Watershed Forestry Project Implementation in Hatboro

Teddi Stark & Alyssa Keiser
Watershed Forestry Program
DCNR Bureau of Forestry

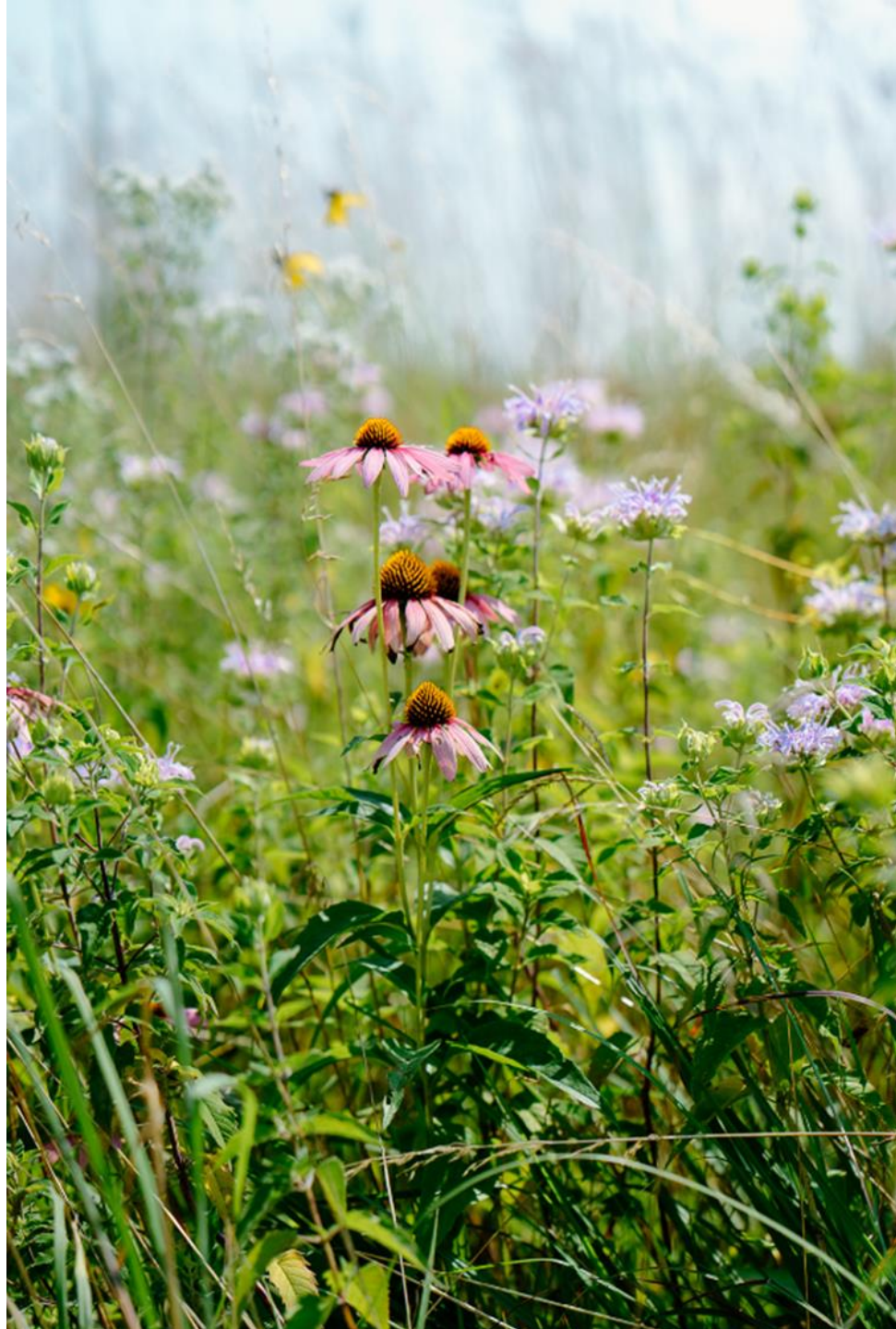
What is Watershed Forestry?

- PA DCNR established in 2016 (and expanded in 2020) to help achieve EPA-imposed goals for Chesapeake Bay Watershed, but developed into a statewide program so all Pennsylvanians can benefit.

- Our current Watershed Forestry Team is made up of 10 positions- seven regional watershed forestry specialists, two program coordinators, and one program manager.

- We assist DCNR with grant programs, provide technical assistance, build partnerships, help bring more money to PA for Watershed Forestry practices, conduct landowner site visits, provide training and resources to partner organizations, and implement projects.

- Riparian Forest Buffers and Lawn Conversion Practices.



What's happening in Hatboro?

- 5 projects going in with DCNR funds on municipal property.
- Tree plantings done, meadow projects in 2024?
- Approved by Borough Council.
- Will be planted by a professional landscape contractor (Landstudies).


Eaton
Memorial Park

Spring 2024

.68 acre meadow installation
near soccer fields

Converting Lawn to Meadow

Lawn to Meadow

- Converting mowed grass lawns to native meadow (aka “conservation landscaping”)
- Driven by need for more pollution reductions from Stormwater sector (non-ag).
- **Ultimate goal is improved water quality**.
- Also improves soil health.
- Provides pollinator and wildlife habitat.

Meadow Establishment

- *Planting perennial native wildflowers and grasses*
  - Maintained to arrest succession
  - Temporally variable but should always be dominated by native, desired species
  - Have comparably more long-term maintenance than converting lawn to forest/woods, but less than keeping as lawn
  - Planted as one large plot via broadcast seeding or no-till drill


LAWNS
2-990-2199

The Benefits of Lawn Conversion

Lawn/Turf Landscape

- Compacted soils and shallow root systems
- Contributes to downstream flooding
- Pesticide and fertilizer applications
- Ongoing maintenance costs
- Carbon emissions from maintenance
- Short, non-native grass monocrop
- Ecological dead zones

Native Meadow Landscape

- Deep root systems improve soil health
- Increased water infiltration & reduced flooding
- Improved nutrient and pollutant processing
- Lower long-term maintenance
- Reduced carbon emissions & increased carbon storage
- Diverse textures and colors all year long
- Wildlife and pollinator habitat

Basic Meadow Planting Tactics

We do this:

- Start with a “sterile” lawn site
- Plan and plant with intention
- Remove turf grass
- Let the plants fill in the gaps
- Spread seed
- Right plants, right place
- Nudge the planting along

Not this:

- Start with a failed conversion
- Let things grow wild
- Overseed into turf grass
- Mulch
- Plant plugs
- Use non-native plants
- Add nutrients, amend soils, and water
- Over-manage the planting

Meadow Timeline (Spring 2024 seeding)

- Connected with DCNR (Spring 2023)
- Plan your project (Summer 2023)
- Site preparation (Spring 2024)
- Planting (Spring 2024)
- Establishment (2024 and possibly 2025)
- Maintenance (2025 and beyond)

Plan the project

Considerations for a successful planting

- Planting extent – consider sight lines and current conditions
- Final seed mix - Ernst Mix ERNMX-153 Showy Northeast Wildflower mix
- Prep and planting methods
- Timeline for implementation
- Who's responsible for what

Site preparation

Goal: kill existing turf cover, efficiently

- Kill turf cover:
  - 1 broadcast application covering the entire site
  - After evaluating, 1 or 2 targeted spot applications may be needed
- Why kill the turf grass?
  - Turf creates a thick mat of roots and shoots that prevents native plants from germinating
  - Non-native vegetation competes with native plants for sunlight and nutrients

Drill seeds

- Utilize a native no-till drill
  - Has a special box to plant native warm-season grasses
- Prep the seed mix in the boxes and calibrate the drill
- Drill is operated by someone with expert skills and experience

Photo by Native Creations Landscaping Services

Establishment

Be patient in year 1 and 2

- Infrequent establishment clipping to about 8-10” when plants are 15”+ high
  - Prevent most undesirable annual plants from going to seed (stops their life cycle)
- May need spot herbicide applications for noxious weeds
- Don’t pull plants!

Meadow Maintenance

Goal is to encourage native plants to flourish and arrest forest succession.

- Spot or rotational mowing *(1-5 year rotations)*

  Goal: control any annual weeds, invite diversity where a single plant begins to dominate, prevent woody establishment

- Use Integrated Vegetation Management Techniques
  - Manual methods, *i.e., use spot clippings prior to blooming to suppress ragweed*
  - Chemical methods, *i.e., use spot herbicide applications to control Canada thistle*
  - Cultural methods, *i.e., when mowing, don't send grass clippings into the meadow*

Example: Pleasant View Meadow

5/17/2021 –

17 days before seeding

Photo by LandStudies

Example: Pleasant View Meadow

6/28/2021 –

42 days after seeding

Photo by LandStudies

Example: Pleasant View Meadow

6/28/2022 –

407 days after seeding

Photo by LandStudies

Herbicides and Conservation…?

In most cases, **long term benefits of habitat restoration outweighs impacts of short term use of herbicide to get those plants to grow**.

Managing weeds is an important part of establishing and maintaining diverse native plant communities over the long term. We recognize that any weed management technique, chemical or non-chemical, can have environmental tradeoffs, such as plastic pollution or impacts to soil health. We also recognize that targeted herbicide use can be part of the restoration process to manage aggressive species at sites where other methods are not feasible. In some situations, we consider herbicides to be a viable short-term method to prepare a site, as well as one of many ongoing tools for targeted weed control.

We always assess herbicide use by the end goal: *will the long-term gains for wildlife from restored native habitat outweigh the impacts caused by short-term or targeted herbicide use?*

What to expect with an herbicide application

- **Flagging** will mark the boundary of the application
- **Signage** on-site to communicate what's happening
  - Expected dates of application
  - A map of the area being treated
  - The herbicides being applied
  - How long to stay out of the treated area (reentry period, see below)
- **Labels and Safety Data Sheets** should be made available
- **Reentry period** describes how long you should avoid the treated area
  - Varies depending on herbicide - "when dry" is common, though
  - Stay on trails (including pets!)

Who makes herbicide applications?

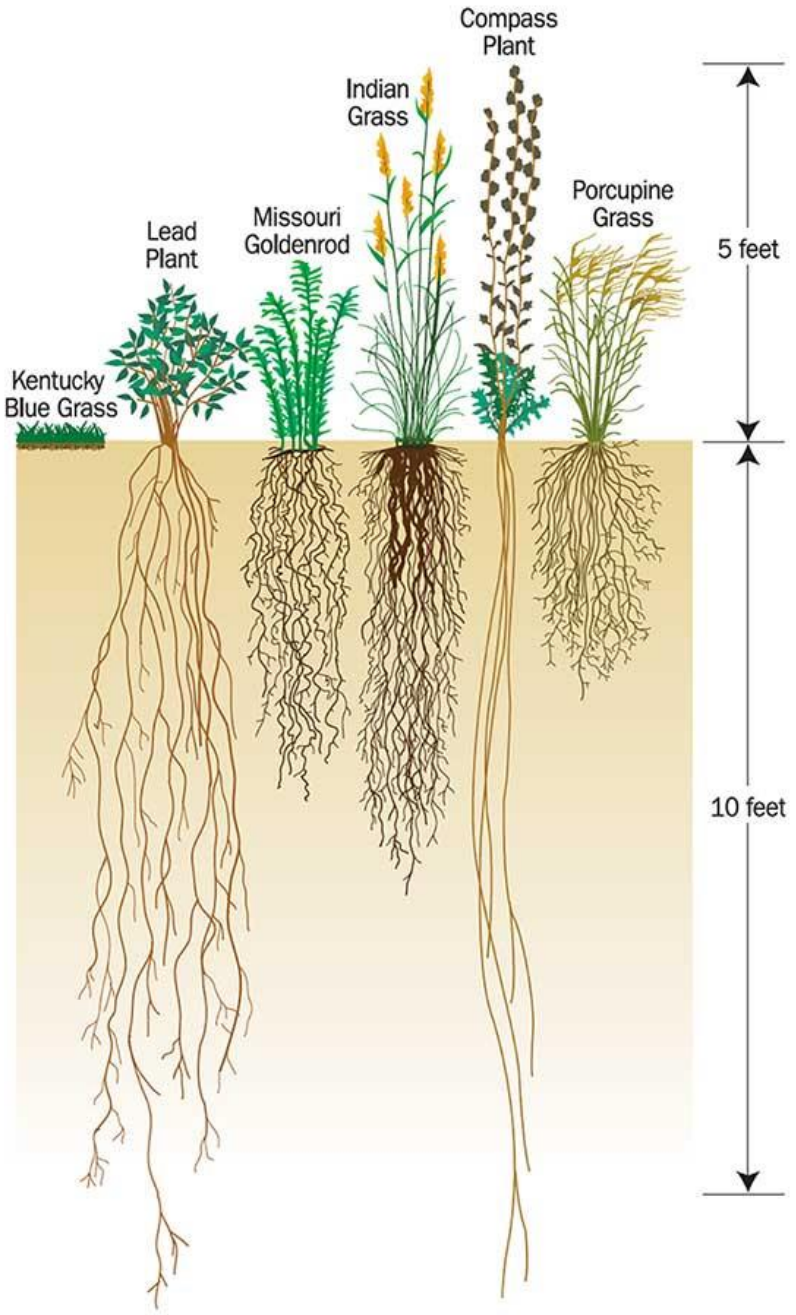
- Certified professionals
  - Many are passionate about caring for native habitats and seek alternative plant control options before choosing herbicides
- Before making an application, they must consider:
  - Time since and until precipitation – to prevent herbicide run-off
  - The plant's life cycle – to choose the most effective herbicide and time application properly
  - Wind speed and direction – to reduce drift
  - The most effective rate and equipment to achieve control without non-target impacts

Herbicide Use for Habitat Restoration vs. Herbicide Use in Commercial Agriculture

- We are not consuming products on which the herbicides will be sprayed.
- Herbicide use for meadow site prep is limited to 1-2 applications for site prep.
- Herbicide for meadow site prep are used to kill non-native vegetation that would otherwise impede the establishment of native species and impede the creation of habitat. Full native groundcover will be established asap.
- Because we are not spraying flowering or fruiting plants, the impact on insect life will be lesser than when spraying plants that attract pollinators (crops).

Will the herbicides harm soil health?

- Herbicides will be applied by a licensed professional at the minimum rate to achieve the control of the non-native grasses currently present.
- We typically use glyphosate-based herbicides, which are inactivated soon after spraying as these herbicides are absorbed onto soil particles. These herbicides are also broken down quickly by soil micro-organisms, such as bacteria and fungi.
- Soils supporting only non-native lawn grasses are typically compacted by mowing equipment, and reduced biologically active than soils supporting native ecosystems. The benefit of planting a native meadow will be much more beneficial to the soils than keeping them in grass.



Do herbicides linger in the soil and harm plants afterward?

- Herbicides that linger and continue to act on new plants have "soil activity"
- **Soil active herbicides are not being applied in Hatboro**
- Herbicides are broken down in soil by microbial soil activity over a varying time period
  - Depends on the herbicide, site conditions, and soil biota present

Tilling/Plowing: Not A Harmless Alternative

- Plowing disturbs bacteria, fungi, and animals that make soils naturally fertile.
- Repeated plowing releases the carbon stored in soil organic matter to the atmosphere as carbon dioxide, a greenhouse gas.
- Some weeds spread by their rhizomes (root nodes that grow stems). When they are ripped apart via tilling, they spread further.
- Weed seeds that are dormant below the surface are brought to the surface through tilling, allowing them to germinate.
- **Plowing raises the risk of erosion, which moves soil into bodies of water.**

Are salt and vinegar good alternatives to herbicide?

- Vinegar will kill helpful bacteria in the soil
- Vinegar is nonselective and harmful to beneficial insects like bees, ladybugs, etc.
- Vinegar will make the soil more acidic, making it difficult for any plants to grow.
- High concentrations of salt in soil can be detrimental to plants due to their ability to accumulate in plant tissue and interfere with root uptake of water
- It's not effective control without many repeated applications. It burns off top-growth but doesn't harm root systems – the plants will come back

Smothering/solarizing the grass and weeds with plastic or other materials?

- Very dependent on size of project
- Clear UV-stable high-grade plastic is often single use, non-recyclable, causes waste
- Creating/shipping the product is expensive
- Labor-intensive to install properly
- May break down, causing microplastic pollution
- May not fully smother current vegetation sufficiently, resulting in failure of native seed establishment due to weed competition
- Better option for much smaller-scale projects

Non-herbicide lawn-to-meadow projects

- Organic methods *can* be a good choice for those adverse to herbicide applications, **in some cases**
- These methods involve increased time, labor, and materials, which results in a significantly increased project cost
- At a large-scale, organic methods may not be feasible or require additional considerations (i.e., tilling a 0.5+ acre site requires additional erosion control)
- Depending on the existing vegetation, organic methods may not be the most viable, efficient, or effective solution

What does this mean for Hatboro?

DCNR cannot provide increased funding to support increased costs associated with a non-herbicide project

- DCNR does not currently have additional funding available for any lawn conversion projects
- The mechanism used to fund the Hatboro project is no longer available

The timeline for this project doesn't allow for the extended timeline necessary for organic establishment

We always assess herbicide use by the end goal: "will the long-term gains for wildlife from restored native habitat outweigh the impacts caused by short-term or targeted herbicide use

Additional Info and References:

- Blumenthal, D. M., N. R. Jordan, and E. L. Svenson. 2003. Weed Control as a Rationale for Restoration: The Example of Tallgra ss Prairie. Conservation Ecology 7(1).
- Crone, E. E., M. Marler, and D. E. Pearson. 2009. Non-target effects of broadleaf herbicide on a native perennial forb: a demogr aphic framework for assessing and minimizing impacts. The Journal of applied ecology 46:673–682.
- Grandy, A. S., and G. P. Robertson. 2006. Aggregation and Organic Matter Protection Following Tillage of a Previously Unculti vated Soil. Soil Science Society of America journal. Soil Science Society of America 70:1398–1406.
- Hanula, J. L., and S. Horn. 2011. Removing an invasive shrub (Chinese privet) increases native bee diversity and abundance in riparian forests of the southeastern United States. Insect conservation and diversity / Royal Entomological Society of London 4:275–283.
- MacDonald, N. W., L. M. Martin, C. K. Kapolka, T. F. Botting, and T. E. Brown. 2013. Hand Pulling Following Mowing and Herbic ide Treatments Increases Control of Spotted Knapweed (Centaurea stoebe). Invasive Plant Science and Management 6:470–479.
- Miller, T. W. 2016. Integrated Strategies for Management of Perennial Weeds. Invasive Plant Science and Management 9:148–158.
- Millikin, A. R., M. E. Jarchow, K. L. Olmstead, R. E. Krentz, and M. D. Dixon. 2016. Site Preparation Drives Long-Term Plant Community Dynamics in Restored Tallgrass Prairie: A Case Study in Southeastern South Dakota. Environmental management 58:597–605.
- Nunes, M. R., D. L. Karlen, K. S. Veum, T. B. Moorman, and C. A. Cambardella. 2020. Biological soil health indicators respond to tillage intensity: A US meta-analysis. Geoderma 369:114335.
- Russell, K. N., G. J. Russell, K. L. Kaplan, S. Mian, and S. Kornbluth. 2018. Increasing the conservation value of powerline corridors for wild bees through vegetation management: an experimental approach. Biodiversity and conservation.
- Russell, C., and C. B. Schultz. 2009. Effects of grass-specific herbicides on butterflies: an experimental investigation to adva nce conservation efforts. Journal of insect conservation 14:53–63.
- Schultz, C. B., and J. A. Ferguson. 2020. Demographic costs and benefits of herbicide-based restoration to enhance habitat fo r an endangered butterfly and a threatened plant. Restoration Ecology 28:564–572.
- Schultz, C. B., J. L. Zemaitis, C. C. Thomas, M. Deane Bowers, and E. E. Crone. 2016. Non-target effects of grass-specific herbicides differ among species, chemicals and host plants in Euphydryas butterflies. Journal of insect conservation 20:867–877.
- Skurski, T. C., B. D. Maxwell, and L. J. Rew. 2013. Ecological tradeoffs in non-native plant management. Biological conservation 159:292–302.
- Stanley, A. G., T. N. Kaye, and P. W. Dunwiddie. 2011. Multiple Treatment Combinations and Seed Addition Increase Abundance a nd Diversity of Native Plants in Pacific Northwest Prairies. Ecological Restoration 29:35–44.
- Stark, J. D., X. D. Chen, and C. S. Johnson. 2012. Effects of herbicides on Behr's metalmark butterfly, a surrogate species f or the endangered butterfly, Lange's metalmark. Environmental pollution 164:24–27.
- Van Oost, K., G. Govers, S. De Alba, and T. A. Quine. 2006. Tillage erosion: a review of controlling factors and implications for soil quality. Prog ress in Physical Geography: Earth and Environment 30:443–466.

Questions?

Teddi Stark & Alyssa Keiser
Watershed Forestry Program
PA DCNR Bureau of Forestry
c-tstark@pa.gov
c-akeiser@pa.gov