Northeast: A Guide for Gardening and Conservation, Timber Press, Portland, OR. 308 p.
- Uva, R.H., J.C. Neal, and J.M. DiTomaso. 1997. Weeds of the Northeast, Cornell University Press, Ithaca, NY. 408 p.
- Weaner, L. and T. Christopher. 2016. Garden Revolution: How Our Landscapes Can Be a Source of Environmental Change, Timber Press, Portland, OR. 328 p.

Contact Information for the Restoration Science Center



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<https://www.esf.edu/research/restorationscience/>



Restoration Science Center at SUNY ESF



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