Species Status Assessment

Common Name: Rusty-patched bumble bee **Date Updated:** January 3, 2024

Scientific Name: *Bombus affinis* **Updated By:** Katie Hietala-Henschell

Class: Insecta

Family: Apidae

Species Synopsis *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Bombus affinis (rusty-patched bumble bee) belongs to the subgenus (Bombus), which has been shown to be significantly more infected by the pathogen *Nosema bombi* than bumble bees of other subgenera (Cameron *et al.* 2011). Researchers believe this pathogen is largely responsible for the rapid (99-100%) decline of this species in most of the Northeast (Schweitzer and Sears 2013). The last known New York record is from 1999, and the species appears to have not persisted in this or neighboring states (New York Natural Heritage Program 2023a, Richardson 2013, Yanega 2013). It is ranked as SH, state historical, in New York and highly imperiled globally. The historical native range spanned from Maine along the east coast south to Georgia and west to Nebraska and Ontario. It is listed as SH throughout much of the northeast (NatureServe 2023). Its current range has been reduced to the Midwest and can be found in Wisconsin, Ohio, Iowa, Indian, Illinois, and Minnesota and isolated populations in Virginia, Tennessee, Connecticut, Maryland, and Massachusetts (Hatfield *et al.* 2015).

From White (2013): Bumble bees are generalist foragers and need nesting habitat in the spring, flowers for adult and larval nutrition throughout the spring and summer, and sites for queens to overwinter. Suitable habitat can occur in natural, agricultural, and urban areas and some species require forested habitat (Schweitzer *et al.* 2012). *Bombus affinis* is known to nest underground and feeds on sunflowers, honeysuckles, goldenrods, asters, *Vaccinium*, *Prunus*, and *Aesculus* (Colla *et al.* 2011).

I. Status

a. Current legal protected Status

i. **Federal:** Endangered (USFWS 2024) **Candidate:** No

ii. **New York:** Not listed

b. Natural Heritage Program

i. **Global:** G2

ii. **New York:** SH **Tracked by NYNHP?:** Yes

Other Ranks:

-IUCN Red List: Critically Endangered (Hatfield *et al.* 2015)

-Northeast Regional RSGCN: RSGCN (Northeast Fish and Wildlife Diversity 2023)

-New York 2025 SGCN status: High Priority Species of Greatest Conservation Need

Status Discussion:

From the NYNHP Conservation Guide (New York Natural Heritage Program 2023b): *Bombus affinis* has been ranked state historical (SH) as the last known record for New York is from 1999

and the species has not persisted in most neighboring states, suffering catastrophic decline throughout its range in recent years. While the definitive cause for its decline is unknown, bumble bee experts and scientists strongly suspect exotic pathogens such as *Nosema bombi* that have been introduced into wild populations (Cameron *et al.* 2011) and neonicotinoid pesticides (Colla and Taylor-Pindar 2011).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Declining	Declining	<1931-2000 vs 1991-2009	Federally Endangered	
Northeastern US	Yes	Declining	Declining		RSCGN	Yes
New York	Possibly extirpated	Declining	Declining	Pre-2000 vs 2000-2022	SH	Yes
Connecticut	Presumed extirpated	Declining	Declining		SX	Yes
Massachusetts	Presumed extirpated	Declining	Declining		SX	Yes
New Jersey	Yes	Unknown	Unknown		SNR	
Pennsylvania	Yes	Declining	Declining		S1	Yes
Vermont	Presumed extirpated	Declining	Declining		SX	Yes
Ontario	Yes	Declining	Declining		S1	Yes
Quebec	Yes	Unknown	Unknown		SNR	

Column options
Present?: Yes; No; Unknown; No data; (blank) or Choose an Item
Abundance and Distribution: Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
SGCN?: Yes; No; Unknown; (blank) or Choose an item

References used in table: North America (IUCN 2024, U.S. Fish and Wildlife Service 2024), Northeastern US (Northeast Fish and Wildlife Diversity 2023), State/Province Ranks (NatureServe 2023, NY SWAP 2015)

*Bumble bee species that have been ranked as Critically Imperiled (S1), Imperiled (S2), or Vulnerable (S3) by individual states have been interpreted as declining in abundance and distribution for this Species Status Assessment, unless additional data is available suggesting otherwise. Bumble bees are generalists and were typically widespread within their ranges and many species have experienced declines within their range. Most bumble bee species are not restricted to a specific rare habitat type or host, although some cuckoo bumble bees are reliant on an individual host species.

Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

The Empire State Native Pollinator Survey was a multi-year pollinator survey effort conducted from 2017-2021. Bumble bees were included in the focal taxa targeted by this survey. The statewide

effort resulted in up-to-date data on the occurrence of bumble bees across the state (White *et al.* 2022). However, no organized, regular monitoring or survey activities are directed toward this species.

Trends Discussion *(insert map of North American/regional distribution and status):*

Species in the subgenus Bombus have declined 99-100% in most of the Northeast (Schweitzer and Sears 2013). In New York, there are no known records of *B. affinis* post 2000 (White *et al.* 2022). There is a 100% decline of this species long-term and it is currently ranked state historical (White *et al.* 2022).

Historically, *B. affinis* had a large distribution from as far west as North and South Dakota, to the upper Midwest, to the eastern United States (from northern Georgia to Maine) and continuing north into southern Quebec and Ontario in Canada (USFWS 2021). This wide distribution encompassed 31 states; however, B. *affinis* has experienced drastic declines in its distribution and abundance since the late 1990s (Colla and Packer 2008, USFWS 2016). Approximately only 9% of their historical locations are currently occupied by *B. affinis* (USFWS 2016). Its current range covers just 13 states and 1 Canadian Province (USFWS 2021). Most of the remaining population occurs in the Midwest.

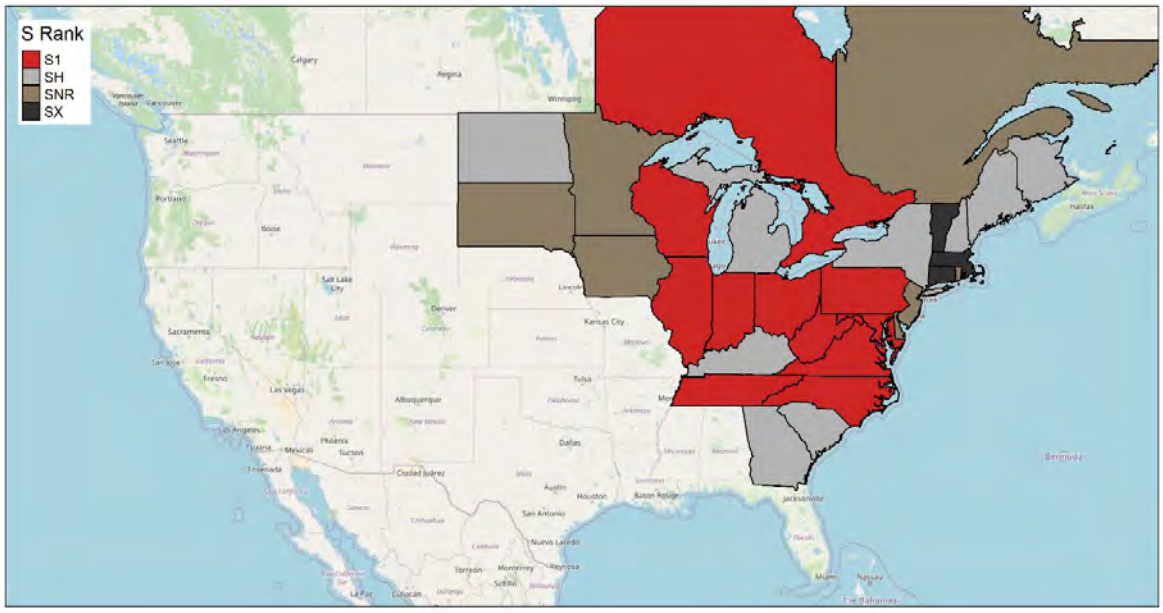

Figure 1. *Bombus affinis* distribution and status (Source: NatureServe 2023)

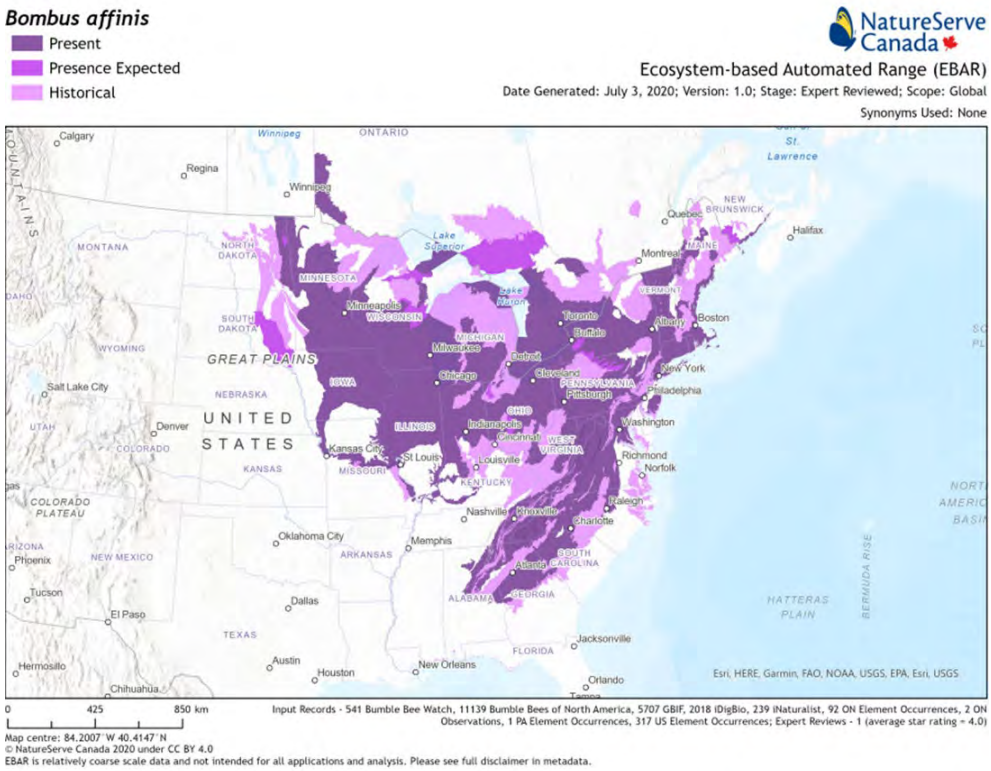

Figure 2. *Bombus affinis* distribution and range map (Source: NatureServe Canada 2020).

III. New York Rarity *(provide map, numbers, and percent of state occupied)*

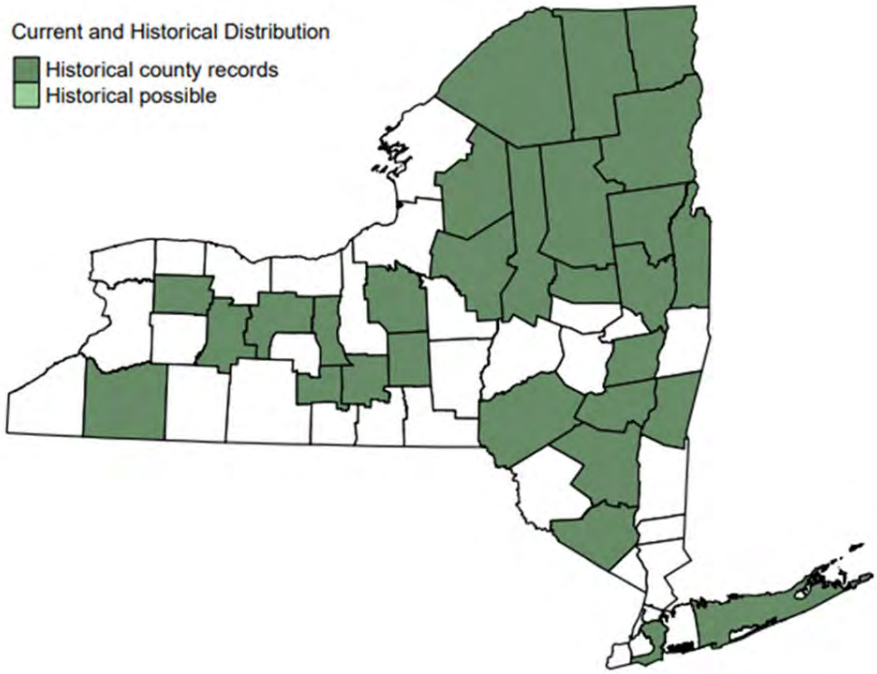

Figure 3. Records of *Bombus affinis* in New York. No observations from 2000 to present; those from 1999 and earlier shown as shaded counties (Source: White *et al.* 2022).

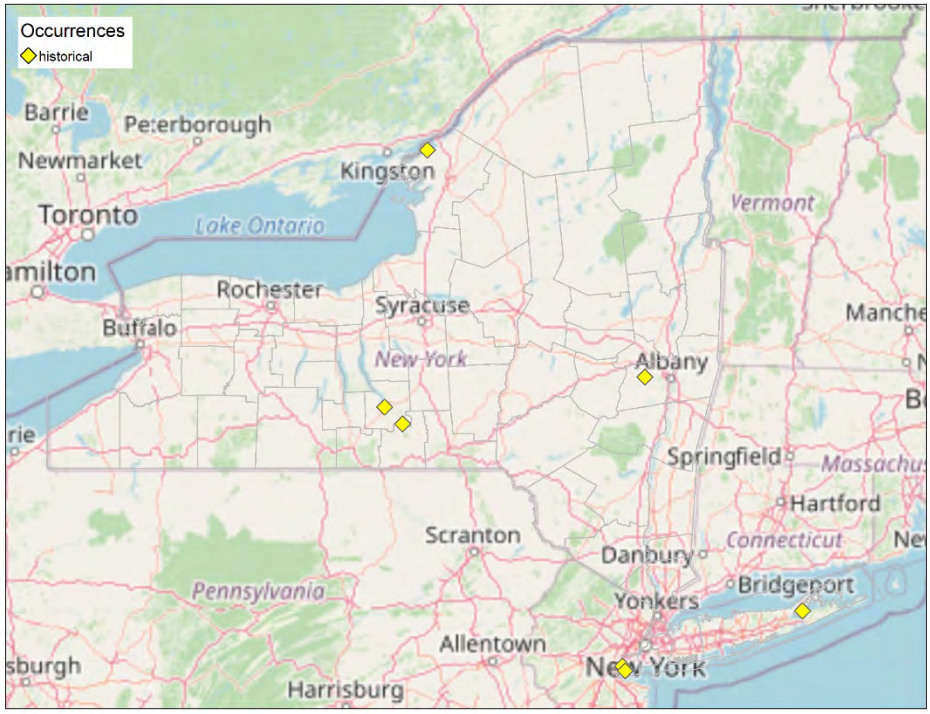

Figure 3. NYNHP element occurrence records for *Bombus affinis* in New York (Source: New York Natural Heritage Program 2023c).

Years	# of Records	# of Counties	% of State
Pre-2000	845	38	61%
2000-2021	0	0	0%

Table 1. Records of *Bombus affinis* in New York.

Details of historic and current occurrence:

Bombus affinis has not been confirmed in New York since 1999. Due to this and its rapid, recent decline throughout much of its range, its current status in New York is state historical (SH). There are no records known from New York post-2000 (White *et al.* 2022).

New York's Contribution to Species North American Range:

Percent of North American Range in NY	Classification of NY Range	Distance to core population, if not in NY
1-25%	Peripheral	Unknown

Column options
Percent of North American Range in NY: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
Classification of NY Range: Core; Peripheral; Disjunct; (blank) or Choose an item.

IV. Primary Habitat or Community Type *(from NY crosswalk of NE Aquatic, Marine, or Terrestrial Habitat Classification Systems):*

Various terrestrial communities (both natural and otherwise) including but not limited to meadows, fields, grasslands, pasturelands, gardens, and orchards that can support a diversity of wildflowers with variable phenology throughout the warm seasons (White 2013).

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Pollinator Species?	Habitat/ Community Trend	Time frame of Decline/Increase
No	No	Yes	Unknown	

Column options
Habitat Specialist, Indicator Species and Pollinator Species: Yes; No; Unknown; (blank) or Choose an item
Habitat/Community Trend: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

Habitat Discussion:

Bumble bees are generalist foragers and need nesting habitat in the spring, flowers for adult and larval nutrition throughout the spring and summer, and sites for queens to overwinter. *Bombus affinis* are underground nesters and will use abandoned rodent burrows, hollow tree stumps, and fallen dead wood (Colla and Taylor-Pindar 2011). Suitable sites for bumble bees to overwinter may include rotting logs, mulch, or loose soil (Schweitzer *et al.* 2012). Usually close to or within woodlands, urban parks and gardens (Williams *et al.* 2014).

Foraging habitat should include flower abundance and species richness with overlapping blooms to ensure nectar availability throughout the growing season (Schweitzer *et al.* 2012). Select food plants for *B. affinis* include asters, *Helianthus*, *Solidago*, *Vaccinium*, *Prunus*, *Aesculus Agastache*, *Dalea*, *Eupatorium*, *Impatiens*, *Lonicera*, and *Monarda* (Colla *et al.* 2011, Williams *et al.* 2014).

V. Species Demographic, and Life History:

Breeder in NY?	Non-breeder in NY?	Migratory Only?	Summer Resident?	Winter Resident?	Anadromous/ Catadromous?
Yes	-	-	Yes	Yes	-

Column options
First 5 fields: Yes; No; Unknown; (blank) or Choose an item
Anadromous/Catadromous: Anadromous; Catadromous; (blank) or Choose an item

Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Bumble bees have annual colonies and are eusocial. In the spring, a queen will emerge from hibernation. She will forage on early floral resources and locate a suitable nest site. She will then lay her first batch of eggs, from which worker bees will emerge a few weeks later. Workers typically live for about four weeks whereas queens live for about a year. Workers then take over the tasks of maintaining the colony and foraging for nectar and pollen to feed new generations. During mid to late summer, the queen will start laying eggs that will become new queens and males. In the late summer and early fall, the new queens and males will disperse from the colony and mate. Only the new queens will overwinter and begin their own nest the following spring (Schweitzer *et al.* 2012).

B. *affinis* typically nests underground in deserted mammal burrows; males patrol circuits in search of mates (Williams *et al.* 2014).
The foraging range of a bumble bee varies by species, size of individual and colony, resource availability, and other factors. Studies have found that the flight range typically fall between 0.15 to 0.62 miles; however, some species have been documented to forage as far as 1.86 miles (Jarau and Hrncir 2009).

VI. Threats *(from NY 2015 SWAP or newly described):*

The primary threat to species in the subgenus Bombus leading to their rapid, recent decline has been attributed to exotic pathogens. Cameron *et al.* (2011) showed a higher proportion of *B. affinis* individuals infected by the pathogen *Nosema bombi* than other bumble bees with stable global populations. In addition, insecticides, habitat loss and fragmentation, are known long-term threats for many bumble bees and research is needed to determine the impact of climate change and the introduction of non-native Hymenoptera (Colla and Taylor-Pindar 2011, Environment and Climate Change Canada 2020, Schweitzer *et al.* 2012).

Recent studies have started to identify the impacts of climate change. Increased temperatures had negative impacts on the majority of bumble bee species studied (Jackson *et al.* 2022). Climate change is also leading to shrinking and shifting of bumble bee ranges (Kerr *et al.* 2015) and can cause phenological mismatch between bumble bees and their floral resources (Pyke *et al.* 2015).

Threat Level 1	Threat Level 2	Threat Level 3	Spatial Extent	Severity	Immediacy	Trend	Certainty
1. Residential and Commercial	1.1 Housing & Urban Areas		Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
4. Transportation & Service Corridors	4.1 Roads & Railroads		Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.4 Pathogens		Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
11. Climate Change	11.1 Habitat Shifting & Alteration		Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.

Table 2. Threats to *Bombus affinis*.

Are there regulatory mechanisms that protect the species or its habitat in New York?

Yes: ü **No: _____** **Unknown: _____**

If yes, describe mechanism and whether adequate to protect species/habitat:

Governor Kathy Hochul signed into law Legislation S.1856-A/A.7640, the Birds and Bees Protection Act. This law prohibits the use of certain neonicotinoid pesticide treated corn, soybean, or wheat seeds and neonicotinoid pesticides for outdoor ornamental plants and turfs. Reducing the amount of neonicotinoids used in the landscape in New York will likely benefit *B. affinis.*

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

In various life stages, including adequate nest and overwintering sites as well as food sources from March-October in relatively close proximity without barriers to dispersal (Schweitzer *et al.* 2012). It is recommended to avoid application of insecticides on flowers used by bumble bees, and when chemicals must be used, to limit dosage and modify the application timing and method to affect them as little as possible. Minimizing contact between wild bumble bee populations and commercial bees can help protect the wild bees (Schweitzer *et al.* 2012). The recovery strategy for *B. affinis* in Canada includes surveys and monitoring, management of individuals and habitat, research, and partnership, communication, outreach, and education (Environment and Climate Change Canada 2020).

Further inventory is needed within its native range to document any extant occurrences, if present, and define the current distribution of *B. affinis*. In addition, research is required to understand the habitat requirements and threats to this species, and to create appropriate management guidelines for its persistence in known locations. Further research is needed to determine more information on threats, climate change effects, insecticide, and non-native bee introduction effects for B. *affinis*.

Action Category	Action	Description
A.2 Direct Species Management	A.2.0.0.0 Direct Species Management	Species recovery
B.3 Outreach	B.3.1.4.0 Public outreach and information	Awareness and communications
C.6 Design and Plan Conservation	C.6.5.0.0 Conservation planning	Resource and habitat protection
C.6 Design and Plan Conservation	C.6.5.1.3 Develop a conservation, management, or restoration plan for protected private lands	Habitat/Natural process restoration

Action Category	Action	Description
C.7 Legislative and Regulatory Framework or Tools	C.7.1.3.0 Create, amend, or influence regulation	
C.7 Legislative and Regulatory Framework or Tools	C.7.2.1.0 Create or amend policies	

Table 3. Recommended conservation actions for *Bombus affinis*.

VII. References

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VIII. Version history

Originally prepared by: Erin White
Date prepared: 10/30/2013

First revision: Samantha Hoff
Revision date: 2/19/2014

Last updated: Katie Hietala-Henschell
Updated Date: 1/3/2024