Farming for Biodiversity
at Island Grown Farm

TOOLKIT OF SCALABLE + REPLICABLE
FARMSCAPE HABITAT DESIGNS
TO SUPPORT POLLINATION SYSTEMS
AT RISK ON MARTHA'S VINEYARD

EVAN ABRAMSON

a project of

LANDSCAPE|NTERACTIONS

ISLAND GROWN INITIATIVE

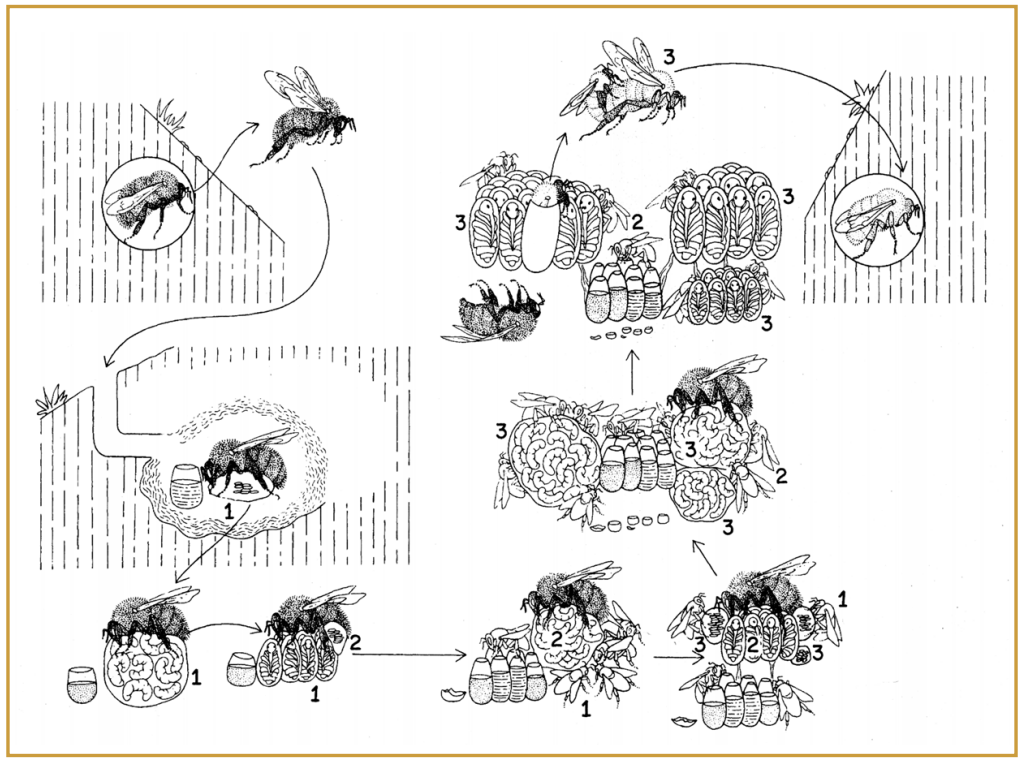


Diagram of a bumblebee colony cycle. From Bumblebee Economics by Bernd Heinrich (1979). Illustration by Celeste Green and Phyllis Thompson.

WHAT IS A TOOLKIT?

Replicable landscape designs and habitat management strategies based on common landscape scenarios and specific selections and arrangements of plants.

The Toolkit on the following pages was designed by Evan Abramson, Principal at Landscape Interactions, based on decades of scientific study by Robert Gegear of UMass-Dartmouth and the Beecology Project, Matt Pelikan of BiodiversityWorks and Paul Goldstein of the USDA National Museum of Natural History. The designs, plant lists and landscape management guidelines published here have been developed specifically to support native bee, butterfly and flower-visiting moth species that are of the greatest conservation priority on Martha's Vineyard, and represent common landscape typologies found on working farms both on and off-island.

WHAT MAKES THESE DESIGNS DIFFERENT?

Most pollinator plantings have focused on overall abundance – "seeing lots of bees" — rather than on the wide range of wild pollinators found in a biodiverse and resilient ecosystem. The same problem arises from habitats planted with generic pollinator seed packets or non-native plants. While we see lots of flowers, those flowers are often providing resources for only a few common species of pollinators, or species whose populations are stable, and don't satisfy the full pollen, nectar and nesting/host requirements of a functionally diverse ecosystem.

HOW SHOULD THIS TOOLKIT BE USED?

The varied design areas in this Toolkit were selected because they represent common landscape "situations" on working vegetable, fruit and livestock farms. It is our hope and intention for them to be replicated on farms and on properties across Martha's Vineyard, as well as the coastal Northeast. The designs were created to increase biodiversity and climate resiliency by attracting and sustaining the widest possible range of pollinator species, and in particular, species of the greatest conservation priority – in other words, species whose populations have been declining significantly in recent decades. Each design area targets a particular type of land use or ecological condition: the plant arrangements and lists can therefore be applied to any similar landscape. By replicating this Toolkit across Martha's Vineyard as well as neighboring counties and states, the building blocks for a regional pollinator corridor will be established, and hopefully, many of these at-risk species will not only be attracted to our landscapes, but sustained.

Above: Hemaris gracilis (Slender Clearwing Moth) foraging for nectar. A species of Special Concern in Massachusetts as well as a Threatened species in Connecticut, it is still found in Martha's Vineyard as well as sandplain environments in southeast Massachusetts and Franklin County. Photograph by Sylvain Bédard. Below: Section of the hedgerow design facing northeast. Refer to pages 17-19 for the complete hedgerow design and plant list.

Plants Matter

A truly "pollinator-friendly" landscape is highly diverse in both plant and animal species composition and includes a wide range of native plant types, ensuring that pollen and nectar are available throughout the growing season; and that nesting habitat and host plants are available throughout the year. The focus of this Toolkit is to provide the recommended plants and landscape management strategies to support native pollinator species that are at the highest risk of local extinction on Martha's Vineyard. The loss of these pollinator-plant interactions, or pollination systems, can have catastrophic consequences on the biodiversity of the island, the state, and the region as a whole. But it's not too late to start planting.

Female blueberry cellophane bee (Colletes validus) excavating a nest near host blueberry plants in Falmouth, MA. While still found on Martha's Vineyard (Goldstein and Ascher 2016), this species is in decline across the Northeast United States (Bartomeus et al. 2013). Photograph by Dorianscale3.

Why Pollinators?

Native pollinators are vital to creating and maintaining the habitats and ecosystems that most animals rely on for food and shelter — including humans. What happens (or doesn't happen) at the pollination scale has repercussions all the way through the food web. Over 80% of the flowering plants on Earth depend upon insect-mediated pollination; bees alone pollinate one-third of the food grown in the United States, and nearly half the crops grown in Massachusetts. In a global study of more than 40 crops in 600 fields across every populated continent, scientists found that wild pollinators were twice as effective as honeybees in producing seeds and fruit (Garibaldi et al. 2013). In the United States, wild bee pollination services were estimated to be worth $3.07 billion in 2006 (Losey & Vaughan 2006). This estimate is a conservative approximation of wild bee pollination's contemporary value, considering the increase in pollinator-dependent crop plants over the past decade (Russo et al. 2013; Mathiasson & Rehan 2020).

As **keystone species**, wild pollinators provide food, shelter and nest sites to wildlife at other trophic levels through their interactions with native flowering plants. Protecting a diversity of native pollination systems is therefore critical for maintaining healthy and diverse ecosystems. Pollination systems include bees, butterflies and moths, birds, beetles and flies, and represent over 80% of plant species worldwide.

Just like humans, pollinators need nutrient-dense food, shelter, and successful reproduction to thrive. But not all species require the same thing. A delicate balance exists between native plants and their pollinators, relationships that evolved over millions of years. Some plants have a small guild of species which coevolved with them to ensure their pollination. Similarly, approximately 15% of northeastern native bee species are considered pollen specialists (Fowler 2016). For many specialists, once their "partner" is missing from the landscape, they cannot reproduce – and thus risk becoming extirpated, endangered (and eventually, extinct).

A major misconception about pollinator decline is that all species are declining at the same rate. In fact, many species are actually *increasing* in abundance and geographic distribution as a direct result of human disturbance. "Seeing lots of bees" does not necessarily mean that your landscape is pollinator-friendly. Unfortunately, most efforts to restore pollination systems to date have resulted in increasing the numbers of a few common bee, butterfly and moth species, rather than on the range of wild pollinator species needed for ecosystem health and resiliency.



Above (left to right): Gleaners clear the field at Island Grown Farm following the commercial vegetable harvest. IGI shares gleaned food with schools, senior centers and community support programs including the Island Food Pantry and the Wampanoag Safe Harbors Program. Aerial view of the no-till vegetable fields at Island Grown Farm. Education Director Emily Armstrong plants with a visiting school group in IGI's community garden. All photographs courtesy Randi Baird and Island Grown Initiative.

Project Context

The Island Grown Farm is a 42-acre farm located in the center of the island of Martha's Vineyard. IGI was gifted this farm in 2012, and we are committed to restoring soil health and biodiversity on the land while producing abundant healthy, delicious food for our community.

This island is the home of the Wampanoag people, who have been here for many thousands of years and who are still here today. In considering the farm's past, it is important to recognize that the vast majority of the land care and food production history of this farmland and this island have been in the hands of the Wampanoag people, who developed complex systems to support a flourishing environment, bountiful food, and a thriving human community.

As we seek to implement a regenerative land care ethic now on this farm, we recognize that we are looking to restore some of the vibrancy that was created by many, many generations of skilled, attentive, and successful Wampanoag land stewards. Regenerative practices are not new or novel or recently invented — they are a current manifestation that seeks to learn from the traditional way of approaching food production and relationship to land, water, and place that was honed by the Wampanoag people.

—Noli Taylor, Senior Director of Programs, Island Grown Initiative

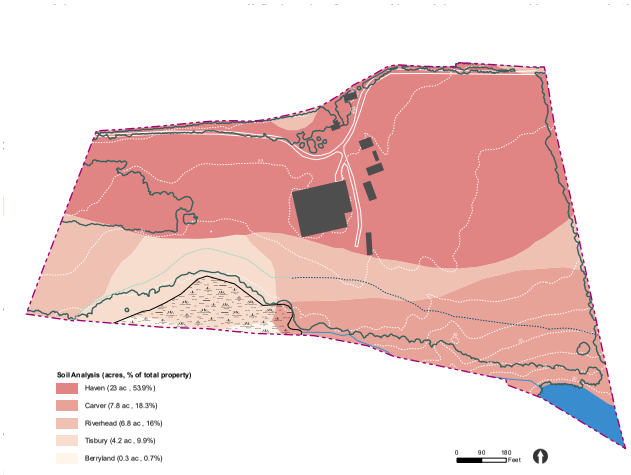
In the fall of 2021, Evan Abramson of Landscape Interactions was contracted by IGI to create a series of design and habitat management strategies at Island Grown Farm to support pollinator species at risk, and serve as a model for other farms on Martha's Vineyard as well as the greater island community. By demonstrating a range of design interventions and approaches to landscape conversion, the vision is for IGI Farm to serve as a standard for biodiverse, climate resilient design and land management across the region.

During an initial site visit in September of that year, it was observed that the vast majority of the farm is comprised of non-native vegetation. Annual vegetable crops dominate the open fields, in combination with cool season grasses, common agricultural weeds and clover. A small planted orchard has been installed in the southeastern portion of the farm, which in reality is a sandplain grassland suppressed by non-native grasses and forbs. While native vegetation in this area consists of less than 30% of the land cover, notable native plant species found in this area include Rosa virginiana (Virginia rose), Symphyotrichum ericoides (heath aster), Eurybia spectabilis (showy aster), Ionactis linariifolia (stiff aster), Asclepias tuberosa (butterfly weed), Solidago juncea (early goldenrod), Asclepias syriaca (common milkweed), Solidago nemoralis (gray goldenrod), Eragrostis spectabilis (purple love grass), Schizachyrium scoparium (little bluestem), Andropogon virginicus (broomsedge bluestem), Achillea millefolia (common yarrow), Pityopsis falcata (golden sickle leaf aster), Baptisia tinctoria (yellow wild indigo), Rhus copallinum (winged sumac), Lespedeza capitata (round-headed bush-clover) and Eupatorium hyssopifolium (hyssop-leaf boneset).

While the orchard contains a few rows of woody perennial flowering vegetation in the form of cultivated Morus sp. (mulberry), Castanea sp. (chestnut), Prunus tomentosa (Nanking cherry), Aronia sp. (hybridized black chokeberry) as well as native Prunus maritima (beach plum), and a small section of cultivated blueberries also exists, nearly 90% of the farm's open fields are characterized by herbaceous, non-native vegetation, thus providing very limited foraging opportunities for native pollinators, particularly in the early portion of the growing season, when pollen is crucial to the reproduction of many species of native bees.

The areas of the farm with the richest habitat consist of forested margins and, in particular, a forested wetland and perennial stream corridor in the southernmost portion of the site. This diverse area is connected to a kettle pond and a heathland located just across the property line, on the Little Duarte's Pond Preserve owned by the Land Bank, where Quercus ilicifolia (scrub oak), Carex pensylvanica (Pennsylvania sedge), Baptisia tinctoria (yellow wild indigo), Lespedeza hirta (hairy bush-clover), Eupatorium hyssopifolium (hyssop-leaf boneset), Arctostaphylos uva-ursi (bearberry), Schizachyrium scoparium (little bluestem), Juniperus virginiana (eastern red cedar), Hudsonia ericoides (pine-barren false heather), Pinus rigida (pitch pine) and Deschampsia flexuosa (wavy hair grass) are encountered.

An emergent wet meadow is found along the fenceline southwest of the greenhouse, where Prunella vulgaris (common selfheal) and Eutrochium dubium (coastal plain Joe-pye weed) are growing among non-native grasses and weeds adjacent to an area seeded with grains for seasonal sheep grazing. Moving west, typical non-native species continue, with some remnants of native grassland habitat found in limited populations of Solidago juncea (early goldenrod), Solidago sp. (likely S. rugosa ssp. aspera), Asclepias syriaca (common milkweed) and Asclepias tuberosa (butterfly weed).



Various ecological site analyses were conducted for Island Grown Farm in order to better inform the design process. Nearly the entire property is listed by MassWildlife's Natural Heritage and Endangered Species Program (NHESP) as BioMap2 Core Habitat (right), likely due in large part to the farm's proximity to several intact natural areas, including the Manuel F. Correllus State Forest (bottom right). The dominant soil types on the farm are Haven very fine sandy loam, Carver loamy coarse sand and Riverhead sandy loam, which together comprise over 88% of the property (left). These three soils are representative of much of the farmland on the island: all are among the five most common soil types on Martha's Vineyard, with Carver covering nearly 34% of the island.

After walking the site for two days with IGI's Regenerative Landscape Manager Mary Sage Napolitan, Senior Director of Programs Noli Taylor and Education Director Emily Armstrong, as well as meeting on site with Senior Director of Island Grown Farm Matthew Dix, Regenerative Agriculture Consultant Andrew Woodruff and Field Manager Tim Connelly, it was determined that the best approach for improving and expanding the biodiversity and resilience of the farm would be multifaceted, responsive to the unique ecological and social conditions of the site and sensitive to the many constraints that define a working landscape.

First, numerous narrow stretches of land that criss-crossed the farm upon existing tractor roads and footpaths were identified to be redundant, and it was agreed that these could be converted into permanent hedgerows and field borders comprised of a mix of woody and herbaceous perennial vegetation, including early season pollen sources, host plants and native warm season grasses and forbs. Second, several marginal or unproductive portions of field would be turned over to permanent grassland/meadow installations, including the emergent wet meadow area along the southern fenceline which was consistently difficult to access with equipment. Third, the lower, less productive half of the orchard, which was already partially comprised of native sandplain grassland vegetation, would be restored into an oak savannah community, with the remaining fruit and nut trees transplanted to the western, more successful portion of the existing orchard site. Fourth, the understory areas in between existing orchard tree plantings would be filled in with shade tolerant native shrubs and forbs. Fifth, in addition to the various custom seed mixes which would be created for the diverse grassland/meadow and oak savannah areas, a graze-tolerant seed mix would be created for livestock so that permanent grazing areas on the farm could be established, comprised entirely of native vegetation.

Most importantly, all proposed habitat areas would be mapped out in draft form and reviewed by the farmers and land managers before any final decisions were to take place. The habitat areas would be phased in over a 3+ year process developed in coordination with Mary Sage Napolitan, who would be responsible for the implementation and maintenance of these areas on the farmscape for the foreseeable future.

Land Use
Threatens Biodiversity

Insects are the cornerstone of all terrestrial ecosystems — as pollinators, food for other creatures, and recyclers of nutrients. Without them, a bottom-up trophic cascade occurs: in essence, a domino effect that surges up through the food chain, wiping out higher animals (Carrington 2019a). Forty percent of the one million known species of insect are presently facing extinction (Carrington 2019b), including over half of the native bee species in North America (Marshman & Knezevic 2021). At the current rate of decline, most insect species on the planet could vanish within less than a century (Sánchez-Bayo, et al.; Carrington 2019c). Habitat loss and widespread pesticide use — in particular through industrial agriculture — are understood to be the main drivers of the declines, in addition to climate change.

By some measures, the biodiversity crisis is even more serious than that of climate change. Since the dawn of civilization, humanity has caused the loss of 83% of all wild mammals. In the last 50 years alone, the populations of all mammals, birds, reptiles and fish on the planet have fallen by an average of 60%. In a study published in late 2019, it was reported that in North America over 1 in 4 birds, or 3 billion birds, have disappeared since 1970 (Rosenberg et al. 2019). Habitat loss was again cited as the most direct cause.

Connected, diverse and extensive ecosystems can help stabilize the climate and will have a better chance of thriving in a world permanently altered by rising emissions (Pettorelli et al. 2021). One of the most important components of any healthy and viable ecosystem is diversity. Diversity is strongly linked to the resilience of natural communities (Helzer 2010). A diverse combination of plant and animal species in a community increases the likelihood that the loss of one species can be somewhat compensated by other species that might play a similar role in the ecosystem. **Ecological resilience may be the most important attribute for any natural system, especially in the face of rapid climate change, continuing loss and degradation of habitat, encroaching invasive species and other threats** (Helzer 2017).

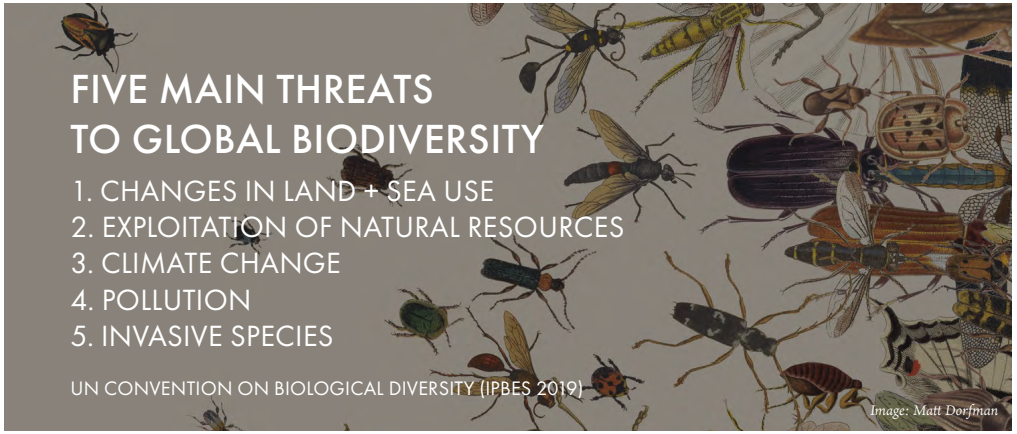
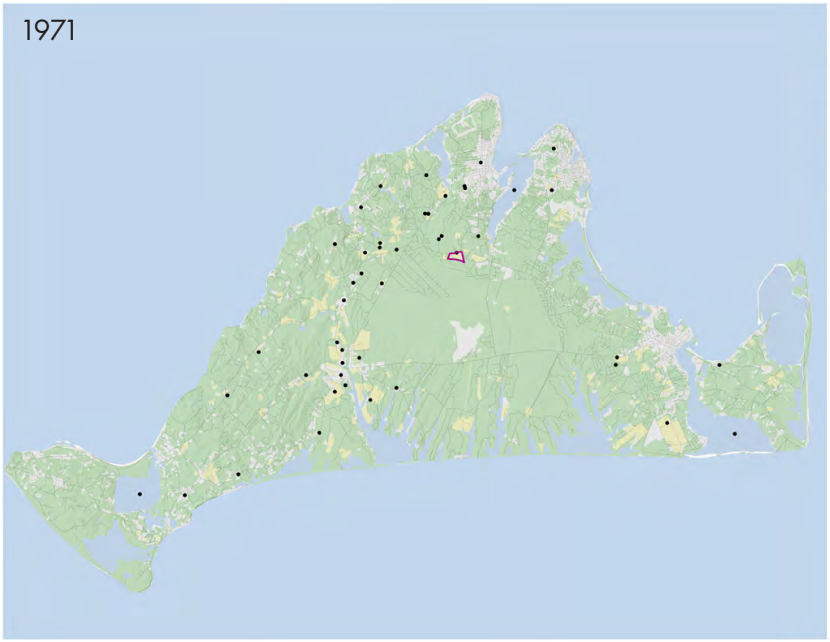
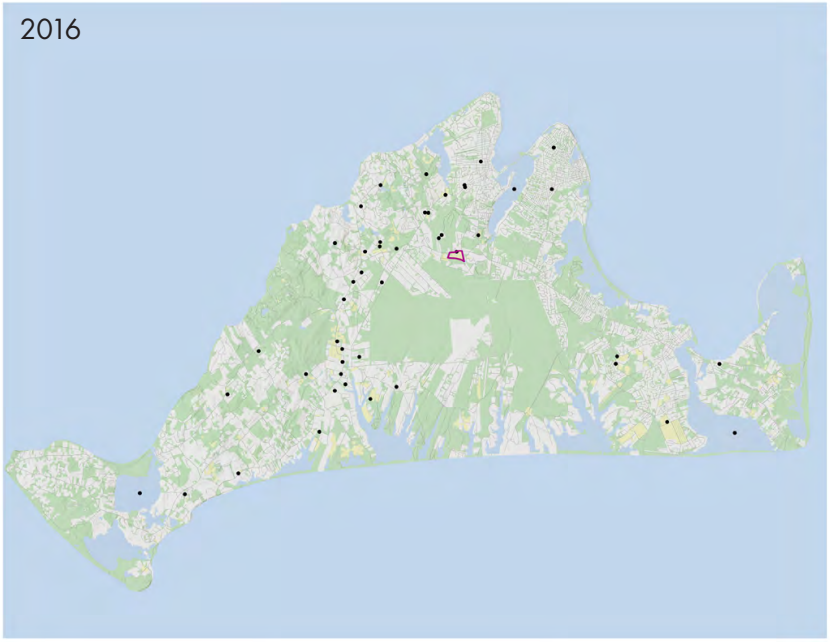


Image: Matt Dorfman





Right: Between 1971 and 2016, developed land on Martha's Vineyard nearly quadrupled from 11 to 40% of the island's total area. During the same period, agricultural land use shrank from 4 to 2%. Data obtained from MassGIS Land Use datasets (1971, 2016) and MassGIS Openspace by Ownership. 1971 data categorized by LU-21 Land Use Code system; 2016 data categorized by combining General Use Codes with Land Cover Codes and excluding permanently protected land or agricultural land from developed category.

Above (left to right): Regenerative Landscape Manager Mary Sage Napolitan checks on native plant seedlings that overwintered in the unheated portion of Island Grown Farm's greenhouse. Working off the plant list in this Toolkit, she has been collecting seeds from wild populations of native plants on Martha's Vineyard along with a core group of volunteers. IGI hopes to eventually grow most of the plants they need for future phases of the Farming for Biodiversity installation. Below: working farms, and in particular those with organic practices, are very well suited to the incorporation of native plants into active production areas as well as marginal spaces. This rendering shows the wide range of opportunities that working farms present, including orchards and pick-your-own fruit comprised of native pollen, nectar and host plants.

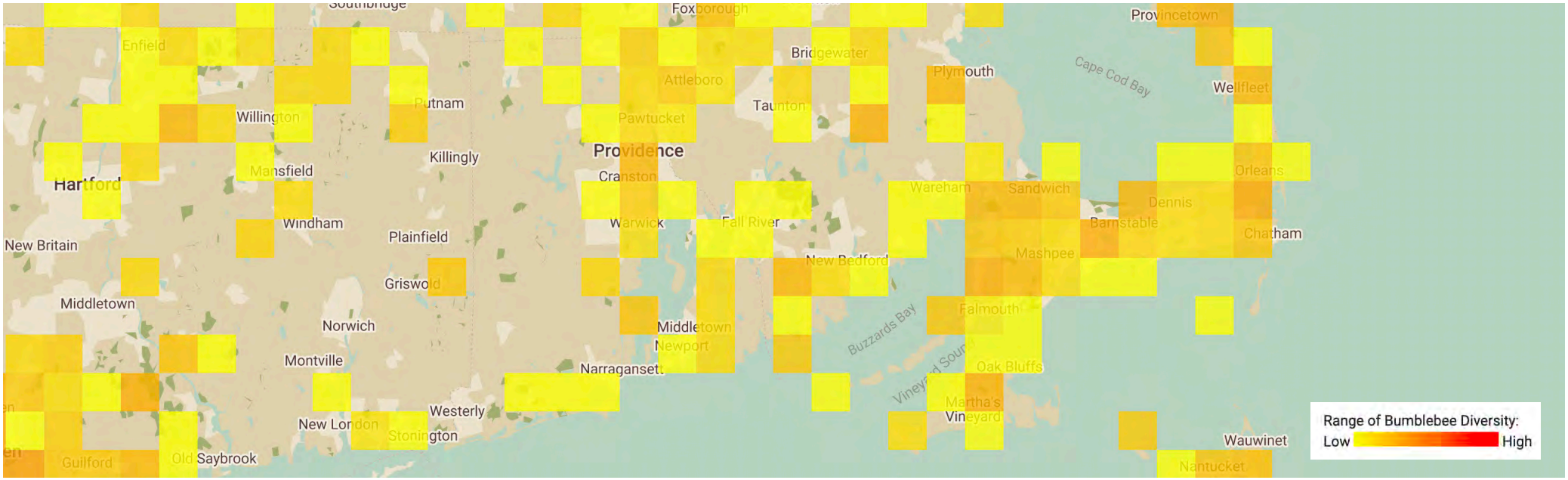
Native Plant Agriculture

Working farms provide a wealth of opportunities for expanding regional biodiversity, climate change resilience, ecological health and food security through the implementation of native pollination systems. While landscape conversion to intensive agriculture is understood to be the main driver of insect declines globally (Sánchez-Bayo, et al. 2019), diversified organic farms often provide refugia for a wide range of wildlife, including pollinator species. Yet if the majority of a farm's landscape consists of annual crops and fields are regularly plowed or otherwise disturbed (even by no-till practices such as tarping), limited opportunities may exist for manypollinator species to meet their life cycle requirements, especially species at risk whose habitat needs are often more specialized.

WHAT DOES REGENERATIVE MEAN?

"Regenerative agriculture takes a more systems-based, holistic look at the land being stewarded and applies various principles with the goal of making the land more productive and biodiverse over time. In most situations, improving soil health and function is the key to improving productivity and biodiversity." (Kiss the Ground 2022). While it is clear that soil health is important, particularly with regards to the productivity of food systems, biodiversity is difficult to achieve if significant portions of the farmscape are not allocated to uses other than human. Wild spaces on or adjacent to productive lands, untouched by pesticides and not managed for food production, are critical for wildlife survival. On Martha's Vineyard, this might look like a combination of open meadows, fallow fields, hedgerows, forest edges, riparian areas, heathland, field borders or other forms of edge habitat; all comprised primarily of functionally diverse, native plant communities.

Soil health, improved water retention, beneficial insect populations, increased carbon sequestration and full crop pollination services are all byproducts of natural habitat areas (Yang et al. 2019; Kremen et al. 2002). But in order for a farm to truly be biodiverse — and thus, regenerative by definition — intentional planting and management of areas for a diversity of native pollinator-plant interactions is vital.



Above: portion of map depicting 10,115 observations of bumblebees in New England based on range of species diversity, 1864-2022. Courtesy the Beecology Project. Below: Dr. Gegear surveying bumblebee foraging behavior in the field. Photograph by Christine Peterson/Worcester Telegram.

Science Informs Design

Pollinators have experienced dramatic declines in recent decades, particularly since the year 2000. In comparing historical to contemporary records for the Northeast, over 100 native bee species are found to be declining across the region (Bartomeus et al. 2013; Mathiasson & Rehan 2019) including three bumblebee species in Massachusetts, with two more bumblebee species already extirpated from the state (Gegear 2018). The consensus among scientists is that these declines are being driven primarily by a combination of land development, pesticide use and climate change.

While the subject of pollinator decline is understood by many to be highly significant, few pollinator habitat projects target the range of species at risk in a given geographic area. This is ironic since it is due to the decline of so many pollinator species that we are aware of the pollinator crisis in the first place. **Shouldn't pollinator habitat projects target species that merit conservation, rather than common species with stable populations?**

The plants featured in this Toolkit were selected specifically to support native bees, butterflies and moths at the greatest risk of local extinction on Martha's Vineyard. In many cases, this means species that are rapidly disappearing from areas across the Northeast, but are still found on Martha's Vineyard (Bartomeus et al. 2013; Goldstein & Ascher 2016); in other cases, it means species that have only been found on Martha's Vineyard and neighboring islands, and are in decline; for some, their only known regional records are from Martha's Vineyard (Goldstein et al. 2018).

The Massachusetts off-shore islands have a well-documented insect diversity (Goldstein & Ascher 2016), with Martha's Vineyard supporting one of the highest concentrations of regionally unique or threatened Lepidopteran occurrences in the Northeast (Goldstein et al. 2018). Regarding bees, compared to other regional islands, Martha's Vineyard's fauna is more species-rich and includes a diverse assemblage of sand-nesting specialists and pollen specialists with broader botanical associations (Goldstein & Ascher 2016).

Due to a combination of its geological history, location and land use, Martha's Vineyard serves as a refugia for many threatened insects and natural communities otherwise in decline regionally (Dean 2000; Goldstein & Ascher 2016). Ecologically, more than 40 terrestrial, palustrine, and estuarine communities are represented on Martha's Vineyard, including a mosaic of natural communities, some considered globally rare: sandplain and cultural grasslands, coastal heathlands, sandplain maritime and scrub oak shrublands, mixed oak and oak-hickory forest, as well as pitch pine-scrub oak barrens, of which Martha's Vineyard supports one of the most extensive and intact concentrations in New England (Goldstein & Ascher 2016).

SHOULDN'T POLLINATOR HABITAT PROJECTS TARGET SPECIES THAT MERIT CONSERVATION, RATHER THAN COMMON SPECIES WITH STABLE POPULATIONS?

We are greatly indebted to Dr. Paul Goldstein of the National Museum of Natural History for generously taking the time to speak with us at length about his work surveying moths as well as bees on Martha's Vineyard, for a combined period of nearly four decades. For the purposes of this report, from a list of over 100 at-risk moth species presently found on the island (Goldstein et al. 2018), we have reduced the number to 16 known flower-visiting (and thus pollinating) species. While certainly highly valuable to regional biodiversity and the food web, not all moths are pollinators, and therefore do not fit within the conservation goals of this project.

For bumblebees, our target species list comes from Dr. Robert Gegear's ongoing research, both through his lab at UMass-Dartmouth as well as the Beecology Project that he directs. Dr. Gegear has been studying the ecology, evolution and conservation of pollination systems native to eastern North America for over 25 years, as well as the pollen, nectar and nesting preferences of at-risk bumblebees in Massachusetts for over seven years.

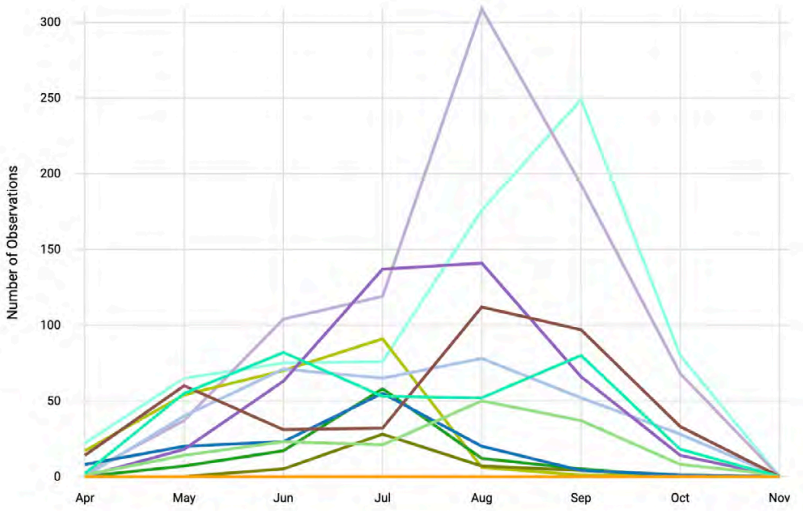
For other native bees, Bartomeus et al.'s 2013 publication *Historical changes in northeastern US bee pollinators related to shared ecological traits* as well as Mathiasson and Rehan's *Status changes in the wild bees of northeastern North America over 125 years revealed through museum specimens* (2019) were compared to Goldstein and Ascher's *Taxonomic and Behavioral Composition of an Island Fauna: A Survey of Bees* (2016) in order to determine which Northeast species in decline were still present on Martha's Vineyard. Notably, in a 2022 study of island farms by Matt Pelikan of BiodiversityWorks, six of these bee species were found at participating farms, including two which were found at Island Grown Farm.

The list of at-risk butterfly species in this report was compiled by Matt Pelikan. We asked Matt to include all butterflies that he has observed to be declining over the course of two decades plus surveying and photographing them on the island, including his contributions to annual Massachusetts Butterfly Club and NABA (North American Butterfly Association) counts. Matt also provided recommendations for host plants as well as nectar plants thought to be of high value to his list of at-risk butterfly species. We are greatly beholden to Matt for all of his support.

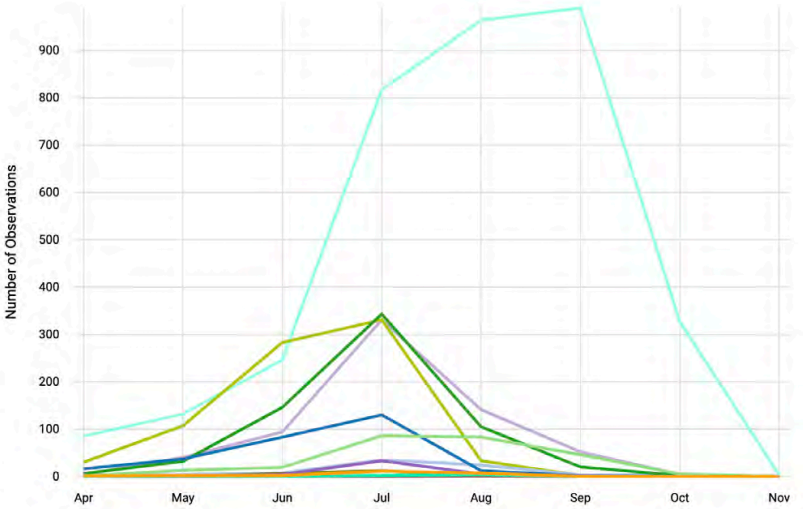
The plant and habitat recommendations in this Toolkit are a product of Dr. Gegear's ongoing research on bumblebee foraging and nesting behavior; Matt Pelikan's butterfly observations; Paul Goldstein's meticulous moth studies; Theodore Mitchell's seminal two volume set *The Bees of the Eastern United States* (1960, 1962); and Robertson's *Flowers and insects: lists of visitors to four hundred and fifty-three flowers* (1929).

Using the **Beecology** app that Dr. Gegear has created, citizen scientists can contribute bumblebee and butterfly observations at Island Grown Farm, as well as throughout the island, by uploading videos of bumblebees and butterflies on plants. Dr. Gegear and members of his lab verify every species ID before they are added to the database. To become a Beecologist you can get started at: https://beecology.wpi.edu/website/participate#apps

BUMBLEBEE OBSERVATIONS IN SOUTHERN AND CENTRAL NEW ENGLAND BY MONTH (1864-1999)



BUMBLEBEE OBSERVATIONS IN SOUTHERN AND CENTRAL NEW ENGLAND BY MONTH (2000-2022)



Historical data from Yale Peabody Museum, contemporary data from Dr. Robert Gegear. Between 1864 and 1999 there were 3,739 observations recorded; between 2000 and 2022, 6,376 observations were recorded. Data visualization courtesy the Beecology Project.

Design
Overview
ISLAND GROWN FARM

Island Grown Farm has been divided into eight scalable and replicable habitat types. Each represents a distinct landscape typology commonly found on working farms on Martha's Vineyard. For each habitat type, a selection of plants and/or seed mixes have been designed, appropriate for the ecological conditions of the site as well as the aesthetics and constraints of the particular space, its present land use on the farm, and the surrounding landscape.

1 FIELD BORDERS

Running north to south as well as east to west along field edges, narrow roadsides and walking paths across the farm, 5-6' wide field borders improve water infiltration and nutrient flow of soils and sub-soils with deep-rooted native graminoids and flowers; expand biodiversity, improve crop pollination, and reduce pest pressure by attracting and sustaining a wide range of native bee, butterfly and moth species as well as beneficial insects throughout the growing season.

2 HEDGEROWS

Running east to west along existing tractor roads throughout the farm, 10-12' wide hedgerows are comprised of compact trees and shrubs, herbaceous forbs, bunching grasses and mow-tolerant groundcovers. By providing diverse horizontal and vertical structure, wind is slowed, bird habitat is created, and pollinator life across the farmscape is greatly expanded through the addition of numerous early season pollen sources and host plants.

3 WET MEADOW

Biodiversity on the farmscape is greatly expanded by adding a whole suite of wetland plants that would otherwise be difficult to establish on site, as other areas of the farm are much drier. This wetland buffer area will be restored to a native wet meadow environment through a combination of tarping, direct seeding and planting.

4 GRAZING AREAS

Two marginal areas on the farm have been identified for conversion to permanent grazing lands for sheep. As a future phase of the project, they will be tarped and seeded with mixes comprised entirely of native warm season grasses and forbs suitable for forage, all of which are host plants, pollen and nectar sources.

5 ORCHARD

Existing fruit and nut trees will be interplanted with native understory vegetation on contour, creating a corridor that connects a restored oak savannah to the farm's main artery. Wide paths allow animals to graze between rows, which provide much needed shade.

6 OAK SAVANNAH

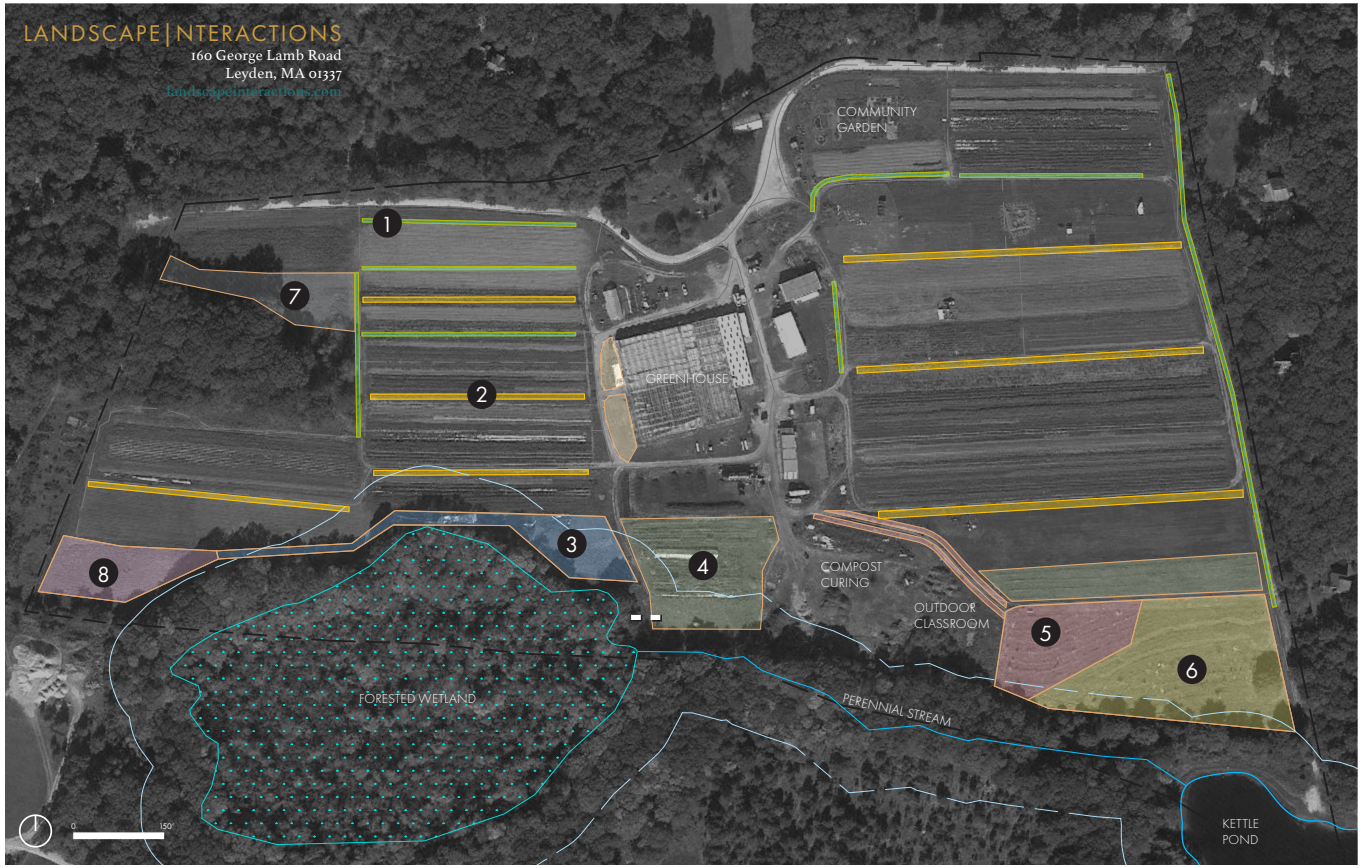
Characterized by excessively well-draining soils, this sandplain grassland remnant is converting back into a native landscape on its own. It will be helped along by removing non-native grasses, invasives and weeds through a combination of hand pulling and tarping; filling in the gaps that are created with a diverse seed mix of sandplain grassland species, as well as widely spaced plantings of trees and heathland shrubs.

7 WOODLAND EDGE

North of a forested section of the farm, this marginal area is not often utilized for production due to the fact that it is shaded. This offers the opportunity to create a unique habitat feature. After tarping to remove the predominantly non-native vegetation, this area will be seeded with a shade-tolerant mix and planted with a structurally diverse combination of shade-tolerant shrubs, sedges, flowers and a redbud tree.

8 MESIC MEADOW

This fallow field corner, dominated by about 70% non-native grasses, invasives and weeds, is significantly drier than the wet meadow area to the east. It will be restored as a rich, upland meadow by tarping and seeding with a custom mix appropriate for full sun and mesic soil conditions.




Phasing Schedule
ISLAND GROWN FARM
1 2022
2 2023
3 2024+
1 FIELD BORDER 6′ X 265′
2 FIELD BORDER 6′ X 300′
3 HEDGEROW 10′ X 555′
3 FIELD BORDER 6′ X 6060′
3 HEDGEROW 10′ X 570′
HEDGEROW 12′ X 600′ 1
ORCHARD PATH 8′ X 365′ X 2 2
GRAZING AREA 0.4 ACRES 3
ORCHARD 0.6 ACRES 2
OAK SAVANNAH 1.4 ACRES 2
3 GRAZING AREA 0.9 ACRES
1 WET MEADOW 0.5 ACRES
MESIC MEADOW 0.5 ACRES 1
2 HEDGEROW 8′ X 430′
HEDGEROW 8′ X 350′ 3
3 HEDGEROW 8′ X 350′
FIELD BORDER 5′ X 350′ 3
2 HEDGEROW 8′ X 350′
FIELD BORDER 5′ X 350′ 2
1 WOODLAND EDGE 0.4 ACRES
FIELD BORDER 5′ X 350′ 3
0
150′
LANDSCAPE | NTERACTIONS
160 George Lamb Road
Leyden, MA 01337
landscapeinteractions.com

At-Risk Pollinators
Supported by this Toolkit

BEES:

- » *Andrena carlini* Carlinville Miner Bee
- » *Andrena crataegi* Hawthorn Miner Bee
- » *Andrena distans* Distant Miner Bee
- » *Andrena forbesii* Forbes's Miner Bee
- » *Andrena miserabilis* Smooth-faced Miner Bee
- » *Andrena nubecula* Cloudy-winged Miner Bee
- » *Andrena placata* Peaceful Miner Bee
- » *Andrena vicina* Neighbouring Miner Bee
- » *Bombus vagans* Half-black Bumblebee
- » *Bombus fervidus* Golden Northern Bumblebee
- » *Coelioxys rufitarsis* Red-legged Cuckoo Leafcutter Bee
- » *Colletes compactus* Aster Cellophane Bee
- » *Colletes validus* Blueberry Cellophane Bee
- » *Epeolus scutellaris* Red-chested Cuckoo Nomad Bee
- » *Halictus rubicundus* Polymorphic Sweat Bee
- » *Lasioglossum cinctipes* Band-footed Sweat Bee
- » *Lasioglossum heterognathum* Wide-mouthed Sweat Bee
- » *Lasioglossum imitatum* Bristle Sweat Bee
- » *Lasioglossum leucocomum* White-haired Golden Sweat Bee
- » *Lasioglossum pilosum* Hairy Sweat Bee
- » *Lasioglossum quebecense* Quebec Sweat Bee
- » *Megachile brevis* Short Leafcutter Bee
- » *Megachile latimanus* Broad-handed Leafcutter Bee
- » *Melissodes druriella* Drury's Long-horned Bee
- » *Osmia atriventris* Maine Blueberry Bee
- » *Peponapis pruinosa* Squash Bee

BUTTERFLIES:

- » *Callophrys gryneus* Juniper Hairstreak
- » *Callophrys irus* Frosted Elfin
- » *Callophrys polios* Hoary Elfin
- » *Erynnis horatius* Horace's Duskywing
- » *Erynnis icelus* Dreamy Duskywing
- » *Euphydryas phaeton* Baltimore Checkerspot
- » *Hesperia leonardus* Leonard's Skipper
- » *Lethe appalachia* Appalachian Brown
- » *Parrhasius m-album* White-m Hairstreak
- » *Pholisora catullus* Common Sootywing
- » *Satyrium favionus* Oak Hairstreak
- » *Thorybes bathyllus* Southern Cloudywing
- » *Thorybes pylades* Northern Cloudywing

MOTHS:

- » *Abagrotis benjamini* Coastal Heathland Cutworm
- » *Abagrotis magnicupida* One-Dotted Dart
- » *Agrotis stigmosa* Spotted Dart Moth
- » *Chaetaglaea cerata* Waxed Sallow Moth
- » *Cucullia speyeri* Speyer's Paint
- » *Digrammia equivocata* Equivocal Looper
- » *Euxoa perpolita* Polished Dart
- » *Euxoa pleuritica* Fawn Brown Dart
- » *Euxoa violaris* Violet Dart Moth
- » *Hemaris gracilis* Slender Clearwing Moth
- » *Leucania extincta* No Common Name
- » *Lithophane lemmeri* Lemmer's Noctuid Moth
- » *Schinia gracilenta* Slender Flower Moth
- » *Schinia septentrionalis* Northern Flower Moth
- » *Schinia spinosae* Spinose Flower Moth
- » *Zanclognatha theralis* No Common Name

Photographs (clockwise from top left): Bombus fervidus on Monarda didyma (scarlet beebalm) by Norm Levey; Cucullia speyeri caterpillar by Jackie Elmore; Andrena crataegi on Malus sp. (apple) by Angus MacLean; Juniper Hairstreak on Prunus maritima (beach plum); Lithophane lemmeri by Bernie Knaupp.

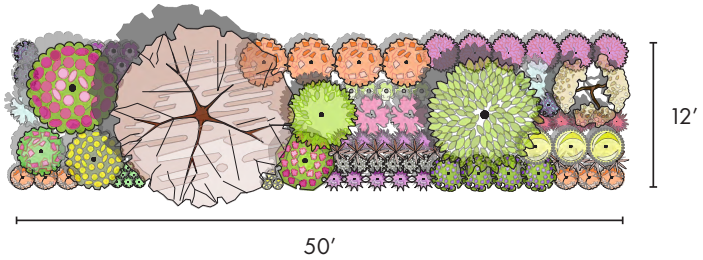
BIGGEST THREATS FACING POLLINATORS

- » HABITAT LOSS *(AGRICULTURE + DEVELOPMENT)*
- » PESTICIDES
- » CLIMATE CHANGE

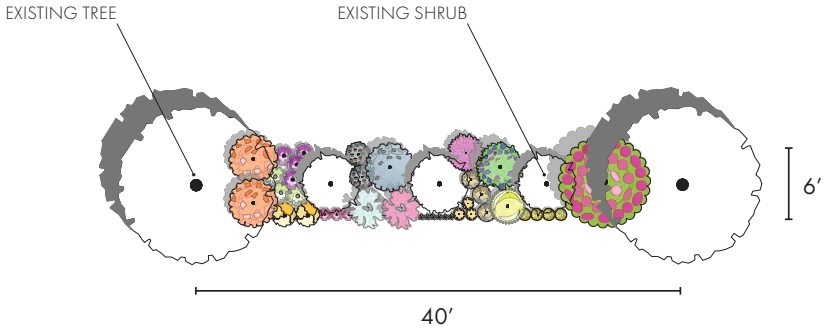
Farming for Biodiversity
at Island Grown Farm

SCALABLE + REPLICABLE
FARMSCAPE HABITAT DESIGNS
TO SUPPORT POLLINATION SYSTEMS
AT RISK ON MARTHA'S VINEYARD

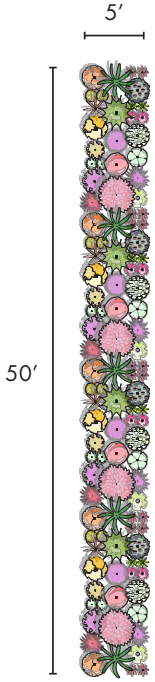
SEE FOLLOWING PAGE
FOR PLANT LISTS



HEDGEROW
(12 FT. X 50 FT.)

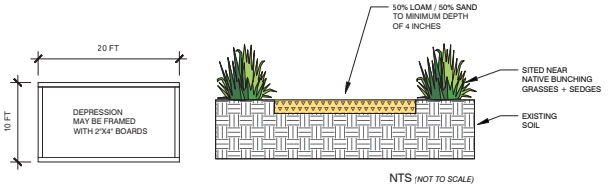


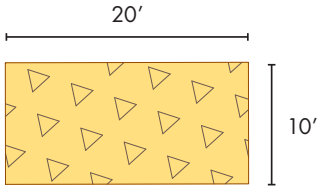
ORCHARD UNDERSTORY
(6 FT. X 40 FT.)



FIELD BORDER
(5 FT. X 50 FT.)

BEE NESTING STRIP DETAIL

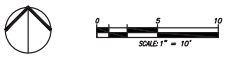




BEE NESTING STRIP*
(10 FT. X 20 FT.)

**Bee nesting strips can be installed as a break among hedgerows or field borders, in meadows, or anywhere with sunny, well draining soil.*

LAYOUT CONCEPT



PLANT SCHEDULE HEDGEROW

TREES	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Prunus maritima	Beach Plum	1	6' wide spacing
	Quercus ilicifolia	Scrub Oak	1	15' wide spacing
	Salix humilis	Prairie Willow	1	6' wide spacing
	Salix petiolaris	Meadow Willow	1	10' wide spacing

SHRUBS	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Baptisia tinctoria	Yellow Wild Indigo	4	3' wide spacing
	Diervilla lonicera	Northern Bush-honeysuckle	4	4' wide spacing
	Hypericum prolificum	Shrubby St. John's-wort	1	5' wide spacing
	Rosa carolina	Carolina Rose	1	4' wide spacing
	Rosa virginiana	Virginia Rose	1	5' wide spacing
	Rubus odoratus	Purple-flowering Raspberry	1	7' wide spacing
	Spiraea alba	Meadowsweet	2	3' wide spacing
	Spiraea tomentosa	Steeplebush	2	3' wide spacing
	Vaccinium angustifolium	Lowbush Blueberry	4	3' wide spacing

GRASSES	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Eragrostis spectabilis	Purple Lovegrass	5	2' wide spacing
	Schizachyrium scoparium	Little Bluestem	10	2' wide spacing

PERENNIALS	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Asclepias tuberosa	Butterfly Milkweed	6	2' wide spacing
	Eutrochium purpureum	Purple Joe-Pye Weed	6	3' wide spacing
	Lespedeza virginica	Slender Bush Clover	6	1' wide spacing
	Monarda didyma	Scarlet Bee Balm	5	2' wide spacing
	Monarda fistulosa	Wild Bergamot	5	2' wide spacing
	Penstemon digitalis	Foxglove Beardtongue	5	1.5' wide spacing
	Penstemon hirsutus	Northeastern Beardtongue	6	1.5' wide spacing
	Solidago bicolor	White Goldenrod	3	1' wide spacing
	Symphyotrichum novae-angliae	New England Aster	3	2' wide spacing
	Tephrosia virginiana	Goat's Rue	6	1.5' wide spacing

PLANT SCHEDULE FIELD BORDER

GRASSES	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Andropogon gerardii	Big Bluestem	5	3' wide spacing
	Carex pensylvanica	Pennsylvania Sedge	8	1' wide spacing
	Panicum virgatum	Switchgrass	4	3' wide spacing
	Schizachyrium scoparium	Little Bluestem	4	2' wide spacing

PERENNIALS	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Agastache scrophulariifolia	Purple Giant Hyssop	4	2' wide spacing
	Asclepias syriaca	Common Milkweed	4	2' wide spacing
	Asclepias tuberosa	Butterfly Milkweed	5	2' wide spacing
	Desmodium canadense	Showy Tick Trefoil	4	2' wide spacing
	Eurybia spectabilis	Purple Wood Aster	4	2' wide spacing
	Eutrochium fistulosum	Hollow Joe-Pye Weed	4	3' wide spacing
	Geranium maculatum	Spotted Crane's-bill	8	1' wide spacing
	Lespedeza capitata	Round-headed Bush Clover	8	1' wide spacing
	Liatris novae-angliae	Northern Blazing Star	16	1` wide spacing
	Monarda didyma	Scarlet Bee Balm	4	2' wide spacing
	Monarda fistulosa	Wild Bergamot	4	2' wide spacing
	Penstemon digitalis	Foxglove Beardtongue	4	1.5' wide spacing
	Pycnanthemum muticum	Broad-leaved Mountain-mint	4	1.5' wide spacing
	Solidago sempervirens	Seaside Goldenrod	4	1.5' wide spacing
	Solidago speciosa	Showy Goldenrod	4	2' wide spacing
	Symphyotrichum lateriflorum	Calico Aster	4	2' wide spacing
	Zizia aurea	Golden Alexanders	8	1' wide spacing

PLANT SCHEDULE ORCHARD

SHRUBS	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Baptisia tinctoria	Yellow Wild Indigo	1	3' wide spacing
	Diervilla lonicera	Northern Bush-honeysuckle	2	4' wide spacing
	Rubus allegheniensis	Allegheny Blackberry	1	4' wide spacing
	Rubus odoratus	Purple-flowering Raspberry	1	7' wide spacing
	Rubus vermontanus	Vermont Blackberry	1	4' wide spacing
	Spiraea alba	Meadowsweet	1	3' wide spacing
	Spiraea tomentosa	Steeplebush	1	3' wide spacing

PERENNIALS	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Eurybia spectabilis	Purple Wood Aster	2	2' wide spacing
	Eutrochium purpureum	Purple Joe-Pye Weed	1	3' wide spacing
	Geranium maculatum	Spotted Crane's-bill	3	1' wide spacing
	Hypericum punctatum	Spotted St. John's-wort	3	1.5' wide spacing
	Penstemon digitalis	Foxglove Beardtongue	3	1.5' wide spacing
	Penstemon hirsutus	Northeastern Beardtongue	4	1.5' wide spacing
	Solidago juncea	Early Goldenrod	3	1' wide spacing
	Solidago speciosa	Showy Goldenrod	2	2' wide spacing
	Viola pedata	Bird's-foot Violet	6	0.5' wide spacing
	Zizia aurea	Golden Alexanders	4	1' wide spacing

TO BE SEEDED AS A GROUNDCOVER ON ALL THREE AREAS:

Chamaecrista fasciculata (Partridge Sensitive Pea)
Pedicularis canadensis (Canadian Lousewort)
Prunella vulgaris ssp. lanceolata (Common Selfheal)

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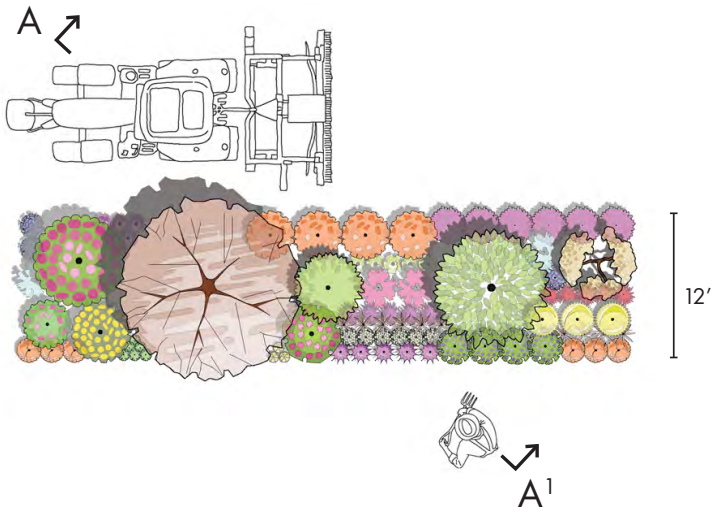

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Section A - A1 of the hedgerow facing northeast. Scale of section below is three times the scale of design above.

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Leyden, MA 01337
landscapeinteractions.com

SCRUB OAK
(QUERCUS ILLICIFOLIA)

Host plant for multiple lepidoptera, including the at-risk Horace's Duskywing (Erynnis horatius), White-M Hairstreak (Parrhasius m-album) and possibly Oak Hairstreak (Satyrium favionus).

PRAIRIE WILLOW
(SALIX HUMILIS)

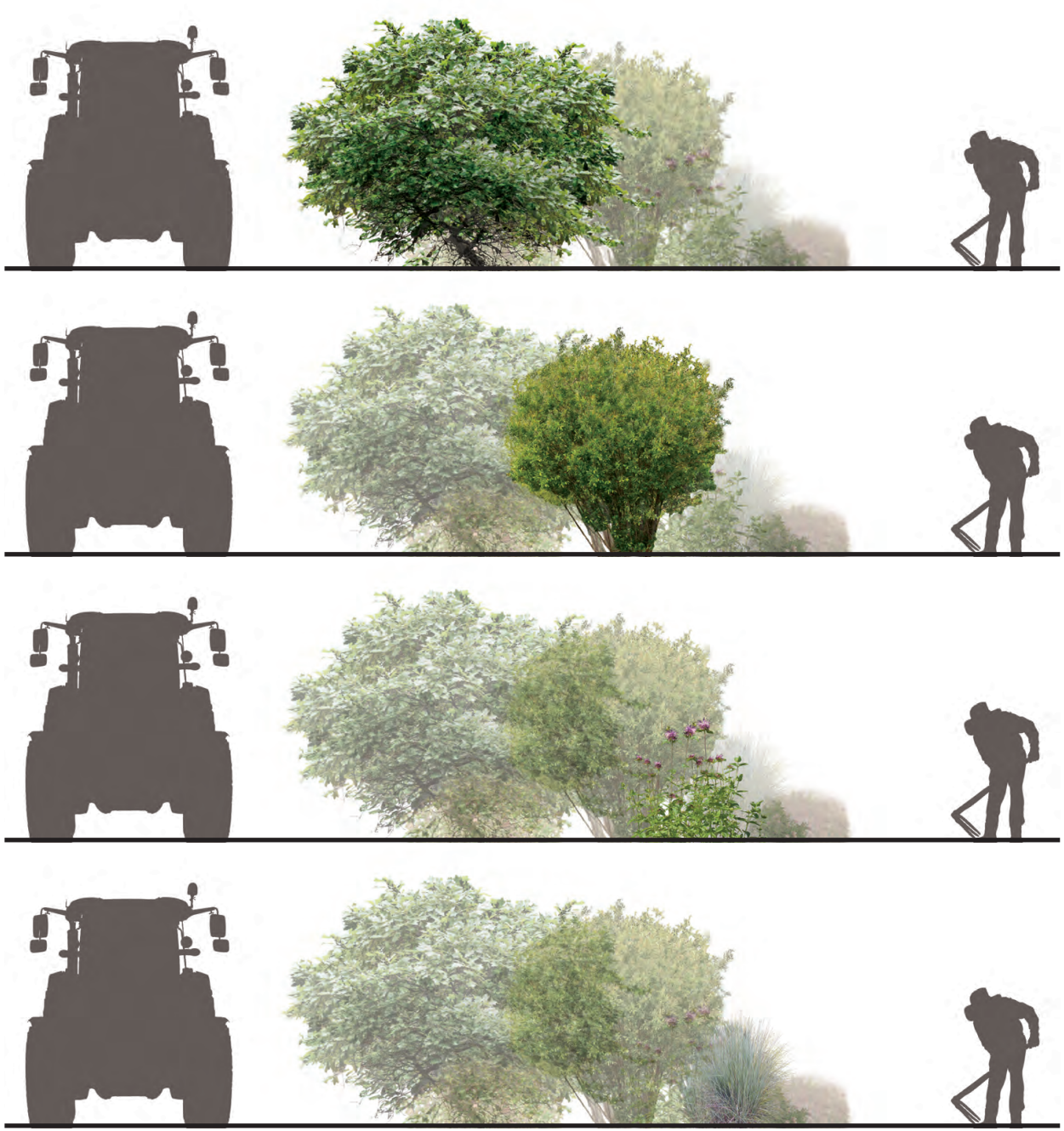
Critical early season pollen and nectar plant for numerous at-risk bees, including Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Lasioglossum cinctipes, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense and Osmia atriventris. Host plant for the at-risk Dreamy Duskywing (Erynnis icelus).

WILD BERGAMOT
(MONARDA FISTULOSA)

Highly visited for nectar as well as pollen. Supports several at-risk bees, including Andrena placata, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Lasioglossum imitatum, Megachile brevis and Megachile latimanus. Also favored by at-risk butterflies and moths for nectar.

LITTLE BLUESTEM
(SCHIZARIUM SCOPARIUM)

Host plant for the at-risk Leonard's Skipper (Hesperia leonardus) as well as other skipper butterflies.



Conceptual rendering of field border between farm fields and walking path, with biodiverse grazing area on the right. Rendering by Evan Abramson based on original photograph by Randi Baird.

OAK SAVANNAH PLANTINGS

LATIN NAME	COMMON NAME
Arctostaphylos uva-ursi	Bearberry
Carex pensylvanica	Pennsylvania sedge
Cercis canadensis	Eastern Redbud
Eurybia spectabilis	Purple wood-aster
Gaylussacia baccata	Huckleberry
Juniperus virginiana	Eastern red cedar
Liatris novae-angliae	New England blazing star
Pityopsis falcata	Sickle-leaved golden aster
Polygonella articulata	Coastal jointed knotweed
Prunus maritima	Beach plum
Quercus illicifolia	Scrub oak
Rosa carolina	Carolina rose
Rosa virginiana	Virginia rose
Solidago bicolor	White goldenrod
Solidago sempervirens	Seaside goldenrod
Vaccinium augustifolium	Lowbush blueberry
Vaccinium pallidum	Hillside blueberry

WOODLAND EDGE SEED MIX

LATIN NAME	COMMON NAME
Andropogon gerardii	Big bluestem
Asclepias syriaca	Common milkweed
Astragalus canadensis	Canada milk-vetch
Blephilia ciliata	Downy wood mint
Carex blanda	Common wood sedge
Chamaecrista fasciculata	Partridge sensitive pea
Euthamia graminifolia	Grass-leaved goldenrod
Eutrochium purpureum	Purple Joe-Pye weed
Geranium maculatum	Wild geranium
Hypericum punctatum	Spotted St. John's-wort
Hypericum pyramidatum	Great St. John's-wort
Lespedeza virginica	Slender bush-clover
Pedicularis canadensis	Canadian lousewort
Penstemon digitalis	Foxglove beardtongue
Penstemon hirsutus	Northeastern beardtongue
Prunella vulgaris ssp. lanceolata	Common selfheal
Pycnanthemum muticum	Clustered mountain mint
Solidago juncea	Early goldenrod
Symphyotrichum cordifolium	Heart-leaved American-aster
Symphyotrichum novae-angliae	New England American-aster
Symphyotrichum novae-belgii	New York American-aster
Viola pedata	Bird's foot violet
Zizia aptera	Heart-leaved golden Alexanders
Zizia aurea	Common golden Alexanders

OAK SAVANNAH SEED MIX

LATIN NAME	COMMON NAME
Achillea millefolium	Yarrow
Agastache scrophulariaefolia	Purple giant hyssop
Asclepias tuberosa	Butterflyweed
Baptisia tinctoria	Yellow wild indigo
Carex blanda	Common wood sedge
Carex brevior	Short-beaked sedge
Chamaecrista fasciculata	Partridge sensitive pea
Cirsium discolor	Pasture thistle
Danthonia spicata	Poverty oat grass
Desmodium canadense	Showy tick trefoil
Eragrostis spectabilis	Purple lovegrass
Geranium carolinianum	Carolina crane's-bill
Hypericum prolificum	Shrubby St. John's-wort
Lespedeza capitata	Round-headed bush-clover
Monarda fistulosa	Wild bergamot
Panicum virgatum	Switchgrass
Pedicularis canadensis	Canadian lousewort
Prunella vulgaris ssp. lanceolata	Common selfheal
Pycnanthemum muticum	Clustered mountain mint
Schizachyrium scoparium	Little bluestem
Solidago juncea	Early goldenrod
Solidago speciosa	Showy goldenrod
Symphyotrichum ericoides	Heath American-aster
Symphyotrichum lateriflorum	Calico American-aster
Tephrosia virginiana	Goat's rue
Zizia aptera	Heart-leaved golden Alexanders

WET MEADOW PLANTINGS

LATIN NAME	COMMON NAME
Cephalanthus occidentalis	Common buttonbush
Chamaecyparis thyoides	Atlantic white cedar
Chelone glabra	White turtlehead
Eutrochium dubium	Coastal plain Joe-Pye weed
Iva frutescens	Maritime marsh-elder
Lyonia ligustrina	Maleberry
Mimulus alatus	Winged monkey-flower
Pontederia cordata	Pickerelweed
Rosa palustris	Swamp rose
Salix bebbiana	Bebb's willow (male + female)
Salix discolor	Pussy willow (male + female)
Salix lucida	Shining willow (male + female)
Vaccinium corymbosum	Highbush blueberry
Vaccinium macrocarpon	Large cranberry
Vaccinium oxycoccos	Small cranberry

WOODLAND EDGE PLANTINGS

LATIN NAME	COMMON NAME
Apocynum cannabinum	Common dogbane
Carex pensylvanica	Pennsylvania sedge
Cercis canadensis	Eastern Redbud
Diervilla lonicera	Northern bush-honeysuckle
Epigaea repens	Trailing-arbutus
Eutrochium fistulosum	Hollow Joe-Pye weed
Eutrochium purpureum	Purple Joe-Pye weed
Gaylussacia baccata	Huckleberry
Geranium maculatum	Wild geranium
Impatiens capensis	Jewelweed
Pedicularis canadensis	Canadian lousewort
Penstemon hirsutus	Northeastern beardtongue
Prunus virginiana	Chokecherry
Rubus allegheniensis	Common blackberry
Rubus odoratus	Purple-flowering Raspberry
Rubus vermontanus	Vermont blackberry
Salix bebbiana	Bebb's willow (male + female)
Solidago bicolor	White goldenrod
Spiraea alba	Meadowsweet
Symphyotrichum cordifolium	Heart-leaved American-aster
Vaccinium corymbosum	Highbush blueberry
Viola sagittata	Arrowhead violet

WET MEADOW SEED MIX

LATIN NAME	COMMON NAME
Asclepias incarnata	Swamp milkweed
Carex bebbii	Bebb's oval sedge
Carex granularis	Pale sedge
Carex lacustris	Common lake sedge
Carex normalis	Spreading oval sedge
Carex stricta	Tussock sedge
Chelone glabra	White turtlehead
Cirsium muticum	Swamp thistle
Euthamia graminifolia	Grass-leaved goldenrod
Eutrochium fistulosum	Hollow Joe-Pye weed
Eutrochium maculatum	Spotted Joe-Pye weed
Hypericum pyramidatum	Great St. John's-wort
Impatiens capensis	Jewelweed
Mimulus ringens	Allegheny monkey-flower
Panicum virgatum	Switchgrass
Pontederia cordata	Pickerelweed
Scutellaria galericulata	Hooded skullcap
Scutellaria lateriflora	Mad dog skullcap
Spiraea alba	Meadowsweet
Symphyotrichum novae-angliae	New England American-aster
Symphyotrichum novae-belgii	New York American-aster

MESIC MEADOW SEED MIX

LATIN NAME	COMMON NAME
Achillea millefolium	Yarrow
Agastache scrophulariaefolia	Purple giant hyssop
Andropogon gerardii	Big bluestem
Asclepias syriaca	Common milkweed
Asclepias tuberosa	Butterflyweed
Astragalus canadensis	Canada milk-vetch
Baptisia tinctoria	Yellow wild indigo
Blephilia ciliata	Downy wood mint
Carex blanda	Common wood sedge
Carex brevior	Short-beaked sedge
Carex communis	Fibrous-rooted sedge
Chamaecrista fasciculata	Partridge sensitive pea
Cirsium discolor	Pasture thistle
Danthonia spicata	Poverty oat grass
Desmodium canadense	Showy tick trefoil
Eragrostis spectabilis	Purple lovegrass
Euthamia graminifolia	Grass-leaved goldenrod
Eutrochium purpureum	Purple Joe-Pye weed
Geranium carolinianum	Carolina crane's-bill
Hypericum prolificum	Shrubby St. John's-wort
Hypericum punctatum	Spotted St. John's-wort
Lespedeza capitata	Round-headed bush-clover
Lespedeza virginica	Slender bush-clover
Monarda fistulosa	Wild bergamot
Panicum virgatum	Switchgrass
Pedicularis canadensis	Canadian lousewort
Penstemon digitalis	Foxglove beardtongue
Penstemon hirsutus	Northeastern beardtongue
Prunella vulgaris ssp. lanceolata	Common selfheal
Pycnanthemum muticum	Clustered mountain mint
Schizachyrium scoparium	Little bluestem
Solidago juncea	Early goldenrod
Solidago speciosa	Showy goldenrod
Spiraea tomentosa	Steeplebush
Symphyotrichum ericoides	Heath American-aster
Symphyotrichum lateriflorum	Calico American-aster
Tephrosia virginiana	Goat's rue
Viola pedata	Bird's foot violet
Zizia aptera	Heart-leaved golden Alexanders
Zizia aurea	Common golden Alexanders

GRAZING AREA SEED MIX

LATIN NAME	COMMON NAME
Achillea millefolium	Yarrow
Agastache scrophulariaefolia	Purple giant hyssop
Andropogon gerardii	Big bluestem
Chamaecrista fasciculata	Partridge sensitive pea
Danthonia spicata	Poverty oat grass
Desmodium canadense	Showy tick trefoil
Eragrostis spectabilis	Purple lovegrass
Eutrochium purpureum	Purple Joe-Pye weed
Geranium carolinianum	Carolina crane's-bill
Hypericum prolificum	Shrubby St. John's-wort
Monarda fistulosa	Wild bergamot
Panicum virgatum	Switchgrass
Penstemon digitalis	Foxglove beardtongue
Penstemon hirsutus	Northeastern beardtongue
Prunella vulgaris ssp. lanceolata	Common selfheal
Pycnanthemum muticum	Clustered mountain mint
Solidago juncea	Early goldenrod
Solidago speciosa	Showy goldenrod
Sorghastrum nutans	Indiangrass
Spiraea alba	Meadowsweet
Spiraea tomentosa	Steeplebush
Symphyotrichum ericoides	Heath American-aster
Symphyotrichum lateriflorum	Calico American-aster
Tephrosia virginiana	Goat's rue
Tripsacum dactyloides	Eastern gammagrass
Viola pedata	Bird's foot violet
Zizia aptera	Heart-leaved golden Alexanders
Zizia aurea	Common golden Alexanders

Top and bottom right: Contrary to commonly held belief, livestock can be trained to graze in fields dominated by native vegetation, picking and choosing what to forage on across the landscape. Few native forbs or graminoids are toxic to livestock. Above: Prescribed fire is an excellent tool for both establishing and maintaining a diversity of native grassland vegetation. Periodic fire helps knock back non-native cool season grasses and weeds, while benefiting most native flower and grass species.

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Leyden, MA 01337
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RECOMMENDED PLANTS FOR MARTHA'S VINEYARD

Latin Name	Common Name	Plant Type	Habitat Area											Bloom Time (month)								Bloom Color	Height	Spread	Sunlight			Moisture			Pollen, Nectar, Host	Pollinators Supported
			Hedgerow	Field Border	Orchard	Oak Savannah	Wet Meadow	Woodland Edge	Mesic Meadow Seed Mix	Oak Savannah Seed Mix	Wet Meadow Seed Mix	Woodland Edge Seed Mix	Grazing Area Seed Mix	M	A	M	J	J	A	S	O				Full	Part	Shade	Moist	Medium	Dry		
Achillea millefolium	Yarrow	Perennial							x	x			x				J	J	A	S		White	1-1.5 ft	1-1.5 ft							Pollen, Nectar, Host	Coelioxys rufitarsis, Colletes compactus, Halictus rubicundus, Lasioglossum imitatum, Lasioglossum pilosum, Megachile brevis, Melissodes druriella, Agrotis stigmosa
Agastache scrophulariaefolia	Purple giant hyssop	Perennial		x					x	x			x				J	J	A			Purple	6 ft	2 ft							Nectar	Bombus fervidus, Bombus vagans, at-risk butterflies
Andropogon gerardii	Big bluestem	Grass							x			x	x				J	J	A	S	O	Green, Tan	5-8 ft	2-3 ft							Host	Possibly Leucania extincta, Hesperia leonardus, other at-risk butterflies
Apocynum cannabinum	Common dogbane	Perennial						x								M	J	J	A			White	4 ft	1.5-2.5 ft							Nectar	Satyrium favionus, Thorybes bathyllus, Thorybes pylades
Arctostaphylos uva-ursi	Bearberry	Evergreen Shrub				x								M	A	M	J					White, Pink	0.5-1 ft	5-15 ft							Nectar, Host	Callophrys polia
Asclepias incarnata	Swamp milkweed	Perennial									x							J	A			Pink	4 ft	2 ft							Pollen, Nectar	Andrena vicina, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Lasioglossum imitatum, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, Melissodes druriella, Peponapis pruinosa, Satyrium favionus, at-risk butterflies,
Asclepias syriaca	Common milkweed	Perennial		x					x			x					J	J	A			Pink	3 ft	2 ft							Pollen, Nectar	Andrena vicina, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Lasioglossum imitatum, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, Melissodes druriella, Peponapis pruinosa, Parrhasius m-album, at-risk butterflies
Asclepias tuberosa	Butterflyweed	Perennial	x	x					x	x							J	J				Orange, Yellow	1-2 ft	1-2 ft							Pollen, Nectar	Andrena vicina, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Lasioglossum imitatum, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, Melissodes druriella, Peponapis pruinosa, Satyrium favionus, at-risk butterflies
Astragalus canadensis	Canada milk-vetch	Perennial							x			x				M	J	J				White	1-4 ft	1.5-2 ft							Pollen, Nectar	Bombus fervidus, Bombus vagans, Megachile brevis, Megachile latimanus, Osmia atriventris, at-risk butterflies
Baptisia tinctoria	Yellow wild indigo	Shrub	x		x				x	x							J	J	A			Yellow	3 ft	3 ft							Nectar, Host	Bombus fervidus, Bombus vagans, Callophrys irus, Erynnis horatius, Thorybes bathyllus, at-risk butterflies
Blephilia ciliata	Downy Wood Mint	Perennial							x			x					J	J				Purple	1 ft	1-1.5 ft							Pollen, Nectar	Andrena crategii, Bombus vagans, Coelioxys rufitarsis, Halictus rubicundus, Lasioglossum imitatum, Lasioglossum pilosum, Megachile latimanus, Peponapis pruinosa, Thorybes pylades, at-risk butterflies
Carex bebbii	Bebb's oval sedge	Sedge									x						J	J				Green	3 ft	1 -2 ft							Host	Lethe appalachia
Carex blanda	Common wood sedge	Sedge							x	x		x				M						Green	1-3 ft	1-2 ft							Host	Lethe appalachia
Carex brevior	Short-beaked sedge	Sedge							x	x							J	J				Green, Tan	1-4 ft	1-4 ft							Host	Lethe appalachia

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			Hedgerow	Field Border	Orchard	Oak Savannah	Wet Meadow	Woodland Edge	Mesic Meadow Seed Mix	Oak Savannah Seed Mix	Wet Meadow Seed Mix	Woodland Edge Seed Mix	Grazing Area Seed Mix		M	A	M	J	J	A	S	O				Full	Part	Shade	Moist	Medium	Dry		
Carex communis	Fibrous-rooted sedge	Sedge							x									J					Green, Tan	1-2 ft	1-2 ft							Host	Lethe appalachia
Carex granularis	Pale sedge	Sedge									x						M	J	J				Green, Tan	0.5-2 ft	1-2 ft							Host	Lethe appalachia
Carex lacustris	Common lake sedge	Sedge									x							J	J				Tan	3-6 ft	1-2 ft							Host	Lethe appalachia
Carex normalis	Spreading oval sedge	Sedge									x						M	J					Green, Tan	2-3 ft	2-3 ft							Host	Lethe appalachia
Carex pensylvanica	Pennsylvania sedge	Sedge		x		x		x								A	M	J					Tan	0.5-1 ft	0.5-1 ft							Host	Lethe appalachia
Carex rosea	Rosy sedge	Sedge										x				A							Green	1 ft	1 ft							Host	Lethe appalachia
Carex stricta	Tussock sedge	Sedge									x							J					Green, Tan	3-4 ft	1-2 ft							Host	Lethe appalachia, other at-risk butterflies
Carex tonsa	Shaved sedge	Sedge								x							M	J					Green, Tan	0.5-1 ft	0.5-1 ft							Host	Lethe appalachia
Cephalanthus occidentalis	Common buttonbush	Shrub					x											J	J	A			White	15 ft	3-4 ft							Nectar	Bombus vagans, Peponapis pruinosa, at-risk butterflies
Cercis canadensis	Eastern Redbud	Tree				x		x							M	A	M						Pink	15-30 ft	15-25 ft							Pollen, Nectar	Andrena carlini, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Lasioglossum pilosum, at-risk butterflies
Chamaecrista fasciculata	Partridge sensitive pea	Annual	x seed	x seed	x seed				x	x		x	x					J	J	A	S		Yellow	1-3 ft	1-3 ft							Host	Thorybes bathyllus
Chamaecyparis thyoides	Atlantic white cedar	Tree					x								M	A	M						Bluish fruit	30-50 ft	30-40 ft							Host	Lithophane lemmeri
Chelone glabra	White turtlehead	Perennial					x				x								J	A	S	O	White	2-4 ft	1.5-2.5 ft							Nectar, Host	Bombus vagans, Euphydryas phaeton
Cirsium discolor	Pasture thistle	Biennial							x	x										A	S	O	Purple	6 ft	1-2 ft							Pollen, Nectar	Andrena crataegi, Andrena vicina, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Halictus rubicundus, Lasioglossum pilosum, Megachile latimanus, Megachile brevis, Peponapis pruinosa, Thorybes pylades, Thorybes bathyllus, at-risk butterflies

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			Hedgerow	Field Border	Orchard	Oak Savannah	Wet Meadow	Woodland Edge	Mesic Meadow Seed Mix	Oak Savannah Seed Mix	Wet Meadow Seed Mix	Woodland Edge Seed Mix	Grazing Area Seed Mix	M	A	M	J	J	A	S	O				Full	Part	Shade	Moist	Medium	Dry		
Cirsium muticum	Swamp thistle	Biennial									x						J	J	A	S	O	Purple	2-7 ft	1-2 ft							Pollen, Nectar	Andrena crataegi, Andrena vicina, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Halictus rubicundus, Lasioglossum pilosum, Megachile latimanus, Megachile brevis, Peponapis pruinosa, Thorybes bathyllus, Thorybes pylades, at-risk butterflies
Danthonia spicata	Poverty oat grass	Grass							x	x			x			M	J	J				Brown	1-2 ft	1 ft							Host	Hesperia leonardus, possibly Leucania extincta
Desmodium canadense	Showy tick trefoil	Perennial		x					x	x			x					J	A			Pink	5 ft	3 ft							Nectar, Host	Bombus vagans, Thorybes bathyllus, Thorybes pylades
Diervilla lonicera	Northern bush-honeysuckle	Shrub	x		x			x									J	J	A			Yellow	1-2 ft	4 ft							Pollen, Nectar	Bombus fervidus, Bombus vagans, Lasioglossum pilosum, at-risk butterflies
Epigaea repens	Trailing-arbutus	Evergreen Perennial						x						M	A	M						White, Pink	1-3 ft	1-3 ft							Nectar, Host	Callophrys polia
Eragrostis spectabilis	Purple lovegrass	Grass	x						x	x			x					J				Purple	18-24 in	2-3 ft							Host	Hesperia leonardus, possibly Leucania extincta, other at-risk butterflies
Eurybia spectabilis	Purple wood-aster	Perennial		x	x	x													A	S	O	Yellow, Purple	1-2 ft	1-2 ft							Host	Parrhasius m-album, Schinia septentrionalis
Euthamia graminifolia	Grass-leaved goldenrod	Perennial							x		x	x						J	A	S		Yellow	4 ft	2.5 ft							Pollen, Nectar	Andrena nubecula, Hesperia leonardus
Eutrochium fistulosum	Hollow Joe-Pye weed	Perennial		x				x			x							J	A	S		Pink	6 ft	3 ft							Nectar	Bombus vagans, at-risk butterflies
Eutrochium maculatum	Spotted Joe-Pye weed	Perennial									x							J	A	S		Pink	5 ft	3-4 ft							Nectar	Bombus vagans, at-risk butterflies
Eutrochium purpureum	Purple Joe-Pye weed	Perennial	x		x			x	x			x	x					J	A	S		Pink	7 ft	3-4 ft							Nectar	Bombus vagans, at-risk butterflies
Eutrochium dubium	Coastal plain Joe-Pye weed	Perennial					x											J	A	S		Pink	2-5 ft	2 ft							Nectar	Bombus vagans, at-risk butterflies
Gaylussacia baccata	Huckleberry	Shrub				x		x								M	J	J				White, Pink	1-3 ft	1-3 ft							Pollen, Nectar, Host	Andrena carlini, Chaetaglaea cerata
Geranium carolinianum	Carolina crane's-bill	Annual							x	x			x	M	A	M	J	J				White, Pink	1-3 ft	1-3 ft							Pollen, Nectar	Andrena distans, Megachile brevis, Lasioglossum pilosum, Peponapis pruinosa

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			Hedgerow	Field Border	Orchard	Oak Savannah	Wet Meadow	Woodland Edge	Mesic Meadow Seed Mix	Oak Savannah Seed Mix	Wet Meadow Seed Mix	Woodland Edge Seed Mix	Grazing Area Seed Mix		M	A	M	J	J	A	S	O				Full	Part	Shade	Moist	Medium	Dry		
Geranium maculatum	Wild geranium	Perennial		x	x			x				x			M	A	M	J	J				Pink	1-2 ft	1-2 ft							Pollen, Nectar	Andrena distans, Bombus fervidus, Megachile brevis, Lasioglossum pilosum, Peponapis pruinosa, at-risk butterflies
Hypericum prolificum	Shrubby St. John's-wort	Shrub	x						x	x			x					J	J	A			Yellow	1- 5 ft	2 ft							Pollen, Nectar	Bombus vagans, Lasioglossum pilosum, Megachile brevis
Hypericum punctatum	Spotted St. John's-wort	Perennial			x				x			x						J	J	A	S		Yellow	2 ft	1.5 ft							Pollen, Nectar	Bombus vagans, Lasioglossum pilosum, Megachile brevis
Hypericum pyramidatum	Great St. John's-wort	Perennial									x	x							J				Yellow	5 ft	3 ft							Pollen, Nectar	Bombus vagans, Lasioglossum pilosum, Megachile brevis
Impatiens capensis	Jewelweed	Annual						x			x								J	A	S		Orange, Yellow	4 ft	1.5-2.5 ft							Pollen, Nectar	Bombus fervidus, Bombus vagans, Megachile brevis
Iva frutescens	Maritime marsh-elder	Shrub					x													A	S	O	White	6-12 ft	4-8 ft							Host	Schinia gracilenta
Juniperus virginiana	Eastern red cedar	Evergreen Tree				x													J	A	S		Green	30-65 ft	8-25 ft							Nectar, Host	Callophrys gryneus, at-risk butterflies, Lithophane lemmeri
Lespedeza capitata	Round-headed bush-clover	Perennial		x					x	x									J	A	S		White	3-4 ft	1-2 ft							Pollen, Nectar	Megachile brevis, Thorybes bathyllus, Thorybes pylades
Lespedeza virginica	Slender bush-clover	Perennial	x						x			x							J	A	S		Pink	3-6 ft	1-2 ft							Pollen, Nectar, Host	Thorybes pylades, Thorybes bathyllus, Megachile brevis
Liatris novae-angliae	New England blazing star	Perennial		x		x														A	S	O	Purple	1-4 ft	1-2 ft							Nectar	Bombus fervidus, Bombus vagans, Hesperia leonardus
Lyonia ligustrina	Maleberry	Shrub					x											J					White	6-12 ft	12-20 ft							Pollen, Nectar	Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum quebecense
Mimulus alatus	Winged monkey-flower	Perennial					x												J	A	S		Blue	1-3 ft	0.75-1.5 ft							Nectar	Bombus fervidus, Bombus vagans, at-risk butterflies
Mimulus ringens	Allegheny monkey-flower	Perennial									x							J	J	A	S		Purple	2 ft	1-2 ft							Nectar	Bombus fervidus, Bombus vagans, at-risk butterflies
Monarda didyama	Scarlet beebalm	Perennial	x	x														J	J	A			Red	3-5 ft	2-3ft							Pollen, Nectar	Andrena placata, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Lasioglossum imitatum, Megachile brevis, Megachile latimanus, at-risk butterflies

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Monarda fistulosa	Wild bergamot	Perennial	x	x					x	x			x						J	A	S		Pink	4 ft	2-3 ft							Pollen, Nectar	Andrena placata, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Lasioglossum imitatum, Megachile brevis, Megachile latimanus, at-risk butterflies
Panicum virgatum	Switchgrass	Grass							x	x	x		x						J	A	S		Purple	4 ft	1-3 ft							Host	Hesperia leonardus, possibly Leucania extincta, other at-risk butterflies
Pedicularis canadensis	Canadian lousewort	Perennial	x seed	x seed	x seed			x	x	x		x				A	M						Yellow	1 ft	0.5-1 ft							Nectar	Bombus fervidus, Bombus vagans, at-risk butterflies
Penstemon digitalis	Foxglove beardtongue	Perennial	x	x	x				x			x	x				M	J	J				White	3 ft	1-2 ft							Pollen, Nectar	Bombus fervidus, Bombus vagans, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, at-risk butterflies
Penstemon hirsutus	Northeastern beardtongue	Perennial	x	x	x			x	x			x	x				M	J					Purple	1.5 ft	0.5-1 ft							Pollen, Nectar	Bombus fervidus, Bombus vagans, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, at-risk butterflies
Pityopsis falcata	Sickle-leaved golden aster	Perennial				x													J	A	S	O	Orange, Yellow	1 ft	1 ft							Pollen, Nectar, Host	Epeolus scutellaris, Lasioglossum pilosum, Megachile latimanus, Parrhasius m-album, Schinia spinosae
Polygonella articulata	Coastal jointed knotweed	Annual				x														A	S	O	White, Pink	0.5-2 ft	0.5-1 ft							Host	Schinia spinosae
Pontederia cordata	Pickerelweed	Perennial					x				x							J	J	A			Purple	3 ft	1-2 ft							Pollen, Nectar	Bombus fervidus, Bombus vagans, Peponapis pruinosa, at-risk butterflies
Prunella vulgaris ssp. lanceolata	Common selfheal	Perennial	x seed	x seed	x seed				x	x		x	x					J	J	A			Purple	0.25-1 ft	1 ft							Pollen, Nectar	Bombus fervidus, Bombus vagans, Megachile latimanus, at-risk butterflies
Prunus maritima	Beach plum	Shrub	x			x										A	M	J					White	6-12 ft	5-6 ft							Pollen, Nectar, Host	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Colletes validus, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum heterognathum, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense, Abagrotis benjamini
Prunus virginiana	Chokecherry	Tree						x								A	M	J	J				White	20-30 ft	15-20 ft							Pollen, Nectar, Host	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Colletes validus, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum heterognathum, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense, Abagrotis benjamini
Pycnanthemum muticum	Clustered mountain mint	Perennial		x					x	x		x	x						J	A	S		White	1-3 ft	1-3 ft							Nectar	Lasioglossum pilosum, at-risk butterflies, Callophrys gryneus, Parrhasius m-album
Quercus illicifolia	Scrub oak	Tree	x			x									M	A	M	J					Yellow	12-20 ft	10-15 ft							Host	Erynnis horatius, Parrhasius m-album, possibly Satyrium favionus, other at-risk butterflies
Rosa carolina	Carolina rose	Shrub	x			x												J	J	A			Pink	2 ft	2-3 ft							Pollen, Nectar	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Halictus rubicundus, Lasioglossum pilosum, Lasioglossum imitatum, Lasioglossum cinctipes, Megachile latimanus

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Rosa palustris	Swamp rose	Shrub					x										J	J	A			Pink	5 ft	2-4 ft							Pollen, Nectar	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Halictus rubicundus, Lasioglossum pilosum, Lasioglossum imitatum, Lasioglossum cinctipes, Megachile latimanus
Rosa virginiana	Virginia rose	Shrub	x			x											J	J	A			Pink	5-7 Ft	3-5 ft							Pollen, Nectar	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Halictus rubicundus, Lasioglossum pilosum, Lasioglossum imitatum, Lasioglossum cinctipes, Megachile latimanus
Rubus allegheniensis	Common blackberry	Shrub			x			x									J					White	6-12 ft	8 ft							Pollen, Nectar	Andrena vicina, Andrena miserabilis, Andrena forbesii, Andrena crataegi, Bombus fervidus, Coelioxys rufitarsis, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum heterognathum, Lasioglossum pilosum, Lasioglossum quebecense, Osmia atriventris, Thorybes bathyllus
Rubus odoratus	Purple flowering Raspberry	Shrub	x		x			x									J	J				Pink	3- 6 ft	6-12 ft							Pollen, Nectar	Andrena vicina, Andrena miserabilis, Andrena forbesii, Andrena crataegi, Bombus fervidus, Coelioxys rufitarsis, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum heterognathum, Lasioglossum pilosum, Lasioglossum quebecense, Osmia atriventris, Thorybes bathyllus
Rubus vermontanus	Vermont blackberry	Shrub			x			x									J					White	1.5-3 ft	1-2 ft							Pollen, Nectar	Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum heterognathum, Lasioglossum pilosum, Lasioglossum quebecense, Osmia atriventris, Thorybes bathyllus
Salix bebbiana	Bebb's willow (male + female)	Shrub					x	x							A	M						White	12-36 ft	20 ft							Pollen (male), Nectar (female), Host	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Lasioglossum cinctipes, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense, Osmia atriventris, Erynnis icelus, at-risk butterflies
Salix discolor	Pussy willow (male + female)	Shrub					x							F M								White	6-20 ft	4-12 ft							Pollen (male), Nectar (female), Host	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Lasioglossum cinctipes, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense, Osmia atriventris, Erynnis icelus, at-risk butterflies
Salix humilis	Prairie willow (male + female)	Shrub	x												A	M						Green	8 ft	2-5 ft							Pollen (male), Nectar (female), Host	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Lasioglossum cinctipes, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense, Osmia atriventris, Erynnis icelus, at-risk butterflies
Salix lucida	Shining willow (male + female)	Shrub					x								A	M						Yellow	12-20 ft	10 ft							Pollen (male), Nectar (female), Host	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Lasioglossum cinctipes, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense, Osmia atriventris, Erynnis icelus, at-risk butterflies
Salix petiolaris	Meadow willow (male + female)	Tree	x												A	M						Yellow, Red	3-20 ft	10-20 ft							Pollen (male), Nectar (female), Host	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena miserabilis, Andrena vicina, Bombus fervidus, Bombus vagans, Lasioglossum cinctipes, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense, Osmia atriventris, Erynnis icelus, at-risk butterflies
Schizachyrium scoparium	Little bluestem	Grass	x						x	x								J	A	S	O	Red	3 ft	2-3 ft							Host	Hesperia leonardus, other at-risk butterflies
Scutellaria galericulata	Hooded skullcap	Perennial									x							J	A	S		Purple	1-2.5 ft	0.5-1 ft							Nectar	Bombus fervidus, Bombus vagans, Lasioglossum pilosum, Megachile brevis, at-risk butterflies
Scutellaria lateriflora	Mad dog skullcap	Perennial									x							J	A	S		Blue	2-3 ft	1.5-2.5 ft							Nectar	Bombus fervidus, Bombus vagans, Lasioglossum pilosum, Megachile brevis, at-risk butterflies
Solidago bicolor	White goldenrod	Perennial	x			x		x										J	A	S	O	White, Yellow	1-3 ft	1-1.5 ft							Pollen, Nectar	Andrena placata and Melissodes druriella are pollen specialists of Solidago. Andrena crataegi, Andrena nubecula, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Colletes compactus, Epeolus scutellaris, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum heterognathum, Lasioglossum leucocomum, Lasioglossum pilosum, Lasioglossum quebecense, Megachile brevis, Megachile latimanus, Hesperia leonardus

RECOMMENDED PLANTS FOR MARTHA'S VINEYARD

Latin Name	Common Name	Plant Type	Habitat Area											Bloom Time (month)							Bloom Color	Height	Spread	Sunlight			Moisture			Pollen, Nectar, Host	Pollinators Supported
			Hedgerow	Field Border	Orchard	Oak Savannah	Wet Meadow	Woodland Edge	Mesic Meadow Seed Mix	Oak Savannah Seed Mix	Wet Meadow Seed Mix	Woodland Edge Seed Mix	Grazing Area Seed Mix	M	A	M	J	J	A	S	O				Full	Part	Shade	Moist	Medium	Dry		
Solidago juncea	Early goldenrod	Perennial			x				x	x		x	x					J	A	S		Yellow	2-4 ft	2-3 ft							Pollen, Nectar	Andrena placata and Melissodes druriella are pollen specialists of Solidago. Andrena crataegi, Andrena nubecula, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Colletes compactus, Epeolus scutellaris, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum heterognathum, Lasioglossum leucocomum, Lasioglossum pilosum, Lasioglossum quebecense, Megachile brevis, Megachile latimanus, Hesperia leonardus, at-risk butterflies
Solidago sempervirens	Seaside goldenrod	Perennial		x		x													A	S	O	Yellow	3-6 ft	2-3 ft							Pollen, Nectar	Andrena placata and Melissodes druriella are pollen specialists of Solidago. Andrena crataegi, Andrena nubecula, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Colletes compactus, Epeolus scutellaris, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum heterognathum, Lasioglossum leucocomum, Lasioglossum pilosum, Lasioglossum quebecense, Megachile brevis, Megachile latimanus, Hesperia leonardus, at-risk butterflies
Solidago speciosa	Showy goldenrod	Perennial		x	x				x	x			x						A	S	O	Yellow	3-5 ft	2-3 ft							Pollen, Nectar	Andrena placata and Melissodes druriella are pollen specialists of Solidago. Andrena crataegi, Andrena nubecula, Bombus fervidus, Bombus vagans, Coelioxys rufitarsis, Colletes compactus, Epeolus scutellaris, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum heterognathum, Lasioglossum leucocomum, Lasioglossum pilosum, Lasioglossum quebecense, Megachile brevis, Megachile latimanus, Hesperia leonardus, at-risk butterflies
Sorghastrum nutans	Indiangrass	Grass											x						A	S	O	Gold	3-5 ft	2-3 ft							Host	Hesperia leonardus, possibly Leucania extincta, other at-risk butterflies
Spiraea alba	Meadowsweet	Shrub	x		x			x			x		x				J	J	A	S		White	3-4 ft	3-4 ft							Pollen, Nectar	Andrena carlini, Andrena forbesii, Andrena miserabilis, Andrena nubecula, Andrena vicina, Bombus fervidus, Bombus vagans, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense
Spiraea tomentosa	Steeplebush	Shrub	x		x				x				x					J	A	S		Pink	2-4 ft	3-5 ft							Pollen, Nectar	Andrena carlini, Andrena forbesii, Andrena miserabilis, Andrena nubecula, Andrena vicina, Bombus fervidus, Bombus vagans, Halictus rubicundus, Lasioglossum cinctipes, Lasioglossum imitatum, Lasioglossum pilosum, Lasioglossum quebecense
Symphyotrichum cordifolium	Heart-leaved American-aster	Perennial						x				x						J	A			Blue	3 ft	1.5-2 ft							Pollen, Nectar, Host	Melissodes druriella is a pollen specialist of aster. Bombus vagans, Bombus fervidus, Coelioxys rufitarsis, Colletes compactus, Lasioglossum leucocomum, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, Parrhasius m-album, at-risk butterflies, Cucullia speyeri
Symphyotrichum ericoides	Heath American-aster	Perennial							x	x			x						A	S	O	White	2 ft	1-1.5 ft							Pollen, Nectar, Host	Melissodes druriella is a pollen specialist of aster. Bombus vagans, Bombus fervidus, Coelioxys rufitarsis, Colletes compactus, Lasioglossum leucocomum, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, Parrhasius m-album, at-risk butterflies, Cucullia speyeri
Symphyotrichum lateriflorum	Calico American-aster	Perennial		x					x	x			x						A	S	O	White, Purple	2 ft	1.5-3 ft							Pollen, Nectar, Host	Melissodes druriella is a pollen specialist of aster. Bombus vagans, Bombus fervidus, Coelioxys rufitarsis, Colletes compactus, Lasioglossum heterognathum, Lasioglossum leucocomum, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, Parrhasius m-album, at-risk butterflies, Cucullia speyeri
Symphyotrichum novae-angliae	New England American-aster	Perennial	x								x	x							A	S	O	Purple	5 ft	2-3 ft							Pollen, Nectar, Host	Melissodes druriella is a pollen specialist of aster. Bombus fervidus, Bombus vagans, Colioxys rufitarsis, Colletes compactus, Lasioglossum leucocomum, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, Parrhasius m-album, Cucullia speyeri, Schinia septentrionalis
Symphyotrichum novae-belgii	New York American-aster	Perennial									x	x							A	S	O	Purple	3-4 ft	3 ft							Pollen, Nectar, Host	Melissodes druriella is a pollen specialist of aster. Bombus fervidus, Bombus vagans, Colioxys rufitarsis, Colletes compactus, Lasioglossum leucocomum, Lasioglossum pilosum, Megachile brevis, Megachile latimanus, Parrhasius m-album, Cucullia speyeri
Tephrosia virginiana	Goat's rue	Perennial	x						x	x			x			M	J	J	A			Yellow	1-2 ft	0.75-1.5 ft							Pollen, Nectar, Host	Megachile brevis, Osmia atriventris, Digrammia equivocata
Tripsacum dactyloides	Eastern gammagrass	Grass											x			M	J	J	A	S		Purple	4-8 ft	4-6 ft							Host	Hesperia leonardus, possibly Leucania extincta
Vaccinium corymbosum	Highbush blueberry	Shrub					x	x								M	J					White	6-12 ft	6-12 ft							Pollen, Nectar	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena vicina, Bombus fervidus, Bombus vagans, Colletes validus, Halictus rubicundus, Lasioglossum quebecense, Callophrys gryneus, Callophrys polios, at-risk butterflies

RECOMMENDED PLANTS FOR MARTHA'S VINEYARD

Latin Name	Common Name	Plant Type	Habitat Area												Bloom Time (month)							Bloom Color	Height	Spread	Sunlight			Moisture			Pollen, Nectar, Host	Pollinators Supported
			Hedgerow	Field Border	Orchard	Oak Savannah	Wet Meadow	Woodland Edge	Mesic Meadow Seed Mix	Oak Savannah Seed Mix	Wet Meadow Seed Mix	Woodland Edge Seed Mix	Grazing Area Seed Mix		M	A	M	J	J	A	S	O				Full	Part	Shade	Moist	Medium	Dry		
Vaccinium macrocarpon	Large cranberry	Shrub					x											J	J	A			White, Pink	1 ft	3-4 ft							Pollen, Nectar	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena vicina, Bombus fervidus, Bombus vagans, Colletes validus, Halictus rubicundus, Lasioglossum quebecense, Callophrys gryneus, Callophrys polios, at-risk butterflies
Vaccinium augustifolium	Lowbush blueberry	Shrub	x			x											M	J					White	1.5-2 ft	1-2 ft							Pollen, Nectar, Host	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena vicina, Bombus fervidus, Bombus vagans, Colletes validus, Halictus rubicundus, Lasioglossum quebecense, Callophrys gryneus, Callophrys polios, at-risk butterflies, Chaetaglaea cerata, Hemaris gracilis
Vaccinium oxycoccos	Small cranberry	Shrub					x										J						Pink	0.25-1 ft	1 ft							Pollen, Nectar	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena vicina, Bombus fervidus, Bombus vagans, Colletes validus, Halictus rubicundus, Lasioglossum quebecense, Callophrys gryneus, Callophrys polios
Vaccinium pallidum	Hillside blueberry	Shrub				x									M	J							White, Pink	0.5-3 ft	2-3 ft							Pollen, Nectar, Host	Andrena carlini, Andrena crataegi, Andrena forbesii, Andrena vicina, Bombus fervidus, Bombus vagans, Colletes validus, Halictus rubicundus, Lasioglossum quebecense, Callophrys gryneus, Callophrys polios
Viola pedata	Bird's foot violet	Perennial			x				x			x	x		A	M	J						Purple	3 in	0.5 ft							Pollen, Nectar, Host	Bombus fervidus, Bombus vagans, Lasioglossum pilosum, Osmia atriventris, at-risk butterflies
Viola sagittata	Arrowhead violet	Perennial						x							A	M	J						Purple	1 ft	1 ft							Pollen, Nectar, Host	Bombus fervidus, Bombus vagans, Lasioglossum pilosum, Osmia atriventris, at-risk butterflies
Zizia aptera	Heart-leaved golden Alexanders	Perennial							x	x		x	x				M	J					Yellow	1-3 ft	0.75-1 ft							Pollen, Nectar	Andrena crataegi, Andrena forbesii, Bombus vagans, Lasioglossum imitatum, Lasioglossum pilosum, Osmia atriventris, at-risk butterflies
Zizia aurea	Common golden Alexanders	Perennial		x	x				x			x	x		A	M	J						Yellow	3 ft	1-2 ft							Pollen, Nectar	Andrena crataegi, Andrena forbesii, Bombus vagans, Lasioglossum imitatum, Lasioglossum pilosum, Osmia atriventris, at-risk butterflies
Aronia sp.	Chokeberry	Shrub	On Site														M	J	J				Green	3-6 ft	3-6 ft							Nectar	Callophrys gryneus, Lasioglossum pilosum
Betula sp.	Birch	Tree	On Site													A	M						Green	20-50 ft	20-40 ft							Host	Erynnis icelus
Chenopodium album	Lamb's-quarters (non-native)	Annual	On Site															J	J	A	S	O	Green	5 ft	1 ft							Host	Pholisora catullus
Cucurbita sp.	Cucurbits	Annual	On Site																J	A	S		White, Yellow, Orange	1-3 ft	varies							Pollen, Nectar	Peponapis pruinosa is a pollen specialist for Cucurbita sp. Bombus fervidus, Bombus vagans, Lasi
Plantago	Plantain (non-native)	Perennial	On Site													A	M	J	J	A	S		Green, Brown	3-4 in	4-12 in							Host	Euphydryas phaeton
Populus sp.	Poplar	Tree	On Site												M	A	M						Gray	40-50 ft	20-30 ft							Host	Erynnis icelus
Quercus alba	White oak	Tree	On Site												M	A	M						Yellow, Green	50-80 ft	50-80 ft							Host	Parrhasius m-album, Erynnis horatius, Satyrium favionus, other at-risk butterflies
Usnea spp.	Old Man's Beard	Lichen	On Site																				Silver, Green									Host	Likely Pholisora catullus, Zanclognatha theralis

SITE PREPARATION

Adequate site preparation is crucial before attempting to seed or plant native vegetation. Successfully establishing a meadow can be a three-year process, with the first growing season devoted to site preparation. Eliminating competitive weeds or invasive species before planting is essential to long-term success. At Island Grown Farm, we chose to employ two distinct, chemical-free methods of site preparation: smothering with black silage tarp and repeated shallow soil disturbance using pigs.

SMOTHERING

All meadow areas which are to be direct seeded in the fall were smothered with 6-milimeter black plastic silage tarp for 4-5 months beginning in May. This ensures that non-native cool season grasses and perennial weeds are eliminated before seeding. Native flowers and grasses tend to stay small and low to the ground their first year of growth as they develop root systems. This is why a full season of site preparation is critical to success.

Areas to be tarped should be mowed as short as possible beforehand. Any excessive organic matter can be raked off to create a smooth surface. **DO NOT TILL THE SOIL**, as this will only bring more weed seeds to the surface. Leaving a light layer of clippings is okay.

Lay thick (5- or 6-mil) black plastic over the entire area, overlapping the edges by about a foot if you use more than one roll or piece of plastic. All edges must be weighed down with sandbags, rocks, cinderblocks or other materials, every 3 to 6 feet. By excluding light from the vegetation below the plastic, those plants are unable to photosynthesize and will eventually die. Any seeds that germinate under the plastic are likewise unable to survive for long.

Dark tarps, landscape cloth or thick layers of wood chips can also be used instead of plastic. If wood chips are used, it's best to lay down a layer of cardboard underneath so that plants can't grow up through the wood chips. Watering the cardboard first is recommended. All material should be removed before seeding, to avoid enriching soil nutrient levels.

Leave the soil covered from mid-May until late September or October. When you remove the plastic or other materials, you will have bare soil on which to plant. Avoid disturbing this clean seed bed; do not till the prepared area as it will stimulate more weed growth. Do not apply compost or other nitrogen-rich material: native forbs do best in low nutrient soil. If needed, rake lightly to remove dead grasses and surface debris just before spreading the seed mix or planting.

PIGS

Hedgerow and field border areas were cleared of existing vegetation by running a pair of young pigs across the extent of the spaces to be planted. This has the added benefit of providing a product in the form of meat.

In order for this method to be effective, the pigs must stay in each area long enough to root around and consume weed seeds and roots below the surface of the soil. Ideally, the pigs would visit each area twice in the same growing season, with at least 6 weeks between each visit. This would allow any potential regrowth to also be eliminated.

The hedgerow and field border areas are to be installed in the fall using plants in the form of plugs and 1-2 gallon pots, with cardboard squares around each plant and wood chips across the expanse of the planted space in order to ensure establishment is successful. Irrigation drip lines will also be laid down. Weeding will be necessary throughout the first and second growing seasons following planting. In the case of the hedgerows, occasional winter pruning every 2-5 years may also be employed in order to prevent unwanted shading.

SOD CUTTING

In smaller grass-dominated areas you can remove the top layer of vegetation with a sod cutter and plant directly. It is recommended to mow short and wait until soils are dry before cutting, as the weight of the material is a lot less. This method has the benefit of requiring very little time to prepare for planting.

STALE SEED BEDDING

Stale bedding is another chemical-free method that is best suited for a large scale. The process involves repeated shallow tillage every 2-3 weeks from April or May until planting will occur, for a minimum of 60 days. This keeps bringing up new weed seeds and terminating them. Soils should only be disturbed to a depth of 2-3". Seeds or plants can then be installed directly.

Stale bedding is a desirable option for site preparation if soil disturbance is not a barrier and access to equipment is possible. While only two months of this process may be necessary, it is recommended to wait until after mid-October for direct seeding native plant species.



MEADOW SEEDING + MAINTENANCE

It is highly recommended to install native seed mixes in the dormant season, mid-October through January. This is because most native flowering species require between one and three months of cold stratification in order to germinate. Fall and winter naturally provide this opportunity in the Northeast, and are usually followed by rainfall in the spring. It is also possible to sow seeds in the early spring, but many species may not germinate until the following year, and watering may be necessary.

Due to the relatively small scale of the areas at Island Grown Farm that are to be seeded directly (a combined total of 4 acres), it is possible to install all seeds manually by broadcasting the mixes. The process is fairly straightforward: after seed mixes are created and purchased for each area, the mixes are weighed with a food scale and divided into 1/4-acre parts. Each 1/4-acre part is then mixed with a 5 gallon bucket of moistened sand or parboiled rice hulls (PBH) as a carrying agent. The physical areas to be seeded are divided into 1/4 acre sections, and each section is distributed evenly with buckets containing the seed mixes and their carrying agent.

A cover crop should always be included when direct seeding: winter wheat *(Triticum aestivum)* for fall or winter installations, and wild oats *(Avena sativa)* for spring installations, at 100 lbs/acre. When broadcasting, cover crops can be installed separately following the seed mixes.

To give a concrete example, let's say we're seeding the Wet Meadow area at IGI Farm (see page 15). This area will have a unique seed mix, as it's the only wet area on the farm. The total wet meadow area to be seeded is 0.5 acres. When the seed mix arrives, it will be divided in half using a food scale. Each half will be mixed evenly with a 5 gallon bucket of moistened sand or parboiled rice hulls.

The wet meadow area at the farm will then be divided in half with a string. Each half of the wet meadow area will be broadcast evenly with a 5 gallon bucketful of seed mix and sand, followed by 25 lbs of winter wheat cover crop. It is best to walk back-and-forth across the area in two directions (West to East and North to South for example) in order to guarantee even coverage. Refer to the diagram to the right for an example of how to evenly broadcast seeds across a site.

For the first growing season following seeding, at least 1 inch of rain per week is necessary. If there is not adequate precipitation, areas recently seeded should be watered 1-2 times per week.

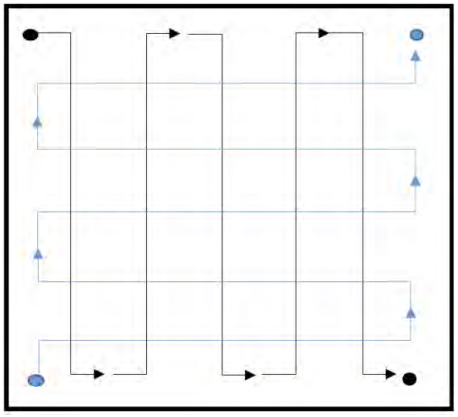
MOWING REGIME

For the first growing season following seeding, all recently seeded areas should be closely monitored for growth. When the average height of vegetation is around 12 inches, the area should be brush hogged or weed whacked down to a height of no less than 5-6 inches. This schedule should continue throughout the first growing season, as most native plants are focusing their energy on establishing root systems, and can easily become outcompeted and shaded out by weeds and non-native cool season grasses.

In the second year, 1-2 mows will be necessary between April and May depending on growth, down to the same height (5-6 inches) as cool season grasses take hold at the beginning of the season. After June 1, the seeded areas should be assessed by a botanist or individual with vetted plant identification skills. **If the majority of vegetation in a given area is native species from the seed mixes**, then mowing for that area can be paused until the end of the season (mid-October), after which all vegetation can be mowed down to 6 inches. **If the majority of vegetation in a given area still appears to remain non-native grasses or weeds**, then continue mowing as described above to keep the overall height of plants consistently between 6 and 12 inches. This regime should be followed until the third growing season.

By the third growing season, the site should transition to one mow every 1-3 years. This should always occur during the dormant season (mid-October to mid-April), after plants have gone to seed or before next season's growth. Doing so allows native pollinators to overwinter safely, and native plants to naturally scatter their seeds. Ideally, the site would be broken up into 2 or 3 sections, with each section cut on a rotational basis. During this dormant season mow, vegetation should be cut to a height of no less than 6 inches.

Invasive species and early successional trees should always be closely monitored and, after mowing becomes less frequent, either manually pulled, cut or mechanically grubbed.



This diagram from the University of New Hampshire illustrates the two directions that should be walked when broadcasting seeds, in order to ensure even coverage.

BEST MANAGEMENT PRACTICES

1. NO CHEMICALS

Eliminate pesticide use, particularly those containing neonicotinoids. Herbicides and chemical lawn treatments can also be highly damaging to pollinators.

Avoid planting in areas previously contaminated by pesticides or without a spatial buffer from areas where pesticides are applied (at least 100 ft. wide forested buffer is recommended).

Ensure plants and seeds come from a clean, pesticide-free source. Many commercial nurseries treat their plants and seeds, oftentimes before retailers receive them. Some pesticides and most neonicotinoids persist in plants and soil for months to years.

2. DIVERSE NATIVE PLANTS

Plant straight native plant species. Cultivars and exotic plants largely do not support the pollen, nectar and host plant preferences of threatened pollinators and tend to be visited by common pollinator species whose populations are stable.

Include a range of plant types (trees, shrubs, forbs, grasses, sedges) with varying bloom times, to ensure pollen, nectar and host plants are available across the entire growing season.

3. CREATE NESTING OPPORTUNITIES

Seventy percent of native bee species are ground nesting. Mulch using compost or natural materials (e.g. chopped leaves, seed-free hay, composted wood chips) and leave bare areas of well-drained soil in sunny locations.

Thirty percent of native bee species are cavity nesting. Allow dead trees, snags and pithy stemmed plants such as raspberries to remain standing.

To benefit bumblebees, maintain small brush piles. This will provide cover for rodents that will in turn create nesting habitat for bumblebees. Where possible, leave leaf litter in gardens and allow it to build up over time. This provides cover for overwintering queens. Barns with unbaled hay or a dry, protected cavity containing hay, straw, clumps of moss or grass located above or below ground are also ideal.

As with other ground nesting bees, limiting or eliminating tillage practices will limit the potential of harming bumblebees.

4. BE MESSY

Skip the fall clean up, allowing dead stems, leaves and seed heads to stand over winter, and wait until evening temperatures consistently reach 50 degrees before raking in the spring.

Don't be overzealous when it comes to tidying up. Some weeds act as host plants for caterpillars, such as lambsquarters *(Chenopodium album)* for Common Sootywing *(Pholisora catullus)* and Queen Anne's lace *(Daucus carota)* for Black Swallowtail *(Papilio polyxenes)*.

5. IT DOESN'T STOP WITH PLANTING

That being said, with new plantings, water and weed regularly for the first two years.

To deter deer and rodents until plants fully establish, it may be helpful to construct temporary fencing or set up netting. Natural repellent sprays such as *Plantskydd* can be effective when applied regularly. Thorny plants such as roses can also deter deer browse and function as natural fences for more vulnerable plants.

6. LAST BUT NOT LEAST

Put something in place to catch rainwater, with a dirt base to simulate a puddle, providing pollinators necessary minerals. Make it last between rainy days.

Keep night skies dark for moths and other nocturnal insects: motion-detecting lights or lamps facing down instead of spotlights on all night.

Some plant species establish best by direct seeding: while late fall or early winter is the best time to sow, early spring seeding is also possible, although some species may not germinate until the following year.

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Bee Specimen Databases Accessed through Discoverlife.org:

American Museum of Natural History, Bee Specimen Record database
Bee Biology and Systematics Laboratory database
Cornell University Insect Collection database
Rutgers University Arthropod Collection database
University of California, Riverside, Entomology Research Museum database
University of Connecticut Insect Collection database





Clockwise from top left: Vaccinium angustifolium; Prunus maritima; Rubus odoratus; Penstemon hirsutus; Cercis canadensis; Bombus ternarius on Salix discolor; Spirea alba; Carex stricta; Schizachyrium scoparium; Baptisia tinctoria; Zizia aurea; Vaccinium macrocarpon; Scutellaria galericulata.

Plants + Seeds

SOURCES FOR NATIVE PLANTS AND SEEDS:

Archewild - Quakertown, PA - https://archewild.com/nursery/
Bigelow Nurseries - Northboro, MA - https://bigelownurseries.com/
Blue Stem Natives - Norwell, MA - https://www.bluestemnatives.com/
Earth Tones Native Plants - Woodbury, CT - http://www.earthtonesnatives.com/
Ernst Seeds - Meadville, PA - https://www.ernstseed.com/
Long Island Native Plant Initiative - Hampton Bays, NY - https://linpi.org/
Native Plant Trust - Framingham and Whately, MA - http://www.nativeplanttrust.org/
New England Wetland Plants - South Hadley, MA - https://newp.com/
New Moon Nursery - Bridgeton, NJ - http://www.newmoonnursery.com/
North Creek Nurseries - Oxford, PA - https://www.northcreeknurseries.com/
Northeast Pollinator Plants - Fairfax, VT - https://www.northeastpollinator.com/
Pierson Nurseries - Biddeford, ME - https://www.piersonnurseries.com/
Pinelands Nursery & Supply - Columbus, NJ - https://www.pinelandsnursery.com/
Polly Hill Arboretum - West Tisbury, MA - https://www.pollyhillarboretum.org/plants/plant-sale/
Prairie Moon - Winona, MN - https://www.prairiemoon.com/
Toadshade Wildflower Farm - Frenchtown, NJ - https://toadshade.com/
Vermont Willow Nursery - Fairfield, VT - https://vermontwillownursery.com/
Wild Seed Project - Portland, ME - https://wildseedproject.net/
Wing and a Prayer Nursery - Cummington, MA - https://aliceskitchenathoneyhill.com/amys-nursery/

NATIVE PLANT PROPAGATION GUIDELINES:

Wild Seed Project - How to Grow Natives from Seed:
https://wildseedproject.net/how-to-grow-natives-from-seed/

Prairie Moon - How to Germinate Native Seeds
https://www.prairiemoon.com/blog/how-to-germinate-native-seeds

Native Plant Network Propagation Protocol Database:
https://npn.rngr.net/propagation

Indigenous Landscapes - Native Plant Propagation Guide and Nursery Model:
https://indigescapes.com/nativepropguide

Farming for Biodiversity is a comprehensive guide for identifying, creating and maintaining functionally diverse habitat on farmscapes across Martha's Vineyard, to support native bee, butterfly and moth species at the greatest risk of local extinction. While the designs, plant lists and management recommendations are based on the conditions found at Island Grown Farm, their applicability stretches far beyond the boundaries of the farm or the island. The product of a year-long collaboration between farmers, designers, planners, scientists and citizens, this Toolkit endeavors to make pollinator habitat creation easy, exciting and beneficial to the function of the whole farm system — inspiring landowners and land managers to view their properties as integral parts of a network of ecosystems that stretches into surrounding communities and across the wider region.

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