

Species Status Assessment

Common Name: Frugal leafcutter bee

Date: 3/10/2025

Scientific Name: *Megachile frugalis* **Proposed By:** Katie Hietala-Henschell

Class: Insecta

Family: Megachilidae

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

Megachile frugalis appears to be a southern North American species with its range extending as far north as the Midwest and Northeast, and as far south as Costa Rica (NatureServe 2021, Young et al. 2016). This species is experiencing population declines in parts of its range (NatureServe 2021). In New York, it was not historically known to occur; however, recent efforts (2000 and later) confirmed *M. frugalis* in three counties (White et al. 2022).

Threats facing *M. frugalis* populations may include habitat loss from conversion of shrublands to agriculture, fire, logging and wood harvesting, invasive plants and pathogens, pesticides, and climate change (White et al. 2022). Additionally, *M. frugalis* may have reduced reproductive capacity and limited dispersal abilities which may impact overall health and survival (NatureServe 2021). In the face of climate change and other threats, management and protection of suitable habitat will be essential to support this species.

I. Status

a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** Not listed

b. Natural Heritage Program

i. **Global:** G4

ii. **New York:** S1 **Tracked by NYNHP?:** No

Other Ranks:

- NYS 2025 SGCN Status: High Priority Species of Greatest Conservation Need
- IUCN Red List: Not assessed (IUCN 2025)
- Northeast Regional SGCN: Not assessed (Northeast Fish and Wildlife Diversity 2025)

Status Discussion:

The conservation status for *M. frugalis* was assessed after the Empire State Native Pollinator Survey efforts and this species was ranked as Critically Imperiled (S1) in New York. *M. frugalis* occurs in just 5% of New York state, based on the number of extant counties (3) (White et al. 2022). In addition to its rarity, *M. frugalis* appears to be experiencing declines (NatureServe 2021) and threats to this species are medium-high (White et al. 2022).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Declining	Declining			Choose an item.
Northeastern US	Yes	Unknown	Unknown			Choose an item.
New York	Yes	Declining	Declining	Pre-2000 vs 2000-2022	S1	No
Connecticut	Yes	Unknown	Unknown		SNR	Choose an item.
Massachusetts	Yes	Unknown	Unknown		SNR	Choose an item.
New Jersey	Yes	Unknown	Unknown		SNR	Choose an item.
Pennsylvania	Yes	Unknown	Unknown		SNR	Choose an item.
Vermont	No	-	-			Choose an item.
Ontario	No	-	-			Choose an item.
Quebec	No	-	-			Choose an item.

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 and State/Province Ranks (NatureServe 2021); Northeastern US (Northeast Fish and Wildlife Diversity 2025)

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. Leafcutter bees were included in the focal taxa targeted by this survey. The statewide effort resulted in up-to-date information on the occurrence of Megachilids across the state (White et al. 2022). However, no continued organized, regular monitoring or survey activities are directed toward this species.

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

Primarily a southern species but extending into the Midwest and northeast, it appears to be experiencing declines in parts of its range including the northeast (Bartomeus et al. 2013), the west, and southeast (NatureServe 2021). Of the states with conservation ranks, New York, Michigan, and Indiana, *M. frugalis* has been assessed as Critically Imperiled, Imperiled, and Vulnerable. There are many data gaps to fill regarding this species range and conservation status. It was not previously known from New York prior to the ESNPS (White et al. 2022) and was first documented in Minnesota in 2018 (Satyshur et al. 2020). In Michigan, *M. frugalis* was thought to be extirpated until recently observed in 2019 (Rowe et al. 2022).

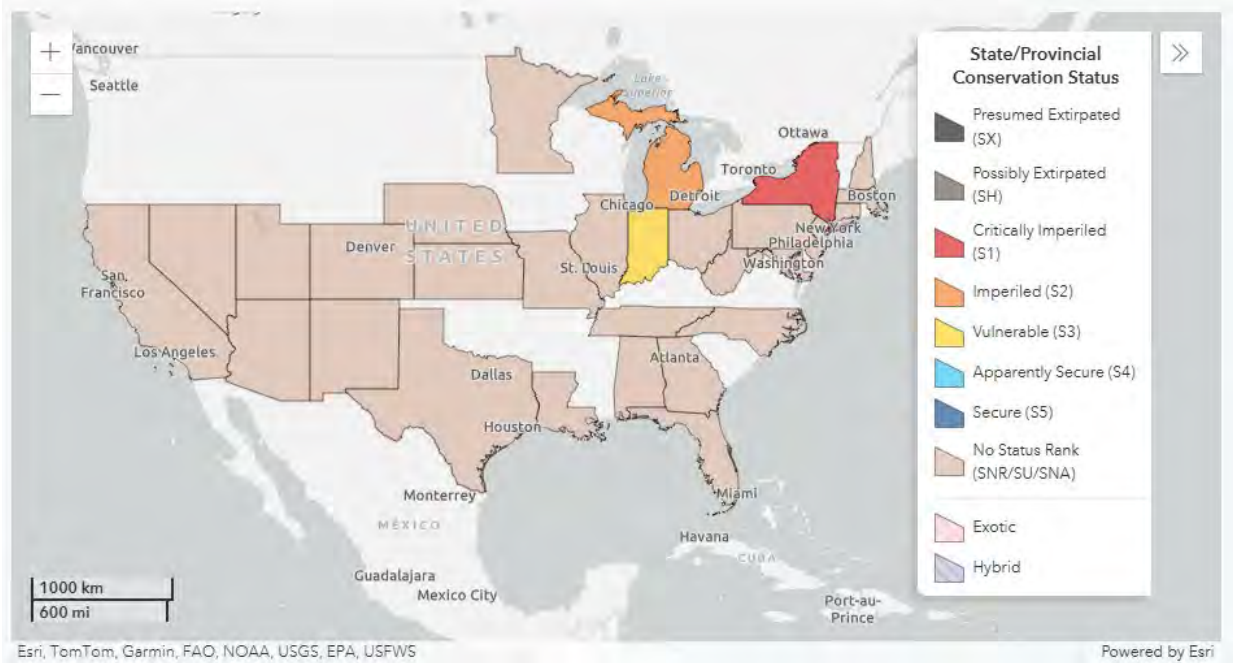


Figure 1. *Megachile frugalis* distribution in North America (NatureServe 2021)

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

Megachile frugalis has been assessed as Critically Imperiled in New York. It is known from just three counties including Suffolk, Westchester, and Tompkins (White et al. 2022).

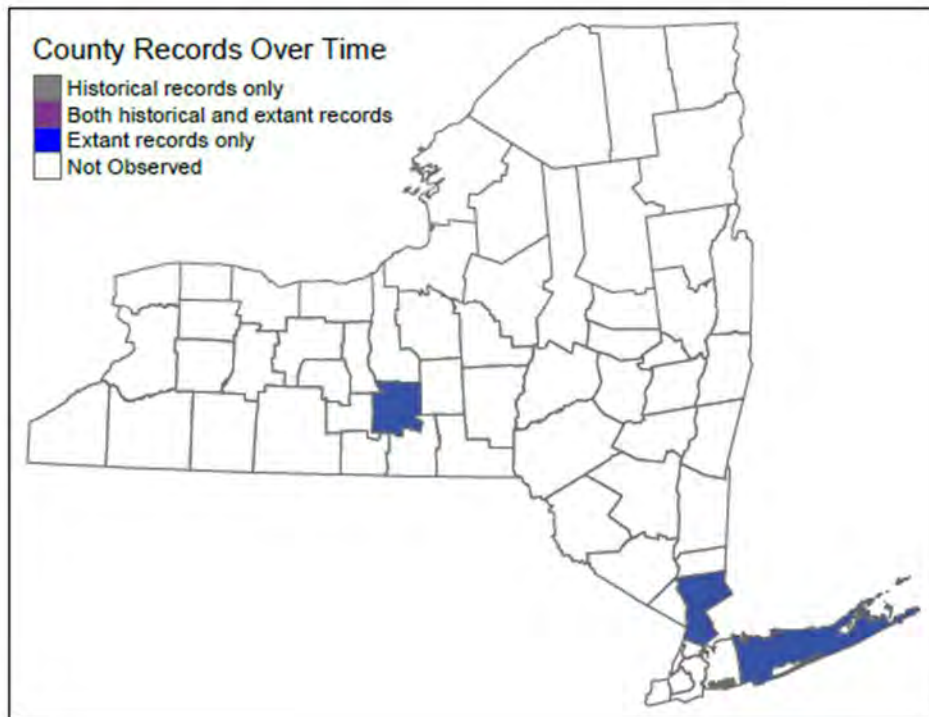


Figure 2. County level observations of *Megachile frugalis* in New York from 2000 to present depicted in blue; no records from 1999 and earlier (White et al. 2022).

Years	# of Records	# of Counties	% of State
Pre-2000	0	0	0%
2000-2021	6	3	5%

Table 1. Records of *Megachile frugalis* in New York.

Details of historic and current occurrence:

Not previously known from New York, *M. frugalis* was detected in approximately 5% of the state. The Empire State Native Pollinator Survey effort (2017-2020) and partner data detected *M. frugalis* in three new counties (Suffolk, Westchester, and Tompkins) (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	

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):

- a. Suburban/orchard, Urban/edificarian (NatureServe 2021)
- b. Barrens, Open (Grass/herb meadow) (White et al. 2022)

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/Community Trend	Time frame of Decline/Increase
No	-	-	

Column options

Habitat Specialist and Indicator Species: Yes; No; Unknown; (blank) or Choose an item

Habitat/Community Trend: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

Habitat Discussion:

M. frugalis is a cavity-nesting bee and will nest in pre-existing holes and tunnels and also in the ground (Reyes-Novelo et al. 2009, Rowe et al. 2022). In New York, *M. frugalis* was detected in barrens meadow habitat (White et al. 2022). In general, *M. frugalis* is considered a generalist. In parts of its range, it is associated with *Asclepias* sp., *Coreopsis* sp., *Dalea* sp., *Rudbeckia* sp., and *Verbena* sp. (Rowe et al. 2022).

V. Species Demographic, and Life History:

Breeder in NY?	Non-breeder in NY?	Migratory Only?	Summer Resident?	Winter Resident?	Anadromous/Catadromous?
Yes	No	No	Yes	Yes	Choose an item.

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):

Bees in the *Megachile* genus are commonly referred to as leafcutter bees. Leafcutter bees are important pollinators and can utilize various nesting materials such as leaves and soil and will nest in logs, hollow stems, in the ground, and man-made boxes. Most species will form individual cells with leaves that they cut and provision them with pollen and nectar for their young (Killewald et al. 2019). Most females in this group have pollen-collecting hairs (scopae) on the underside of the abdomen. While there is limited information about *M. frugalis*, it appears to visit a wide range of flowers, including *Asclepias tuberosa* and *Verbena stricta* (Killewald et al. 2019).

M. frugalis is a solitary, cavity nesting bee (Reyes-Novelo et al. 2009). Little is known regarding the cavity sizes *M. frugalis* will utilize, however species in the genus *Megachile* have been documented using 4 mm, 6 mm, 7 mm, and 8-10 mm tube sizes (Killewald et al. 2019). Recently, a nest was documented during the Minnesota Bee Atlas Bee Blocks project and *M. frugalis* was described nesting in a 7.94 mm (5/16") cavity (University of Minnesota Extension 2025). This species uses cut whole leaf pieces, chewed vegetation, and soil particles to make partitions between cells in their nests. The observed *M. frugalis* nest had 8 cells (averaging around 10.1 mm long) that were partitioned from leaf circles and the leaf circles and lower walls of the cell were covered with masticated vegetation (Satyshur et al. 2020).

M. frugalis appears to be univoltine in northern parts of its range. It has been documented in late July and early August in New York (White et al. 2022) and Michigan (Killewald et al. 2019). *M. frugalis* adults emerged in mid-April (Satyshur et al. 2020). Leafcutter bees typically spend several weeks mating, building and provisioning nests, and laying eggs. Once the hollow stem, tunnel, or hole is full of provisioned cells, females will cap the end with a plug made up of primarily masticated vegetation. In Minnesota, nests were completed and capped sometime between late July and early August (Satyshur et al. 2020).

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

Threats facing stem-nesting bees, like *M. frugalis*, include habitat loss from conversion of shrublands to agriculture, fire, logging and wood harvesting, invasive plants and pathogens, pesticides, and climate change (White et al. 2022). Kammerer et al. (2020) found that warmer winters will result in fewer bees and solitary bees are more sensitive to drought conditions, which are predicted in the Northeast due to climate change. Specific threats to this species are unknown, however *M. frugalis* may have reduced reproductive capacity and limited dispersal abilities which may impact overall health and survival (NatureServe 2021).

Threat Level 1	Threat Level 2	Threat Level 3	Scope	Severity	Irreversibility	Trend	Certainty
2. Agriculture & Aquaculture	2.1 Annual & Perennial Non-Timber Crops	(agricultural expansion/conversion of shrublands)	R	L	H	Choose an item.	Choose an item.
5. Biological Resource Use	5.3 Logging & Wood Harvesting	-	R	L	H	Choose an item.	Choose an item.
7. Natural System Modifications	7.1 Fire & Fire Suppression	7.1.1 Increase in the fire regime	R	L	H	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.1 Invasive Non-Native Plants & Animals	8.1.2 Terrestrial plants	P	M	H	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.4 Pathogens	-	P	M	H	Choose an item.	Choose an item.
9. Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides	R	L	H	Choose an item.	Choose an item.
11. Climate Change	11.1 Habitat Shifting & Alteration	(warmer winters result in fewer bees)	W	L	H	Choose an item.	Choose an item.
11. Climate Change	11.4 Changes in Precipitation & Hydrological Regimes	11.4.2 Droughts (solitary bees more sensitive to drought).	R	L	H	Choose an item.	Choose an item.

Table 2. Threats to *Megachile frugalis*

SCOPE: Spatial proportion of the distribution that is expected to be affected in the next 10 years (**narrow**= 1-10%; **restricted**=11-30%; **widespread**=31-70%; **pervasive**= 71-100%).

SEVERITY: The degree of population reduction in the next 10 years that can be reasonably expected from the threat given the current circumstances and trends (**low**=degrade/reduce population by 1-10%; **medium**=d/r population by 11-30%; **high**=d/r population by 30-70%; **very high**=d/r population by 71-100%).

IRREVERSIBILITY: The degree to which the effects can be reduced and the species restored (**low**=easily reversed, at a low cost, and/or within 0-5 years; **medium**=can be reversed with a reasonable commitment of resources and/or within 6-20 years; **high**=can technically be reversed, but not practicably affordable and/or it would take 21-100 years; **very high**=cannot be reversed and species not likely to be restore and/or it would take >100 years).

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

Yes: _____ 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 *M. frugalis*.

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

Providing suitable nesting and foraging habitat are crucial for minimize threats facing *M. frugalis*. Specific actions to conserve *M. frugalis*, and other leafcutter bees, include protecting nesting habitat (e.g., decaying plant materials), ensuring availability of leaves and petals, alternating management activities (e.g., fires and mowing) in nesting areas, providing abundant floral resources in the spring and early summer, avoiding pesticides, and avoiding the use of non-native pollinators in agriculture that could spread pathogens (Young et al. 2016). Establishing inventory and monitoring programs for native Megachile spp. will increase our understanding of current distributions and trends in population to inform conservation actions (Young et al. 2016).

Action Category	Action	Description
B.3 Outreach	B.3.1.4.0 Public outreach and information	Awareness & Communications
C.6 Design and Plan Conservation	C.6.5.0.0 Conservation planning	Resource/Habitat Protection

Action Category	Action	Description
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
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 *Megachile frugalis*

VII. References

- Bartomeus, I., J.S. Ascher, J. Gibbs, B.N. Danforth, D.L. Wagner, S.M. Hedtke, and R. Winfree. 2013. Historical changes in northeastern US bee pollinators related to shared ecological traits. PNAS. Available at: https://winfreelab.com/wp-content/uploads/2019/06/bartomeus2013_pnas.pdf
- Kammerer, M., S.C. Goslee, M.R. Douglas, J.F. Tooker, and C.M. Grozinger. 2020. Wild bees as winners and losers: Relative impacts of landscape composition, quality, and climate. *Global Change Biology*. 27:1250-1265.
- Killewald, M.F., L.M. Rowe, K.K. Graham, T.J. Wood, and R. Isaacs. 2019. Use of nest and pollen resources by leafcutter bees, genus *Megachile* (Hymenoptera: Megachilidae) in Central Michigan. *The Great Lakes Entomologist*. Vol 52 (1). Available at: <https://scholar.valpo.edu/tgle/vol52/iss1/8>
- University of Minnesota Extension. 2025. Minnesota Bee Atlas. Online resource: <https://extension.umn.edu/natural-resources-volunteers/minnesota-bee-atlas>
- NatureServe. 2021. NatureServe Explorer: *Megachile frugalis*. Authored by: S. Cannings. Available at: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.882200/Megachile_frugalis
- New York Natural Heritage Program. 2023a. Pollinator Record Compilation. Unpublished data. New York Natural Heritage Program, State University of New York College of Environmental Science and Forestry, Albany, New York.
- Reyes-Novelo, E., V. Melendez-Ramirez, R. Ayala, and H. Delfin-Gonzalez. 2009. Bee faunas (Hymenoptera: Apoidea) of six natural protected areas in Yucatan, Mexico. *Entomological News*. Available at: https://www.researchgate.net/publication/277470891_Bee_Faunas_Hymenoptera_Apoidea_of_Six_Natural_Protected_Areas_in_Yucatan_Mexico
- Rowe, L.M., N.J. Smith, D.L. Cuthrell, and H.D. Enander. 2022. Assessing species diversity, distribution, and status of the bee genus *Megachile* in Michigan. <https://mnfi.anr.msu.edu/reports/MNFI-Report-2022-29.pdf>

Satyshur, C.D., T.A. Evans, B.M. Forsberg, and R.B. Blair. 2020. Minnesota State Records for *Osmia georgica*, *Megachile inimica*, and *Megachile frugalis* (Hymenoptera, Megachilidae), Including a New Nest Description for *Megachile frugalis* Compared with Other Species in the Subgenus *Sayapis*. *The Great Lakes Entomologist*, vol 53 (2). Available at: <https://scholar.valpo.edu/tgle/vol53/iss2/6>

White, Erin L., Matthew D. Schlesinger, and Timothy G. Howard. 2022. The Empire State Native Pollinator Survey (2017-2021). New York Natural Heritage Program. Albany, NY.

Young, B. E., D. F. Schweitzer, G. A. Hammerson, N. A. Sears, M. F. Ormes, and A. O. Tomaino. 2016. Conservation and Management of North American Leafcutter Bees. NatureServe, Arlington, Virginia.

Version history

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