Mowing to Meadows: Lessons Learned

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The Pennsylvania Environmental Council (PEC) protects and restores the natural and built environments through innovation, collaboration, education and advocacy. PEC believes in the value of partnerships with the private sector, government, communities and individuals to improve the quality of life for all Pennsylvanians.
Introduction
• Benefits of Meadow Creation
• Meadow Case Studies

Lessons Learned
• Education and Outreach
• Design
• Installation
• Maintenance
• Unintended positive consequences
Case Study Partners

• Terry Hough (DCNR grant)
• Drew Gilchrist (NLT, now DCNR)
• Gary Gimbert (NLT)
• Derek Dureka (Upper Dublin Township Parks)
• Doug Knauss (Whitemarsh Township Parks)
• David Kline (Montgomery School teacher)
Financial Support Provided By:

- PA Department of Conservation and Natural Resources
- Martin Foundation
- Philadelphia Water Department
- William Penn Foundation
<table>
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<th>MEADOWS IMPLEMENTATION TEAM</th>
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<td>MEADOW DESIGN</td>
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<td>LAND MANAGERS AND FACILITIES DECISION MAKERS</td>
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<td>Woodland Cemetery</td>
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<td>National Park Service at Valley Forge</td>
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<td>PEC's SE Office</td>
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<td>Villanova University</td>
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Convert lawns to landscapes of less mowing and more diversity to improve water quality.

LAWNS

- = MORE
- money
- pollution
- runoff
- erosion
- pesticides
- gas

MEADOWS

- = MORE
- habitat
- bioremediation
- enjoyment
- infiltration
Three Types

Let it grow
- Reduce Mowing
- Observe
- Remove weeds

Grow and Plant
- Reduce Mowing
- Plant seed, plugs, or containerized plants
- Remove weeds

Kill and Plant
- Kill existing vegetation, herbicide, smother, or till
- Plant seed, plugs, or containerized plants
- Remove weeds
Montgomery School
Kill and Plant
Koontz Park
Kill and Plant
Lessons Learned

- Education and Outreach
- Design
- Installation
- Maintenance
- Unintended positive consequences
Education and Outreach

- Project location
- Aesthetics in SE PA
- Cues to care
- Proactive outreach
- Municipal buy in
- Meadow Implementation Team
Project Location

- View-shed site control
- Get it right first, then scale up
- Grow and expand meadow expertise
Aesthetics in SE PA

• Neat/tidy means care
• Concerns about wildness:
  – Looks messy
  – The coyote ate my cat
Turf Grass and Machine Culture
• Mowed edge and fences
• Flowering plants and trees
• Wildlife feeders and houses
• Bold patterns
• Trimmed Shrubs
Degrees of Wildness

Changes in appearance

Manicured ➔ Wild

What appeals to landowner
Beautiful Trails

Invite people into the meadows
More Proactive Outreach

• Letters to neighbors...
• Social media
• Newspaper article
• Look Book
• Educational events
Municipal Buy In
Meadow Implementation Team
...Lessons Learned...

- Communicate the benefits!
- Train the communicators (people fielding complaints)
- People’s aesthetics differ
- Wildflowers desired, but increases $
Shift perceptions

- Increase number of meadows
- Advertise successful ones
- Goal: People recognize and appreciate meadows
Design Considerations

- Ordinances
- Invasive species (%) in/around meadow
- Grow the grasses first
- Cover Crop/mix of species
- Impact of shade trees
- Soil tests: pH, fertility, compost tea
Ordinances

• Consider set backs

• Check Township weed ordinance too
• Percent cover on site
• Nearby migration potential
Grow the grasses first

• Establish grasses (1-3 years)
• Manage invasives
• Then add color
Cover Crop/mix of species
Impact of shade trees
Soil tests – Know Your Soil

- pH (5-6 range desired)
- Fertility
- Compost tea
Montgomery School
Too much organic matter

Farmer was spreading manure

Boundary line determined and manure spreading stopped
Installation

- Shock of herbicide kill
- Signage (meadow in progress)
- Involving volunteers
- Forensics - when things go wrong.
- Adding flowers
Herbicide Shock

• “The initial project was started by removing most of the vegetation on the lot. Many of the kids were horrified by the stark change and “accused” Mr. Kline of destroying nature.”
  – David Kline, Teacher at Montgomery School
Koontz Park Volunteers 😊

- Green house on site!
- Volunteer gardeners!
- Planting workforce!
- Maintenance crew!
Koontz Park Forensics 😞

- Plant die off
- pH was >8. added aluminum sulfate, lowered to 7
- Compacted soils a factor
- And droughty summer
- The culprits: longer lasting herbicides
  - AquaNeat, Bullseye Blue, Clean Slate, MSO 7.9.10
- No long-term toxicity, meadow recovered!
Montgomery School
Compost Tea

Photo by Lee Armillei, GreenWeaver Landscapes
GreenWeaver spraying fungal dominant compost tea over the meadow
Compost Tea

- Concentrations and ratios of bacteria, fungi, protozoa, and nematodes.
- Amend soil to create conditions more favorable for warm season grasses.
- 3 soil samples October 2012; recommended apply “compost tea’ to boost levels of fungi, protozoa, and nematodes.
- Fungal-dominant compost tea (30 gallons tested and approved compost extract, diluted with water) applied April 25 2013
- Follow-up sampling indicate concentrations of protozoa and nematodes increased, and a more desirable (but not optimal) bacteria/fungi ratio was reported.
- Soil report noted that the microbial community is still selecting for the growth of earlier successional species rather than the most productive and desired warm season meadow grasses.

- Need more compost tea data/results.
- Costs ($878/3 acres)
Adding Color: The Flowers

• After grasses established

• Where to plant
  – High visibility areas
  – Existing gaps
  – Herbicide openings

• Plugs and/or seeds
  – $1/plug + volunteers
  – Protection (e.g. from deer)
Maintenance

- Staff buy in and training
- Invasive plants
- Timing of maintenance mowing
- Dealing with mother nature
- Education and outreach continues
Staff Buy In

- Less mowing and weed whipping
- Initial training for plant ID and invasive removal
- Continued training as techniques evolve
Monitor and control

• Pull
• Spot treat
• Mow
• Basal Bark
• Cut stump
Prioritized Invasive Removal

- Thistle
- Phragmite
- Mile-a-Minute
- Loosestrife
- Stilt grass
Create Specific O/M Plans

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Task</th>
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| 1st Quarter (January – March) | **Meadow Mowing**  
1. Late winter/early spring when soil is dry or frozen  
2. Mow to a height of 8 – 12 inches  
**Control invasive plants**  
1. Apply basal bark herbicide treatment to woody plants (if needed)  
2. Treat any known patches of mile-a-minute and Japanese stiltgrass with pre-emergent herbicide in March (check PSU fact sheets for best timing) |
| 2nd Quarter (April – June) | **Meadow Monitoring**  
1. Check meadows monthly for any potential problems  
**Overseeding & plug planting**  
1. Overseed any bare areas by broadcasting seed into prepared soil bed (April – May)  
2. Prepare and plant desired herbaceous plugs (April – mid-May); plugs can be planted later if they can be watered  
3. See pages 185 – 190 in the Stewardship Handbook for list of native species suitable for various site conditions  
**Control invasive plants**  
1. Control Canada thistle with herbicide(preferred) or mowing before it goes to seed(late May – early June)  
2. Control mile-a-minute by hand pulling and bagging small patches before June or spot treat with post-emergent herbicide as soon as detected  
3. Japanese stiltgrass can be treated with a pre-emergent herbicide through May; check label for best timing, and treated with a post-emergent herbicide June through August |
Operation/Maintenance Plan Agreement for Meadow at Koontz Park Stormwater Basin, Whitemarsh Township Parks & Recreation

This Operation/Maintenance (O/M) Plan includes management tasks for a meadow installed in the stormwater basin at Koontz Park under a Pennsylvania Department of Conservation and Natural Resources (DCNR) Mowing to Meadow Grant (BRC-RCI-16-177) secured by the Pennsylvania Environmental Council.

The O/M Plan includes a plan narrative and an annual task schedule. The O/M Plan also includes back up references including the Natural Lands Trust Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (October 2008), a U.S. Department of Agriculture Invasive Plants Field and Reference Guide (May 2008), and Fact Sheets identified in the Plan that provide information on the control of invasive plant species.

The meadow project includes a warm season grass and wildflower meadow installed in the Koontz Park stormwater basin. The creation of this meadow is consistent with the practices recommended in DCNR’s Creating Sustainable Community Parks, A Guide to Improving Quality of Life by Protecting Natural Resources, January 2007. The meadow installation included the eradication of existing turf grass and re-planting activities consistent with an agreed upon meadow creation design.

Project goals include capturing and filtering stormwater runoff, creating wildlife habitat, reducing erosion, lowering mowing costs, and creating more diverse natural features that are aesthetically pleasing to park users. The meadow was first installed in 2011 and is gradually establishing itself as it enters the third (2013) growing season.

The O/M Plan provides a blueprint of monitoring and maintenance tasks that will support the full establishment and continuity of the meadow.

By signing this agreement Whitemarsh Township agrees to:

1. Perform monitoring and maintenance tasks consistent with the recommendations set forth in this O/M Plan.

2. Install meadow educational signage prepared by PEC and reviewed by the Township, at an appropriate location to inform visitors about the meadow project.

3. Maintain records for at least three (3) years that document meadow installation and management costs, and provide records to PEC that document DCNR grant match.

Richard L. Mellor Jr., Township Manager, Whitemarsh Township
Meadow Implementation Team
...Lessons Learned...

– O/M staff need to talk/learn from peers.
– Need equipment budget (e.g. flail mower)
– Streamline planting plans, easier to ID good and bad plants.
– Start a Delaware Valley Community College or PA Nursery Landscaping Association training program.
– Grow landscaping jobs as green infrastructure expands
Mowing Frequency and Timing

Species composition varies with mowing schedule

Mow no more than two times per year*

*Exceptions for spot treatment mowing
General Rules

• Blackout dates
  April to June

• Mow
  Saint Patty’s Day
  and/or
  Fourth of July
Why not mow April 1 to June 30?
Saint Patty’s Day Mowing

Positives

Winter food and cover
Greatest species diversity
Higher vegetation acts as snow fence

Negatives

Difficult weather or ground conditions
Less effect on controlling woody and invasive species
Independence Day Mowing

Positives

Encourages Warm Season Grasses (native)
Greater impact on invasive plants
Generally dry conditions for mowing

Negatives

Less winter cover
Effects early wildflowers
Dealing with mother nature

Summer of 2011....hot and dry June and July
Education and outreach continues

Creating a Native Meadow

WHY plant a meadow?
Compared to ordinary lawns, native meadows:
- Are drought resistant, requiring no watering after establishment
- Only need mowing once or twice a year
- Thrive without fertilizers and pesticides
- Filter and clean pollutants from stormwater runoff
- Recharge groundwater supplies

HOW do meadows work?
Perennial meadow plants native to the Eastern U.S. spend their first year building deep roots. These roots give the plants access to moisture and nutrients far below the surface. Compare the roots of the common lawn grass, Kentucky Bluegrass, to native perennial meadow plants.

WHAT grows in a meadow?
Below are examples of some of the native grass and flower species you may find growing in a meadow. In addition to soaking up excess runoff and reducing water pollution, these plants provide food (nectar and seeds) and cover for birds and butterflies.

root systems of prairie plants

WHO can plant a meadow?
YOU!

Seeding a native meadow in an unused section of your lawn is simple and inexpensive. With some patience to let the new plants set their deep roots, you'll add color and interest to your property while reducing mowing, watering and fertilizing expenses. You'll be improving habitat for beneficial wildlife, too.

In front of you is a demonstration meadow. It was planted in 2011 and will take two to three years to get fully established. An established meadow is close to maintenance free, requiring only occasional weedng and mowing once a year.
Post card; messaging on reverse side

DON'T MOW...LET IT GROW!
How to Create a Meadow In SE PA Brochure

Meadow Maintenance

The first several years after planting are critical to ensuring native grasses become well-established and that weeds do not take over. High initial success is greatly aided by mowing to prevent the weeds from developing seed heads while allowing the grasses to flourish. Weeds grow more quickly than native grasses and wildflowers, so regular high-frequency mowing will keep the weeds from flowering while allowing the grasses to grow and mature. Cut several large seeds off at ground level—instead of pulling—to avoid damaging young grass plants. The frequency of mowing will depend greatly on the amount of rainfall in the first growing season, but mowing may need to be done up to six times. Do not mow later in the season since it is important to allow the young grasses to grow before winter. Know the best time in the early spring (March or April) for the second year. After the first year, avoid mowing during the main growing season (late May through August). Seedlings should be mowed in July. This will help keep the weeds from flowering before the grasses mature.

Herbicides

Although many people are nervous about using herbicides, feeling that they are not “natural,” herbicides can be very effective tools in the establishment and maintenance of a healthy meadow. Weeds that provide a great challenge to a meadow must be controlled by either not growing or growing them to North America and eradicating them using only mechanical means of control. The use of chemical herbicides is often subject to a host of regulatory and safety issues. It is best to consult with a professional to ensure that herbicides are applied in a manner to minimize damage to the meadow greats and wildflowers.

Resources

For more information on developing your own organic meadow, contact the PA Department of Conservation and Natural Resources. WWW.PADC.RI.FR

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WWW.Worriedvalley.com

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GreenTreks Videos

Mowing to Meadows

Neighborhood Parks:
Partnership in Action

http://www.greentreks.tv/programs/video-library
Establishment phase can be tough

• Aiden Lair Park challenge
• Desired aesthetics not yet achieved
• That and other complaints have resulted:
  – Ticks and Lyme Disease
  – Blind spot for deer crossing road
  – Allergies
  – Weeds
Accepting imperfections (but don’t let the weeds take over)

Keeping an eye on the Stilt Grass in small area
Meadow Implementation Team
...Lessons Learned...

• Manage the “ugly stage” (1-3 years)

• Adaptive management, hard to predict variables

• Knowledgeable decision maker (when/how much to cut, what invasive to remove and how).

• 10-steps meadow guide?...inexperienced landowners may know 75%, but the 25% they don’t know can kill the meadow.

• Expand # of “garden ecologists” who can help.
Unintended Positive Consequences

- Less geese!
- More projects!
- Saving money!
- Student learning/involvement
- Basin retrofits
Less Geese!
Townships Considering More Projects!

- Upper Dublin:
  - Robbins Park
  - Twining Valley Golf Course Study

- Whitemarsh
  - East Valley Green Park
    - (let it grow)
  - McCarthy Park basin
    - (naturalized)
Save Money!

Catherine Zimmerman, 
Urban and Suburban Meadows, 
How Much Does It Cost Table

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<th>Maintenance Method</th>
<th>Contractor</th>
<th>Homeowner</th>
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<tbody>
<tr>
<td>mowing</td>
<td>$1000</td>
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<tr>
<td>total</td>
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Contractor lawn to meadow savings over 10 years for 1/3 acres = $31,000

Homeowner lawn to meadow savings over 10 years for 1/3 acres = $20,000
Lower Makefield Township
Bucks County

- Basin Naturalization Program...Mowing to Meadows
- 60 + Basins and Open Space Areas in the Program
- Saves $50,000+/Year

Jim Bray Presentation at PSATS 2012
More Cost Data

• Cusano Environmental Edu. Center (4 acres):
  – Turf mowing labor = 80 hrs./yr. x $40/hr. = $3,200
  – Meadow mowing labor = 16 hrs./yr. x $40/hr. = $640
  – Savings = $2,560/year

• Siemens Corporation Meadow (10 acres):
  – Created by Wissahickon Valley Watershed Assoc.
  – Reported savings of $16,000 in mowing cost.
Student learning/involvement

Montgomery School Students...living classroom
Basins Retrofits

- Have site control
- Plentiful
- Minor modifications improve function...like a meadow
- Basin inspection & maintenance is already required
Basins

Before and After
Thank you!

Questions and Comments?