

A Guide to the
**Bumble Bees
of Nebraska**



Bumble Bees of Nebraska

Authors:

Katie Lamke, Conservation Biologist
Xerces Society for Invertebrate Conservation

Doug Golick, Associate Professor of Entomology
University of Nebraska-Lincoln

Leif Richardson, Conservation Biologist
Xerces Society for Invertebrate Conservation

Jennifer Hopwood, Senior Pollinator
Conservation Specialist, Xerces Society for
Invertebrate Conservation

Rae Powers, Farm Bill Pollinator Conservation
Planner & NRCS Partner Biologist, Xerces
Society for Invertebrate Conservation

Rich Hatfield, Senior Conservation Biologist
Xerces Society for Invertebrate Conservation

Cover, illustrations, & diagrams by D.Golick;
Lifecycle art by T. Jung; Occurrence maps by L.
Richardson

This guide is a product of the Nebraska Bumble Bee Atlas, a statewide community science project aimed at tracking and conserving Nebraska's native bumble bees led by the Xerces Society for Invertebrate Conservation in collaboration with the University of Nebraska-Lincoln.

This project is funded through a grant from the Nebraska Environmental Trust (19-132). The Trust is funded through proceeds from the Nebraska Lottery and has awarded more than \$305 million to conservation projects in Nebraska since 1994.

A portion of this guide was adapted from *Bumble Boosters: A Guide to Identifying Nebraska Bumble Bee Species*, published in 2002 by the University of Nebraska Cooperative Extension (EC02-1564-S).

Table of Contents

Thank You	7
Introduction.....	8
History of Bumble Bee Surveys in Nebraska.....	9
Bumble Bee Life Cycle.....	10
Conserving Bumble Bees.....	13
Top Bumble Bee Plants by Ecoregion.....	14
Photographing Bumble Bees for Conservation.....	16
Steps for Identifying Bumble Bees	18
Distinguishing Bumble Bees from Look-alikes	22
Using the Species Profiles	24
Species Profiles.....	26
Glossary	66
Resources.....	67

List of Nebraska Species (organized alphabetically by scientific name)

White-shouldered Bumble Bee 26 <i>Bombus appositus</i>	Common Eastern Bumble Bee..... 46 <i>Bombus impatiens</i>
Black-and-gold Bumble Bee..... 28 <i>Bombus auricomus</i>	Indiscriminate Cuckoo Bumble Bee..... 48 <i>Bombus insularis</i>
Two-form Bumble Bee 30 <i>Bombus bifarius</i>	Morrison Bumble Bee 50 <i>Bombus morrisoni</i>
Two-spotted Bumble Bee 32 <i>Bombus bimaculatus</i>	Nevada Bumble Bee..... 52 <i>Bombus nevadensis</i>
Central Bumble Bee 34 <i>Bombus centralis</i>	Western Bumble Bee..... 54 <i>Bombus occidentalis</i>
Lemon Cuckoo Bumble Bee 36 <i>Bombus citrinus</i>	American Bumble Bee 56 <i>Bombus pensylvanicus</i>
Yellow Bumble Bee..... 38 <i>Bombus fervidus</i>	Red-belted Bumble Bee 58 <i>Bombus rufocinctus</i>
Southern Plains Bumble Bee 40 <i>Bombus fraternus</i>	Suckley Cuckoo Bumble Bee..... 60 <i>Bombus suckleyi</i>
Brown-belted Bumble Bee 42 <i>Bombus griseocollis</i>	Half-black Bumble Bee 62 <i>Bombus vagans</i>
Hunt Bumble Bee 44 <i>Bombus huntii</i>	Variable Cuckoo Bumble Bee..... 64 <i>Bombus variabilis</i>



Thank You

Thanks to the many individuals and organizations that contributed to the Nebraska Bumble Bee Atlas between 2019-2021. The success of the NEBBA is because of your hard work and support.

Sarah Bailey, Julie Bain, Collen Beard, Cara and Gary Bentrup, Natalia Bjorklund, Shane Brandt, Trevis Carmichael, Amanda K. Ciurej, Jeff Cluever, Erin Considine, Jennifer Corman, Crane Trust, Lisa Darlington, Molly Darlington, Cody Dreier, Allyson Frank, Robert Fuchs, Lauren Govekar, Kaelynn Graham, Belinda Greiner, Carl Greiner, Marla and Brad Grier, Lisa Harnack, Kellie Hayden, Chris Helzer, Donna Hoppe, Paula Hoppe, Gloria Jacoby Overstreet, Sarah R. Jenkins, Merri Johnson, Alaina Kapla, Justin Ketchmark, Alison Krohn, Esme Krohn, Kristin Krohn, Rachel Kunc Hall, Ted Kyster, Halle Lambeau, Diane LeDoux, Jenna Malzahn, Mercy Manzanares, Alie Mayes, Rob McEntarffer, Amanda Medaries, Donna Mehlin, Randy Mehlin, Jen Metcalf, Atticus Miller, Kayla Mollet, The Nature Conservancy, Nebraska Game and Parks Commission, Nebraska Master Naturalists, Melvin Nenneman, Brianna Nevitt, Chadwick Nugent, Marsha Nyffeler, Bethany Ostrom, Judy Parks, Hadley Pawlenty, Jason Pawlenty, Denise Pecha, Theresa Pella, Prairie Plains Resource Institute, Matthew Rahko, Mic Rohde, Matthew Schaaf, Amber Schiltz, Erin Schoenberg, Carson Schultz, Patricia Slatin, Parsifal Smith, William H. Smith, Lexi Spurlin, Alison Stevens, Lane Stevens, Sheila Stevens, Rae Ellen Syverson, J. Carey Taylor, Upper Loup NRD, U.S. Forest Service (Nebraska National Forest's Bessey and Pine Ridge Ranger Districts), Cynthia Van Den Broeke, Matthew Van Den Broeke, Rebekah Van Den Broeke, Jamie Vrtiska, K. Denise Wally, Chelsie West, Bill White, Josh Wiese, and Carl Wolfe.

Photo Credit: Britton Bailey



Introduction

Nebraska is home to 20 species of bumble bees that play a critical role in sustaining the health of our environment. These animals have evolved a suite of unique characteristics that make them effective pollinators, including the ability to collect and transport large amounts of pollen, use their long tongues to feed on a diversity of flowers, fly in cooler temperatures, and form large colonies that may reach +1,000 foraging worker bees. Being located near the center of the country, Nebraska provides suitable habitat for both eastern species, like the Black-and-gold bumble bee (*Bombus auricomus*), as well as western species like Hunt bumble bee (*B. huntii*). Each species has their own defining color patterns, natural history, and habitat associations.

This book provides an overview of Nebraska's bumble bee species with identification features of its species, occurrence maps, and natural history notes.

Photo: American bumble bee (*B. pensylvanicus*) on Platte thistle (*Cirsium canescens*), Xerces Society/Katie Lamke.



History of Bumble Bee Surveys in Nebraska

The first formal list of Nebraska bumble bee species was published in 1907 by University of Nebraska Professor Myron Swenk. Myron Swenk and Lawrence Bruner, University of Nebraska-Lincoln's first Professor of Entomology, participated in biological survey expeditions to remote regions of the Nebraska sandhills and pine ridge regions in the early 1900's. Swenk listed 17 bumble bee species in his *Bees of Nebraska* (1907). Nearly 60 years later, Dr. Wallace LaBerge, UNL Associate Professor of Entomology and graduate student Morgan C. Webb published the *Bumble Bees of Nebraska* (1962). This work included distribution maps of bumble bee species based on LaBerge and Webb's personal collections, examination of museum collections from Nebraska's colleges and universities, and additional survey trips conducted by the authors in the late 1950's. LaBerge and Webb's work expanded Nebraska's known species count to 20. Finally, in 2006, Dr. Marion Ellis, UNL Professor of Entomology, and graduate student Doug Golick, published

an updated distribution and abundance of Nebraska bumble bee species gathered from the Bumble Boosters community science program. All but one of the twenty species (Morrison Bumble Bee) was collected during the Bumble Boosters program between 1999-2003 (Golick & Ellis, 2006).

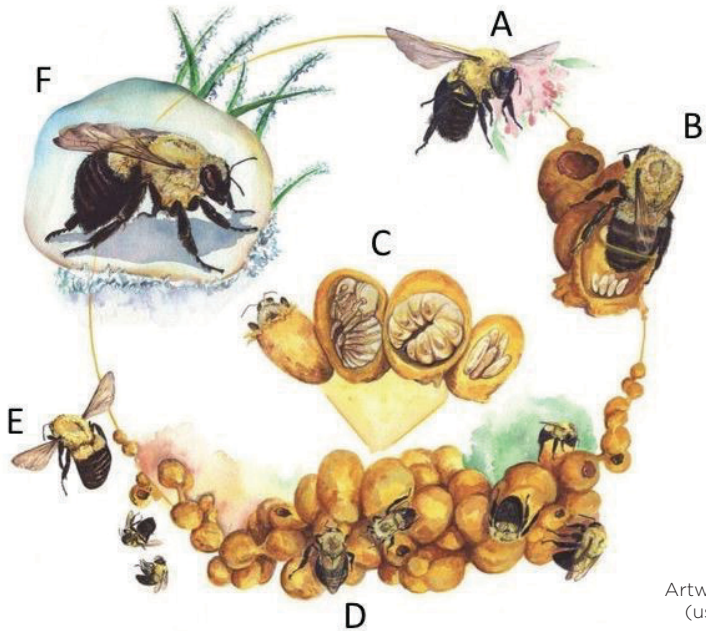
In 2019, the University of Nebraska-Lincoln and the Xerces Society for Invertebrate Conservation launched the Nebraska Bumble Bee Atlas to engage community scientists in a statewide bumble bee inventory, supported by the Nebraska Environmental Trust. Participants attended workshops where they learned bumble bee ecology, conservation, identification, and how to collect data on bumble bees utilizing capture-and-release methods. More than 240 participants observed ~6,000 bumble bees (collecting 13 of the 20 NE species) and conducted over 500 bumble bee habitat assessments across Nebraska from 2019-2021. Information gathered by participants provides modern data for bumble bee species in Nebraska and serves as the basis for this guide.

Bumble Bee Life Cycle

Bumble bees are social insects that live in an annual colony. The life cycle of a bumble bee begins in spring, when a single mated queen emerges from hibernation (A). Bumble bee queens search for a pre-existing cavity with insulative material, like an abandoned rodent den or bunch grass, to start their nest. Once a suitable nest location is found, the queen begins to construct waxen “honeypots” to store nectar. She also constructs wax cups, filling them with a mixture of pollen and nectar before laying her first clutch of eggs on the mixture (B). The eggs hatch into larvae and spend several weeks consuming the food mixture and growing before they pupate and emerge as adult, female worker bees (total time from egg to adult is 4-6 weeks) (C). In the early stages of colony development, the queen splits her time incubating the developing brood and foraging for food. As more worker bees are produced, the queen stays in the nest to lay eggs and tend to her offspring while the workers carry out other tasks such as foraging, caring for developing brood, and defending the nest (D). The colony will

reach peak size by mid-summer which ranges from 25 - 1,000 individuals depending on the species, climate, and habitat quality. As summer fades, the colony will produce male bees and new queens who leave the nest to find mates. In anticipation of mating, males of some species patrol a territory by perching on tall grasses or shrubs and dart out at objects that enter their territory. The foundress queen, worker bees, and males eventually die at the end of the annual colony cycle, while newly-mated queens spend time foraging to build up fat reserves and receive support in the nest from any remaining workers (E). Queens locate a safe place to hibernate in pine duff or a few inches under the soil surface where they will remain until the following spring when they will begin the cycle anew (F).

Cuckoo bumble bees are social parasites and lack a worker caste. Female cuckoo bees enter the nests of host bumble bee species after the first few clutches of workers have emerged and attempt to kill the host queen. If successful, the cuckoo females will lay eggs within the nest that will be raised by the host worker bees.



Artwork by Trenton Jung
(used with permission)



Xerces Society, Jennifer Hopwood



Xerces Society, Katie Lamke



Xerces Society, Jennifer Hopwood



Xerces Society, Sarah Hamilton-Buxton

Conserving Bumble Bees

Now more than ever it is important to take steps to support bumble bees. These valuable animals provide pollination services in our natural and urban areas, contribute to the successful harvest on farms, and help maintain floral diversity on rangelands. Unfortunately, bumble bees are in trouble and face an uncertain future. At least one quarter of North America's ~50 bumble bee species are facing risk of extinction. Nebraska lists four bumble bee species as Species of Greatest Conservation Need (SGCN) in the Nebraska Natural Legacy Plan, including the Southern Plains (*B. fraternus*), Suckley cuckoo (*B. suckleyi*), Western (*B. occidentalis*), and Variable cuckoo (*B. variabilis*) bumble bees. While these declines are not fully understood, contributing factors include habitat loss, pesticide exposure, climate change, low genetic diversity, and the amplification and distribution of pathogens through commercial pollinators. The most immediate and productive steps that we can take to conserve these imperiled pollinators is to intentionally manage and restore existing habitat or create additional habitat.

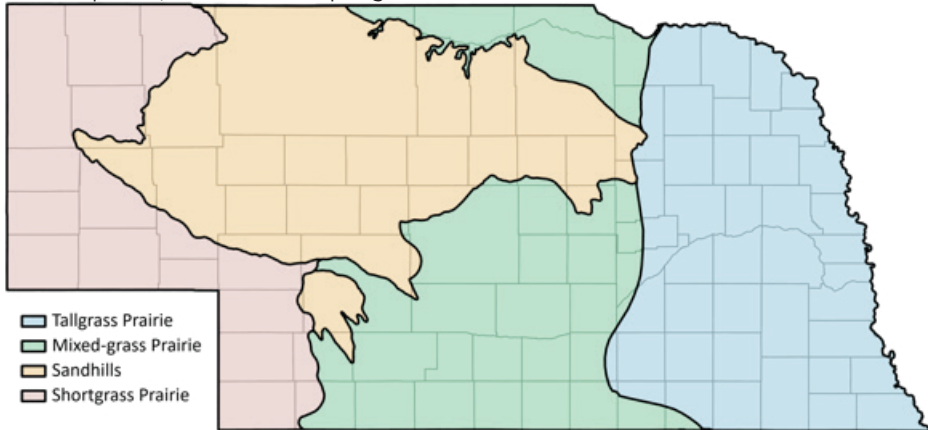
Recommended Practices:

- Select native plants with overlapping bloom periods from spring through fall.
- Avoid pesticide use, especially for aesthetic or cosmetic purposes.
- If pesticides are used, take steps to mitigate their risk: target applications to avoid drift onto flowering plants, avoid use when plants are flowering, and use during periods when bumble bees are less active (after dusk).
- Ask your local nursery for native plants grown without systemic insecticides.
- Leave "messy" areas in your space, such as rock piles, uncut bunchgrasses, downed branches or logs, and areas with leaf litter.
- Keep areas of land unmown and untilled.
- To protect overwintering queens, avoid raking and mowing early in the spring before daytime temperatures are 65°F for 14 consecutive days.
- Display a pollinator habitat sign.

For more information visit Xerces.org or contact your local extension office.

Top Bumble Bee Plants by Ecoregion

Understanding which plants bumble bees utilize is key to making effective conservation decisions. It can also help us locate bumble bee species during survey efforts. The plants utilized vary by bumble bee species, but also from spring to fall and from east to west.



In the first column below are native plant genera that are widespread across the state and top performing in (1) attracting a high number of bumble bee species and (2) number of bumble bee visits. Top performing species and genera in each of Nebraska's four ecoregions are listed on the right.

All Regions	Shortgrass	Sandhills	Mixed-grass	Tallgrass
Beebalm (<i>Monarda</i> sp.)	Rocky Mountain Bee Plant (<i>Cleome serrulata</i>)	Rocky Mountain Bee Plant (<i>Cleome serrulata</i>)	Native Sage (<i>Salvia</i> sp.)	Coneflower (<i>Echinacea</i> sp.)
Vervain (<i>Verbena</i> sp.)	Lupine (<i>Lupinus</i> sp.)	Gooseberry (<i>Ribes</i> sp.)	Goldenrod (<i>Solidago</i> sp.) (<i>Oligoneuron</i> sp.)	American Aster (<i>Symphyotrichum</i> sp.)
Milkweed (<i>Asclepias</i> sp.)	Snowberry (<i>Symphoricarpos</i> sp.)	False Indigo (<i>Amorpha</i> sp.)	Sneezeweed (<i>Helenium</i> sp.)	Native Sage (<i>Salvia</i> sp.)
Prairie Clover (<i>Dalea</i> sp.)	Wild Licorice (<i>Glycyrrhiza lepidota</i>)	Goldenrod (<i>Solidago</i> sp.) (<i>Oligoneuron</i> sp.)	Coneflower (<i>Echinacea</i> sp.)	Goldenrod (<i>Solidago</i> sp.) (<i>Oligoneuron</i> sp.)
Sunflower (<i>Helianthus</i> sp.)	Scurf-pea (<i>Pediomelum</i> sp.) (<i>Psoraleidum</i> sp.)	Wild Licorice (<i>Glycyrrhiza lepidota</i>)	Rocky Mountain Bee Plant (<i>Cleome serrulata</i>)	Hyssop (<i>Agastache</i> sp.)
Native Thistle (<i>Cirsium</i> sp.)	False Indigo (<i>Amorpha</i> sp.)	Beggarticks (<i>Bidens</i> sp.)	Nuttall's Sensitive-briar (<i>Mimosa nuttallii</i>)	American Vetch (<i>Vicia americana</i>)
Beardtongue (<i>Penstemon</i> sp.)	Evening Primrose (<i>Oenothera</i> sp.)	Mentzelia (<i>Mentzelia</i> sp.)	American Aster (<i>Symphyotrichum</i> sp.)	False Indigo (<i>Amorpha</i> sp.)
Nightshade (<i>Solanum</i> sp.)	Yellow Rabbitbrush (<i>Chrysothamnus viscidiflorus</i>)	American Aster (<i>Symphyotrichum</i> sp.)	Boneset (<i>Eupatorium</i> sp.)	Partridge Pea (<i>Chamaecrista fasciculata</i>)
Blazing Star (<i>Liatris</i> sp.)	Rose (<i>Rosa</i> sp.)	Evening Primrose (<i>Oenothera</i> sp.)	Partridge Pea (<i>Chamaecrista fasciculata</i>)	Smartweed (<i>Polygonum</i> sp.)
	Lettuce (<i>Lactuca</i> sp.)	American Vetch (<i>Vicia americana</i>)	Onion (<i>Allium</i> sp.)	False Sunflower (<i>Heliopsis helianthoides</i>)

Plant lists were generated using plant-bumble bee interaction data from the Nebraska Bumble Bee Atlas, spanning 2019-2021 and the Nebraska records from Bumble Bees of North America occurrence records database spanning 1900-2021 (Richardson, L. L., 2021).

Photographing Bumble Bees for Conservation

Photography is a harmless method of recording bumble bee observations. Identifying moving bumble bees in the field can be difficult, but with good photographs you can later identify bumble bees and forage plants. Photographs can be submitted to BumbleBeeWatch.org, a community science platform that collects bumble bee

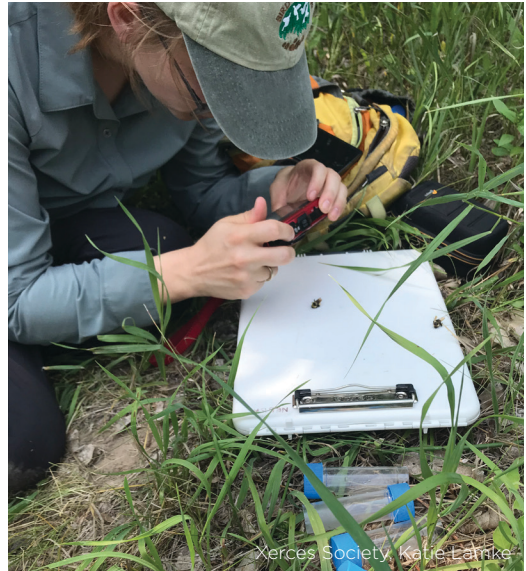
observations from the United States and Canada. All photos are reviewed by bumble bee experts and feedback is provided on the species identification. In addition, submitted photographs contribute to our understanding of the occurrence and abundance of species in North America.

Photos submitted to Bumble Bee Watch need to include the date the photo was taken, location, and floral host (if possible).



The process for creating high-quality bumble bee images for submission is simple and straightforward.

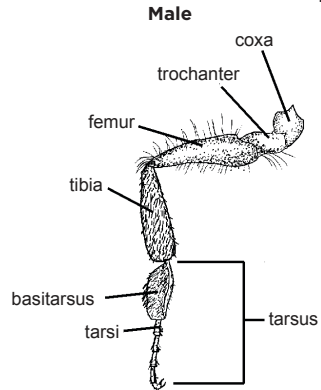
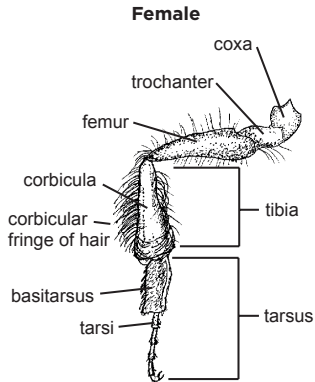
1. Capture a bumble bee using a net and place the bee in a sealed vial.
2. Place the vial in crushed ice (in a small cooler) for about 5-10 minutes. The bee will become mostly immobile at which point it is time to photograph it.
3. Use a digital camera or phone with a macro setting to take pictures of your chilled bee; small clip-on macro lenses also work well on smartphones. Multiple pictures of the same bee are needed for identification.
4. Pose your bee and take pictures from (1) the side, (2) looking top-down, and (3) the face, as shown in photos above.
5. Place the bee in a safe location and allow it to warm up and fly away.
6. Record the date, location, and floral host the bee was captured on.
7. Upload photos of your specimen (up to 5 per specimen) to BumbleBeeWatch.org



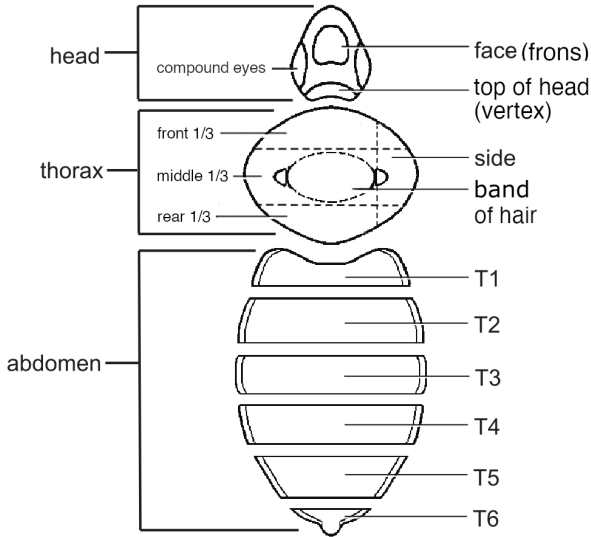
For more information about photographing bumble bees visit www.bumblebeeatlas.org

Steps for Identifying Bumble Bees

1. Determine sex by assessing the following:
 - a. Presence or absence of pollen basket (i.e. corbicula) on hind tibia (pollen baskets are found on females, but not male or cuckoo bees)



- b. Number of dorsal abdominal segments (tergites), 6 for females, (abbr. T1-T6) and 7 for males (abbr. T1-T7)
- c. Shape of the eyes (some males have bulbous eyes) compared to females, and males of other species

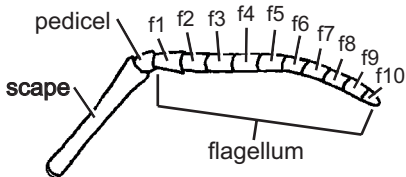


Normal Eyes

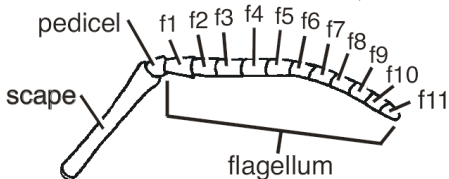


Bulbous Eyes

- d. Number of antennal segments, 12 for female and 13 for male. Usually not necessary to count, as male antennae appear slightly longer than female.



Female

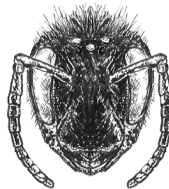
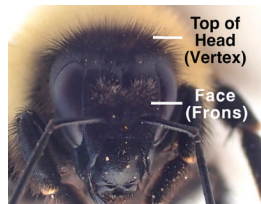


Male

2. Assess the hair color and pattern on the following body regions:

- a. Head - front of the face (i.e. frons) and the top of the head (i.e. vertex).

Examine the shape of the face, bees have different tongue lengths that change the overall shape of their face. A bumble bee can have a short, medium, or long face.

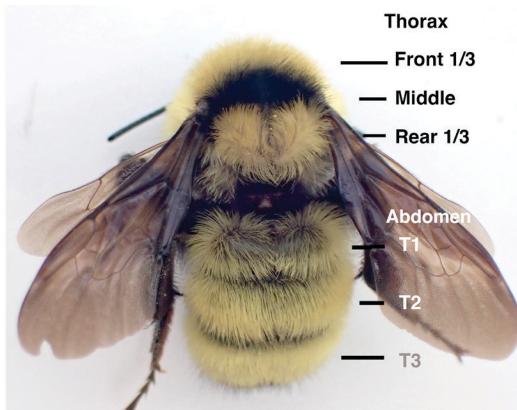


Short Face



Long Face

- b. Thorax - divide the top view into thirds (starting near the head and working towards the abdomen) and examine if the color in each third is black, yellow, or a mixing of black and yellow. Notice if any patterns are present, like a circle or band between the wings.



Top view of a typical specimen with T1-T3 visible and T4-T6 obscured.

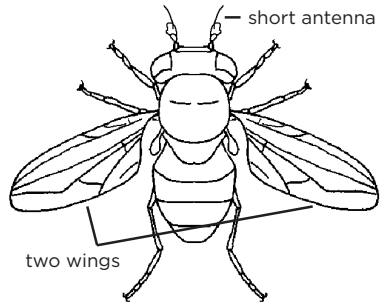
- c. Abdomen - examine the color on each tergite and whether the color band fills an entire segment or if a pattern is present instead. The colors may be black, yellow, brown, orange, red, or white.
3. Flip through the species profiles and match the features of your bee to a species in the book. Species are organized alphabetically by scientific name.
 4. To receive expert verification, upload high quality photographs of the bee to BumbleBeeWatch.org.

Distinguishing Bumble Bees from Look-alikes

When one animal resembles another living in the same locality, it is called a mimic. Mimicry is common in the insect world. A few look-alike insects that are commonly confused with bumble bees include: carpenter bees, long-horned bees, digger bees, and syrphid flies. To distinguish a bumble bee from other mimics, first assess their hind legs. Female bumble bees have a pollen basket (corbicula) that resembles a shiny, hairless concave triangle on the hind leg while other female native bees typically lack a pollen basket and instead have densely-packed long hairs (scopa) covering the hind leg or the underside of the abdomen. Carpenter bees have a shiny, near hairless abdomen, while bumble bee abdomens will be covered in hair. Bumble bees can be differentiated from flies as they have four wings while flies have two wings. Flies are not equipped with pollen-collecting structures. Flies also have much shorter antennae, often with a bristle, and more bulbous eyes that nearly touch at the top of their head.



Digger bee hind leg



Top view of fly

Syrphid Fly



Digger Bee



Carpenter Bee



Clearwing Moth

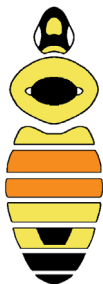


Using the Species Profiles

Species are organized alphabetically by scientific name.



Female



Male

Key features

Descriptive text to help identify each species and distinguish those with similar patterns.

SGCN icon

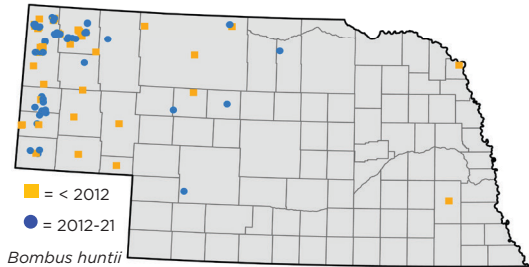
Species with this icon are included on Nebraska's Species of Greatest Conservation Need (SGCN). An SGCN is an evidence-supported rare or declining species that is in need of conservation. The Nebraska Game and Parks Commission manages the list of SGCNs and prioritizes these species when planning conservation efforts.

Color pattern diagrams

Displays the hair color of each body region, not the black exoskeleton. The diagram reflects the most common pattern observed in Nebraska, but understand that color patterns can be variable.

Yellow bar

Assists you in quickly finding species pages.



Occurrence maps

Intended to provide a sense of historical and modern distribution through confirmed observations. Maps contain collection records from Swenk M.H. and T.A. Cockerell (1907), LaBerge W.E. and M.C. Webb (1962), Golick D.A. and M.D. Ellis (2006), Richardson L.L. (2021), and the Nebraska Bumble Bee Atlas (2019-2021). These sources represent the confirmed and digitized records for Nebraska, though additional records likely exist in museum collections that have not yet been digitized. Observations presented on the maps should not be interpreted as static. As Nebraska continues to experience changes in land use and climate, the ongoing surveying of Nebraska bumble bee species within and outside of their historical range is imperative to monitoring their health.

Natural history & notes

Provides perspective on each species commonality or abundance in Nebraska, conservation status, and other information. The information in this section is from Frison T.H. (1917, 1928, 1930), Gixti J.C. et al. (2009), Medler J.T. and D.W. Carney (1963), Williams et al. (2014), and anecdotal records from the authors.

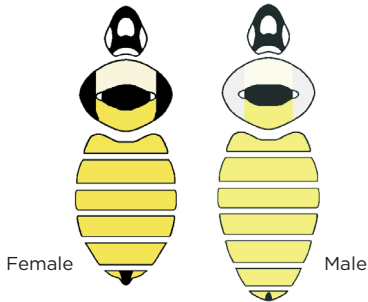
White-shouldered Bumble Bee *Bombus appositus*

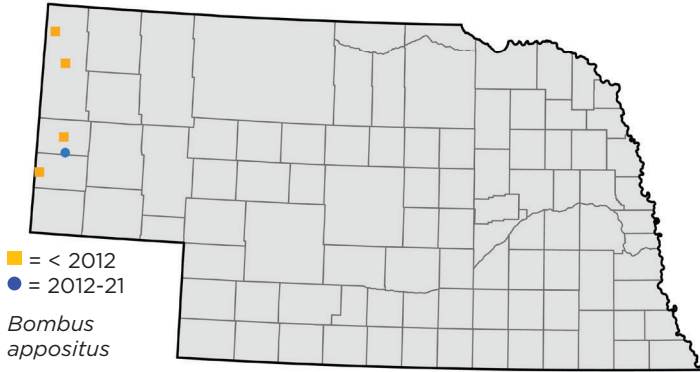


Key features

Female bees with pale yellow/white hair on face and on top of head. Thorax is yellow, pale yellow, or white, with a black band between the wings. Abdomen is golden yellow on T1-5 and black on T6. Long-faced bee. Males similar in appearance to females, though often paler.

Females are distinguishable from *B. fervidus* by (1) yellow/white hair on top of head and face (vs. black), (2) sides of thorax are predominantly black (vs. yellow), and (3) T5 is golden yellow (vs. black).





Natural history & notes:

- This species is very uncommon. It has only been observed 11 times (1908-2021) at higher elevations in Banner, Scotts Bluff, and Sioux counties.
- Nests are underground or sometimes on the surface.
- Males cluster outside nest entrances to find mates, waiting for new queens to emerge.
- Host to the nest parasite, Indiscriminate Cuckoo Bumble Bee (*B. insularis*).

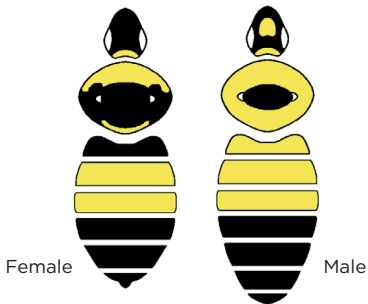
Black-and-gold Bumble Bee *Bombus auricomus*

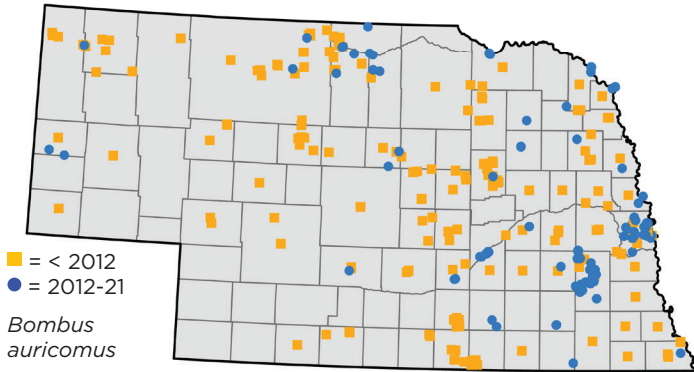


Key features

Female bees with black hair on face and predominantly yellow hair on top of head. Thorax is yellow with a wide black band between the wings; the rear $\frac{1}{3}$ of thorax may also be black or lined with a small band of yellow. Abdomen is black on T1 (sometimes with yellow patches on either side), yellow on T2-3, and black on T4-6. Males have large, bulbous eyes, otherwise similar in appearance to females.

Females are distinguishable from *B. pensylvanicus* by (1) yellow hair on top of head (vs. black), (2) if rear $\frac{1}{3}$ of thorax is yellow then there will not be black hair mixed in, and (3) T1 may be black or yellow but never equally split into $\frac{1}{2}$ black, $\frac{1}{2}$ yellow. Females are distinguishable from *B. nevadensis* by a wide black band between wings (vs. a round spot).





Natural history & notes:

- Found throughout Nebraska but observed more frequently in Eastern $\frac{2}{3}$ of NE.
- Nests on the surface of the ground.
- Males perch on tall objects to observe and then chase potential mates.
- This species forms small colonies, sometimes less than 25 workers. Workers are most commonly viewed in NE in July.
- This species has a longer tongue than many other bumble bees and can be found visiting flowers with deep corollas.

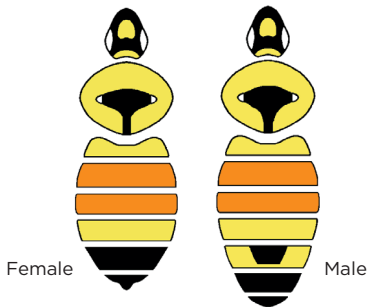
Two-form Bumble bee *Bombus bifarius*

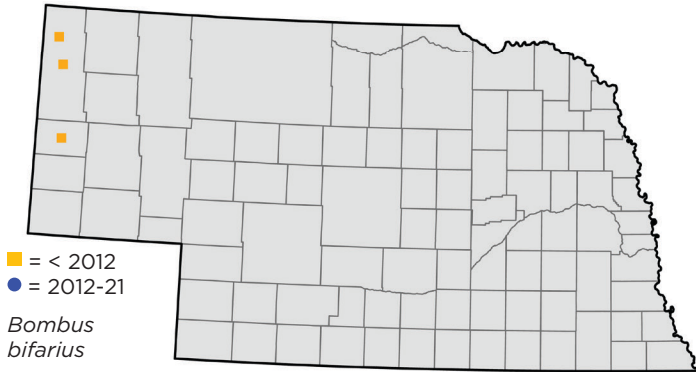


Key features

Female bees with yellow or white hair on face and top of head. Thorax is yellow or white with many black hairs intermixed, a black band between the wings, and a black triangular notch on the rear $\frac{1}{3}$ of the thorax. Abdomen is yellow on T1 (sometimes white), orange to near red on T2-3 (often with dark hair intermixed), yellow on T4, and black on T5-6. Color pattern is variable. Medium-faced bee.

Females are distinguishable from *B. huntii* by black triangular notch on the top rear $\frac{1}{3}$ of thorax (vs. lack of notch) and from *B. rufocinctus* by orange or black on T2 (vs. some yellow coloration).





Natural history & notes:

- Very uncommon in Nebraska, generally a western montane species. Observations are limited to a single record from Scotts Bluff county (1962) and two records from Sioux county (1962 and 2001).
- Nests underground, sometimes on the surface.
- Males search for mates by marking prominent objects along a path with pheromones to attract queens and patrol the path regularly.
- Host to the nest parasite, Indiscriminate Cuckoo Bumble Bee (*B. insularis*).

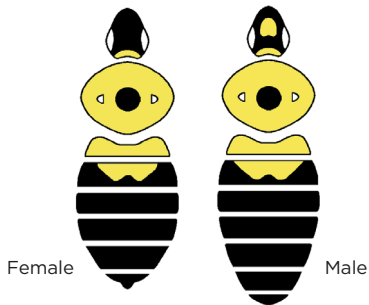
Two-spotted Bumble Bee *Bombus bimaculatus*



Key features

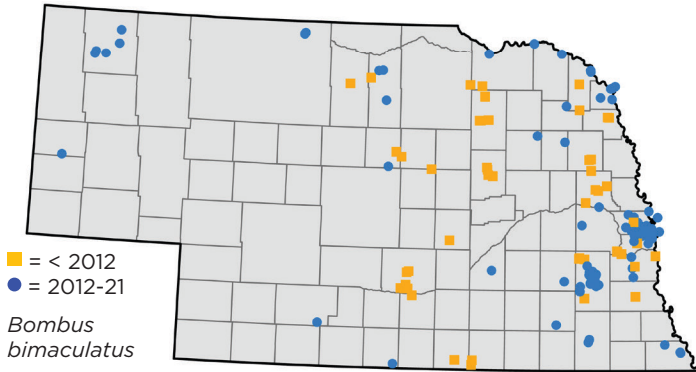
Female bees with black hair on face and yellow hair on top of head. Thorax is yellow with a round black spot between the wings. Abdomen is yellow on T1, black with two yellow patches on T2 (yellow patches resemble a “W” shape), and black on T3-6. Males look similar to females or can be extensively yellow.

Females are distinguishable from *B. vagans* by distinct “W” patch of hairs on T2; from *B. griseocollis* by (1) yellow hair on top of head (vs. black) and (2) longer overall hair length; from *B. impatiens* by yellow hair on T2 (vs. black). Males often confused with *B. vagans*, *B. bimaculatus* males often have a residual yellow “W” shape on T2 with black patches of hair on the sides.



Female

Male



Natural history & notes:

- Historically found in eastern ½ Nebraska, the Nebraska Bumble Bee Atlas brought in records from Dawes and Scotts Bluff counties suggesting this species is expanding its range west.
- One of the earliest species to emerge in spring, often April.
- Nests underground, sometimes above ground.
- Males search for mates by marking prominent objects along a path with pheromones to attract queens and patrol the path regularly.
- Host to the nest parasite, Lemon Cuckoo Bumble Bee (*B. citrinus*).

Central Bumble Bee *Bombus centralis*

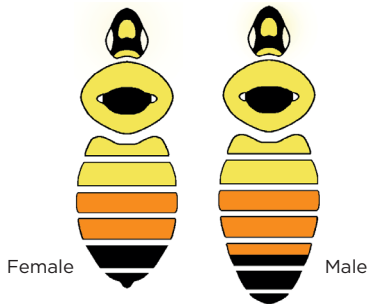


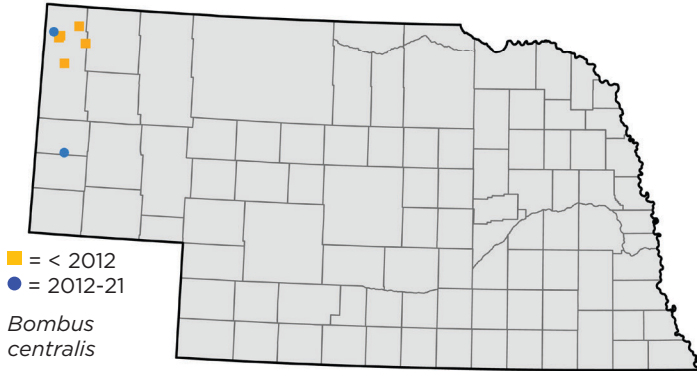
Xerces Society / Rich Hatfield

Key features

Female bees with yellow hair on face and on top of head. Thorax is yellow (with few to no black hairs intermixed) with a wide black band between the wings. Abdomen is yellow on T1-2, orange on T3-4, and black on T5-6 black. Medium-faced bee. Relatively small species.

Females are distinguishable from *B. huntii* by orange hair on T3-4 (vs. T2-3) and from *B. rufocinctus* by (1) face shape medium (vs. short) and (2) orange hair on T3-T4 (vs. orange, yellow, or black on T3-4) and (3) yellow hair on face (vs. yellow/black hair on face).





Natural history & notes:

- Very uncommon species in Nebraska. Most frequently observed in Sioux county, but few records are known from Dawes and Scotts Bluff counties.
- Nests underground.
- Males search for mates by marking prominent objects along a path with pheromones to attract queens and patrol the path regularly.
- Host to the nest parasite, Lemon Cuckoo Bumble Bee (*B. citrinus*).

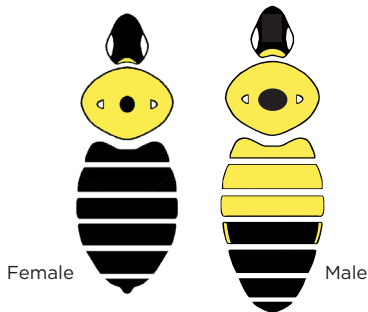
Lemon Cuckoo Bumble Bee *Bombus citrinus*

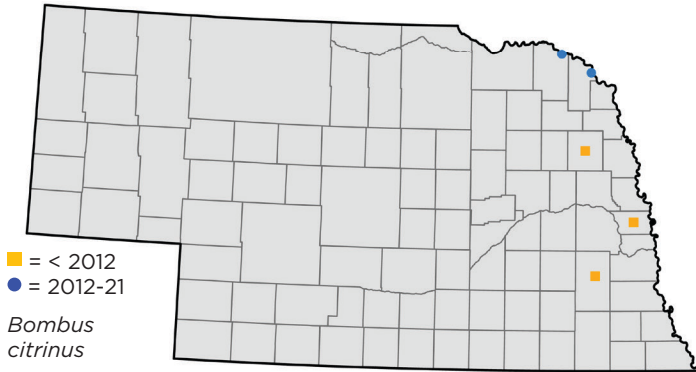


Key features

Female bees with black and/or yellow hair on face and yellow hair on top of head. Thorax is entirely yellow though there may be black hair in the center. Abdomen is predominantly bare on T1 -2 (with black hair near sides), yellow on T3 (sometimes black with yellow patches on sides or rear edge), and sparse black hair on T4-6. Color pattern variable throughout its range in eastern United States. Short-faced bee. No pollen baskets (corbicula) on hind legs.

Females are distinguishable from *B. variabilis* by (1) yellow hair on the side of thorax, (2) longer black hairs on T1-6, and (3) a short face.





Natural history & notes:

- A nest parasite to Two-spotted Bumble Bee (*B. bimaculatus*), Common Eastern Bumble Bee (*B. impatiens*), and Half-black Bumble Bee (*B. vagans*).
- Very uncommon species in Nebraska with only 6 records from Cedar, Cuming, Dixon, Douglas, and Lancaster counties.

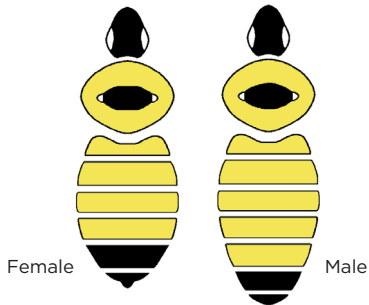
Yellow Bumble Bee *Bombus fervidus*

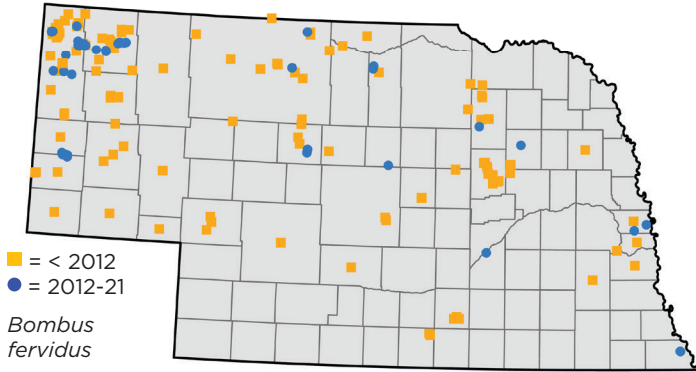


Key features

Female bees with black hair on face and on top of head. Thorax is yellow with a narrow black band between the wings. Abdomen is yellow on T1-4 yellow and black on T5-6.

Females are distinguishable from *B. appositus* by (1) black hair on face and top of head (vs. yellow), (2) the even coloration of yellow hair on the thorax and abdomen and (3) side of thorax all yellow (vs. black hair mixed in). Males are easily confused with *B. pensylvanicus*, *B. fervidus* males have yellow hair on the rear $\frac{1}{3}$ of the thorax and on the side of the thorax (vs. mixing of black and yellow hairs) and T7 is always black (vs. sometimes with orange hair).





Natural history & notes:

- Found throughout Nebraska, can be locally common.
- Typically nests above ground or on the surface but occasionally underground.
- Workers may defend their nest more vigorously than other bumble bee species, if disturbed.
- Males cluster outside nest entrances to find mates, waiting for new queens to emerge.
- Host to the nest parasite, Indiscriminate Cuckoo Bumble Bee (*B. insularis*).

Southern Plains Bumble Bee *Bombus fraternus*

SGCN



Bumble Bee Watch, Kellie Hayden

Key features

Female bees with black hair on face and on top of head. Thorax is yellow with a black band between the wings. Abdomen is yellow on T1-2 (hair very appressed on abdomen) and black on T3-6. Hair length short and even throughout. Short-faced bee. Males with large, bulbous eyes and appear to have a long abdomen. Relatively large species.

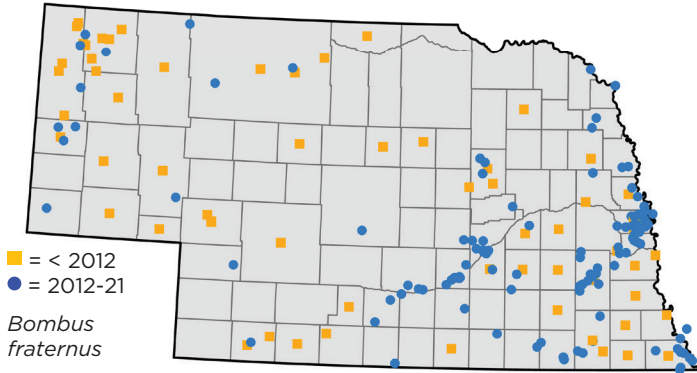
Females are distinguishable from *B. vagans* by (1) black hair on face (vs. yellow) and (2) a black band between wings (vs. black spot), and from *B. pensylvanicus* by (1) yellow hairs at rear of thorax (vs. mixing of black and yellow) and (2) T3 black (vs. yellow).



Female



Male



Natural history & notes:

- Sparsely found throughout Nebraska, can be locally common during midsummer months.
- Nebraska Bumble Bee Atlas participants added 17 new county records for this species between 2019-2021 (i.e. counties where this species was recorded for the first time).
- A species of concern across its range.
- Nests underground.
- Males pheromone-mark and perch on tall objects to observe and then chase potential mates.

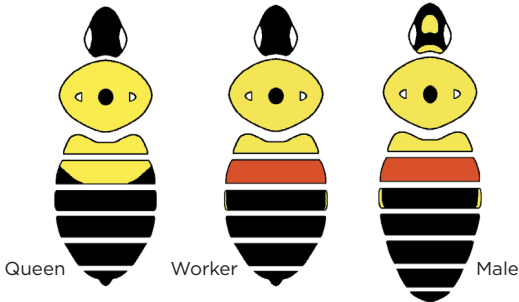
Brown-belted Bumble Bee *Bombus griseocollis*

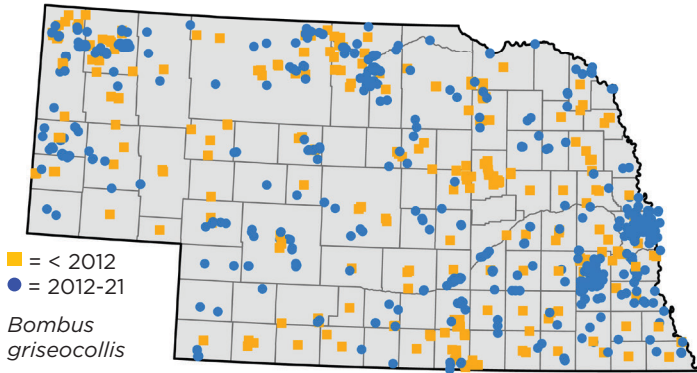


Key features

Female bees with black hair on face and on top of head. Thorax is yellow with a small black spot between the wings. Abdomen is yellow on T1, yellow or brown on T2 (band of coloration often crescent-shaped), black on T3 (workers with sparse yellow or brown hair on sides), and black on T4-6. Hair very short and even throughout. Males have large, bulbous eyes.

Females are distinguishable from *B. impatiens* by (1) black hair on top of head (vs. yellow) and (2) T2 yellow or brown (vs. black), and from *B. vagans* and *B. bimaculatus* by (1) black hair on face (vs. yellow) and (2) short, even hair (vs. long, uneven hair).





Natural history & notes:

- Consistently one of the most common species found throughout Nebraska and recorded as such from 1907 to present day.
- Males are often observed on high perches patrolling for mates during late summer and will dart out at objects (including humans) that enter their territory.
- Nests underground, occasionally on the surface.
- Males perch on tall objects to observe and then chase potential mates.

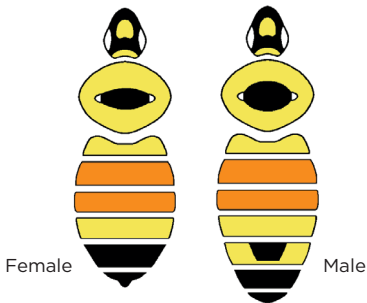
Hunt Bumble Bee *Bombus huntii*

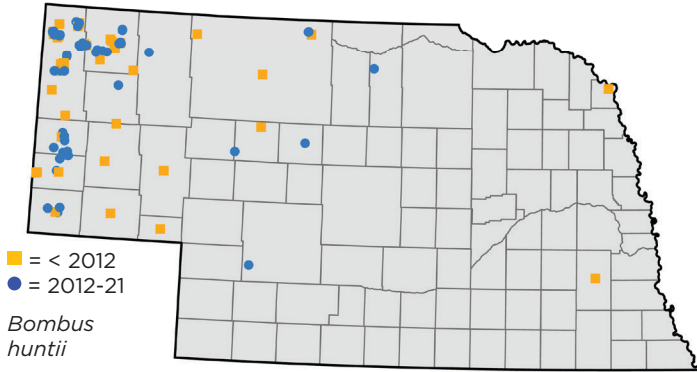


Key features

Female bees with yellow hair on face and on top of head. Thorax is yellow with a black band between the wings. Abdomen is yellow on T1, orange on T2-3 (color can fade to yellow on older individuals), yellow on T4, and black on T5-6. Medium-faced bee.

Females are distinguishable from *B. bifarius* (1) by lack of a black triangular notch in yellow band at rear of thorax and (2) by black hair on the edge of the pollen basket (vs. orange), and from *B. rufocinctus* by (1) face shape medium (vs. short), and (2) T2-3 orange and T4 yellow (vs. T2 yellow and orange/red, and T4 often with orange).





Natural history & notes:

- The most commonly observed red-tailed bumble bee in Nebraska.
- Frequently observed in the western Nebraska counties, with scattered single observations in eastern counties.
- Nests underground.
- Host to the nest parasite, Indiscriminate Cuckoo Bumble Bee (*B. insularis*).

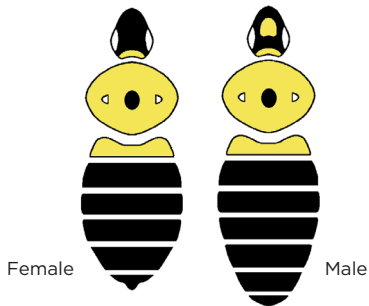
Common Eastern Bumble Bee *Bombus impatiens*

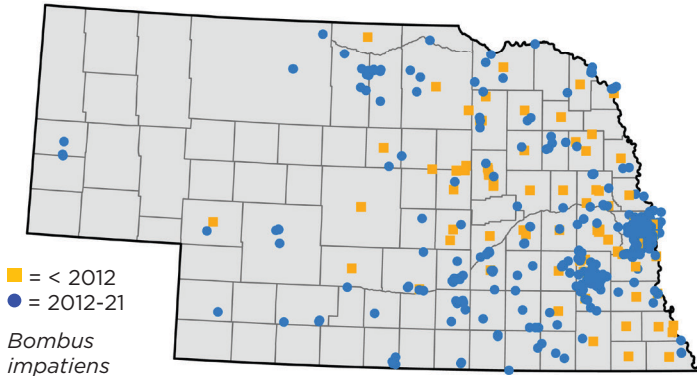


Key features

Female bees with black hair on face and yellow hair on top of head. Thorax is predominantly yellow, often with black hair intermixed (shape of mixed hair color resembles an upside down teardrop). Abdomen is yellow on T1 yellow and black on T2-6.

Females are distinguishable from *B. bimaculatus*, *B. vagans* and *B. griseocollis* by (1) lack of distinct pattern of black hair on thorax (no spot or band between wings) and (2) T2-6 all black (vs. yellow or brown on T2).





Natural history & notes:

- One of the most common bumble bees in eastern Nebraska; showing range expansion west.
- This species has a long active season and large nest size. Usually nests underground.
- Reared commercially for greenhouse pollination, research, and educational purposes. Lab-reared colonies may be detrimental to wild bumble bee populations and should be kept in an enclosed area.
- Host to the nest parasite, Lemon Cuckoo Bumble Bee (*B. citrinus*) and Indiscriminate Cuckoo Bumble Bee (*B. insularis*).

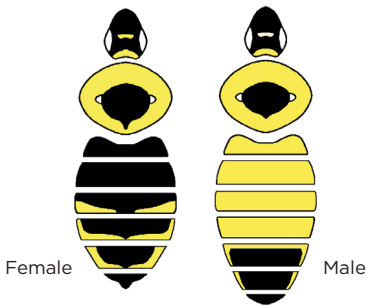
Indiscriminate Cuckoo Bumble Bee *Bombus insularis*

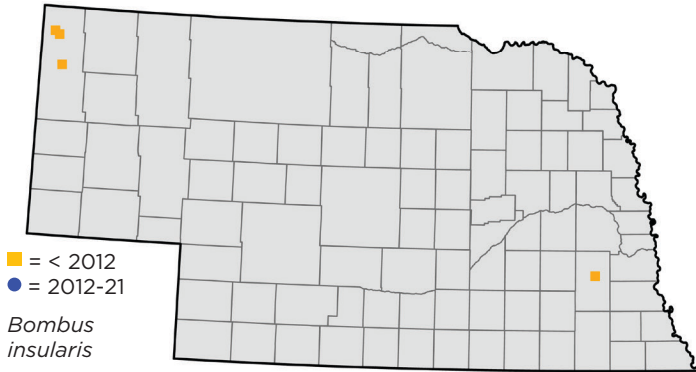


Key features

Female bees with black hair on face with yellow hair above the antennae and on top of the head. Thorax yellow with broad black band between the wings, the rear $\frac{1}{3}$ of the thorax may be black or yellow. Hair on the abdomen is predominantly black on T1-2 (sometimes with yellow hair on the sides of T2), black on T3 but often with yellow patches on the side, yellow on T4-5 with black medially, and sparse black on T6. Medium-faced bee. No pollen baskets (corbiculae) on hind legs.

Females are distinguishable from *B. suckleyi* by yellow hair on face (vs. black).





Natural history & notes:

- A nest parasite to Two-form Bumble Bee (*B. bifarius*), Two-spotted Bumble Bee (*B. bimaculatus*), Yellow Bumble Bee (*B. fervidus*), Hunt Bumble Bee (*B. huntii*), Common Eastern Bumble Bee (*B. impatiens*), Red-belted Bumble Bee (*B. rufocinctus*), and Half-black Bumble Bee (*B. vagans*).
- Very rare species in Nebraska; only 10 records exist: 1908 (8), 1962 (1), and 2000 (1).

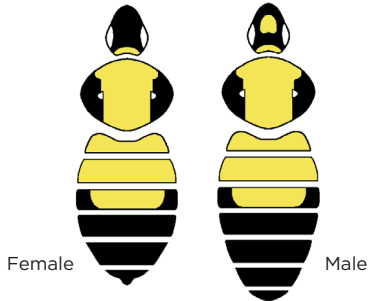
Morrison Bumble Bee *Bombus morrisoni*

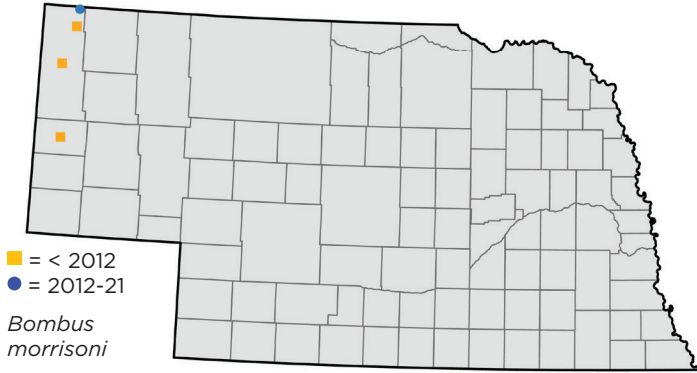


Key features

Female bees with black hair on face and yellow hair on top of head. Thorax is all bright yellow; first $\frac{1}{3}$ of the side of the thorax is yellow, then transitions to black. Abdomen is bright yellow on T1-2, bright yellow on T3 (or black with yellow medially), and if T3 with black then T4-6 black, if T3 yellow then T4 black with yellow medially, T5-6 black. Relatively large species. Males with large bulbous eyes.

Females are distinguishable from *B. nevadensis*, *B. pensylvanicus*, and *B. auricomus* by lack of black hair on top of thorax.





Natural history & notes:

- Very uncommon species in Nebraska and is experiencing decline throughout much of its range.
- Found in open, dry scrub habitat.
- Nests underground.
- Males perch on tall objects to observe and then chase potential mates.

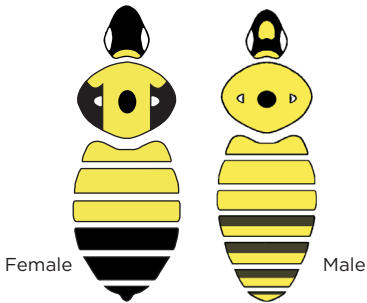
Nevada Bumble Bee *Bombus nevadensis*

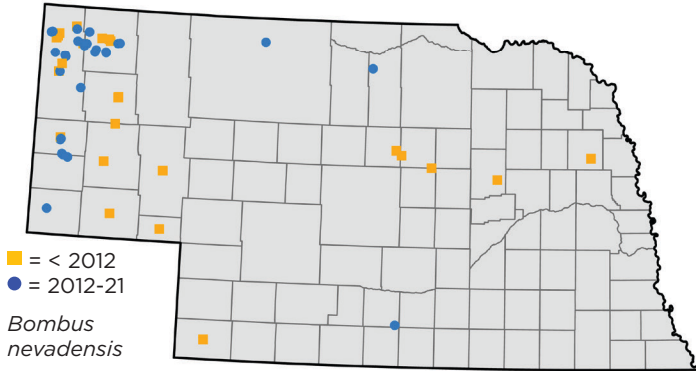


Key features

Female bees with black hair on face and top of head. Thorax is yellow with a distinct black spot in the center (yellow hairs may be intermixed in spot); the side of thorax starts yellow and transitions to black. Abdomen is yellow on T1-3 and black on T4-6. Males have large, bulbous eyes, and often orange hair on T7. Very robust species with a rectangular appearance.

Females are distinguishable from *B. auricomus* by a black spot between wings (vs. black band); from *B. vagans* by T3 yellow (vs. black); from *B. morrisoni* by black spot on thorax (vs. all yellow thorax).





Natural history & notes:

- Closely related to the Black-and-gold Bumble Bee (*B. auricomus*), the Nevada Bumble Bee becomes more common in the western $\frac{1}{3}$ of Nebraska.
- Males are often observed on high perches patrolling for mates during late summer and will dart out at objects (including humans) that enter their territory.
- Nests underground, sometimes on the surface.

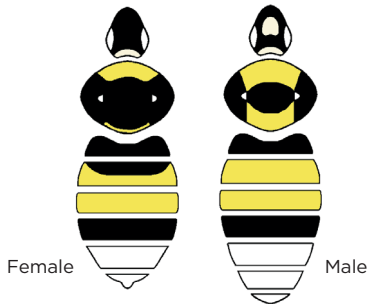
Western Bumble Bee *Bombus occidentalis*

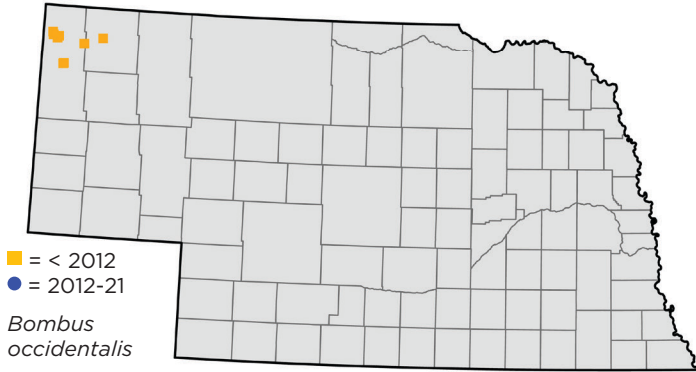


Key features

Female bees with black hair on face and on top of head, occasionally with pale hair intermixed. Thorax is predominantly black with a yellow band on the front $\frac{1}{3}$ of thorax; some individuals may have a mixed band of black and yellow hair on the rear edge. Abdomen is black on T1, partially or completely yellow on T2, yellow to pale brown on T3, black on T4, T5-6 yellow or white. Alternatively, the abdomen may be black on T1-3, white on T4-5, and black on T6. Short-faced bee.

Nebraska's only white-tailed bumble bee.





Natural history & notes:

- Uncommon species in Nebraska with collection records limited to Dawes and Sioux counties. Species has not been observed in Nebraska since 2001, despite an intentional search effort by Nebraska Bumble Bee Atlas volunteers.
- This species has been experiencing range-wide decline since the late 1990s and as of 2022 is under review by the U.S. Fish and Wildlife Service to determine if the Western bumble bee warrants protection under the Endangered Species Act.
- Nests underground.
- Host to the nest parasite, Suckley Cuckoo Bumble Bee (*B. suckleyi*).

American Bumble Bee *Bombus pensylvanicus*

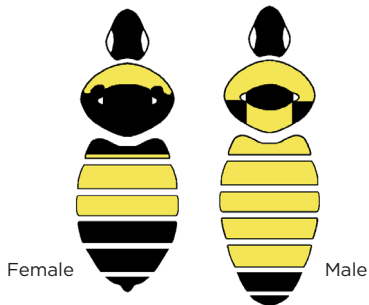


Bumble Bee Watch, Ted Kyster

Key features

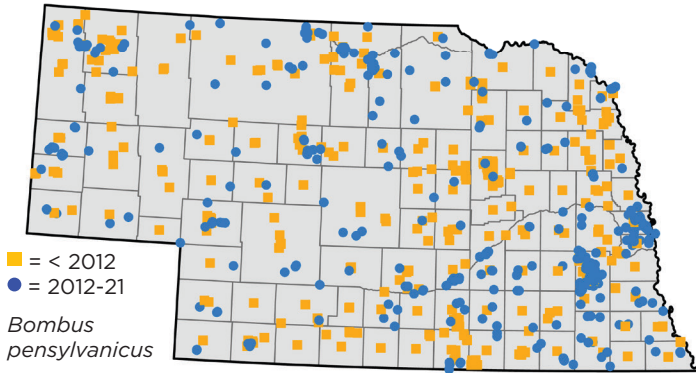
Female bees with black hair on face and top of head. Thorax with yellow band on the front $\frac{1}{3}$, remainder of thorax black though some individuals may have a mixing of black and yellow hair on the rear $\frac{1}{3}$ of thorax. Abdomen is often $\frac{1}{2}$ black, $\frac{1}{2}$ yellow on T (or just black), yellow on T2-3, and black on T4-6. Long-faced bee.

Females are distinguishable from *B. auricomus* by (1) black hair on top of head (vs. yellow), (2) if rear $\frac{1}{3}$ of thorax is yellow then there will be black hair mixed in (vs. only yellow hair), and (3) T1 may be black or yellow but often in Nebraska it is equally split into $\frac{1}{2}$ black, $\frac{1}{2}$ yellow. Males are easily confused with *B. fervidus* males as both are extensively yellow; *B. pensylvanicus* males have a mixing of black and yellow hair on the rear $\frac{1}{3}$ of the thorax and on the side of the thorax (vs. only yellow hair) and often have orange hair on T7.



Female

Male



Natural history & notes:

- The American Bumble Bee is showing a sharp decline throughout much of its range in North America. As of 2022, this species is currently under review by the U.S. Fish and Wildlife Service for protection under the Endangered Species Act.
- Frequently observed in Nebraska and has been recorded in every county. It appears to be more abundant in Nebraska than some other areas of its range.
- Nests on the surface, sometimes underground. Vigorously defends nest if disturbed.
- Host to the nest parasite, Variable Cuckoo Bumble Bee (*B. variabilis*).

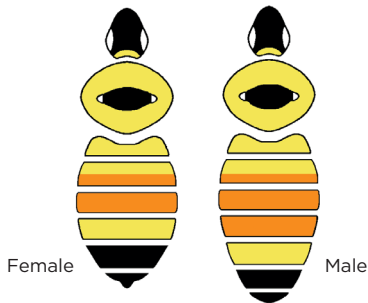
Red-belted Bumble bee *Bombus rufocinctus*

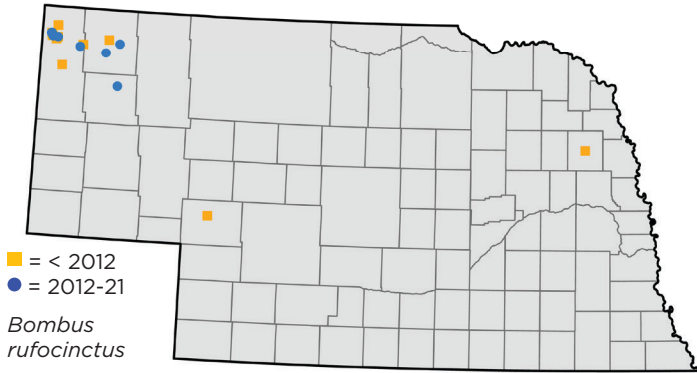


Key features

Female bees with black hair on face and yellow hair on top of head. Thorax is predominantly yellow with a black spot or band between the wings. Abdomen is yellow on T1, black, orange or red with a medial yellow crescent on T2, black, orange or red on T3 and T4, black on T5 with yellow on sides, and black on T6. Color pattern is highly variable. Males with bulbous eyes. Short-faced bee.

Females are distinguishable from *B. huntii* by (1) short face, (2) more than just orange hair on T2 (i.e. presence of black or yellow hair too), and from *B. centralis* by presence of yellow hair on T4.





Natural history & notes:

- Locally common in western Nebraska counties.
- Nests above ground or on the surface.
- Males are often observed on high perches patrolling for mates during late summer and will dart out at objects (including humans) that enter their territory.
- This species expresses a high variation in hair color pattern making it difficult to identify. The Red-belted Bumble Bee can be distinguished by their very short face.

Suckley Cuckoo Bumble Bee *Bombus suckleyi*

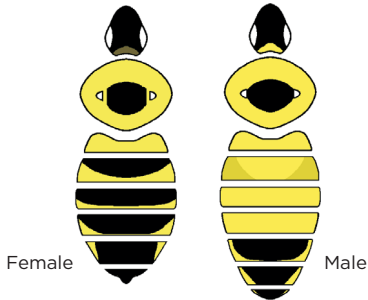
SGCN

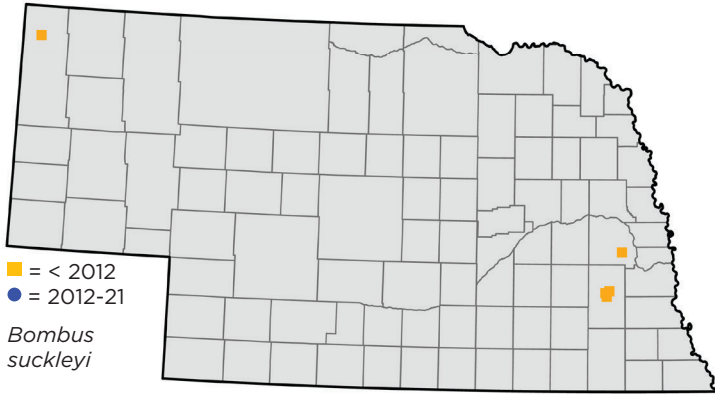


Key features

Female bees with black hair on face and top of head. Thorax yellow with a black spot or band between the wings. Hair on the abdomen is predominantly (but often sparse) black on T1-2, sparse yellow hair on sides and rear edge of T3, yellow on T4-5, and black on T6. Medium-faced bee. No pollen baskets (corbicula) on hind legs.

Females are distinguishable from *B. insularis* by black hair on head (vs. yellow).





Natural history & notes:

- Rare species of bumble bee. Only three known records in Nebraska including one from Dawes county, one from Sioux county, and one from 1892 in Lancaster county.
- A nest parasite to Western Bumble Bee (*B. occidentalis*).

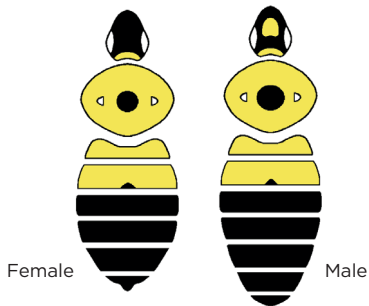
Half-black Bumble Bee *Bombus vagans*

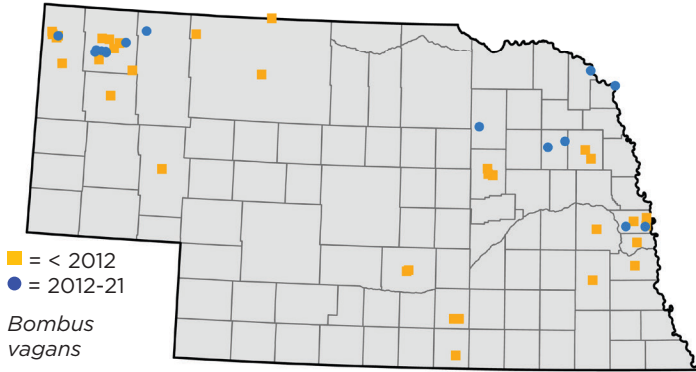


Key features

Female bees with black hair on face and yellow hair on top of head. Thorax is yellow, often with a small black patch in the center. Abdomen is yellow on T1-T2 (yellow hairs appear to swoop from the center outwards along the margin of T2/T3), and black on T3-6. Medium-faced bee.

Females are distinguishable from *B. griseocolis* by (1) yellow hair on face (vs. black) and (2) long, uneven hair on thorax (vs. short, even hair) and from *B. bimaculatus* by complete yellow band on T2 (vs. central patches of yellow). Males can be confused with *B. bimaculatus* males, *B. vagans* males often with some yellow hairs on sides of T2.





Natural history & notes:

- Most commonly observed in northwestern and northeastern regions of Nebraska, though sparsely distributed throughout.
- Observable in a wide variety of both developed and natural habitats.
- Nests underground or occasionally above ground.
- Males search for mates by marking prominent objects along a path with pheromones to attract queens and patrol the path regularly.
- Host to the nest parasite, Lemon Cuckoo Bumble Bee (*B. citrinus*).

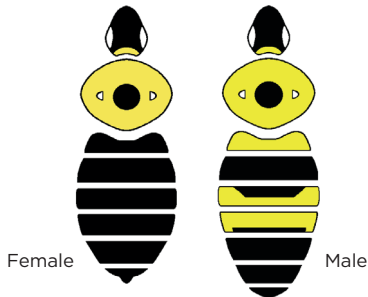
Variable Cuckoo Bumble Bee *Bombus variabilis*

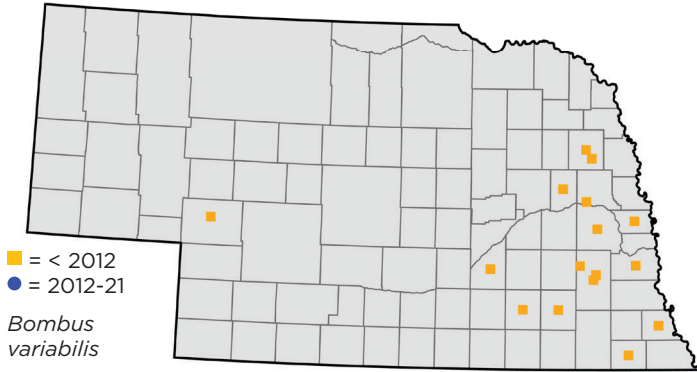


Key features

Female bees with black hair on face and yellow hair on top of head. Thorax is yellow with black patch or band between the wings. Abdomen is black on T1-6 (sometimes with patches of yellow). Hair is very short throughout the body. Medium-faced bee. No pollen baskets (corbicula) on hind legs.

Females are distinguishable from *B. impatiens* by (1) lack of corbicula and (2) black hair on T1 (vs. yellow), and from *B. citrinus* by (1) very short hair throughout the body and (2) sides of thorax are predominantly black (vs. yellow).





Natural history & notes:

- An obligate nest parasite of the American Bumble Bee (*B. pensylvanicus*).
- Considered one of North America's rarest bumble bees and has only been observed in Nebraska 8 times: 1903 (3), 1909 (2), 1986 (1), and 1999 (2).
- As of 2022, this species is currently under review by the U.S. Fish and Wildlife Service for protection under the Endangered Species Act.

Glossary

Head

Antennae — pair of segmented sensory appendages attached to the head. Female bees have 12 antennal segments, males have 13.

Compound eyes — eyes made of many facets or individual elements.

Cheek - area below compound eyes and above mandible joint.

Frons (face) — front of head, area above mouth, between compound eyes and extending to the base of the antennae.

Head — front part of the body bearing the compound eyes, ocelli, antennae and mouthparts.

Long face — cheek is longer than the width of the mandible.

Short face— cheek is shorter than the width of the mandible.

Mandible — external jaw-like mouthpart located below each compound eye.

Vertex (Top of head) — region on the top or crown of the head.

Thorax

Corbicula (Pollen basket) — a concave structure surrounded by a fringe of hair on the outer surface of the tibia, located on the hind leg of *Bombus* females.

Band of hair — a band of hairs that stretch from wing-base to wing-base.

Leg — jointed walking appendage attached to the thorax. Bumble bees have three pairs of legs: forelegs, middle legs, and hind legs.

Patch of hair — refers to a circular patch of hairs in the middle of the scutum.

Side — refers to the lateral aspect of the thorax.

Thorax — part of the body between the head and abdomen where legs and wings attached.

Abdomen

Abdomen — hind part of the body separated from the thorax by a constriction or “waist.”

Tergites — dorsal plates of the abdominal exoskeleton. Each bumble bee species has characteristic abdominal hair color patterns. Tergites are numbered in succession starting with the tergum closest to the thorax. They are designated with the letter T followed by a number; for example T1 or T2. There are six abdominal tergites in female bumble bees and seven in males.

Resources

- Cameron, S.A., J.D. Lozier, J.P. Strange, J.B. Koch, N. Cordes, L.F. Solter, and T.L. Griswold. 2011. Patterns of widespread decline in North American bumble bees. *Proceedings of the National Academy of Sciences*, 108 (2), pp.662-667.
- Frison, T. H. 1917. Notes on Bombidae, and on the life history of *Bombus auricomus* Robt. *Annals of the Entomological Society of America* 10: 277-286.
- Frison, T. H. 1928. A contribution to the knowledge of the life history of *Bremus bimaculatus* (Cresson). *Annals of the Entomological Society of America* 8: 159-223.
- Frison, T. H. 1930. A contribution to the knowledge of the bionomics of *Bremus americanorum* (Fabr.). *Annals of the Entomological Society of America* 23: 644-65.
- Golick, D.A., & Ellis, M.D. 2006. An update on the distribution and diversity of *Bombus* in Nebraska (Hymenoptera: Apidae). *Journal of the Kansas Entomological Society*, 79 (4), 341-347.
- Grixti, J.C., L.T. Wong, S.A. Cameron, and C. Favret, 2009. Decline of bumble bees (*Bombus*) in the North American Midwest. *Biological Conservation*. 142(1): 75-84.
- Hatfield, R., S. Colla, S. Jepsen, L. Richardson, R. Thorp, and S. Foltz Jordan. 2015. IUCN Assessments for North American *Bombus* spp. for the North American IUCN Bumble Bee Specialist Group.
- LaBerge, W.E. and M.C. Webb. 1962. The Bumblebees of Nebraska. *Historical Research Bulletins of the Nebraska Agricultural Experiment Station* (1913-1993). 178. University of Nebraska.
- Lhomme, P., and H.M. Hines. 2019. Ecology and evolution of cuckoo bumble bees. *Annals of the Entomological Society of America*, 112 (3), 122-140.
- Medler, J.T. and D.W. Carney. 1963. Bumblebees of Wisconsin (Hymenoptera:Apidae). *Agricultural Experiment Station, University of Wisconsin*.
- Richardson, L.L., 2021. Bumble bees of North America occurrence records database. <http://www.leifrichardson.org/bbna/html>. Data accessed 12-01-2021.
- Swenk, M.H., and T.D.A. Cockerell. 1907. The bees of Nebraska. *Entomological News*, 18 (7): 293-300.
- Williams, P.H., R.W. Thorp, L.L. Richardson, and S.R. Colla. 2014. *Bumble Bees of North America*. Princeton University Press.



Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln cooperation with the Counties and United States Department of Agriculture.

University of Nebraska–Lincoln Extension educational programs abide with the nondiscrimination policies of the University of Nebraska–Lincoln and the United States Department of Agriculture.

© Copyright by the University of Nebraska, 2022

UNIVERSITY of NEBRASKA–LINCOLN