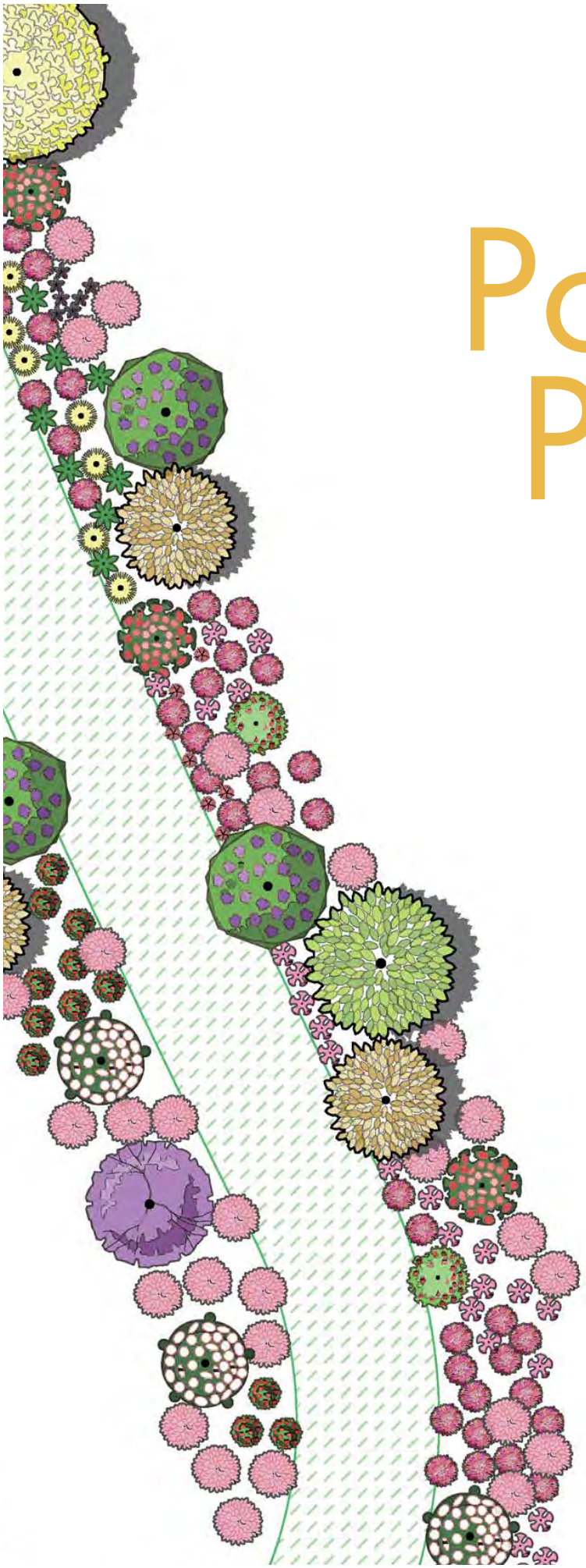


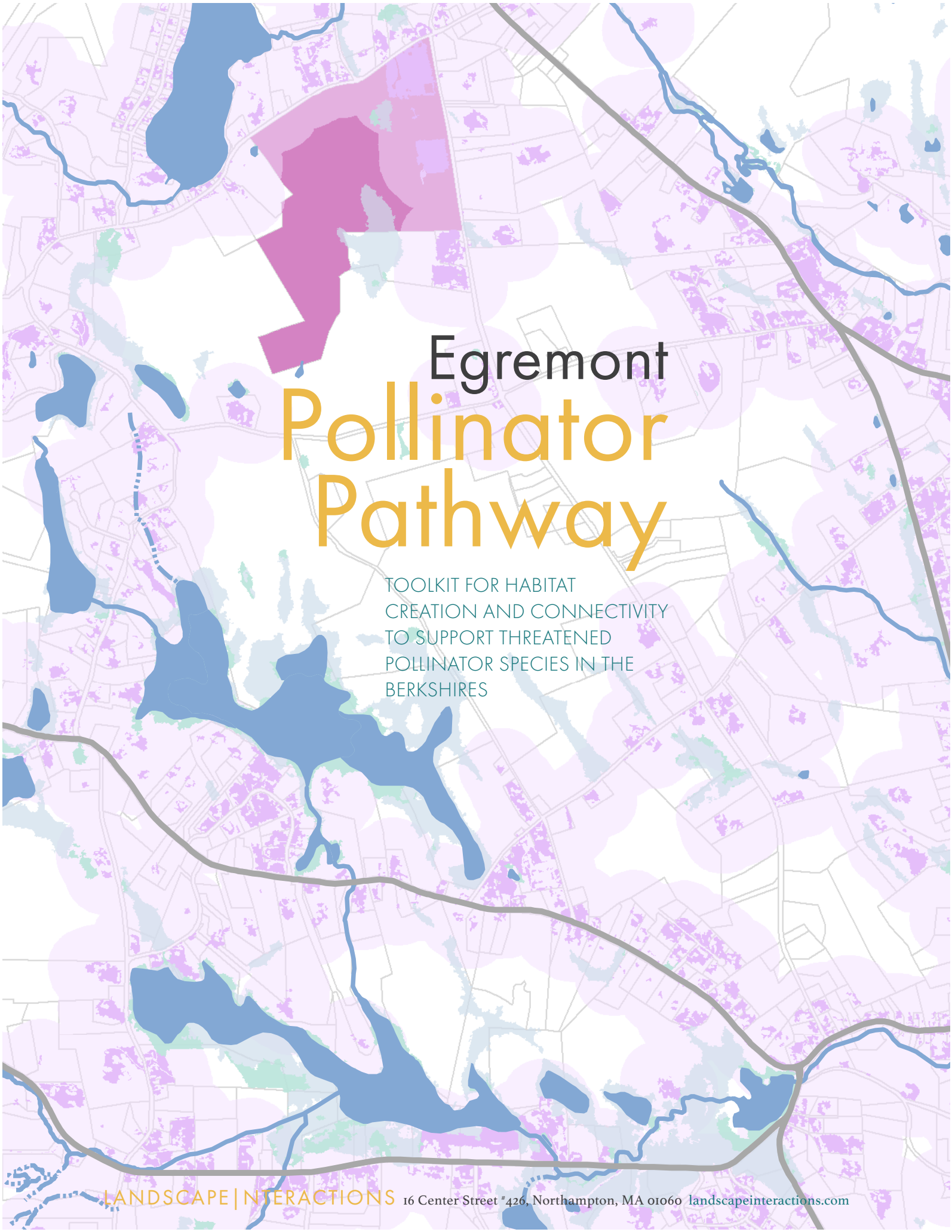
Egremont Pollinator Pathway

TOOLKIT FOR HABITAT CREATION AND CONNECTIVITY TO SUPPORT THREATENED POLLINATOR SPECIES IN THE BERKSHIRES

Commissioned by the Egremont Agricultural Commission

a project of
LANDSCAPE | NTERACTIONS

written and designed by
Evan Abramson



Egremont Pollinator Pathway

TOOLKIT FOR HABITAT CREATION AND CONNECTIVITY TO SUPPORT THREATENED POLLINATOR SPECIES IN THE BERKSHIRES

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Thank you: Elizabeth Keen, Abigail Rogers-McKee, Tom Reynolds, Will Conklin and Greenagers, Indian Line Farm crew, Mary McGurn for the photographs, Vivian Orlowski for suggesting the idea, and the citizens of Egremont for getting their hands dirty.

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Opposite: Design planset during French Park installation October 2020. Photograph courtesy McGurn Media. Following page (clockwise from top): Mountain lion by Wisconsin Department of Natural Resources; Bald eagle by Steven M. Bellovin; Bobcat by Forest Wander; Coyote by Brennan Lindsay; Black-capped Chickadee by Tim Sackton; White tailed deer by Henry Mulligan; Eastern cottontail by Ryan Hoddnet; Wood frog by K.P. McFarland; Salix petiolaris *by unknown;* Bombus vagans *by Norm Levey;* Vaccinium macrocarpon *by G. Mittelhauser; West Virginia White by M. Silver; Racoon by MWanner; White footed mouse by Capri23auto; Common raven by Andrew Lunt.*


French Park
Pollinator
PLANT SCHEDULE
SHRUBS
GRASSES
EXISTING ASH
MOWED GRASS PATH
BEE NESTING STRIP
PATH TO FOREST
NESTING STRIP DETAIL
NORTH

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 threatened in the Berkshires of Western Massachusetts. The loss of these pollinator-plant interactions, or pollination systems, can have catastrophic consequences on the biodiversity of the state, and the region as a whole. But it's not too late to start planting.

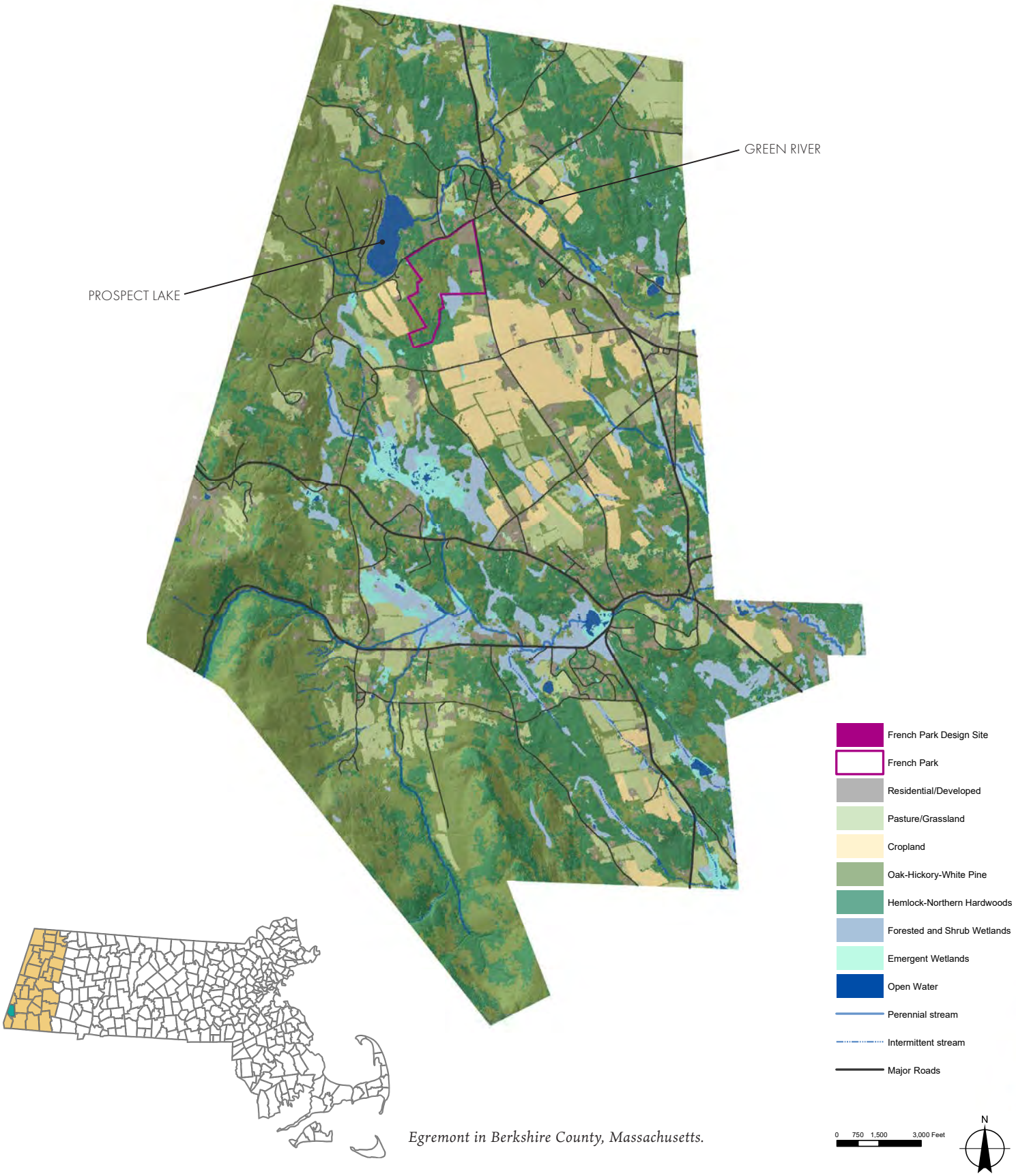
Why Pollinators?

Native pollinators are vital to creating and maintaining the habitats and ecosystems that most animals rely on for food and shelter — including humans. 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 bees 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.

Bombus fervidus *foraging on* Monarda didyma (*scarlet beebalm*). *One of the most abundant bumblebee species in Massachusetts a few decades ago, it is now the second rarest bumblebee species in the state. Photograph by Norm Levey.*

LAND USE AND NATURAL COMMUNITIES IN EGREMONT



Egremont in Berkshire County, Massachusetts.

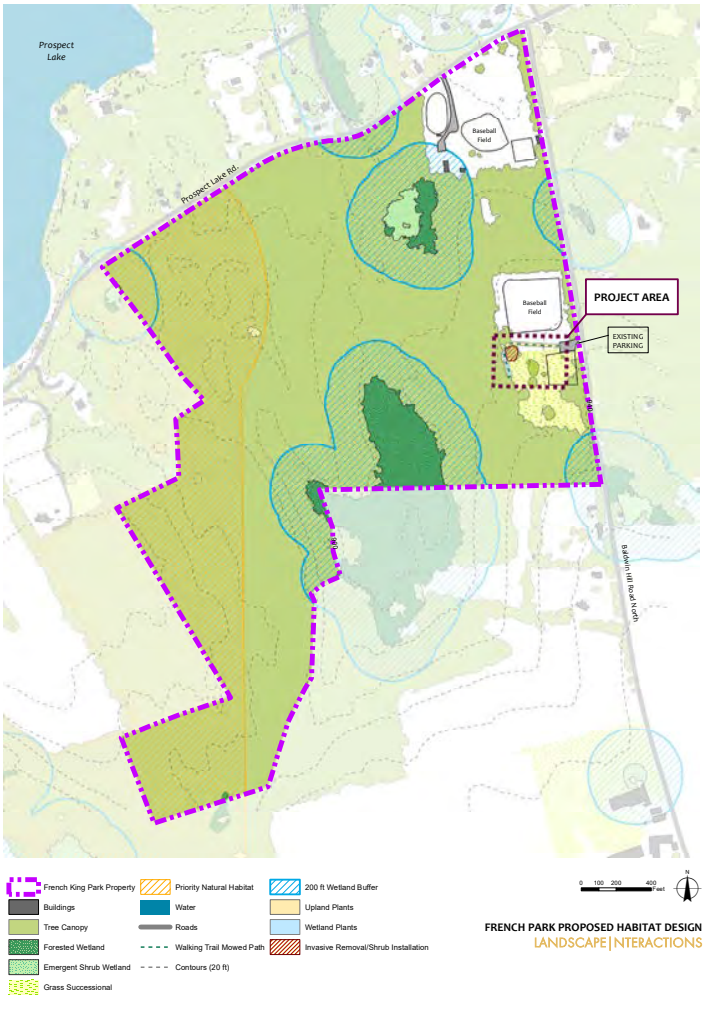
Project Context

The Town of Egremont is located in southwestern Berkshire County, where the Western New England Marble Valleys meet the Taconic Mountains. Nearly all of the town falls within the Housatonic River watershed. Over 15% of the town's 18.9 square miles is in agricultural use, and approximately 26% is permanently protected. While less than 1% of the town is open water, wetlands constitute nearly 10% of the town's total area. Of those wetlands, approximately 222 acres are emergent, or not under forest or shrub cover. Residential and developed areas in Egremont comprise nearly 8% of the town, or 916 acres. Most development in Egremont is focused in the lowlands, including land along the floodplains of Hubbard Brook and the Green River.

The central and eastern lowlands of Egremont, comprising nearly 75% of the town's total area, are part of the Western New England Marble Valleys ecoregion, one of the most distinct and biologically rich areas in Massachusetts as well as New England (BioMap2, 2011). The marble valleys support an impressively high percentage of Massachusetts' state-listed species and Priority Natural Communities. Extensive wetland areas within this ecoregion in Egremont support many threatened species that reply on calcareous wet meadows and fens for survival.

French Park is a 136-acre public park in North Egremont that is situated within this biologically rich Marble Valleys ecoregion. The site consists of a mix of wet meadows, forested wetlands, upland forest and developed open space in the form of a dog park and ball fields.

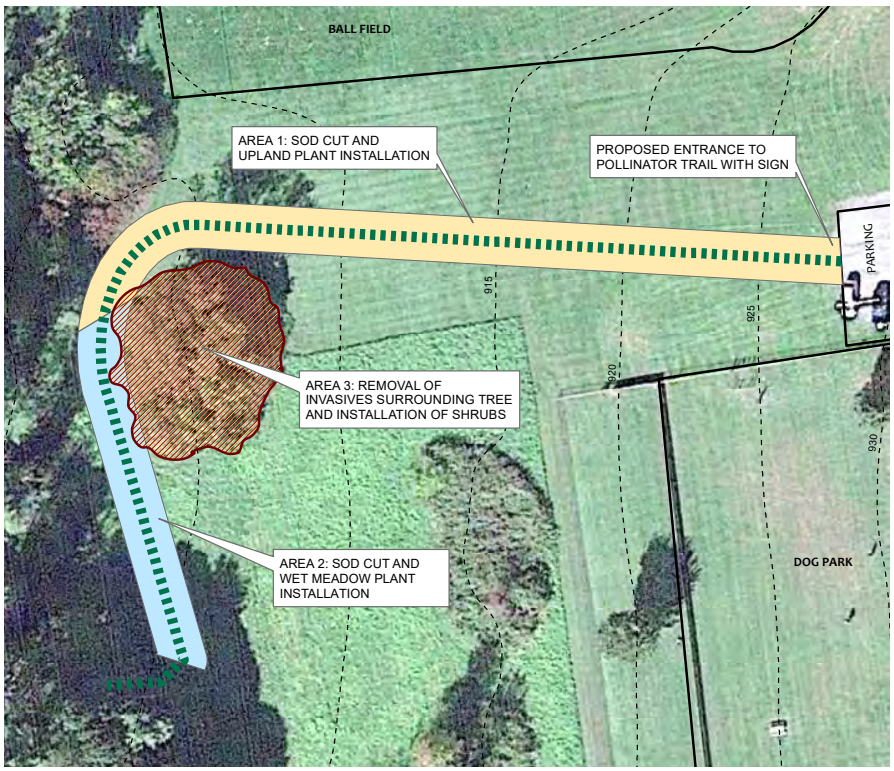
At a public meeting held in October 2019, it was determined that French Park would be the ideal location in Egremont for a demonstration landscape design to support threatened pollinator species, as the site was public; highly visible; owned and managed by the town; and comprised of a variety of ecological conditions which could be replicated on other properties in the town. The meeting was convened by Elizabeth Keen, Chair of the Egremont Agricultural Commission, and in attendance were members of the Egremont Select Board; Garden Club; Green Committee; Conservation Commission; Town Groundskeeper Tom Reynolds; Will Conklin, Executive Director of Greenagers; and Evan Abramson, Principal of Landscape Interactions.



Map of project area in French Park submitted to Town for approval.

Creating Habitat

On the weekend of October 24-25, 2020, citizens in Egremont braved cold rain and winds and installed almost 10,000 sq.ft of plants stretching from the French Park Dog Park parking lot to the forest edge. The installation encompassed upland meadow, woodland edges and wet meadow habitat; and included 38 species of native shrubs, forbs, graminoids and trees. All of the plants were selected to support at-risk bees and butterflies endemic to high elevation Western Massachusetts, based upon field observations and historical research by Dr. Robert Gegear over the 2020 growing season. *See the following pages for more information about the plants selected and the species they support.*



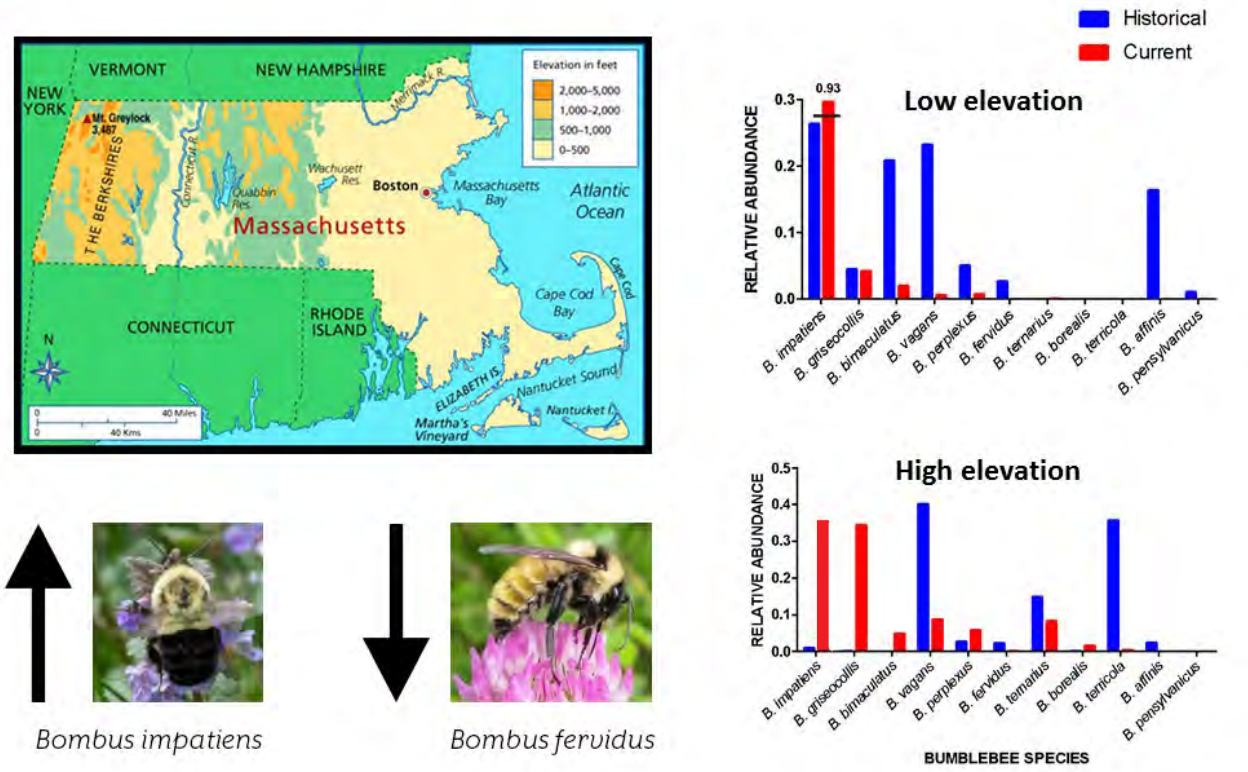
Draft of French Park design with habitat areas delineated.

Installation of Pollinator Pathway in French Park.
Photographs courtesy of McGurn Media.

The Pollinator Pathway installation in French Park represented a town-wide collaboration across sectors and experiences. Town Groundskeeper Tom Reynolds, Greenagers and the Indian Line Farm crew were instrumental in preparing the site for planting, by removing over 3,000 sq.ft of invasive bittersweet, barberry and honeysuckle, as well as nearly 7,000 sq.ft of sod.

Volunteers from across town showed up on both planting days, installing over 1,200 plugs and potted plants across three areas of habitat (see design draft on opposite page).

THE STATUS OF BUMBLEBEE SPECIES IN MASSACHUSETTS *(1960-2019)*



Bombus impatiens

Bombus fervidus

Images and data courtesy Dr. Robert Gegear and Yale Peabody Museum of Natural History.

Pollinator Decline in Massachusetts

By tracking bee, butterfly and moth observations over the past 150+ years, we get an accurate picture of pollinator health in the state. The situation isn't so great: the number of bumblebee species has dropped from 11 to nine, with three more species (*Bombus fervidus*, *Bombus terricola* and *Bombus vagans*) in danger of being extirpated within the next decade. MassWildlife lists five more bees and 44 butterflies and moths as Species of Greatest Conservation Need (Massachusetts Division of Fisheries and Wildlife, 2015). These losses risk cascading impacts across ecosystems. If trends continue, human actions will remove too many species and natural systems will begin to collapse.

Photographs (clockwise from top): Aphrodite Fritillary by Andrea Janda; Bombus terricola by K.P. McFarland; Bog Coppers by Jim Brighton; Bombus affinis by Serina Jepsen.

At-Risk Pollinators Supported by this Toolkit

Bees:

- *Bombus affinis* Rusty patched bumblebee
- *Bombus fervidus* Golden northern bumblebee
- *Bombus pensylvanicus* American bumblebee
- *Bombus terricola* Yellow-banded bumblebee
- *Bombus vagans* Half-black bumblebee

Butterflies:

- *Amblyscirtes hegon* Pepper and Salt Skipper
- *Amblyscirtes vialis* Common Roadside-Skipper
- *Boloria bellona* Meadow Fritillary
- *Callophrys irus* Frosted Elfin
- *Carterocephalus palaemon* Arctic Skipper
- *Chlosyne harrisii* Harris' Checkerspot
- *Erora laeta* Early Hairstreak
- *Euphyes bimacula* Two-spotted Skipper
- *Euphyes conspicua* Black Dash
- *Euphyes dion* Dion Skipper
- *Hesperia leonardus* Leonard's Skipper
- *Hesperia metea* Cobweb Skipper
- *Hesperia sassacus* Indian Skipper
- *Lycaena epixanthe* Bog Copper
- *Lycaena hyllus* Bronze Copper
- *Pieris oleracea* Mustard White
- *Pieris virginiensis* West Virginia White
- *Poanes massasoit* Mulberry Wing
- *Polygonia progne* Gray Comma
- *Satyrium acadica* Acadian Hairstreak
- *Satyrium favonius* Oak Hairstreak
- *Speyeria aphrodite* Aphrodite Fritillary
- *Speyeria atlantis* Atlantis Fritillary

BIGGEST THREATS FACING POLLINATORS

- Habitat Loss *(agriculture + human development)*
- Pesticides
- Climate Change

What You Can Do

The good news is, there's a lot that can be done on the part of individuals and communities. That's where this Toolkit comes in. By following the plant lists and habitat management guidelines outlined on the following pages, citizens in Egremont and in towns across the Berkshires can attract and sustain threatened pollinator species at their homes or sites — building local networks of biodiversity, ecosystem health and climate resiliency through pollinator-plant interactions.














This page, clockwise from top: Rosa virginiana; Mimulus ringens; Bombus vagans *by Norm Levey;* Eutrochium fistulosum; *Mulberry wing on* Asclepias syriaca; Doellingeria (Aster) umbellata; Physostegia virginiana; Salix bebbiana; *Black dash;* Panicum virgatum; Chasmanthium latifolium; *Early Hairstreak by Bruce deGraaf;* Prunella vulgaris ssp. lanceolata; Cercis canadensis. *Opposite page, clockwise from bottom:* Zizia aurea; Vaccinium angustifolium; Rubus odoratus; Ribes rubrum; Penstemon hirsutus; Bombus ternarius *on* Salix discolor; Spirea alba.



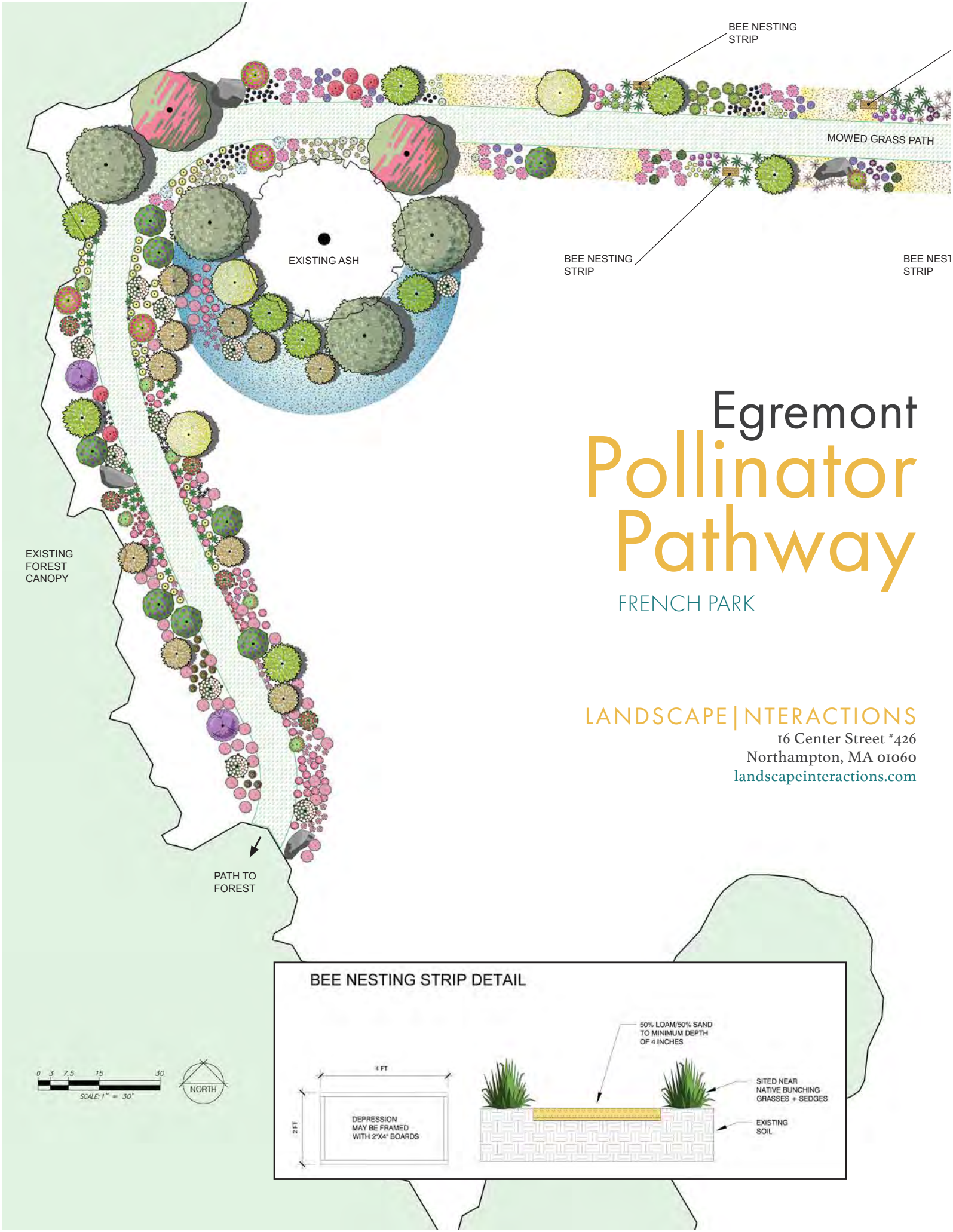



Recommended Plants for the Berkshire Region*

Latin Name	Common Name
Agastache scrophulariaefolia	Purple giant hyssop
Andropogon gerardii	Big bluestem
Asclepias incarnata	Swamp milkweed
Asclepias syriaca	Common milkweed
Cardamine concatenata	Toothwort
Cardamine diphylla	Two-leaved toothwort
Carex brevior	Plains oval sedge
Carex stricta	Tussock sedge
Cephalanthus occidentalis	Buttonbush
Cercis canadensis	Redbud
Chasmanthium latifolium	River oats
Cirsium muticum	Swamp thistle
Doellingeria umbellata	Tall white aster
Eragrostis spectabilis	Purple Lovegrass
Eutrochium fistulosum	Hollow Joe-Pye weed
Geranium maculatum	Spotted crane's-bill
Hypericum kalmianum	Kalm's St. John's-wort
Lobelia siphilitica	Blue lobelia
Lupinus perennis	Wild lupine
Mimulus ringens	Allegheny monkeyflower
Monarda didyma	Scarlet beebalm
Monarda fistulosa	Wild bergamot
Monarda punctata	Spotted beebalm
Panicum virgatum	Switchgrass
Pedicularis canadensis	Canadian wood betony
Penstemon digitalis	Foxglove beardtongue
Penstemon hirsutus	Northeastern beardtongue
Physostegia virginiana	Obedient false dragonhead

Latin Name	Common Name
Prunella vulgaris ssp. lanceolata	Common selfheal
Ribes rubrum	Red currant
Rosa nitida	Shining rose
Rosa palustris	Swamp rose
Rosa virginiana	Virginia rose
Rubus odoratus	Purple-flowering raspberry
Rumex orbiculatus	Great water dock
Salix bebbiana	Bebb's willow
Salix discolor	Pussy willow
Salix petiolaris	Meadow willow
Salix sericea	Silky willow
Sambucus nigra	Black elderberry
Schizachyrium scoparium	Little bluestem
Solidago altissima	Tall goldenrod
Solidago arguta	Forest goldenrod
Solidago caesia	Axillary goldenrod
Solidago juncea	Early goldenrod
Solidago odora	Sweet goldenrod
Solidago speciosa	Showy Goldenrod
Spiraea alba	White meadowsweet
Spiraea tomentosa	Steeplebush
Symphyotrichum lateriflorum	Calico aster
Symphyotrichum novi-belgii	New York American-aster
Symphyotrichum puniceum	Purple-stemmed American-aster
Vaccinium angustifolium	Lowbush blueberry
Vaccinium corymbosum	Highbush blueberry
Vaccinium macrocarpon	Large cranberry
Zizia aurea	Golden Alexanders

**Plant recommendations are site-specific and based on landscape conditions at French Park.*



Egremont Pollinator Pathway

FRENCH PARK

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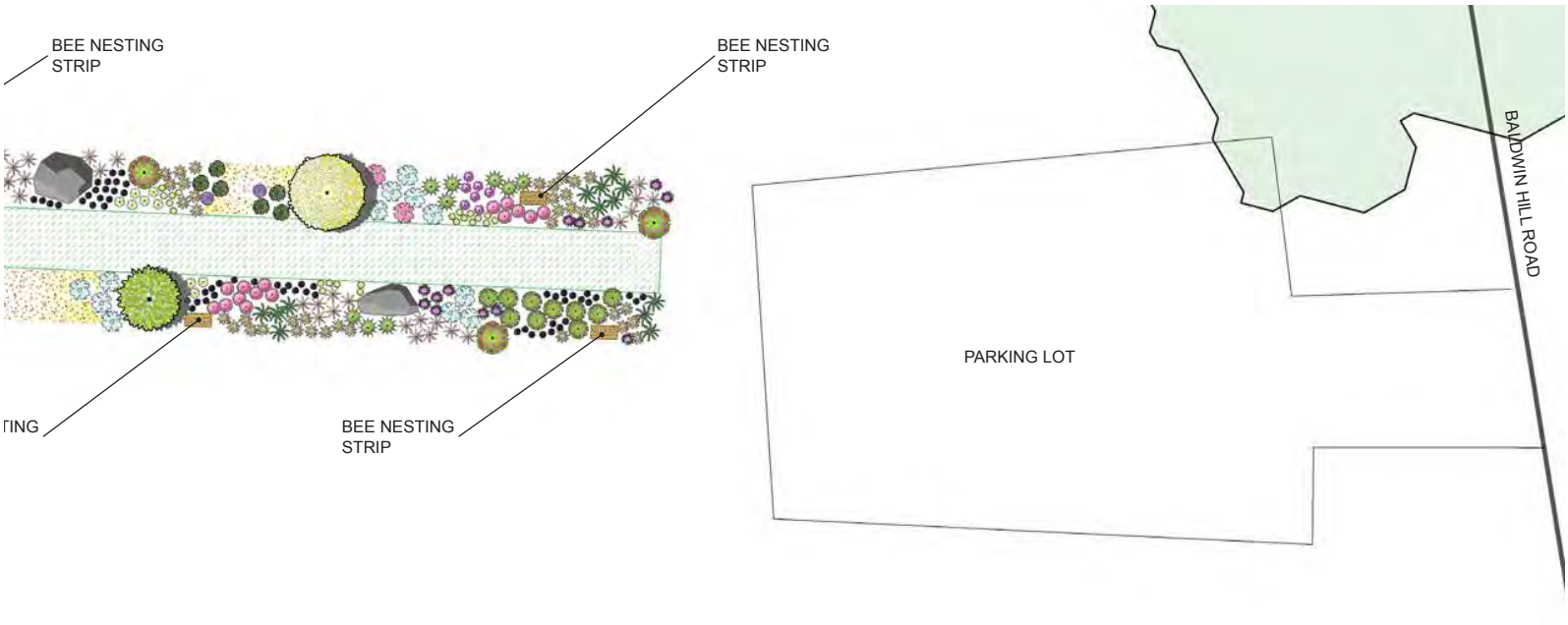


PLANT SCHEDULE

TREES	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Cercis canadensis	Eastern Redbud	2	20` wide spacing
	Salix bebbiana	Beaked Willow	4	20` wide spacing
	Salix discolor	Pussy Willow	10	8` wide spacing
	Salix petiolaris	Meadow Willow	10	10` wide spacing
	Salix sericea	Silky Willow	4	12` wide spacing

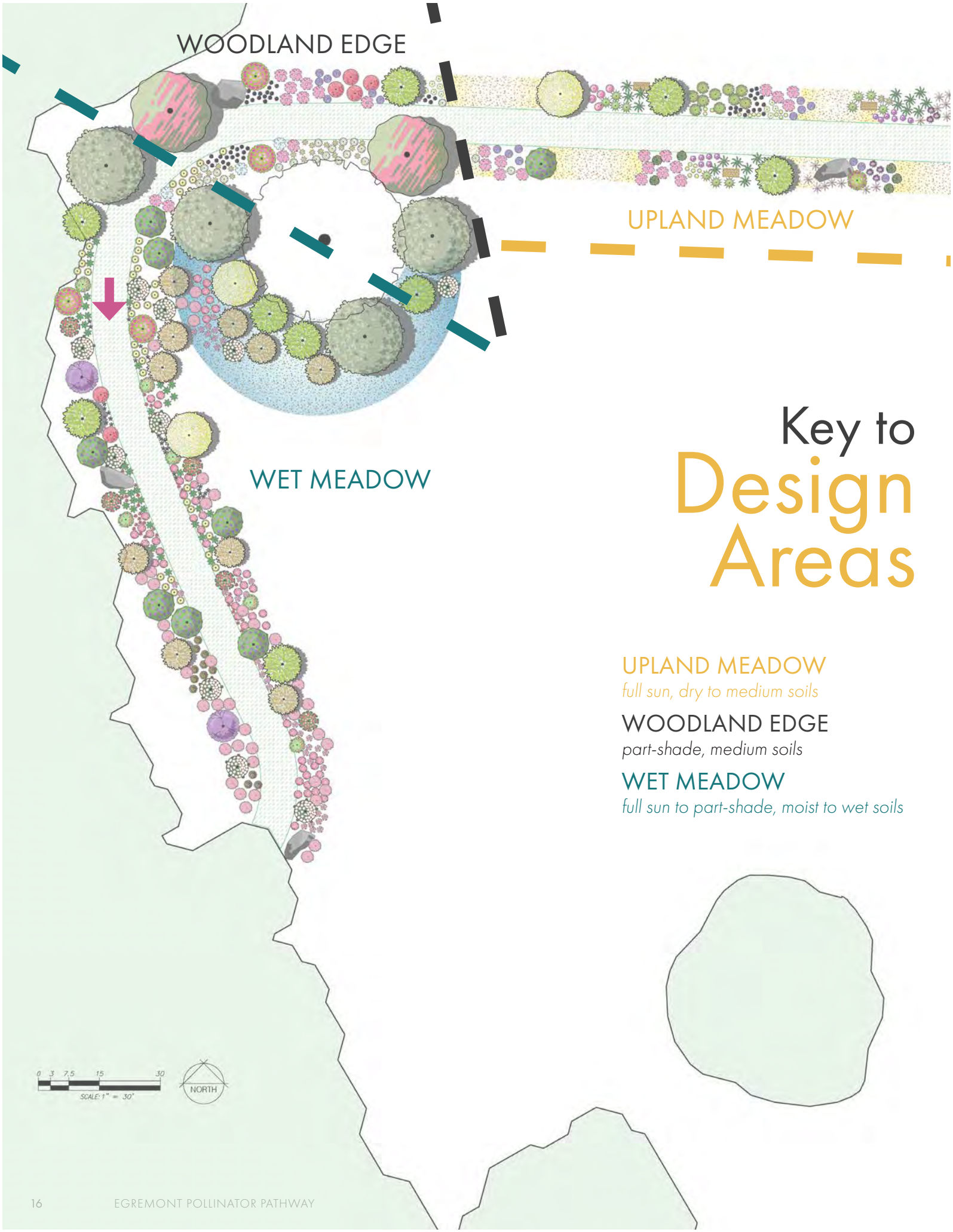
SHRUBS	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Cephalanthus occidentalis	Buttonbush	10	6` wide spacing
	Ribes rubrum	Red Currant	6	4` wide spacing
	Rosa nitida	Shining Rose	6	4` wide spacing
	Rosa palustris	Swamp Rose	5	5` wide spacing
	Rosa virginiana	Virginia Rose	4	5` wide spacing
	Rubus odoratus	Purple-flowering Raspberry	4	7` wide spacing
	Sambucus nigra	Black Elderberry	2	8` wide spacing
	Spiraea alba	Meadowsweet	15	3` wide spacing
	Spiraea tomentosa	Steeplebush	30	3` wide spacing
	Vaccinium angustifolium	Lowbush Blueberry	20	3` wide spacing
	Vaccinium corymbosum	Highbush Blueberry	8	8` wide spacing
	Vaccinium macrocarpon	American Cranberry	12	2` wide spacing

GRASSES	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Andropogon gerardii	Big Bluestem	30	3` wide spacing
	Carex stricta	Tussock Sedge	40	2` wide spacing
	Chasmanthium latifolium	River Oats	40	2` wide spacing
	Panicum virgatum	Switchgrass	20	3` wide spacing
	Schizachyrium scoparium	Little Bluestem	40	2.5` wide spacing

PERENNIALS	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Asclepias incarnata	Swamp Milkweed	60	2` wide spacing
	Asclepias syriaca	Common Milkweed	20	2` wide spacing
	Doellingeria umbellata	Flat-topped Aster	40	2` wide spacing
	Eutrochium fistulosum	Hollow Joe-Pye Weed	40	3` wide spacing
	Hypericum kalmianum	Kalm St. John`s-wort	12	2.5` wide spacing
	Lobelia siphilitica	Blue Lobelia	30	1` wide spacing
	Mimulus ringens	Monkeyflower	30	1` wide spacing
	Monarda fistulosa	Wild Bergamot	20	2` wide spacing
	Penstemon digitalis	Foxglove Beardtongue	20	1.5` wide spacing
	Penstemon hirsutus	Northeastern Beardtongue	20	1.5` wide spacing
	Physostegia virginiana	Obedient Plant	40	1.5` wide spacing
	Prunella vulgaris	Self-Heal	116	1` wide spacing
	Solidago caesia	Blue-stemmed Goldenrod	20	1.5` wide spacing
	Symphyotrichum lateriflorum	Calico Aster	20	2` wide spacing
	Symphyotrichum novi-belgii	New York Aster	20	2` wide spacing
	Zizia aurea	Golden Alexanders	40	1` wide spacing

GROUND COVERS	BOTANICAL NAME	COMMON NAME	QTY	REMARKS
	Dry Mix	Upland Meadow Seed Mix	871 sf	110 PLS/sf
	Wet Mix	Wet Meadow Seed Mix	1,824 sf	110 PLS/sf

Refer to page 18 for more information regarding the plants used in the design.

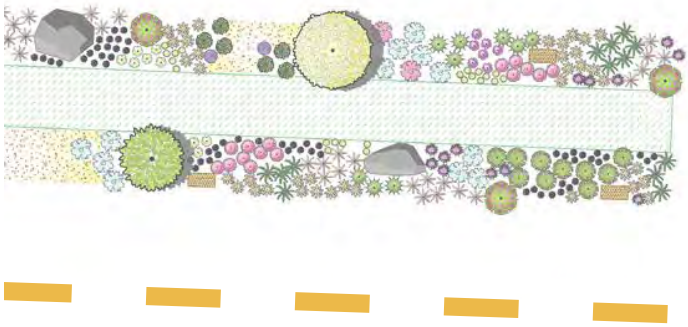


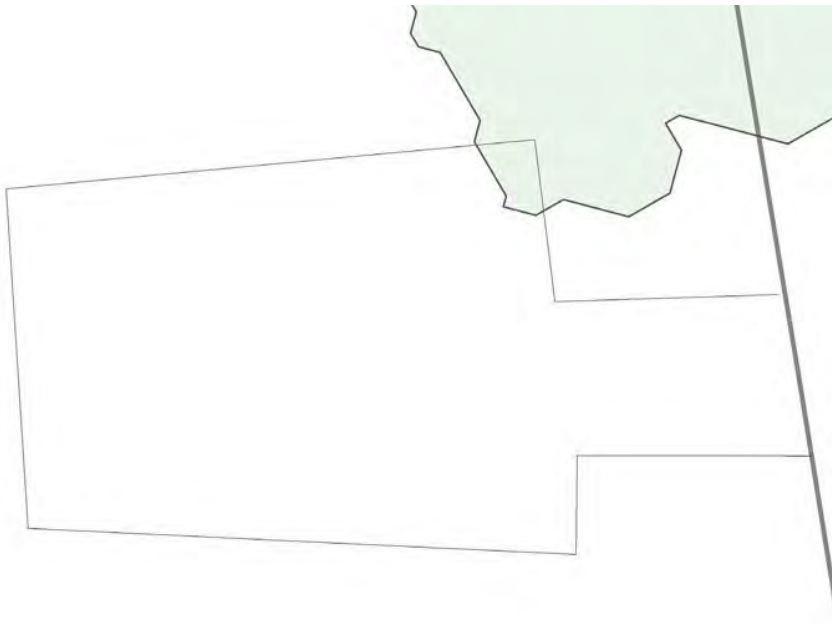
Key to Design Areas

UPLAND MEADOW
full sun, dry to medium soils

WOODLAND EDGE
part-shade, medium soils

WET MEADOW
full sun to part-shade, moist to wet soils





Below: conceptual rendering of the Wet Meadow area facing south (see opposite). Right: Wet Meadow one month before installation.

KEY TO DESIGN AREAS

UPLAND MEADOW | WOODLAND EDGE | WET MEADOW

PLANT SCHEDULE

TREES	BOTANICAL NAME	COMMON NAME
	Cercis canadensis	Eastern Redbud
	Salix bebbiana	Beaked Willow
	Salix discolor	Pussy Willow
	Salix petiolaris	Meadow Willow
	Salix sericea	Silky Willow

SHRUBS	BOTANICAL NAME	COMMON NAME
	Cephalanthus occidentalis	Buttonbush
	Ribes rubrum	Red Currant
	Rosa nitida	Shining Rose
	Rosa palustris	Swamp Rose
	Rosa virginiana	Virginia Rose
	Rubus odoratus	Purple-flowering Raspberry
	Sambucus nigra	Black Elderberry
	Spiraea alba	Meadowsweet
	Spiraea tomentosa	Steeplebush
	Vaccinium angustifolium	Lowbush Blueberry
	Vaccinium corymbosum	Highbush Blueberry
	Vaccinium macrocarpon	American Cranberry

GRASSES	BOTANICAL NAME	COMMON NAME
	Andropogon gerardii	Big Bluestem
	Carex stricta	Tussock Sedge
	Chasmanthium latifolium	River Oats
	Panicum virgatum	Switchgrass
	Schizachyrium scoparium	Little Bluestem

PERENNIALS	BOTANICAL NAME	COMMON NAME
	Asclepias incarnata	Swamp Milkweed
	Asclepias syriaca	Common Milkweed
	Doellingeria umbellata	Flat-topped Aster
	Eutrochium fistulosum	Hollow Joe-Pye Weed
	Hypericum kalmianum	Kalm St. John`s-wort
	Lobelia siphilitica	Blue Lobelia
	Mimulus ringens	Monkeyflower
	Monarda fistulosa	Wild Bergamot
	Penstemon digitalis	Foxglove Beardtongue
	Penstemon hirsutus	Northeastern Beardtongue
	Physostegia virginiana	Obedient Plant
	Prunella vulgaris	Self-Heal
	Solidago caesia	Blue-stemmed Goldenrod
	Symphyotrichum lateriflorum	Calico Aster
	Symphyotrichum novi-belgii	New York Aster
	Zizia aurea	Golden Alexanders

GROUND COVERS	BOTANICAL NAME	COMMON NAME
	Dry Mix	Upland Meadow Seed Mix
	Wet Mix	Wet Meadow Seed Mix

Egremont Pollinator Pathway

FRENCH PARK

FRENCH PARK UPLAND MEADOW SEED MIX

Shrubs	
Spiraea alba	Meadowsweet
Spiraea tomentosa	Steeplebush
Forbs	
Agastache scrophulariifolia	Purple giant hyssop
Asclepias syriaca	Common milkweed
Doellingeria umbellata	Tall white aster
Geranium maculatum	Spotted crane's-bill
Lupinus perennis	Wild lupine
Monarda fistulosa	Wild bergamot
Monarda punctata	Spotted beebalm
Pedicularis canadensis	Canadian lousewort
Penstemon digitalis	Foxglove beardtongue
Penstemon hirsutus	Northeastern beardtongue
Solidago caesia	Blue-stemmed goldenrod
Solidago juncea	Early goldenrod
Solidago odora	Sweet goldenrod
Solidago speciosa	Showy goldenrod
Symphyotrichum lateriflorum	Calico American-aster
Zizia aurea	Golden Alexanders
Graminoids	
Andropogon gerardii	Big bluestem
Carex brevior	Plains oval sedge
Chasmanthium latifolium	River oats
Eragrostis spectabilis	Purple lovegrass
Panicum virgatum	Switchgrass
Schizachyrium scoparium	Little bluestem

FRENCH PARK WET MEADOW SEED MIX

Forbs	
Asclepias incarnata	Swamp milkweed
Cirsium muticum	Swamp thistle
Doellingeria umbellata	Tall white aster
Eutrochium fistulosum	Hollow Joe-Pye weed
Lobelia siphilitica	Great blue lobelia
Mimulus ringens	Allegheny monkey flower
Rumex orbiculatus	Great Water Dock
Symphyotrichum novi-belgii	New York American-aster
Symphyotrichum puniceum	Purple-stemmed American-aster
Graminoids	
Carex stricta	Tussock sedge
Chasmanthium latifolium	River oats

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Mowing Regime

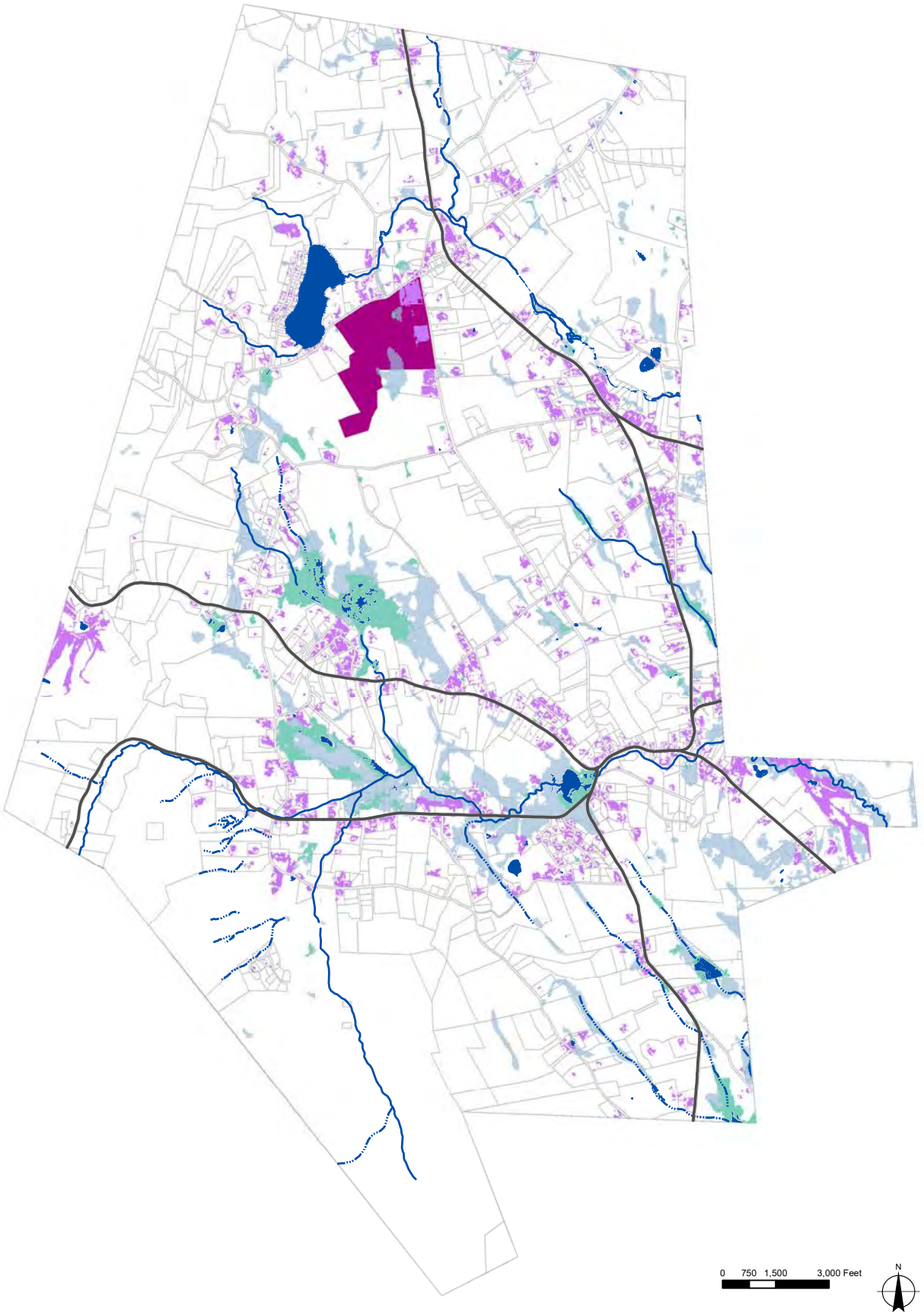
For the first growing season following seeding (2022), all seeded areas should be closely monitored for growth. When the average height of vegetation in a seeded area is approximately 12 inches, the area should be weed whacked or brush hogged to a height of no less than 8 inches. This schedule should continue throughout the first, and possibly second growing season.

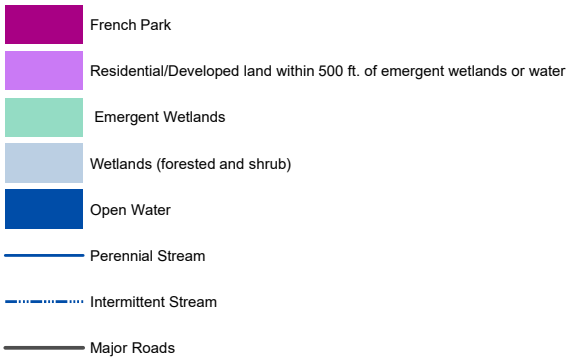
In the second growing season (2023), the seeded areas should be periodically assessed by a botanist or other individual with vetted plant identification skills. If the majority of vegetation in a given area is native species from the seed mixes, then the mowing schedule for that area should transition to a once-a-year mow. This should always occur during the dormant season (after November 15 or before April 1), after plants have gone to seed or before they begin next season's growth. Ideally, the site would be broken up into 2 or 3 mowed sections, with each section mowed once a year on a rotational basis. During this annual mow, vegetation should be cut to a height of 6-8 inches.

If during the second growing season, the majority of vegetation in a given area appears to remain non-native grasses and/or weeds, then continue mowing to keep the overall height of plants between 8-12 inches. This regime should be followed until the third growing season.

By the third growing season (2024), the site should be ready for transition to an annual mow on a rotational basis as described above. Invasive species and early successional trees should be closely monitored throughout the 3-5 year establishment period, and either manually grubbed using a weed wrench; mechanically grubbed using a brush grubber mounted on a tractor, ATV or pickup truck; or applied with herbicides in a cut stump treatment, by a licensed pesticide applicator.

SITES IN EGREMONT SUITABLE FOR REPLICATION OF FRENCH PARK DESIGN FEATURES





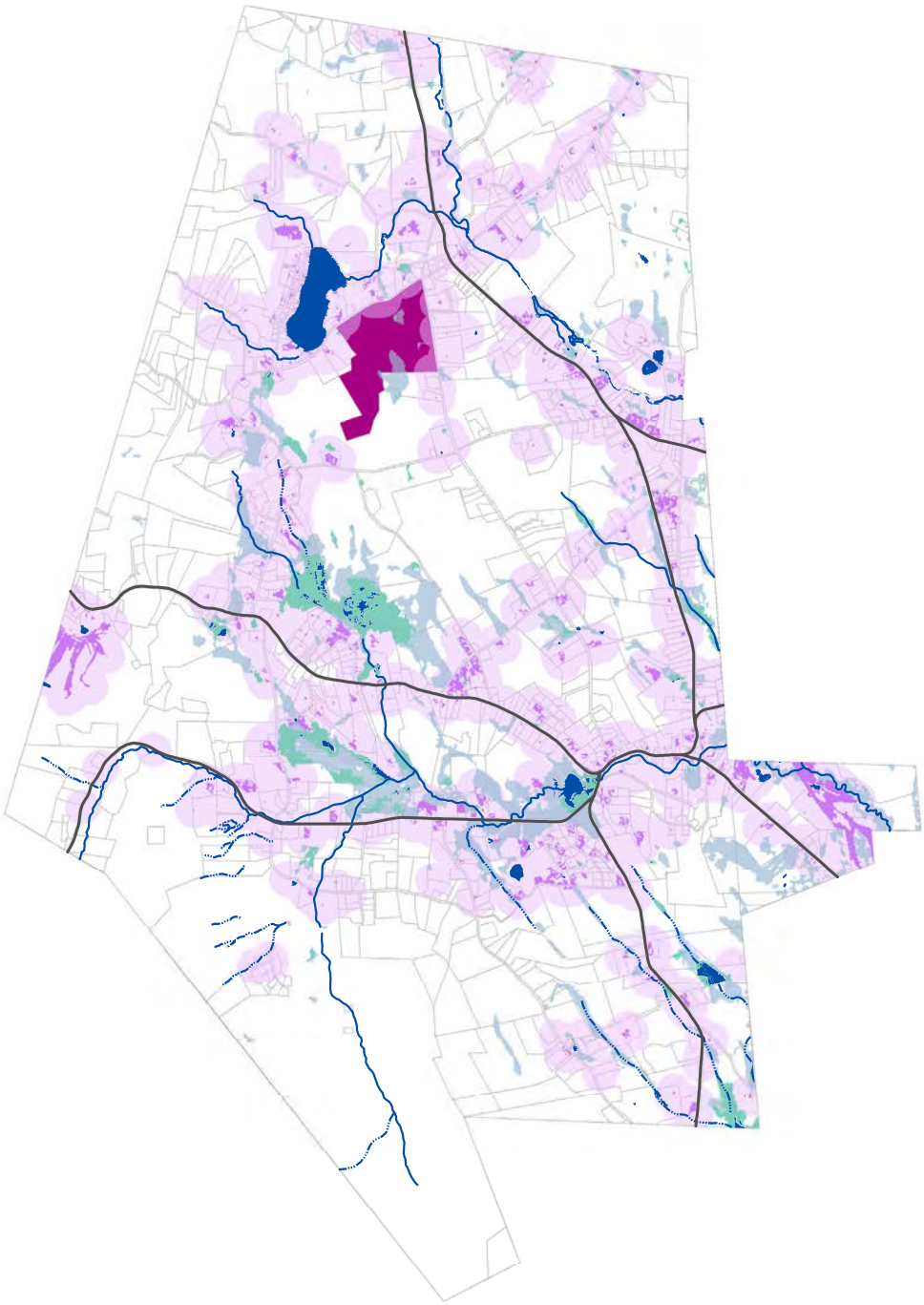
Replication Opportunities

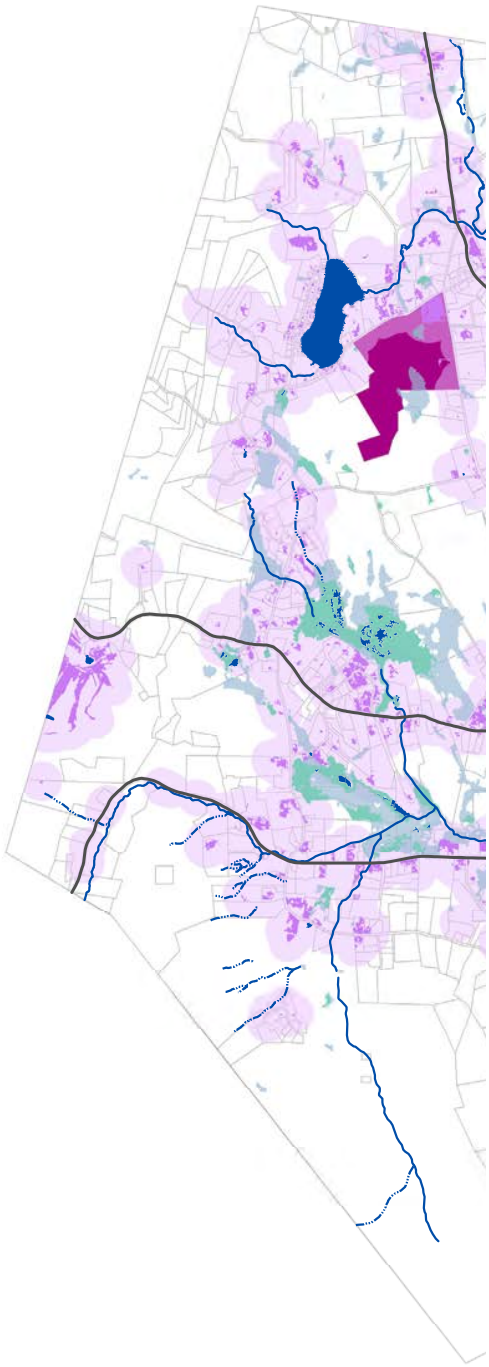
The maps on the following pages represent opportunities for replication of the French Park Pollinator Pathway design on properties across Egremont. By focusing on residential and developed land within 500 feet of emergent (non-forested) wetlands or open water, the design areas and corresponding plants outlined on the previous pages can be implemented on similar sites across town and throughout the region, creating the building blocks for a corridor of biodiversity and ecological resilience by specifically targeting at-risk pollinator species.

POLLINATOR CORRIDOR PROJECTIONS IN EGREMONT
BASED ON TOWN-WIDE LEVEL OF PARTICIPATION

25%

50

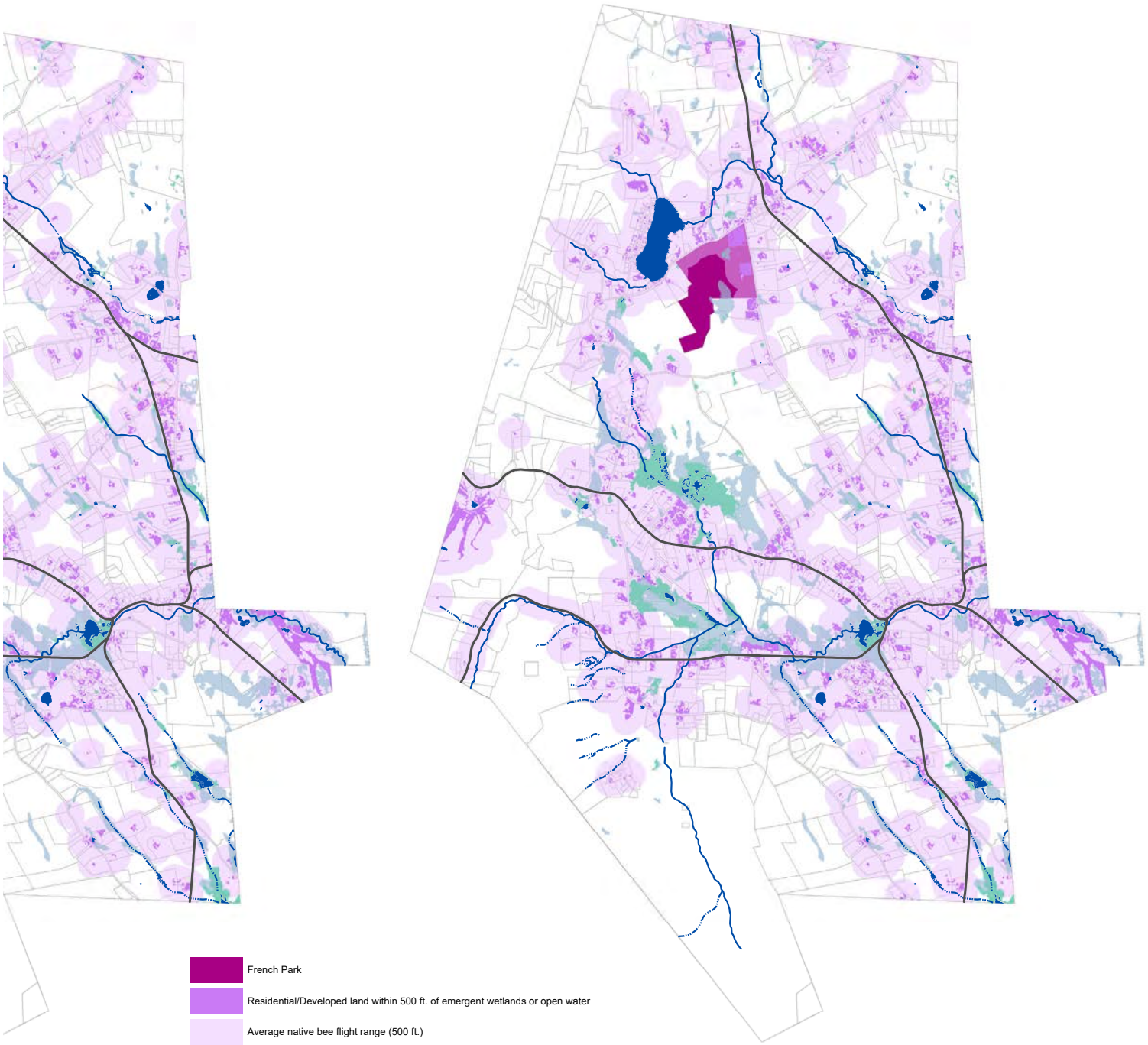




Left to right: maps showing 25%, 50% and 100% of all residential and developed land in Egremont within 500 feet of emergent wetlands or open water, with 500 foot buffers representing the average foraging range of a native bee.

)%

100%


French Park
Residential/Developed land within 500 ft. of emergent wetlands or open water
Average native bee flight range (500 ft.)
Emergent Wetlands
Wetlands (forested and shrub)
Open Water
Perennial stream
Intermittent stream
Major Roads
0 750 1,500 3,000 Feet
N

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' 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 and nectar 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 bees 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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and Further Reading

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