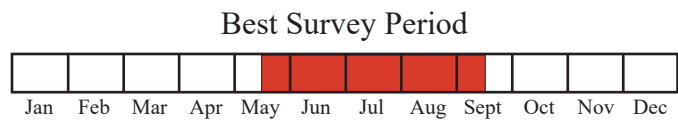
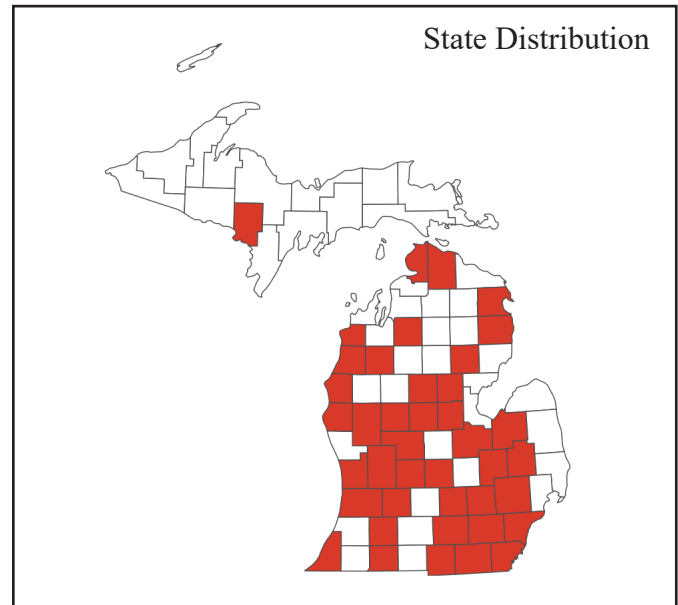




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Status: State and Federal Endangered

Global and State Rank: G2 (Globally Imperiled)/SH (Possibly Extirpated in Michigan)

Family: Apidae (honey bees, bumblebees, and allies)

Subfamily: Apinae (apine bees)

Range: *Bombus affinis* is known from much of Eastern and Midwestern North America, from Alabama east to South Carolina, north to Maine, and west to North Dakota. Globally, it is ranked as imperiled (G2). At the state/provincial level, it is ranked as No Status Rank (SNR/SU/SNA) in Alabama, Iowa, Minnesota, Quebec, and South Dakota; Possibly Extirpated (SH) in Georgia, Kentucky, Maine, Michigan, New Brunswick, New Hampshire, New York, North Dakota, and South Carolina; and Presumed Extirpated (SX) in Connecticut, Massachusetts, and Vermont (NatureServe 2026). Like many bumblebees, *B. affinis* populations have been in sharp decline over recent decades (Colla et al. 2008, Cameron et al. 2020). Extant populations are known from only two regions, one in Minnesota,

ta, Wisconsin, Iowa, and Illinois, the other in Virginia and West Virginia (USFWS 2022). Genetically, these two regions support a total of three distinct clusters: Minnesota, the rest of the Midwest, and Appalachia (Mola et al. 2024).

State Distribution: In Michigan, *B. affinis* is represented by 71 element occurrences (EOs) across 40 counties throughout the Lower Peninsula and Dickinson County in the Upper Peninsula. All EOs are ranked H (historic). The most recent observation date is from 1999 in Washtenaw County despite significant recent survey effort (Wood et al. 2019, Rowe et al. 2023, MNFI 2026).

Recognition: Like other members of the Apinae subfamily, morphology differs between queens, workers, and males. Queens, generally 19-22 mm in length and 9.5-11 mm in breadth, have short pubescent hair throughout their body, and an entirely black head (Mitchell 1962). The abdominal tergum (split into segments called terga and referred to as T1, T2, T3, etc.) is **yellow on T1 and T2 and black on T3, T4, and T5. The thorax is yellow with a round black patch found between the wings, scutum, and scutellum.** Workers, generally



11-16 mm in length and 5-8 mm in breadth, also have pubescent bodies but with slightly longer hairs and slightly different coloring (Mitchell 1962). Like queens, workers have **black heads, yellow T1 and T2, and black T3, T4, and T5; however, workers have a reddish (rusty) patch stretching across the top center of T2, and a more elongated-diamond shaped black patch on the thorax between the wings, scutum, and scutellum.**

Males, generally 13-17.5 mm in length and 5-7 mm in breadth, share many of the same identifiers as workers (Mitchell 1962): pubescent bodies; **a black head with a few pale hairs interspersed along the top; a yellow thorax with an elongated-diamond shaped black patch; yellow T1 and T2 with a reddish patch across the top center of T2; black T3, T4, and T5, with the difference between males and workers being the addition of black T6 and T7.** In addition, males lack corbiculae (pollen baskets), that both queens and workers have. *Bombus affinis* shares many characteristics and is often confused with other bees that have a rounded angle on their midleg, like *B. griseocollis* (brown-belted bumble bee), which has a brown T2, *B. rufocinctus* (red-belted bumble bee), which generally has a reddish-orange belt on T3 and T4, and *B. morrisoni* (Morrison's bumble bee), which has an entirely yellow T1, T2, and T3 (Williams et al. 2014).

Microscopic Characteristics: In both queens and workers, the mandible holds a deep notch in front of their back tooth, **the upper half of the clypeus (lower margin of the face) is strongly swollen, ocelli are located along the back middle edges of the vertex in a straight line,** and hind leg basitarsi are thick and curved along the outer side (Williams et al. 2014).

Best Survey Time: The third week of April to fourth week of October is the full window of documented activity, with the second week of May through the second week of September being considered the best interval appropriate for surveying for *B. affinis* (MNFI 2026). Sunny days with low wind speeds (<15 mph) are advised while avoid-

ing any damp conditions (e.g., rain, drizzle, and fog) (Rowe et al. 2019, USFWS 2019). According to historical data (MNFI 2026), queens emerge mid-April and continue to forage through mid-July; workers have been documented foraging from late-May through mid-October; Males have been documented from early May through the last week of October. Compared to other *Bombus* species that are tracked as rare in Michigan (*B. auricomus* [black and gold bumble bee], *B. fervidus* [golden northern bumble bee], *B. pensylvanicus* [American bumble bee], *B. sandersoni* [Sanderson's bumble bee], and *B. terricola* [yellow-banded bumble bee]), *B. affinis* is one of the first to emerge in the early spring and is one of the last to be seen in late autumn.

Habitat: *Bombus affinis* is rarely associated with a specific habitat type in Michigan, and has been observed in agricultural lands, prairies, woodlands, and marshes amongst other habitat types throughout their known range (USFWS, n.d.). *Bombus affinis* is a foraging generalist. Documented forage species within and near Michigan include milkweeds (*Asclepias* spp.), spotted knapweed (*Centaurea stoebe*), thistles (*Cirsium* spp.), blazing-stars (*Liatris* spp.), common St.-John's-wort (*Hypericum perforatum*), wild bergamot (*Monarda fistulosa*), black-eyed Susan (*Rudbeckia hirta*), goldenrods (*Solidago* spp.), and asters (*Symphyotrichum* spp.) (Wilhelm and Rericha 2017, MNFI 2026). This is consistent with a statewide general bumblebee survey in which Rowe et al. (2023) found Joe-Pye-weed (*Eutrochium purpureum*), goldenrods, and wild bergamot (*Monarda fistulosa*) to be the dominant native food source for *Bombus* species. However, the non-native spotted knapweed was the most common floral resource overall and the non-native common St.-John's-wort was the fourth most common. Range-wide, a broad array of forage species has been consistently documented particularly among the aster family (Asteraceae), parsley family (Apiaceae), buttercup family (Ranunculaceae), and rose family (Rosaceae) (Cornman et al. 2026). Observed and published nests have been few and far between, with only four descriptions hav-



ing been made since 1913, with most nests being reported underground in old rodent burrows with tunnel depth varying from 45 to 91 centimeters. (COSEWIC 2010, Boone et. al. 2022).

Biology: *Bombus affinis*, much like other *Bombus* species, are **eusocial**, meaning they maintain an advanced social caste system (queen>worker>male) that is characterized by their cooperative brood care, overlapping generations, and division of labor into reproductive and non-reproductive groups. There have not been many explicit studies done on *B. affinis* biology, however, many *Bombus* species have similar biology and lifecycles. ***Bombus* colonies are annual, where the queen emerges early spring, founds a new colony by producing all the workers and males needed for foraging, defense, and reproduction, and produces new queens in the late fall that will go on to found new colonies come spring** (Goulson 2010). Upon emergence in the spring, the queen deposits nectar in wax pots she forms from glands located on her abdomen and creates a brood clump by laying a mass of eggs in clumps of pollen she has foraged. The eggs hatch and progress through several larval stages before metamorphosing into their adult worker form around the start of summer (two to three weeks after being laid). Once adults, workers take control of foraging, brood tending, and nest defense from the queen who then remains in the colony laying eggs. Towards the end of summer, the queen will begin to lay unfertilized eggs, which will develop into drones (males). ***Bombus* species operate under a haplodiploidy sex-determination system, meaning unfertilized eggs develop into males and are haploid, while fertilized eggs develop into females and are diploid.** Workers rear fertilized eggs into new gynes (queens), who will leave the colony and mate with the drones mid-fall while the workers and founding queen die out by winter. After locating a suitable overwintering location, generally burrowing into loose soils and thatch, gynes will enter diapause for six to nine months before emerging and forming their own colony in the spring (Goulson 2010).

Conservation/Management: *Bombus affinis* was listed as federally endangered in 2010 by the Committee on the Status of Endangered Wildlife in Canada and was the first bee species to be protected by the Endangered Species Act in 2017 by the United States Fish and Wildlife Service (University of Wisconsin 2025). Producing reproductive individuals towards the end of long colony cycles makes for vulnerability in *Bombus* population growth, especially when human driven factors such as urban development, habitat fragmentation, fire suppression, pathogens, parasites, and pesticides are in play (Colla 2008, COSEWIC 2010, USFWS 2022). In a range-wide study of population structure, Mola et al. (2024) found evidence of inbreeding depression, high population differentiation across the range, and low colony abundance indicating that populations are insufficiently connected, susceptible to stochastic extirpation, and potentially unable to support take for translocation efforts. Due to the inability to translocate, current strategies for *B. affinis* conservation focus on native wildflower reestablishment within urban areas, aiming to enhance present habitat through surveys done by community scientists, with the hope of population growth (Smith 2018, Wolf et. al 2022). Additionally, improving nesting habitat by providing vegetative shelter and reducing pesticide and herbicide usage is essential for reinforcing existing populations (Smith et al. 2020).

Research Needs: No *B. affinis* have been observed in Michigan since 1999, so continued population surveys on both known and historical sites throughout its range will contribute to *B. affinis* understanding. Continuing genetic research like the 2024 study done by Mola et al. that focused on colony abundance and genetic diversity amongst populations across its range is still needed throughout the entire range. Only four *B. affinis* nests have been observed and published since 1913. A deeper understanding of ideal nesting location and resource needs could help inform landowners on how to best manage *B. affinis* conservation (Boone et. al. 2022). Finally, further study on *B. affinis*' susceptibility to human disruptions like pesticides, parasites,



and climate change is needed to better address and adapt conservation efforts for the species.

Related Abstracts: American Bumble Bee

Selected References

- Boone, M.L., E. Evans, A. Wolf, H. Minser, J. Watson, and T.A. Smith. 2022. Notes from rusty patched bumble bee (*Bombus affinis* Cresson) nest observations. *Insect Conservation and Diversity* 15: 380-384.
- Cameron, S.A. and B.M. Sadd. 2020. Global trends in bumble bee health. *Annual Review of Entomology* 65: 209-232.
- Colla, S.R. and Packer, L. 2008. Evidence for decline in eastern North American bumblebees (Hymenoptera: Apidae), with special focus on *Bombus affinis* Cresson. *Biodiversity and Conservation* 17: 1379-1391.
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2010. COSEWIC assessment and status report on the Rusty-Patched Bumble Bee *Bombus affinis* in Canada. Ottawa, ON, CN.
- Cornman, R.S., M.J. Hepner, and C.R.V. Otto. 2026. The Appalbees menu: a multiyear, multilocus metagenetic assessment of pollen foraging by Appalachian *Bombus affinis* workers. *PeerJ*. 14: e20284.
- Goulson, D. 2010. *Bumblebees Behavior Ecology and Conservation*. Second Edition. Oxford University Press, New York, NY.
- Michigan Natural Features Inventory (MNFI). 2026. Michigan Natural Heritage Database, Lansing, MI.
- Mitchell, T.B. 1962. *Bees of the Eastern United States: Volume II. The North Carolina Agricultural Experiment Station*. Raleigh, NC.
- Mola, J.M., I.S. Pearse, M.L. Boone, E. Evans, M.J. Hepner, R.P. Jean, K.M. Kochanski, C. Nordmeyer, E. Runquist, T.A. Smith, J.P. Strange, J. Watson, and J.B.U. Koch. 2024. Range-wide genetic analysis of an endangered bumble bee (*Bombus affinis*, Hymenoptera: Apidae) reveals population structure, isolation by distance, and low colony abundance. *Journal of Insect Science* 24: 19; ieae041.
- NatureServe. 2026. NatureServe Network Biodiversity Location Data accessed through NatureServe Explorer Web. [https://explorer.natureserve.org/Taxon h 2026/ELEMENT_GLOBAL.2.108845/Bombus _affinis](https://explorer.natureserve.org/Taxon%202026/ELEMENT_GLOBAL.2.108845/Bombus_affinis) Accessed 25 March 2026.
- Rowe, L.M., D.L. Cuthrell, and H.D. Enander. 2019. *Assessing Bumble Bee Diversity, Distribution, and Status for the Michigan Wildlife Action Plan*. Michigan Natural Features Inventory, Report Number 2019- 33, Lansing, MI.
- Rowe, L.M., D.L. Cuthrell, D.J. Earl, S.G. Eckhardt, and H.D. Enander. 2023. *Michigan Statewide Bumble Bee and Habitat Surveys*. Michigan Natural Features Inventory Report No. 2023-21, Lansing, MI.
- Shafer, L.B., C.A. Klimas, J. Vogt, and A.F. Hasle. 2025. Community engagement in urban habitat creation for the Rusty Patched Bumble Bee (*Bombus affinis*) indicates the potential of conservation in private yards. *Urban Forestry & Urban Greening* 113: 129129.
- Smith, T., J.P. Strange, E.C. Evans, B.M. Sadd, J.C. Steiner, J.M. Mola and K. Traylor-Holzer. (Eds.). 2020. *Rusty Patched Bumble Bee, *Bombus affinis*, Ex Situ Assessment and Planning Workshop: Final Report*. ICUN SSC Conservation Planning Specialist Group, Apply Valley, MN.
- Smith, T. 2018. *Rusty Patched Bumble Bee Midwest Plant Guide*. U.S. Fish and Wildlife Ser-



vice. <https://www.fws.gov/media/rusty-patched-bumble-bee-midwest-plant-guide>. Accessed 19 Mar. 2026.

University of Wisconsin. 2025. Rusty-Patched Bumble Bee: A Beloved Bumble Bee That Needs Our Help! <https://fruit.wisc.edu/2020/05/26/rusty-patched-bumble-bee-a-beloved-bumble-bee-that-needs-our-help/>. Accessed 23 March 2026.

U.S. Fish & Wildlife Service (USFWS). n.d. Rusty Patched Bumble Bee (*Bombus affinis*). www.fws.gov/species/rusty-patched-bumble-bee-bombus-affinis. Accessed 19 Mar. 2026.

U.S. Fish and Wildlife Service (USFWS). 2019. Survey Protocols for the Rusty Patched Bumble Bee (*Bombus affinis*) Version 2.2. https://www.fws.gov/sites/default/files/documents/Survey_Protocols_RPBB_12April2019.pdf.

Wilhelm, G. and L. Rericha. 2017. Flora of the Chicago Region: A Floristic and Ecological Synthesis. Indiana Academy of Science, Indianapolis, IN.

Williams, P., R. Thorp, L. Richardson, and S. Colla. 2014. Bumble Bees of North America; An Identification Guide. Princeton University Press, Princeton, NJ.

Wolf, A.T., J.C. Watson, T.J. Hyde, S.G. Carpenter, and R.P. Jean. 2022. Floral resources used by the endangered rusty patched Bumble Bee (*Bombus affinis*) in the Midwestern United States. *Natural Areas Journal* 42: 301-312.

Wood, T.J., J. Gibbs, K.K. Graham, and R. Isaacs. 2019. Narrow pollen diets are associated with declining Midwestern bumble bee species. *Ecology* 100: 1-15.

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