

## Appendix A: Insects

### American Bumble Bee

*Bombus pensylvanicus*

Federal Listing	N/A
State Listing	SGCN
Global Rank	
State Rank	S1
Regional Status	

#### Justification (Reason for Concern in NH)

Bumble bees have been declining seriously, with extensive range reductions in several species (Cameron et al. 2011). American bumble bees are missing from their northern and eastern ranges, occurring only in the south and western Midwest, with a range reduction of 23% (Cameron et al. 2011). Declines are due to multiple threats including habitat loss and fragmentation and pesticide use. Changing agricultural practices including extensive monocultures and the increasingly pervasive use of herbicides has removed critical flowering plants that bumble bees use for foraging (Grixti et al. 2009). Lack of breaks in fields and less edge habitat also removes the undisturbed ground needed for nests. Pesticides directly kill or cause impairment in bees (Whitehorn et al. 2012, Hopwood et al. 2012, Thompson 2001). Another emerging threat is diseases carried by commercially produced bumble bees used in crop pollination, particularly the fungus *Nosema bombi* (Cameron et al. 2011, Colla et al. 2006). Cameron et al (2011) found that American bumble bees had a significantly higher presence of *N. bombi* than were found in stable species such as common eastern or two-spotted bumble bees. Fragmented populations can lead to loss of genetic diversity (Hatfield et al. 2012).

#### Distribution

Bumble bees can be found statewide in a variety of habitats that support flower production. They are in agricultural settings, backyards, gardens, meadows and forested areas.

#### Habitat

Bumble bees frequent meadows, crop fields, orchards, gardens and other locations with flowering plants. They also require untilled soil nearby for their underground nests.

#### NH Wildlife Action Plan Habitats

- Grasslands
- Developed Habitats
- Shrublands



Distribution Map

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### Current Species and Habitat Condition in New Hampshire

Unknown. Data from museum collections suggest a major decline but New Hampshire specific data is lacking. The last recorded specimen is from 1997.

### Population Management Status

Various NGOs promote pollinator conservation efforts including creating pollinator gardens, reducing pesticide use and promoting pollinator habitat near crops, including orchards (Hatfield 2012). NRCS will provide partial payment for actions on agricultural lands that promote pollinator habitat (USDA 2015). The University of New Hampshire Bee Lab promotes bee conservation and habitat enhancements, in particular nesting habitat.

### Regulatory Protection (for explanations, see Appendix I)

- NHFG Permit for collection or possession
- NH NHB Database - current

### Quality of Habitat

Bumble bee habitat is mostly privately owned. There is no quantitative measurement of bumble bee habitats. Some landowners are managing their properties to enhance bumble bee and other pollinator habitat.

### Habitat Protection Status

Bumble bee habitat is generally not protected. Recent interest in and focus on agricultural land protection may lead to increased habitat protection.

### Habitat Management Status

It is unknown how well the recent efforts to protect and enhance bumble bee and other pollinator habitat is working.

### Threats to this Species or Habitat in NH

*Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.*

### Mortality and species impacts from an offset of plant-pollinator phenology (Threat Rank: High)

Bumblebees depend on nectar-producing flowers for food. They collect both nectar and pollen from these flowers. Climate change has altered the timing of flowering dates (Hayhoe et al 2008) and this may also combine with summer drought (Northeast Climate Impacts Assessment 2007) to decrease the availability of forage in late summer.

### Mortality and species impacts from neonicotinoids (Threat Rank: High)

Neonicotinoids are broad spectrum insecticides that are applied both to foliage and to seeds which absorb them into the growing plant. The insecticide accumulates in nectar and pollen, which bumble

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bees consume. Bumble bees also may be exposed to direct spray or to residues on plant surfaces (Hopwood et al 2012). Use of neonicotinoids has expanded, with many crops and nursery plants receiving treatment. Nursery plants generally are not labelled as treated, and thus end up in gardens even when the gardener is trying to attract pollinators. Exposure to neonicotinoids causes increased queen mortality, reduced movements in workers and reduced storage of nectar (Scholer and Krischik 2014).

### **Mortality and species impacts from agricultural pesticide use (Threat Rank: High)**

Insecticides are used regularly in agricultural production to control crop pests, but most insecticides are designed to kill all types of insects. During spraying of insecticides the chemical can drift outside of crop lands and affect habitat acres away. In addition, insecticides are often used in gardens. Spring applications of pesticides cause the largest declines in bumble bee populations as queens or just a few new workers are foraging at that time. The use of Integrated Pest Management (IPM), which targets treatment to actual pest outbreaks, has decreased in agricultural production, so more insecticides are being used prophylactically, meaning a greater amount of insecticides are being used.

### **Habitat conversion due to development (loss of nesting habitat, soils) (Threat Rank: Medium)**

Development, especially when it occurs on agricultural land, removes essential nesting and foraging habitat.

### **Species impacts from range shifting of native species (Threat Rank: Medium)**

As climate change shifts temperature ranges, precipitation patterns, and other factors, the geographic ranges of bumble bees will also shift (Kerr et al 2015). This will be compounded by the effects of disease, altered phenology and continued decline in wildflowers (Goulson et al 2015).

### **List of Lower Ranking Threats:**

- Disturbance from introduced or invasive animals (bee species)
- Mortality and species impacts from pathogens (introduced and *Apis* spill-over)
- Habitat degradation due to gardening practices that result in nest and forage loss
- Habitat degradation from forestry practices
- Habitat degradation due to agricultural practices causing loss of foraging and nesting components

## **Actions to benefit this Species or Habitat in NH**

### **Conserve farmland.**

**Primary Threat Addressed:** Habitat conversion due to development (loss of nesting habitat, soils)

**Specific Threat (IUCN Threat Levels):** Residential & commercial development

### **Objective:**

Conserve farmland that is managed to protect pollinators through a variety of practices including

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reduced chemical use and encouragement of foraging areas.

### **General Strategy:**

Encourage land trusts and their funders to identify and put under permanent protection farm lands where the landowners agree to farm organically, or nearly so, and to provide untilled and unmown areas for nesting and foraging habitat.

### **Political Location:**

Statewide

### **Watershed Location:**

Statewide

## **Promote practices that enhance bumble bee and other pollinator habitat.**

**Primary Threat Addressed:** Habitat degradation due to agricultural practices causing loss of foraging and nesting components

**Specific Threat (IUCN Threat Levels):** Agriculture & aquaculture

### **Objective:**

Provide technical assistance to organizations that provide education, technical assistance and funding to farmers, landowners and landscapers on practices that enhance habitat for pollinators.

### **General Strategy:**

Encourage NRCS to fund practices that enhance habitat for pollinators. Work with the NH Department of Agriculture and UNH Cooperative Extension to promote farming practices that enhance pollinator habitat. Work with the UNH Bee Lab to promote native pollinators including providing nesting habitat. Add information on the NHFG website or Taking Action for Wildlife website on pollinator friendly practices such as leaving grassy areas in orchards unmowed, providing unmowed areas at the edges of crop fields, putting in hedgerows and reducing chemical use. Include the creation and management of natural meadows. Encourage the UNH Cooperative Extension's Master Gardeners Program to promote gardening practices that enhance pollinator habitat. Work with others who provide education to landscapers on promoting pollinator habitat in gardens (in both private and commercial settings).

### **Political Location:**

Statewide

### **Watershed Location:**

Statewide

## **Promote organic practices and integrated pest management (IPM)**

**Primary Threat Addressed:** Mortality and species impacts from agricultural pesticide use

**Specific Threat (IUCN Threat Levels):** Pollution / Agricultural & forestry effluents / Herbicides & pesticides

### **Objective:**

Provide technical assistance to organizations that provide education, technical assistance and funding to farmers and homeowners on organic growing practices and IPM.

### **General Strategy:**

Work with the Northeast Organic Farmers Association, UNH Cooperative Extension, NRCS, nursery

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stock growers, garden centers, garden clubs, landscapers and others to educate farmers, homeowners and commercial landscapers on using IPM and organic practices.

**Political Location:**

Statewide

**Watershed Location:**

Statewide

### Monitor Bumblebees

**Objective:**

Develop and implement a monitoring program for bumblebees.

**General Strategy:**

Develop a monitoring program for bumble bees in partnership with a university program such as the UNH Bee Lab. Work with other states to ensure the program is consistent with other monitoring programs. Consider developing this as a citizen science project. Begin to implement the program.

**Political Location:**

Statewide

**Watershed Location:**

Statewide

### References, Data Sources and Authors

#### Data Sources

Data on bumble bee distribution comes from the published literature and a database of museum specimens provided by Dr. Leif Richardson. Data on habitat, nationwide population declines and threats come from the scientific literature.

#### Data Quality

There have been few surveys of bumble bees in NH, so the quality of information for NH must be extrapolated from regional or national studies.

#### 2015 Authors:

Emily Preston, NHFG

#### 2005 Authors:

### Literature

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