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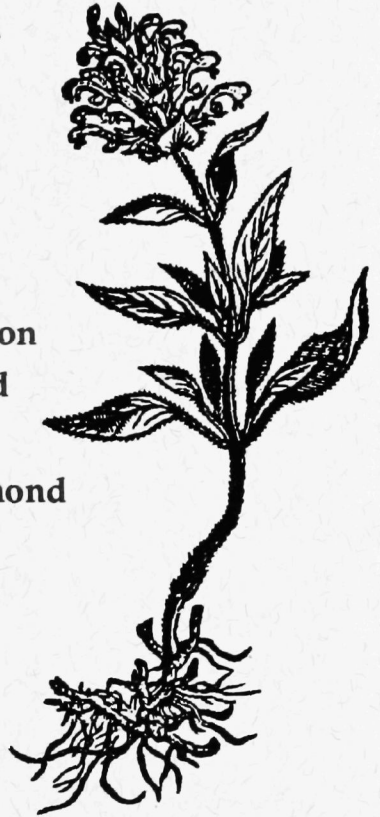
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# Alternative Forage Plants for Native (Wild) Bees Associated with Lowbush Blueberry, *Vaccinium* spp., in Maine



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and  
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with Lowbush Blueberry,  
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On the cover are wood cuts of male and female leafcutter bees and an *Aster* and a *Prunella* plant.



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## INTRODUCTION

Native bees provide three basic pollination services, which make them a valuable resource. First, along with honeybees, native bees pollinate blueberry, *Vaccinium* spp. (Bigras-Hout et al. 1973; Eck 1988; Parker et al. 1987; Phipps 1930) and many other commercially important crops. Second, native bees also pollinate rare plant species, such as the Furbish lousewort, *Pedicularis furbishiae* (Macior 1978). Third, native bees pollinate many common plants, including such species as shadbush, *Amelanchier* spp., and bunchberry, *Cornus canadensis* L, whose beauty delights us every spring and whose fruits other organisms use for food.

Despite the important pollination services native bees provide, there are "fewer numbers of bee species and smaller populations of remaining bees distributed in and adjacent to areas of intensive cultivation" (Torchio 1990:1651). Removal of fence rows and strips of uncultivated land, which provide nesting sites and alternative forage plants, and the widespread use of herbicides and pesticides have contributed to this reduction of wild bee populations (Free 1970; Johansen 1969; Kevan 1990; MacKenzie and Winston 1984; Plowright and Laverty 1987). In Maine, pesticide use and habitat alterations have reduced populations of beneficial species of native bees (Boulanger et al. 1967; Hansen and Osgood 1984; Miliczsky and Osgood 1979; Osgood 1972).

Maine's native bees serve as reproductive resources for many of their floral hosts. Floral nectar and pollen are, in turn, food resources for wild bees, food for the immediate well-being and survival of adult bees as well as for that of their offspring who will be responsible for future pollination.

Sugars, the primary constituents of floral nectars, are the major energy source of bees for daily maintenance. The quantity and quality of nectars vary among plant species. Nectar production for six common Maine plants ranged from 0.02 mg/flower to 0.625 mg/flower (Heinrich 1979); flowers with concealed nectar tend to be more rewarding than flowers with exposed nectar (Plowright and Laverty 1984). Nectars of flowering plants also contain amino acids, vitamins, and inorganic minerals that may be important for fulfilling nutritional and homeostatic requirements (Baker and Baker 1975, 1983; Southwick 1990; Nicolson and Worswick 1990).

Pollen proteins are important for egg maturation, larval growth, and adult longevity (Kevan and Baker 1984; Schmidt et al. 1987; Stanley and Liskens 1974). Like nectar, pollen quality also varies; many individual pollens are nutritionally inadequate (Standifer

1980). Schmidt et al. (1987) found that the percentage of protein present in the pollen of 25 different species ranged from 9.8% to 30.6% and that average adult longevity went from 20 days for honeybees fed no pollen or a nutritionally inadequate pollen to over 80 days for bees fed a mixture of five different pollens. Pollen availability also affects the well-being of bees. Sutcliffe and Plowright (1990) found pollen deprivation lengthened the larval period and decreased adult size in managed colonies of *Bombus ternarius* L., which they suggested might also decrease the population size of bumblebee colonies in the wild.

Although blueberry flowers are nectar and pollen sources for native bees, blueberry blooms for approximately one month. In contrast, adults of many of the species of native bees that pollinate lowbush blueberry in Maine are active prior to blueberry bloom and often for a considerable period after blueberry bloom. To maintain their populations, appropriate and accessible alternative food sources must be provided *before*, perhaps during, and *after* blueberry bloom. Methods of providing a suitable continued food supply for our native bees, however, is a much neglected area. Therefore, in order to determine potentially suitable alternative food sources for the more important native bee pollinators of blueberry, the primary objectives of the present research were:

- 1) to compile the published North American nectar, pollen, and flower records;
- 2) to analyze the pollen loads of native bees associated with *Vaccinium* spp. in Maine; and
- 3) to survey distribution and abundance patterns of native bee populations in Maine blueberry fields.

## METHODS

### Literature Search

This literature search of published North American nectar, pollen, and flower records through 1990 was restricted to native bee species that have been collected on or near lowbush blueberry in Maine and eastern Canada. Records for parasitic and inquiline species of native bees, *Nomada*, *Psithyrus*, and *Sphecodes*, were included. Unless the author stated specifically that the bee was observed foraging for nectar, we have cited it as a flower record because of the possibility that it may have been present on the plant for other reasons (e.g., resting, foraging for pollen). Inclusion as a pollen record was based on at least one of the following criteria being met:

- 1) microscopic examination of pollen loads;
- 2) observation of bees collecting pollen from a particular plant taxon;
- 3) statement that the bee collected pollen from a particular plant taxon.

The work of earlier compilers of floral records for native bees, (i.e., Krombein et al. 1979; Mitchell 1960) provided most of the floral citations prior to 1976. All sources that provided additions to their earlier lists are cited in the Appendix. Floral nomenclature is from Kartesz and Kartesz (1980). Bee nomenclature is from Krombein et al. (1979), LaBerge publications on *Andrena* spp., and McGinley (1986). Occasionally changes in taxonomy or earlier misidentification of species resulted in our making judgments as to which bee or flower was meant. Fortunately, this was rare and where uncertainty still remained, it is indicated with a footnote.

### Pollen Analysis

Pollen loads were examined from bees in the Entomology Department Insect Collection at the University of Maine. Only species known to be associated with the lowbush blueberry in Maine were examined and most specimens had been collected in Maine during the period 1962–63, 1989–90, and a few intervening years from either *Vaccinium* spp., *Amelanchier* spp. (shadbush), or *Rubus allegheniensis* Porter ex Bailey (blackberry). Shadbush, which blooms, in part, earlier than blueberry, and blackberry, which blooms after blueberry, were included in order to determine whether wild bees associated with blueberry use them as alternative sources of pollen.

Sample preparation was a variation on standard preparation methods *sensu* Faegri and Iversen (1989). Pollen loads were detached from individual bees using fine forceps. Pollen was dispersed in 10% potassium hydroxide at 90° C for 10 min. A 9/1 solution of acetic anhydride and concentrated sulfuric acid at 90° C was used to remove organic matter, and the remaining sample was suspended in silicon oil. Samples were analyzed at 400 X with a Leitz microscope. At least 100 pollen grains were identified from each pollen load, and pollen percentages were calculated for each pollen load. Pollen identification was aided by standard reference texts and articles and the pollen reference collection of the Plant Biology and Pathology Department, University of Maine.

### Measuring Native Bee Abundance and Distribution Patterns

Sweeps of blueberry bloom for bees and plot counts of insects on blueberry were performed to determine current species distribution and abundance patterns in Washington County, Maine.

Native bees were collected on blueberry bloom using a sweep net with a 15-in. net ring and a 5-ft. handle. A sweep was made every third or fourth step in a transect across each blueberry field so that bees would not be disturbed by the collector. Each sample consisted of 50 sweeps. Large and small fields in Beddington and Deblois, Maine, were sweep sampled in 1989. One hundred and twenty one samples were taken on May 30, June 2, June 3, and June 5. In 1990 two sets of sweep samples were taken. The first set consisted of thirty-two sweep samples. Twelve samples were taken on May 26 and four samples on May 31 from the large barrens in Deblois; 16 samples were taken on June 1 from a small field on Vienna Mountain in Vienna. The second set consisted of five sets of 50 sweeps of the borders and interiors of nine fields on June 12 and June 13. Sample sites were three small fields, located in Winterport, Frankfort, and Township 31, and six large fields, five in Deblois and one in Township 32.

Native pollinators were counted in ten 3-ft x 6-ft plots established in both a small blueberry field in Beddington and the large barrens in Deblois in 1989. Six 30-sec. counts of pollinators (native bees, honeybees, bee flies, and syrphid flies) were made each day within each plot. Counts were made simultaneously by two observers, who alternated between fields each day. Sampling days were May 23, 25, 26, and 29 and a total of 240 counts of 30 sec. each were taken.

Species richness, the number of species present in some area within a community, was estimated using the jackknife procedure (Heltshel and Forrester 1983).

## RESULTS AND DISCUSSION

The literature survey (Table 1) results indicate that 28 species of native bees associated with blueberry in Maine collect *Vaccinium* spp. pollen. Coupled with our new pollen records from the pollen analysis work (Table 2 and Table 3), a total of 38 native bee species pollinate *Vaccinium* spp. and all are polylectic, meaning they forage on a diversity of plant species for nectar and pollen. For example, *Andrena regularis* Malloch, which was the most abundant wild bee species collected in Maine blueberry barrens during the period 1961–1965 (Boulanger et al. 1967), collects blueberry pollen and has been collected on 21 different plant genera. All of these genera are found in Maine (*Checklist of the Josselyn Botanical Society*). Likewise, *Andrena rufosignata* Cockerell, the most abundant native bee species collected during 1989–1990, also pollinates blueberry and has been collected from 24 plant genera, 21 of which are found in Maine.

Table 1. Published nectar, pollen, and flower records for native bees associated with *Vaccinium* spp.

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***Agapostemon texanus texanus* Cresson**

pollen: *Cassia fasciculata*; *Solanum carolinense*; *S. rostratum*

flower records: *Amelanchier*; *Amorpha*; *Antennaria*; *Aronia melanocarpa*; *Aster*; *Aster spinosus*; *Barbarea*; *Cassia*; *Cephalanthus*; *Cerasus*; *Cirsium*; *Convolvulus arvensis*; *Coreopsis*; *Crataegus*; *Cucurbita*; *Dalea*; *Echinacea*; *Erigeron*; *Fragaria*; *Geranium*; *Helianthus*; *H. annuus*; *Heterotheca latifolia*; *Lepachys*; *Lippia alba*; *Malus*; *Mentha piperita*; *Melilotus*; *Mikania scandens*; *Palafoxia texana*; *Potentilla*; *Pluchea odorata*; *Prunus*; *P. americana*; *Pycnanthemum*; *Ratibida*; *Rhus*; *Rosa*; *Rubus*; *Salix*; *Senecio*; *Silphium*; *Solidago*; *Sonchus*; *Teucrium cubense*; *Tragopogon*; *Verbena*; *Verbesina encelioides*; *Veronica*

***Andrena alleghaniensis* Viereck**

nectar and pollen: *Acer spicatum*

pollen: *Prunus*

flower records: *Amelanchier*; *Barbarea*; *Brassica*; *Cornus*; *Crataegus*; *Euphorbia cyparissias*; *Fragaria vesca*; *F. virginiana*; *Ledum*; *Leucanthemum vulgare*; *Melilotus alba*; *Ranunculus*; *Rubus*; *R. idaeus*; *Salix*; *Vaccinium*<sup>1</sup>; *Viburnum*; *V. cassinoides*; *V. opulus*

***Andrena bisalicis* Viereck**

flower records: *Acer*; *A. rubrum*; *Amelanchier*; *A. canadensis*; *Antennaria neglecta*; *Arabis laevigata*; *Aronia*; *Barbarea vulgaris*; *Brassica*; *Claytonia virginica*; *Cornus*; *Crataegus*; *C. mollis*; *Diospyros virginiana*; *Ilex*; *Lomatium foeniculaceum* ssp. *daucifolium*; *Malus sylvestris*; *Prunus*; *P. americana*; *P. angustifolia*; *P. persica*; *P. serotina*; *Pyracantha*; *Ranunculus*; *Rosa*; *Rubus*; *Salix*; *Salix amygdaloides*; *S. cordata*; *S. exigua*; *S. humilis*; *S. nigra*; *S. sericea*; *S. tristis*; *Stellaria media*

***Andrena bradleyi* Viereck.**

pollen: *Malus sylvestris*; *Rhododendron canadense*; *Vaccinium*

flower records: *Arctostaphylos uva-ursi*; *Barbarea vulgaris*; *Chamaedaphne*; *Crataegus*; *Gaylussacia*; *Kalmia angustifolia*; *K. latifolia*; *Ledum*; *Prunus*; *P. virginiana*; *Pyrus malus*; *Rhododendron*; *Ribes*; *R. oxyacanthoides*; *R. rubrum*; *Salix*; *Vaccinium corymbosum*; *V. vacillans*

***Andrena carlini* Cockerell**

nectar and pollen: *Acer rubrum*

pollen: *Amelanchier*; *Aronia arbutifolia*; *Crataegus*; *Fragaria*; *Malus*; *M. sylvestris*; *Prunus*; *P. pensylvanica*; *P. virginiana*; *Pyrus*; *Salix*; *Taraxacum officinale*; *Tragus*; *Trifolium repens*; *Vaccinium*

flower records: *Acer*; *Amelanchier canadensis*; *Amorpha fruticosa*; *Anemone canadensis*; *Arabis*; *A. perstellata*; *Arctostaphylos uva-ursi*; *Aronia melanocarpa*; *Astragalus*; *Barbarea*; *B. vulgaris*; *Berberis thunbergii*; *Borago officinalis*; *Brassica*; *B. napus*; *Buxus*; *Caltha palustris*; *Camassia scilloides*; *Caragana arborescens*; *Cercis*; *C. canadensis*; *Chaerophyllum*; *C. procumbens*; *Chamaedaphne*; *Claytonia*; *C. virginica*; *Collinsia verna*; *Cornus*; *C. florida*; *C. mas*; *C. racemosa*; *Corydalis*; *Crataegus punctata*; *Cynoglossum officinale*; *Dentaria*; *D. laciniata*; *Dicentra*; *D. cucullaria*; *Erigenia*; *E. bulbosa*; *Erigeron hyssopifolius*; *E. philadelphicus*; *Erysimum asperum*; *Erythronium*; *E. albidum*; *E. americanum*; *Euphorbia*; *E. cyparissias*; *Fagus grandifolia*; *Fragaria*; *F. virginiana*; *Gaylussacia*; *Hepatica*; *H. acutiloba*; *Heraclium*; *H. lanatum*; *Hieraceum*; *Hydrophyllum*; *H. appendiculatum*; *Isopyrum*; *I. biternatum*; *Krigia*; *Ledum*; *Lepidium*; *Lesquerella*; *Melilotus*; *M. officinalis*; *Paeonia*; *Phacelia bipinnatifida*; *Physocarpus opulifolius*; *Polemonium*; *P. reptans*; *Prunus americana*; *Pulsatilla patens*; *Ptelea trifoliata*; *Pyrus*; *Rhus*; *R. aromatica*; *Ribes*; *R. missouriense*; *R. odoratum*; *R. setosum*; *Rosa*; *Rubus*; *R. argutus*; *R. canadensis*; *R. flagellaris*; *R. occidentalis*; *Salix*; *S. amygdaloides*; *S. cordata*; *S. exigua*; *S. humilis*; *S. nigra*; *Sanguinaria*; *S. canadensis*; *Sassafras*; *S.*

*albidum*; *Scilla*; *Scrophularia*; *Smilacina*; *Spiraea*; *S. vanhouttei*; *Solidago*; *S. canadensis*; *Stanleya*; *Staphylea trifolia*; *Thalictrum*; *T. thalictroides*; *Thaspium trifoliatum*; *Tussilago farfara*; *Uvularia grandiflora*; *Vaccinium corymbosum*; *Viburnum*; *V. cassinoides*; *V. opulus*; *V. prunifolium*; *Vicia*; *Viola*; *V. obliqua*; *V. rafinesquii*; *V. pubescens*; *V. stricta*; *Zigadenus*; *Zizia aurea*

### ***Andrena carolina* Viereck**

flower records: *Aronia melanocarpa*; *Azalea*; *Claytonia*; *Dentaria*; *Ledum*; *Malus sylvestris*; *Prunus virginiana*; *Pyrus*; *Rhododendron*; *Vaccinium*

### ***Andrena crataegi* Robertson**

pollen: *Amelanchier*; *Acer pensylvanicum*; *A. spicatum*; *Caragana aborescens*; *Malus sylvestris*; *Narcissus pseudo-narcissus*; *Ribes*; *Salix incana*; *Spiraea vanhouttei*; *Taraxacum officinale*; *Tulipa gesneriana*; *Vaccinium*

flower records: *Amorpha*; *Aronia melanocarpa*; *Aruncus*; *Astragalus*; *Barbarea*; *Blephilia*; *Brassica*; *Caragana*; *Cardaria*; *Carduus*; *Cirsium hookerianum*; *C. paniculatus*; *Castanea*; *Ceanothus*; *Chamaebatia foliolosa*; *Chrysanthemum*; *Conium*; *Cornus*; *Crataegus*; *Crepis*; *Cryptantha intermedia*; *Daucus*; *Diervilla*; *Deutzia*; *Eulophus*; *Euphorbia*; *E. cyparissias*; *Fragaria*; *F. virginiana*; *Frasera*; *F. speciosa*; *Gilia achilleifolia*; *Hackelia*; *Heracleum*; *H. lanatum*; *Holodiscus*; *H. dumosus*; *Hydrangea*; *Ilex*; *Iris*; *Ledum*; *Lomatium dasycarpum*; *Malus*; *Malvastrum*; *Melilotus*; *Monarda*; *M. fistulosa*; *Narcissus*; *N. officinale*; *Pastinaca*; *Philadelphus*; *Physocarpus*; *Polytaenia*; *Potentilla*; *Prunus*; *P. virginiana*; *P. virginiana* var. *demissa*; *Ptelea*; *Purshia*; *Pyracantha*; *Pyrus*; *Ranunculus*; *Raphanus*; *Rhamnus*; *Rhododendron*; *Rhus*; *Rosa*; *R. acicularis*; *Rubus*; *R. deliciosus*; *R. idaeus*; *Salix*; *Senecio*; *Solidago*; *Sorbaria*; *S. sorbifolia*; *Spiraea*; *S. latifolia*; *Symphoricarpos*; *Taenidia*; *Tamarix*; *Taraxacum*; *Thaspium*; *Trifolium*; *T. repens*; *Tulipa*; *Viburnum*; *V. cassinoides*; *Zizia*

### ***Andrena cressonii cressonii* Robertson**

pollen: *Vaccinium*

flower records: *Acer saccharinum*; *Achillea millefolium*; *Aesculus glabra* var. *glabra*; *Agoseris heterophylla*; *Alliaria petiolata*; *Amelanchier*; *A. arborea*; *A. canadensis*; *Amorpha fruticosa*; *Antennaria*; *A. neglecta*; *Anthemis cotula*; *Apocynum medium*; *Arabis*; *Aronia*; *A. arbutifolia*; *A. melanocarpa*; *Aruncus*; *Astragalus*; *Barbarea*; *B. vulgaris*; *Berberis*; *Brassica*; *Buxus*; *Camassia esculenta*; *C. scilloides*; *Capsella*; *C. bursa-pastoris*; *Cardamine*



*bulbosa*; *Castanea pumila*; *Ceanothus*; *C. americanus*; *C. integerrimus*; *C. ovatus*; *Celastrus*; *Cercis canadensis*; *Claytonia*; *C. virginica*; *Collinsia verna*; *Cornus*; *C. paniculatus*; *C. sericea*; *Crataegus*; *C. crus-galli*; *C. mollis*; *C. tomentosa*; *Crepis runcinata*; *Daucus carota*; *Dentaria*; *D. laciniata*; *Descurainia*; *D. pinnata* ssp. *brachycarpa*; *D. sophia*; *Diospyros virginiana*; *Echinacea angustifolia*; *Erigeron*; *E. philadelphicus*; *Eriogonum nudum*; *Erysimum asperum*; *Erythronium albidum*; *Euphorbia commutata*; *E. cyparissias*; *Fragaria*; *F. virginiana*; *Geum macrophyllum*; *Gilia*; *Hackelia floribunda*; *Heracleum*; *Hieracium aurantiacum*; *Horkelia*; *Ilex*; *Lasthenia californica*; *Leucanthemum vulgare*; *Lepidium*; *L. campestre*; *Leucocrinum montanum*; *Limnanthes douglasii*; *Lomatium dissectum*; *Lonicera*; *Magnolia*; *Malus sylvestris*; *Medicago sativa*; *Melilotus alba*; *M. officinalis*; *Nemophila spatulata*; *Oenothera*; *Oxalis*; *Parthenium repens*; *Pastinaca*; *P. sativa*; *Paeonia*; *Phacelia*; *P. humilis*; *Philadelphus*; *Physocarpus opulifolius*; *Pimpinella integerrimus*; *Poa pratensis*; *Polytaenia nuttallii*; *Potentilla*; *P. flabelliformis*; *Prunus*; *P. americana*; *P. angustifolia*; *P. canadensis*; *P. serotina*; *P. virginiana*; *P. virginiana* var. *demissa*; *Ptelea*; *Pulsatilla patens* ssp. *multifida*; *Pyracantha*; *Pyrrhopappus*; *Pyrus*; *Quercus*; *Radicula*; *Ranunculus*; *R. alismifolius*; *R. bulbosa*; *R. californicus*; *R. fascicularis*; *R. hortivus*<sup>2</sup>; *R. occidentalis*; *R. septentrionalis*; *R. testiculatis*; *Rhamnus lanceolata*; *R. rubra*; *Rhus canadensis*; *R. glabra*; *Ribes*; *R. missouriensis*; *Rorippa sinuata*; *Rosa*; *R. amygdaloides*; *Rubus idaeus*; *Salix*; *S. bebbiana*; *S. exigua*; *S. nigra*; *S. tristis*; *Sanicula*; *Saxifraga virginensis*; *Senecio*; *S. balsaminifera*; *Smilacina*; *Smilax*; *S. hispida*; *Spiraea*; *S. aruncus*; *S. latifolia*; *S. thunbergii*; *S. vanhouttei*; *Sorbaria sorbifolia*; *Stellaria*; *S. media*; *Tamarix gallica*; *Taraxacum*; *T. densleoni*; *T. officinale*; *Taenidia*; *Thaspium barbinode*; *Thelypodium repandum*; *Thlaspi arvense*; *Tradescantia*; *T. brevicaulis*; *Trifolium*; *Veronica*; *Viburnum*; *V. cassinoides*; *Waldsteinia*; *Zanthoxylum*; *Z. americanum*; *Zigadenus*; *Zizia*; *Z. aurea*

### ***Andrena dunningi* Cockerell**

flower records: *Amelanchier*; *A. arborea*; *A. canadensis*; *Barbarea vulgaris*; *Cercis canadensis*; *Claytonia*; *C. virginica*; *Collinsia*; *Cornus mas*; *Crataegus*; *C. crus-galli*; *C. mollis*; *Dentaria laciniata*; *Gleditsia*; *G. triacanthos*; *Hydrophyllum virginianum*; *Malus*; *M. sylvestris*; *Narcissus*; *Pastinaca sativa*; *Physocarpus opulifolius*; *Prunus*; *P. angustifolia*; *P. serotina*; *Ribes*; *R. missouriensis*; *Rosa*; *Rubus*; *R. flagellaris*; *Salix*; *S. amygdaloides*; *S. cordata*; *S. discolor*; *S. nigra*; *Sambucus*; *Sanguinaria canadensis*; *Sanicula marilandica*; *Scilla*; *Spiraea*; *Syringa*; *Taraxacum*; *T. officinale*; *Trillium*; *Uvularia grandiflora*; *Viburnum*; *V. prunifolium*

***Andrena forbesii* Robertson**nectar and pollen: *Acer rubrum*

flower records: *Acer negundo*; *Alliaria officinalis*; *Amelanchier*; *A. arborea*; *A. canadensis*; *Antennaria*; *Aronia*; *A. melanocarpa*; *Astragalus*; *Barbarea vulgaris*; *Brassica*; *Callirhoe digitata*; *Capsella*; *Cardamine bulbosa*; *Ceanothus*; *C. ovatus*; *Cercis*; *C. canadensis*; *Claytonia*; *C. caroliniana*; *C. virginiana*; *Cornus*; *C. florida*; *C. mas*<sup>2</sup>; *Crataegus*; *Echinacea purpurea*; *Erigenia*; *Erythronium americanum*; *Euphorbia*; *E. commutata*; *Forsythia*; *F. suspensa*; *Fragaria*; *F. virginiana*; *Heracleum*; *H. lanatum*; *Hieracium*; *Ilex*; *Isopyrum*; *Lappula redowskii*; *Lomatium*; *L. foeniculaceum* ssp. *daucifolium*; *Lonicera*; *Malus*; *M. ioensis*; *M. sylvestris*; *Melilotus alba*; *M. officinalis*; *Paeonia*; *Pastinaca sativa*; *Physocarpus opulifolius*; *Polytaenia*; *Populus deltoides*; *Prunus*; *P. americana*; *P. serotina*; *P. virginiana*; *P. virginiana* var. *demissa*; *Ptelea*; *Pyracantha*; *Pyrus*; *Ranunculus abortivus*; *Rhamnus lanceolatus*; *Rhus*; *R. aromatica*; *R. canadensis*; *R. toxicodendron*; *Ribes*; *R. gracile*; *Rosa*; *Rubus*; *R. argentus*<sup>2</sup>; *Salix*; *S. discolor*; *S. nigra*; *Sassafras*; *Sedum ternatum*; *Shepherdia argentea*; *S. canadensis*; *Spiraea*; *S. aruncus*; *S. latifolia*; *Stellaria*; *Symphoricarpos*; *Tamarix gallia*; *Taraxacum officinale*; *Thlaspi arvense*; *Vaccinium*; *Viburnum*; *V. opulus*; *V. prunifolium*; *Zanthoxylum*; *Zizia*; *Z. aurea*;

***Andrena imitatrix* Cresson**

flower records: *Acer*; *A. negundo*; *Alsine media*; *Amelanchier arborea*; *A. canadensis*; *Amorpha*; *A. fruticosa*; *Angelica atropurpurea*; *Antennaria dioica*; *Astragalus*; *Barbarea vulgaris*; *Cassia fasciculata*; *Ceanothus ovatus*; *Claytonia*; *Cornus*; *Crataegus*; *C. macrantha*; *C. mollis*; *Dentaria laciniata*; *Descurainia pinnata* ssp. *intermedia*; *Diospyros virginiana*; *Erythronium*; *Euphorbia*; *Exochorda racemosa*; *Forsythia*; *Hedyotis*; *Heracleum*; *Ilex*; *Lindera benzoin*; *Lomatium foeniculaceum*; *L. foeniculaceum* var. *daucifolium*; *Lonicera morrowii*; *Malus sylvestris*; *Medicago sativa*; *Paeonia*; *Pastinaca sativa*; *Phacelia*; *Physocarpus opulifolius*; *Populus*; *Prunus*; *P. americana*; *P. caroliniana*; *P. gracilis*; *P. pennsylvanica*; *P. serotina*; *P. virginiana*; *Ptelea*; *Pyracantha*; *Rhamnus utilis*<sup>2</sup>; *Rhus aromatica*; *R. canadensis*<sup>2</sup>; *Ribes aureum* var. *gracillium*; *Rosa*; *Rubus*; *Salix amygdaloides*; *S. babylonica*; *S. bebbiana*; *S. discolor*; *S. exigua*; *S. nigra*; *Senecio*; *Shepherdia canadensis*; *Spiraea aruncus*; *S. thunbergii*; *S. vanhouttei*; *Tamarix gallica*; *Taraxacum officinale*; *Thlaspi arvense*; *Vaccinium*; *Viburnum dentatum*; *V. prunifolium*; *Zigadenus*; *Zizia*

***Andrena mandibularis* Robertson**

flower records: *Acer saccharinum*; *A. negundo*; *Amelanchier*; *A. canadensis*; *Astragalus*; *Cercis canadensis*; *Claytonia*; *C. virginica*; *Cornus*; *Crataegus*; *C. mollis*; *Dentaria*; *Forsythia*; *Geranium*; *Hepatica*; *H. acuta*; *Malus ioensis*; *M. sylvestris*; *Prunus*; *P. persica*; *P. serotina*; *Pyrus*; *Rhamnus lanceolatus*; *Rhus*; *R. aromatica*; *Ribes*; *R. gracile*; *Rubus*; *R. villosus*; *Salix*; *S. amygdaloides*; *S. cordata*; *S. discolor*; *S. humilis*; *S. longifolia*; *S. nigra*; *S. tristis*; *Staphylea*; *Taraxacum officinale*; *Uvularia grandiflora*; *Vaccinium*; *Viburnum*; *V. pubescens*; *Zanthoxylum*; *Z. americanum*

***Andrena melanochroa* Cockerell**

pollen: *Fragaria*; *Potentilla*

flower records: *Aronia melanocarpa*; *Ceanothus*; *Cerastium arvense*; *Cornus canadensis*; *C. drummondii*; *Fragaria virginiana*; *Kalmia*; *Potentilla canadensis*; *Ranunculus*; *Rubus*; *Salix*; *Taraxacum*; *T. officinale*; *Vaccinium*; *Waldsteinia*

***Andrena milwaukeensis* Graenicher**

pollen: *Malus sylvestris*

flower records: *Amelanchier*; *Angelica*; *Aronia melanocarpa*; *Aruncus*; *Astragalus*; *Barbarea vulgaris*; *Berberis*; *B. thunbergii*; *Ceanothus fendleri*; *Cornus*; *Crataegus*; *Dentaria*; *Euphorbia cyparissias*; *E. esula*; *Fragaria virginiana*; *Geranium*; *Hydrolea*; *Hydrophyllum virginianum*; *Ilex*; *Kalmia angustifolia*; *Melilotus*; *Orebatus deliciosus*<sup>2</sup>; *Philadelphus*; *Prunus*; *P. serotina*; *P. virginiana*; *Ribes*; *Rosa*; *R. arkansana*; *Rubus*; *R. occidentalis*; *Salix*; *Symphoricarpos*; *Taraxacum officinale*; *Thermopsis*; *Vaccinium*; *Viburnum*; *V. lentago*; *Zizia aurea*

***Andrena miserabilis* Cresson**

pollen: *Caltha palustris*; Rosaceae; Salicaceae

flower records: *Amelanchier*; *Antennaria*; *Arabis*; *Aronia*; *A. melanocarpa*; *Berberis*; *Brassica*; *Capsella*; *Cardamine*; *Ceanothus*; *Cercis*; *Cercocarpus*; *Claytonia*; *Comandra*; *Convolvulus*; *Cornus*; *Crataegus*; *Cydonia*; *Dentaria*; *Erigenia*; *Euphorbia*; *E. cyparissias*; *Exochorda*; *Fragaria*; *Hepatica*; *Heracleum*; *Ilex*; *Isopyrum*; *Malus*; *M. sylvestris*; *Prunus*; *Ptelea*; *Pyracantha*; *Pyrus*; *Ranunculus*; *Rhamnus*; *Rhus*; *Rubus*; *Salix*; *Solidago*; *Sorbaria*; *Spiraea*; *Stachys*; *Staphylea*; *Stellaria*; *Taraxacum*; *Vaccinium*; *Viburnum*; *V. cassinoides*; *Viola*; *Zanthoxylum*

***Andrena nivalis* Smith**

nectar: *Pyrus communis*; *Taraxacum officinale*

flower records: *Acer*; *Achillea millefolium*; *Amelanchier*; *Arctostaphylos*; *Astragalus*; *Berberis*; *Brassica*; *Ceanothus*; *C. americanus*; *Cirsium arvense*; *Cornus*; *C. canadensis*; *Crataegus*; *Erigeron*; *Eriogonum*; *Euphorbia esula*; *Fragaria*; *Gaylussacia*; *Geranium*; *Heracleum*; *Hesperis matronalis*; *Hieracium*; *Hydrangea*; *Hydrophyllum*; *Kalmia*; *Lappula*; *Ledum*; *Leontodon*; *Lesquerella*; *Lonicera fragrantissima*; *L. longistylus*<sup>2</sup>; *Lyonia ligustrina*; *Maianthemum canadense*; *Malus*; *M. domestica*; *Medicago sativa*; *Melilotus alba*; *M. officinalis*; *Pastinaca sativa*; *Penstemon*; *Physocarpus opulifolius*; *Potentilla paradoxa*; *Prunus*; *Ranunculus*; *Rhododendron*; *Rhus cismontana*; *R. glabra*; *Ribes*; *R. missouriensis*; *R. vallecola*; *Robinia hispida*; *Rosa*; *R. arkansana* var. *suffulta*; *R. multiflora*; *Rubus*; *R. idaeus*; *Salix*; *S. brachycarpa*; *S. orestera*; *S. sessilifolia*; *Sanicula marilandica*; *Smilacina*; *Sorbaria sorbifolia*; *Sphaeroclea*; *Symphoricarpos*; *Taraxacum*; *Thaspium*; *Trifolium repens*; *Vaccinium*; *Viburnum cassinoides*; *V. opulus*; *Zizia aurea*

***Andrena regularis* Malloch**

pollen: *Amelanchier*; *Aronia arbutifolia*; *Crataegus*; *Fragaria*; *Malus*; *Prunus pensylvanica*; *P. virginiana*; *Vaccinium*

flower records: *Acer*; *Aronia melanocarpa*; *Aster*; *Barbarea*; *Brassica*; *Chamaedaphne calyculata*; *Cornus mas*; *Crataegus punctata*; *Kalmia*; *Ledum*; *Malus sylvestris*; *Prunus*; *Rubus*; *R. idaeus*; *R. occidentalis*; *Salix*; *Sinapis arvensis*; *Syringa*; *Spiraea vanhouttei*; *Viburnum cassinoides*

***Andrena rufosignata* Cockerell**

flower records: *Acer*; *Amelanchier*; *Arctostaphylos*; *Aronia melanocarpa*; *Barbarea vulgaris*; *Caltha palustris*; *Cornus*; *C. canadensis*; *Crataegus*; *Fagus grandifolia*; *Fragaria*; *Kalmia*; *Malus sylvestris*; *Melilotus*; *Prunus*; *P. virginiana* var. *demissa*; *Purshia tridentata*; *Rhododendron canadense*; *Rhus*; *Ribes*; *Rosa*; *Rubus*; *Salix*; *Taraxacum officinale*; *Uvularia grandiflora*; *Vaccinium*

***Andrena rugosa* Robertson**

nectar and pollen: *Acer rubrum*

pollen: *Aronia melanocarpa*; *Taraxacum officinale*

flower records: *Acer*; *Amelanchier arborea*; *A. canadensis*; *Angelica*; *Astragalus*; *Barbarea vulgaris*; *Brassica*; *B. arvensis*; *Claytonia*; *C. virginica*; *Cornus mas*; *Crataegus*; *C. punctata*; *Dentaria*

*laciniata*; *Dirca*; *Erigenia bulbosa*; *Fragaria*; *Geranium*; *Hepatica*; *Heracleum*; *Isopyrum*; *Macrocalyx nyctelea*; *Melilotus officinalis*; *Paeonia*; *Pastinaca sativa*; *Physocarpus opulifolius*; *Prunus*; *P. americana*; *P. virginiana*; *Ptelea*; *Pyracantha*; *Rhus*; *Ribes*; *Rosa multiflora*; *Rubus argutus*; *R. occidentalis*; *Salix*; *Sanicula*; *Spiraea aruncus*; *Symphoricarpos*; *Vaccinium*; *Viburnum*; *Zanthoxylum*; *Zizea aurea*

### ***Andrena salictaria* Robertson**

pollen: *Salix*; *S. bebbiana*; *S. cordata*; *S. humilis*

flower records: *Amelanchier*; *Antennaria*; *Barbarea*; *Chamaedaphne*; *Claytonia*; *Crataegus*; *Erigenia*; *Lomatium*; *Prunus americana*; *Pyracantha*; *Rhus*; *Sassafras*; *Vaccinium*; *Viburnum*

### ***Andrena sigmundi* Cockerell**

pollen: *Salix*; *S. bebbiana*; *S. discolor*

flower records: *Acer*; *A. saccharinum*; *Amelanchier*; *A. canadensis*; *Aronia melanocarpa*; *Barbarea vulgaris*; *Ceanothus*; *C. fendleri*; *Cornus canadensis*; *Crataegus*; *Fragaria virginiana*; *Fraxinus*; *Kalmia latifolia*; *Melilotus alba*; *Populus*; *Potentilla*; *Prunus*; *P. virginiana*; *P. virginiana* var. *demissa*; *Pulsatilla*; *P. patens*; *Rubus*; *Shepherdia argentea*; *S. canadensis*; *Spiraea*; *Taraxacum officinale*; *Vaccinium*; *Waldsteinia fragarioides*

### ***Andrena thaspii* Graenicher**

pollen: *Leucanthemum vulgare*; *Malus sylvestris*; *Trifolium repens*; *Vaccinium*; *V. canadense*

flower records: *Agoseris glauca*; *Angelica*; *A. atropurpurea*; *Arenaria*; *Asclepias*; *A. speciosa*; *Astragalus*; *Barbarea vulgaris*; *Brassica*; *B. arvensis*; *Calochortus leichtlinii*; *Calyptridium umbellatum*; *Ceanothus*; *C. americanus*; *Chrysanthemum*; *Cornus*; *C. canadensis*; *Diervilla*; *Erigeron*; *Eriogonum*; *E. flavum*; *Euphorbia cyparissias*; *Frasera speciosa*; *Geranium fremontii*; *Hedyotis pygmaea*; *Heracleum*; *H. lanatum*; *Heuchera*; *Hieracium*; *Kalmia*; *Lappula redowskii*; *Ledum*; *Leptodactylon pungens*; *Linum lewisii*; *Melilotus*; *M. alba*; *Pastinaca sativa*; *Phacelia*; *P. sericea*; *Physocarpus opulifolius*; *Polemonium*; *Potentilla*; *Purshia tridentata*; *Ranunculus*; *Rhaphanus*; *Rhododendron*; *Ribes longifloris*; *R. vallicola*; *Rosa*; *R. arkansana*; *R. carolina*; *Rubus*; *R. idaeus*; *Rudbeckia hirta*; *Salix*; *S. brachycarpa*; *Sambucus canadensis*; *Senecio*; *Solidago*; *Sonchus arvensis*; *Sorbaria sorbifolia*; *Spiraea aruncus*; *S. frobeli*; *S. latifolia*; *Symphoricarpos*; *S. occidentalis*; *Stellaria*; *Taraxacum*; *Tilia americana*; *Thaspium trifoliatum*; *Trifolium*; *Valeriana capitata*; *Viburnum*; *Vicia*

***Andrena vicina* Smith**

nectar and pollen: *Acer rubrum*

pollen: *Caragana arborescens*; *Malus sylvestris*; *Prunus*; *Spiraea vanhouttei*; *Taraxacum officinale*; *Tulipa gesneriana*; *Vaccinium*; *V. myrtilloides*

flower records: *Amelanchier*; *Amorpha*; *Antennaria spica*; *Arctostaphylos uva-ursi*; *Aronia melanocarpa*; *Aruncus*; *A. dioicus*; *Astragalus drummondii*; *Azalea*; *Barbarea vulgaris*; *Berberis*; *B. vulgaris*; *Caltha*; *Caragana*; *Castanea*; *C. pumila*; *Ceanothus*; *Cercis canadensis*; *Chamaedaphne*; *Cornus*; *Crataegus*; *C. punctata*; *C. succulenta*; *Crepis runcinata*; *Dentaria laciniata*; *Deutzia gracilis*; *Doronicum*; *Erysimum asperum*; *Erythronium*; *Euphorbia*; *Fragaria*; *Geranium caespitosum*; *Gaylussacia frondosa*; *Hepatica*; *Heracleum*; *Hesperis matronalis*; *Ilex*; *Kalmia*; *Ledum*; *Linaria canadensis*; *Lonicera*; *Lyonia ligustrina*; *Mahonia repens*; *Malus*; *Melilotus officinale*; *Narcissus*; *Penstemon glaber*; *Philadelphia*; *Physocarpus opulifolius*; *Picea*; *Potentilla*; *P. arguta*; *Prunus americana*; *P. angustifolia*; *P. virginiana*; *P. virginiana* var. *demissa*; *Ptelea*; *Pyrus*; *Ranunculus*; *Rhododendron*; *Ribes*; *Rosa*; *R. acicularis*; *R. arkansana*; *Rubus*; *R. argutus*; *R. deliciosus*; *R. idaeus*; *R. occidentalis*; *Salix*; *Sambucus*; *Sanguinaria*; *Saxifraga virginensis*; *Scilla sibirica*; *Scrophularia*; *Spiraea*; *Stanleya pinnatifida*; *Taraxacum*; *Trifolium hybridum*; *Tulipa*; *Vaccinium corymbosum*; *Viburnum*; *V. cassinoides*; *V. opulus*; *Weigelia*

***Andrena wheeleri* Graenicher**

nectar and pollen: *Vaccinium*

flower records: *Aralia nudicaulis*; *Aronia melanocarpa*; *Brassica*; *Centaurea*; *Chrysanthemum*; *Cornus*; *Crataegus*; *Cryptotaenia canadensis*; *Diervilla*; *Fragaria virgiana*; *Hackelia floribunda*; *Hesperis matronalis*; *Leucanthemum vulgare*; *Lomatium dissectum*; *L. triternatum*; *Polygonum convolvulus*; *Prunus*; *P. virginiana*; *Rhododendron*; *Rubus*; *R. allegheniensis*; *R. idaeus*; *Salix*; *Sanicula marilandica*; *Sedum acre*; *Zizia aurea*

***Andrena wilkella* (Kirby)**

pollen: *Cirsium*; *Daucus carota*; *Malus sylvestris*; *Solidago*; *Taraxacum officinale*; *Trifolium repens*; *Vaccinium*

flower records: *Achillea*; *Allium*; *Amorpha*; *Apocynum cannabinum*; *Aralia hispida*; *Aronia melanocarpa*; *Barbarea vulgaris*; *Berberis thunbergii*; *Brassica*; *Camassia scilloides*; *Cicuta maculata*; *Clintonia borealis*; *Coronilla varius*; *Cornus racemosa*; *C. sericea* ssp. *sericea*; *Crataegus*; *Daucus*; *Epilobium*; *Euphorbia*; *E. cyparissias*;

*Fragaria*; *Geranium*; *Hesperis matronalis*; *Hieracium*; *Hydrophyllum*; *Iris versicolor*; *Leontodon*; *Leucanthemum vulgare*; *Linaria canadensis*; *Lonicera*; *Lotus corniculatus*; *Lysimachia quadriflora*; *Lythrum salicaria*; *Malus*; *Medicago*; *M. sativa*; *Melilotus*; *M. alba*; *M. officinalis*; *Penstemon*; *P. digitalis*; *Philadelphus*; *Pinus*; *Polemonium reptans*; *Prunus*; *P. virginiana*; *Ranunculus*; *Rhaphanus*; *Rhododendron*; *Ribes*; *Rubus*; *R. alleghaniensis*; *R. idaeus*; *Salix*; *Spiraea*; *Sorbaria sorbifolia*; *Stellaria*; *Taraxacum*; *Trifolium*; *T. pratense*; *Viburnum*; *Vicia*; *V. cracca*; *Zizia aurea*

### ***Andrena w-scripta* Viereck**

pollen: *Vaccinium*

flower records: *Acacia greggii*; *Achillea millefolium*; *Adenostoma fasciculatum*; *Amelanchier*; *A. arborea*; *Arctostaphylos*; *A. glandulosa*; *A. patens*; *A. patula*; *A. pungens*; *A. viscida* ssp. *mariposa*; *Arenaria douglasii*; *Astragalus flavus* var. *candicans*; *Barbarea vulgaris*; *Berberis*; *Brassica*; *B. vulgaris*; *Calochortus*; *C. luteus*; *Cardaria draba*; *Castanea pumila*; *Ceanothus*; *C. americanus*; *C. cordulatus*; *C. cuneatus*; *C. divaricatus*<sup>2</sup>; *C. greggii*; *C. integerrimus*; *C. leucodermis*; *C. palmeri*; *C. sorediatus*; *C. velutinus*; *Chamaebaetia foliolosa*; *Clarkia amoena*; *Claytonia caroliniana*; *C. perfoliatum*; *C. spathulata*; *Cleome*; *Conium maculatum*; *Crataegus*; *Cryptantha*; *C. intermedia*; *C. micrantha* var. *lepida*; *C. muricata*; *Daucus carota*; *Descurainaea sophia*; *Erigeron*; *Eriogonum*; *E. marifolium*; *E. nudum*; *E. fasciculatum*; *Eriophyllum confertifolium*; *Fritillaria*; *Fragaria*; *Gilia*; *Hackelia patens*; *Heracleum lanatum*; *Heteromeles arbutifolia*; *Heterotheca*; *Holodiscus discolor*; *Horkelia*; *Hydrangea*; *Hypochoeris*; *Lasthenia*; *L. californica*; *Lepidium*; *Lesquerella*; *Lomatium*; *L. dissectum*; *L. foeniculaceum*; *L. triternatum*; *Lotus scoparius*; *Malus*; *M. sylvestris*; *Melilotus*; *M. alba*; *Mertensia*; *Philadelphus*; *Phacelia*; *P. distans*; *P. humilis*; *Physocarpus opulifolius*; *Potentilla*; *P. anserina*; *P. glandulosa*; *P. paradoxa*; *P. tridentata*; *Prunus*; *P. americana*; *P. andersonii*; *P. emarginata*; *P. ilicifolia*; *P. pennsylvanica*; *P. virginiana*; *P. virginiana* var. *demissa*; *Ptelea crenulata*; *Pulsatilla patens* var. *multifida*; *Pyracantha*; *Quercus*; *Q. douglasii*; *Ranunculus*; *R. californicus*; *Rhamnus californicus*; *R. crocea*; *Rhus trilobata*; *Ribes*; *Rosa caroliniana*; *Rubus*; *R. idaeus*; *R. occidentalis*; *R. ursinus*; *Salix*; *S. laevigata*; *S. orestera*; *Sisymbrium*; *Sorbaria sorbifolia*; *Sphenosciadium capitellatum*; *Spiraea prunifolia*; *S. vanhouttei*; *Symphoricarpos*; *Tamarix gallica*; *Taraxacum officinale*; *T. vulgare*; *Townsendia exscapa*; *Trifolium*; *Vicia villosa*; *Wyethia mollis*; *Zizia aurea*

***Augochlorella striata* (Provancher)**

pollen: *Caltha palustris*; *Cassia fasciculata*; *Vaccinium*

flower records: *Achillea*; *Actaea*; *Aesculus*; *A. syriaca*; *A. tuberosa*; *Agastache*; *Agoseris*; *Althaea*; *Amelanchier*; *Amorpha*; *Anemone*; *Antennaria*; *Apocynum*; *Aquilegia*; *Arabis*; *Aralia*; *Argemone*; *Arunca*; *Asclepias*; *Aster*; *Astragalus*; *Barbarea*; *Berteroa*; *Bidens*; *Blephilia*; *Brassica*; *Callirhoe*; *Calopogon*; *Camassia*; *Camelina*; *Campanula*; *Capsella*; *Cardamine*; *Carduus*; *Cassia*; *Caulophyllum*; *Ceanothus*; *Celastrus*; *Centaurea*; *Cephalanthus*; *Cercis*; *Chaerophyllum*; *Chrysanthemum*; *Chrysopsis*; *Cichorium*; *Cicuta*; *Circaea*; *Cirsium*; *Citrullus*; *Claytonia*; *Clethra*; *Campanula americana*; *Convolvulus*; *Coreopsis*; *Cornus*; *Crataegus*; *Cryptantha*; *Cryptotaenia*; *Cucumis*; *Cucurbita*; *Cunila*; *C. origanoides*; *Cypripedium candidum*; *Dalea*; *Daucus*; *Dentaria*; *Diervilla*; *Diospyros*; *Dodecatheon*; *Echinacea*; *Echinum*; *Ellisia*; *Erigena*; *Erigeron*; *E. philadelphicus*; *Erysimum*; *Euonymus*; *Eupatorium*; *Euphorbia*; *Fagopyrum*; *Fragaria*; *Gaillardia*; *Geranium*; *Gerardia*; *Geum*; *Glechoma*; *Gnaphalium*; *Gossypium*; *Grindelia*; *Gutierrezia*; *Haplopappus*; *Hedeoma*<sup>3</sup>; *Helenium*; *Helianthus*; *Heliopsis*; *Heracleum*; *Heterotheca*; *Heuchera*; *Hedyotis*; *H. caerulea*; *Hieracium*; *Hybanthus*; *Hydrangea*; *Hydrocotyle*; *Hydrolea*; *Hydrophyllum*; *Hypericum*; *Ilex*; *Impatiens*; *Inula*; *Ipomoea*; *Iris*; *Isopyrum*; *Kolkwitzia*; *Krigia*; *Lactuca*; *Lathyrus*; *Lepidium*; *Lespedeza*; *Lesquerella*; *Linaria*; *Linum*; *Lippia*; *Lobelia*; *Lomatium*; *Lonicera*; *Lotus*; *Ludwigia*; *Lycopersicum*; *Lycopus*; *Lythrum*; *Malus*; *Malva*; *Medicago*; *Melilotus*; *M. alba*; *M. fistulosa*; *Mentha*; *Mertensia*; *Mikania*; *Monarda*; *Myosoton*; *Nelumbo*; *Nemastylis floridana*; *Nepeta*; *Nigella*; *Nothoscordum*; *Oenothera*; *Onopordum*; *Opuntia*; *Osmorhiza*; *Oxalis*; *Paeonia*; *Parthenocissus*; *Parthenium*; *Paspalum*; *Pastinaca*; *Penstemon*; *Perideridia*; *Phryma*; *Physalis*; *Polemonium*; *Polygonatum*; *Polygonum*; *Polymnia*; *Polytaenia*; *Pontederia*; *Potentilla*; *Prenanthes*; *Prunella*; *Prunus*; *P. virginiana*; *Psoralea*; *Ptelea*; *Pteridium*; *Pycnanthemum*; *Pyrrophappus*; *Pyrus*; *Radicula*; *Ranunculus*; *Ratibida*; *Rhamnus*; *Rhododendron canadense*; *Rhus*; *Ribes*; *Rorippa*; *Rosa*; *Rubus*; *R. idaeus*; *Rudbeckia*; *Sagittaria*; *Salix*; *Salvia*; *Sanicula*; *Sapindus*; *Satureja*; *Scrophularia*; *Scutellaria*; *Sedum*; *Senecio*; *Sida*; *Silphium*; *Sisymbrium*; *Sisyrinchium*; *Smilacina*; *Smilax*; *Solanum*; *Solidago*; *Sonchus*; *Specularia*<sup>4</sup>; *Sphaeroclea*; *Spiraea*; *Stellaria*; *Stokesia*; *Strophostyles*; *Symphoricarpos*; *Symplocus*; *Syringa*; *Taenidia*; *Tanacetum*; *Taraxacum*; *Teucrium*; *Thalictrum*; *Thaspium*; *Tradescantia*; *Tragopogon*; *Trifolium*; *Trillium*; *Triosteum*; *Verbascum*; *Verbena*; *Vernonia*; *Viburnum*; *Vicia*; *Viola*; *Vitis*; *Waldsteinia*; *Zanthoxylum*; *Zizia*



***Bombus affinis* Cresson**

nectar: *Aureolaria pedicularia*; *Berberis thunbergii*; *Crataegus succulenta*; *Dicentra canadensis*; *D. cucullaria*; *Lonicera tatarica*; *Malus ioensis*; *M. sylvestris*; *Syringa vulgaris*; *Taraxacum officinale*

nectar and pollen: *Aquilegia caerulea* var. *hybrida*; *A. canadensis*; *A. skinneri*; *A. vulgaris*; *Hydrophyllum apendiculatum*; *Pedicularis canadensis*

pollen: *Aquilegia*; *Aesculus*; *Berberis*; *Crataegus*; *Dicentra*; *Dodecatheon*; *Lonicera*; *Pyrus*; *Spiraea*; *Solanum dulcamara*; *Syringa*; *Taraxacum*

flower records: *Aralia*; *Angelica*; *Asclepias*; *Aesculus glabra*; *Aster*; *Berberis*; *Carduus*; *Ceanothus*; *Cercis canadensis*; *Chamaedaphne*; *Cirsium*; *Epilobium*; *Eupatorium*; *Delphinium tricornis*; *Helianthus*; *Hydrangea*; *Hypersicum*; *Impatiens*; *Kalmia*; *Linaria*; *Lonicera*; *Lotus corniculatus*; *Lythrum*; *Malus*; *Medicago*; *Melilotus alba*; *M. sativa*; *Parnassia*; *Prunus*; *Rhododendron*; *Ribes*; *Robinia*; *Rosa*; *Salix*; *Solidago*; *Spiraea*; *Trifolium pratense*; *Vaccinium*; *Veronica*; *Vicia tenuifolia*

***Bombus bimaculatus* Cresson**

nectar: *Aquilegia vulgaris*; *Berberis thunbergii*; *Crataegus succulenta*; *Malus ioensis*; *M. sylvestris*; *Taraxacum officinale*

nectar and pollen: *Aesculus glabra*; *Helianthus annuus* L. Northrop King Sunbred 212 & 254; *Lonicera tatarica*; *Syringa vulgaris*; *Vaccinium*

pollen: *Achillea*; *Aquilegia canadensis*; *Arctium minus*; *Berberis*; *Camassia scilloides*; *Chichorium*; *Crataegus*; *Cleistes divaricata*; *Cirsium*; *Daucus carota*; *Delphinium tricornis*; *Dicentra canadensis*; *D. cucullaria*; *Echium vulgare*; *Epilobium*; *Euphorbia*; *Fragaria virginiana*; *Gentiana andrewsii*; *Geranium maculatum*; *Hydrophyllum appendiculatum*; *Hypericum perforatum*; *Ilex*; *Linaria*; *Lonicera*; *Lotus corniculatus*; *Medicago sativa*; *Melilotus*; *Nepeta*; *Pedicularis canadensis*; *Prunus*; *Ranunculus acris*; *R. fascicularis*; *Ribes*; *Rubus*; *Salix nigra*; *Silene cucubalis*; *Sinapis arvensis*; *Solanum dulcamara*; *S. esculentum*; *Spiraea*; *Symphoricarpos albus*; *Syringa*; *Taraxacum*; *Tilia americana*; *Trifolium*; *T. pratense*; *Verbascum*; *V. thapsus*; *Verbena hastata*; *Viburnum*

flower records: *Amelanchier*; *Aesculus carnea*; *Ajuga genevensis*; *Baptisia tinctoria*; *Blephilia*; *Carduus nutans*; *Caulophyllum*; *Cephalanthus*; *Cirsium*; *C. vulgare*; *Collinsia*; *Cotoneaster adpressa*; *Chimaphila maculata*; *C. umbellata*; *Dicentra*; *Dipsacus sylvestris*; *Euthamia graminifolia*; *Frasera caroliniensis*; *Gaultheria procumbens*; *Geranium*; *Halesia*; *Helianthus*; *Hy-*

*drangea; Hypericum; Itea; Kalmia; Lonicera caerulea; Malus; Melilotus; M. alba; Mertensia; Monarda; Nepeta cataria; Pentstemon; Phlox; Prunus; Polemonium; Pontedaria cordata; Pyrus; Rhododendron; Ribes; R. nigrum; Ribes uva-crispa var. sativum; Robinia pseudoacacia; Rosa; Seymeria; Salix; Solidago; S. canadensis; S. flexicaulis; Stachys; Symphytum officinale; Trifolium repens; Triosteum; Uvularia; Verbena; Vicia; V. cracca; V. tenuifolia; Weigelia florida*

***Bombus borealis* Kirby**

pollen: *Aralia hispida; Daucus carota; Echium vulgare; Fagopyrum; Hypericum perforatum; Malus sylvestris; Nepeta cataria*<sup>5</sup>; *Oenothera biennis; Solanum dulcamara; Tilia americana; Trifolium; T. hybridum; T. pratense; T. repens; Vaccinium; Asteraceae; Pinaceae; Poaceae; Rosaceae*

flower records: *Anaphalis margaritaceae; Brassica nigra; Cirsium vulgare; Cornus; Diervilla; Epilobium; E. angustifolium; Galeopsis tetrahit; Grindelia; Helianthus; Lonicera; Lupinus; Medicago; M. sativa; Melilotus; M. alba; Pontederia; P. cordata; Prunella vulgaris; Pyrus; Rhododendron; Rosa; R. carolina; Rubus; Silene alba; Sinapis arvensis; Solidago; Syringa vulgaris; Vicia*

***Bombus frigidus* Smith**

nectar: *Hedysarum sulphurescens*

nectar and pollen: *Aquilegia caerulea; A. eleganta*

pollen: *Pedicularis*

flower records: *Vaccinium*

***Bombus perplexus* Cresson**

nectar: *Asclepias syriaca; Cephalanthes occidentalis; Epilobium angustifolium; Rosa nitida; Solidago canadensis*

nectar and pollen: *Spiraea latifolia*

pollen: *Achillea; Aesculus glabra; Asclepias; Aralia hispida; Camassia scilloides; Chelidonium majus; Chicorium; Cirsium; Dicentra canadense; Delphinium tricorne; Echium vulgare; Gentiana andrewsii; Hypericum perforatum; Hydrophyllum appendiculatum; Impatiens capensis; Lonicera tatarica; Lotus corniculatus; Medicago sativa; Oenothera; Pedicularis canadensis; Plantago major; Podophyllum peltatum; Ranunculus acris; Silene cucubalis; Sinapis arvensis; Solanum dulcamara; Syringa vulgaris; Tilia americana; Trifolium; Vaccinium; Verbascum thapsus; Viburnum*

flower records: *Aesculus carnea; Aralia hispida; A. nudicaulis; Angelica; Asclepias incarnata; Aster puniceus; Berberis thunbergii;*

*Carduus nutans*; *Chimaphila maculata*; *C. umbellata*; *Cirsium vulgare*; *Cornus canadensis*; *Cotoneaster adpressa*; *Dicentra cucullaria*; *Deutzia gracilis*; *Dipsacus fullonum*; *Euthamia graminifolia*; *Hydrangea*; *Hydrophyllum virginianum*; *Lonicera*; *L. caerulea*; *Malus*; *M. sylvestris*; *Medicago*; *Pontederia cordata*; *Prunus tomentosa*; *Rhododendron*; *Ribes*; *R. nigrum*; *Ribes uva-crispa* var. *sativum*; *Robinia pseudoacacia*; *Rubus*; *R. idaeus*; *Salix*; *Solidago flexicaulis*; *Symphytum officinale*; *Taraxacum officinale*; *Tilia americana*; *T. platyparia*; *Trifolium hybridum*; *T. pratense*; *T. repens*; *Vicia cracca*; *Weigelia florida*

### ***Bombus ternarius* Say**

nectar: *Asclepias syriaca*; *Apocynum androsaemifolium*; *Cephalanthus occidentalis*; *Euthamia graminifolia*; *Hieracium*; *Pontederia cordata*; *Solidago canadensis*

nectar and pollen: *Aster novae-angliae*; *Erythronium americanum*; *Kalmia angustifolia*; *Leontodon autumnalis*; *Potentilla recta*; *Prunella vulgaris*; *Rosa nitida*; *Spiraea latifolia*; *Solidago*; *Thalictrum dasycarpum*; *Trifolium hybridum*; *T. pratense*; *Vicia cracca*

pollen: *Aralia hispida*; *Chrysanthemum*; *Cirsium*; *Daucus carota*; *Hypericum perforatum*; *Malus sylvestris*; *Narcissus pseudo-narcissus*; *Nymphaea odorata*; *Pinus*; *Rosa*; *Rhododendron*; *Taraxacum*; *Tulipa*; *Vaccinium*

flower records: *Agastache foeniculum*; *Anaphalis margaritacea*; *Apocynum*; *Asclepias*; *Aster*; *A. azureus*; *Brassica nigra*; *Calopogon occidentalis*; *Calluna vulgaris*; *Centaurea maculosa*; *Cirsium arvense*; *C. vulgare*; *Clintonia borealis*; *Cornus canadensis*; *Cynoglossum officinale*; *Daucus*; *Epilobium angustifolium*; *Helianthus*; *Hieracium aurantiacum*; *Lonicera*; *Medicago*; *M. sativa*; *Melilotus*; *M. alba*; *M. officinale*; *Narcissus*; *Pontederia cordata*; *Primula farinosa*<sup>2</sup>; *Prunus*; *P. pennsylvanica*; *P. tomentosa*; *Ranunculus septentrionalis*; *Rhus typhina*; *Rubus*; *R. idaeus*; *Salix*; *S. juncea*; *Syringa vulgaris*; *Symphytum officinale*; *Taraxacum officinale*; *Trifolium repens*; *Uvularia sessifolia*; *Vaccinium angustifolium*; *Viburnum lentago*

### ***Bombus terricola terricola* Kirby**

nectar: *Apocynum androsaemifolium*; *Cephalanthus occidentalis*; *Euthamia graminifolia*; *Hieracium*; *Impatiens biflora*; *Robinia pseudoacacia*; *Rubus hispidus*; *Solidago*; *Vicia cracca*

nectar and pollen: *Asclepias syriaca*; *Daucus carota*; *Epilobium angustifolium*; *Kalmia angustifolia*; *Leontodon autumnalis*; *Prunella vulgaris*; *Solidago canadensis*; *Spiraea latifolia*; *Trifolium hybridum*; *T. pratense*

pollen: *Achillea*; *Ambrosia*; *Aster*; *Arctium minus*; *Capsella bursa-pastoris*; *Caragana*; *Cardiaca*?; *Cichorium*; *Cirsium*; *Chelidonium majus*; *Cornus*; *Echium vulgare*; *Euphorbia*; *Hypericum perforatum*; *Ilex*; *Impatiens capensis*; *Leonurus*; *Linaria vulgaris*; *Lonicera*; *L. tatarica*; *Lychnis alba*; *Malus sylvestris*; *Medicago sativa*; *Melilotus*; *Nymphaea odorata*; *Podophyllum peltatum*; *Potentilla recta*; *Phleum*; *Plantago major*; *Pinus*; *Ranunculus acris*; *Rosa*; *Salix*; *Silene cucubalis*; *Sinapis arvensis*; *Solanum dulcamara*; *Syringa vulgaris*; *Typha angustifolia*; *Thalictrum*; *Tilia americana*; *Vaccinium*; *Verbascum thapsus*; *Verbena hastata*

flower records: *Aesculus*; *Anaphalis margaritacea*; *Angelica*; *Apocynum*; *Aralia*; *A. hispida*; *A. nudicaulis*; *Asclepias*; *A. incarnata*; *Aster azureus*; *A. ericoides*; *A. lateriflorus*; *A. novae-angliae*; *A. puniceus*; *Berberis thunbergii*; *Brassica nigra*; *Carduus nutans*; *Calopogon tuberosa*; *Cargana*; *Chimaphila umbellata*; *Cirsium arvense*; *C. vulgare*; *Cornus canadensis*; *Cotoneaster adpressa*; *Cypripedium acaule*; *Deutzia gracilis*; *Echium*; *Epilobium*; *Eupatorium*; *Gaultheria*; *Gaylussacia*; *Helianthus*; *Hydrophyllum virginianum*; *Hypericum virginianum*; *Impatiens*; *Ledum*; *Liatris aspera*; *Linum*; *Lonicera caerulea*; *L. tatarica*; *Lotus corniculatus*; *Malus*; *Medicago*; *Melilotus alba*; *Minuartia groenlandica*; *Nepeta cataria*; *Oxycoccus*; *Pedicularis furbishiae*; *Phleum*; *Potentilla*; *Prunus*; *P. pennsylvanica*; *P. tomentosa*; *Rhododendron*; *Rhus typhina*; *Ribes*; *R. nigrum*; *R. uva-crispa* var. *sativum*; *Rosa acicularis*; *R. carolina*; *Rubus*; *R. idaeus*; *Salix incana*; *Silene cucubalis*; *Solidago juncea*; *Spiraea*; *Symphytum officinale*; *Taraxacum officinale*; *Thalictrum dasycarpum*; *Tilia platyparia*; *Trifolium T. repens*; *Uvularia sessilifolia*; *Vaccinium corymbosum*; *V. macrocarpon*; *Verbena*; *Viburnum*; *V. cassinoides*; *V. lentago*; *Vicia*; *Weigelia florida*;

### ***Bombus vagans bolsteri* Franklin**

flower records: *Vaccinium*

### ***Bombus vagans vagans* Smith**

nectar: *Apocynum androseamifolium*; *Cephalanthus occidentalis*; *Chelone glabra*; *Euthamia graminifolia*; *Galeopsis tetrahit*; *Hieracium*; *H. pratense*; *Impatiens biflora*; *I. capensis*; *I. pallida*; *Iris versicolor*; *Pontederia cordata*; *Robinia pseudoacacia*; *Rubus hispidus*; *R. strigosus*; *Solidago*; *S. canadensis*; *Uvularia sessilifolia*; *Vicia cracca*

nectar and pollen: *Asclepias syriaca*; *Aster novae-angliae*; *Epilobium angustifolium*; *Helianthus annuus* cultivars; *Kalmia angustifolia*; *Leontodon autumnalis*; *Prunella vulgaris*; *Spiraea latifolia*; *Trifolium hybridum*; *T. pratense*

pollen: *Aralia hispida*; *Caragana*; *Cleistes divaricata*; *Daucus carota*; *Delphinium tricornis*; *Dicentra canadensis*; *Fragaria*; *Dodecatheon*; *Geranium maculatum*; *Hydrophyllum canadense*; *Hypericum perforatum*; *Lonicera*; *Malus sylvestris*; *Monarda fistulosa*; *Narcissus pseudo-narcissus*; *Nymphaea odorata*; *Orchis spectabilis*; *Pedicularis canadensis*; *Phleum*; *Pinus*; *Potentilla recta*; *Prunus*; *Pyrus*; *Rosa*; *Salix*; *Spiraea*; *Syringa*; *Taraxacum*; *Tulipa*; *Vaccinium*

flower records: *Actinomeris*; *Aesculus glabra*; *Agastache*; *Alnus viridis* var. *crispa*; *Amphicarpum*; *Arctium*; *Aralia nudicaulis*; *Asclepias*; *Aster*; *Aureolaria pedicularia*; *Azalea*; *Betula*; *Blephilia*; *Brassica nigra*; *Cassia*; *Chimaphila maculata*; *C. umbellata*; *Cirsium*; *C. altissimum*; *C. arvense*; *Claytonia*; *Clematis*; *Clintonia borealis*; *Calopogon tuberosa*; *Cornus canadensis*; *Crataegus succulenta*; *Cypripedium acaule*; *Delphinium*; *Dicentra*; *D. cucullaria*; *Ellisia*; *Erigenia*; *Eupatorium*; *E. maculatum*; *Frasera caroliniensis*; *Geranium*; *Gerardia*; *Geum rivale*; *Helianthus*; *Hieracium aurantiacum*; *Hydrangea*; *Hydrophyllum*; *Hypericum*; *Ipomoea*; *Liatris*; *Linaria*; *Linnaea borealis*; *Lobelia*; *Lonicera tatarica*; *Lythrum salicaria*; *Maianthemum canadense*; *Malus*; *M. sylvestris*; *Malva*; *Medicago*; *M. sativa*; *Mertensia*; *Mimulus*; *Monarda*; *Nepta*; *Orthilia secunda*; *Pedicularis furbishiae*; *P. lanceolata*; *Pentstemon*; *Philadelphus hirsutus*; *Phlox*; *Phyllostegia*; *Polygonatum*; *Polymnia*; *Pontederia cordata*; *Prunella*; *Ranunculus septentrionalis*; *Rhododendron canadense*; *Rhus typhina*; *Ribes*; *Rosa carolina*; *Rubus*; *R. idaeus*; *Rudbeckia hirta*; *Scrophularia*; *Scutellaria*; *Seymeria*; *Silene cucubalis*; *Silphium*; *Sonchus oleraceus*; *Stachys*; *Staphylea*; *Symphoricarpos*; *Syringa vulgaris*; *Teucrium*; *Thalictrum dasycarpum*; *Tradescantia*; *Trifolium*; *T. repens*; *Triosteum*; *Vaccinium corymbosum*; *V. macrocarpon*; *Verbascum*; *Verbena*; *Veronica*; *Vicia*; *V. tenuifolia*; *Viola*; *Zizia*

### ***Ceratina dupla* Say**

pollen: *Caltha palustris*

flower records: *Aesculus glabra* var. *glabra*; *Amelanchier*; *A. canadensis*; *Ammania*; *Amorpha*; *Antennaria*; *A. plantaginifolia*; *Anthemis cotula*; *Arabis*; *Arctium*; *Aruncus*; *Asclepias*; *Aster simplex*; *Barbarea vulgaris*; *Bidens mitis*; *B. pilosa*; *Blephilia*; *Brassica*; *Cacalia*; *Camassia*; *Capsella bursa-pastoris*; *Cardamine*; *Ceanothus*; *Cephalanthus*; *C. occidentalis*; *Cerastium*; *Chrysanthemum*; *Chrysopsis*; *Circaea*; *Cirsium*; *Claytonia*; *C. caroliniana*; *Collinsia*; *Convolvulus*; *Coreopsis*; *Cornus*; *Crataegus*; *C. punctata*; *Cryptotaenia*; *Cypripedium*; *Dalea*; *Daucus carota*; *Delphinium*; *Dentaria*; *D. diphylla*; *D. laciniata*; *Dianthera*<sup>6</sup>; *Diospyros*; *Dorca*; *Echinacea*; *Ellisia*; *Emilia coccinea*; *Erigenia*; *Erygon annuus*; *E. canadensis*; *E. philadelphicus*; *E. quercifolius*; *Eryngium*; *Erythronium*; *Eupatorium*; *Flaveria linearis*; *Fragaria*; *F.*

*virginiana*; *Galactia*; *Geranium maculatum*; *Gerardia*; *Gillenia*; *Hedeoma*<sup>3</sup>; *Hedyotis*; *Helenium*; *Helianthus*; *Heliopsis*; *Heracleum*; *Hieracium*; *Hydrangea*; *H. paniculata*; *Hydrophyllum*; *Hypoxis*; *Isopyrum*; *Krigia*; *Lactuca*; *Leonurus*; *Lepidium*; *Leucanthemum vulgare*; *Liatris*; *Lindera benzoin*; *Lithospermum*; *Lobelia*; *Lycopus*; *Lythrum*; *Malus*; *Malva*; *Marrubium*; *Medicago lupulina*; *Melilotus alba*; *M. officinalis*; *Monarda*; *Nelumbo*; *Nepeta*; *Oenothera*; *Opuntia*; *Oxalis*; *Pastinaca*; *Penstemon*; *Phacelia ranunculacea*; *Phryma*; *Poinciana*; *Polemonium*; *Polygonatum*; *Polygonum*; *Potentilla recta*; *Prunella*; *Prunus americana*; *P. serotina*; *Psoralea*; *Ptelea*; *Pulsatilla*; *Pycnanthemum*; *Ranunculus*; *Rhamnus*; *Rhus*; *Rosa*; *Rubus*; *Rudbeckia*; *Sabatia*; *Sagittaria*; *Salix discolor*; *S. sericea*; *Salvia lyrata*; *S. pratensis*; *Sambucus*; *Scrophularia*; *Scutellaria*; *Senecio plattensis*; *Sida*; *Silphium*; *Sinapis*; *Smilax*; *Solidago*; *Specularia*<sup>4</sup>; *Spiraea*; *Stachys floridana*; *Stellaria*; *Stokesia laevis*; *Taraxacum dens-leonis*; *T. officinale*; *Teucrium*; *Thalictrum*; *Tradescantia*; *Trifolium*; *Triosteum*; *Tussilago farfara*; *Vaccinium*; *V. corymbosum*; *Verbena*; *Verbesina*; *Vernonia*; *Veronica*; *Viburnum*; *Viola rafinesquii*; *Waldsteinia*; *Zizia*; *Z. aurea*

### ***Colletes inaequalis* Say**

nectar and pollen: *Acer rubrum*

pollen: *Arctostaphylos*; *Vaccinium*; *V. stamineum*

flower records: *Acer*; *Aesculus glabra* var. *glabra*; *Amelanchier*; *Anemone*; *A. virginiana*; *Arctostaphylos*; *Cercis*; *C. canadensis*; *Claytonia*; *C. palustris*; *Crataegus*; *Dentaria*; *Dirca*; *Erigenia*; *Erythronium*; *Hepatica*; *Heracleum*; *Isopyrum*; *Leiophyllum buxifolium*; *Lomatium foeniculaceum*; *Polytaenia*; *Prunus*; *Ptelea*; *Pyrus*; *Malus ioensis*; *Rhamnus*; *R. utilis*<sup>2</sup>; *Rhus*; *R. aromatica*; *R. canadensis*; *Ribes*; *Rubus*; *Salix*; *Spiraea*; *S. vanhouttei*; *S. thunbergii*; *Staphylea*; *Stellaria*; *Taraxacum*; *Thalictrum*; *Viburnum*; *V. acerifolium*; *Zanthoxylum*; *Zizia*

### ***Colletes simulans armatus* Patton**

nectar: *Cicuta maculata*; *Polygonum hydropiperoides*

flower records: *Aster*; *A. ericoides*; *Baccharis*; *Bidens aristosa*; *Eupatorium*; *Euthamia graminifolia*; *Fagopyrum*; *Polygonum cuspidatum*; *Solidago canadensis*; *S. nemoralis*; *S. ulmifolia*

### ***Colletes validus* Cresson**

nectar and pollen: *Acer rubrum*; *Amelanchier*; *Prunus*; *Vaccinium*

pollen: *Pinus*; *Vaccinium stamineum*

flower records: *Chamaedaphne*; *C. calyculata*; *Leucothoe*; *L. racemosa*; *Prunus*; *Ribes oxycanthoides*; *R. rubrum*; *Vaccinium corymbosum*

***Dialictus admirandus* (Sandhouse)**

flower records: *Agastache*; *Althaea*; *Antennaria*; *Anthemis*; *Apocynum*; *Asclepias*; *Aster*; *Baptisia*; *Barbarea*; *Brassica*; *Ceanothus*; *Cirsium*; *Claytonia*; *Daucus*; *Eryngium*; *Fagopyrum*; *Fragaria*; *Gladiolus*; *Gypsophila*; *Helenium*; *Hydrangea*; *Hypericum*; *Isopappus*; *Koellia*; *Leucothoe*; *Lepidium*; *Lotus*; *Malus*; *Medicago*; *Melilotus*; *Nepeta*; *Oxypolis*; *Paeonia*; *Pastinaca*; *Phaseolus*; *Plantago*; *Polygonum*; *Potentilla*; *Prunus*; *Ptilimnium*; *Pycnanthemum*; *Pyracantha*; *Raphanus*; *Rhus*; *Robinia*; *Rorippa*; *Rosa*; *Rubus*; *Rudbeckia*; *Salix*; *Salvia*; *Senecio*; *Solidago*; *Spiraea*; *Symplocos*; *Taraxacum*; *Trifolium*; *Vaccinium*; *Vernonia*; *Viburnum*; *Vicia*

***Dialictus albipennis* (Robertson)**

flower records: *Apocynum*; *Aronia melanocarpa*; *Asclepias*; *Barbarea*; *Chrysanthemum*; *Comandra*; *Cucurbita*; *Dalea*; *Erigeron*; *Hedyotis*; *Krigia*; *Lepachys*; *Melilotus*; *Potentilla*; *Oenothera*; *Oxalis*; *Prunus virginiana*; *Rubus*; *Salvia*; *Solidago*; *Radicula*; *Rudbeckia*; *Taraxacum*; *Vaccinium*; *Zizia*

***Dialictus imitatus* (Smith)**

flower records: *Agastache*; *Alisma*; *Althaea*; *Amelanchier*; *Ammannia*; *Amorpha*; *Antennaria*; *Anthemis*; *Apocynum*; *Arabis*; *Aralia nudicaulis*; *Arctium*; *Aronia*; *Aruncus*; *Asclepias*; *Aster*; *Baptisia*; *Berteroa*; *Barbarea*; *Blephilia*; *Boltonia*; *Brassica*; *Cacalia*; *Campunula*; *Capsella*; *Cassia*; *Caulophyllum*; *Ceanothus*; *Cephalanthus*; *Cerastium*; *Cercis*; *Chrysanthemum*; *Cicuta*; *Crataegus*; *Cirsium*; *Claytonia*; *Clematis*; *Clintonia borealis*; *Cornus*; *Crataegus*; *Cryptotaenia*; *Dalea*; *Daucus*; *Dentaria*; *Dianthera*<sup>6</sup>; *Diospyros*; *Echinacea*; *Ellisia*; *Erigenia*; *Erigeron*; *Eryngium*; *Eulophus*; *Eupatorium*; *Euphorbia*; *E. cyparissias*; *Fagopyrum*; *Fragaria*; *F. virginiana*; *Gerardia*; *Geranium*; *Geum*; *Gillenia*; *Gleditsia*; *Gnaphalium*; *Gonolobus*; *Gypsophila*; *Hedyotis*; *Helenium*; *Helianthus*; *Heliopsis*; *Hepatica*; *H. nobilis* var. *acuta*; *Heracleum*; *Hieracium*; *Hydrangea*; *Hypoxis*; *Ilex*; *Impatiens*; *Isopyrum*; *Lactuca*; *Lappula*; *Leonurus*; *Lepidium*; *Lindernia*; *Lobelia*; *Ludwigia*; *Lycopus*; *Lotus*; *Malus*; *Malva*; *Melilotus*; *Mollugo*; *Monarda*; *Narcissus*; *Nelumbo*; *Nepeta*; *Osmorhiza*; *Oxypolis*; *Panicum*; *Pastinaca*; *Philadelphus*; *Phytolacca*; *Plantago*; *Polygonum*; *Polytaenia*; *Potentilla*; *Prunus*; *Ptelea*; *Pycnanthemum*; *Pyracantha*; *Pyrus*; *Ranunculus*; *Rhamnus*; *Ribes*; *Rhus*; *Robinia*; *Rubus*; *Rudbeckia*; *Sagittaria*; *Salix*; *Salvia*; *Sambucus*; *Sanguinaria*; *Sanicula*; *Sassafras*; *Scrophularia*; *Scutellaria*; *Silphium*; *Sisymbrium*; *Stium*; *Smilacina*; *Solidago*; *Stellaria*; *Stenanthium*; *Strophostyles*; *Symphoricarpos*; *Taraxacum*; *Taenidia*; *Tecoma*; *Thalictrum*; *Thaspium*; *Tilia*; *Trifolium*; *Trichostema*; *Vaccinium*; *Verbesina*; *Veronica*; *Viburnum*; *V. cassinoides*; *Viola*; *Vitis*; *Zanthoxylum*; *Zizia*

***Dialictus oblongus* (Lovell)**

flower records: *Aplectrum hyemale*; *Aquilegia*; *Aruncus*; *Asclepias*; *Brassica*; *Eupatorium*; *Gerardia*; *Hydrophyllum*; *Melilotus*; *Nymphaea*; *Rudbeckia*; *Rubus*; *Salix*; *Smilacina*; *Solidago*; *Taraxacum*; *Vaccinium*; *Zizia*

***Dialictus perpunctatus* (Ellis)**

flower records: *Antennaria*; *Anthemis*; *Barbarea*; *Brassica*; *Chrysanthemum*; *Cirsium*; *Crataegus*; *Erigeron*; *Euphorbia*; *Fagopyrum*; *Fragaria*; *Malus*; *Melilotus*; *Rhaphanus*; *Rhus*; *Rubus*; *Rudbeckia*; *Salix*; *Solidago*; *Taraxacum*; *Trifolium*; *Vaccinium*

***Dialictus pilosus pilosus* (Smith)**

pollen: *Vaccinium*

flower records: *Achillea*; *Althaea*; *Amelanchier*; *Ammannia*; *Amorpha*; *Antennaria*; *Apium*; *Apocynum*; *Aronia*; *A. melanocarpa*; *Asclepias*; *Aster*; *Barbarea*; *Blephilia*; *Brassica*; *Camassia*; *Cardamine*; *Cassia*; *Ceanothus*; *Cerastium*; *Cercis*; *Chrysanthemum*; *Cirsium*; *Claytonia*; *Coreopsis*; *Cornus*; *Crataegus*; *Cucurbita*; *Cryptotaenia*; *Cypripedium candidum*; *Dalea*; *Dentaria*; *Diervilla*; *Dianthera*<sup>6</sup>; *Diospyros*; *Echinacea*; *Eriogenia*; *Erigeron*; *Eryngium*; *Erythronium*; *Euphorbia*; *Fragaria*; *Gerardia*; *Geranium*; *Geum*; *Gnaphalium*; *Haplopappus*; *Hedyotis*; *Helenium*; *Helianthus*; *Heliopsis*; *Heracleum*; *Hydrophyllum*; *Hypericum*; *Hypochoeris*; *Isopyrum*; *Krigia*; *Lactuca*; *Lepidium*; *Lindernia*; *Lippia*; *Lobelia*; *Ludwigia*; *Lupinus*; *Malus*; *M. sylvestris*; *Malva*; *Medicago*; *Melilotus*; *Mollugo*; *Monarda*; *Nasturtium*; *Nelumbo*; *Nepeta*; *Oenothera*; *Opuntia*; *Osmorhiza*; *Oxalis*; *Parthenium*; *Penstemon*; *Polemonium*; *Polygonum*; *Polytaenia*; *Potentilla*; *Prunus*; *P. virginiana*; *Ptelea*; *Pycnanthemum*; *Pyracantha*; *Pyrrhopappus*; *Pyrus*; *Radicula*; *Ranunculus*; *Rhamnus*; *Rhaphanus*; *Rhus*; *Rubus*; *Rudbeckia*; *Sagittaria*; *Salix*; *Scutellaria*; *Senecio*; *Silphium*; *Sisymbrium*; *Sisyrinchium*; *Solidago*; *Stellaria*; *Taraxacum*; *Tephrosia*; *Trichostema*; *Trifolium*; *Verbena*; *Verbesina*; *Vernonia*; *Veronica*; *Viburnum*; *Viola*; *Zizia*

***Dialictus rohweri* (Ellis)**

flower records: *Amelanchier*; *Apocynum*; *Barbarea*; *Brassica*; *Chrysanthemum*; *Crataegus*; *Cypripedium candidum*; *Erigeron*; *Fagopyrum*; *Fragaria*; *F. virginiana*; *Hieracium*; *Malus*; *Melilotus*; *Plantago*; *Potentilla*; *Prunus*; *Ranunculus*; *Rhaphanus*; *Rhus*; *Rubus*; *Rudbeckia*; *Salix*; *Senecio*; *Sisyrinchium*; *Solidago*; *Taraxacum*; *Vaccinium*; *Viburnum*; *Vitis*



***Dialictus versans* (Lovell)**

flower records: *Amelanchier*; *Anaphalis*; *Aruncus*; *Barbarea*; *Epilobium*; *Fragaria*; *Hydrangea*; *Ledum*; *Melilotus*; *Plantago*; *Prunus*; *P. virginiana*; *Ranunculus*; *Rosa*; *Rubus*; *R. idaeus*; *Salix*; *Solidago*; *Taraxacum*; *Trifolium*; *Vaccinium*; *Viburnum cassinoides*

***Dialictus viridatus* (Lovell)**

pollen: *Vaccinium*

flower records: *Amelanchier*; *Anaphalis*; *Apocynum*; *Aralia*; *Aronia melanocarpa*; *Aster*; *Barbarea*; *Brassica*; *Cichorium*; *Diervilla*; *Epilobium*; *Euphorbia cyparissias*; *Leontodon*; *Malus sylvestris*; *Melilotus*; *Rheum*; *Rhododendron*; *Rubus*; *R. idaeus*; *Salix*; *Solidago*; *Taraxacum*

***Evylaeus cinctipes* (Provancher)**

pollen: *Malus sylvestris*; *Taraxacum*

flower records: *Amelanchier*; *Barbarea*; *Crataegus*; *Cirsium*; *Daucus*; *Epilobium*; *Eupatorium*; *Malus*; *Melilotus*; *Prunus*; *Pyrus*; *Rhus*; *Rubus*; *Salix*; *Solidago*; *Vaccinium*; *Viburnum*

***Evylaeus divergens* (Lovell)**

pollen: *Vaccinium*

flower records: *Aronia melanocarpa*; *Barbarea*; *Crataegus*; *Euphorbia cyparissias*; *Fragaria*; *Geranium*; *Hedyotis purpurea*; *Malva*; *Nasturtium*; *Potentilla*; *Rubus*; *R. idaeus*; *Salix*; *Sisyrinchium*; *Solidago*; *Taraxacum*

***Evylaeus foxii* (Robertson)**

pollen: *Vaccinium*

flower records: *Acer*; *Amelanchier*; *Anaphalis*; *Antennaria*; *Apocynum*; *Arabis*; *Aralia*; *Aronia melanocarpa*; *Aruncus*; *Aster*; *Barbarea*; *Brassica*; *Cacalia*; *Capsella*; *Cirsium*; *Claytonia*; *Coreopsis*; *Cornus*; *Crataegus*; *Cryptotaenia*; *Dentaria*; *Diervilla*; *Erigenia*; *Fragaria*; *Geum*; *Hedyotis purpurea*; *Hieracium*; *Hydrangea*; *Isopyrum*; *Lotus*; *Malus*; *Melilotus*; *Nemastylis floridana*; *Oxalis*; *Phleum*; *Potentilla*; *Rhamnus*; *Rhaphanus*; *Rhododendron*; *Rhus*; *R. typhina*; *Ribes*; *Rubus*; *Salix*; *Sanguinaria*; *Sanicula*; *Solidago*; *Stellaria*; *Symphoricarpos*; *Taenidia*; *Taraxacum*; *Trifolium*; *Tussilago*; *Viburnum*; *Vicia*; *Viola*; *Zanthoxylum*; *Zizia*

***Evylaeus quebecensis* (Crawford)?**pollen: *Vaccinium*flower records: *Acer*; *Aralia nudicaulis*; *Aronia melanocarpa*; *Aruncus*; *Azalea*; *Barbarea*; *Berteroa*; *Cornus canadensis*; *Crataegus*; *Fragaria*; *Ilex*; *Kalmia*; *Linnaea borealis*; *Maianthemum canadense*; *Malus sylvestris*; *Melilotus*; *Prunus*; *P. virginiana*; *Rubus*; *R. idaeus*; *Salix*; *Solidago*; *Taraxacum*; *Viburnum cassinoides****Evylaeus truncatus* (Robertson)**flower records: *Amelanchier*; *Apocynum*; *Aronia*; *Barbarea*; *Brassica*; *Ceanothus*; *Chrysanthemum*; *Claytonia*; *Cryptotaenia*; *Crataegus*; *Erigeron*; *Eupatorium*; *Fragaria*; *Hydrangea*; *Krigia*; *Malus*; *Malva*; *Melilotus*; *Prunus*; *Rubus*; *Salix*; *Sium*; *Solidago*; *Taraxacum*; *Vaccinium*; *Viburnum****Halictus confusus confusus* Smith**pollen: *Glycine max*; *Vaccinium*flower records: *Abutilon*; *Althaea*; *Amelanchier* *Amorpha*; *Anaphalis*; *Antennaria*; *Anthemis*; *Apocynum*; *Arabis*; *Aronia melanocarpa*; *Asclepias*; *Aster*; *Barbarea*; *Blephilia*; *Berteroa*; *Boltonia*; *Brassica*; *Camissa*; *Capsella*; *Cardamine*; *Ceanothus*; *Cerastium*; *Cercis*; *Chrysanthemum*; *Cicuta*; *Cirsium*; *Claytonia*; *Clematis*; *Coreopsis*; *Cornus*; *C. canadensis*; *Crataegus*; *Cryptotaenia*; *Cypripedium candidum*; *Dalea*; *Dianthera*; *Ellisia*; *Epilobium*; *Erigenia*; *Erigeron*; *Eryngium*; *Erythronium*; *Eupatorium*; *Euphorbia*; *Fagopyrum*; *Fragaria*; *Geum*; *Gnaphalium*; *Hedyotis*; *Helenium*; *Helianthus*; *Heracleum*; *Hydrangea*; *Isopyrum*; *Krigia*; *Lappula*; *Leontodon*; *Leonurus*; *Lepidium*; *Lippia*; *Lobelia*; *Lotus*; *Ludwigia*; *Lychnis flos-cuculi*; *Lycopus*; *Lythrum*; *Malus*; *Malva*; *Melilotus*; *Mollugo*; *Monarda*; *Nepeta*; *Oenothera*; *Osmorhiza*; *Oxalis*; *Parthenium*; *Pastinaca*; *Phytolacca*; *Polygonum*; *Polytaenia*; *Potentilla*; *Prunella*; *Prunus*; *Psoralea*; *Pycnanthemum*; *Radicula*; *Ranunculus*; *Rhamnus*; *Rhus*; *Rubus*; *R. idaeus*; *Rudbeckia*; *Salix*; *Salvia*; *Scilla*; *Scrophularia*; *Solidago*; *Sisymbrium*; *Sisyrinchium*; *Sium*; *Specularia*<sup>4</sup>; *Staphylea*; *Stellaria*; *Symphoricarpos*; *Taenidia*; *Taraxacum*; *Thalictrum*; *Tradescantia*; *Trifolium*; *Verbena*; *Veronica*; *Viola*; *Zizia****Halictus ligatus* Say**flower records: *Achillea*; *Althaea*; *Antennaria*; *Anthemis*; *Arctium*; *Asclepias*; *Aster*; *Barbarea*; *Berteroa*; *Bidens*; *Blephilia*; *Boltonia*; *Brassica*; *Cacalia*; *Camassia*; *Capsella*; *Cardamine*; *Carduus*; *Ceanothus*; *Cephalanthus*; *Chrysanthemum*; *Chrysopsis*; *Cichorium*; *Cicuta*; *Cirsium*; *Claytonia*; *Coreopsis*; *Cornus*;

*Crataegus; Cryptotaenia; Dalea; Dianthera; Dentaria; Echinacea; Elephantopus; Epilobium; Erigeron; Eryngium; Eupatorium; Euphorbia; Fagopyrum; Flaveria; Fragaria; Geranium; Gnaphalium; Haploppapus; Hedeoma<sup>3</sup>; Hedyotis; Helenium; Helianthus; Heliopsis; Hieracium; Hypoxis; Inula; Krigia; Lactuca; Lepachys; Lepidium; Lespedeza; Liatris; Lippia; Ludwiga; Lycopus; Lythrum; Malus; Malva; Medicago; Melilotus; Monarda; Nelumbo; Nepeta; Oenothera; Onopordum; Opuntia; Oxalis; Parthenium; Phytolacca; Polytaenia; Polygonum; Potentilla; Prunus; Ptelea; Pycnanthemum; Radicula; Ranunculus; Rhapphanus; Rhus; Rosa; Rubus; Rudbeckia; Sagittaria; Salix; Scutellaria; Senecio; Silphium; Sisyrinchium; Sium; Solidago; Sonchus; Spiraea; Stellaria; Stokesia; Suriana; Tanacetum; Taraxacum; Taenidia; Tragopogon; Trifolium; Vaccinium; Valerianella; Verbena; Vernonia; Veronica; Zanthoxylum; Zinnia; Zizia*

### ***Halictus rubicundus* (Christ)**

pollen: *Vaccinium*

flower records: *Achillea; Althaea; Amelanchier; Amorpha; Anaphalis; Antennaria; Anthemis; Arabis; Arctium; Aralia nudicaulis; Aronia; Asclepias; Aster; Barbarea; Blephilia; Brassica; Berteroa; Camassia; Campanula; Capsella; Castalia; Caulophyllum; Ceanothus; Chrysanthemum; Cirsium; Collinsia; Comandra; Coreopsis; Cornus; Crataegus; Cryptotaenia; Dalea; Daucus; Delphinium; Dentaria; Dianthera; Epilobium; Eriogenia; Erigeron; Eryngium; Erythronium; Eulophus; Eupatorium; Euphorbia; Fagopyrum; Fragaria; Frasera speciosa; Geranium; Heracleum; Hydrangea; Isopyrum; Krigia; Lepachys; Leontodon; Lycopus; Maianthemum canadense; Malva; M. sylvestris; Malvus; Medicago; Melilotus; Monarda; Nelumbo; Nepeta; Oenothera; Osmorhiza; Oxalis; Oxypolis; Polemonium; Polygonum; Potentilla; Prunus; Psoralea; Pycnanthemum; Ranunculus; Rhamnus; Rhus; Ribes; Rubus; Rudbeckia; Salix; Sassafras; Scrophularia; Silphium; Sium; Smilacina; Solidago; Sonchus; Spiraea; Stellaria; Symphoricarpos; Taraxacum; Tragopogon; Trifolium; Teucrium; Thalictrum; Thaspium; Tilia; Triosteum; Tulipa; Verbena; Verbesina; Viburnum; V. cassinoides; Veronica; Zanthoxylum; Zizia*

### ***Hylaeus ellipticus* (Kirby)**

flower records: *Acer; Arenaria; Aruncus; Ceanothus; Chrysanthemum; Eriogonum marifolium; Euphorbia; E. cyparissias; Hedyotis purpurea; Hydrangea; Malus; Oxypolis; Penstemon heterodoxus; P. newberryi; Potentilla auserina; P. glandulosa; Rhus; Rosa; Rubus; R. idaeus; Solidago; S. multiradiata; Sphenosciadium capitellatum; Taraxacum*

***Hyleus mesillae cressoni* (Cockerell)**

flower records: *Amorpha*; *Anethum*; *Apocynum*; *Aruncus*; *Aster*; *Blephilia*; *Boltonia*; *Cacalia*; *Capsella*; *Cardamine*; *Castanea*; *Ceanothus*; *Cerastium*; *Cicuta*; *Cornus*; *Crataegus*; *Cryptotaenia*; *Daucus*; *Erigeron*; *Eryngium*; *Euonymus*; *Eupatorium*; *Euphorbia*; *Fagopyrum*; *Fragaria*; *Galium*; *Geum*; *Heracleum*; *Hydrangea*; *Krigia*; *Lepidium*; *Lycopus*; *Malva*; *Melilotus*; *Osmorhiza*; *Oxypolis*; *Paenonia californica*; *Parthenium*; *Pastinaca*; *Perideridia*; *Polygonum*; *Polytaenia*; *Potentilla*; *Prunus*; *Pycnanthemum*; *Pyracantha*; *Rhus*; *Rubus*; *Salix*; *Sanicula*; *Sium*; *Solidago*; *Taenidia*; *Thaspium*; *Valerianella*; *Veronica*; *Viburnum*; *Zizia*

***Hylaeus modestus modestus* Say**

flower records: *Acer*; *Achillea*; *Amorpha*; *Angelica*; *Apocynum*; *Arabis*; *Aralia*; *Aronia melanocarpa*; *Aruncus*; *Azalea*; *Cacalia*; *Castanea pumila*; *Ceanothus*; *Chrysanthemum*; *Cicuta maculata*; *Cornus*; *Crataegus*; *Daucus carota*; *Erigeron*; *Eulophus*; *Eupatorium*; *Gerardia*; *Geum*; *Heracleum*; *Hedyotis purpurea*; *Hydrangea*; *Ilex*; *Koellia*; *Lepidium*; *Malva*; *Monarda*; *Osmorhiza*; *Pastinaca*; *Ptelea*; *Pycnanthemum*; *Pyracantha*; *Rhus*; *Rosa*; *Rubus*; *R. idaeus*; *Sanicula*; *Sium*; *Solidago*; *Spiraea*; *Symphoricarpos*; *Taenidia*; *Thaspium*; *Zizia*

***Lasioglossum acuminatum* McGinley**

flower records: *Acer*; *Apocynum*; *Brassica*; *Chamaedaphne*; *Clethra*; *Galax*; *Lysimachia*; *Prunus*; *Pyrus*; *Rhododendron*; *Rosa*; *Rubus*; *Salix*; *Solidago*; *Vaccinium*; *Viburnum*

***Lasioglossum athabascense* (Sandhouse)**

flower records: *Barbarea*; *Brassica*; *Cornus*; *Epilobium*; *Eupatorium*; *Hackelia*; *Impatiens*; *Inula*; *Malus sylvestris*; *Melilotus*; *Penstemon*; *Pyrus*; *Rubus*; *R. idaeus*; *Salix*; *Spiraea*; *Taraxacum*; *Tamarix*; *Vaccinium*; *Veronica*; *Viola*

***Lasioglossum leucozonium* (Schrank)**

flower records: *Achillea*; *Anaphalis*; *Apocynum*; *Arctium*; *Aster*; *Barbarea*; *Campanula*; *Centaurea*; *Chrysanthemum*; *Cichorium*; *Cirsium*; *Cornus*; *Crataegus*; *Cypripedium*; *Daucus*; *Diervilla*; *Epilobium*; *Erigeron*; *Fagopyrum*; *Fragaria*; *Hedyotis*; *Helianthus*; *Hieracium*; *Inula*; *Leontodon*; *Lotus*; *Lythrum*; *Malus sylvestris*; *Medicago*; *Melilotus*; *Narcissus*; *Philadelphus*; *Potentilla*; *Prunus*; *Rubus*; *Rudbeckia*; *Ranunculus*; *Salix*; *Solidago*; *Sonchus*; *Spiraea*; *Taraxacum*; *Thaspium*; *Tragopogon*; *Trifolium*; *Vaccinium*; *Verbena*

***Lasioglossum zonulum* (Smith)**

pollen: *Caragana*; *Chrysanthemum*; *Cirsium*; *Leontodon*; *Lonicera*;  
*Lychnis*; *Malus sylvestris*; *Rosa*; *Spiraea*; *Tulipa*

flower records: *Acer*; *Achillea*; *Apocynum*; *Aralia*; *Asparagus*; *Barbarea*;  
*Brassica*; *Carduus*; *Cichorium*; *Cornus*; *Crataegus*; *Cypripedium*;  
*Epilobium*; *Fragaria*; *Grindelia*; *Helianthus*; *Heracleum*;  
*Hieracium*; *Iris*; *Lotus*; *Lychnis flos-cuculi*; *Lysimachia*; *Malva*;  
*Medicago*; *Melilotus*; *Nelumbo pentapetala*; *Potentilla*; *Ranunculus*;  
*Rhus*; *Rubus*; *Senecio*; *Solidago*; *Sonchus*; *Spergula*;  
*Sphaeroclea*; *Symphoricarpos*; *Tamarix*; *Tanacetum*; *Taraxacum*;  
*Tragopogon*; *Trifolium*; *Vaccinium*; *Viburnum*

***Megachile melanophaea melanophaea* Smith**

pollen: *Medicago*; *Melilotus*

flower records: *Agastache*; *A. occidentalis*; *Apocynum*; *Astragalus*; *A. bisulcatus*;  
*Azalea*; *Campanula*; *C. rotundifolia*; *Cypripedium*; *C. reginae*;  
*Epilobium*; *E. angustifolium*; *Helianthus*; *Hemilobus tenellus*;  
*Lupinus*; *L. argenteus*; *L. nootkatensis*; *Medicago sativa*;  
*Mimulus*; *Nolina*; *Phacelia*; *Psoralea*; *P. argophylla*; *Ranunculus*;  
*Rhaphanus*; *Rhododendron*; *Robinia*; *Rosa*; *Rubus*; *R. idaeus*;  
*Rudbeckia*; *Solidago*; *Symphoricarpos*; *S. occidentalis*;  
*Sisymbrium*; *Taraxacum*; *Trifolium*; *T. hybridum*; *T. pratense*;  
*Vaccinium*; *Vicia*; *V. eracea*

***Nomada capitalis* Mitchell**

flower records: *Vaccinium*

***Nomada cressonii cressonii* Robertson**

nectar: *Vaccinium*

flower records: *Antennaria*; *Azalea*; *Claytonia*; *Dentaria*; *Erigeron*;  
*Nothoscordum*; *Oenothera*; *Oxalis*; *Rubus*; *R. idaeus*; *Salix*; *Senecio*;  
*Smilacina*; *Taenidia*; *Viburnum*; *Zanthoxylum*

***Nomada illinoensis* Robertson**

flower records: *Amelanchier*; *Claytonia*; *Cornus*; *Crataegus*; *Dentaria*;  
*Fragaria*; *Heracleum*; *Krigia*; *Polytaenia*; *Prunus*; *Radicula*; *Ribes*;  
*Rubus*; *Salix*; *Senecio*; *Vaccinium*; *Viburnum*; *Zanthoxylum*

***Nomada imbricata* Smith**

nectar: *Vaccinium*

***Nomada lepida* Cresson**nectar: *Vaccinium*flower records: *Brassica; Fragaria; Geranium; Ilex; Prunus; Pyracantha; Pyrus; Rubus****Nomada maculata* Cresson**flower records: *Vaccinium****Nomada pygmaea* Cresson**flower records: *Euonymus; Rhus; Rubus; R. idaeus; Vaccinium****Nomada ulsterensis* Mitchell**flower records: *Vaccinium****Osmia albiventris* Cresson**flower records: *Brassica; Geranium; Gillenia; Malus; Penstemon; Rubus; Trifolium; Verbena****Osmia atriventris* Cresson**flower records: *Arabis; Astragalus; Barbarea; Cardamine; Cercis canadensis; Claytonia; Collinsia; Chrysanthemum; Ellisia; Erigenia; Fragaria; Geranium; Gillenia; Hydrangea; Hypoxis; Leucanthemum vulgare; Lithospermum; Mertensia; Nothoscordum; Penstemon; Polemonium; Potentilla tridentata; Psoralea; Rubus; R. idaeus; Salix; Spiraea latifolia; Sorbaria sorbifolia; Trifolium; Uvularia; Vaccinium; Vicia; Viola; Zizia****Osmia bucephala* Cresson**flower records: *Aesculus; Azalea; Baptisia; Cercis canadensis; Dentaria; Dicentra; Erythronium; Mertensia virginica; Nepeta hederacea<sup>2</sup>; Penstemon; Taraxacum; Tephrosia virginiana; Viola****Osmia distincta* Cresson**flower records: *Blephilia; Dianthera<sup>6</sup>; Gillenia; Hypoxis; Lithospermum; Penstemon; Rubus; Trifolium; Vaccinium****Osmia inspergens* Lovell & Cockerell**pollen: *Vaccinium*flower records: *Baptisia; Trifolium; Vaccinium macrocarpon*

***Osmia inermis* (Zetterstedt)**pollen: *Vaccinium*flower records: *Kalmia polifolia*; *Ledum glandulosum*; *Phyllodoce breweri*; *Rubus*; *Salix****Osmia proxima* Cresson**flower records: *Hedyotis*; *Penstemon*; *Rubus*; *Trifolium****Osmia virga* Sandhouse**flower record: *Salix****Psithyrus ashtoni* (Cresson)**nectar: *Vaccinium****Psithyrus fernaldae* Franklin**nectar: *Vaccinium*flower records: *Potentilla*; *Rubus*; *Trifolium****Psithyrus insularis* (Smith)**nectar: *Vaccinium****Sphecodes carolinus* Mitchell**flower records: *Acer spicatum*; *Aronia melanocarpa*; *Aruncus*; *Ceanothus*; *Hydrangea*; *Leucanthemum*; *Rubus*; *Vaccinium****Sphecodes confertus* Say**flower records: *Aronia melanocarpa*; *Asclepias*; *Cicuta maculata*; *Ptelea*; *Pycnanthemum*; *Rhus*; *Salix****Sphecodes dichrous* Smith**flower records: *Asclepias*; *Cacalia*; *Cicuta*; *Ceanothus*; *Chrysanthemum*; *Claytonia*; *Clematis*; *Comandra*; *Cryptotaenia*; *Eryngium*; *Euphorbia*; *Fagopyrum*; *Heracleum*; *Melilotus*; *Oxypolis*; *Pastinaca*; *Potentilla*; *Prunus*; *Pycnanthemum*; *Rhus*; *Rubus*; *Salix*; *Sassafras*; *Sium*; *Solidago*; *Strophostyles*; *Symphoricarpos*; *Taenidia*; *Taraxacum*; *Viburnum*; *Zizia****Sphecodes persimilis* Lovell & Cockerell**flower records: *Aronia melanocarpa*; *Rubus*; *Vaccinium*

***Sphecodes ranunculi* Robertson**

flower records: *Arabis*; *Aronia melanocarpa*; *Asclepias*; *Aster*; *Barbarea*; *Chaerophyllum*; *Heracleum*; *Ilex*; *Osmorhiza*; *Potentilla*; *Pycnanthemum*; *Ranunculus*; *Rhus*; *Rubus*; *Taenidia*; *Taraxacum*; *Thaspium*; *Vaccinium*; *Viburnum*; *Zizia*

***Sphecodes solonis* Graenicher**

flower records: *Fagopyrum*

***Sphecodes stygius* Robertson**

flower records: *Aruncus*; *Asclepias*; *Aster*; *Ceanothus*; *Cicuta*; *Crataegus*; *Cryptotaenia*; *Erigeron*; *Eryngium*; *Fagopyrum*; *Fragaria*; *Heracleum*; *Hydrangea*; *Medicago*; *Melilotus*; *Polygonum*; *Pycnanthemum*; *Rubus*; *Salix*; *Sium*; *Solidago*; *Taenidia*; *Vaccinium*; *Viburnum*

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<sup>1</sup>The genus *Vaccinium* includes species that are not lowbush blueberries. Therefore, when only the genus is cited it may not refer to lowbush blueberry.

<sup>2</sup>This species is not listed in Kartesz and Kartesz (1980).

<sup>3</sup>The genus *Hedeoma* may refer to *Hedeoma*, *Rhododon*, or *Stachydeoma*.

<sup>4</sup>The genus *Specularia* is not a valid genus. It may refer to *Heterocodon*, *Legousia* or *Triodanis*.

<sup>5</sup>May include *Prunella vulgaris* and *Mentha arvensis*.

<sup>6</sup>The genus *Dianthera* is not a valid genus. It may refer to *Carlwrightia* or *Justicia*.

<sup>7</sup>Apparently an unidentified species is often confused with this species.



Table 2. Percentages of pollen taxa found in the pollen loads of native bees collected in Maine. The pollen loads of adult bees were examined microscopically to determine their pollen composition. When more than one specimen was examined the percentages indicate means.

BEE	HOST	N	POLLEN
<i>Andrena alleghaniensis</i>	<i>Rubus</i>	1	95% Rosaceae (degraded) <sup>8</sup> ; 5% <i>Viburnum</i>
<i>A. bradleyi</i>	<i>Vaccinium</i>	8	> 99% <i>Vaccinium</i>
<i>A. carlini</i>	<i>Vaccinium</i>	4	95% <i>Vaccinium</i> ; 3% <i>Fragaria</i> ; 2% <i>Quercus</i>
	<i>Amelanchier</i>	2	50% <i>Amelanchier</i> ; 28% <i>Ostrya</i> ; 20% <i>Acer</i> ; 2% other ( <i>Abies</i> ; <i>Betula</i> <sup>9</sup> ; Rosaceae)
	<i>Rubus</i>	2	35% Apiaceae; 25% <i>Cornus</i> ; 25% <i>Rubus</i> ; 14% <i>Ilex</i> ; 1% other ( <i>Pinus</i> ; <i>Salix</i> ; <i>Viburnum</i> )
<i>A. carolina</i>	<i>Vaccinium</i>	3	75% <i>Vaccinium</i> ; 25% <i>Ribes</i>
<i>A. crataegi</i>	<i>Rubus</i>	2	50% <i>Rubus</i> ; 50% <i>Viburnum</i>
<i>A. cressonii cressonii</i>	<i>Rubus</i>	2	85% <i>Rubus</i> ; 15% <i>Cornus</i>
<i>A. melanothroa</i>	<i>Rubus</i>	1	>99% Rosaceae (degraded)
<i>A. nivalis</i>	<i>Vaccinium</i>	3	89% <i>Vaccinium</i> ; 3% <i>Rubus chamaemorus</i> ; 3% <i>Spergula arvensis</i> ; 5% other ( <i>Carya</i> ; <i>Lycopodium</i> ; <i>Myrica</i> ; <i>Pinus</i> )
	<i>Rubus</i>	1	30% Ericaceae; 30% <i>Viburnum</i> ; 10% Rosaceae; 30% other ( <i>Pinus</i> ; degraded unknowns)
<i>A. regularis</i>	<i>Vaccinium</i>	3	56% <i>Vaccinium</i> ; 36% <i>Fragaria</i> ; 3% <i>Prunus</i> ; 5% other Brassica; <i>Juglans</i> )
	<i>Amelanchier</i>	2	>99% <i>Amelanchier</i>

Table 2. Continued.

BEE	HOST	N	POLLEN
<i>A. rufosignata</i>	<i>Rubus</i>	2	97% Rosaceae (degraded); 3% other
	<i>Vaccinium</i>	5	80% <i>Vaccinium</i> ; 12% <i>Quercus</i> ; 8% <i>Amelanchier</i>
	<i>Amelanchier</i>	2	77% <i>Amelanchier</i> ; 12% <i>Acer</i> ; 10% <i>Ledum</i> ; <1% <i>Betula</i>
<i>A. rugosa</i>	<i>Rubus</i>	3	68% Rosaceae (degraded); 36% <i>Vaccinium</i>
	<i>Vaccinium</i>	1	>99% <i>Amelanchier</i>
<i>A. sigmundi</i>	<i>Vaccinium</i>	2	51% <i>Amelanchier</i> ; 38% <i>Vaccinium</i> ; 9% <i>Corylus</i> ; 2% unknown
<i>A. vicina</i>	<i>Vaccinium</i>	5	79% <i>Vaccinium</i> ; 19% <i>Fragaria</i> ; 2% <i>Quercus</i>
	<i>Amelanchier</i>	2	67% <i>Amelanchier</i> ; 12% <i>Acer</i> ; 10% <i>Salix</i> ; 1% <i>Ledum</i>
	<i>Rubus</i>	1	> 99% <i>Viburnum</i>
<i>A. wheeleri</i>	<i>Vaccinium</i>	2	95% <i>Fragaria</i> ; 5% other (Brassicaceae; <i>Quercus</i> ; <i>Vaccinium</i> ; unknown)
	<i>Rubus</i>	3	95% Rosaceae (degraded); 5% other (Asteraceae; unknown)
<i>A. w-scripta</i>	<i>Vaccinium</i>	2	97% <i>Amelanchier</i> ; 3% <i>Vaccinium</i>
<i>Augochlorella striata</i>	<i>Rubus</i>	4	73% Rosaceae (degraded); 25% Asteraceae; 2% <i>Dipsacus</i>
<i>Bombus ternarius</i>	<i>Vaccinium</i>	2	>99% <i>Vaccinium</i>
	<i>Rubus</i>	2	80% <i>Kalmia</i> ; 5% Rosaceae (degraded <i>Rubus</i> type); 15% other ( <i>Viburnum</i> ; unknown)
<i>B. terricola terricola</i>	<i>Vaccinium</i>	1	99% <i>Vaccinium</i> ; 1% other

Table 2. Continued.

BEE	HOST	N	POLLEN
<i>B. vagans vagans</i>	<i>Vaccinium</i>	4	97% <i>Vaccinium</i> ; 3% other ( <i>Onagraceae</i> ; <i>Rosaceae</i> ; <i>Rubus chamaemorus</i> )
	<i>Rubus</i>	1	95% <i>Rosaceae</i> (degraded); 5% other
<i>Ceratina dupla</i>	<i>Rubus</i>	1	90% <i>Rosaceae</i> (degraded <i>Rubus</i> type); 10% other ( <i>Asteraceae</i> ; <i>Ambrosia</i> ; <i>Chenopodium</i> ; <i>Viburnum</i> )
<i>Colletes inaequalis</i>	<i>Vaccinium</i>	2	57% <i>Vaccinium</i> ; 42% <i>Salix</i> ; 1% other ( <i>Pinus</i> ; unknown)
<i>Dialictus albipennis</i>	<i>Vaccinium</i>	2	49% <i>Salix</i> ; 49% <i>Vaccinium</i> ; 2% other
<i>D. pilosus pilosus</i>	<i>Vaccinium</i>	2	45% <i>Fragaria</i> ; 20% <i>Vaccinium</i> ; 25% <i>Salix</i> ; 25% <i>Asteraceae</i> ; 10% other ( <i>Rosaceae</i> ; <i>Rumex</i> )
	<i>Amelanchier</i>	2	97% <i>Amelanchier</i> ; 3% <i>Vaccinium</i>
	<i>Rubus</i>	3	64% <i>Rosaceae</i> (degraded); 33% <i>Rubus</i> ; 3% <i>Dipsacus</i>
<i>Evylaeus quebecensis</i>	<i>Vaccinium</i>	3	63% <i>Fragaria</i> ; 20% unknown; 7% other ( <i>Vaccinium</i> ; <i>Gentiana</i> )
	<i>Amelanchier</i>	1	>99% <i>Amelanchier</i>
	<i>Rubus</i>	3	85% <i>Rosaceae</i> (degraded); 15% <i>Asteraceae</i>
<i>Halictus confusus confusus</i>	<i>Vaccinium</i>	3	65% <i>Vaccinium</i> ; 31% <i>Viburnum</i> ; 4% other ( <i>Fragaria</i> ; unknown)
	<i>Amelanchier</i>	1	some <i>Amelanchier</i> (<100 pollen grains)
	<i>Rubus</i>	2	95% <i>Rosaceae</i> (degraded); 5% <i>Vaccinium</i>

Table 2. Continued.

BEE	HOST	N	POLLEN
<i>H. rubicundus</i>	<i>Vaccinium</i>	2	95% <i>Rhododendron</i> ; 5% <i>Vaccinium</i>
	<i>Rubus</i>	2	80% Rosaceae (degraded); 20% <i>Vaccinium</i>
<i>Lassioglossum atahascense</i>	<i>Rubus</i>	2	>99% <i>Dipsacus</i>
<i>Osmia albiventris</i>	<i>Rubus</i>	2	92% Rosaceae (degraded); >7% <i>Vaccinium</i> ; <1% <i>Chenopodium</i>
<i>O. atriventris</i>	<i>Amelanchier</i>	1	>99% <i>Vaccinium</i>
<i>O. inermis</i>	<i>Vaccinium</i>	1	90% <i>Vaccinium</i> ; 10% <i>Salix</i>
<i>O. inspergens</i>	<i>Vaccinium</i>	1	99% <i>Vaccinium</i> ; <1% <i>Betula</i>
<i>O. proxima</i>	<i>Amelanchier</i>	1	99% <i>Salix</i>
<i>O. virga</i>	<i>Vaccinium</i>	1	99% <i>Vaccinium</i> ; 1% other (Pinaceae; <i>Salix</i> ; unknown)

<sup>8</sup>Although the degraded nature of the pollen made more precise identification impossible, we think that generally the Rosaceae pollen in loads of bees collected on *Rubus allegheniensis* would be that of *Rubus*.

<sup>9</sup>Genera such as *Betula* and *Pinus* are wind pollinated. Thus, it is very unlikely that bees visit such species or actively collect their pollen.

Although much remains to be learned about native bee pollination behavior and ecology, results of honeybee pollination studies by Chagnon et al. (1991) and Free (1966) suggest that native bees foraging for pollen as well as nectar should set more fruit than native bees foraging for only nectar. Our pollen analysis results (Table 2) provide evidence that many native species of bees play a role in blueberry pollination in Maine. Of the 35 native bee species examined, 26 species collected *Vaccinium* pollen. Eight species of native bees collected primarily *Vaccinium* pollen (95% or greater): *Andrena bradleyi*, *A. carlini*, *Bombus ternarius*, *B. terricola terricola*, *B. vagans vagans*, *Osmia atriventris*; *O. inspergens*, and *O. virga*, which suggests they could be important pollinators of blueberry.

Table 3. New pollen records. Pollen loads of adult bees from six families were examined microscopically. The following list of plant taxa indicate new pollen records. An asterisk indicates that the amount of pollen was less than 5%.

Family	Bee species	Pollen
Colletidae	<i>Colletes inequalis</i>	<i>Pinus</i> * <sup>9</sup>
Andrenidae	<i>Andrena alleghaniensis</i>	<i>Viburnum</i> ; Rosaceae
	<i>A. carlini carlini</i>	<i>Abies</i> *; <i>Acer</i> ; <i>Betula</i> *; <i>Cornus</i> ; <i>Ilex</i> ; <i>Ostrya</i> ; <i>Quercus</i> ; Apiaceae; Rosaceae
	<i>A. carolina</i>	<i>Ribes</i> ; <i>Vaccinium</i>
	<i>A. crataegi</i>	<i>Viburnum</i> ; Apiaceae*; Rosaceae
	<i>A. cressonii cressonii</i>	<i>Cornus</i> ; Rosaceae
	<i>A. melanochroa</i>	Rosaceae
	<i>A. nivalis</i>	<i>Carya</i> *; <i>Lycopodium</i> *; <i>Myrica</i> *; <i>Pinus</i> *; <i>Rubus</i> <i>chamaemorus</i> ; <i>Spergula</i> <i>arvensis</i> ; <i>Vaccinium</i>
	<i>A. regularis</i>	<i>Brassica</i> *; <i>Juglans</i> *
	<i>A. rufosignata</i>	<i>Ledum</i> ; <i>Quercus</i> ; <i>Vaccinium</i> ; Rosaceae
	<i>A. rugosa</i>	<i>Amelanchier</i>
	<i>A. sigmundi</i>	<i>Betula</i> *; <i>Corylus</i> ; <i>Vaccinium</i> ; Rosaceae
	<i>A. vicina</i>	<i>Acer</i> ; <i>Corylus</i> *; <i>Quercus</i> ; <i>Salix</i> ; Rosaceae
	<i>A. wheeleri</i>	<i>Fragaria</i> ; <i>Quercus</i> *; Asteraceae*; Brassicaceae; Rosaceae
	<i>A. w-scripta</i>	<i>Cornus</i> *; <i>Pinus</i> *; Asteraceae*; Rosaceae
	Halictidae	<i>Augochlorella striata</i>
<i>Dialictus albipennis</i>		<i>Salix</i> ; <i>Vaccinium</i>
<i>D. pilosus pilosus</i>		<i>Amelanchier</i> ; <i>Dipsacus</i> ; <i>Fragaria</i> ; <i>Rubus</i> ; <i>Rumex</i> ; <i>Salix</i> ; Asteraceae; Rosaceae
<i>Evylaeus quebecensis</i>		<i>Amelanchier</i> ; <i>Fragaria</i> ; <i>Gentiana</i> *; Asteraceae*; Rosaceae
<i>Halictus confusus confusus</i>		<i>Amelanchier</i> ; <i>Fragaria</i> ; <i>Viburnum</i>

Table 3. Continued.

Family	Bee species	Pollen
	<i>H. rubicundus</i>	<i>Rhododendron</i>
	<i>Lasioglossum athabascense</i>	<i>Dipsacus</i>
Megachilidae	<i>Osmia albiventris</i>	<i>Chenopodium</i> ; <i>Vaccinium</i> ; Rosaceae
	<i>O. inermis</i>	<i>Salix</i>
	<i>O. inspergens</i>	<i>Betula</i> *
	<i>O. proxima</i>	<i>Salix</i>
	<i>O. virga</i>	<i>Vaccinium</i>
Apidae	<i>Bombus ternarius</i>	<i>Kalmia</i> ; <i>Viburnum</i>
	<i>B. vagans vagans</i>	<i>Rubus chamaemorus</i>
Xylocopidae	<i>Ceratina dupla dupla</i>	<i>Ambrosia</i> *; <i>Chenopodium</i> *; Asteraceae; Rosaceae

\*Genera such as *Betula* and *Pinus* are primarily wind pollinated. Thus, it is very unlikely that bees visit such species or actively collect their pollen.

The sweep sample findings, although not directly comparable to those of Boulanger et al. (1967), indicate some changes in local native bee abundance patterns for Washington County. The five most abundant species in the early 1960s were *Andrena regularis*, *Evylaeus quebecensis* (Crawford), *Andrena crataegi* Robertson, *Andrena vicina* Smith, and *Dialictus pilosus pilosus* (Smith), whereas in 1989–1990 the most abundant species were *Andrena carolina* Viereck, *A. rufosignata*, *A. bradleyi* Viereck, *Andrena carlini* Cockerell, and *Andrena nivalis* Smith. All of the above species collect *Vaccinium* pollen so these shifts in species abundance are probably not of major import. Although several “new” species were collected on lowbush blueberry (species in Table 4 with an asterisk), species of wild bees found in 1961–1965, but not in the present survey include: *Andrena mandibularis*, *A. rugosa*, *A. salictaria*, *A. thaspii*, *Dialictus rohweri*, *Evylaeus truncatus*, and *Lasioglossum leucozonium*. Further sampling should yield these “missing” species as results from the jackknife estimator of species richness ( $S = 38 \pm 8.03$ ; 90% CI) indicated that native bee species richness probably had not changed in Washington County since the surveys conducted by Boulanger et al. (1967).

The difference between native bee abundance in small fields and large barrens, however, for both sweep samples and plot counts is noteworthy. For example, there were 4.8 times as many bees in the small field in Vienna as there were in the large blueberry barren in Deblois. Also, 26 species of pollen-collecting bees were collected in the small Vienna Mountain field, including 106 female native bees (6.625 female bees/sample). Bumblebees and leafcutter bees were present at Vienna. In the large field at Deblois, only 13 species of pollen-carrying bees were found, with 22 female native bees collected (1.375 female bees/sweep sample). No bumblebees or leafcutter bees were collected at Deblois. These findings were substantiated by the second set of sweep samples taken in 1990: the small fields had 4.7 times as many bees as the large fields (Figure 1). The mean number of bees in small fields was  $11.33 \pm 1.71$ , whereas in large fields it was  $2.42 \pm 0.56$  ( $F = 24.386$ ;  $p < .0017$ ). Furthermore, the plot

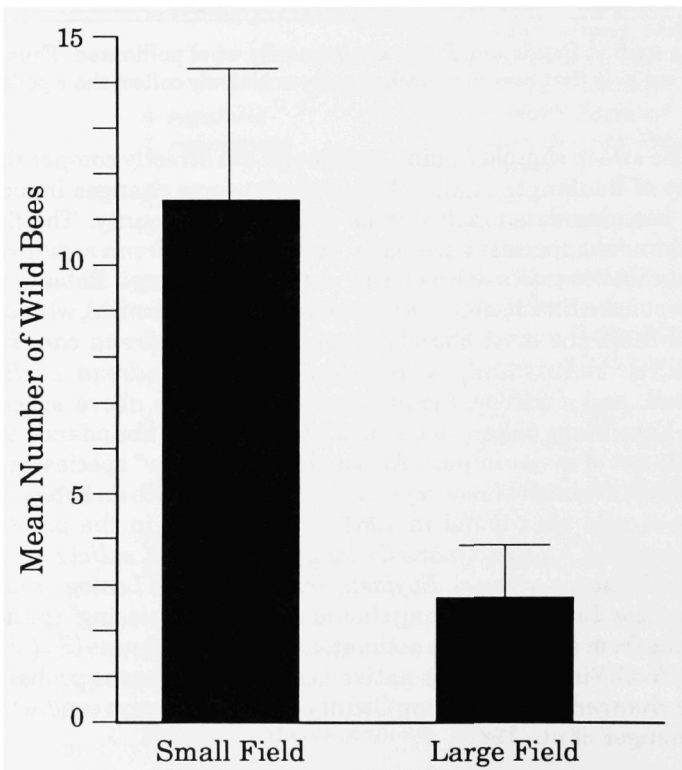


Figure 1. Wild bees caught in small and large blueberry fields in eastern Maine, 1990.

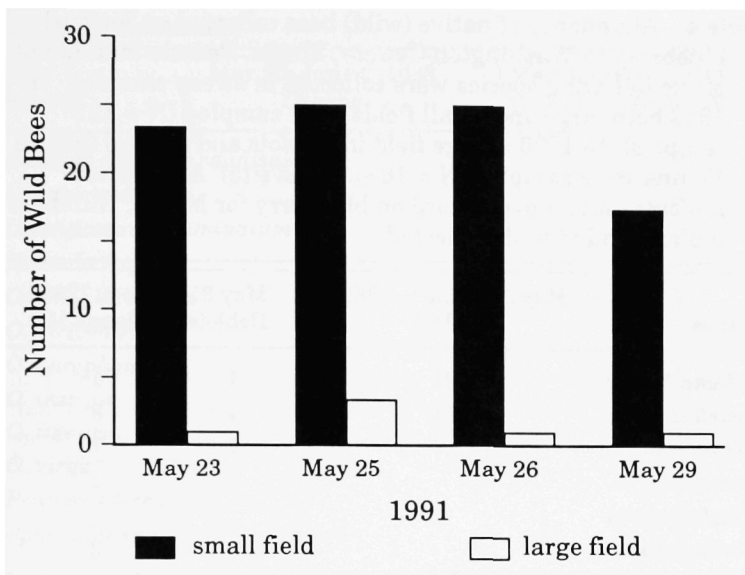


Figure 2. Native bees counted in two blueberry fields in Deblois, Maine.

counts of pollinator abundance for the small Deblois field and large Deblois field indicate major differences in native bee abundance between the two fields (Figure 2).

Overall, the striking difference in relative abundance of native bees is probably due in part to the greater accessibility of alternative food sources on the edges of smaller fields. Determining and establishing suitable forage plants not only requires consideration of the nutritional value of the plants visited, but also requires consideration of the energetics involved in foraging (Heinrich 1983; Waser 1983). Therefore, the distance bees must travel to obtain pollen and nectar is an important factor. Heinrich (1975a) found that most wild flowers visited by bumblebees, *Bombus* spp., in Franklin, Maine, occurred in clumps and suggested that if bees attempted to gather nectar and pollen from more dispersed flowers, foraging profits would decrease. Also, Heinrich (1975b) aptly noted that although 0.4 km had been put forth as a reasonable foraging distance, a "reasonable" distance really depends on the amount of sugar a bee can return with, and this in turn depends on whether it is a good or poor year for nectar production. In many blueberry barrens, the distance wild bees must travel to find alternative forage appears to be far greater than 0.4 km.



Table 4. Abundance of native (wild) bees collected on lowbush blueberry in Washington County, Maine. Female individuals of the following species were collected in sweep samples. In 1989 both large and small fields were sampled (N = 121 samples). In 1990 a large field in Deblois and a small field in Vienna were sampled (N = 16 samples/site). An asterisk indicates it is a new record on blueberry for Maine. Numbers indicate individuals collected.

Species	May 30–June 5, 1989	May 31–June 1, 1990	
	Deblois	Deblois	Vienna Mt.
<i>Andrena bradleyi</i>	21	1	1
<i>A. carlini</i>	21	4	8
<i>A. carolina</i>	27	1	7
<i>A. imitatrix*</i>			1
<i>A. melanochroa</i>	1		
<i>A. milwaukeensis*</i>			2
<i>A. nivalis</i>	11	1	
<i>A. regularis</i>	4	1	4
<i>A. rufosignata</i>	8	2	27
<i>A. sigmundi</i>	2	1	
<i>A. vicina</i>	22	5	7
<i>A. wheeleri</i>	1		1
<i>A. w-scripta</i>	4		1
<i>Augochlorella striata</i>	1	1	
<i>Bombus ternarius</i>	3		3
<i>B. terricola terricola</i>	3		2
<i>B. vagans vagans</i>	2		2
<i>Colletes inaequalis*</i>	4	1	
<i>Dialictus albipennis</i>	21	1	4
<i>D. cressoni*</i>	2		1
<i>D. imitatus</i>	1		2
<i>D. perpunctatus</i>	1		
<i>D. pilosus pilosus</i>	1		2
<i>D. versans</i>			1
<i>Evylaeus divergens*</i>	1		
<i>E. foxii</i>	3	2	4
<i>E. quebecensis</i>	7	1	13

Table 4. Continued

Species	May 30–June 5, 1989		May 31–June 1, 1990	
	Deblois		Deblois	Vienna Mt.
<i>Halictus confusus confusus</i>	2			2
<i>H. rubicundus</i>	1			3
<i>Lasioglossum acuminatum</i>	1			
<i>Nomada</i> spp.	4		1	
<i>Osmia albiventris</i> *				1
<i>O. atriventris</i>	3			
<i>O. bucephala</i> *				1
<i>O. inermis</i>	1			
<i>O. lignaria</i>	1			1
<i>O. virga</i> *	1			
<i>Psithyrus fernaldae</i>				1
<i>Sphécodes</i> spp.	4		1	1

As mentioned earlier, many species of wild bees need alternative forage plants because they are active as adults before and after blueberry bloom. Based on our pollen analysis results, and the abundance patterns from both our sweep samples and those of the early 1960s, sixteen species of wild bees (Table 5) have the potential to be important pollinators of lowbush blueberry in Washington County. Therefore, efforts should be undertaken to build up their populations. It should be noted that at least 15 of the 16 species require alternative forage plants because their adult activity period is longer than the period of blueberry bloom (Table 5).

Given the importance of pollen for adult and larval bees, all possible alternative forage plants should be suitable pollen as well as nectar sources. Table 6 provides suggestions for potential alternate forage plants. Findings from our pollen analysis as well as those of Brittain (1933), Brittain and Newton (1933, 1934), and Macior (1978) suggest that the likelihood of published flower records indicating that the plant is used for pollen ranges from 62% to 100%. Although the correlation between flower and pollen records is good, we chose to be cautious in our recommendations, and the plants listed in Table 6 are *known* to provide pollen for native bees. (In order for a plant to be included in Table 6 it had to be used for pollen by at least four species of wild bees associated with lowbush blueberry in Maine or by only one species if that species was among

Table 5. Alternative forage plant requirements for important species of wild bee pollinators of lowbush blueberry. An X indicates the species has been collected on alternative forage plants that bloom before and/or after *Vaccinium*. Important pollinators collected at least 95% *Vaccinium* pollen or were abundant and collected some *Vaccinium* pollen.

Species	Before	After
<i>Andrena bradleyi</i>	X	X
<i>A. carlini</i>	X	X
<i>A. carolina</i>		X
<i>A. crataegi</i>	X	X
<i>A. nivalis</i>	X	X
<i>A. regularis</i>	X	X
<i>A. rufosignata</i>	X	X
<i>A. vicina</i>	X	X
<i>Bombus ternarius</i>	X	X
<i>B. terricola terricola</i>	X	X
<i>B. vagans vagans</i>	X	X
<i>Dialictus albipennis</i>		X
<i>D. pilosus pilosus</i>	X	X
<i>Evylaeus quebecensis</i>	X	X
<i>Osmia atriventris</i>	X	X
<i>O. inspergens</i>		X

the 17 important species of wild bees associated with *Vaccinium* spp. in Maine.) Many of these plants have been suggested as forage plants in other publications (i.e., Pellet 1978; Kevan 1990; Ramsay 1987). Deciding which plants are best suited for a particular blueberry barren will depend on which bees are present and the comparative costs associated with different plantings.

If we are to ensure the well-being of native bee populations and the ecosystems in which they work, we must develop and help implement wise resource management practices. It is hoped that our compilation of nectar, pollen, and flower records, pollen load data, and alternative forage plant recommendations will be used in conjunction with future field and laboratory studies to develop and help implement model resource management practices aimed at protecting and enhancing native bee populations.

**Table 6. Potential alternative forage plants for wild bees associated with lowbush blueberry for Washington County, Maine. Dates for flowering are approximate for the New England region and are from Seymour (1968), unpublished phenological records of the Augusta Nature Center (Maine), and unpublished records for Winterport and Costigan, Maine for May–September 1991.**

Genus	Common Name	Flowers
<i>Acer</i>	maple	Feb. 28–June 28
<i>Achillea</i>	yarrow	May 24–Sept. 30
<i>Ambrosia</i>	ragweed	July 17–Oct. 9
<i>Amelanchier</i>	shadbush	April 18–June 16
<i>Aquilegia</i>	columbine	April 24–July 20
<i>Arctium</i>	burdock	July 7–Sept. 30
<i>Asclepias</i>	milkweed	July 24–Aug. 31
<i>Aster</i>	aster	July 7–Oct. 4
<i>Brassica</i>	mustard	May–July
<i>Capsella</i>	shepherd's purse	June 14–July 31
<i>Chrysanthemum</i>	chrysanthemum	June 1–Oct. 1
<i>Cirsium</i>	thistle	July 1–Aug. 31
<i>Cornus</i>	dogwood	May 1–July 22
<i>Crataegus</i>	hawthorn	May 12–July 8
<i>Daucus</i>	wild carrot	June 21–Sept. 6
<i>Epilobium</i>	fireweed	June 14–Aug. 31
<i>Fragaria</i>	wild strawberry	May 1–June 24
<i>Helianthus</i>	sun flower	July 11–Oct. 3
<i>Hypericum</i>	St. John's wort	June 20–Sept. 7
<i>Kalmia</i>	laurel	May 8–July 21
<i>Leontodon</i>	hawkbit	May 21–Oct. 30
<i>Leucanthemum</i>	daisy	June 1–Oct. 1
<i>Lonicera</i>	honeysuckle	April 25–June 27
<i>Malus</i>	apple	May 1–June 10
<i>Medicago</i>	alfalfa	June 13–Sept. 7
<i>Melilotus</i>	sweet clover	May–Oct.
<i>Monarda</i>	bee balm, bergamot	June 13–Sept. 6
<i>Pedicularis</i>	lousewort	April 24–June 15
<i>Phleum</i>	timothy	June–Aug.
<i>Plantago</i>	plantain	July 1–Aug. 1

Table 6. Continued.

Genus	Common Name	Flowers
<i>Potentilla</i>	cinquefoil	May 20–Aug. 30
<i>Prunella</i>	self-heal	June 14–Oct. 1
<i>Prunus</i>	plum; cherry	April 24–June 15
<i>Ranunculus</i>	buttercup	April 1–Sept. 7
<i>Rhododendron</i>	azalea	May 10–June 20
<i>Rosa</i>	rose	June 10–Aug. 20
<i>Rubus</i>	blackberry; raspberry	June 18–July 28
<i>Salix</i>	willow	April 14–June 20
<i>Silene</i>	catchfly, campion	June 6–Sept. 9
<i>Sinapis</i>	mustard, charlock	June–July
<i>Solidago</i>	golden rod	July–Sept. 30
<i>Spiraea</i>	steplebush, meadow sweet	July–Sept. 11
<i>Syringa</i>	lilac	May 15–June 20
<i>Taraxacum</i>	dandelion	April 23–Sept. 29
<i>Trifolium</i>	clover	May 25–Oct. 18
<i>Verbena</i>	verain	July 7–July 21
<i>Verbascum</i>	mullein	July 16–Aug. 25
<i>Vicia</i>	vetch	May 30–Sept. 25

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## APPENDIX

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