Still Growing: Pollinator Habitat Maintenance Tips

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XERCES SOCIETY for Invertebrate Conservation

Photo: Bee Campus USA - University of Illinois, Chicago, IL. Gardens at Arthington Mall,

Bee City USA & Bee Campus USA

- **Renewals are due now!**

  Need an extension? Please reach out to Laura and Carly: beecityusa@xerces.org

- **2025 Earth Week and No Mow May Promo Kits are now online** (Links are in the eNewsletter)

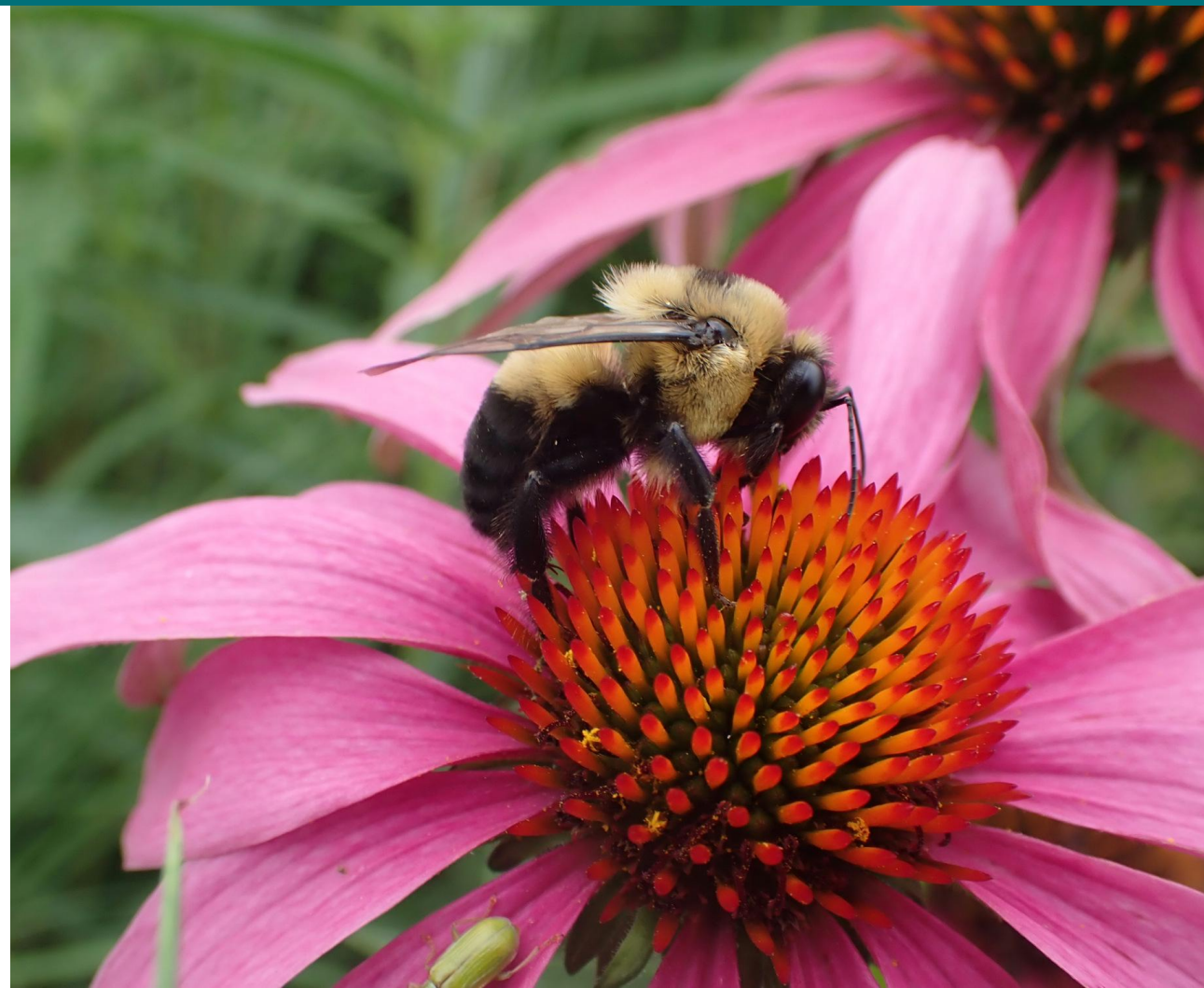


Photo: Xerces Society / Katie Lamke

Importance of Maintenance

Native Pollinator Habitat Plantings

What is Pollinator Habitat Maintenance?

- **Habitat Maintenance:** The continued care you provide to your habitat after planting to help maintain high flower diversity and abundance for foraging pollinators
- **Goal**: sustained diverse pollinator & plant community

Photo: Bee Campus USA - University of Vermont

Importance of Maintenance

Maintenance is critical to habitat longevity… but often gets overlooked. Plan before you plant!

Helps to:

1. Ensure new plants survive, spread, reseed and continuing supporting pollinators
2. Keep undesirable plants from undoing hard work
3. Demonstrate to community that pollinator habitat is beautiful and functional = worth investing in!

Photo: Francine Sanchez. Bee City USA - Sammamish, WA

Key Takeaways of Today

Tips for maintaining and planning pollinator habitats

Photo: Bee Campus USA - University of Wisconsin-Madison

Yes, we do acknowledge there can be challenges

Photo: Bee Campus USA - James Madison University

Progress, not perfection! No one way to success

Photo: Reclamation Garden; Stefanie Steele/Xerces

Tips: Planning for Maintenance

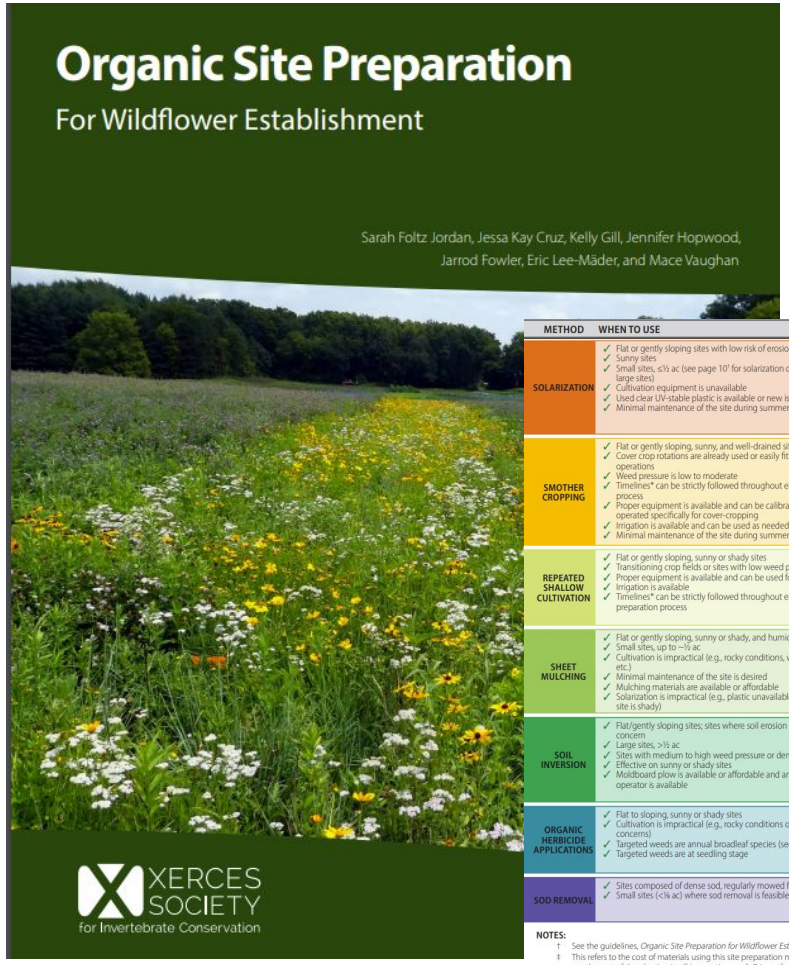
Tips: Planning for Maintenance

1. Good Site Preparation
2. Keep Track of Plantings:
   a. map plants
   b. label plants
   c. take seasonal photos
3. Add “Cues to Care”:
   a. signage
   b. mulch
   c. borders
4. Create a Maintenance Plan
   a. engage your community
   b. identify seasonal tasks

Photos: (L to R) Laura Rost / Xerces Society; Bee Campus USA - University of Oregon

Tip #1: Good Site Preparation

- ❑ Smother Cropping
- ❑ Solarization
- ❑ Repeat Cultivation
- ❑ Soil inversion
- ❑ Organic Herbicides
- ❑ Sheet Mulching
- ❑ Sod Removal
- ❑ Weed barriers
- ❑ Livestock Rooting
- ❑ Burning/Grazing



METHOD	WHEN TO USE	WHEN NOT TO USE	HOW IT WORKS	COMMENTS	EQUIPMENT NEEDED
SOLARIZATION	✓ Flat or gently sloping sites with low risk of erosion ✓ Sunny sites ✓ Small sites, ≤½ ac (see page 10† for solarization options for large sites) ✓ Cultivation equipment is unavailable ✓ Used clear UV-stable plastic is available or new is affordable ✓ Minimal maintenance of the site during summer is desired	✗ Steep slopes or areas with microtopography ✗ Shady or wet sites ✗ Large sites (>½ ac) ✗ Regions where average summer temperatures are low ✗ Clear UV-stable plastic is unavailable or unaffordable ✗ Sites where deer pressure is high, as deer can easily puncture plastic	Kills existing vegetation by heat and smothering; Reduces weed seed bank by heat; Reduces weed seed by flushing plants from soil	‣ Consistently out-performed other site preparation methods in our trials ‣ Can kill soil-dwelling plant pathogens ‣ Ideal in hot climates ‣ Plastic can be re-used for multiple seasons	‣ Clear UV-stable plastic (4 or 6 mil thickness) ‣ Greenhouse repair tape ‣ Mower ‣ Cultivation equipment (cultivation recommended in most situations) ‣ Equipment to dig and backfill trench around perimeter; ‣ AND/OR hoes and shovels to dig and backfill trench by hand **RELATIVE COST OF MATERIALS‡—HIGH:** new UV-stable plastic is very costly (note: this method is low-cost if used plastic can be obtained)
SMOTHER CROPPING	✓ Flat or gently sloping, sunny, and well-drained sites ✓ Cover crop rotations are already used or easily fit into existing operations ✓ Weed pressure is low to moderate ✓ Timelines* can be strictly followed throughout entire site prep process ✓ Proper equipment is available and can be calibrated and operated specifically for cover-cropping ✓ Irrigation is available and can be used as needed ✓ Minimal maintenance of the site during summer is desired	✗ Steep slopes/sites with high erosion potential or poor drainage ✗ Cover crop rotations are not used or do not fit into farm plan ✗ Weed pressure is high (i.e., fallow fields) ✗ Timelines* cannot be strictly followed (see text†) ✗ Proper equipment for planting and termination are not available ✗ Irrigation is not available or easily accessed ✗ In designated wetlands or area with poorly drained soil ✗ Where planting non-native plants is prohibited or native plants may be threatened by the unintentional escape of non-native/cultivated species	Prevents weeds from spreading; Reduces weeds by cultivation and smothering	‣ Improves soil health ‣ Gives wildlife temporary forage and cover ‣ Planting and termination dates vary by region	‣ Mower ‣ Cultivation equipment and implements (see Appendix B†) ‣ Irrigation system or water tank and water source ‣ Seeding equipment (broadcast seeder, seed drill) ‣ Cover crop termination equipment /implement (disk, mower, roller-crimper) **RELATIVE COST OF MATERIALS‡—LOW:** if cultivation equipment is available; seed for smother cropping is generally inexpensive
REPEATED SHALLOW CULTIVATION	✓ Flat or gently sloping, sunny or shady sites ✓ Transitioning crop fields or sites with low weed pressure ✓ Proper equipment is available and can be used for this purpose ✓ Irrigation is available ✓ Timelines* can be strictly followed throughout entire site preparation process	✗ Steep slopes ✗ Where erosion is of concern ✗ Site is fallowed or weed pressure is medium to high ✗ Shallow tillage equipment is unavailable (see Appendix B†) ✗ Irrigation is unavailable ✗ Designated wetlands or areas with poorly drained or fragile soil	Kills weeds by cutting and dislodging; Reduces weed seed bank by repeated disturbance; Weakens weed root systems	‣ Diminishes soil health ‣ May expose dormant weed seeds and cause future weed pressure ‣ Must remain shallow and only disturb top layer of soil	‣ Mower or brushhog ‣ Cultivation equipment and implements (see Appendix B†). ‣ Cultipacker or lawn barrel (tow behind or push) ‣ Irrigation system or water tank and water source **RELATIVE COST OF MATERIALS‡—LOW:** if appropriate cultivation equipment is available
SHEET MULCHING	✓ Flat or gently sloping, sunny or shady, and humid sites ✓ Small sites, up to ~½ ac ✓ Cultivation is impractical (e.g., rocky conditions, weed pressure, etc.) ✓ Minimal maintenance of the site is desired ✓ Mulching materials are available or affordable ✓ Solarization is impractical (e.g., plastic unavailable/unaffordable, site is shady)	✗ Steep slopes or arid sites without irrigation ✗ Large sites (>½ ac) ✗ Arid or semi-arid climates without access to irrigation ✗ Site contains aggressive or persistent deep-rooted, perennial, rhizomatous or woody weeds ✗ Mulching materials are unavailable or unaffordable (see text†)	Kills existing vegetation by smothering; Prevents seeds from germinating by smothering	‣ Can be used for seeds, but is ideal for transplants ‣ Can prepare new habitat, or enhance existing habitat ‣ Performs well in shady or rocky sites ‣ On organic certified land, mulching materials that are free from synthetic chemicals and weed seeds are required	‣ Mower, no-till roller/crimper, scythe, or string-trimmer ‣ Core or spike lawn aerator or spading fork ‣ Irrigation system or water tank and water source ‣ Carbon- and nitrogen-based mulching materials (see text†) **RELATIVE COST OF MATERIALS‡—MODERATE:** mulching materials can be moderately costly, unless they are available as farm products/by-products
SOIL INVERSION	✓ Flat/gently sloping sites; sites where soil erosion is not a concern ✓ Large sites, >½ ac ✓ Sites with medium to high weed pressure or dense grass sod ✓ Effective on sunny or shady sites ✓ Moldboard plow is available or affordable and an experienced operator is available	✗ Steep slopes ✗ Erosion concerns are very high ✗ Moldboard plow is unavailable or unaffordable ✗ Abundant deep-rooted perennial weeds (less susceptible to method) ✗ Weed pressure is low and other methods can be used	Kills weeds by burying in weed-free and nutrient poor subsoil; Reduces seed bank germination; Weakens weed root systems	‣ Effectively breaks up grass sod ‣ Provides wildflowers with a competitive advantage over weeds ‣ Reduces soil compaction and increases water infiltration ‣ This method will not always kill deep-rooted perennial weeds like nut sedge or bermuda grass	‣ Mower ‣ Moldboard plow ‣ Cultivation equipment and implements **RELATIVE COST OF MATERIALS‡—LOW:** if appropriate cultivation equipment is available
ORGANIC HERBICIDE APPLICATIONS	✓ Flat to sloping, sunny or shady sites ✓ Cultivation is impractical (e.g., rocky conditions or conservation concerns) ✓ Targeted weeds are annual broadleaf species (see text†) ✓ Targeted weeds are at seedling stage	✗ Application equipment is unavailable or unaffordable ✗ Targeted weeds are monocots (grasses), succulents, or perennials ✗ Targeted weeds are taller than 6" ✗ Water pollution concerns are high	Weakens weeds with chemicals; Reduces weed seed bank by repeatedly damaging germinated weeds	‣ Burns plant tissues by direct-contact, not translocated through plants ‣ Requires repeated applications for effective control ‣ May be ineffective against grasses and many broad-leaf weeds ‣ This method was the least effective in our trials	‣ May require special equipment that can tolerate caustic herbicides or herbicides that can clog nozzles ‣ Backpack sprayer or tractor/ATV and spray rig **RELATIVE COST OF MATERIALS‡—HIGH:** most organic herbicides are significantly more expensive than conventional herbicides
SOD REMOVAL	✓ Sites composed of dense sod, regularly mowed for several years ✓ Small sites (<1⅛ ac) where sod removal is feasible	✗ Large sites where sod removal would be impractical	Kills existing weeds by cutting roots and removing sod in large sheets from site	‣ Excellent method for converting small areas of lawn to native wildflowers	‣ Manual sod cutter ("kick-type"), or gas-powered sod cutter **RELATIVE COST OF MATERIALS‡—LOW:** if equipment is available (note: if not, rental can be costly)

NOTES:

† See the guidelines, *Organic Site Preparation for Wildflower Establishment*

‡ This refers to the cost of materials using this site preparation method, relative to the other methods. It does not include the cost of the time/labor involved, nor the cost of the planting itself (e.g., native seed). Prices of materials may vary.

* Download the accompanying *Organic Site Preparation Timelines & Checklists* at www.xerces.org/guidelines-organic-site-preparation

This fact sheet on organic site preparation methods was produced by the Xerces® Society. For more information about pollinator conservation, please visit www.xerces.org.

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WI Habitat Kit Case Studies: Pathways for Site Prep and Planting

Site Prep Methods:
Results = Low Weed Pressure

1. Smother, paper barrier, & wood chip mulch
2. Sod cut and wood chip mulch
3. Herbicide and wood chip mulch OR straw mulch

WISCONSIN POLLINATOR HABITAT KIT PROGRAM

Habitat Kit Case Studies: Pathways for Site Prep and Planting

Smothering, tillage, mulching, and many hands contribute to the successful planting of beautiful and important native pollinator habitat. (Photos [l – r]: Harriet Behar / Sweet Springs Farm, Sarah Mullins / Brooklyn School Garden, Harriet Behar / Sweet Springs Farm.)

The following case studies were produced in collaboration with 2023 Wisconsin Habitat Kit Program awardees – farmers and community members – who graciously shared their site preparation and planting experiences: what worked, what could be improved, and why they chose a particular method. These case studies demonstrate how existing vegetation, site preparation, and weed pressure are interlinked and influence native plant establishment and growth in the first year.

Each case presents a snapshot of a different site preparation method and the materials used to prepare a site for a garden-like, native plug planting: smothering, tillage, herbicide, mulching, a combination of these varying methods, and others[1]. These cases are not intended to describe a "right way" of planting as there are so many. Rather, each case study is a realistic and informative story that describes the different ways kit awardees balanced the unique characteristics of their pollinator habitat project (below) to successfully prepare for, complete, and steward their planting:

- Site – soils, existing vegetation, weeds, and history.
- Resources – materials, machinery, and people.
- Resource budget – time, labor, and availability.
- Knowledge – familiarity with a method or materials.

While some plantings were more successful than others with first year weed control and native plant establishment, each case study created healthy, permanent pollinator habitat. However, two consistent standards emerged from many of the 2023 habitat kit plantings: 1) Following planting, weeds were less problematic for those projects that used mulch and/or were rigorous in their site preparation and weeding; and 2) Watering the native plant plugs greatly helped their growth.

Case studies in this publication detail the following site preparation methods and include information on each kit partner, rationale for site prep, pre-planting site conditions, weed results, and photo highlights:

Seeds or Plugs?

The **type of plant material** you decide to use to start your habitat **will impact how you manage** your habitat for years to come.

Table 1. Establishing Perennial Wildflower Habitat from Seed or Plugs

This table compares the planting of native perennial wildflower habitat from seed and from transplants (plugs). Use this table to help decide which option is best for the specific site.

STARTING FROM SEED	STARTING FROM TRANSPLANTS (PLUGS)
Typically lower cost (can vary by region/availability).	**Higher cost** (cost is reduced if you are able to grow some transplants yourself).
Very thorough pre-planting weed control is needed, since native seeds are slower to establish and can be outcompeted by weeds.	**Less pre-planting weed control needed,** since native transplants have more of a competitive advantage against weeds.
In some regions **mowing is required for weed management** during establishment. In drier areas (e.g., western US) hand-weeding or mowing are options for post-planting weed control.	**Hand-weeding or weed-whacking is typically necessary** during establishment.
Slower to bloom; blooms are usually not abundant until years 2–4 of project (depending on site preparation and establishment mowing).	**Quicker to bloom;** blooms abundant in year 1 or 2 of the project, depending on the timing of planting.
Can be low or high diversity. Seed mixes can be designed with very high diversity, but this is not always realized in the planting; some species are very difficult to establish from seed.	**Can be low or high diversity.** Some species are not available as plugs; others are nearly impossible to establish without using plugs.
Less control of planting layout; design is mostly limited to seed mix.	**More control & design opportunities;** select plants can be clustered, evenly distributed, arranged by height & bloom time, etc.
Lower installation time/labor.	**Higher installation time/ labor.**
Irrigation may not be needed or may be minimal, depending on location and climate.	**Will likely require irrigation** at the time of transplant or during dry periods.

Tip #2: Keeping Record of Your Habitats by... Mapping where you plant

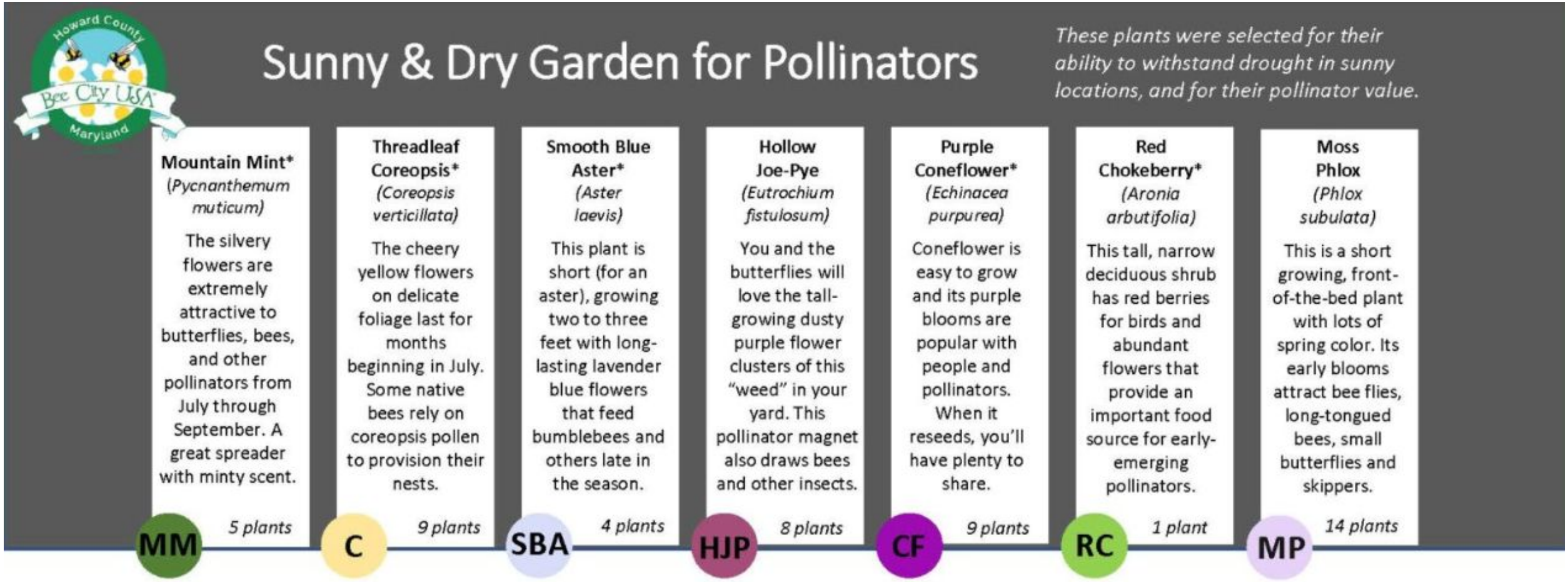

Image: Bee City USA - Howard County, MD

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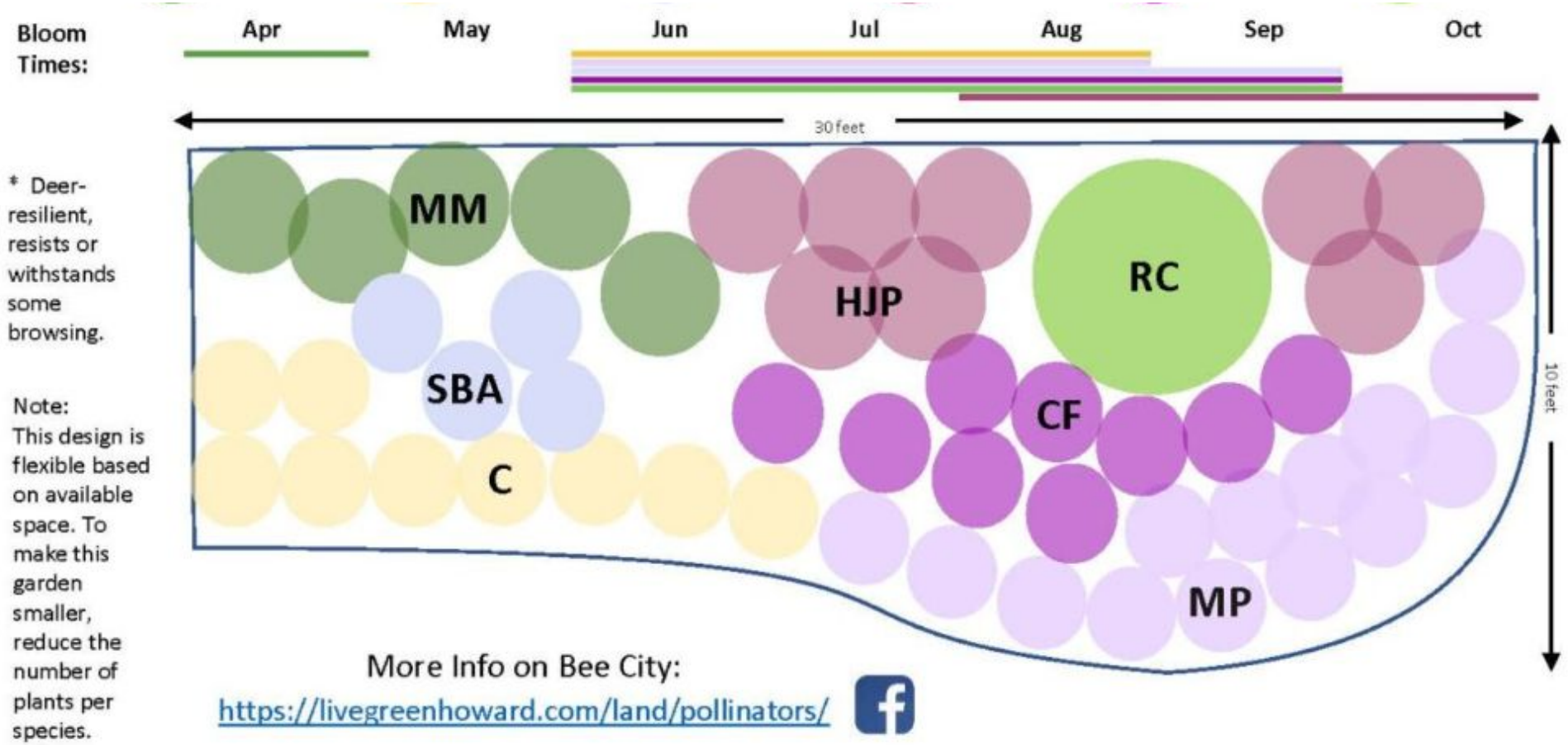

Featured Pollinator:
American Lady
Vanessa virginiensis
American lady butterflies nectar on coneflowers, milkweed, and many other native species. But they lay eggs mainly on pussytoes (*Antennaria* species), a lovely groundcover. Caterpillars hide during the day in silky enclosures they create from the silvery leaves, coming out at night to feed.

Image: Bee City USA - Howard County, MD

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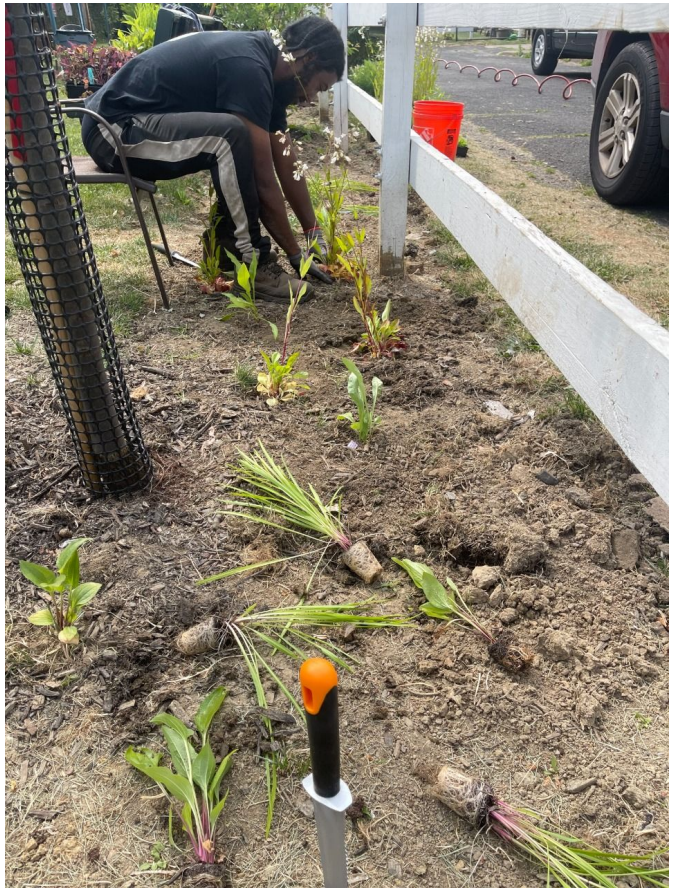
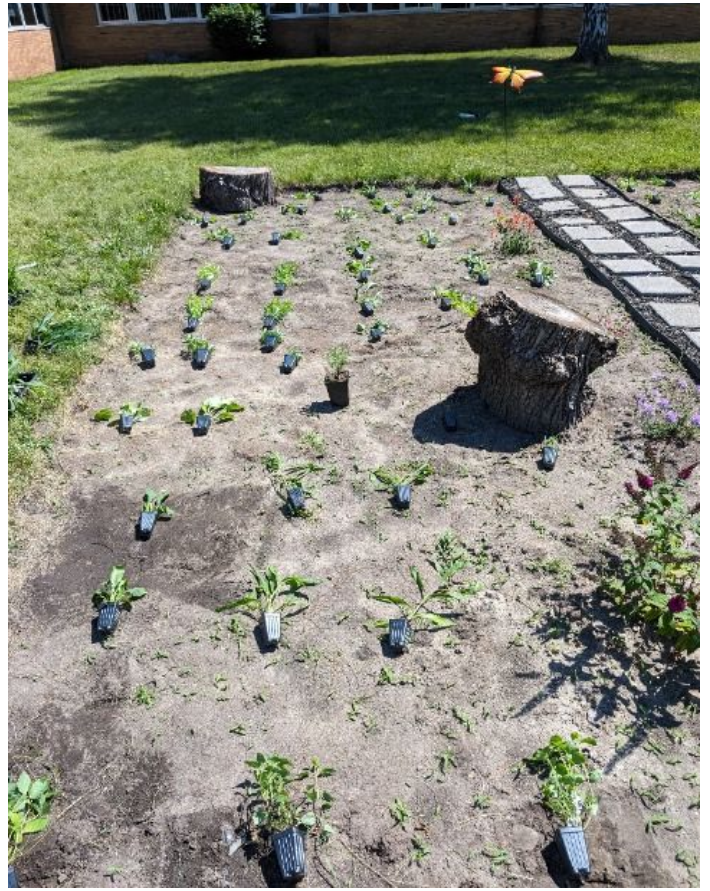


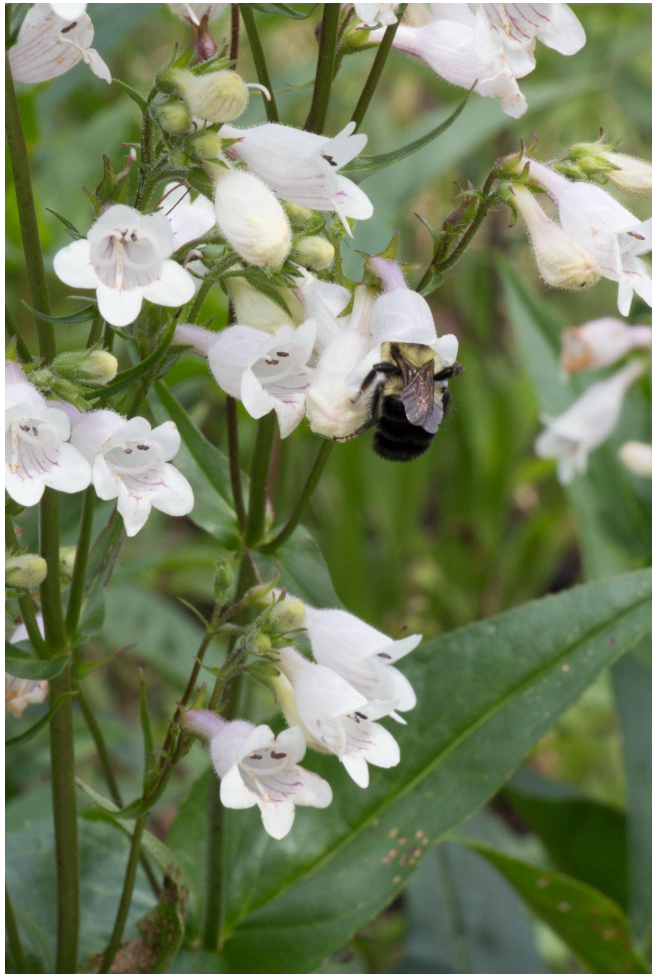


Photos: Skye Glover; Lisa Higgins; Ruaa Bahran

Tip #2: Keeping Record of Your Habitats by... Labeling your plants

Photos: Stefanie Steele

Tip #2: Keeping Record of Your Habitats by... Taking seasonal photos



Photos: Stefanie Steele; Justin Wheeler

Tip #3: Incorporate "cues to care" - Communicate Intention

Photos: Marilyn Griffin, Kailee Slusser, Stefanie Steele, Laura Rost, Kelly Gill / Xerces; Chelsea Youmans

Tip #3: Incorporate “cues to care” - Communicate Intention

Photos: Ann Hazen; Tanya Suliko; Catherine Lowther

Tip #4: Create a Maintenance Plan

- **SPRING:** take photos; weeding; planned disturbance (mowing, burning, dividing, cut stems); expand habitat; share plants with community
- **SUMMER:** take photos; weeding; assess challenges; “Chelsea chop”; plant inventory
- **FALL:** take photos; weeding; collect seed; leave the leaves & stems
- **WINTER:** take photos; plan next year’s goals, tasks, leaders; fundraise, collect seeds & winter sow

Challenges of Habitat Maintenance

Common Challenges

- Plant survival struggles
- Undesirable plants
- Lack of resources
- Misunderstandings of pollinator habitat

Plant Survival Struggles

Too Little / Too Much Water

- Irrigation mismatch
- Location too dry/wet

Photo: Melissa McLeod

Adjust Irrigation

- Increase or decrease supplemental irrigation
- Divert water
- Adjusting shade or mulch may help

Photo: Kelly Gill

Right Plant, Right Place!

- Transplant to appropriate location
- Replace with plant suitable for soil moisture and drainage

Photo: Kaitlin Haase

Plant Survival Struggles

Removal, Mowing

- Maintenance staff or volunteers indiscriminately weeding or cutting plants

Photo: Stefanie Steele

Signs, Barricades

- Label plants, post signage, mark plant locations with flags
- Fencing or borders

Photo: Bee City USA - Ashland, OR

Communication, Plant ID Training

- Include grounds staff in planting and follow up regularly
- Train staff and volunteers on plant ID

Photo: Kaitlin Haase/Xerces

Plant Survival Struggles

Crowding

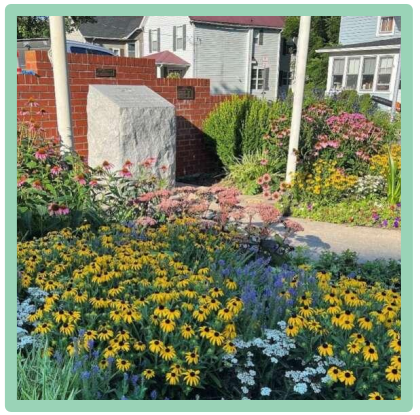
- Plants outcompeting others
- Aggressive, fast growing plants dominate space

Photo: Kaitlin Haase/Xerces

Divide and Transplant

- Dig up problem plant and transplant or put in containers to share
- Collect and giveaway seed

Photo: Allison Murphy



Better Spacing During Planting

- Plant in clusters or groups for one species
- Give fast growers space or their own area

Photo: Berlin, MD Horticultural Advisory Committee

Undesirable Plants

Competition

- Weeds in seed bed outcompeting pollinator plants

Photo: Kaitlin Haase/Xerces

Heavy mulch

- Apply mulch to prevent weeds from emerging
- Living mulch like groundcovers

Photo: Kaitlin Haase

Weeding Work Days

- Organize habitat caretakers to weed regularly in growing season with hands and tools

Photo: Bee Campus USA - James Madison University

Undesirable Plants

Weed Seeds

- Weeds gone to seed
- Seeds coming in from offsite

Photo: Laura Rost

Weed before Seeding

- Time weeding to remove before seeding
- Cut weeds before seeding

Photo: Laura Rost

Prevent Contamination

- Use mulch, seed, soils that are free of weed seeds
- Clean tools/tires/shoes of weed seeds

Photo: Laura Rost

Lack of Resources

Access to Water and Tools

- Unreliable irrigation
- Price and number of tools

Photo: Bee Campus USA -East Carolina University

Water Conservation

- Rainwater harvesting
- Irrigation system improvements and check ups

Photo: Stefanie Steele

Tool Sharing

- Tool libraries or rentals
- Bring your own tool or donate tools event
- Partners with tools

Photo: Loretta Powell

Misunderstandings of Habitat

Aesthetics and Safety Concerns

- Misperceptions of “messy” landscaping
- Fears of bee stings, other wildlife

Photo: Stefanie Steele

Educate!

- Educational workshops and events
- Interpretive signage, pamphlets/brochures

Photo: Cristina Salvador / Santa Fe Botanical Garden

Encourage Habitat Visits

- Create clear, accessible paths that are well-maintained
- Host plant and insect walks in habitat

Photo: Stefanie Steele

Misunderstandings of Habitat

Using or harming plants?

- Harmful or benign pest?
- Managing animal damage

Photo: Oleander aphids, Kathryn Prince / Xerces Society

Identify and Understand

- Who created damage? Does damage threaten plant survival?
- Is plant serving its intended purpose?

Photo: Raven Larcom / Xerces Society

Other benefits of animal damage

- Gophers improve soil health
- “Pests” feed predators

Photo: Marcel Holyoak

Power of People & Community

Rally the People for the Pollinators!

- Creating and maintaining habitat depends on people power
- Plants and pollinators are great motivators to bring people together
- A big, caring community will ensure habitat is seen and valued

Photo: Michael Rahn

Maintenance by Property Management

Approach grounds/facilities early and often

Open communication about issues or requests

Often happy to help and grateful for alerts to problems!

Photo: Bee City USA - Virginia Beach, VA

Organizing a Maintenance Team

Engage local, interested, or frequent visitors of habitat to participate

Make volunteering fun and rewarding

- Use incentives to encourage turnout - seed giveaways
- Not only hard labor, include accessible tasks or fun activities like a bioblitz!

Photo: Bee Campus USA - University of Louisiana at Lafayette / Blair Begnaud

Community Science in Habitat

- iNaturalist:
  - *Megachile* bee leaf cuts (leafcutter bees)
  - Project GNBees (ground nesting bees)
- Monarch Butterflies:
  - Xerces Monarch Nectar Plant Database
  - Journey North: Monarch Nectar & Plant Watch
- Xerces Atlas Programs:
  - Firefly Atlas
  - Bumble Bee Atlas & Watch
- Xerces Insect Scouting & Monitoring Guides
  - Beneficial Insect
  - Native Bee

Photos: Xerces / Stefanie Steele

Bee City USA & Bee Campus USA Case Studies

Stats (Since 2019)

Bee Cities and Campuses have

- Engaged 1,760,000+ people in pollinator conservation
- Created or enhanced 18,600+ acres of pollinator habitat

Thank you!

Photos: Top: Bee City USA – Tualatin, OR.
Bottom: Bee City USA - Beaumont, TX

Rent Goats (For Site Prep)

Pros

- Fuels reduction
- Invasive species removal

Cons

- May eat non-target plants
- Not great for woody invasives or seed removal

Used by

- Dozens of Bee Cities and Campuses

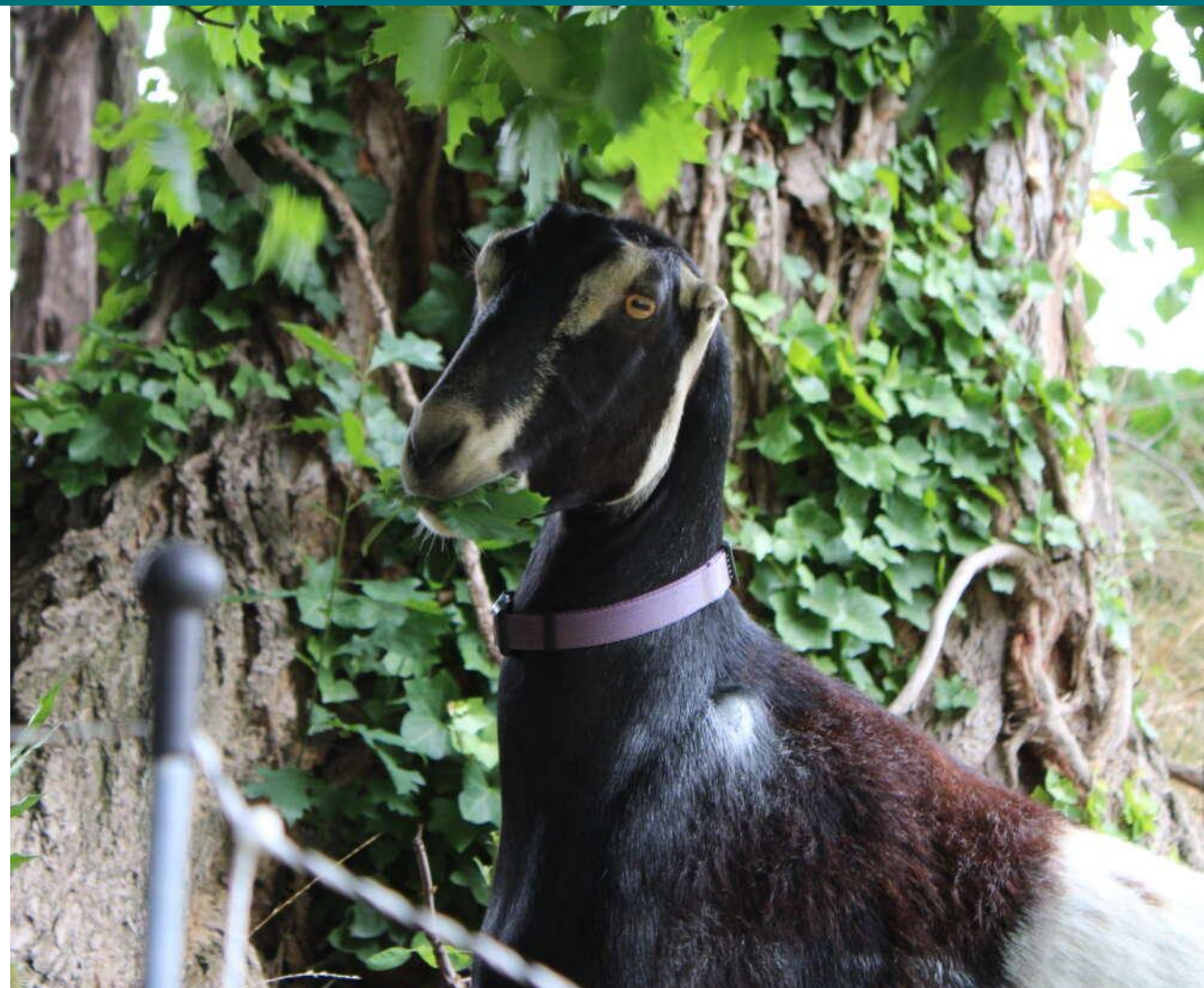


Photo: Bee Campus USA - University of Pittsburgh, PA

Flame & Steam Weeders

Flame weeder used by:

- Greenwood, SC

Steam weeders used by:

- Colorado State University, CO
- Gonzaga University, WA
- Santa Fe, NM (steam/foam weeder)
- Talent, OR
- University of California Irvine, CA
- University of Wisconsin – Stevens Point, WI
- Wilsonville, OR
- Winston-Salem, NC

Photo: Tommy Reeder, City of Wilsonville, OR

Wilsonville, OR's Steam Weeder

Photo: Tommy Reeder, City of Wilsonville, OR

Steam Weeders

“The Grounds Work Unit purchased a steam weeder, [it] looks like a vacuum cleaner with a long hose that superheats water up to 250 degrees. This machine uses a unique combination of boiling water and saturated steam at low pressure...When weeds are hit, they are cooked instantly, leaving behind a chemical-free mulch for soil organisms to feed on. As a result, the soil health improves over time.”

- University of Wisconsin – Stevens Point

Secure Dedicated Staffing & Funding

Photos: (L to R) Bee City USA - Westminster, CO / Liam Cullinane; Bee City USA - Madison, WI

Committed Volunteers

- **Require volunteer hours** for a committee members or officers (University of Texas at Austin)
- Schedule **volunteer shifts** (Garden Angels - Talent, OR)
- Schedule & publicize regular **volunteer events** (Eugene, OR; Santa Barbara, CA; & many more)

Photo: Bee City USA - Talent, OR

Fundraising

- Offer a **tax-deduction**, if possible (Fed Tax ID #) (check w/school or town)
- Ask for **money** or **in-kind gifts** (including gift cards)
- Send a **thank you** note
- Send an update w/a **photo** (Norcross, GA)
- Other ideas: **plant sale** (donated or grown yourself), **bake sale**, **raffles, silent auctions**

Photo: (top) Jackie Morgan / Norcross, GA,
(bottom) Tufts Pollinator Initiative, Tufts University

What Bee City USA - Southport, NC Does

- Small **budget + donations** (supplies & native plants)
- **Workdays** (weeding, pruning, mulching & transplanting)
- **Garden Party** in the spring
- **Watering schedule** (no automatic irrigation)
- **Soil test** by local extension service; limited organic amendments added
- **Added plant diversity:** ~15 native plants from local nursery & volunteers
- **Cage plants** from deer & rabbits
- **Move plants** to improve health
- Volunteer creating **plant ID signs**
- **Journal of activities**

Credit: Bee City USA – Southport, NC

Resource Review

Xerces Resources (visit xerces.org)

Maintaining Diverse Stands of Wildflowers Planted for Pollinators

Ongoing Management of Pollinator Habitat

Hillary Sardiñas, Jennifer Hopwood, Jessa Kay Cruz, James Eckberg, Kelly Gill, Rae Powers, Sarah Foltz Jordan, Mace Vaughan, Nancy Lee Adamson, and Eric Lee-Mäder

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Creating Perennial Habitat for Pollinators and Beneficial Insects Using Plugs

High-quality pollinator and beneficial insect habitat is usually composed of native vegetation. Providing pollen and nectar resources, host plants, overwintering and nesting opportunities, and protection from pesticides are all critical to quality habitat. Native habitat plantings can be established from seed or with small live plants, also known as plugs. There are advantages and disadvantages for each approach (see Table 1 on page 2 for comparison), and selecting the right plant materials depends on the project goals and a variety of other site-specific factors. If you decide that establishing habitat with plugs is the method you want to use, this fact sheet will help you successfully complete your project.

Plugs, often sold in a few cubic inches of soil, are a great way to establish small-scale habitat in a variety of locations, such as city parks, street landscaping, urban and rural farms, residential gardens, natural areas, or acreages. While plugs are generally more expensive than seeds, they are much faster to establish, more reliably successful, often require less management in the long-term, and offer more opportunities for aesthetic and functional design of the habitat. Bloom densities, heights, colors, and vegetative textures can be specifically coordinated and staggered to provide diverse resources for pollinators and beneficial insects throughout the growing season.

This document focuses on how to design and create perennial pollinator and beneficial insect habitat by installing native plugs. The strategies outlined for plug planting are broad to cover multiple regions. For larger plantings (an acre or more in size), starting with seed is generally a more practical and economical approach, and Xerces Habitat Installation Guides (see "Further Reading" on page 6) should be referenced for that process.

TOP-DOWN—Native pollinator habitat installed by farm interns and apprentices at Michigan State University's Detroit Partnership for Food, Learning, & Innovation; green sweat bee on purple milkweed; parking lot pollinator garden in New Jersey. (Xerces Society Photos: Stefanie Steele [top, middle]; Kelly Gill [bottom].)

XERCES SOCIETY for Invertebrate Conservation

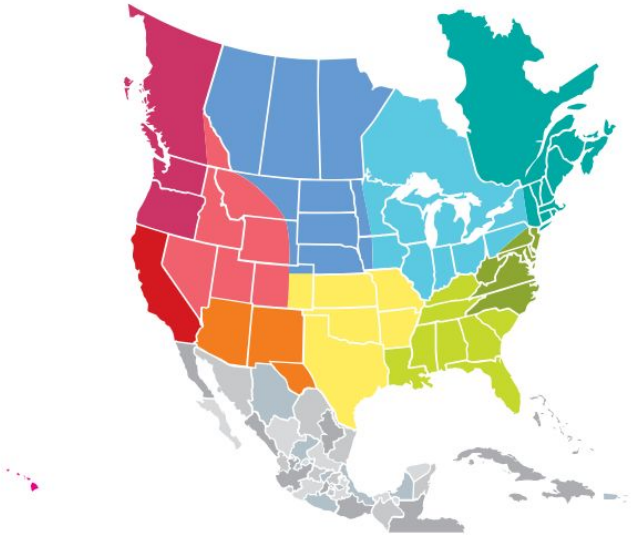
Pollinator Conservation Resource Center

Region-specific resources to aid in the planning, establishment, restoration, and maintenance of pollinator habitat.

Welcome to the Pollinator Conservation Resource Center! Here we offer region-specific collections of publications, native plant and seed suppliers, and other resources to aid in planning, establishing, restoring, and maintaining pollinator habitat—as well as materials to help you learn about the various invertebrates you might encounter.

We also offer free pollinator habitat kits to eligible partners across the United States! Please visit our Xerces Habitat Kit Program webpage to learn more.

To view resources relevant to where you live and work, start by selecting your region from the map or the list.



(Map: Xerces Society / Sara Morris)

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- U.S. Fish and Wildlife Service's Office of Conservation Investment
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- USDA Forest Service International Programs (USFS IP)
- USDA Natural Resources Conservation Service
- USDOI National Park Service
- Washington State University
- White Pine Fund
- Whole Foods Market

Thank You

Contact us with Questions!

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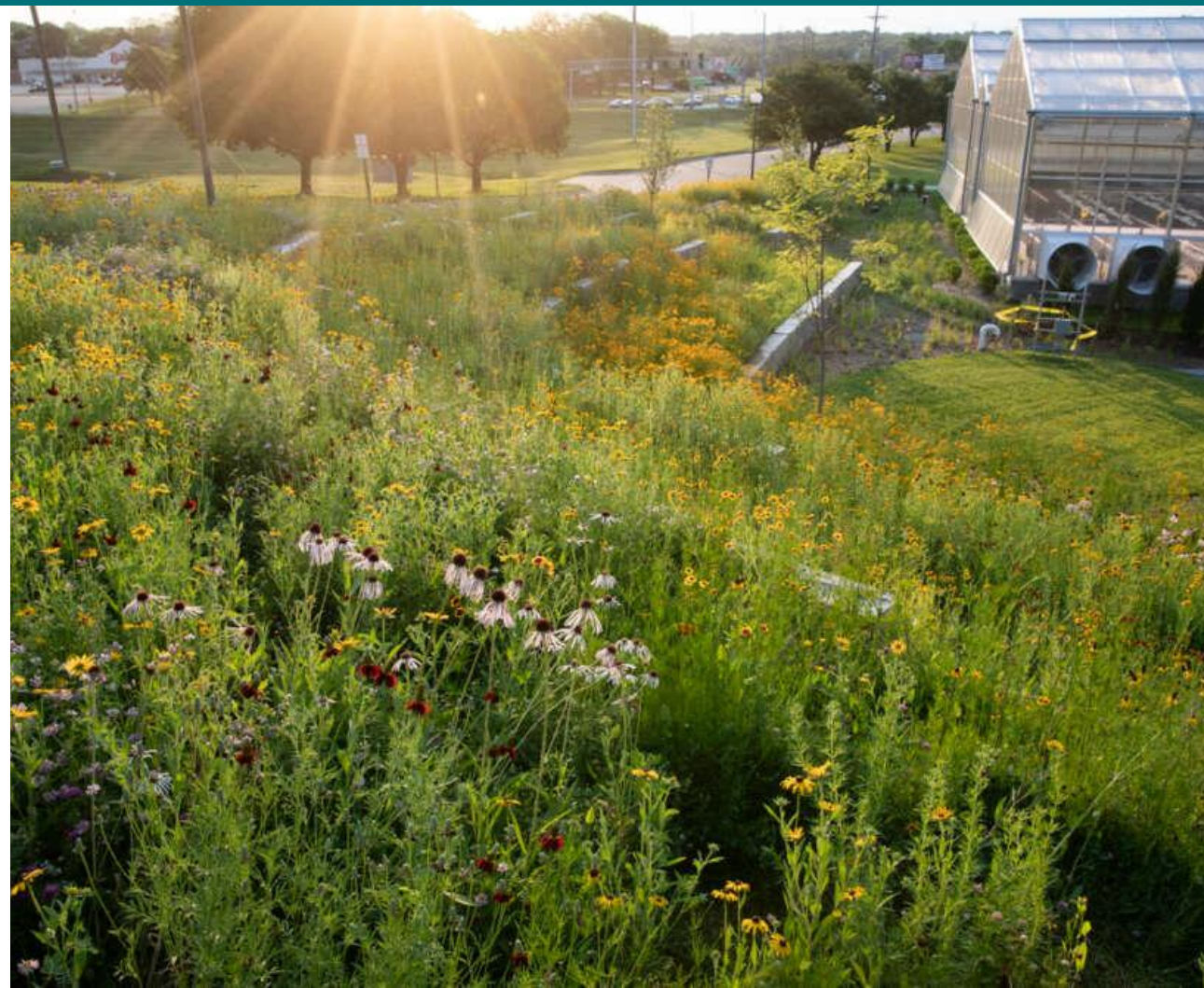

Photo: Bee Campus USA - Bellevue University, NE

What challenges do you encounter when maintaining habitat?	***What solutions to these challenges do you find most effective?***	***Any tips to implementing these solutions?***
Non-native weeds	Native ruderal species, “weedy” native pollinator plants	Learn to identify these and encourage them to compete with non-native weeds
Gophers	Use underground gopher baskets	Watch which plants the gophers attack and which they leave, use baskets for gopher-preferred plants only
Oleander aphids	Manual removal	Be careful to not remove syrphid fly larvae or other predators!
Aggressive invasives	Constant weed eating of goutweed, cardboard and mulch	Need to place soil and seed on top pf mulch and cardboard to prevent goutweed from moving back in
High deer density	Selecting plants unpalatable to deer	
DEER	“Mask” tasty plants by planting perimeter with unpalatable plants	
Irrigation getting blocked by larger plants and not reaching small plants	Plan plant placement with regard to irrigation heads in mind	
Difficulty educating people with aesthetics concerns		
People digging up natives :(		
Deer, gopher, and rabbits	Fencing fencing fencing!	Remove only once plants are established and robust
Stray cats		
Invasive plants	Tried smothering with compostable weed mat and mulch	Wound up removing soil to remove seed bed of aggressive weeds
Turf grass, smooth brome		
No communication from grounds staff about site issues, i.e. concrete, drainage		