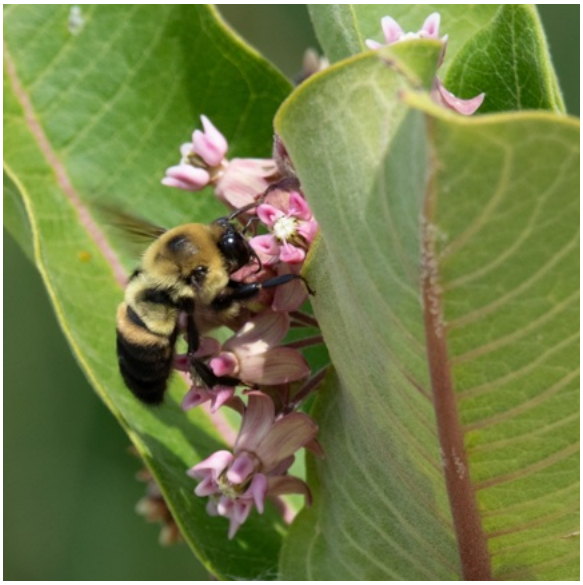
Pollinators of
Lead Mills Conservation Area

Marblehead, Massachusetts

Final Report

Pollinators of
Lead Mills Conservation Area

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Cover photographs highlight insects documented at Lead Mills Conservation Area (clockwise, starting upper left): *Melissodes subillatus* visiting butterflyweed (*Asclepias tuberosa*), PC: Nick Dorian. Brown-belted bumble bee (*Bombus griseocollis*) visiting common milkweed (*Asclepias syriaca*), PC: Nick Dorian. Georgia mason bee (*Osmia georgica*) visiting fleabane (*Erigeron sp.*), PC: Max McCarthy. Hairy-banded mining bee (*Andrena hirticincta*) visiting goldenrod (*Solidago sp.*). PC: Nick Dorian.

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Executive Summary

Declines of flower-visiting insects have prompted concerns over their populations and associated pollination services. Habitat restoration remains one of the leading ways to address declines, yet the impact of restoration activities is often unclear. Here, we report the results from a one-year impact assessment of pollinator habitat restoration at Lead Mills Conservation Area in Marblehead, Massachusetts. In 2025, an inventory of pollinator biodiversity and plant-pollinator interactions was conducted across the growing season with an emphasis on wild bees. This project represents the most thorough documentation of pollinators in Marblehead to date.

In total, 120 pollinator species were documented across six groups: bees (70 spp., including 4 spp. of bumble bees), butterflies and moths (17 spp.), beetles (5 spp.), wasps (20 spp.), flies (7 spp.), and birds (1 spp.). Additionally, several species of bees and their cleptoparasites were documented to nest at the site, indicating that Lead Mills Conservation Area currently provides both foraging and nesting habitat resources for certain species. Pollinators interacted with 44 species of plants on site including both native and exotic species. On average, native plant species tended to support more pollinator taxa than exotic species, with Canada goldenrod (*Solidago canadensis*; 28 visitor species), boneset (*Eupatorium perfoliatum*; 17 visitor species), daisy fleabane (*Erigeron annuus*; 16 visitor species), and common milkweed (*Asclepias syriaca*; 13 visitor species) as the top performing native plants. Moving forward, emphasis should be placed on adding spring-flowering native trees, shrubs, and forbs. Adopting a “mosaic mowing” regime and maintaining open bare soil within the meadow will help to maintain nesting habitat for diverse pollinators across their life cycles. Finally, given the limited timeline of the project, we recommend continued monitoring to document the impact of restoration activities on the pollinator community.

Introduction

Amid widespread declines of flower-visiting insects[1–3], conservation actions to restore their populations and associated pollination services have gained momentum[4,5]. Stewardship of green space with pollinators in mind—from small demonstration gardens to large preserves—is a potentially impactful way to address declines while also connecting community members to their natural world and contributing to broader biodiversity conservation. However, the ecological outcomes of pollinator plantings remain poorly understood[4]. Monitoring of green space stewarded for pollinators remains an important and necessary tool to measure the conservation impact of plantings. This document presents the results and synthesis of a one-year survey to document the impact of pollinator habitat restoration at Lead Mills Conservation Area in Marblehead, Massachusetts.

Background

Throughout its history, the land on which Lead Mills Conservation Area sits has seemingly been at odds with biodiversity conservation. For over a century, the 4.5-acre site, which straddles the towns of Salem and Marblehead, Massachusetts, housed a white lead manufacturing plant, producing nearly 6000 tons of white lead annually[6]. In the late 20th century, following decades of neglect, community members rallied together to prevent development of the abandoned factory site into housing. Now, Lead Mills Conservation Area is a cherished coastal open space. Marblehead Conservancy Inc., an all-volunteer nonprofit organization, stewards the site as a conservation area.

Entering Lead Mills Conservation Area from the west at Lafeyette Street (Route 114), one finds a native pollinator garden including plants such as purple coneflower (*Echinacea purpurea*), clustered mountain mint (*Pycnanthemum muticum*), and wild bergamot (*Monarda fistulosa*). Moving east across the site, one encounters an old field of weedy grasses and perennial forbs such as common milkweed (*Asclepias syriaca*) and crownvetch (*Securigera varia*). From there, the site transitions into the stewardship activities of Marblehead Conservancy, Inc. Native meadows and hedgerows rise across the eastern and southern edge of the site. Ongoing stewardship expands the footprint of the restoration by approximately 500 sq. ft. every year. An elevated bike path built on the old Boston-Maine rail line borders the site to the north and a secondary growth woodlot known as Wyman Woods borders the site to the east.

In 2025, pollinator ecologists and consultants Nick Dorian, Ph.D. and Max McCarthy conducted a one-year survey of the pollinator biodiversity at Lead Mills Conservation Area. The project had two main goals:

1) **Inventory the pollinator diversity** at Lead Mills Conservation Area, including bees, butterflies, flies, wasps, beetles, and hummingbirds
2) **Document ecological interactions** between pollinators and flowering plants to assess use of restoration area and to guide future restoration efforts

Common eastern bumble bees (Bombus impatiens) *were observed sonicating purple flowering raspberry* (Rubus odoratus) *in the native hedgerow restoration. PC: Nick Dorian.*

Meet the Pollinators

Bees (Hymenoptera) are among the most important pollinators in temperate ecosystems. As a group, they depend on floral resources for nutrition—pollen provides protein and flower nectar provides carbohydrates. Although people are familiar with a single species, the European honey bee (*Apis mellifera*), nearly 400 species of bees occur in Massachusetts[7].

Butterflies and moths (Lepidoptera) are conspicuous and charismatic flower visitors, even if they have low value as pollinators. As adults, many butterflies and some moths consume nectar, but as larvae consume vegetation such as leaves, stems, and flower buds. The plants suitable for developing Lepidoptera are known as “host plants.”

Wasps (Hymenoptera) are often overlooked as pollinators, but are common summer flower visitors. Adults feed on nectar, but consume paralyzed insects as larvae. Solitary wasps can be highly specialized on their prey items, with different species of wasps specializing on diverse prey items such as crickets, spiders, flies, and even bees.

Flower-visiting **flies** (Diptera) are convincing mimics. Flies themselves cannot sting, but many species sport black and yellow colorations similar to stinging wasps and produce loud buzzing sounds similar to bumble bees. Mimicry is thought to make flies less visually appealing to predators that have learned to avoid stinging insects.

Beetles (Coleoptera) are among the oldest lineages of pollinators. Beetles are often attracted to white, pollen-laden flowers such as viburnum (*Viburnum* spp.), dogwoods (*Cornus* pp.), and elderberry (*Sambucus* spp.).

Hummingbirds (Trochilidae) are cherished pollinators. Only one species breeds east of the Mississippi River, the ruby-throated hummingbird (*Archilochus colubris)*. This species tends to visit flowers with deep corollas or nectar spurs including bee balm (*Monarda didyma*) and cardinal flower (*Lobelia cardinalis*), but will forage from a variety of plants with suitable nectar volumes.

Survey Methods

Pollinator diversity was surveyed at Lead Mills using a combination of non-lethal observations and targeted sampling. On each survey, observers (NND and/or MWM) walked the entirety of the site, documenting 1) pollinator identifications and 2) plant-pollinator interactions. This approach provides information on species occurrence and community composition, but not relative abundance among species. As needed, targeted netting was performed to confirm identifications. Interactions between pollinators and both native and non-native plant species were documented.

Hawthorn mining bees (Andrena crataegi) were common visitors to white meadowsweet and purple flowering raspberry during June survey. PC: Nick Dorian

Surveys were conducted between 0900 and 1400 during weather suitable for insect flight (sunny, warmer than 60˚F, less than 15 mph wind). No nocturnal surveys were conducted. During the spring survey in April, observers documented pollinators in Wyman Woods since insect activity was concentrated in the forest understory.

Results

Pollinator Diversity

In total, **120 species of flower-visiting insects and birds were observed at Lead Mills Conservation Area**, the majority of which were native to North America (Table 1).

Bees represented the greatest proportion of pollinator diversity, with 70 species across 5 taxonomic families. This includes four species of bumble bees which is a group of conservation concern and a focus of ongoing restoration efforts at the site. Bee diversity in spring and early summer was characterized by a high proportion of solitary mining bees (genera *Andrena*), and in summer and fall by cavity-nesting mason, leaf-cutter, and resin bees (genera *Osmia*, *Hoplitis*, and *Megachile*). In addition, several pollen specialist bees were observed—species which depend entirely on one or a few plant species for pollen throughout their lives—including two specialists on ground-cherry (*Physalis* sp.) and five specialists on goldenrod (*Solidago* spp.).

Beyond bees, five other groups of pollinators were observed at Lead Mills: butterflies and moths, wasps, flies, beetles, and birds. Butterflies and moths at Lead Mills Conservation Area were represented by 17 species from four families (Table 1; Appendix 1: Table S1). Although some moths present in northeastern Massachusetts are active during the day, no day-flying moths were observed. Twenty species of wasps were observed, most of which are solitary nesters (Table 1; Appendix 1: Table S1); solitary wasps pose little threat to open space visitors as they do not aggressively defend their nests. Seven species of flower-visiting flies, five species of beetles, and one species of bird were observed as well (Table 1; Appendix 1: Table S1).

Table 1. Breakdown of pollinator diversity at Lead Mills by pollinator group. Most flower-visiting insect and bird species observed on site were native in origin.

Pollinator Group	Taxonomic Units^	% Native Species
bee	70	93%
beetle	5	100%
bird	1	100%
butterfly/moth	17	94%
fly	7	100%
wasp	20	100%
total	**120**	**95%**

^Taxonomic unit refers to distinct taxa recorded during survey, including species and species pairs.

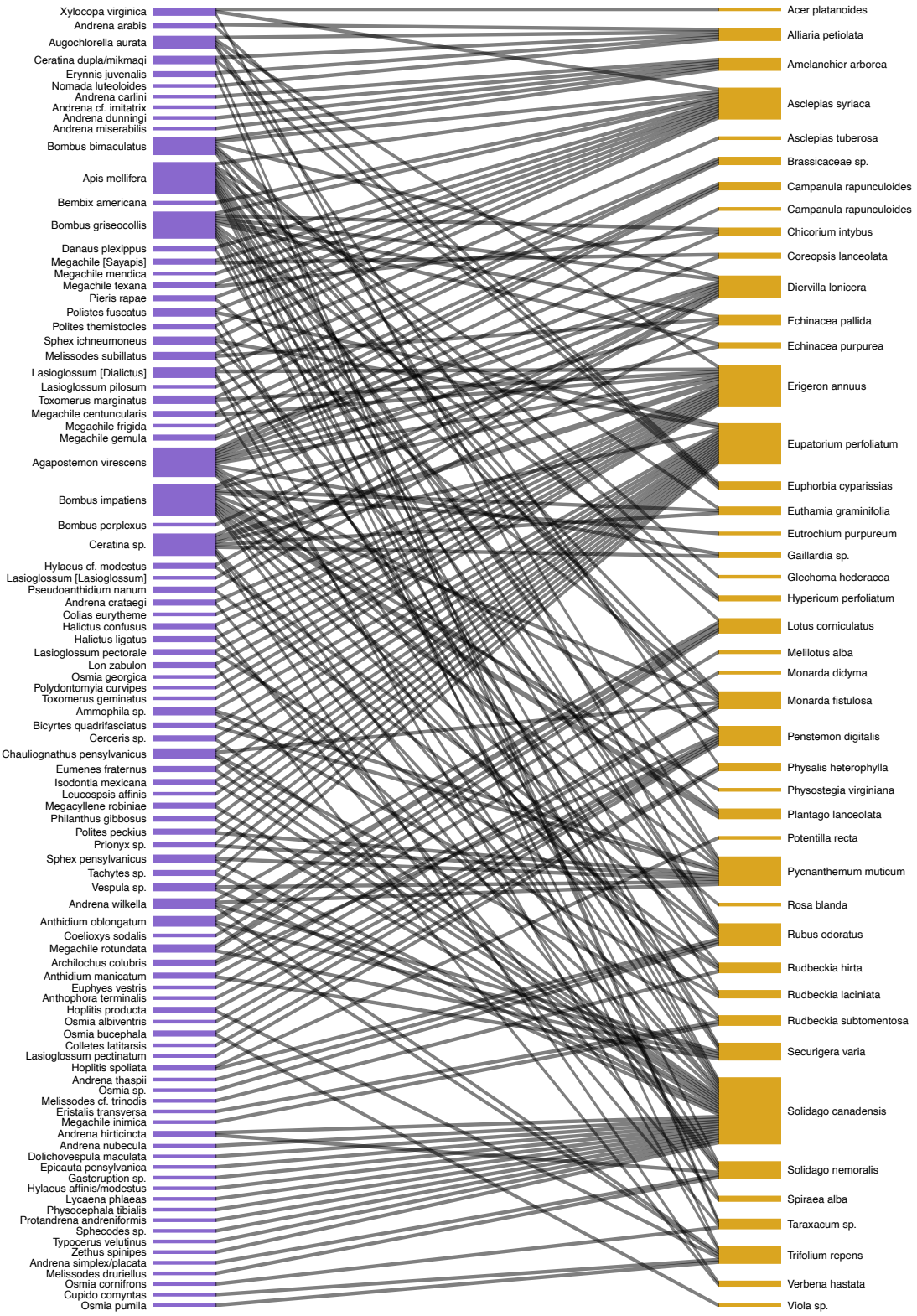

Figure 1. Lead Mills plant-pollinator interaction network. Unique interactions between pollinators (left) and plants (right) documented on surveys are shown. The width of each box is directly proportional to the number of unique interactions. Pollinator common names are provided in Table S1.

Plant-Pollinator Interactions

Pollinators interacted with 44 species of plants, including both native and exotic species**. On average, native plant species tended to support more visitor species (~6 species) than exotic plants (~3.2 species),** demonstrating the overall value of native plants for pollinators at Lead Mills. Native plants that supported the greatest diversity of pollinator species were goldenrod (*Solidago canadensis*; 28 visitor species), boneset (*Eupatorium perfoliatum*; 17 visitor species), annual fleabane (*Erigeron annuus*; 16 visitor species), and common milkweed (*Asclepias syriaca*; 13 visitor species) (Table 2). In addition, bumble bee diversity was concentrated on the following native shrubs: northern bush-honeysuckle (*Diervilla lonicera*), white meadowsweet (*Spiraea alba*), wild rose (*Rosa* sp.) and purple flowering raspberry (*Rubus odoratus*). Native plants that supported specialized interactions include downy serviceberry (*Amelanchier arborea*), clammy ground-cherry (*Physalis heterophylla*), and black-eyed susan (*Rudbeckia hirta*)—that is, these plants tended to attract insects not attracted by other plant species.

Table 2. Number of unique pollinator species supported by the 20 most commonly visited plants at Lead Mills. Although pollinators visited both native and non-native plants, on average, native plants

Family	Common Name	Scientific Name	Native	N^
Asteraceae	Canada goldenrod	*Solidago canadensis*	N	28
Asteraceae	boneset	*Eupatorium perfoliatum*	N	17
Asteraceae	annual fleabane	*Erigeron annuus*	N	16
Apocynaceae	common milkweed	*Asclepias syriaca*	N	13
Lamiaceae	clustered mountain-mint	*Pycnanthemum muticum*	N	11
Caprifoliaceae	northern bush-honeysuckle	*Diervilla lonicera*	N	9
Rosaceae	purple flowering raspberry	*Rubus odoratus*	N	9
Plantaginaceae	foxglove beardtongue	*Penstemon digitalis*	N	8
Lamiaceae	wild bergamot	*Monarda fistulosa*	N	7
Fabaceae	crown vetch	*Securigera varia*	E	7
Asteraceae	old field goldenrod	*Solidago nemoralis*	N	7
Fabaceae	white clover	*Trifolium repens*	E	7
Brassicaceae	garlic mustard	*Alliaria petiolata*	E	5
Rosaceae	downy serviceberry	*Amelanchier arborea*	N	5
Fabaceae	bird's foot trefoil	*Lotus corniculatus*	E	5
Asteraceae	pale purple coneflower	*Echinacea pallida*	N	4
Asteraceae	black-eyed susan	*Rudbeckia hirta*	N	4
Asteraceae	sweet black-eyed susan	*Rudbeckia subtomentosa*	N	4
Asteraceae	common dandelion	*Taraxacum sp.*	E	4
Brassicaceae	mustard sp.	*Brassicaceae sp.*	E	3

^N = number of unique species visiting a given plant

Bicolored striped sweat bees (Agapostemon virescens) *were common visitors to both native and exotic asters at Lead Mills including annual fleabane* (Erigeron annuus). *This bee species was observed nesting on site. PC: Nick Dorian.*

Additional Natural History Notes

The following bee species were observed nesting on site: *Halictus ligatus*, *Halictus rubicundus*, *Halictus confusus*, *Agapostemon virescens*, and *Lasioglossum cf. cinctipes.* Several cleptoparasitic bees species (*Nomada articulata, Sphecodes dichrous,* and *Sphecodes davisii*) known to be associated with these ground-nesting bees were also observed in the vicinity of the nesting area. These initial observations indicate the suitability of Lead Mills Conservation Area for supporting both foraging and nesting habitat requirements of diverse wild bees. Numerous nesting holes were observed in bare soil and at the bases of bunch grasses occurring along the north fork of the walking trail (on and around: 42.4974, -70.8853). Maintaining this part of the site as open soil will help to promote the future nesting of these species.

Of note, two pollen-specialist bees were observed foraging on native wild ground cherry (*Physalis heterophylla*) in the garden along Lafayette St: *Lasioglossum pectinatum* and *Colletes latitarsis*. These species are widespread throughout the northeast, but infrequently observed, in part due to a lack of survey effort on wild populations of their host plant.

Ground-cherry sweat bee (Lasioglossum pectinatum) *was exclusively observed visiting clammy ground cherry* (Physalis heterophylla) *in the Lafayette Street garden. This bee species is rarely recorded throughout its range. PC: Nick Dorian.*

Recommendations for Future Work

Monitoring

- Continue non-lethal pollinator monitoring at Lead Mills Conservation Area to assess the long-term effects of habitat restoration, with a focus on the ecological interactions between insects and native plants. Because insect populations can be highly variable across years, an optimal survey design will include two-to-three-year blocks of consecutive monitoring, repeated over time. Such a monitoring scheme would capture both short and long-term population trajectories at the site.

Stewardship

- Develop a supplementary plant palette with native plants that support rare specialized ecological interactions and which are suitable for the site. Place immediate priority on spring-blooming trees, shrubs, and forbs.

- Adopt a “mosaic mowing” regime whereby the entire site is mowed every two years, rather than annually. For example, mow half of the site in even years, and

the other half of the site in odd years. This approach ensures that there is always a portion of the site where insects can complete development.

- Maintain areas of bare, open soil within the meadow to continue providing nesting habitat for ground-nesting bees, wasps, and their cleptoparasites.

- Do not permit placement of managed honey bees (*Apis mellifera*) hives on site. Although a growing number of conservation areas permit honey bee pasturing, there is strong scientific evidence that honey bees can alter native bee foraging behavior and outcompete native bees for floral resources. Therefore, this practice should not be adopted at Lead Mills Conservation Area.

Community

- Design and install educational signage at Lead Mills Conservation Area that connects management activities to conservation outcomes. Highlighting charismatic pollinator species can raise awareness to visitors about native pollinator biodiversity.

- Create a downloadable and printable “illustrated checklist” of pollinators present at Lead Mills Conservation Area.

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Appendix 1.

Table S1. Complete pollinator survey inventory from Lead Mills Conservation Area. Subgenera are denoted with brackets. Difficult field identifications are denoted either as a species pair or as "cf.". Native status is denoted N = Native and E = exotic. Note many species have no formally accepted common name.

Group	Family	Scientific Name	Common Name	Native
bee	Andrenidae	*Andrena [Trachandrena]*		N
bee	Andrenidae	*Andrena arabis*	Mustard mining bee	N
bee	Andrenidae	*Andrena bradleyi*	Bradley's mining bee	N
bee	Andrenidae	*Andrena carlini*	Carlin's mining bee	N
bee	Andrenidae	*Andrena cf. imitatrix*		N
bee	Andrenidae	*Andrena crataegi*	Hawthorn mining bee	N
bee	Andrenidae	*Andrena dunningi*	Dunning's mining bee	N
bee	Andrenidae	*Andrena hirticincta*	Hairy-banded mining bee	N
bee	Andrenidae	*Andrena miserabilis*	Smooth-faced mining bee	N
bee	Andrenidae	*Andrena nubecula*	Cloudy-winged mining bee	N
bee	Andrenidae	*Andrena simplex/placata*		N
bee	Andrenidae	*Andrena thaspii*	Parsnip mining bee	N
bee	Andrenidae	*Andrena wilkella*	Wilke's mining bee	E
bee	Andrenidae	*Protandrena andreniformis*		N
bee	Apidae	*Anthophora terminalis*	Orange-tipped wood-digger bee	N
bee	Apidae	*Apis mellifera*	European honey bee	E
bee	Apidae	*Bombus bimaculatus*	Two-spotted bumble bee	N
bee	Apidae	*Bombus griseocollis*	Brown-belted bumble bee	N
bee	Apidae	*Bombus impatiens*	Common eastern bumble bee	N
bee	Apidae	*Bombus perplexus*	Perplexing bumble bee	N
bee	Apidae	*Ceratina dupla/mikmaqi*		N
bee	Apidae	*Ceratina sp.*	Small carpenter bee	N
bee	Apidae	*Melissodes cf. trinodis*		N
bee	Apidae	*Melissodes druriellus*	Drury's longhorn bee	N
bee	Apidae	*Melissodes subillatus*		N
bee	Apidae	*Nomada articulata*	Articulated nomad	N
bee	Apidae	*Nomada* bidentate group		N
bee	Apidae	*Nomada cf. illinoensis*		N
bee	Apidae	*Nomada cf. pygmaea*		N
bee	Apidae	*Nomada luteoloides*	Black-and-yellow nomad bee	N
bee	Apidae	*Nomada maculata*	Spotted nomad bee	N
bee	Apidae	*Xylocopa virginica*	Eastern carpenter bee	N
bee	Colletidae	*Colletes latitarsis*	Broad-footed cellophane bee	N
bee	Colletidae	*Hylaeus affinis/modestus*	Masked bee	N
bee	Colletidae	*Hylaeus cf. modestus*		N

bee	Halictidae	*Agapostemon virescens*	Bicolored striped-sweat bee	N
bee	Halictidae	*Augochlorella aurata*	Golden sweat bee	N
bee	Halictidae	*Halictus confusus*	Confusing furrow bee	N
bee	Halictidae	*Halictus ligatus*	Ligated furrow bee	N
bee	Halictidae	*Halictus rubicundus*	Orange-legged furrow bee	N
bee	Halictidae	*Lasioglossum [Dialictus]*		N
bee	Halictidae	*Lasioglossum [Lasioglossum]*		N
bee	Halictidae	*Lasioglossum cf. cinctipes*		N
bee	Halictidae	*Lasioglossum coriaceum*	Leathery sweat bee	N
bee	Halictidae	*Lasioglossum pectinatum*	Ground cherry sweat bee	N
bee	Halictidae	*Lasioglossum pectorale*	Rugose-chested sweat bee	N
bee	Halictidae	*Lasioglossum pilosum*	Hairy sweat bee	N
bee	Halictidae	*Sphecodes davisii*	Davis' cuckoo sweat bee	N
bee	Halictidae	*Sphecodes dichrous*	Scalloped cuckoo sweat bee	N
bee	Halictidae	*Sphecodes sp.*		N
bee	Megachilidae	*Anthidium manicatum*	European wool-carder bee	E
bee	Megachilidae	*Anthidium oblongatum*	Oblong wool-carder bee	E
bee	Megachilidae	*Coelioxys sodalis*		N
bee	Megachilidae	*Hoplitis producta*	Produced small-mason bee	N
bee	Megachilidae	*Hoplitis spoliata*	Dilated-horned small-mason bee	N
bee	Megachilidae	*Megachile [Sayapis]*		N
bee	Megachilidae	*Megachile centuncularis*	Patchwork leafcutter bee	N
bee	Megachilidae	*Megachile frigida*	Frigid leafcutter bee	N
bee	Megachilidae	*Megachile gemula*	Small-handed leafcutter bee	N
bee	Megachilidae	*Megachile inimica*	Hostile leafcutter bee	N
bee	Megachilidae	*Megachile mendica*	Flat-tailed leafcutter bee	N
bee	Megachilidae	*Megachile rotundata*	Alfalfa leafcutter bee	N
bee	Megachilidae	*Megachile texana*	Texas leafcutter bee	N
bee	Megachilidae	*Osmia albiventris*	White-bellied mason bee	N
bee	Megachilidae	*Osmia bucephala*	Bufflehead mason bee	N
bee	Megachilidae	*Osmia cornifrons*	Horn-faced mason bee	N
bee	Megachilidae	*Osmia georgica*	Georgia mason bee	N
bee	Megachilidae	*Osmia pumila*	Dwarf mason bee	N
bee	Megachilidae	*Osmia sp.*		N
bee	Megachilidae	*Pseudoanthidium nanum*	European small-woolcarder bee	E
beetle	Cantharidae	*Chauliognathus pensylvanicus*	Goldenrod soldier beetle	N
beetle	Cerambycidae	*Megacyllene robiniae*	Locust borer	N
beetle	Cerambycidae	*Typocerus velutinus*	Banded longhorn beetle	N

beetle	Meloidae	*Epicauta pensylvanica*	Black blister beetle	N
beetle	Scarabaeidae	*Euphoria inda*	Bumble flower beetle	N
bird	Trochilidae	*Archilochus colubris*	Ruby-throated hummingbird	N
butterfly_moth	Hesperiidae	*Epargyreus clarus*	Silver-spotted skipper	N
butterfly_moth	Hesperiidae	*Erynnis juvenalis*	Juvenal's duskywing	N
butterfly_moth	Hesperiidae	*Euphyes vestris*	Dun skipper	N
butterfly_moth	Hesperiidae	*Lon zabulon*	Zabulon's skipper	N
butterfly_moth	Hesperiidae	*Polites peckius*	Peck's skipper	N
butterfly_moth	Hesperiidae	*Polites themistocles*	Tawny-edged skipper	N
butterfly_moth	Lycaenidae	*Celastrina ladon*	Spring azure	N
butterfly_moth	Lycaenidae	*Celastrina neglecta*	Summer azure	N
butterfly_moth	Lycaenidae	*Cupido comyntas*	Eastern tailed-blue	N
butterfly_moth	Lycaenidae	*Lycaena phlaeas*	American copper	N
butterfly_moth	Nymphalidae	*Danaus plexippus*	Monarch	N
butterfly_moth	Nymphalidae	*Junonia coenia*	Common buckeye	N
butterfly_moth	Nymphalidae	*Megisto cymela*	Little wood-satyr	N
butterfly_moth	Nymphalidae	*Vanessa virginiensis*	American lady	N
butterfly_moth	Pieridae	*Colias eurytheme*	Orange sulphur	N
butterfly_moth	Pieridae	*Colias philodice*	Clouded sulphur	N
butterfly_moth	Pieridae	*Pieris rapae*	Cabbage white	E
fly	Conopidae	*Physocephala tibialis*	Thick-headed fly	N
fly	Syrphidae	*Eristalis transversa*	Transverse-banded flower fly	N
fly	Syrphidae	*Eupeodes sp.*	Aphideater	N
fly	Syrphidae	*Polydontomyia curvipes*	Dimorphic sickleleg	N
fly	Syrphidae	*Syrphus sp.*		N
fly	Syrphidae	*Toxomerus geminatus*	Eastern calligrapher	N
fly	Syrphidae	*Toxomerus marginatus*	Margined calligrapher	N
wasp	Crabronidae	*Bembix americana*	American sand wasp	N
wasp	Crabronidae	*Bicyrtes quadrifasciatus*	Four-banded stink bug hunter	N
wasp	Crabronidae	*Cerceris sp.*		N
wasp	Crabronidae	*Philanthus gibbosus*	Hump-backed beewolf	N
wasp	Crabronidae	*Tachytes sp.*		N
wasp	Gasteruptiidae	*Gasteruption sp.*		N
wasp	Leucospidae	*Leucospsis affinis*		N
wasp	Sphecidae	*Ammophila sp.*		N
wasp	Sphecidae	*Isodontia mexicana*	Mexican grass-carrying wasp	N
wasp	Sphecidae	*Prionyx sp.*		N
wasp	Sphecidae	*Sphex ichneumoneus*	Golden digger wasp	N

wasp	Sphecidae	*Sphex pensylvanicus*	Great black digger wasp	N
wasp	Vespidae	*Dolichovespula maculata*	Bald-faced hornet	N
wasp	Vespidae	*Eumenes fraternus*	Fraternal potter wasp	N
wasp	Vespidae	*Monobia quadridens*	Four-toothed mason wasp	N
wasp	Vespidae	*Polistes dominula*	European paper wasp	N
wasp	Vespidae	*Polistes fuscatus*	Northern paper wasp	N
wasp	Vespidae	*Vespula maculifrons*	Eastern yellowjacket	N
wasp	Vespidae	*Vespula sp.*		N
wasp	Vespidae	*Zethus spinipes*	Mason wasp	N

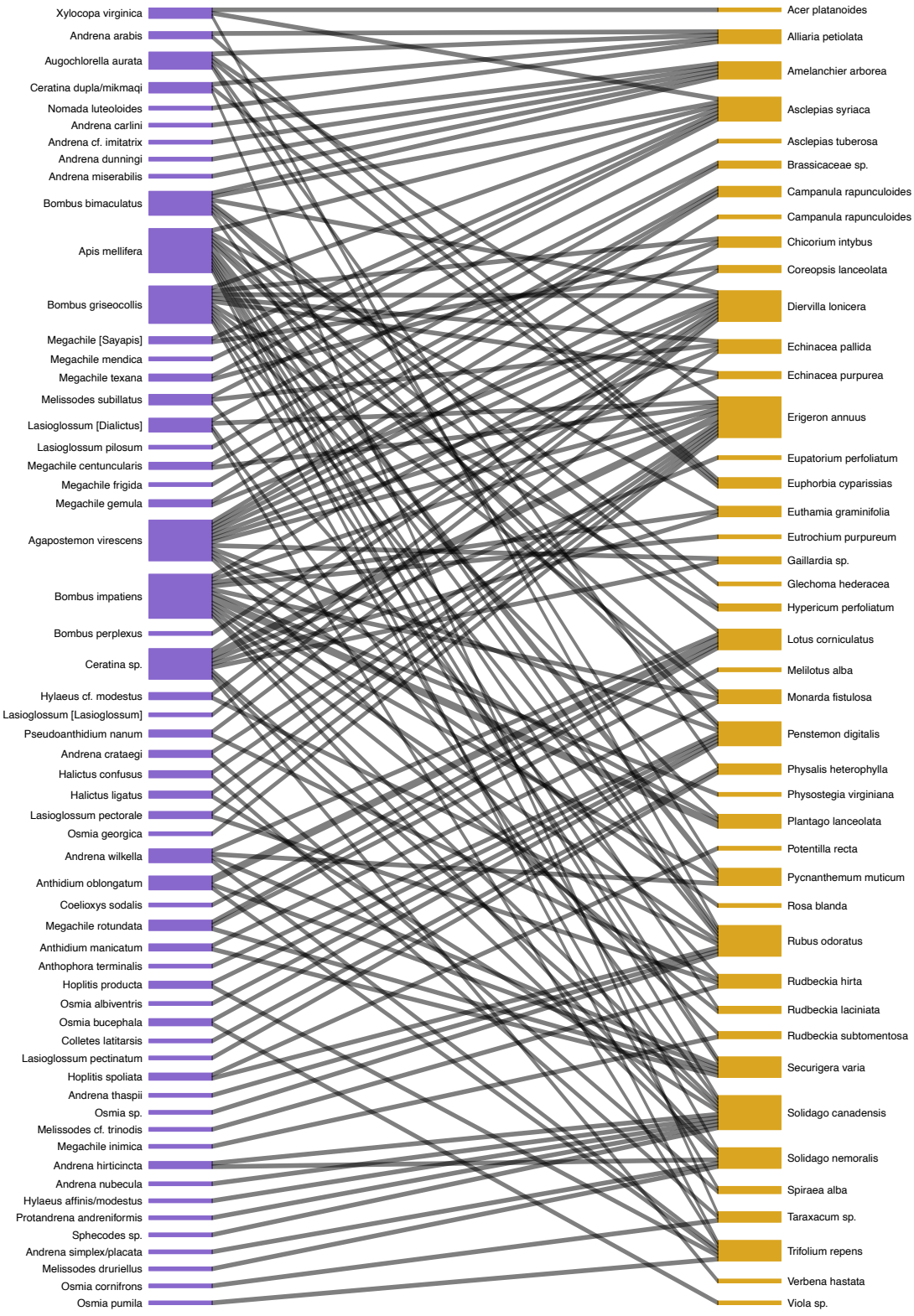

Figure S1. Bee-plant interaction network.

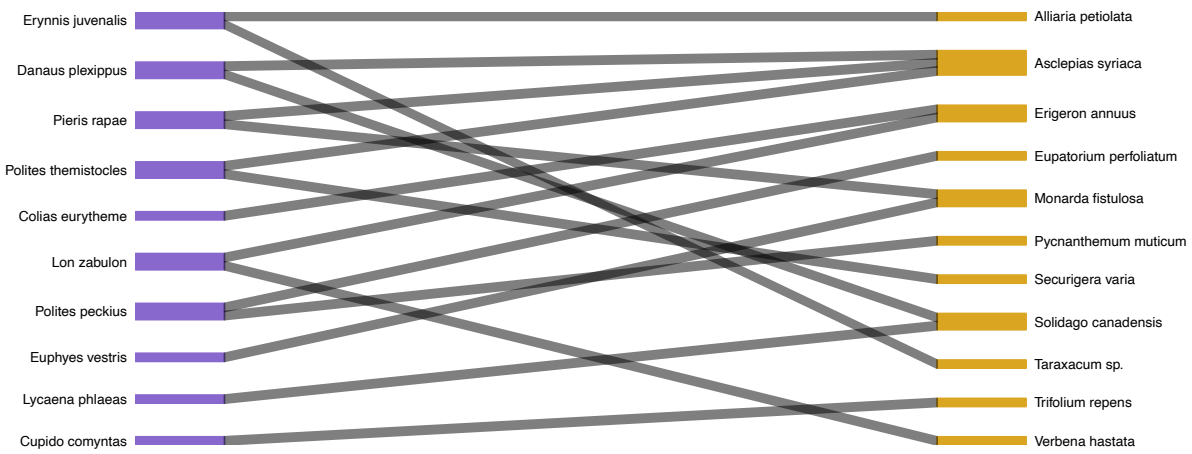

Figure S2. Butterfly and moth – plant interaction network.

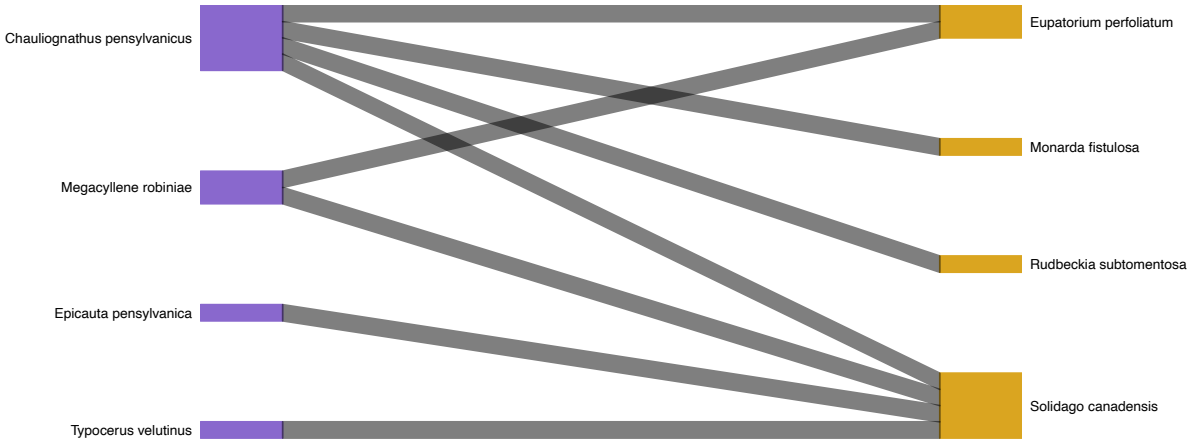

Figure S3. Beetle – plant interaction network.

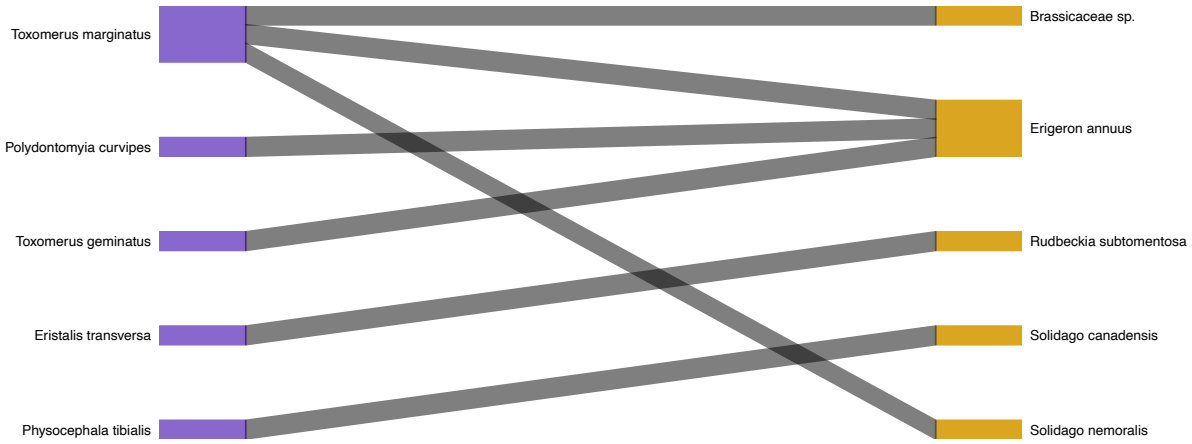

Figure S4. Fly – plant interaction network.

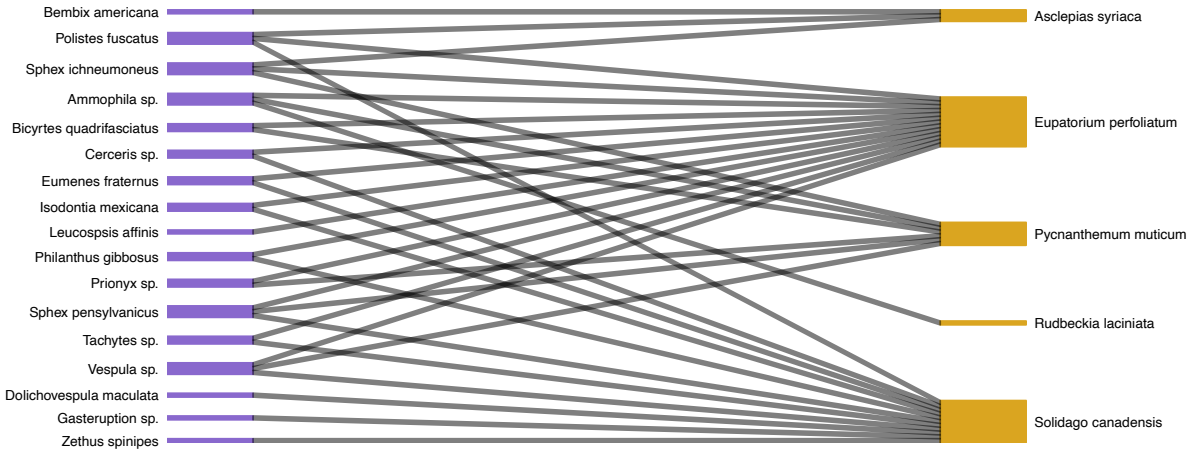

Figure S5. Wasp – plant interaction network. Note that Eupatorium perfoliatum is a key resource hub for foraging wasps at Lead Mills Conservation Area.