Monarch Meadows Grant Summary:

Friends of Mashpee NWR, Falmouth Rod & Gun Club,

Town of Falmouth, MA, The 300 Committee Land Trust

This is a summary of the educational and partnership field work in creating of 7 acres of Monarch Meadows from a grant from the U.S. Fish & Wildlife Partners Program with the Friends of Mashpee National Wildlife Refuge, Inc and their conservation land partners, The Falmouth Rod and Gun Club, inc,, The Town of Falmouth Conservation Commission, and The 300 Committee Land Trust in Barnstable County, in the town of Falmouth, Mass.

There are two components to be summarized in this document. First is the educational component and the second is the field work conducted within the partnership.

Educational Component:

Coordinating this part of the grant, the Friends of MNWR collaborated with the Educational Department of Waquoit Bay National Estuarine Research Reserve (WBNERR). We held three teacher workshops in the winter of 2017, programed site visits to each school, and helped these teachers and students to create and establish a native pollinator garden on their school property. Original grant opportunity was geared for 8 schools with 2 teachers per school in Barnstable County, Massachusetts (Cape Cod) in grades 3-5 Science curriculums. The Course aligns with grade 3-5 Massachusetts State Science Technology and Engineering Standards. This was to facilitate site visits, transportation of plants and equipment, and to accommodate local STEM teacher participation. After announcing the grant opportunity, 13 local schools that included 20 teachers applied with one school located in Boston (total of 14). Approximately 993 students in grades K-12 participated in planting, watering, and some releasing Painted Lady Butterflies they raised in the classroom in the spring of 2017.

Teachers received PDP's available free through the Cape Cod Regional STEM Network and Cape Cod Community College. Optional graduate credit was available from Framingham State College for the two-credit course.

Workshops held:

- February 28th, 2017 5-8pm
- April 19, 2017 8:30-5:30pm
- June 26, 2017 1-5pm

Objectives:

- Create a pollinator garden at each school
- STEM curriculum standards-Learn about pollinator garden habitats, food webs, life cycles and adaptions of plants and animals that inhabit them
- Try out field and classroom activities
- Plants, seeds, and up to $200 worth of other materials per school provided
- Personal Classroom posters and books
- Share teaching lessons and experiences at the last workshop
- Learn how to raise monarch butterflies from egg to butterfly & make rearing cages to keep

School supplies: Each school received the following items for in class instruction:

1. Capstone Books "What if there were no bees?"
2. Workman Publishing: Xerces Society Book "*Attracting* Native Pollinators"
3. Native Pollinator Color, Framed Poster 30”x15”
4. Butterfly Grow-out Culture setup

Site Visits

Each school was required to schedule a site visit prior to creating their gardens. This was to assure each individual garden was placed in an area that would assure success for the teacher and kids involved. These site needed to

have: 1. 6 hours or more of sunlight 2. A water source close by 3. Out of traffic areas 4. A reasonable garden size to start with and that could be expanded on in the future as was suggested by the teachers. During the workshops, the most common comment and concerns by the Teachers was that they did not know how to choose plants and how to start a garden that was manageable for their schedules. One site visit was given to each school, after this site visit, the Friends would create a design based on the conversation from that visit and create an excel spreadsheet that contained their plants list with bloom times (Spring, Summer, Fall) and bloom colors was created. This allowed the teachers to become familiar with the plant names (common and Latin) and could be used for future plantings so they could target specific blooming times more favorable for the kids (Spring and Fall) while they are at school and choose to add more color and plant diversity.

Plant Selection

Predominately, we choose to use native plants and some cultivated plants that were not invasive yet thrived under dry hot conditions. The number of plants for each garden were calculated by the garden size, placing one plant per square foot, and growth pattern (Small, climbing, tall, wide) determined how many plant would be planted and that varied widely for each school. Some teachers expressed an interest in planting fruit trees, and flowering shrubs near their gardens to enhance the site for pollinators and to increase diversity and bloom times throughout the year. Plants were also selected to have bloom times from early spring to late fall, having a minimum of three plants per season for small garden and more for the larger sites. Most plants were started as seeds in a greenhouse during the winter of 2017 beginning the cold-moist stratification process required by most native plants. Some plants were purchased from New England Wildflower Society as plugs and others were purchased at local garden stores in town.

To encourage butterflies to the school gardens, we selected specific host plants. There were 15 species of butterfly species that the gardens supported by planting with their associated host plants. These species include: Monarch, Viceroy, White Admiral, Black Swallowtail, Tiger Swallowtail, Spring Azure, Silvery Blue, Karner Blue, Common Buckeye, Gray Hairstreak, Common Hairstreak, Checkered Skipper, American Lady, Painted Lady, Anise Swallowtail.

All plants were labeled for identification as they were planted. A short demonstration at the beginning of each session to the student on how to transplant and gently plant their garden was given. Most teachers sent out their students in groups of 10 kids and had volunteers so that each child had access to instruction as they planted. Some kids just wanted to dig holes, not plant so their wishes were granted and the process moved along nicely! Worms were a big hit and stopped all activities so everyone got to see one and watch and learn about them from instructors. This seemed to be a very popular attraction at all the schools so we allowed the kids to have their own pace, focus, and interests.

This next section summaries all the schools involved, location, teachers involved, site visit dates, garden planting dates, size of garden, number of plants they received for their gardens, number of species, host plants, bloom times and lastly number of kids involved at each garden. Averages are given at the bottom.

Schools & Teachers Participating in Grant

School	Address	Teachers
Bournedale Elementary 1-3	41 Ernest Valeri Rd Bournedale, MA 02532	Lucinda Keith, Melanie Henrick, Kelly McKenna
Nauset Elementary 1-3	70 Route 28. Orleans MA 02653	Margaret Brown
Falmouth High School 9-12	874 Gifford Street Falmouth MA 02540	Chris Brothers
Falmouth Lawrence 5-7	113 Lakeview Ave Falmouth MA 02540	Chris Brothers
Forestdale Elementary K-3	151 ROUTE 130 FORESTDALE, MA 02644	Susan Iadonisi
Hyannis West Elementary K-3	549 West Main Street Hyannis, MA 02601	Susan LaValle
Linden STEAM Academy 5-7	29 Wescott Street in Malden, MA 02148	Christina Rosenthal, Emily Bartlett, Justin Umlah, Debora Brennan
Marguerite E. Small Elementary K-3	40 Higgins Crowell Rd. West Yarmouth, MA, 02673	Elizabeth Dugan, Justine Filosa-Wills
Mashpee KC Coombs STEM K-3	152 Old Barnstable Road Mashpee, MA 02649	Katie Martin
Oak Ridge Elementary 3-6	260 Quaker Meeting House Rd East Sandwich, MA 02537	Cynthia Denmat
Sandwich STEM Academy 7-12	365 Quaker Meetinghouse Road. Sandwich, MA, 02537	Renee Fudala
Sturgis West Academy 9_12	105 West Main Street Hyannis MA 02601	John Tecklenburg, Nate Furey
Teaticket Elementary 4th Grade	45 Maravista Ave. Extension East Falmouth, MA 02536	Maureen Dywer

School Garden and plant summaries

School Name	Teachers	Site Visit	Date planted	Garden dimensions	total square ft	total Plants
Bournedale Elementary 1-3	3		4/8 & 4/29	80'x11'	880.0	114
Nauset Elementary 1-3	1		4/19/2017	4ftx12ftx12"	48.0	72
Falmouth High School 9-12	1		5/24 &6/5	10ftx50ftx8"	1600.0	132
Falmouth Lawrence 5-7	3		5/24 & 6/12	20x30x8"	600.0	162
Forestdale Elementary K-3	2		5/30/2017	5'x8'x6" + (2 ft x 20ft X2)	40.0	127
Hyannis West Elementary K-3	1		4/28/2017	2ftx60ftx6"	120.0	101
Linden STEAM Academy 5-7	4		5/17/2017	4ftx8ft Home Depot kit	32.0	97
Marguerite E. Small Elementary K-3	2		6/19/2017	4ftx8ft Home Depot kit	32.0	80
Mashpee KC Coombs STEM K-3	1		4/24/ & 5/1/17	(6ftx10ftx.5)+(15ftx15ftx6")	285.0	143
Oak Ridge Elementary 3-6	2		5/11/2017	5'x8'x10"	40.0	77
Sandwich STEM Academy 7-12	2		6/8/2017	22ftx22ft x2ft	500.0	84
Sturgis West Academy 9_12	2		5/22/2017	8x8x8" x2	128.0	88
Teaticket Elementary 4th Grade	1		September-17	10x24	240.0	112
Teaticket Elementary K Grade	1		October 13/17	1 new, 2 est gardens	360.00	595

School Garden and plant summaries (continued)

School Name	Total species		#/ Host plants	# /Spring Blooms	# /Summer Blooms	# /Fall Blooms	# of kids participating
Bournedale Elementary 1-3	50		14	10	36	21	55
Nauset Elementary 1-3	32		14	10	36	21	165
Falmouth High School 9-12	18		7	3	15	11	120
Falmouth Lawrence 5-7	17		7	3	12	9	45
Forestdale Elementary K-3	34		12	6	34	11	41
Hyannis West Elementary K-3	29		9	4	21	9	40
Linden STEAM Academy 5-7	30		11	8	20	8	67
Marguerite E. Small Elementary K-3	29		13	4	24	9	83
Mashpee KC Coombs STEM K-3	49		12	13	23	14	120
Oak Ridge Elementary 3-6	21		10	4	12	7	21
Sandwich STEM Academy 7-12	36		12	6	24	14	125
Sturgis West Academy 9_12	27		10	5	18	10	15
Teaticket Elementary 4th Grade	52		16	9	36	19	78
Teaticket Elementary K Grade	47		15	11	42	18	18
	Average		Average	Average	Average	Average	
Totals	34		12	7	25	13	993

Creation of 7 acres of Monarch Meadows: Main Field work and activities

❖ Conservation Land Partnership and Contributions

This grant was administered and organized by the Friends of Mashpee NWR, Inc., who does not own land, but in cooperation with three local conservation land groups: The Falmouth Rod and Gun Club (FR&GC) who contributed 5 acres (7 individual fields), The Town of Falmouth who contributed 2.3 acres (2 individual fields), and The 300 Committee Land Trust (T3C) who established 0.2 acres. The Falmouth Rod and Gun Club has 18 wildlife food plots established in 1958. The Town of Falmouth had two separate fields: one was located in East Falmouth

called the SeaFarm which was 1.3 acres and the other field located in Hatchville called Dupee field which was one of the oldest Dairy Farm on the Cape but only 1.0 acres left cleared. The 300 Committee converted a golf-driving range in downtown area into their “Teaticket” park and wanted to establish a pollinator garden in a natural area of that park to which they can expand upon into the future.

❖ Field Prep

Overall, all fields at the FR&GC and town properties, with the exception of the Teaticket park site, were prepared the week of January 2-5, 2017. A contractor from Vermont, Faun Koplovsky, utilized a new technique of tillage that incorporated all organic material (rocks, brush, trees, top soil) on site. See pictures of equipment and soil preparation.

Sea Farm Field

Falmouth Rod and Gun Club Field

Dupee Field

This site prep process eliminated some invasive such as Oriental bittersweet, honeysuckle and greatly minimized survival of poison ivy, and multiflora rose. It also greatly improved seed to soil contact in these old fields.

❖ Summary of Volunteer field work

- Falmouth Rod & Gun Club (FR&GC): 41° 35’ 38.10” N 70° 31’ 20.03” W

The Club has formed a “Pollinator Committee” to be in charge of these fields designated to this grant. This groups, lead by Don Clarke, has been instrumental in following and schedule field time to get seeds and plants installed and documenting volunteer time and tractor work. The club started field seeding two weeks after soil prep on 1/22/17. In the last year, given scheduled field work that included planting seeds, plant plugs, shrubs, trees they have donated 747 work hours @$20/hour=$14,940. Tractor time was 54 work hours @$100/hour=$5,400 so the club has matched this grant, in just 2017 alone, for $20,340. This included involving 183 volunteers in this work in for 2017. One field, the apple field which is 2 acres, was not reseeded in the winter of 2017 so that work will be concluded in the fall of 2018. All seeds and plants have been ordered and ready to be installed in this field by club members. This work will require tractor time and volunteer involvement which is estimated at an additional contribution of $5,000 for 2018.

Native shrubs were planted on the field edges. These species planted were: American Basswood, Gray Dogwood, Viburnum Arrowwood, Viburnum American Cranberry bush, Wild Raisin, Serviceberry, spicebush, and buttonbush. Other nonnative shrubs added to the field were Magnolia Sweet bay, Chinese/American chestnut, Rose of Sharon, Andromeda, azalea, and rhododendrons.

In each field, after initial soil preparation in January 2017, 5 species of aster (New England, New York, Smooth Blue, White wood, , 5 species of goldenrod(Grey, White, Narrow-leaved, Canadian, Bicolor), and 3 species of milkweed (Common, swamp and butterfly weed) were seeded in circular plots ranging from 3ft to 10ft in diameter throughout each of the fields. Throughout the year, additional plantings of plant plugs and more seed mixes were spread through all the fields. Each field, except the apple field, received the same seed mixes. The Seed mixes from Ernst Seed Company was not available until April of 2017, too late to seed after the initial soil preparation in January so it was decided to seed this mix in the late 2017. These Ernst seed mix, along with other seed mixes purchased from American Meadows and Vermont Wildflower Farm constitute over 236 new species of flowering Forbes to these fields. A list of seed mixes species and companies purchased are listed in the appendix. Total seeds in pounds are listed below for each field site:

Fields 3,4,5 and Stump area: 49 lbs plus individual seeds
Field 6: 18 lbs plus individual seeds
Field 7: 20 lbs plus individual seeds

Plants plugs, grown by the Bristol Agriculture High School were planted in Fields 3,4,5 and stump area, now collectively called "Sweet Meadows" field. The species planted as plugs were: perennial lupine, white beardtongue, Indian hemp, narrow-leafed mountain mint, broad-leaved mountain mint, evening primrose, butterfly weed, white and blue vervain, blue campion.

The Club decided to create two vernal pools, located in Field 4 and 6 for the local wildlife, and specifically for the box turtles. They are approximately 10 ft long, 5 ft wide and 2 ft deep with shallow sides for easy access on all sides.

- Town of Falmouth
  - Sea Farms 41° 33' 41.77" N 70° 33' 23.57" W
  - Dupee 41° 36' 52.58" N 70° 34' 16.20" W

Field preparation on town properties of Dupee and Sea Farms were prepared the week of January 2-5, 2017. First seeding was started 2/1/17 at Dupee and 2/9/17 for Sea Farms where 5 species of aster (New England, New York, Smooth Blue, White wood, , 5 species of goldenrod(Grey, White, Narrow-leaved, Canadian, Bicolor), and 3 species of milkweed (Common, swamp and butterfly weed) were seeded in circular plots ranging from 3ft to 10ft in diameter throughout each fields. Throughout the year, additional plantings of plant plugs and more seed mixes were spread through all the fields. Each field, except the apple field, received the same seed mixes. The Seed mixes from Ernst Seed Company was not available until April of 2017, too late to seed after the initial soil preparation in January so it was planted by Cape Cod AmeriCorps in the late fall of 2017. These Ernst seed mix, along with other seed mixes purchased from American Meadows and Vermont Wildflower Farm constitute over 236 new species of flowering Forbes to these fields. A list of seed mixes species and

companies purchased are listed in the appendix. Total seeds in pounds are listed below for each field site:

Sea Farms and Dupee: each received 49 lbs. plus individual seeds

Native shrubs were planted on the field edges. These species planted were: American Basswood, Gray Dogwood, Viburnum American Cranberry bush, Wild Raisin, Serviceberry and spicebush.

Both fields were treated in 10/18/17 for invasive control by contractor Ralph Alfieri

- The 300 Committee Land Trust (T3C) 41° 33' 55.42" N 70° 35' 40.16" W

  This project has not been completed as scheduled due to staffing issues, and invasive control. The initial 0.25 acres had to be downsized to 0.12 acres due to the pervasive presence of bittersweet vines, poison ivy and porcelain berry. We attempted twice to rototill the heavy sod and realized heavy equipment was needed to remove the sod. Site preparation was impacted by this and by lack of work done to cut nonnative tree species and herbicide treatments. New staffing will not start until October 2018 so it highly unlikely that this pollinator field will be a priority. However, seed mix has been purchased for this site. We have been assured that site preparation will begin in November so that seeds can be sowed late 2018. Serviceberry, New Jersey Tea, and wild raisin shrubs will be planted in this site.

- Overall Summary of grant activities:

  6/17/16 Grant awarded for $17,000, 7 acres, educational component
  8/16/16 Grant participate meeting. Info and questions session
  8/30/16 Bristol Agriculture High School meeting w Brian B, coordinated by Jared Green
  students to grow 5000 native plants for project
  8/31/16 T3C planning, budget meting
  9/6/16 Town of Falmouth/ T3C planning meting

9/14/16 Teaticket Park garden plots layout
10/11/16 Teaticket Park cleanup crew on site
11/10/16 Nstar OK'd Towns digging in all fields
11/11/16 Mass Natural Heritage & Endangered Species Program contact-Emily Holt for state permits. It was determined that FR&GC only site requiring permits.
11/17/16 Budget draft to grant project
11/18/16 Meeting with Town and T3C on plant list selection
11/21/16 Falmouth Selection Meeting on grant permission
12/7/16 Conservation Commission meeting-update on grant
1/ 2-5/17 Field preparation at all fields by Vermont contractor-Faun Koplovsky
Planting for asters, goldenrods, anise starts
1/10-11/17 FR&GC fields *Remove 4 trees, Trim tree edges spread manure in field, to allow big tractor work*
1/13/17 Plant native plant flats in greenhouse
1/22/17 FR&GC fields seeding (21 people for 5 hours)
2/1/17 Dupee Field planting (4 people for 5 hrs)
2/9/17 Sea Farms field planting-(4 people fo 3 hrs)
2/28/17 FR&GC fields 6 & 7 at Rod and Gun Club planting finished
2/28/17 First Teacher Workshop 5-8pm
3/9/17 20 volunteers from FR&GC transplant donated plants from Spohr gardens
3/13/17 Site visit to Bournedale Elementary
3/23/17 Site visit to K.C. Coombs Elementary
3/27/17 Site visit to Malden STEM Academy
4/8/17 Bournedale Elementary garden planting-parents and students
4/12/17 Site visits to Sandwich schools: Forestdale, Oakridge, High School
4/13/17 Site visits to Hyannis, Yarmouth, Eastham schools: Hyannis West Elementary, Sturgis West H.S., Marguerite Small Elementary, Nauset

4/18/17 2nd Teacher Workshop 8:00-6:30pm
4/21-22/17 FR&GC fields Move 280 shrubs from donated Spohr Garden plants to FR&GC
4/24/17 1pm meet with instructors for monarch raising class for teachers,
4/24/17 K.C. Coombs heart garden created with students and teacher
4/29/17 Bournedale Elementary 2nd plantings with parents and students
5/8/17 FR&GC fields Planning meeting
5/11/17 Oak Ridge Elementary School garden planting
5/13/17 collected 4-32gal barrels of town compost for Malden school gardens
5/17/17 Malden School garden plantings in Boston
5/18/17 FR&GC fields Weeding and prep field
5/22/17 Delivered soil, plants and manure to Sturgis West in Hyannis for gardens; pickup trellis for Forestdale garden planting date
5/24/17 Lawrence and FHS gardens plantings
5/25/17 Setup Forestdale and Sandwich STEM plants, purchased hose
5/26/17 Dropped off materials to K.C Coombs teacher. FR&GC planning meeting
5/30/17 Dropped plants off to Forestdale and Sandwich STEM gardens
6/5/17 Plants and seeds to FHS gardens plantings with students
6/7/17 Ordered Monarch Waystation Signs
6/9/17 Setup FR&GC fields for Saturdays plantings
6/10/17 23 FR&GC fields people plantings of plugs, seeds and transplanting of donated shrubs
6/14/17 Collected plant from Bristol Aggie;
Completed Forestdale Arbor with Teacher
6/15/17 Bournedale garden party-all classes and parents celebrating garden
6/16/17 Teach Ticket Garden Site Visit
6/22/17 Cape Cod AmeriCorps-plantings Bristol Aggie 1000 plugs in fields 3,4,5, and stump
6/26/17 Final Teacher Workshop 12-6pm
7/4-6/17 FR&GC fields Watering fields 1 & 2

7/10/17 Teaticket park-rented rototiller-too small
7/20/17 FR&GC fields Mow Fields 1 (apple field) w bush hog
7/25/17 FR&GC fields Watering of apple field
8/1/17 Wampanoag Tribal Youth Camp (Preserve our Homeland-POH) planting gardens
8/5/17 Monomoy NWR Intern picks up their garden plants
8/5/17 FR&GC fields Well testing for setup and use as main water source
8/16/17 FR&GC fields Tractor to prepare field 6 and herbicide
9/8/17 Tried to rototill Teaticket park site, larger machine but not adequate
9/30/17 Teaticket 4th grade Elementary garden planting
10/5/17 Teaticket 4th grade Elementary garden-added shrubs & trees
10/13/17 Teaticket K-1 grades Elementary garden planting- additional garden on grant
10/3/17 Sprayed FR&GC field 6 to eliminate noxious weed
10/16/17 Tilled FR&GC field 6
10/18/17 Herbicide Tx for Dupee and Sea Farms-Town fields
11/2/17 FR&GC fields Tractor time digging two vernal pools and mowing fields
11/6/17 Tilled all FR&GC fields except apple field. Cut short field 7
11/4/17 Seeded and planted FR&GC field 6-11volunteers
11/12/17 Seeded and planted FR&GC fields 3,4,5 and stump field
11/13/17 Ordered last seeds for clubs, town, Teaticket.
11/14/17 FR&GC fields Completed work in fields 3,4,5. Planted transplants of flowering perennials
11/17/17 Weeded and reseeded Falmouth High School
11/20/17 Cut and reseeded Dupee Field with Cape Cod AmeriCorps
11/21/17 Rolled Sea Farms and Dupee Fields
12/19/17 Planted dormant trees and shrubs from Cold Stream Farm in FR&GC fields
6/18/18 Seeded FR&GC fields 6 and 7 with zinnia, cosmos, and anise
8/1/17 Site visit to all fields w Ted K and MK Fox-evaluate success

8/20/18 mowed FR&GC fields 6 to eliminate Sneeze Weed flower heads
8/26/18 USFWS & Friends FR&GC field summary and future suggestion report

ESTIMATED FUTURE ACTIVITIES

- <u>September 2018</u>
  FR&GC: mow 8ft strips in apple field (#1) perpendicular to access road on both sides of apple tree line. Herbicide. Wait two weeks, till under. Herbicide if needed.
- <u>October 2018</u>
  Plant spicebush, highbush cranberry, basswood, rose of Sharon, etc bushes into all fields for project.
  In FR&GC stump field, create a planting of basswood with wild raisin and highbush cranberry bushes that is protected with fencing to protect from Deer browsing
  Prepare Teaticket park site. Seed areas, plant shrubs, plant plugs of flowering plants
- <u>November 2018</u>
  Seed FR&GC apple field tilled areas with remaining purchased seeds.

The Friends of Mashpee NWR coordinated both educational and partner field work, plant selection, site visits and rearing of the native plants for educational gardens. We have contributed over 250 hours on supporting the educational component and 1540 hours with field component work, support, plantings, etc. which, if billed at $20.00 per hour the estimated volunteer work donation to the grant's effort sums as a $35,800 support.

Appendix 1: Main Seed Mix, plant lists and seed companies purchased from.

A. Ernst Conservation Seeds Inc 1/31/2017 9:36:22 AM

Component	Item Number	Component Description		QTY	Percentage
Seed Mix A					
	APOCAN01	Indianhemp, PA Ecotype	lb	0.010	1.00
	AQUCAN01	Eastern Columbine	lb	0.020	2.00
	ASCINC05	Swamp Milkweed, IA Ecotype	lb	0.050	5.00
	ASTLAE01	Smooth Blue Aster, NY Ecotype	lb	0.030	3.00
	ASTLAT01	Calico Aster	lb	0.030	3.00
	ASTNOV01	New England Aster, PA Ecotype	lb	0.050	5.00
	ASTPIL02	Heath Aster, IA Ecotype	lb	0.050	5.00
	CHAFAS01	Partridge Pea, PA Ecotype	lb	0.500	50.00
	DESCAN01	Showy Ticktrefoil, PA Ecotype	lb	0.050	5.00
	EUTCAR01	Slender Goldentop, NJ Ecotype	lb	0.005	0.50
	HELHEL02	Oxeye Sunflower	lb	0.020	2.00
	OENBIE01	Evening Primrose	lb	0.020	2.00
	PENDIG01	Tall White Beardtongue, PA Ecotype	lb	0.110	11.00
	PYCINC01	Hoary Mountain mint	lb	0.005	0.50
	PYCVIR01	Virginia Mountain mint, PA Ecotype	lb	0.005	0.50

Component	Item Number	Component Description		QTY	Percentage
SOLBIC01	White (Silver Rod) Goldenrod, PA Ecotyp		lb	0.010	1.00
SOLNEM01	Gray Goldenrod, PA Ecotype		lb	0.010	1.00
SOLODO01	Licorice Scented Goldenrod, PA Ecotype		lb	0.010	1.00
SOLRUG01	Wrinkleleaf Goldenrod, PA Ecotype		lb	0.010	1.00
VERNOV01	New York Ironweed, PA Ecotype		lb	0.005	0.50

B. American Meadows Seeds and Mixes purchased

1. Northeast Wildflower Seed Mix contains 27 different annual and perennial wildflowers that thrive when planted in the Northeast.
2. Zinnia and Cosmos Seed Collection. Plant this easy, vibrant flower duo for endless blooms from summer all the way until frost.
3. All Perennial Wildflower Seed mix with 15 biennial and perennial wildflowers like Sweet William, Foxglove, Blue Flax and Blazing Star, this mix is designed to build blooms and increase color as the years pass.
4. Deer Resistant Wildflower Mix. Containing 17 wildflowers that deter deer, the brings loads of colorful blooms to the landscape. Perennials like Lupine, Gaillardia and Lance Leaf Coreopsis return and multiply each season, while annual varieties like California Poppy, Zinnia and Scarlet Sage burst into blooms the very first year.
5. Butterfly & Hummingbird Wildflower Seed Mix. Containing 16 annual and perennial wildflowers including Wild Cosmos, Rocket Larkspur, Echinacea and Catchfly.

C. Vermont Wildflower Mixes purchased

1. Northeast Native Wildflower Seed Mix this mix contains 16 annuals and perennials. Includes Eastern Columbine, Butterfly Weed, Smooth Aster, New England Aster, White Upland Aster, Wild Blue Indigo, Lance-leaf Coreopsis, Showy Tick Trefoil, Indian Blanket, Gay feather, Evening Primrose, Hairy Beardtongue, Slender Mountain Mint, Brown-eyed Susan, Rigid Goldenrod, Golden Alexander

2. Deluxe Pollinator Wildflower Seed Mix contains 27 species. We've taken our standard regional mix and added treats such as late blooming perennials, natives and rare species that the standard regional mix does not have. Treats such as New England Aster, Perennial Sunflower, Showy Red Milkweed, Butterfly weed etc.

Botanical Name	Common Name	Life Cycle	Approx. Height & Color
Asclepias incarnata	Red Milkweed	Perennial	2-5 ft. Pink/White/Mauve
Asclepias tuberosa	Butterfly Weed	Perennial	2-3 ft. Orange
Aster novae-angliae	New England Aster	Perennial	3-6 ft. Purple
Centaurea cyanus	Multi Cornflower	Annual	2 ft. Blue
Cheiranthus allionii	Siberian Wallflower	Biennial	2 ft. Orange
Chrysanthemum maximum	Shasta Daisy	Perennial	3 ft. White
Coreopsis lanceolata	Lance-leaf Coreopsis	Perennial	3 ft. Yellow
Coreopsis tinctoria	Plains Coreopsis	Annual	2-3 ft. Yellow/Red
Cosmos bipinnatus	Wild Cosmos	Annual	3-6 ft. Pinks/Whites/Maroon
Cosmos sulphureus	Sulphur Cosmos	Annual	3 ft. Orange
Delphinium consolida	Giant Larkspur	Annual	3-4 ft. Multi
Dianthus barbatus	Sweet William	Biennial	2 ft. Multi Pinks
Echinacea purpurea	Purple Coneflower	Perennial	3 ft. Purple
Eschscholzia californica	Orange Poppy	Tender Perennial	2-3 ft. Orange
Gaillardia aristata	Blanket Flower	Perennial	3 ft. Yellow/Red
Gypsophila elegans	Baby's Breath	Annual	2 ft. White
Helianthus annuus	Wild Sunflower	Annual	3 ft. Yellow
Helianthus maximiliani	Perennial Sunflower	Perennial	3-5 ft. Yellow
Liatris spicata	Blazing Star	Perennial	2-3 ft. Purple/Pink
Linum perenne lewisii	Blue Flax	Perennial	2 ft. Blue
Linum grandiflorum rubrum	Scarlet Flax	Annual	2 ft. Red
Lupinus perennis	Perennial Lupine	Perennial	3-4 ft. Purple
Papaver rhoeas	Red Poppy	Annual	2-3 ft. Red
Dalea purpurea	Purple Prairie Clover	Perennial	3 ft. Purple

Rudbeckia gloriosa	Gloriosa Daisy	Perennial	2-3ft. Red/Yellow
Rudbeckia hirta	Black-eyed Susan	Biennial	2-3 ft. Yellow
Silene armeria	None-so-pretty	Annual	2-3 ft. Pink

3. Quick Bloom Wildflower Seed Mix is the perfect mix with 35 quick blooming colorful annuals just a short time after planting and hardy perennials for the next season! The drought & heat tolerant quick blooming annuals give you color in just a short time and you also have some hardy tough perennials for years of bloom. Full sun to partial shade, super easy to grow. Includes the following species - **ANNUALS** Baby's Breath, Blue Cornflower, Orange Cosmos, Wild Cosmos, African Daisy, Indian Blanket, Evening Primrose, Garland Daisy, Red Poppy, Baby Snapdragon, None-so-Pretty (Catchfly), Sweet Alyssum, Plains Coreopsis, Crimson Clover, Ch. Forget-me-not, Multi Cornflower, Four O'clock, Autumn Beauty Sunflower, Calendula, Scarlet Flax, Rose Mallow, Arroyo Lupine **PERENNIALS/BIENNIALS** Siberian Wallflower, Blue Flax, Sweet William, California Poppy (Tender Perennial), Blanket Flower, Rocky Mountain Penstemon, Shasta Daisy, Yellow Coneflower, Gloriosa Daisy, Black-eyed Susan, Lance-leaf Coreopsis, Candytuft, Perennial Lupine

D. Prairie Moon Nursery

1. Individual seeds: Blazing Star (Liatris scariosa), Button Bush (Cephalanthus occidentalis) , Yellow Indigo (Baptisia tinctoria), Oxeye Sunflower (Heliopsis helianthoides).
2. Wetland plant species mix

Monarch Pollinator Seed list: For all fields and source for Educational Gardens

- Arrowleaf Aster (Symphyotrichum urophyllum)
- American Basswood (Linden Americana)
- Bee Balm (Monarda fistulosa)
- Bellflowers (Campanula persicifolia)
- Big leave wood aster (Eurybia macrophylla))- Friends collected seeds
- Birds foot violet (Viola pedata) Purchased 11/8/16
- Blazing Star (Liatris scariosa)
- Black-eyed Susans (Rudbeckia hirta)
- Blanket Flower (Gaillardia aristata)
- Blue stem goldenrod (Solidago caesia)
- Blue Vervain (Verbena hastate) Purchased 11/8/16
- Bronze and Green Leaf Fennel (Foeniculum vulgare)

Monarch Pollinator Seed list (continued)

- Butterfly weed (Asclepias tuberosa) -Friends collected seed, germinated 90 pts
- Buttonbush (Cephalanthus occidentalis))
- Calico Aster (Symphyotrichum lateriflorum)
- Cardinal Flower (Lobelia cardinalis)
- Common Blue Violet-(Viola sororia) Purchased 11/8/16
- Common evening primrose (Oenothera biennis) Friends collected seed
- Common Goldenrod (Solidago Canadensis)
- Common Milkweed (Asclepias syriaca)- Friends collected seeds
- Common Rue (Ruta graveolens)
- Cosmos (sps)
- Crimson Clover (Trifolium incarnatum)
- Cup Plant (Silphiium perfoliatum)
- Dense Blazing Star (I) (Liatris spitica)
- Dill (Anethum graveolens)
- Ditch Stonecrop (Penthorum Sediodes)
- Early Goldenrod (Solidago Juncea)
- Eastern columbine (Aquilegia Canadensis)
- Evening Primrose (Oenothera biennis)
- False Nettle (Bohemeria cylindrical)- Purchased 11/7/16
- Flat topped Golden Rod (Solidago altissama)- Friends collected seeds
- Foxglove (Digitalis sp)
- Garden Phlox (Phlox paniculata)
- Golden Alexanders (Ziza aurea)
- Gray goldenrod (Solidago nemoralis)
- Heath aster (Symphyotrichum pilosum)
- Highbush Cranberry(Virburnum trilobum)
- Hoary Mountain Mint (Pycnanthemum incanum)
- Holly bush (IIex sp)
- Hollyhocks (Malvaceae sp)
- Indian Hemp (Apocynum cannabinum)
- Joe Pye Weed (Euthrochium fistulosum)

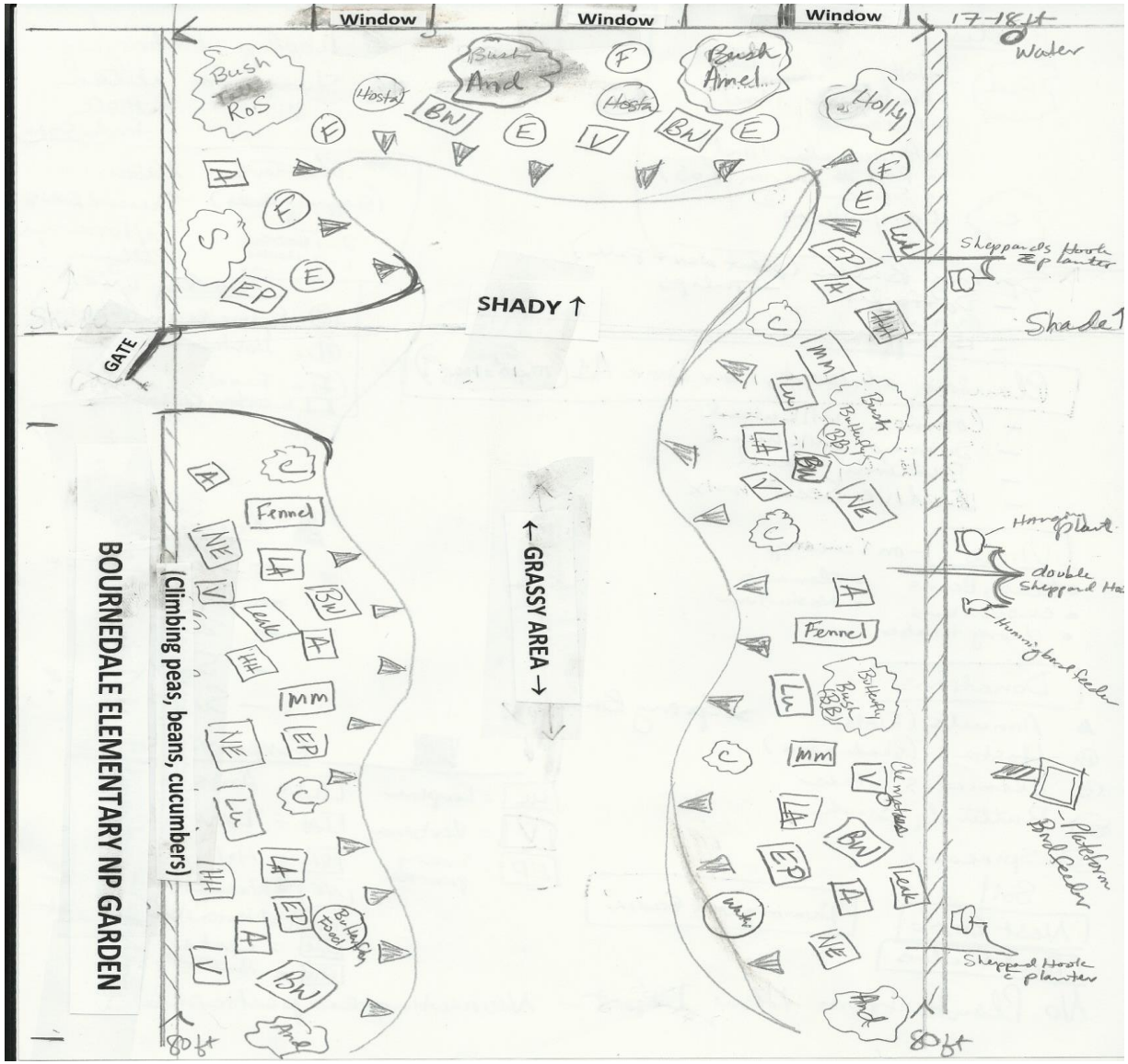
Monarch Pollinator Seed list (continued)

- Lanceleaf coreopsis (Coreopsis Lanceolata)
- Late purple Aster (Symphyotrichum patens)
- Larkspur (Delphinium consolida)
- Licorice scented goldenrod (Solidago odora)
- little bluestem (Schizachyrium scoparium (Long Island ecotype)
- Narrow-leaf Mountain mint (Pycnanthemum tenuifolium) NE Wildflower purchase
- Native Lupine (Lupinus perennis))- Purchased 11/8/16
- Native Coneflower mix (Rudbeckia Laciniata, hirta, fulgida)
- New England aster-NE Wildflower purchase, Friends collected seed
- New Jersey Tea (Ceanothus americanus) Purchased 11/8/16
- "None so pretty" (Sweet William Catchfly, Silene americana)
- Northern Blazing star (N) (Liatris scariosa)
- NY Ironweed (Vernonia noveboracensis)
- Oxeye Daisy (Heliopsis helianthoides)
- Partridge pea (Chamaecrista fasciculata)--Jack collected seed
- Pasture Rose (Rosa Carolina)
- Pearly Everlasting (Anaphalis margaritacea)
- Perennial Lupine (Lupinus perennis)
- Perennial Sunflower(Helianthus Maximiliani)
- Queen Anne's Lace-Friends collected seed (on-site)
- Red Clover (Trifolium pretense)
- Red-stemmed Aster (Symphyotrichum puniceum)
- Rose of Sharon (Hibiscus species)
- Rough Golden Rod (Solidago rugossa) (on site) Friends collected
- Scaly Blazing star (Liatris squarrosa) Purchased 11/11/16
- Seaside Goldenrod (S.sempervirens)- Friends collected seed
- Shadbush (Amelanchier Canadensis) NE Wildflower purchase
- Showy Tick Trefoil (Desmodium canadense))- Purchased 11/8/16
- Sickle leafed golden aster (on-site)
- slender goldentop (Euthamia caroliniana)
- smooth blue aster (Symphyotrichum laevis)

Monarch Pollinator Seed list (continued)

- Spirea bush (Spirea sp)
- Swamp Milkweed (Asclepias incarnate)
- Tall Verbena (I) (Verbena bonariensis)
- Tall white beard tongue (*Penstemon digitalis*) (Ernst Seed purchase)
- Veronica (Veronica Spicata)
- Virginia Mountain Mint (Pycnanthemum virginianum)
- Virgin's Bower (Clematis virginiana)
- White (silver rod) goldenrod (Solidago bicolor)
- White Clover (Trifolium repens)
- White Vervain (Verbena urticifolia)
- White Wood Aster (Eurybia divaricata)
- Wild geranium (Geranium maculatum)- Purchased 11/8/16
- Wild Yellow False indigo - (Baptisia tinctoria) Jack collected
- Wrinkle leaf goldenrod (Solidago rugosa)
- Yellow Blossom Sweet Clover (Melilotus officinalis)
- Yellow Coneflower (Ratibida columnifera)
- Yellow Indigo (Baptisia tinctoria)
- Purple Coneflower (Echinacea purpurea)

APPENDIX 2: Educational Garden designs and planting excel spreadsheet lists: Bournedale Elementary



Bournedale Elementary NP Garden plants (total of 125 plants, 52 species: 11 spring, 35 summer, 21 fall blooming plants) 15 Host Plants

Plant Latin Name	Common Name	Plant type	Plant date	#	Host Plant ?	Bloom Color and Period		
						Early	Mid	Late
Aquilegia canadensis	Eastern columbine	Perennial	too small					
Amelanchier sp	Shadbush	Bush	4/8/2017	**1**		**white**		
Pieris japonica	Andromeda	Bush	4/8/2017	**3**		**white**		
Ziza aurea	Golden Alexanders	Perennial	4/29/2017	3				
Ceanothus americanus	New Jersey Tea	Perennial	too small			**white**		
Heather sp	Pink Heather	Bush	4/8/2017	3				
Salix discolor	American pussy willow	Tree	4/8/2017	1				
Cercis canadensis	Eastern RedBud	Tree	4/8/2017	1				
Iiex sp	Holly bush	Bush	4/8/2017	1		**white**	**white**	
Leucothoe fontanesiana	Rainbow leucothoe	Bush	4/8/2017	2		**white**		
Geranium maculatum	Wild Geranium	Perennial	4/29/2017	6				
Asarum canadense	Wild Ginger	Perennial	4/29/2017	6			**White**	
Allium ampeloprasum sp	Leek	Perennial	4/8/2017	3			**white**	
Agastache foeniculum	Anise Hyssop	Perennial	4/8/2017	3				

Alcea rosea	Hollyhock	Perennial	4/29/2017	3			
Asclepia incarnata	Swamp Milkweed	Perennial	4/29/2017	**3**			
Clematis	Clematis	Perennial	planted	4			
Asclepia tuberosa	Butterfly weed	Perennial	4/29/2017	**3**			
Buddleia sp(Blue and Pink)	Butterfly Bush	Perennial	4/29/2017	**2**		**and blue**	**and pink**
Iris versicolor	Blue Flag Iris	Perennial	4/8/2017	**2**			
Epimedium × rubrum	Red Barrenroot	Perennial	4/8/2017	**1**			
Foeniculum vulgare	Bronze and Green Leaf Fennel	Perennial	4/29/2017	10			
Salvia sp	Red Salvia	Annual					
Antirrhinum majus	Snapdragons	Perennial on Cape	5/3/2017			multiple	
Liatris scariosa	Northern Blazing star (N)	Perennial	too small				
Lupinus perennis	Perennial Lupine	Perennial	5/6/2017	9			
Monarda fistulosa	Bee Balm	Perennial	4/8/2017	3			
Phlox paniculata	Garden Phlox-white	Perennial	5/6/2017	**4**		**White**	
Pycnanthemum tenuifolium	Narrow Leaf Mountain Mint	Perennial	4/29/2017	4			
Achillea millefolium	Yarrow	Perennial	5/6/2017				
Digitalis sp	Foxglove	Biannual	4/29/2017	3			
Verbena bonariensis	Tall Verbena (I)	Perennial	4/8/2017	4			
Hosta plantaginea	August Lilly	Perennial	4/8/2017	3		**White**	**White**
Spirea sp.	Spirea Bush	Bush	4/8/2017	1			
Hibiscus syriacus	Rose of Sharon	Bush	4/8/2017	1			

Eurybia divaricata	Wood Aster	Perennial	4/8/& 5/62017	4			**White**	**White**
Solidago bicolor	White (silver rod) goldenrod	Perennial	4/29/2017	too small				**White**
Sedum	Autumn Joy	Perennial	4/8/2017	5				
Solidago sempervirens	Seaside Goldenrode	Perennial	4/29/2017	too small				
Symphyotrichum novae-angliae	NE Aster	Perennial	4/8/&4/29/17	10				
Oenothera biennis	Evening Primrose	Perennial	4/29/2017	3				
Chrysanthemum indicum	Chrysanthemum(4 orange)(3 Yellow)	Perennial	4/8 & 5/6/17	7			orange	yellow
Dryopteris erythrosora	Autumn Fern	Perennial	4/8/2017	3				
Matteuccia struthiopteris	Ostrich Fern	Perennial	4/29/2017	2				
Eupatorium rugosum 'Chocolate's	Snakeroot	Perennial	5/6/2017	1				**White**
Nipponanthemum nipponicum.	Montauk Daisy	Perennial	4/29/2017	1				WHITE
Alyssum sp	Alyssum sp	Annual	4/29/2017	1		**White**	**White**	**White**
Stachys byzantina	Lambs Ear	Perennial	4/29/2017	3				
Lamium maculatum	Spotted Dead nettle	Perennial	4/29/2017	3				
	Dianthus	Annual	5/3/2017	12		White	White	
	torenia	Annual	5/3/2017	6		White	White	
			total plants=	154			total species= 47	

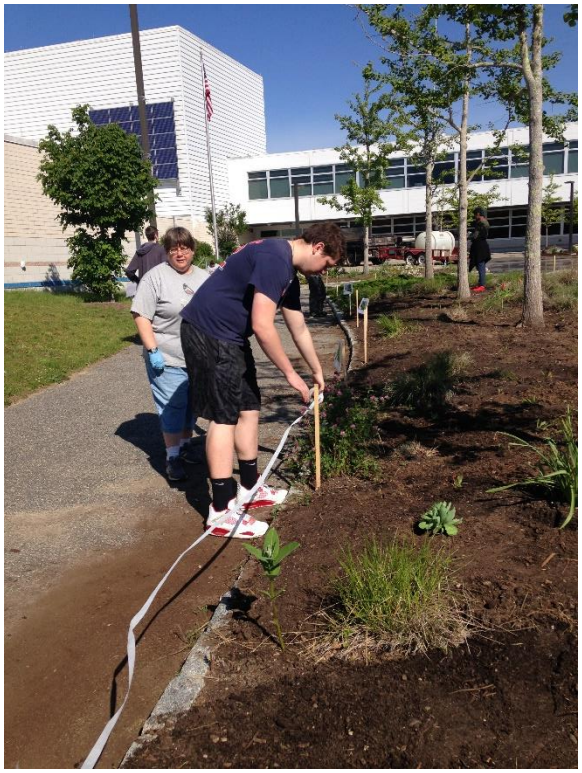
Dear Mrs. MaryKay, October 10, 2017

Thank you so much for helping us plant our Monarch Garden. We joined the Million Gardener Pollinator Challenge. We also had a monarch butterfly in our garden Monday morning.

I was inspired to make my own monarch garden at home with almost all the flowers that we have here in our garden, like bee balm and the common milkweed, and also corn flowers.

Sincerely,
McKenna [redacted]

Monarch butterfly




Pollinator Garden
Planted June 2, 2017