

PUTNAM FARM CONSERVATION AREA POLLINATOR AND BENEFICIAL INSECT CONSERVATION PLAN

PLAN OVERVIEW

This Pollinator and Beneficial Insect Habitat Conservation Plan was prepared by Kelly Gill (Senior Pollinator Conservation Specialist, The Xerces Society for Invertebrate Conservation and Partner Biologist, USDA NRCS) for Putnam Farm Conservation Area for the purpose of creating, enhancing, and protecting habitat for pollinators, beneficial insects, and other wildlife. The client was referred to Xerces by NRCS for recommendations for pollinator conservation practices to be included in their NRCS conservation plan.

This is to be considered a **preliminary draft** of recommendations prepared for Putnam Farm Conservation Area based on Putnam Farm’s conservation goals and mission per a discussion with Rick Francolini (phone communication, Feb. 8, 2023) and the practices outlined in the NRCS conservation plan (prepared by Lisa Petruski). Putnam Farm’s Recommended practices were selected and designed with site-specific parameters (e.g., local conditions, existing features, natural resources, farm operations, land use, implementation methods, community engagement and education programs, etc.).

More details are provided for each of the recommended practices within each section of the plan along with associated guidance documents and resources. The process for reviewing, finalizing, and implementing practices recommended in this plan are summarized in the “Next Steps” section. Where applicable, Xerces is available to consult with NRCS or other service provider assisting Putnam Farm on integrating the recommendations and practices in Putnam Farm’s Pollinator Habitat Conservation Plan into their larger whole-farm stewardship and conservation plan and/or to ensure there are no conflicting recommendations.

CLIENT INFORMATION

Site/Farm Name: Putnam Farm Conservation Area

Client(s): Town of Orleans

Point of Contact: Rick Francolini

Phone: 917-699-8738 **Email:** rick_francolini@yahoo.com

TECHNICAL SERVICE PROVIDER/PLAN AUTHOR INFORMATION

Company/Organization: The Xerces Society for Invertebrate Conservation

Plan Developed By: Kelly Gill, Senior Pollinator Conservation Specialist, The Xerces Society & Partner Biologist, USDA NRCS, East Region.

Phone: 856-888-4646 **Email:** Kelly.Gill@xerces.org, Kelly.Gill@usda.gov

NRCS FIELD OFFICE (if applicable)

NRCS Service Center: West Yarmouth (Cape Cod Conservation District)

Assisted By: Lisa Petruski

Plan Type/NRCS Program: Pollinator Conservation Plan/Conservation Technical Assistance (CTA)

PROPERTY INFORMATION

Site Name: Putnam Farm Conservation Area

Property Size: 13.86 acres

Address: 50 Bridge Road, Orleans, MA

Coordinates: 41.799901°, -69.989266°

County: Barnstable

Plant Hardiness Zone: 7a

Major Land Resource Area: 149B—Long Island-Cape Cod Coastal Lowland

Ecoregion: 84—Atlantic Coastal Pine Barrens, 84a Cape Cod/Long Island

BACKGROUND

Putnam Farm Conservation Area is a ~14-acre property located in Orleans, MA. The farm is owned by the Town of Orleans; acquired by the town in 2010 through the Local Acquisitions for Natural Diversity (LAND) grant program. The property is permanently protected open space, preserved for the purpose of conservation, agriculture, and passive recreation, and is managed under the control and care of the Conservation Commission.

Past land use included a gravel mining operation, where the previous landowners excavated gravel and sold the material for fill used during the construction of the Eastham rotary. After that, the topsoil was replaced, and the land was converted to agricultural use.

The change in ownership, land use, and management goals on site required a new operations and management plan for the site. Putnam Farm is working with NRCS and other service providers and specialists to develop a holistic farm plan that includes natural resource conservation, community farming and educational programs, and passive recreation opportunities. The NRCS conservation plan includes practices that address a variety of natural resource concerns, including soil health, water quality and irrigation efficiency, plant productivity, wetlands, and wildlife habitat.

CONSERVATION GOALS

Putnam Farm is interested in supporting and protecting pollinators and beneficial insects as part of their land stewardship and management plan that will improve habitat conditions on the farm and provide multiple benefits to agricultural production, biodiversity conservation, and the local community. These goals include:

1. Creating and enhancing habitat for pollinators and beneficial insects
 - By selecting and establishing native flowering plants that provide continuous bloom from spring to fall, the property will be able to support pollinators and other beneficial insects throughout the entire growing season
 - By diversifying the plant community, Putnam Farm will also increase the abundance and diversity of wildlife supported on the property
2. Protecting existing habitat features
3. Promoting climate resilience and regenerative practices

- Establishing diverse native plant communities helps buffer the effects of climate change for wildlife populations
 - Providing a diverse range of resources often ensures some cover or food will be available for species in the case of disturbance
 - Providing continuous areas of habitat provides dispersal corridors for wildlife to flee disturbance
- Addressing erosion issues with deep-rooted perennial flowers and grasses
- Creating healthy, productive meadows, improves carbon sequestration
- 4. Enhancing biodiversity and the overall conservation value of the farm
- 5. Restoring and sustaining agricultural productivity
 - Improving the condition of natural habitats within and around cropland can enhance ecosystem services like pollination and pest control, supporting productive and sustainable cropland
- 6. Providing the community with a source of locally grown food and other farm products
- 7. Increasing community engagement including expanding the farm plot rental program, hosting education and outreach events, promoting collaborative conservation initiatives, and providing opportunities for the public to connect with nature

HABITAT ASSESSMENT AND DOCUMENTATION OF RESOURCES CONCERNS

To evaluate if the pre-existing habitat at Putnam Farm is providing the quality, abundance, diversity, or continuous availability of resources pollinators and beneficial insects need to complete their life cycle, a New England Pollinator Partnership (NEPP) Wildlife Habitat Evaluation Guide (WHEG) was used to score critical habitat features for the assessment area. The WHEG score is used to determine if the habitat is adequate as is or if wildlife (pollinator) resource concerns exist. Two main resource concerns are evaluated using the NEPP WHEG: Degraded Plant Condition and Inadequate Habitat for Wildlife. The overall Comprehensive Assessment index must meet ≥ 0.5 to address the resource concern of Terrestrial Habitat for Wildlife and Invertebrates (i.e., quantity, quality or connectivity of food, cover, space, shelter, and/or water is inadequate to meet requirements of identified terrestrial wildlife or invertebrate species). Achieving a higher score of 0.7 is encouraged.

Habitat scores are interpreted as follows:

- 0.3 or below indicates poor habitat
- >0.3 to 0.5 indicates fair habitat
- >0.5 to 0.7 indicates good habitat
- above 0.7 indicate excellent habitat

New England Pollinator WHEG

The completed New England Pollinator WHEG and documented resources concerns are summarized below and the completed New England Pollinator WHEG forms are included in the appendix of this plan.

Assessment Area (AA)	Benchmark Index Score	Resource Concern(s)	Planned Index Score	Practice(s) Planned Address Resource Concern
Putnam Farm Property Boundary	0.48	Terrestrial Habitat for Wildlife and Invertebrates (i.e., quantity, quality or connectivity of food, cover, space, shelter, and/or water is inadequate to meet requirements of identified terrestrial wildlife or invertebrate species).	0.97	Wildlife Habitat (420), Riparian Forest Buffer (391)

ABOUT THE RECOMMENDATIONS IN THIS PLAN

This plan is to be considered a **preliminary draft** that identifies conservation opportunities on Putnam Farm that support pollinators, beneficial insects, other wildlife, and their habitats. There are four main categories of recommendations:

1. **Recommendations for pollinator/wildlife habitat practices recommended in the NRCS conservation plan.** See NRCS Conservation Plan, Recommended Practice (page 4).
 - a. These are practices specifically designed to support pollinators and beneficial insects, but can also have benefits to other resource concerns on the farm.

- b. E.g., Wildlife Habitat Planting (420).
2. **Recommendations on ways to increase pollinator/beneficial insect habitat value of other practices recommended in the NRCS conservation plan.** See NRCS Conservation Plan, Recommended Practice (page 4).
 - a. These are practices where pollinators might not be the primary resource concerns but the practice can have secondary benefits of supporting pollinators, beneficial insects, and other wildlife and will increase overall biodiversity.
 - b. E.g., The Riparian Forest Buffer (391) practice is primarily planned to improve and/or protect water quality, but plant selection can include considerations for native plant species that pollinators and beneficial insects.
3. **Recommendations for “other opportunities” to support pollinators/beneficial insects.**
 - a. These are practices that may not be included in the NRCS conservation plan, but might be of interest to the client(s).
 - b. E.g., Considerations for adding pollinator value to the wetland restoration and adjusting management activities to benefit pollinators.
4. **Recommendations or resources related to opportunities for community engagement, such as community science and educational programs, and associated resources.**

NEXT STEPS

- The draft plan will be shared with the client(s) for review and feedback. Since this plan is associated with an NRCS conservation plan, the plan will also be shared with NRCS as documentation for the client(s) file.
- After reviewing the recommendations in this document, the client can request revisions to the plan and the plan will be updated accordingly.
- A site visit can be scheduled to ground truth and verify that the recommendations are compatible with the site conditions, farm operations, and client(s) goals, and any other important, site-specific factors.
- If/when the client chooses to implement any of the practices in this plan, Xerces can continue to provide technical assistance throughout the implementation process: installation, establishment, and long-term maintenance.

SUMMARY OF PRELIMINARY RECOMMENDATIONS

Recommendation	Location*	Size**	General Description
Pollinator Hedgerow Planting / Habitat Strips	Fields 1a and 1b, along farm plot borders	Approx. 15 ft. wide strips mixed length plots	Establish native flowering shrubs and wildflowers in field (plot) borders. Related NRCS practice: Wildlife Habitat Planting (420)
Hedgerow / Windbreak Planting	Along trail where new plots will be	Approx. 15 ft. wide and 100 ft. long	Establish native flowering trees, shrubs and wildflowers to provide a privacy screen and windbreak along the trail adjacent to new plots. Related NRCS practice: Wildlife Habitat Planting (420)
Riparian Buffer Planting	Field For, NW and SE areas of farm adjacent to salt marsh, wetlands	Approx. 1 ac. each	Include native flowering plants for pollinators in riparian buffer plantings. Related NRCS Practice: Riparian Forest Buffer (391)
Upland Buffer Planting	Upland buffers of wetland areas; upland non-crop areas	TBD	Include of native wildflowers for pollinators in upland buffers/non-crop areas. Related NRCS practice: Wildlife Habitat Planting (420)
Wetland Plants for Pollinators	Wetland areas	TBD	Include flowering wetland plants for pollinators in potential wetland restoration plantings.
Management Practices for Pollinators	Across property, where applicable	Variable	Protect existing habitat areas and important pollinator plants; invasive species management; adjusting intensity and timing of management practices (e.g., mowing).
Community Engagement	All	N/A	List of opportunities and resources.

* Location based on NRCS Conservation Plan Map

** Size is approximated and can be adjusted as needed

The following sections provide additional details on each of the preliminary conservation practices or activities recommended in Putnam Farm’s Pollinator and Beneficial Insect Habitat Conservation Plan. It includes the description of work, implementation instructions, plant lists and seed mixes, management requirements, and other important considerations. Supporting documents are provided in the appendix of this plan. Plan recipients can select the practices to implement. NRCS Conservation Practices are included for reference where applicable. NRCS Program: Conservation Technical Assistance (CTA).


Summary Map of Proposed Conservation Actions

Putnam Farm Conservation Area

Orleans, MA



Legend

- | | | |
|--|---|--|
|  Hedgerow (CPS 420) |  Upland Planting (CPS 420) |  Trail Hedgerow (CPS 420) |
|  Wetland Planting (CPS 420) |  Riparian Planting (CPS 391) | |

POLLINATOR HEDGEROW PLANTING / HABITAT STRIPS

OVERVIEW

Install flowering hedgerows (also referred to as habitat strips) along the borders and/or between community farm plots. The recommended species list provided in this plan includes options for a variety of flowering and fruiting shrubs and wildflowers that have high value to pollinators. The flowering hedgerows will also support a diversity of beneficial insects (predators and parasitoid species important for biological control of insect pests).

Hedgerows provide structural variation to the landscape and expand the range of resources and refuge to support pollinators and beneficial insects. These strips of permanent vegetation are especially important because they provide undisturbed habitat that is often lacking in annual crop fields including ground cover, pollen and nectar forage, alternative prey, refuge, and nesting and overwintering sites that can support a diverse, resident population of pollinators and beneficial insects. Having areas of permanent habitat throughout the farm facilitates the dispersal of beneficial insects into crop fields to feed on insect pests of crops.

Putnam Farm already has several established hedgerows. These hedgerows could benefit from additional plantings of shrubs, grasses, and forbs to fill in the empty spaces. Additionally, the plant list provided serves as a jumping-off point to create new hedgerows along the paths that run adjacent to the phase 4 plots. These hedgerows will function as a buffer and privacy screen for farmers and recreational visitors.

REVISION NOTE: Using some transplants from other areas on the property to create the hedgerows is compatible with this plan. However, to maximize the benefit to wildlife, increasing the plant diversity on the property is a highly recommended priority.

PLANT SELECTION

Plants recommended for this practice were selected for the following criteria:

- Native species with high value to pollinators and beneficial insects;
- Species that are regionally-and ecologically-appropriate and adapted to site conditions;
- Lower-growing, compact native shrubs and stiff-stemmed, hardy wildflowers are recommended for perennial hedgerows or habitat strips bordering farm plots to fit the available space (~15 ft. wide X length of plots);
- Species that, once well established, will have drought resistance;
- Species that are commercially available;
- Potential for value added products for the farm such as harvestable fruits or berries, plant materials (cuttings and seeds for plant starts), floriculture products, medicinal and cultural uses, and;
- Plant species that are not known to be alternative hosts for crop pests.

POLLINATOR HEDGEROW PLANTING/HABITAT STRIPS



Approximate Measurements (NOTE: Precise measurements should be taken before ordering plants)

HR 1 = 70 linear ft (15' width) = 1,050 ft² / ~0.025 ac.

HR 2 = 200 linear ft (15' width) = 3,000 ft² / ~0.07 ac.

HR 3 = 2 rows of 50 linear ft (15' width) = 1,500 ft² / ~0.035 ac.

HR 4 = 140 linear ft (15' width) = 2,100 ft² / ~0.05 ac.

TOTAL = 510 linear ft / 7,650 ft² / 0.17 ac.

POLLINATOR HEDGEROW PLANTING/HABITAT STRIPS (DRAFT PLANT LIST)

Trees and Shrubs

Common Name	Scientific Name
Eastern Shadbush	<i>Amelanchier canadensis</i>
Dwarf Shadbush	<i>Amelanchier spicata</i>
New Jersey Tea	<i>Ceanothus americanus</i>
American Hazelnut	<i>Corylus americana</i>
Shrubby Cinquefoil	<i>Dasiphora floribunda</i>
Black Huckleberry	<i>Gaylussacia baccata</i>
Common Winterberry	<i>Ilex verticillata</i>
Beach Plum	<i>Prunus maritima</i>
Virginia Rose	<i>Rosa virginiana</i>
Highbush Blueberry	<i>Vaccinium corymbosum</i>
Maple Leaf Viburnum	<i>Viburnum acerifolium</i>

Herbaceous (Flowers & Grasses)

Common Name	Scientific Name
Eastern Red Columbine	<i>Aquilegia canadensis</i>
Butterfly Milkweed	<i>Asclepias tuberosa</i>
Yellow Wild Indigo	<i>Baptisia tinctoria</i>
Partridge Pea	<i>Chamaecrista fasciculata</i>
Pink Tickseed	<i>Coreopsis rosea</i>
White Wood Aster	<i>Eurybia divaricata</i>
Eastern Showy Aster	<i>Eurybia spectabilis</i>
Oxeye Sunflower	<i>Heliopsis helianthoides</i>
New England Blazing Star	<i>Liatris novae-angliae</i>
Spotted Beebalm	<i>Monarda punctata</i>
Narrow-Leaved Sundrops	<i>Oenothera fruticosa</i>
Narrowleaf Mountain Mint	<i>Pycnanthemum tenuifolium</i>
Sweet Goldenrod	<i>Solidago odora</i>
Purple Lovegrass	<i>Eragrostis spectabilis</i>
Little Bluestem	<i>Schizachyrium scoparium</i>

Plant materials: Containerized plants (plugs, tubelings, saplings, gallon pots, etc.) are recommended for hedgerow planting to achieve quick establishment and dense cover

POLLINATOR HEDGEROW PLANTING/HABITAT STRIPS PLANTING SPECIFICATIONS AND INSTALLATION

Establishing Plants Using Plugs and Saplings

Establishing hedgerows includes four phases: (1) site preparation (weed control); (2) planting bed preparation and staging; (3) planting and follow-up management during establishment, and; (4) post-establishment maintenance. To ensure plant survival, installing tree guards, shrub cages, fencing, or other plant protectors/exclusions is **strongly** recommended. It is common to see poor establishment success and high rates of plant loss when new plantings are not properly protected from animal damage in the first few years of establishment.

Equipment and Materials:

- Mower or brushhog, string-trimmer
- Shovels, augers, or other hand-planting tools
- Tractor-mounted tillage implements or walk-behind roto-tiller, hand-weeding and pruning tools
- Hose or watering tank or other means of irrigation
- Compost and mulch (weed-free, untreated wood chips)
- Plant materials (container stock, cuttings, etc.)
- Plant protectors (tree guards, shelters, fencing, etc.)

Step 1. Site Preparation

Use mowing, strip tillage, or other mechanical methods to remove current vegetation and weeds to prepare the area(s) where transplants will be installed. For high weed pressure sites, site preparation may require more than one season to reduce competition from pervasive weeds.

When field is accessible:

- a. Mow, brush hog, strip-till, and/or mechanically remove current vegetation along length and width of hedgerow planting area.
- b. Monitor area and repeat to eliminate regrowth/in areas of high weed pressure.
- c. Rake or lightly harrow the strip to create a clean surface for installing transplants.

Step 2. Stage Planting Area

Before planting, measure and stage plants using appropriate spacing:

- a. Prior to planting, rake or harrow the planting area to create a clean surface for installing transplants.
- b. Stage plant placement with appropriate spacing before planting.
- c. Pre-drill/dig the appropriate number of holes. Make holes wide and deep enough to insert roots without “J-rooting” (root tips bent upwards). Keep roots moist until planted.
- d. Add properly aged and mixed, weed seed-free compost to holes and pre-irrigate.

Step 3. Planting and Management Requirements

Installing plants:

- a. When planting, place root crown at ground level (or at maximum of 1 in. below ground level) when inserting roots. Do not expose root crown above ground!
- b. Backfill hole to secure plant
- c. Irrigate transplants thoroughly immediately after planting.
- d. One-time mulching with untreated wood chips after planting is recommended to reduce weed competition and retain moisture during the establishment period. To prevent rodent damage, do not mulch within one foot of seedling.
- e. Flag newly planted trees and shrubs to identify their location

Planting dates: TBD

Installing plant protectors (where applicable):

Install animal guards, tree tubes, shelters or temporary fencing to protect seedlings from deer browse or other animal damage and remove animal guards before they impede growth.

- When tree shelters or tubes are used, shelters shall be made of a translucent, mesh, or netting material and shall be at least four feet tall. Use five feet tall tubes in areas of moderate to heavy deer pressure.
- Shelters bottoms shall be 'sealed' at the ground surface, either by being tapped 2" into the soil or by piling 2" of soil around the bottom of the shelter.
- Bird nets shall be used with solid shelters and shall be removed before the saplings emerge from the shelter. Shelters with perforated seams may be left on the trees.
- Shelters without perforated seams shall be split lengthwise or removed when sapling trunks are 1 ½ inches in diameter at the top of the shelter. Stakes should be removed at the same time as shelters-- especially metal stakes-- to prevent damage to equipment used for future mowing or maintenance.
- Multi-stemmed shrubs may be protected with shelters made from woven-wire metal or UV-resistant plastic fence materials, or acceptable wood materials.
- Shrub shelters shall be at least four feet tall, preferably five feet tall in areas of moderate to heavy deer pressure.
- Shrub shelters shall be at least three feet in diameter, to accommodate the growth and natural spread of multi-stemmed shrubs.
- Shrub shelters shall be securely anchored using at least two durable stakes. All shelters shall be securely anchored with durable stake(s).
- Wooden stakes shall be hardwood, have a minimum dimension of one inch by one inch, and shall not include sapwood

Management during establishment:

- Weed control is critical in the first and second years after planting.
- Monitor weed growth and continuously control weeds within a minimum of 3 ft. diameter around the base of each seedling by mowing, string-trimming, or hand-weeding until the hedgerow is well established.

- Prevent weeds from going to seed in or adjacent to the project area.
- ***Irrigation will be required.*** Newly transplanted plants should receive at least 1 inch of water per week during the first two years of establishment.
- Protect plants from animal damage and other disturbances. Monitor tree protectors and repair or replace as needed. See “installing plant protectors” for instructions.

Step 4. Post-Establishment Maintenance

To ensure plant health and that this practice functions as intended over time:

- Do not conduct maintenance practices and activities during the primary reproductive period of wildlife. Exceptions can be considered to maintain the health of the vegetative community if such exception do not conflict with agency requirements.
- Control access by vehicles and/or equipment during or after tree/shrub establishment to protect new plants and minimize erosion, compaction and other site impacts.
- Prune plants as needed to maintain health and structure.
- Monitor tree/shrub health.
- Inspect the trees and shrubs periodically, and protect them from adverse impacts of insects, diseases, competing vegetation, fire, livestock, wildlife, non-functioning tree shelters and/or weed barriers, etc.
- Control plant species on the Federal or State invasive species and noxious weed lists.

Plant Materials Information

Source locally-grown native plants on the plant list provided. ***Avoid ornamental cultivars***, as many do not have the same wildlife value as the straight species. When calculating the number of seedlings required, increase the nursery order by at least five percent to allow for damaged or stunted plants.

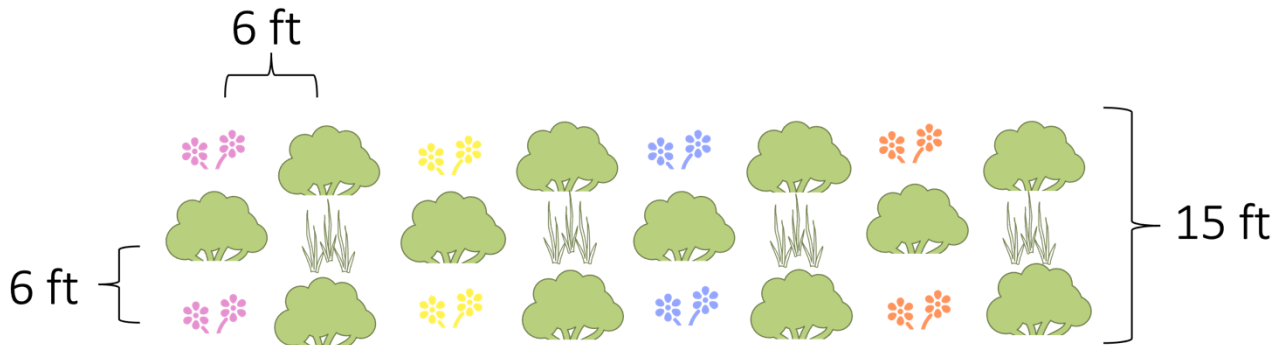
NRCS practice require that plant materials used for this practice shall meet the standards of the American Nursery and Landscape Association as provided in the association’s publication “American Standard for Nursery Stock” (2004) including which includes (but not limited to) the following specifications:

- All container grown nursery stock shall be healthy, vigorous, well rooted, and established in the container in which it is growing.
- Container grown nursery stock shall have a well-established root system reaching the sides of the container to maintain a firm ball when the container is removed, but shall not have excessive root growth encircling the inside of the container.
- Plugs and tubelings shall have a well-established root system reaching the sides of the container to maintain a firm ball when the container is removed, but shall not have excessive root growth encircling the inside of the container.

POLLINATOR HEDGEROW PLANTING/HABITAT STRIPS

Planting Layout/Diagram

1. Space plants approximately 6' apart, alternating woody and herbaceous plants. This will result in approximately 17 plants/100' (linear).



2. For a 15 ft wide hedgerow, you can do approximately 3 rows of shrubs, spaced at 6 ft, alternating between grass and herbaceous species. Planting in a triangular pattern would result in approximately 50 plants (including 25 shrubs), spaced every 6 feet, for a planting that is 100 ft in length and 15 ft in width.

HR 1: ~70 linear ft (15' width) = 18 shrubs

HR 2: ~200 linear ft (15' width) = 50 shrubs

HR 3: 2 rows of ~50 linear ft (15' width) = 26 shrubs

HR 4: ~140 linear ft (15' width) = 36 shrubs

Hedgerow Design Notes:

- It is recommended to plant clusters of the same species to provide continuous foraging opportunities for wildlife.
- The tallest plants should be centrally located in the hedgerow, and transition into smaller-statured plants. This creates a visually appealing gradual transition and unique microclimates and habitats that support a diversity of species.

EXAMPLES OF POLLINATOR HEDGEROW PLANTINGS / HABITAT STRIPS



HEDGEROW/WINDBREAK PLANTING

OVERVIEW

Install privacy hedgerows along the trail adjacent to where the new plots will be. The recommended species list provided in this plan includes options for a variety of flowering and fruiting trees, shrubs, and wildflowers that have high value to wildlife. A mixture of tall and short-statured trees and shrubs will also function as a buffer and privacy screen for farmers and recreational visitors. Incorporating a more diverse stand of trees and shrubs in the landscape will support a greater diversity of wildlife species throughout the year. Our native Oak trees alone support hundreds of butterfly and moth species by serving as a hostplant for caterpillars. The species recommended below provide pollinators and beneficial insects with nesting/overwintering habitat, nectar and pollen resources, as well as vegetation for insect herbivores like caterpillars. Beyond invertebrates, the selected species will also provide protective cover and food resources for a variety of birds and mammals, all year round.

PLANT SELECTION

Plants recommended for this practice were selected for the following criteria:

- Native species that are not present/abundant on the property to enhance plant diversity and support more wildlife;
- Native species with high value to pollinators and beneficial insects;
- Species that are regionally and ecologically appropriate and adapted to site conditions;
- A mix of tall and short native shrubs and trees to serve as a windbreak and privacy screen along the trail;
- Species that, once well established, will have drought resistance.




HEDGEROW/WINDBREAK PLANTING

Putnam Farm Conservation Area

Orleans, MA



Legend

 Trail Hedgerow (CPS 420)

HEDGEROW/WINDBREAK PLANTING (DRAFT PLANT LIST)

Trees and Shrubs

Common Name	Scientific Name	Height (ft)	Value and Purpose
White Oak	<i>Quercus alba</i>	60 to 100	Keystone species; larval host plant; acorns support birds and mammals
Red Oak	<i>Quercus rubra</i>	50 to 70	Larval host plant; acorns support birds and mammals
Cockspur Hawthorne	<i>Crataegus crus-galli</i>	15 to 25	Larval host plant; wildlife/pollinator value
Dwarf Chinkapin Oak	<i>Quercus prinoides</i>	12 to 25	Larval host plant; acorns support birds and mammals
Beach Plum	<i>Prunus maritima</i>	8 to 12	Fruit attractive to birds; wildlife/pollinator value
Bayberry	<i>Myrica pennsylvanicum</i>	5 to 10	Fruit attractive to birds; wildlife/pollinator value
Black Chokeberry	<i>Aronia melanocarpa</i>	3 to 10	Early flowering resource; wildlife/pollinator value
Virginia Rose	<i>Rosa virginiana</i>	4 to 6	Wildlife/pollinator value; pith stems for stem nesters
Dwarf Serviceberry	<i>Amelanchier spicata</i>	3 to 5	Early flowering resource; wildlife/pollinator value
Sweet Fern	<i>Comptonia peregrina</i>	2 to 5	Larval host plant
New Jersey Tea	<i>Ceanothus americanus</i>	2 to 3	Larval host plant; wildlife/pollinator value

Herbaceous (Wildflowers & Grasses)

Common Name	Scientific Name	Height (ft)	Value and Purpose
Wild Strawberry	<i>Fragaria virginiana</i>	0.3 to 0.75	Herbaceous flowering groundcover; supports specialist bee
Eastern Red Columbine	<i>Aquilegia canadensis</i>	2 to 3	Larval hostplant; wildlife/pollinator value; attractive to humminbirds
Hairy Beardtongue	<i>Penstemon hirsutus</i>	1 to 2	Herbaceous flowering groundcover; wildlife/pollinator value; attractive to hummingbirds
Narrowleaf Mountain Mint	<i>Pycnanthemum tenifolium</i>	2	Herbaceous flowering groundcover; wildlife/pollinator value
White Wood Aster	<i>Eurybia divaricata</i>	1 to 3	Herbaceous flowering groundcover; larval hostplant; wildlife/pollinator value
Bluestem Goldenrod	<i>Solidago caesia</i>	1 to 3	Herbaceous flowering groundcover; wildlife/pollinator value
Little Bluestem	<i>Schizachyrium scoparium</i>	2 to 4	Grass cover; larval host plant; seeds support songbirds; nesting and overwintering structure

Plant materials: Containerized plants (plugs, tubelings, saplings gallon pots, etc.) are recommended for hedgerow planting to achieve quick establishment and dense cover.

HEDGEROW/WINDBREAK PLANTING SPECIFICATIONS AND INSTALLATION

See above “Hedgerow Planting Specifications and Installation: Establishing Plants Using Plugs and Saplings” for more information on establishing plants using plugs and saplings (PAGE 12)

Planting Layout/Diagram

3. Space plants approximately 6’ apart, alternating woody and herbaceous plants. This will result in approximately 17 plants/100’ (linear).
4. For a 15 ft wide hedgerow, you can do approximately 3 rows of shrubs, spaced at 6 ft. Planting in a triangular pattern would result in approximately 51 shrubs for a planting that is 100 ft in length and 15 ft in width.

$$\sim 100 \text{ linear ft (15' width)} / 0.034 \text{ acre} = 27 \text{ shrubs}$$

Hedgerow Design Notes:

- It is recommended to plant clusters of the same species to provide continuous foraging opportunities for wildlife.
- The tallest plants should be centrally located in the hedgerow, and transition into smaller-statured plants. This creates a visually appealing gradual transition and unique microclimates and habitats that support a diversity of species.



RIPARIAN FOREST BUFFER PLANTS FOR POLLINATORS

OVERVIEW

Install native trees, shrubs, forbs, and grasses to create a quality riparian habitat adjacent to the salt marsh. The recommended species list provided in this plan includes options for a variety of flowering and fruiting trees, shrubs, and wildflowers that have high value to pollinators and other wildlife. Functional riparian zones are critical to maintaining the health of both terrestrial and aquatic habitats. Plants in the transitional zone not only provide high-quality habitat for species that occupy both areas, but they help bank stabilization, water filtration, and flooding prevention. Planting native trees, shrubs, forbs, and grasses in this area ensures optimal productivity and functionality for this habitat type.

PLANT SELECTION

Plants recommended for this practice were selected for the following criteria:

- Native species with high value to wildlife including pollinators and birds;
- Species that are regionally-and ecologically-appropriate and adapted to site conditions;
- Species that are commercially available;
- Species that exhibit some level of salt tolerance;
- A mixture of tree, shrub, forb, and grasses to mimic the natural riparian zone along a salt marsh



Photo Credit: New York Natural Heritage Program/Gregory J. Edinger

RIPARIAN FOREST BUFFER PLANTS FOR POLLINATORS



RIPARIAN FOREST BUFFER PLANTS FOR POLLINATORS - RECOMMENDED PLANT LIST

Plant Type	Common Name	Scientific Name	Salt Tolerance
Tree	Serviceberry	<i>Amelanchier canadensis</i>	High
Tree	Beach plum	<i>Prunus maritima</i>	High
Shrub	Black Elderberry	<i>Sambucus nigra ssp. Canadensis</i>	High
Shrub	Smooth Arrowwood	<i>Viburnum dentatum</i>	Moderate
Shrub	Red chokeberry	<i>Aronia arbutifolia</i>	Moderate
Shrub	Coastal Sweet Pepperbush	<i>Clethra alnifolia</i>	High
Shrub	Marsh Elder	<i>Iva frutescens</i>	High
Shrub	Common Rose Mallow	<i>Hibiscus moscheutos</i>	Moderate
Grass	Saltmarsh Rush	<i>Juncus gerardii</i>	High
Grass	Pennsylvania sedge	<i>Carex pensylvanica</i>	Moderate
Grass	Smooth Cordgrass	<i>Spartina alterniflora</i>	High
Herbaceous	New England Aster	<i>Aster novae-angliae</i>	Low to moderate
Herbaceous	Seaside goldenrod	<i>Solidago semperivens</i>	High
Herbaceous	Narrowleaf Mountainmint	<i>Pycnanthemum tenuifolium</i>	Low to Moderate
Herbaceous	Red Columbine	<i>Aquilegia canadensis</i>	Low
Herbaceous	Coastal Joe Pye Weed	<i>Eutrochium dubium</i>	Low to Moderate
Herbaceous	Dogbane	<i>Apocynum cannabinum</i>	Low

Plant materials: Containerized plants (plugs, tubelings, saplings gallon pots, etc.) are recommended for hedgerow planting to achieve quick establishment and dense cover.

RIPARIAN FOREST BUFFER SPECIFICATIONS AND INSTALLATION

See above “Hedgerow Planting Specifications and Installation: Establishing Plants Using Plugs and Saplings” for more information on establishing plants using plugs and saplings (PAGE 12)

UPLAND BUFFER PLANTS FOR POLLINATORS

OVERVIEW

Planting a high diversity mix of native perennial wildflowers upland of the restored wetland to provide habitat for terrestrial wildlife. Native wildflower meadows provide critical foraging and nesting habitat for wildlife, including beneficial insects like pollinators. Expanding the natural areas on this site will support a greater diversity of beneficial insect species on the farm and can improve ecosystem services like pollination and pest control.

PLANT SELECTION

Plants recommended for this practice were selected for the following criteria:

- Native species with high value to pollinators and beneficial insects;
- Species diversity to cover a successive bloom period;
- Species that are regionally-and ecologically-appropriate and adapted to site conditions;
- Species that, once well established, will have drought resistance;
- Species that are commercially available;



UPLAND BUFFER PLANTS FOR POLLINATORS

Putnam Farm Conservation Area

Orleans, MA



Legend

- Upland Planting (CPS 420)
- Wetland Planting (CPS 420)

UPLAND BUFFER PLANTS FOR POLLINATORS - PLANT LIST

Common Name	Scientific Name	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Red Columbine	<i>Aquilegia canadensis</i>	█							
Blue False Indigo	<i>Baptisia australis</i>	█							
Hairy Beardtongue	<i>Penstemon hirsutus</i>		█						
Ohio Spiderwort	<i>Tradescantia ohiensis</i>		█						
Butterfly Milkweed	<i>Asclepias tuberosa</i>			█					
Common Milkweed	<i>Asclepias syriaca</i>			█					
Small Yellow Wild Indigo	<i>Symphotrichum laeve</i>			█					
Common Yarrow	<i>Achillea millefolium</i>			█					
Narrowleaf Mountain Mint	<i>Pycnanthemum tenuifolium</i>			█					
Black-eyed Susan	<i>Rudbeckia hirta</i>			█					
Wild Bergamot	<i>Monarda fistulosa</i>				█				
Partridge Pea	<i>Chamaecrista fasciculata</i>				█				
Round-Headed Bushclover	<i>Lespedeza capitata</i>					█			
Smooth Blue Aster	<i>Symphotrichum ericoides</i>					█			
Showy Goldenrod	<i>Solidago speciosa</i>						█		

UPLAND BUFFER PLANTS FOR POLLINATORS - SEED MIX

Common Name	Scientific Name	% PLS	PLS seeds/ft2	lb PLS/ac	Bloom
Red Columbine	<i>Aquilegia canadensis</i>	4.0%	2.4	0.21	April-June
Blue False Indigo	<i>Baptisia australis</i>	1.0%	0.6	1.19	April-August
Hairy Beardtongue	<i>Penstemon hirsutus</i>	10.0%	6.0	0.07	May-June
Ohio Spiderwort	<i>Tradescantia ohiensis</i>	2.0%	1.2	0.41	May-July
Butterfly Milkweed	<i>Asclepias tuberosa</i>	2.0%	1.2	0.75	June-August
Common Milkweed	<i>Asclepias syriaca</i>	1.0%	0.6	0.37	June-August
Small Yellow Wild Indigo	<i>Baptisia tinctoria</i>	10.0%	6.0	0.26	June-August
Common Yarrow	<i>Achillea millefolium</i>	8.0%	4.8	0.07	June-September
Slender Mountain Mint	<i>Pycnanthemum tenuifolium</i>	12.0%	7.2	0.06	June-September
Black-Eyed Susan	<i>Rudbeckia hirta</i>	8.0%	4.8	0.13	June-October
Wild Bergamot	<i>Monarda fistulosa</i>	6.0%	3.6	0.12	July-September
Partridge Pea	<i>Chamaecrista fasciculata</i>	1.0%	0.6	0.40	July-September
Round-Headed Bushclover	<i>Lespedeza capitata</i>	4.0%	2.4	0.60	August-September
Smooth Blue Aster	<i>Symphotrichum ericoides</i>	2.0%	1.2	0.51	August-October
Showy Goldenrod	<i>Solidago speciosa</i>	9.0%	5.4	0.18	September-November
Purple Lovegrass	<i>Eragrostis spectabilis</i>	8.0%	4.8	0.21	Grass
Little Bluestem	<i>Schizachyrium scoparium</i>	12.0%	7.2	1.30	Grass
TOTALS:		100.0%	60	6.84	

PLANT MATERIALS:

Seed mixes that meet practice standards are provided. Seed must meet certification standards for purity, germination, weed seed, and noxious weed seed. Most seed companies advertise and sell wildflower seed in bulk pounds per acre. NRCS recommendations are in pure live seed (PLS). Make sure to specify PLS when ordering seed. Select plant materials from local or regional sources that are adapted to your ecoregion. If transplanting plugs or potted plants, focus on straight species and avoid cultivated varieties. Obtain quotes based on PLS before purchasing the seed mix. Seed companies may adjust specifications or recommend species substitutions on your quote based on inventory. Modifications to the mix or recommended alternative species must be approved. Wildflower seeds range in size and texture. Using equipment that can accommodate different seed types will result in better distribution across the planting area. Requesting seed be packaged separately by species (i.e., not pre-mixed) is recommended for broadcasting and drill seeding as similar seed can be sown in batches making it easier to calibrate seeders for consistent flow

REVISION NOTE: Collected seeds from local plant populations can be used for seeding as well. It is important to ensure seeds are native wildflower species collected from an authorized location in which the plants are not in a vulnerable condition. One example of a plant that can be locally collected and suitable for the upland planting would be Wild Lupine (*Lupinus perennis*).

UPLAND BUFFER PLANTS FOR POLLINATORS SEEDING SPECIFICATIONS AND INSTALLATION

Establishing wildflower habitat from seed includes four phases: (1) intensive site preparation and weed control; (2) seedbed preparation; (3) planting and follow-up management during establishment, and; (4) post-establishment maintenance.

Equipment and materials:

- Mower with adjustable blade height (must be able to adjust to at 10-12 in. height)
- Broadcast seeder (e.g., hand-held “belly-grinder” or tractor-mounted seed spinner)
- Cultipacker or walk-behind barrel roller
- Seed mix from certified seed company with seed tags (copies provided to NRCS)
- Inert carrier for broadcast seeding (cat litter, vermiculture, sand, etc.)

For all steps summarized below, see the Massachusetts Guidance document *Wildlife Habitat Planting (420), Site Preparation* in the appendix of this plan.

Step 1. Site Preparation

Establishing wildflower habitat from seed requires excellent site preparation. Site preparation is the most important, though often inadequately addressed, components of project success. It is also a process that requires more than one season of effort to reduce competition from invasive, noxious, or undesirable non-native plants such as persistent, cool-season pasture grasses prior to planting. Site preparation should focus on the eradication of invasive, persistent perennial broadleaf weeds and grasses. More effort and time spent eradicating undesirable vegetation prior to planting will result in higher success rates in establishing the targeted plant community.

The client would like to use organic practices. Site preparation using non-chemical methods will require at least one full growing season of intensive site preparation using mechanical methods. An integrated approach that combines more than one method may be more effective.

Caution! Site preparation activities should occur when soil is average to moist. Delay activities during drought or wet conditions.

Start in early spring early:

1. As soon as the field is accessible, mow existing vegetation to the ground.
2. Follow mowing with light, shallow disking.
3. In mid spring, conduct first treatment of shallow cultivation (disturbing only top 2 inches of soil) using a disk/tine harrow or sweep cultivator.
4. From June through September, repeat shallow cultivation each time vegetation regrowth reaches 4-6 inches to eliminate emerging seedlings and deplete the weed seed bank. Do not let weeds go to seed. Note: Shallow cultivation can be combined with smother cropping. See below for information on Organic Site Preparation for Wildflower Establishment Guidelines.
5. If adequate control of competition (weeds, sod-forming grass) is not achieved in one season, continue site preparation for an additional season (see reference image)

6. If adequate weed control is achieved, continue to seedbed preparation and fall dormant seeding planting steps (see reference image)



Site preparation timelines and checklists:

The planning schedules and checklist provided below are to help guide site preparation activities. There are two options included here option 1) repeated shallow cultivation and option 2) shallow cultivation combined with buckwheat smother cropping. These checklists are also included in Xerces’ *Organic Site Preparation for Wildflower Establishment Manual*. Full copies are provided in the appendix of this plan.

Available online at:

<https://xerces.org/publications/guidelines/organic-site-preparation-for-wildflower-establishment>

***Note:** See appendix hard copies of this document.

ORGANIC SITE
PREPARATION

Repeated Shallow Cultivation

STEP 1—Site Record (SAVE A COPY OF THIS TIMELINE & CHECKLIST FOR YOUR RECORDS)



SITE NAME: _____ START DATE: _____
 WEED PRESSURE BEFORE TREATMENT: _____ PRIMARY WEED SPECIES TARGETED: _____
 High Moderate Low

STEP 2—Repeated Shallow Cultivation Timeline & Checklist

This method is ideal for large areas with low weed pressure (e.g., former cropland) on farms where cultivation equipment is available.

RECOMMENDED TIMELINE	ACTIVITY	DATE COMPLETED
Early spring	STEP 1 As soon as the field is accessible, mow existing vegetation to the ground.	
	STEP 2 Follow mowing with a one-time treatment of deep cultivation before winter/spring annual weeds go to flower.	
Mid-May	STEP 3 First treatment of shallow cultivation (disturbing only top 2" of soil) using a disk/tine harrow or sweep cultivator.	
June	STEP 4 Repeat shallow cultivation, as needed.	
July	STEP 5 Repeat shallow cultivation, as needed.	
August	STEP 6 Repeat shallow cultivation, as needed.	
September	STEP 7 Repeat shallow cultivation, as needed.	
	STEP 8 <i>Optional:</i> Plant a nurse crop of oats (20 lb/ac) before September 15 th .	
November	STEP 9 Seed recommended pollinator mix into oats.	

Notes:

-  Timeline & checklist originally published in the Xerces Society guidelines, *Organic Site Preparation for Wildflower Establishment*.
-  Download additional copies of this timeline and other resources at: www.xerces.org/pollinator-habitat-installation-guides

***Note:** See appendix hard copies of this document.

ORGANIC SITE
PREPARATION

Buckwheat Smother Crop—East/Midwest

STEP 1—Site Record (SAVE A COPY OF THIS TIMELINE & CHECKLIST FOR YOUR RECORDS)

SITE NAME: _____ START DATE: _____
 WEED PRESSURE BEFORE TREATMENT: _____ PRIMARY WEED SPECIES TARGETED: _____
 High Moderate Low

STEP 2—Buckwheat Smother Crop Timeline & Checklist—East/Midwest

This timeline is ideal for larger areas of low to moderate weed pressure on farms in the East/Midwest where cultivation equipment is available, and farmers/operators are already experienced with successful cover cropping.

RECOMMENDED TIMELINE		ACTIVITY	DATE COMPLETED	
			YEAR 1	YEAR 2
Early spring	STEP 1	As soon as the field is accessible, mow existing vegetation to the ground. Then lightly cultivate project area (1–2" depth).		
Spring ¹	STEP 2	Repeated shallow cultivation (≤2" depth) to eliminate emerging weed seedlings and break up soil clumps.		
Mid–late spring	STEP 3	Assess weed pressure. Continue to eliminate germinating weed seedlings.		
Late spring (~mid-June)	STEP 4	A. Prepare seedbed. Lightly rake or harrow project area to remove all remaining vegetation, residue, or thatch, then immediately plant buckwheat.		
		B. Drill seed 50–60 lb/ac at 0.5–1" deep in 6–8" rows; or Broadcast seed at a minimum rate of 70 lb/ac. Use a drag/chain harrow to incorporate seed.		
		C. Irrigate seedbed after seeding until germination.		
Late spring ²	STEP 5	Assess for gaps in germination and re-seed bare spots as needed.		
Summer ³	STEP 6	Terminate buckwheat cover crop before seed set. Then immediately plant a second buckwheat crop.		
Early fall ⁴	STEP 7	Mow or incorporate cover crop. Leave residue on soil surface.		
Fall	STEP 8	A. For sites with: ♦ Low weed pressure →	GO TO STEP 9	
		♦ High to moderate weed pressure →	GO TO STEP 8B	
		B. Return to STEP 3 the following spring and repeat process for an additional growing season. Consider planting a winter cover crop.	GO BACK TO STEP 3	
Late fall	STEP 9	Remove all residue and expose soil. Plant a nurse crop of oats at 20 lb/ac before September 15 th . Seed recommended pollinator mix into oats.		

Step 2. Seedbed Preparation

Caution! Seedbed preparation activities should occur when soil is average to moist. Delay activities during drought or wet conditions.

Once adequate weed control is achieved (at least one season of site preparation, continue for an additional season if needed to successfully reduce competition from weeds and existing vegetation):

1. In late fall, before seeding is scheduled to occur, rake off all remaining plant clippings, debris, thatch to create a clean seedbed.
2. The soil surface can be lightly hand-raked or harrowed to break-up crusted surfaces, but do not cultivate the site after the site preparation phase (cultivation will bring up additional weed seed).
3. Roll area with a cultipacker or lawn barrel roller to lightly pack soil.

Step 3. Seeding and Establishment

Broadcast seeding is recommended for this site:

1. Seeding should occur in the dormant season after the first hard frost.
2. Mix seeds of similar sizes together in separate batches and bulk up seed with an inert carrier such as sand, fine-grained vermiculite, clay-based kitty litter, gypsum, or pelletized lime. Use a 3:1 ratio of inert carrier to seed by volume. Using inert carriers ensures even seed distribution, provides visual feedback on where seed has been thrown, and makes equipment calibration easier.
3. Use broadcast seeding equipment that has a flow gate that closes down small enough to provide a slow, steady flow of the smallest wildflower seed. Models with an internal agitator are preferred.
4. Fill with flow gates closed. Begin seeding with flow gates set to the narrowest opening to allow at least two perpendicular passes over the seed bed for even distribution. Very large seed should be seeded separately with the flow gate set to a wider opening.
5. Roll over seeded area with a water-filled turf grass roller (available for rent at most hardware stores) or a cultipacker to press the seed into the soil surface. Do not cover the seed with soil after planting.
6. After seeding, continue to Weed Control During Establishment (year 1 after planting) and Operations and Maintenance procedures per instructions below.

Weed control during establishment:

Weed control is critical in the first and second year after planting. Management practices must be adequate to control noxious and invasive species and may involve tools such as mowing, hoeing, flame-weeding, or hand removal. Weeds should be prevented from going to seed in, or adjacent to, the project area to help ensure long-term success. You will not see all the wildflower species in your mix bloom in the first year, as seedlings are putting most of their energy into underground root growth. During this time, it is essential to control weeds that can shade out and out-compete the desired wildflower and grass seedlings.

1. ***In the first year of establishment, whenever the canopy (overall vegetation) reaches a height of 12-18 inches, trim the meadow to a height of 8 inches.*** This will reduce competition by fast-growing weeds with slower-growing native wildflower seedlings. Note: A finishing lawn

mower is not recommended as the mower height will be too low. Adjust mowing time as needed to prevent weeds from going to seed.

2. Mowing should cease by mid-September, unless additional late-season mowing is needed to prevent weed seed production and dispersal.
3. Problem weeds can be removed by hand-pulling, string-trimming, flame-weeding or other preferred method.

Step 4. Post-Establishment Maintenance

Operations and maintenance:

The following actions shall be carried out to ensure that this practice functions as intended throughout its expected lifetime. Wildflower plantings will require ongoing maintenance to maintain plant health, diversity, and function.

- Maintenance measures must be adequate to control noxious weeds and other invasive species.
- Maintenance measures must be adequate to maintain floral diversity and abundance.
- After plants are established, the site will be mown in patches (mowing only 1/3 of the area each year) at a height of 8-10 inches to slow or stop growth of woody plants that may be encroaching on the site and encourage growth of wildflowers.
- Rotate areas being mown each year. Adjust rotation to address weed problems as needed.
- If wildlife habitat is a purpose, maintenance practices and activities shall not disturb cover during the reproductive period for the desired species. Exceptions should be considered for periodic burning or mowing when necessary to maintain the health of the plant community.
- Do not mow or burn during critical wildlife nesting season (once established).
- Occasional removal of thatch/mower clippings by raking or drag implements to expose understory will help plants reseed.

WETLAND PLANTS FOR POLLINATORS

OVERVIEW

The proposed area is currently being evaluated as a location to restore the condition of an existing wetland. While there are beneficial native wetland species within this area already, it is dominated by non-native woody cover that outcompetes beneficial native species. Removal of these invasive species and planting and seeding a mixture of native plant species within and around the wetland will help restore the condition of the land to provide habitat and resources for wildlife, as well as facilitate beneficial processes like water filtration, carbon sequestration, and flood mitigation. Selecting flowering wetland species will provide critical foraging habitat for pollinators and other wildlife. The addition of non-flowering native grasses will not only provide structure to the wetland but serve as critical nesting habitat for many species.

PLANT SELECTION

Plants recommended for this practice were selected for the following criteria:

- Native species with high value to pollinators and beneficial insects;
- Species diversity to cover a successive bloom period;
- Species that provide nesting habitat and cover for other target wildlife groups;
- Species that are regionally-and ecologically-appropriate and adapted to site conditions;
- Species that, once well established, will tolerate dry summer periods;
- Species that are commercially available;



WETLAND PLANTS FOR POLLINATORS

Putnam Farm Conservation Area

Orleans, MA



Legend

 Wetland Planting (CPS 420)

WETLAND PLANTS FOR POLLINATORS - PLANT LIST

Transitional Zone:

Herbaceous Cover (Seeding)

Plant Type	Common Name	Scientific Name
Forb	Golden Alexander	<i>Zizia aurea</i>
Forb	Common Wild Ginger	<i>Asarum canadense</i>
Forb	Ohio Spiderwort	<i>Tradescantia ohioensis</i>
Forb	Mountain Mint	<i>Pycnanthemum virginianum</i>
Forb	Slender Mountain Mint	<i>Pycnanthemum tenuifolium</i>
Forb	Showy Tick Trefoil	<i>Desmodium canadense</i>
Forb	Boneset	<i>Eupatorium perfoliatum</i>
Forb	Grass-Leaved Goldenrod	<i>Euthamia graminifolia</i>
Forb	Hollow Joe Pye Weed	<i>Eutrochium fistulosum</i>
Forb	Blue Vervain	<i>Verbena hastata</i>
Forb	Big-Leaved Aster	<i>Eurybia macrophylla</i>
Grass	Virginia Wild Rye	<i>Elymus virginicus</i>

Trees and Shrubs (Planting)

Plant Type	Common Name	Scientific Name
Tree	Pussy Willow*	<i>Salix discolor*</i>
Tree	Spicebush*	<i>Lindera benzoin*</i>
Shrub	Elderberry*	<i>Sambucus canadensis*</i>
Shrub	Winterberry Holly*	<i>Ilex verticillate*</i>
Shrub	Steeplebush	<i>Spiraea tomentosa</i>
Shrub	Sweet Pepperbush	<i>Clethra alnifolia</i>

Bank and Overbank Zone:

Herbaceous Cover (Planting)

Plant Type	Common Name	Scientific Name
Forb	Marsh Marigold	<i>Caltha palustris</i>
Forb	Northern Blue Flag	<i>Iris versicolor</i>
Forb	Swamp Milkweed	<i>Asclepias incarnata</i>
Forb	Cardinal Flower	<i>Lobelia cardinalis</i>
Forb	Swamp Aster	<i>Symphotrichum puniceum</i>
Sedge	Common Hop Sedge	<i>Carex lupulina</i>

Trees and Shrubs (Planting)

Plant Type	Common Name	Scientific Name
Tree	Res Osier Dogwood*	<i>Cornus sericea*</i>
Shrub	Buttonbush*	<i>Cephalanthus occidentalis*</i>
Shrub	Swamp Rose	<i>Rosa palustris</i>

*Species used for live staking efforts

Plant materials:

In the bank and overbank zone, containerized plants (plugs, tubelings, saplings gallon pots, etc.) are recommended to achieve quick establishment and dense cover to assist with bank stabilization for the newly constructed wetland. This recommendation applies for establishing both herbaceous cover and trees and shrubs. In the transition zone, it is more likely that seeding would be successful, so herbaceous cover can be established using seed.

Most trees and shrubs on the recommended plant list can be established using live stakes. Live stakes are cuttings from other established shrubs that are planted and can develop their own root systems to establish a new plant. This is a cost-effective solution to establishing beneficial native shrubs quickly and cheaply.

For more information on live staking see:

[Live Staking. How to Guide](#) produced by Penn State

[Introduction to Live Staking](#) published by Penn State

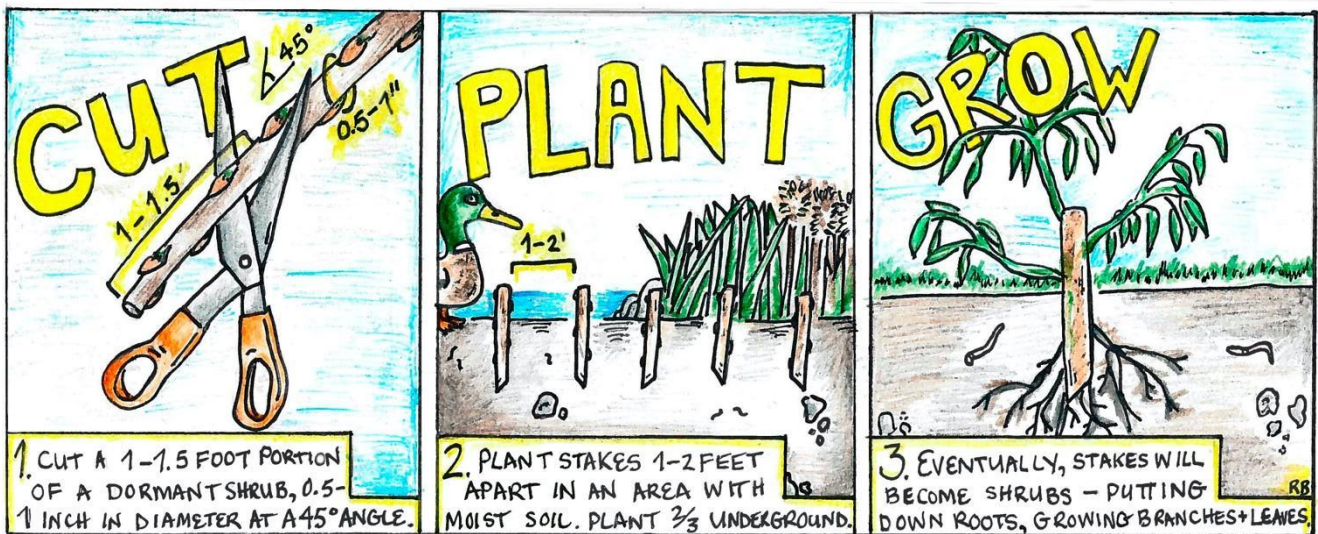


Illustration credit to [Nature Conservancy Canada](#)

OTHER OPPORTUNITIES

Bee City USA - A program that recognizes, supports, and encourages pollinator conservation in cities, towns, and counties.

- o [Commitments](#)
- o [Current Affiliates](#)
- o [Application](#)

Community Science Programs

- o [Bumble Bee Watch](#)
- o [Firefly Atlas](#)
- o [More Opportunities](#)

Plant/Pollinator Surveys, Monitoring

- o [Streamlined Bee Monitoring Protocol for Assessing Pollinator Habitat](#)
- o [Bumblebees of the Eastern United States](#)
- o [Bee Monitoring Tools](#)

ADDITIONAL RESOURCES

General Resources

Pollinator Conservation Resource Center - Webpage maintained by the Xerces Society for Invertebrate Conservation.

<http://www.xerces.org/pollinator-resource-center>

Pollinator Habitat Assessment Guide - Published by the Xerces Society for Invertebrate Conservation.

<https://www.xerces.org/publications/hags/pollinators-farms-and-agricultural-landscape>

Farming with Soil Life - Published by the Xerces Society for Invertebrate Conservation.

<https://xerces.org/publications/guidelines/farming-with-soil-life>

Buying Bee-Safe Plants - Published by the Xerces Society for Invertebrate Conservation.

<https://xerces.org/publications/fact-sheets/buying-bee-safe-plants>

Nesting Resources - Published by the Xerces Society for Invertebrate Conservation.

<https://www.xerces.org/pollinator-conservation/nesting-resources>

Seed Mix Calculator - Resource developed by the Xerces Society for Invertebrate Conservation.

http://www.xerces.org/sites/default/files/seed-mix-calculators/PLS-Seed-Mix-Calculator_2020.xls

Site Preparation and Maintenance Resources

Organic Site Preparation for Wildflower Establishment - Published by the Xerces Society for Invertebrate Conservation.

<https://xerces.org/publications/guidelines/organic-site-preparation-for-wildflower-establishment>

Establishing Pollinator Meadows from Seed - Published by the Xerces Society for Invertebrate Conservation.

<https://xerces.org/publications/guidelines/establishing-pollinator-meadows-from-seed>

Maintaining Diverse Stands of Wildflowers Planted for Pollinators - Published by the Xerces Society for Invertebrate Conservation.

<https://xerces.org/publications/guidelines/maintaining-diverse-stands-of-wildflowers-planted-pollinators>

Pest Management Resources

Farming for Pest Management - Published by the Xerces Society for Invertebrate Conservation.

<https://www.xerces.org/publications/brochures/farming-for-pest-management>

Habitat Planning for Beneficial Insects - Published by the Xerces Society for Invertebrate Conservation.

<https://xerces.org/publications/guidelines/habitat-planning-for-beneficial-insects>

REVISIONS (Sept. 7, 2023)

- Updated boundary of upland buffer to incorporate parking area; an additional location where the provided seed mix and site preparation methods can be applied (PAGE 8 & 25).
- Revision note on using transplants (PAGE 9).
- Updated hedgerow dimensions and shrub counts (PAGE 10).
- Added species to windbreak plant list to incorporate more shade-tolerant herbaceous cover options if using cedar transplants. Additional recommendation of tall-statured deciduous trees for layered privacy (PAGE 19).
- Added several species to the riparian forest buffer and wetland plant list that were noted as desirable for the site. The species that were added are compatible with the conservation goals and site conditions (PAGE 23 & 37).
- Revision note on using collected seed (PAGE 28).