

Simple School Wildlife Garden Guide

Garden Designs to Benefit Songbirds, Monarchs and Pollinators



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Wildlife and Heritage Service
January 2020

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Acknowledgements

This guide is a result of work by multiple people. First, inspiration for this guide and some text were provided from the Baltimore County Public Schools Native Plant Catalog developed by Office of Science staff with Baltimore County Public Schools. In addition, the following people have contributed and reviewed the guide:

- Melissa Boyle-Acuti - Chief of Interpretation, Maryland Department of Natural Resources, Maryland Park Service
- Nancy Doran - Information and Education Manager, Maryland Department of Natural Resources, Wildlife and Heritage Service
- Thomas Melito - Science Resource Teacher/Naturalist, Office of Science PreK-12, Baltimore County Public Schools

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Introduction

The benefits of schoolyard gardens can span across multiple grade bands from pre-K all the way through high school. Building and designing a schoolyard habitat garden helps to create an area for hands-on exploration as well as habitat to support monarchs, pollinators and songbirds. Gardens are a way to integrate science, math, art and appreciation of the natural world and are a great way to get students outside. Creating a school garden is also a sustainability practice for [Maryland Green Schools](#) (Objective 2.4 Habitat Restoration).

Our students are likely to face many environmental challenges in their lifetimes and learn mostly about the problems people have created. A school wildlife garden can demonstrate to students that they can also have a positive impact on their world. In addition, a well implemented school garden can be an inspiration and catalyst for families and the community to try adding native plants to their own yards. The more gardens there are that are free of pesticides and full of native plants, the healthier your area's ecosystem will be and the greater the diversity of wildlife.

Installing a wildlife garden at your school might seem like an intimidating task for any educator to add to an already busy schedule. However, the intention of this guide is to reduce the process to a series of manageable steps by limiting the scale and using ready to go plant lists, planting plans and ordering information. The Appendix includes curriculum connections, professional development opportunities, potential funding sources and more.

Although simple to implement, these gardens are designed to incorporate the latest research on how we can help native pollinators, monarch butterflies and songbirds. The recommended plants are native to Maryland, which means they are the plants our wildlife have adapted to depend on for survival. Their flowers provide the right nutrition for local pollinators and butterflies, while their berries and seeds have the correct balance of fats and sugars for local songbirds.

Each of these gardens will feed a variety of visitors. Spring flowering native shrubs provide early nectar for pollinators as well as berries to fuel migrating songbirds in the fall. The flowers that feed migrating monarchs will also produce seed heads that feed songbirds such as goldfinches through the winter.

Happy Growing!



Children planting a garden by Howard County Library System CC by NC ND 2.0
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Before Starting Your Garden

- **Establish your goals for the garden.** What educational concepts can be relayed through the garden design, implementation and observation process? How can cross curricular concepts be applied? What wildlife do you want to attract with the garden? From adaptations to life cycles, gardens provide a wealth of science learning content. Consider engaging students with poetry, photography and art in the garden as well. See Appendix for curricular connections and professional development opportunities.
- **Include students throughout the process.** Consider having students conduct a habitat assessment before starting a garden to determine if wildlife needs are being met. Carry out a BioBlitz before and after the garden installation so its impacts can be assessed.
- **Assess your habitat.** What area would you like to plant within? What is the sun exposure? What is the soil like? Consider having students collect baseline site data and determine the best locations for your garden. Butterfly and pollinator gardens do best in either full or part-sun (at least four hours in the middle of the day or six hours morning or afternoon). It is easier to use an existing planting bed than to install a new one. Check if an existing bed is available.
- **Gather a support team.** The key to success is having support from other educators. Gather a team of other educators and parents committed to help with design, establishment and maintenance. Brainstorm ideas for curricular connections. Use this guide to estimate the likely number of hours needed for installation and maintenance. Other sources of help and advice can include local Master Naturalists and Master Gardeners or your local nature centers.
- **Start small and expand later.** Don't burn out trying to do too much all at once. Start with a small garden and expand with time, experience and support.
- **Establish a maintenance plan.** Once the garden is installed, who will maintain the area? Maintenance needs are greatest during the first two years while plants establish and then reduce to mainly a spring and fall cleanup. Think about how you will dispose of dead plant material and weeds. If possible, find a place at the school to sustainably compost garden waste. Leave dead material over the winter to provide a food source and habitat for overwintering species. Determine who will take care of the garden during the summer and perhaps consider having families adopt a day/week to maintain.



By: Maryland Department of Natural Resources

Approval

- After deciding the type, size and location of the project you wish to install, you will have to design a proposal. Proposals usually need to address the reason for garden installation, curricular connections, possible funding sources and a maintenance plan.
- Submit proposal to secure the support of your school administration, principal, PTA and maintenance staff.
- For a new planting area, contact your Department of Physical Facilities or similar department to request approval. Start this process between six months and a year before your scheduled planting. To gain approval, you will likely have to produce a map or an aerial view (ex. Google map) of the garden's location and a list of the plants and materials to be used. You may need to provide a maintenance plan in advance as well.

Costs

- An approximate cost for each garden design in 2019 is given below. This cost will vary by nursery used and size of the plants (see seed-starting for a budget alternative):
 - Songbird garden, \$300 (Maryland Green Schools pay ½ this price)
 - Monarch garden, single bed plants \$150
 - Pollinator garden, \$300
- Planting a lower density of plants initially will decrease the cost but will likely increase maintenance.
- In addition to plant costs, budget around \$20-25 for a garden border of pretreated 4" by 4" lumber and an initial layer of mulch for each 4' by 4' bed.
- Budget about \$20-30 for good signage. If you using a professional sign maker, this cost may exceed \$100.

Funding Sources

- [Maryland Green Schools](#) can get a 1 to 1 match for trees with the [Tree-mendous program](#) which would decrease the tree cost by half (see Appendix).
- For a songbird garden, consider applying for a grant from the Maryland Urban and Community Forestry Committee (MUCFC) of the Maryland Forestry Boards (see Appendix).
- Local organizations and businesses are usually the best source of grants or donations for this scale of project (see Appendix).
- Large local hardware stores may donate the limited amount of lumber and mulch required for the gardens.
- Reach out to local garden clubs to see if they can provide any funding. Some nurseries will provide reduced plant costs for schools.

Seed and Plant Sources

- A number of local native plant nurseries can supply plants (see seed and plant sources in Appendix).
- Reach out to local Master Gardeners / Master Naturalists or garden clubs to see if they have extra plants they can provide for your project. It is important to confirm they are supplying a native pollinator plant from the suggested lists. Sometimes gardeners are keen to donate plants that spread rapidly so they are unsuitable for these small pollinator gardens.
- Herbaceous (non-woody) plants can be purchased as plugs while some can be started from seed. Seeds will take more time to grow and to reach mature sizes but are cheaper. Plant plugs are costlier but establish more quickly and require less maintenance.
- Trees and shrubs can be ordered through the [Tree-mendous program](#) which provides free delivery to three locations around the state.
- Remember to use the straight native variety of a plant, if possible. Cultivars have an additional name in apostrophes after the plant's scientific name. Some cultivars have been bred for showy flowers but no longer produce nectar or pollen to feed butterflies and pollinators.
- Black-eyed Susan seeds will add color to the garden while perennials become established. Contact Kerry Wixted at Kerry.wixted@maryland.gov to get a **free packet** of Black-eyed Susan seeds for your garden.

Starting with Seeds

- Save money by buying some, or most, of the plants from seed. This also allows students to participate in another step of the garden's creation.
- For the monarch butterfly garden, choose: Swamp Milkweed, Orange Coneflower, Black-eyed Susan and New England Aster as easy plants to start from seed. Swamp milkweed requires cold stratification before planting (follow directions on packet). Consider adding goldenrod as plugs.
- For the pollinator garden, use the above plants and add: Wild Bergamot and Great Blue Lobelia. Alternatives that can be started from seed include Woodland Sunflower (not deer resistant) and Oxeye Sunflower. Consider purchasing plugs of the spring flowering recommendations like Wild Columbine and Beardtongue, which are harder to start from seed. This practice will ensure the garden still contains flowers from spring to fall.
- Follow directions on seed packets carefully. Some native flower seeds require cold stratification (a period of cold by keeping seeds in a fridge) before planting.
- **Keep in mind: plants started from seed will take longer to establish and won't flower until at least the second year.** Expect a 50% failure rate from seeds, so start with more than you need. Black-eyed Susans and Wild Bergamot will help provide color while the other perennials become established.
- Be sure to label your plants as seedlings may look similar.

Starting Your Garden

Site Selection

- **Consider using existing beds.** Consider replacing vegetation in existing beds with native plants. Investigate to see if an established planting area with low wildlife value (containing mostly weeds, mulch or non-native shrubs) could be converted to a native flower bed.
- **Select areas with proper light.** Try to choose an area with at least 4-6 hours of full sun for a monarch or pollinator garden. The songbird habitat plants can often be placed in lower light settings.
- **Select a site with good drainage.** Most monarch and pollinator plants need well-drained locations. If the site is wet, consider the suggested alternative plantings. Some trees, such as river birch, will be happy in wetter locations and can help reduce waterlogged soils.
- **Select a site close to a water source.** Once established, most gardens placed in the proper location need little supplemental watering. However, in the early stages and especially in the first summer, frequent watering may be needed.
- **Consider additional benefits.** As well as wildlife benefits, trees can improve air quality and reduce noise from road traffic. However, these advantages should be balanced against the disturbance of birds in areas with constant foot traffic and increased chance of vandalism of young trees. Trees require watering through the first summer so consider how you will move the volume required to the location. Fall planting greatly reduces this stress.
- **Consider deer problems.** Is your school regularly visited by deer? If so, you should select a sheltered area closer to the school where deer are less likely to browse. Recommended plants have been selected for deer resistance, but hungry deer will nibble almost any plant.
- **Consider accessibility for student visits.** A 60 minute class period can easily decrease to a 40 minute learning experience when getting students to assemble to go outside and then back inside. If possible, place gardens near classrooms or in areas students can easily view.
- **Consider snow removal** and set beds back a minimum of four feet from sidewalks.
- **Consider the full height and width of trees and shrubs.** Make sure they will not grow into overhead wires, impede or damage sidewalks or will suffer from constricted roots.



Site Preparation

- Take site photos before working on the garden to use as a baseline.
- Call MISS UTILITY at 1-800-257-7777 at least ten days before digging any new area.
- Time considerations:
 - Allow 60 minutes in the summer or fall to treat and kill grass (if applicable). Check to see if herbicides can be used on school grounds.
 - Allow three hours for two people to build a 4' by 4' lumber frame and sink the frame 2" into the soil.
 - If starting the garden directly in spring add two hours to remove turf before planting.
- If possible, **garden beds should have a hard edge to allow for easier maintenance.** Examples include pressure treated lumber, cedar lumber, large stones, pavers or bricks. Consider the material's longevity, potential to be used for vandalism, safety for students and sustainability.
- It is not usually necessary to add any fertilizer, compost or products such as leaf grow as native perennials generally prefer poor soil. These additions will often encourage weed growth.
- If possible, start the garden in fall by preparing during the summer (see planning timeline in Appendix). Cut grass short and cover with clear, strong plastic for at least six weeks to solarize (heat treat to kill grass and weed seeds). Tuck plastic under wood frame. A black cover will also kill grass if left down for the entire summer.
- If starting a garden in spring, prepare the site in the previous fall. Cut grass as short as possible, spread with eight or more layers of newspaper and cover with mulch. In the spring, plant directly into the bed leaving mulch and paper in place.
- If the site has special conditions, such as very sandy soil, contains construction fill or saturated soils, consult the resource list for alternative plants. Seek advice from a Master Gardener or other resource.
- If the soil is compacted or hard to dig (which is common at many school sites), you may need to pre-dig the holes, particularly for younger students. With tree planting, you may need to have a digging bar, pick, auger or other equipment available for adult helpers.
- A native perennial garden designed to support butterflies and pollinators will be different from many people's image of a flower bed and may be viewed as overgrown or untended. This is particularly true in winter when leaf litter and standing dead flower heads are left in the garden to provide safe shelter for butterflies and bees through the cold season (and provide forage for over-wintering birds). **Using good signage to explain the purpose of the garden is essential to reduce conflicts.** For signage examples, please see the Appendix.

Planting

- Time considerations:
 - Preparation and gathering supplies may take 1-2 hours.
 - Allow 30 minutes to plant the 4' x 4' garden with 25 students.
 - Allow 1-2 hours to plant trees with 25 middle school/high school students or 5-10 families depending on soil conditions. (Tree planting requires larger tools and usually cannot be done by younger students unassisted. It is best to plan for families to help plant at an evening or weekend event).
- Unlike many 'traditional' gardens, wildlife gardens depend on dense planting to reduce weeds and to produce cover for wildlife. Aim for a maximum spacing of one square foot per plant.
- If you can, include a green mulch of plants to provide a groundcover. The plants should be planted densely in spaces between the other plants. This technique will greatly reduce long term maintenance and will reduce the need for traditional mulch.
- Dig holes larger and particularly deeper than the plants to loosen the soil. Most native plants grow deep roots (from 1-10 feet deep!) which is why soil improvement isn't necessary. If you have used the summer or fall soil preparation techniques, try not to disturb the soil between plants as this will only encourage weed growth.
- Plugs frequently require roots to be spread (they circle around bottom of plug). The bottom of the plug can be cut with a sharp pair of scissors to break roots apart. Plant at same height as plugs were growing in their containers. Check plants after students have finished and correct any that are too deep or shallow.
- Trees require extra consideration. Excellent planting instructions can be found on the [Tree-mendous](#) web page.
- Label individual plants with popsicle sticks or other sustainable and weatherproof labels to assist with weeding and maintenance in the future. Each plant group can also be labeled with details of the benefits they provide wildlife.



American Goldfinch on Purple Coneflower by Patty O'Hearn Kickham CC by NC ND 2.0

Maintaining Your Garden

Water deeply after initial planting and then regularly for the first two months. For trees planted in the spring, water regularly for at least four months. During the first year, water during any extended dry periods. Watering should be conducted 30 minutes a week for raised beds and one hour for trees and shrubs. In the first summer, water may be needed every other day.

Monarch and Pollinator Gardens:

- Mulch is only recommended during the initial planting while plants become established. It's important to know:
 - many native solitary (non-stinging) bee species need bare soil to dig their nests.
 - many native plants will only reseed on bare soil.
 - using plants as a groundcover is more sustainable than mulch.
 - many birds also look for food in leaf litter.
- Weed regularly until the garden is established. Consider taking pictures of your plants while small to create a plant identification guide for weeders to use so wanted plants do not get pulled. Generally, weeding will require 1-2 hours per month for the first six months.
- Leave dead plants and leaves in the garden for the winter to provide food and shelter.
- The main time to weed is usually during early spring when annual weeds grow before the perennials emerge. Try to weed these weeds before they have a chance to produce seed. Weeding will take 2-4 hours.
- Once grass needs its first cut in spring, it is time to cut back the previous year's flower stalks. Cut the flower stems, leaving 12" standing. Native bees such as the leafcutter and mason bee use hollow plant stems as nesting tubes. The cut material can be composted. This maintenance generally takes about an hour.
- Once the garden is established, pot up surplus self-seeded plants and donate to another garden or school or sell as a fundraiser. Don't forget to label plants.

Songbird Gardens:

- Maintain a mulch circle around each trunk for several years to prevent the trunks from being damaged during grass cutting. Each spring, weed the circle and add extra mulch before the grass is cut (2-4 hours). Keep mulch flat and leave a 2" gap between it and the tree trunk. Be sure to create mulch 'donuts' and not 'volcanoes' as the latter can rot out tree roots.



Improper (left) and proper mulch (right) use examples by Joe Boggs, OSU Extension

Songbird Garden

This selection of trees and shrubs is designed to provide shelter, nesting locations and food for songbirds. Seeds provide food for resident songbirds, while berries can feed summer visitors such as orioles and can help fuel their fall migrations.

In order to raise a family, birds need foods high in protein which they find mainly in insects, particularly caterpillars. Studies by Tallamy and Shropshire (2009) have shown that native trees are the best source of caterpillars for birds with oak and native cherry trees topping the list. Narango et al. (2017) found that birds such as chickadees were both more likely to breed and to be successful where there are native trees.

Flowering native shrubs are also good sources of insects with the additional benefit of providing berries. All the selected shrubs have berries that are non-toxic for people. Summer fruits such as elderberry and serviceberry are high in sugar and are favorites for bluebirds and catbirds among others. Fall and winter berries such as those on the dogwoods and viburnums will attract fall migrants as well as winter residents such as robins.

Order one of each of the suggested trees and shrubs to provide the greatest range of food options for birds or pick and mix from the list according to the space and soil conditions on your school and the birds you would like to attract.

Planting Considerations

- If you transport trees using a pickup or open truck, make sure to cover them with a tarp before driving on a highway to prevent wind damage.
- Add a circle of mulch in the shape of a donut around each to keep mowers away from the trunk.
- The most stressful time for trees is while they are establishing. During this time, water shortages, being hit by mowers or having young branches snapped may negatively impact the tree and its survival. It is important to plan regular watering in the first year, particularly during the summer. Trees should be staked and marked. Consider spraying stakes with neon paint to make new trees more obvious to mowers. If you have deer, use a temporary circle of plastic fencing or tree guards to provide protection. Remember to remove these guards before the plastic degrades.
- Oak trees are beautiful, long lasting, specimen trees that can provide more food for birds and other wildlife than any others. However, they do require more care while they establish and are slower growing. If planted in the partial shade of another tree, they require less watering. Eventually, the oak will likely outgrow and outlive the tree they are planted under. If planted in full sun, oaks require regular watering until established. White oak acorns can easily be collected and planted in pots in the fall. Protect the pots from squirrels. Plant the seedlings in spring with tree guards.
- Evergreen trees, such as the white pine, are an important component to provide year-round cover for birds. Birds are more likely to feed if there is thick cover close by to hide from predators.
- Consider planting the trees as a grove if you have the space, to produce more cover. Plant shrubs on outside of grove to produce layers of vegetation.
- Shrubs need full to partial sun to flower and produce berries.
- Don't plant shrubs close to sidewalks where dropped berries may cause a nuisance.

- Trees should be spaced at least ten feet apart. Close planting produces tall, upright trees and reduces the requirement to prune lower branches. A wider spacing of 25-30 ft will produce trees with a rounder, fuller canopy and more shade benefits.

Substitutions:











Dry Soil: Black locust (*Robinia pseudoacacia*) and chestnut oak (*Quercus prinus*)

Wet Soil: Hackberry (*Cercis occidentalis*), swamp white oak (*Quercus bicolor*), willow oak (*Quercus phellos*), loblolly pine (*Pinus taeda*), American sycamore (*Platanus occidentalis*), silky dogwood (*Cornus amomum*) and buttonbush (*Cephalanthus occidentalis*)



Planting trees by Maryland Department of Natural Resources

Songbird Tree and Shrub Garden Plants

Common Name	Scientific Name	Height (ft)	Spread (ft)	Soil & Sun Conditions*	Notes
TREES					
Red Maple	<i>Acer rubrum</i>	40- 70'	40-60'	M W soil 	Adaptable. Attractive fall foliage
River Birch	<i>Betula nigra</i>	40-70'	40-60'	M W soil 	Attractive peeling bark. Fast growing
Black Cherry	<i>Prunus serotina</i>	40-75'	35-50'	D M soil 	Protect from deer until above 5 ft
White Oak	<i>Quercus alba</i>	80-120'	50-80'	D M soil 	Slow growing
Eastern White Pine	<i>Pinus strobus</i>	75-100'	20-40'	D M soil 	Fast growing. On coastal plain, consider substituting Virginia or loblolly pine
SHRUBS					
Gray Dogwood	<i>Cornus racemosa</i>	10-15'	10'	D M soil 	Attractive spring blossom and fall fruits (non-toxic)
Red Twig Dogwood	<i>Cornus sericea</i>	7-9'	10'	M W soil 	Stressed by hot, dry conditions
Spicebush	<i>Lindera benzoin</i>	6-12'	6-12'	D M soil 	Very deer resistant. Need a male and female plant for berries
Elderberry	<i>Sambucus canadensis</i>	8-15'	5-12'	D M W soil 	Needs space as will grow into a small grove. Protect from deer. Very fast growing. Mowing around plant prevents suckers
Seviceberry	<i>Amelanchier canadensis</i>	15-20'	10-15'	M W soil 	Also known as shadbush. Produces fruits in late May/June

*D= dry soil; M= moist soil; W= wet soil

Songbird Tree and Shrub Garden Plant Benefits

Common Name	Scientific Name	Wildlife Benefits	Birds Attracted
TREES			
Red Maple	<i>Acer rubrum</i>	Early blooms help feed bumblebees and spring bees.	Red eyed vireo, downy woodpeckers and many others
River Birch	<i>Betula nigra</i>	Host for mourning cloak butterfly and many moth species.	Purple finch, goldfinch and Carolina chickadee
Black Cherry	<i>Prunus serotina</i>	Flowers attract many bee species: bumblebees, Halictid and Andrenid bees. Host plant for many butterflies and moths like eastern tiger swallowtail.	American robin, brown thrasher, Baltimore oriole, eastern bluebird, gray catbird, wood thrush and cedar waxwing
White Oak	<i>Quercus alba</i>	Host plant for several hundred butterfly and moth species. Many animals eat acorns and build their homes in white oaks	Blue jay, turkey and crow eat acorns. Warblers, tufted titmouse, Baltimore orioles, woodpeckers and more
Eastern White Pine	<i>Pinus strobus</i>	Host for many moths. Squirrels eat seeds. Many birds will nest in pines including hawks and owls.	Carolina chickadee, Northern cardinal, tufted titmouse, mourning doves and dark-eyed junco
SHRUBS			
Gray Dogwood	<i>Cornus racemosa</i>	Attracts many native bees, including the specialist <i>Andrena fragilis</i> . Host for spring and summer azure butterfly.	Northern cardinal, Northern mockingbird, Eastern bluebird and grey catbird
Red Twig Dogwood	<i>Cornus sericea</i>	Flowers attract many bees and butterflies. Host for many moth species. High fat content of berries makes them important fuel for birds.	Northern mockingbird, Eastern bluebird and grey catbird
Spicebush	<i>Lindera benzoin</i>	Very early flower is important food for bees. Host for spicebush swallowtail butterfly. Berries are sought by fall migrating songbirds.	Wood thrush, Gray catbird, American robin and many others
Elderberry	<i>Sambucus canadensis</i>	Flowers attract many native bees and butterflies. Mason bees and little carpenter bees nest in hollow stems.	Eastern bluebird, scarlet tanager, cedar waxwings, white-breasted nuthatch, American robins and many others
Seviceberry	<i>Amelanchier canadensis</i>	Host for the striped hairstreak butterfly as well as other species.	Eastern bluebird, Baltimore oriole, gray catbird, Eastern towhee and many others

Monarch Butterfly Garden

This garden is designed to support monarch butterflies in either a single 4' x 4' bed or in an extended 4' x 8' bed in full sun. Monarch butterflies are an iconic butterfly due to their bright colors and long fall migration to central Mexico. The numbers of this once common butterfly have declined drastically over the last 20 years but setting up a monarch waystation at your school will still usually attract monarchs (as well as many other butterfly species) and will help fuel the butterflies on their migration. Monarchs only lay their eggs on milkweed plants, so including plenty of milkweed plants will hopefully allow students to watch the life stages of these butterflies. Each caterpillar eats a surprisingly large quantity of leaves. Therefore, it is important to have sufficient milkweed plants.

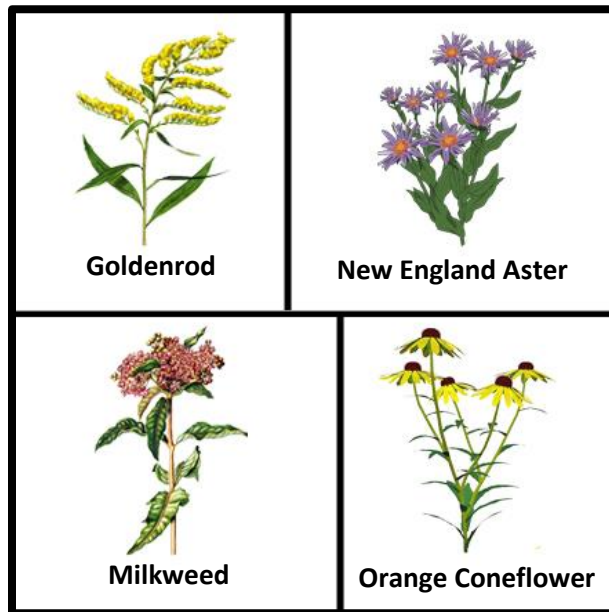
Studies have shown that one cause of monarch decline is a shortage of nectar as they fly south along the east coast of the United States. To help monarchs, this garden focuses on fall flowering plants that provide good nectar sources. Unfortunately, fall flowering natives tend to emerge late in the spring, providing an opening for early spring weeds. Using a native ground cover, such as a sedge or Golden Ragwort (which also provides early spring color), will greatly reduce the maintenance required in spring. Please keep in mind that this garden's seasons of interest mainly will be in the summer and fall.

You can register your garden as a monarch waystation with MonarchWatch.org and can receive a sign that can highlight the function of the garden.

- Normally, native plant gardens do not need extra watering except in extremely dry periods. However, as the purpose of the milkweed is to provide plenty of fresh green leaves to attract monarchs to lay their eggs, **consider watering the Swamp Milkweed during the summer**. Although monarchs can arrive in Maryland as early as May, most caterpillars will be found in late August and through September.
- Have students grow Black-eyed Susans or easy annuals such as sunflowers, cosmos or zinnia to add to the garden to produce more flowers during the first year while perennials become established.
- Butterflyweed (*Asclepias tuberosa*) is another caterpillar host plant option in the milkweed family particularly suited to dry or sandy soils. However, Swamp Milkweed tends to be much more successful at attracting monarchs so if soils allow, it is usually a better option.
- If you wish to include a larger monarch habitat, simply add more plants from the main planting plan or include the optional additional garden.
- Plants are listed in order of their value for monarchs. If you only want to include three different plants, choose the first three.
- Milkweed can be trimmed to encourage regrowth during the summer.

Monarch Butterfly Garden (4' x 4')

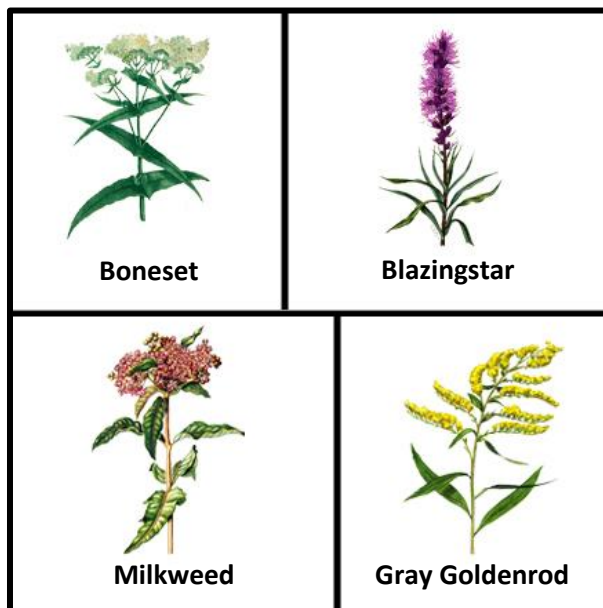
Number (plug or quart)	Common Name	Scientific Name	Height (ft)	Bloom Time / Color	Notes
6	Swamp Milkweed	<i>Asclepias incarnata</i>	4' – 5'	Jun-Jul pink	Can tolerate dry soils though prefers damp
4	Wrinkle-leaf Goldenrod	<i>Solidago rugosa</i>	1' - 5'	Aug-Nov yellow	Can also use the cultivar 'fireworks'
4	New England Aster	<i>Symphyotrichum novae-angliae</i>	1' - 6'	Aug-Oct violet	Prune plants in late May / June. Simply shear the tops back up to 12" to produce a sturdy plant with more flowers
4	Orange Coneflower	<i>Rudbeckia fulgida</i>	2' - 3.5'	Jul-Oct yellow-orange	Use the straight species not one of the many cultivars that flower earlier
Green Mulch- choose one or both species to use under tall flowers to reduce weeding					
16	Pennsylvania Sedge	<i>Carex pensylvanica</i>	0.5 - 1'	May greenish	Grows in clumps
9	Golden Ragwort	<i>Packera aurea</i>	0.5 -2.5'	Apr yellow	Freely self seeds and will spread. Semi-evergreen



Front of Garden

Want to add more habitat? Optional 4' x 4' garden additions

Number (plug or quart)	Common Name	Scientific Name	Height	Bloom Time / Color	Notes
6	Swamp Milkweed or Butterflyweed	<i>Asclepias incarnata or tuberosa</i>	4' - 5' 1' - 3'	Jun-July pink May-Jul orange	Swamp milkweed prefers moist soils; butterflyweed prefers dry & sandy soils
4	Common Boneset	<i>Eupatorium perfoliatum</i>	2' - 3.5'	Jul-Oct white	In dry conditions, <i>Eupatorium hyssopifolium</i> can be used
4	Gray or Dwarf Goldenrod	<i>Solidago nemoralis</i>	1' - 5'	Aug-Nov yellow	Tolerates poor soils
6	Blazingstar	<i>Liatris spicata</i>	1' - 5'	Jul-Aug purple	Can also be planted as bulb. Plant with 8-10" spacing
Green Mulch- choose one or both species to use under tall flowers to reduce weeding					
16	Pennsylvania Sedge	<i>Carex pensylvanica</i>	0.5 - 1'	May greenish	Grows in clumps
9	Golden Ragwort	<i>Packera aurea</i>	0.5 -2.5'	Apr yellow	Freely self seeds and will spread. Semi-evergreen



Front of Garden

Pollinator Garden (4' x 4' or 4' x 8')

This garden is designed to support pollinators from spring to fall and to allow them to feed efficiently by including large clumps of a smaller variety of plant species. Bees prefer to forage from a single species of flower on each outing. This garden can be either a single 4' x 8' bed or two 4' x 4' beds. This garden is best planted in full sun.

Pollinators perform the essential service of fertilization, carrying pollen from flower to flower so the next generation of plant seeds can grow. They are essential for flowering plant reproduction as well as many of the foods we enjoy. Pollination can be performed by moths, beetles, flies and butterflies, but bees are generally the most important.

Although the difficulties facing the European honey bee have been well publicized, the population of this non-native bee are maintained by commercial bee keepers (as well as in many backyard hives). A much greater threat faces the over 430 species of bees native to Maryland. With the exception of bumble bees, all of these bees are solitary. They do not form hives but instead build nests for their own young in tunnels in the ground (70%) or hollow plant stems. These bees are mostly gentle, many are too small to sting people, and they live unique lives sometimes visiting on a single type of flower. The greatest threat to bees and pollinators is habitat loss which a pollinator garden can help replace – especially when kept free of pesticides.

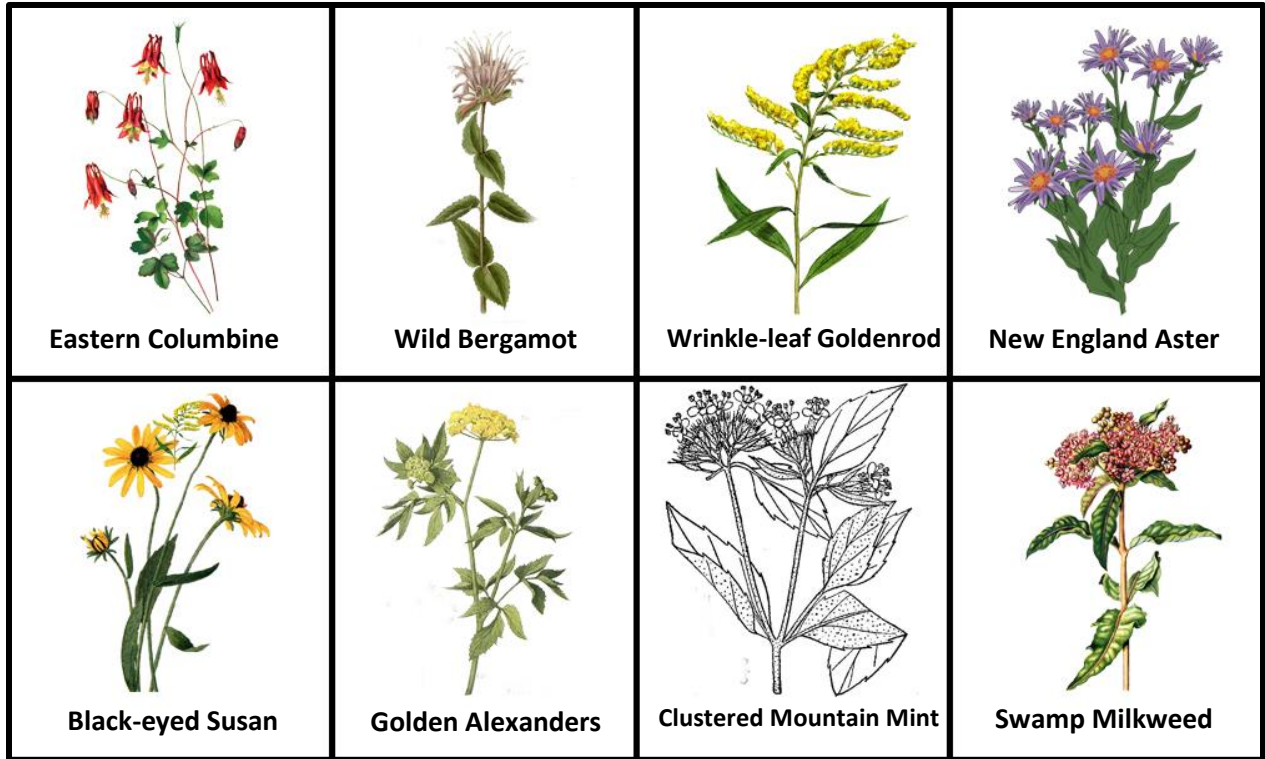
- The pollinator garden is designed to have most flowers in spring and fall while students are in schools. The inclusion of Mountain Mint and Wild Bergamot, however, ensures there will be food for pollinators throughout the summer.
- Swamp Milkweed can be substituted for Wild Bergamot to also provide a host plant for monarch butterfly caterpillars.
- Native mountain mints (*Pycnanthemums*), unlike the herbal mints (*Menthas*), can be included in a regular planting bed. Although they tend to grow well and will spread, they can be easily pulled and controlled. In Pennsylvania State pollinator studies (Ellis 2013), they were found to attract almost twice as many pollinators as the next most popular plant. Their vigorous growth is advantageous for crowding out weeds.
- Goldenrods and asters are particularly important to specialist bees, those that visit a limited set of flower species, and are the most vulnerable to habitat loss.



Common Buckeye on Clustered Mountain Mint by Judy Gallagher CC by 2.0

Pollinator Garden

Number (plug or quart)	Common Name	Scientific Name	Height	Bloom Time / Color	Notes
4	Golden Alexanders	<i>Zizia aurea</i>	1' - 2.5'	Apr-Jun yellow	As well as providing early nectar, this is a host plant for swallowtail butterflies
4	Eastern Columbine	<i>Aquilegia canadensis</i>	1' - 3'	Apr-Jul red	Can tolerate shade. Early food for returning hummingbirds
4	Beardtongue	<i>Penstemon laevigatus</i>	1 - 3.5'	May-Jul white	Will self-seed around garden bringing a show of early color
4	Wild Bergamot	<i>Monarda fistulosa</i>	1' - 5'	Jun-Sep pink	In moist soils, substitute Beebalm (<i>Monarda didyma</i>)
4	Clustered Mountain Mint	<i>Pycnanthemum muticum</i>	1' - 3'	Jul-Sep white	In trials, this plant attracts more pollinators than any other species
4	Swamp Milkweed	<i>Asclepias incarnata</i>	4' - 5'	Jun-Jul pink	Can tolerate dry soils though prefers damp
4	Wrinkle-leaf Goldenrod	<i>Solidago rugosa</i>	1' - 5'	Aug-Nov yellow	Can also use the cultivar 'fireworks'
4	New England Aster	<i>Symphotrichum novae-angliae</i>	1' - 6'	Aug-Oct violet	Prune plants in late May / June. Simply shear the tops back up to 12" to produce a sturdy plant with more flowers
Green Mulch- choose one or both species to use under tall flowers to reduce weeding					
16	Pennsylvania Sedge	<i>Carex pensylvanica</i>	0.5 - 1'	May greenish	Grows in clumps
9	Golden Ragwort	<i>Packera aurea</i>	0.5 - 2.5'	Apr yellow	Freely self seeds and will spread. Semi-evergreen



Front of Garden

- Wild Bergamot and Beardtongue overwinter as a ground rosette (a circular cluster), so they do not need an under planting of sedge or Golden Ragwort. Mountain Mint also grows so densely that it usually prevents weeds from becoming established.
- As Beardtongue flowers early and is a small plant, spread Black-eyed Susan seeds in the same area to provide a summer bloom.



Monarch on New England Aster by dogtooth77 CC by NC SA 2.0

Other Recommended Plants

The secret to success in gardening is matching plants to soil conditions. Consider the following substitutions for different areas:

Great substitutions for dry and sandy soils:

- Wild Blue Indigo (*Baptisia australis*) is a beautiful plant with spikes of blue flowers in May and interesting leaves. It attracts butterflies.
- Anise Hyssop (*Agastache foeniculum*) is not native to Maryland but is attractive to pollinators. It can easily be started from seed.

Great substitutions for moist / wet soils:

- White Turtlehead (*Chelone glabra*) is a tall plant that grows up to 6' and has large, impressive flowers that are particularly attractive to bumble bees.
- Cardinal Flower (*Lobelia cardinalis*) is a spectacular red flower that will also attract hummingbirds but needs bare soil to reseed. The plant is a biennial (has a two year lifecycle) so needs to reseed to persist in the garden.
- Great Blue Lobelia (*Lobelia siphilitica*) grows easily from seed.
- Beebalm (*Monarda didyma*) is a substitution for Wild Bergamot. Its red flowers will also attract hummingbirds.

Great substitutions for part shade:

- Mistflower (*Eupatorium coelestinum*) is an adaptable plant that blooms from July to October and attracts many pollinators. It will spread in the right conditions.
- Wild Geranium (*Geranium maculatum*) is a spring flowering plant with long bloom period that will tolerate significant shade.
- Woodland Sunflower (*Helianthus divaricatus*) has pretty yellow flowers from July-September.
- Parsley (*Petroselinum* sp.) is a common herb that is also attractive to black swallowtail butterfly caterpillars.



Blue False Indigo with Brown-belted Bumble Bee by J. Flynn CC by NC 2.0

Appendix



Baltimore Oriole in Black Cherry by Nature Nerd CC by NC 2.0

Curricular Connections and Professional Development

Professional Development

- **Chicago Botanic Garden Community Science Academy** (online) – online courses focused on community science data that can be collected in schoolyard gardens.
https://www.chicagobotanic.org/education/citizen_science_academy
- **Cornell Lab of Ornithology** (online and in-person) – offers webinars, online courses, and workshop retreats for educators to learn how to teach students about birds.
<https://www.birds.cornell.edu/k12/professional-development/>
- **Growing Up WILD** – for preK-2nd grade educators; minimum three hours; set of 27 developmentally appropriate, early childhood activities in supplemental curriculum guide.
<https://dnr.maryland.gov/wildlife/Pages/Education/GrowingUpWILD.aspx>
- **Flying WILD** -- for grade 3-8 educators; minimum four hours; set of over 30 interdisciplinary lesson plans focused on teaching about birds.
<https://dnr.maryland.gov/wildlife/Pages/Education/FlyingWild.aspx>
- **Project WILD** – for K-12 educators; minimum six hours; set of 100+ interdisciplinary lesson plans in supplemental curriculum guides
<https://dnr.maryland.gov/wildlife/Pages/Education/ProjectWILD.aspx>
- **Project Learning Tree** – for K-12 educators; minimum six hours; set of 50+ interdisciplinary lesson plans in supplemental curriculum guide.
<https://www.plt.org/network/maryland/>

Supplemental Curriculum Guides & Lesson Plans

- Buzz Into Action: The Insect Curriculum Guide for Grades K-4 by David Alexander
- Cornell Lab of Ornithology BirdSleuth Lesson Plan resource list:
<https://www.birds.cornell.edu/k12/get-started/>
- Creepy Crawlies and the Scientific Method: More Than 100 Hands-On Science Experiments for Children by Sally Kneidel
- Pollinator Partnership Curriculum and Lesson Plan resource list:
<https://www.pollinator.org/learning-center/education>
- Project BudBurst- community science program focused on phenology (timing) of plant growth: <https://budburst.org/educators>
- Urban Pollinator Program K-12 guide: <https://qf.nd.gov/gnf/education/docs/instructor-resources/upp-curriculum.pdf>
- WILD at Schools lesson plans for grades K-5:
<https://dnr.maryland.gov/wildlife/Pages/Education/Wild-at-School.aspx>

Funding Sources

Installing and upgrading schoolyard habitats can seem extremely costly, but there are multiple organizations which help with funding for such tasks. The following organizations and businesses provide funding for schoolyard habitats and gardens.

- **Chesapeake Bay Trust**
<https://cbtrust.org/grants/>
Provides grants for restoration projects, environmental education, and community engagement and outreach.
- **KidsGardening.org**
<https://kidsgardening.org/grants-and-programs/>
Provides grants through the National Gardening Association and Home Depot for educational gardens at schools and community centers.
- **Lorrie Otto Seeds for Education**
<https://wildones.org/wp-content/images/SFE-Grant-Application.pdf>
Provides small grants to schools, community centers, nature centers, and other places of learning for stewardship projects.
- **Maryland Urban and Community Forestry Committee (MUCFC)**
<https://dnr.maryland.gov/forests/Pages/programs/urban/mucfcgrant.aspx>
Helps community groups fund tree planting and education projects statewide to enhance Maryland's urban forest.
- **Project Learning Tree**
<https://www.plt.org/resources/greenworks-grants/>
Provides grants for outdoor classrooms, schoolyard habitats and school gardens.
- **Unity Gardens** (Anne Arundel County only)
<http://www.unitygardens.org/grants>
Provides grants up to \$1,000 for community greening projects.
- **United States Environmental Protection Agency**
<http://www2.epa.gov/education/environmental-education-ee-grants>
Provides grants for environmental education projects that promote awareness and stewardship.

Seed and Plant Sources

Note: The following list of native plant suppliers does not count as an endorsement. Additional nurseries can be found here: <https://mdflora.org/nurseries.html>

Seeds

Brandywine Conservancy & Museum of Art

1 Hoffman's Mill Rd

Chadds Ford, PA 19317

Phone: 610-388-8327

Website: <http://www.brandywine.org/brandywine/wildflower-native-plant-gardens/seed-program>

Email: gardens@brandywine.org

Chesapeake Valley Seed

8869 Greenwood Place, Suite C

Savage, MD 20763

Phone: 301-725-7333 (SEED)

Website: <https://chesapeakevalleyseed.com/>

Email: jstraughn@chesapeakevalleyseed.com

Ernst Conservation Seed

8884 Mercer Pike

Meadville, PA 16335

Phone: (800) 873-3321 or (814) 336-2404

Website: <https://www.ernstseed.com/>

Email: sales@ernstseed.com



Plants

Adkins Arboretum*

12610 Eveland Road

Ridgely, MD 21660

Phone: 410-634-2847

Website: www.adkinsarboretum.org

E-mail: nativeplants@adkinsarboretum.org

Brandywine Conservancy & Museum of Art

1 Hoffman's Mill Rd

Chadds Ford, PA 19317

Phone: 610-388-8327

Website: <http://www.brandywine.org/brandywine/wildflower-native-plant-gardens/seed-program>

Email: gardens@brandywine.org

Chesapeake Natives, Inc.

9827 Rosensteel Avenue

Silver Spring, MD 20910

Phone: 202-262-9773 (Chris Puttock)

Website: www.chesapeakenatives.org Sales are by appointment at Rosaryville State Park,

Email: chris@chesapeakenatives.org

Earth Sangha

10123 Commonwealth Blvd.

Fairfax, VA 22032

Phone: 703-764-4830

Website: www.earthsangha.org

Environmental Concern, Inc.

201 Boundary Lane

P.O. Box P

St. Michaels, MD 21663

Phone: 410-745-9620

Website: www.wetland.org

E-mail: nursery-sales@wetland.org

Greenery Nursery and Landscape Center

44222 Greenery Lane

Hollywood, MD 20636

Phone: 301-373-2596

E-mail: greenery-tae@md.metrocast.net

Herring Run Nursery

6131 Hillen Road

Baltimore, MD 21239

Phone: 844-756-8688

Website: <http://bluewaterbaltimore.org/herring-run-nursery/native-plants/>

E-mail: nursery@bluewaterbaltimore.org

Izel Plants - Online Marketplace for Native Plants

Phone: 410-989-3721

Website: www.izelplants.com

Email: hello@izelplants.com

Wakefield Valley Nursery

Frank Vleck

1690 Wakefield Valley Road

New Windsor, MD 21776

Phone: 410-635-2169

Website: www.wakefieldvalleynursery.com

E-mail: wakevn@gmail.com

Tree-Mendous Maryland

Tawes State Office Building E-1

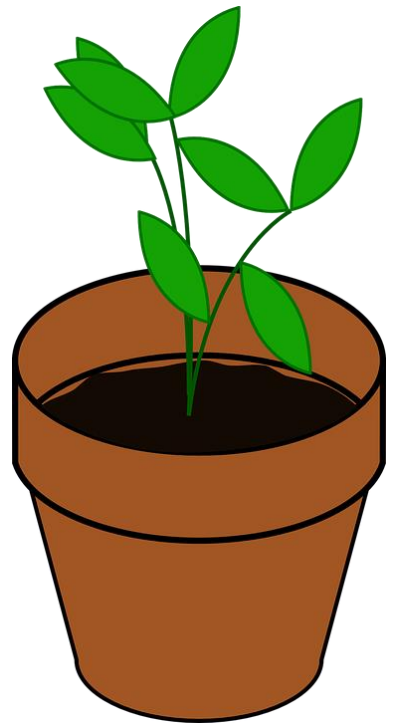
580 Taylor Avenue

Annapolis, MD 21401

Phone: 410-260-8510

Website: <https://dnr.maryland.gov/forests/Pages/treemendous/default.aspx>

Email: anne.gilbert@maryland.gov



Planning Timeline

Summer/ Fall

- Planting window: August-October
- June-August: lay out location for bed and add a border. If area contains grass, cover with clear plastic or black cloth.

Spring/ Summer

- Planting window: May-July
- October-November: lay out location for bed and add a border. If area contains grass, cover with newspaper and mulch.

Six months- 1 year before planting: Choose garden type and location. Plan and consult with Department of Facilities for permission. Choose a planting date and a rain date. Consider inviting other faculty, parents or others who may be interested in assembling the planting.

One month before planting: Have students collect data on the current conditions and plants/animals present at the planting site. Consider using the Seek application (see additional resources in Appendix) to document organisms. Take 'before' photos of site. Order plants from nursery and set date for delivery or pick-up. Try to obtain plants one week before planting and keep watered and in light shade. Be sure grass or existing vegetation has been removed, but keep the planting area covered to prevent other plants from colonizing it. Work to obtain tools to use for the planting day.

One week before planting: Check weather forecast and determine your plan of action for potential weather complications. Select a volunteer to take photos during the planting event. If plastic was used, remove it and allow rain to wet the area.

1-2 days before planting: If weather has been dry, thoroughly wet the area to be planted to allow for easier digging. If necessary, pre-dig holes for students and check the weather forecast. Assemble planting tools and materials for students and volunteers.

Planting day: Make sure tools and water are ready at the site. Gently remove the plugs from trays and spread the roots. After students plant, check to make sure the plants are at the correct depth. Add labels to plants to mark locations. Popsicle sticks work well.

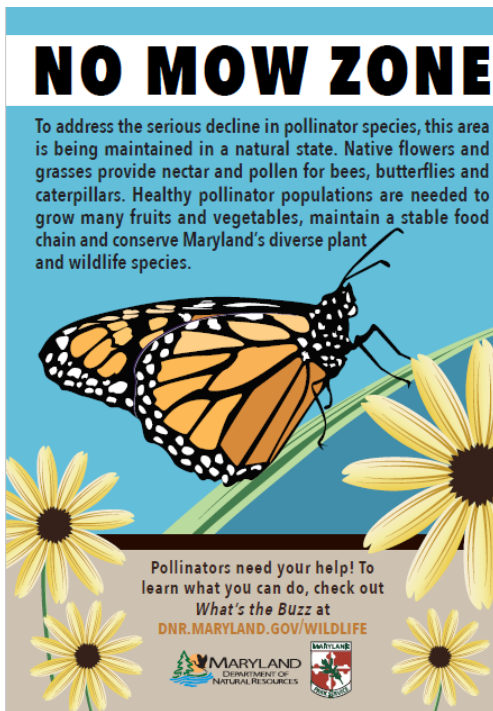
Next eight weeks: Regularly water garden and pull any weeds that may colonize the area while they are still small and manageable.

Through the summer: Water plants only during extended dry periods and have volunteers assist with weed control every 3-4 weeks. Setup a volunteer watering or weeding schedule.

Signage Examples

Signs are a great way to tell others about your garden. Consider purchasing a sign or having students design their own. Examples of signs and sign companies can be found below.

- BayWise (must complete certification) : <https://extension.umd.edu/anne-arundel-county/master-gardeners/bay-wise-gardening>
- Monarch Joint Venture: <https://monarchjointventure.org/resources/signs-and-displays>
- Monarch Waystation (must complete application): <https://shop.monarchwatch.org/product/Waystation-Certification-Application-and-Sign-Bundle/190005>
- National Wildlife Federation: <https://www.shopnwf.org/Certified-Wildlife-Habitat-Signage/index.cat>
- Pollinator Partnership: <http://pollinator.org/share-sign>
- Xerces Society: <https://gifts.xerces.org/products/pollinator-habitat-sign>



Additional Resources

For more information, check out the following garden, play space and habitat creation guides and references:

- **All Hands in the Dirt: A Guide to Designing and Creating Natural School Grounds from the Evergreen Foundation of Canada**
<http://evergreen.ca/downloads/html/all-hands/>
Comprehensive guide to creating schoolyard habitats
- **How-To Guide for Schoolyard Habitats** from the National Wildlife Federation
<https://www.nwf.org/Garden-for-Wildlife/Create/Schoolyards/Resources>
Comprehensive guide to creating schoolyard habitats (PDF)
- **Maryland Department of Natural Resources Schoolyard Wildlife Habitat**
Online resource with lesson plans, ID guides and more
<https://dnr.maryland.gov/wildlife/Pages/Education/Schoolyard-Wildlife-Habitat.aspx>
- **Natural Play Spaces** from the Maryland Department of Natural Resources
<https://dnr.maryland.gov/pgc/Pages/NPS/AdditionalResources.aspx>
Website with resources on creating natural play spaces
- **Schoolyard Habitat Project Guide** from the United States Fish and Wildlife Service
<https://www.fws.gov/external-affairs/marketing-communications/printing-and-publishing/publications/3012-Schoolyard-Habitat-Guide.pdf>
Comprehensive guide to creating schoolyard habitats (PDF)
- **The Learning Grounds: Guide for Schools from the Evergreen Foundation of Canada**
<http://www.evergreen.ca/downloads/pdfs/Guide-for-Schools.pdf>
Comprehensive guide to greening school grounds (PDF)

Literature Cited

Ellis, K. 2013. Identifying and Promoting Pollinator-Rewarding Herbaceous Perennial Plant Species. Final Report to Pennsylvania Department of Agriculture. 16pp.

Narango, D. L., D. W. Tallamy and P. P. Marra. 2018. Nonnative plants reduce population growth of an insectivorous bird. *Proceedings of the National Academy of Sciences*. 115 (45) 11549-11554.

Slattery, B. E., K. Reshetiloff, and S. M. Zwicker. 2003. Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed. U.S. Fish & Wildlife Service, Chesapeake Bay Field Office, Annapolis, MD. 82 pp.

Smith, S. B. and S. R. McWilliams. 2015. Recommended plantings for migratory songbird habitat management. Rochester, NY: Rochester Institute of Technology and University of Rhode Island. 2 p.

Tallamy, D. W. and K. J. Shropshire. 2009. Ranking Lepidopteran Use of Native Versus Introduced Plants. *Conservation Biology*. 23 (4): 941-947.