Utah's Amazing Bumble Bees and How We Can Help Them

Amy Dolan, Xerces Society

Conservation Biologist Mountain States BBA Coordinator





Xerces Society for Invertebrate Conservation





Protecting the life that sustains us.

www.xerces.org
@xercessociety



Photos: Xerces Society/ Rich Hatfield; Xerces Society/ Stephanie McKnight (2); Ryan C. Atkins

Join the Movement

The work we do depends on everyone. Make a difference for the invertebrates that you love by becoming a Xerces member today!

xerces.org/donate

Xerces Society is a 501(c)(3) nonprofit and contributions are tax-deductible.

Photo: Xerces Society/Stephanie McKnight



Utah's Amazing Bumble Bees





Photo: T.T. Kelly

Why are bees important?



Photos: Steve Buchmann, Lance Cheuing/USDA, Xerces Society/Molly Martin

Pollination: Plant Reproduction

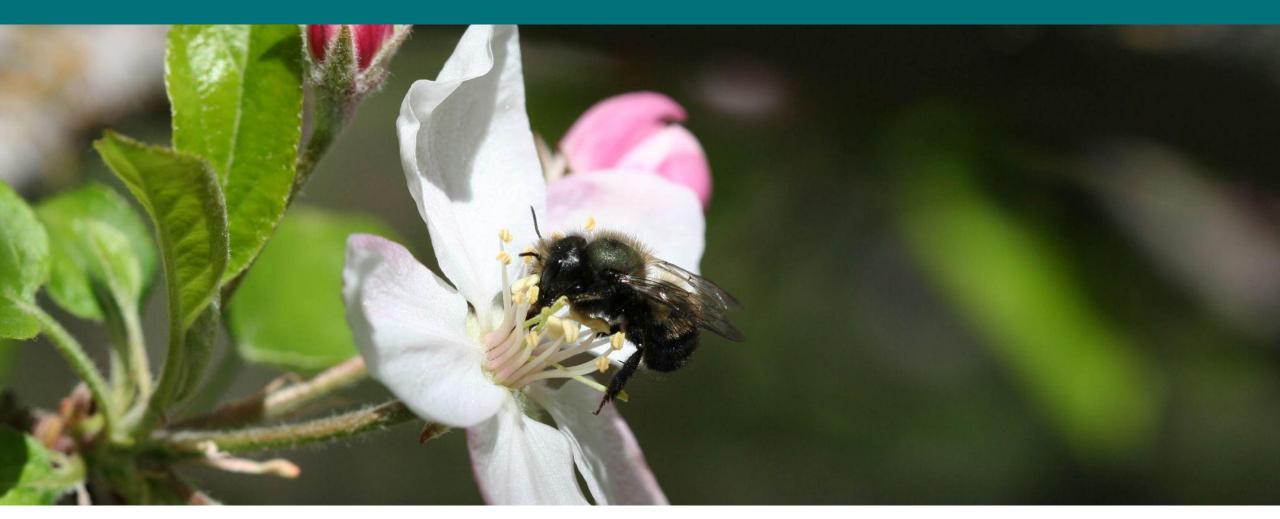


Photo: Theresa Pitts-Singer/USDA-ARS (Blue Orchard Mason bee on apple blossom)

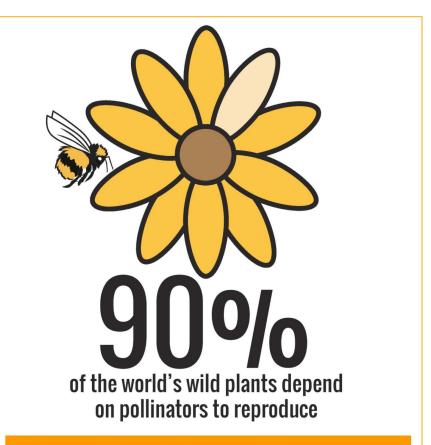
Pollimator Diversity



Why do pollinators matter? What's at stake?



Plant flowers, especially native plants, and reduce pesticide use.



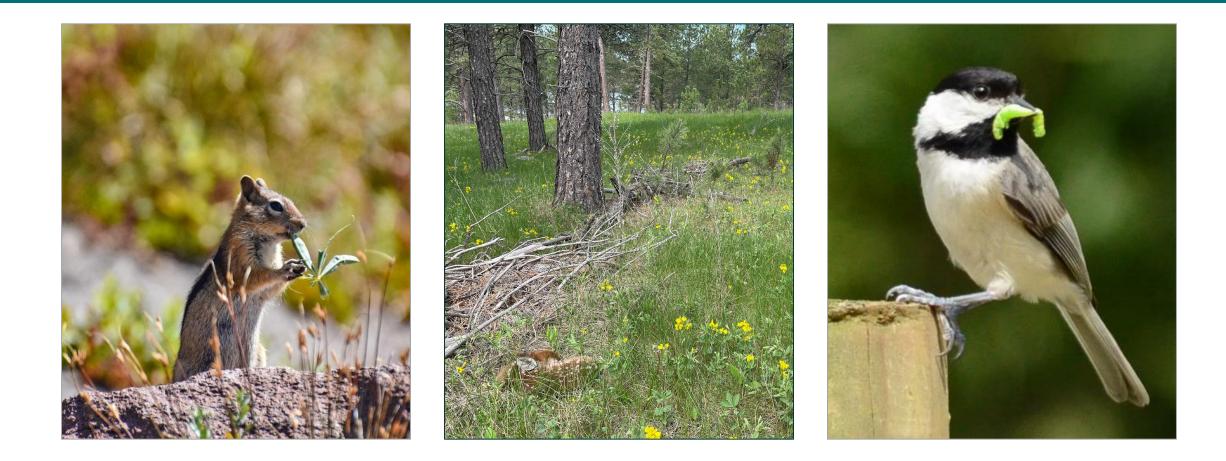
Bees and other pollinators are in decline around the world.

You can help!

Plant flowers, especially native plants, and reduce pesticide use.



Pollinators in Ecosystems Pollinators provide food and habitat for wildlife.



Pollinators: Keystone Species

Every ecosystem on earth would be drastically different without pollinators.



© The Xerces Society, Inc. All rights reserved.

Bees: Most Efficient Pollinators



- Intentionally collect/transport pollen
- Pollen-catching hairs & pollen-carrying structures

20,000+ Bee Species Worldwide 3,600+ in North America; 1,100+ in Utah



Photos: Xerces Society/Emily May; David Cappaert; Barbara Driscoll; Xerces Society/ Sara Morris (8); Xerces Society/Emily May

Order Hymenoptera: Bees, Wasps, Ants, Sawflies



Six families of bees found in North America

(Further divided into subfamily, tribe, genus, species)

Photos: Whitney Cranshaw; Xerces Society/Emily May; Jason King/Flickr Creative Commons; Xerces Society/Katie Lamke; Jack Dykinga/USDA-ARS; USGS-BIML

Bumble Bees: Family Apidae; Genus Bombus



Photos: BumbleBeeWatch.org

~250 species worldwide

~50 species in North America

At least 19 species in Utah

6 species in GSENM (2000-2003)

Most diverse in cool, montane environments.

Bumble Bee or Honey Bees?

Both:

Excellent pollinators | Family Apidae

Pollen basket on hind leg | Colonies

Bumble Bees

Honey Bees



Photo: Leah Lewis

- Approximately 50 species in the U.S.
- Native
- Wild
- Excellent pollinators of native plants and crops
- 25% of NA species have been shown to be in decline.

- One species in the U.S.
- Not native to North America
- Managed hives
- Hugely important in U.S. agricultural practices
- Not endangered; 2.7 million hives in the U.S. in 2023



Photo: David Cappaert

Why Bumble Bees?

Charismatic and easily recognizable Interesting and unique adaptations Active from early spring until late fall

Populations are known to be in decline Actions that benefit bumble bees will help other pollinators too



Photos: Xerces Society/Amy Dolan (2); Xerces Society/Mace Vaughan; Bumble Bee Watch/Vyvyan Brunst

Bumble Bee Biology & Adaptations





Photos: Kent McFarland/Flickr; David Cappaert

Bumble Bee Life Cycle

Eusocial colony: One queen, multiple worker generations

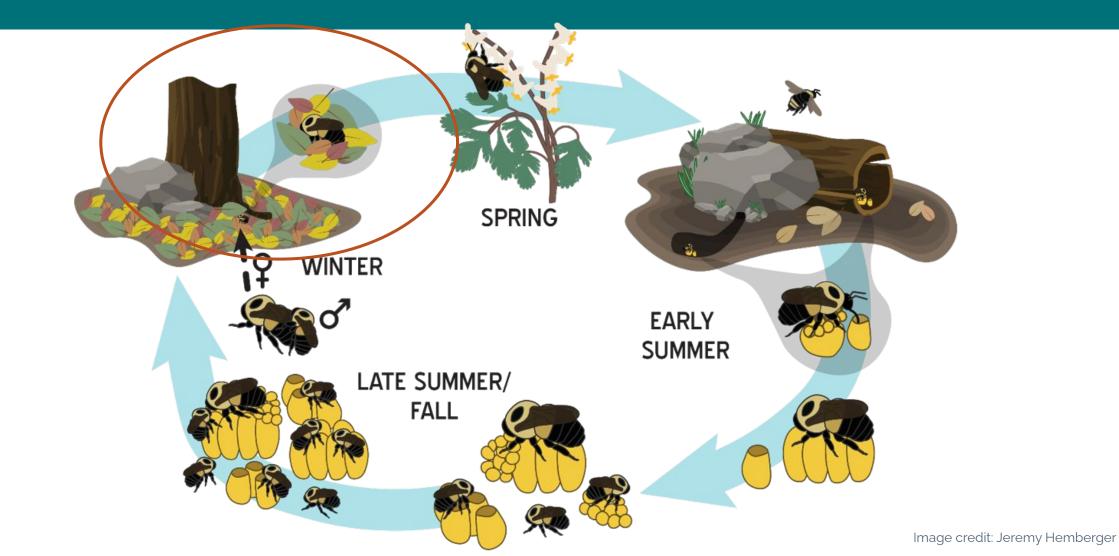
Egg-Larva-Pupa-Adult

Nest in abandoned cavities, often underground

Typical foraging distance: 275-750 meters (up to ½ a mile)



Christa R., Flickr (CC BY-NC 2.0)



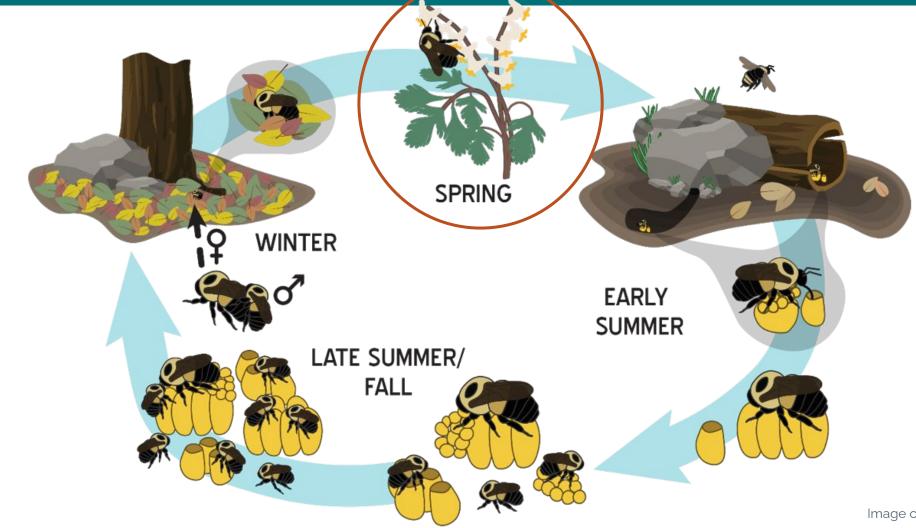
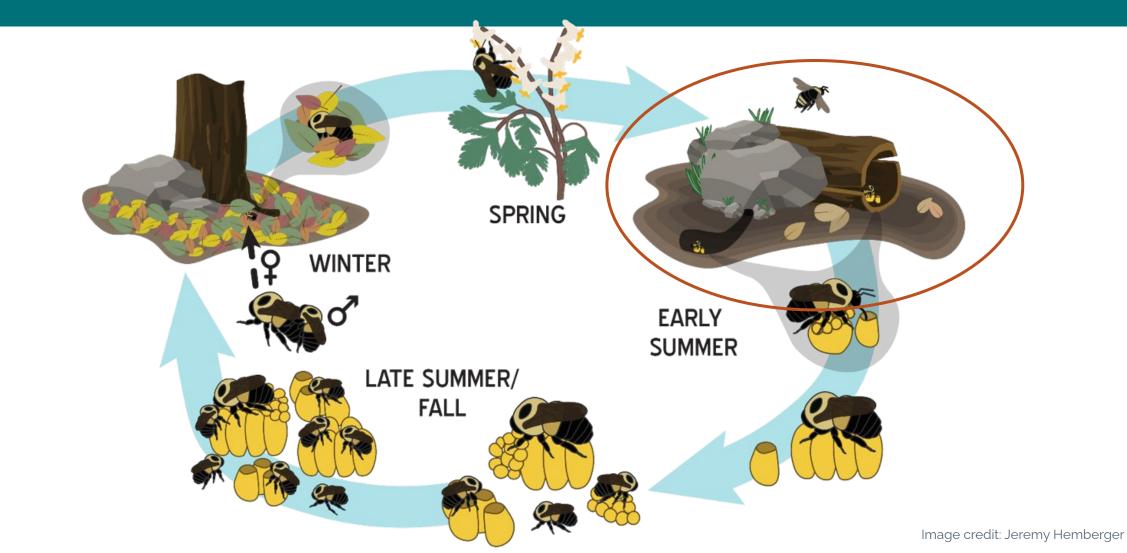
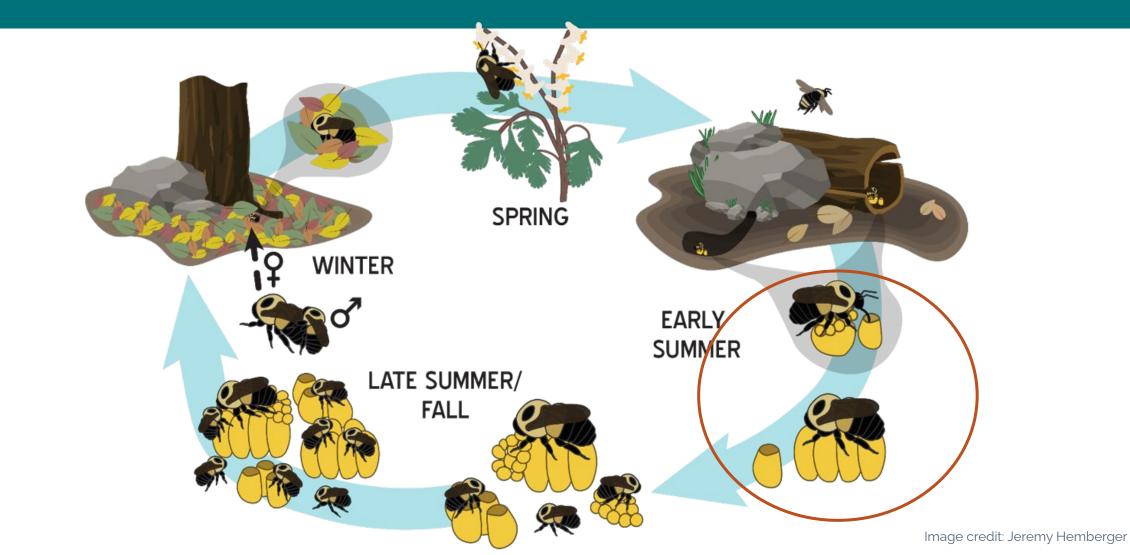
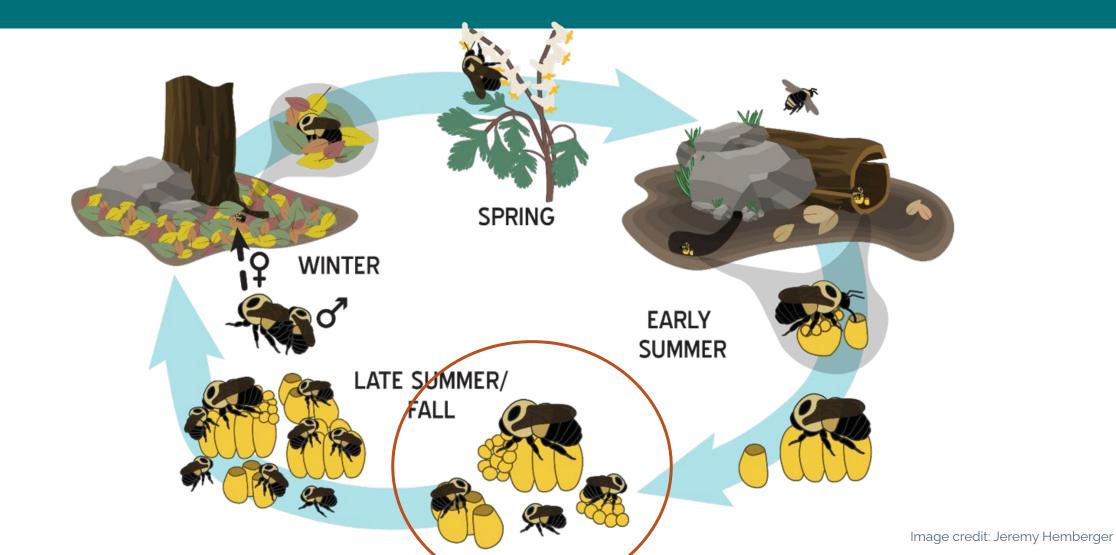


Image credit: Jeremy Hemberger







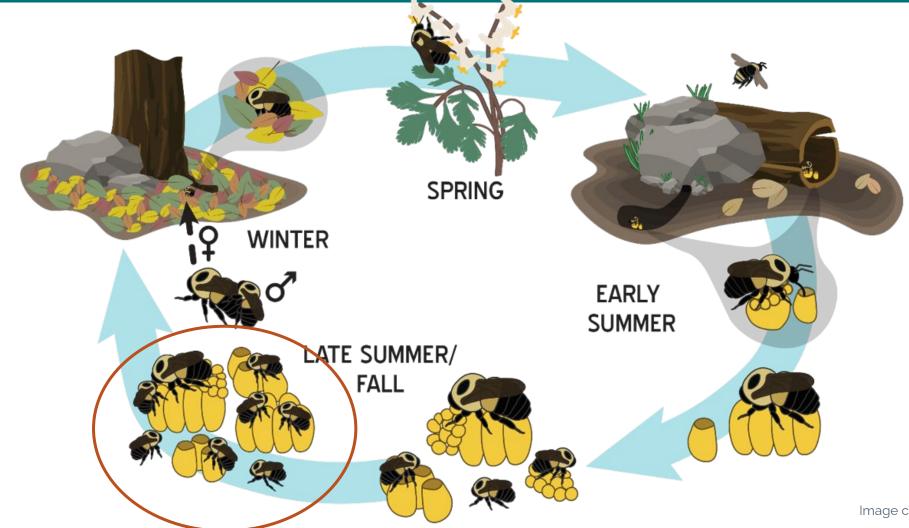


Image credit: Jeremy Hemberger

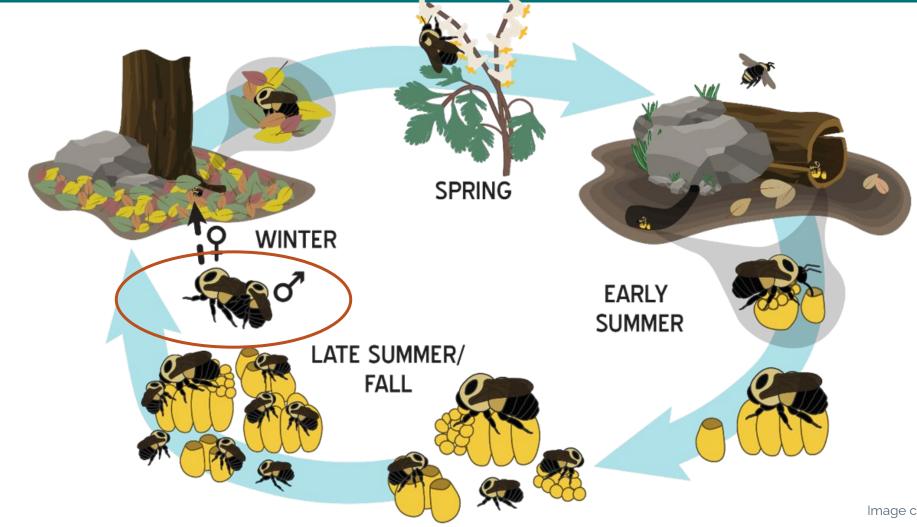
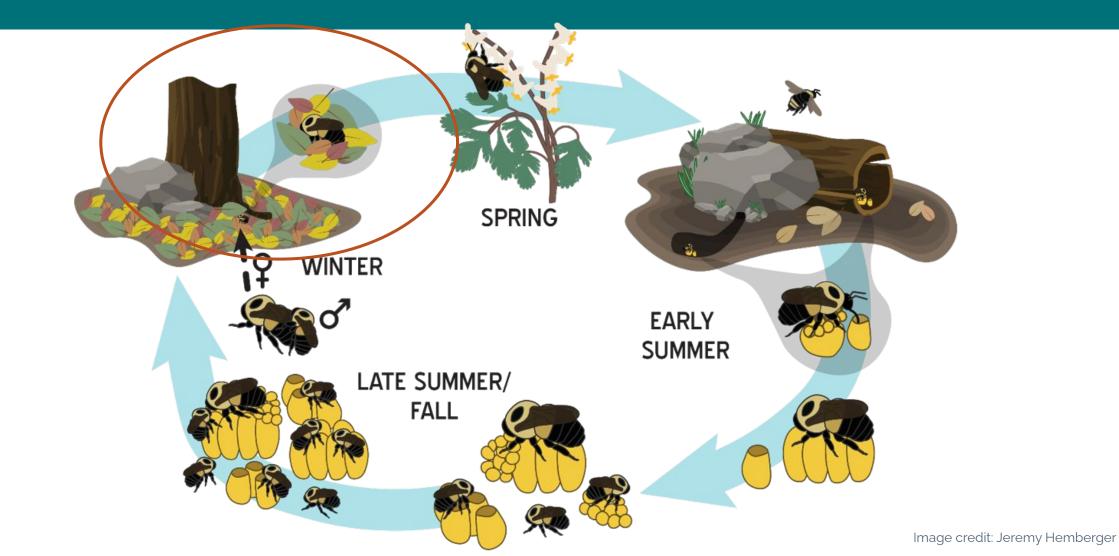


Image credit: Jeremy Hemberger



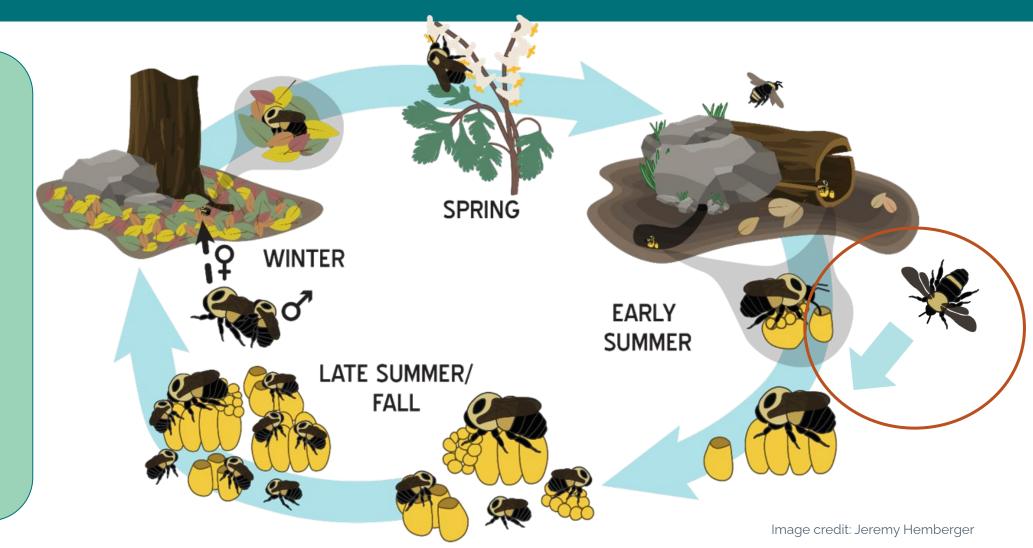
Cuckoo Bumble Bees: Social Parasites

Emerge later than most bumble bees

Usurp/kill host queens

Trick host workers

No workers: only queens & males



Cuckoo Bumble Bees

Characteristics:

- Thick head/mandibles
- Extra-thick exoskeleton
- Strong stingers
- No pollen basket

Species with ranges in Utah

- Indiscriminate cuckoo bumble bee (Common)
- Fernald cuckoo bumble bee (Uncommon)
- Suckley cuckoo bumble bee (Rare -CR)



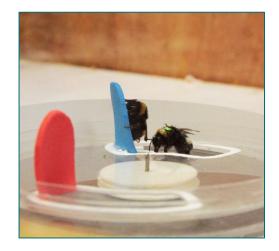
Other Unique Adaptations

Thermoregulation

Social learning & play

Buzz pollination







Photos: Xerces Society/Katie Lamke; Alice Bridges (CC-BY 4.0); Smithsonian channel

Bumble Bee Conservation Concerns

Conserving Bumble Bees

Guidelines for Creating and Managing Habitat for America's Declining Pollinators



Rich Hatfield, Sarina Jepsen, Eric Mader, Scott Hoffman Black, and Matthew Shepherd





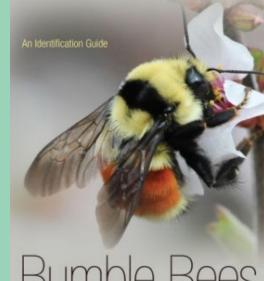
BUMBLE BEE CONSERVATION

A Guide to Protecting Our Vital Pollinators

Bumble bees are an essential part of our wildlands, farms, and urban areas, yet many species are suffering alarming population declines. It is critically important to protect these vital pollinators.

There are simple things you can do to protect or create high-quality bumble bee habitat. Typically, these efforts do not involve significant increases in cost or work, but do require increased awareness and attention to the needs of bumble bees.

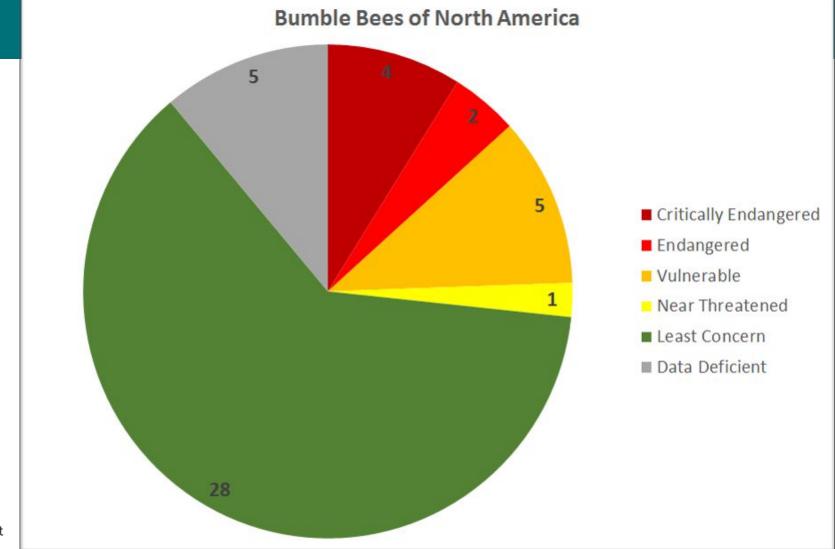
Inside you'll find an overview of information about how to enhance any landscape to meet the seasonal needs of bumble bees.



IMDIE BEES of North America

Paul Williams, Robbin Thorp, Leif Richardson & Sheila Colla

Bumble Bee Populations Are At Risk



Data from IUCN Red List

Species of Concern in Utah





Western Bumble Bee (VU) American Bumble Bee (VU) Morrison Bumble Bee (VU) Suckley Cuckoo Bumble Bee (CR)





Photos: Xerces Society/Amy Dolan; Barbara Driscoll; Xerces Society/Amy Dolan; Bumble Bee Watch/Vivian Brunst

Threats...



- Habitat loss and fragmentation
- Pathogens from commercial bees
- Pesticides

- Competition from commercial bees
- Climate change

Photos: Xerces Society/Matthew Shepherd; Xerces Society/Eric Mader; Keith Weller; Xerces Society/Emily May; Yale School of Environment

Good News: Everyone Can Help!



Provide habitat (& connectivity) for nesting & overwintering

Rethink pesticide use

Share what you know with others



Photo: Xerces Society/Sara Morris

Feed the Bumble Bees

Native Plants for Pollinators & Beneficial Insects: $S_{\text{west}}^{\text{outh}} - AZ \bullet CO \bullet NM \ Plateaus$



Resources

Pollinator Conservation Resource Center:

xerces.org/pollinator-re

BringBackthePollinators.org

Reducing Pesticide Use & Impacts:

- Bring Back The Pollinators:

xerces.org/pesticides

Plant Selection

These plants are attractive to a diversity of pollinators, providing pollen and next to bese, butterflies, likes, bettles, ways, and noths. Some plants provide additional resources as caterpillar host plants or nesting sites and nesting materials for above ground nesting bess. Many support specialist bess that require pollen from specific plants to survive and supplement beneficial insects that can help control pests of ornamental and crop plants. These plants are native to this region—determine if a species is native in your area at plants, useda.gov_and can be used to create or enhance pollinator habitat across runt and urban landscapes.

When purchasing plants, let your local garden center or nursery know you want plant material free of pesticides that may harm pollinators.

| COMMON NAME | BLOOM | LIFE | FORM | SUN | SOIL | ADDITIONAL DETAILS |
|----------------------|---|---|---|---|---|-------------------------|
| Showy milkweed | May-Sep | P | 0 | 0 | M | L 9 8 4 8 |
| Horsetail milkweed | Ja. | P | 0 | 0 | D | LOB |
| Algerita | FED-JUN | P | | 00 | D | LO |
| Side-oats grama | Jui See | P | * | 00 | M | LAO |
| Fendler's ceanothus | Juw-Ju | P | | 0 | D | 140 |
| New Mexico thistle | Mar | B/P | 0 | 0 | M | F=0.4468 |
| White prairie clover | MAY-SEP | P | 0 | 0 | D | ****® |
| Bare-stem larkspur | Mu-Ma | P | 0 | 0 | D | |
| Spectaclepod | Man-Au | A | 0 | 0 | D | |
| Rubber rabbitbrush | Aug-Oct | P | • | 0 | D | L#9 # 8 |
| Spreading fleabane | APR-OCT | в | 0 | 6 | D | 140 |
| James' buckwheat | Jun-Oct | P | | 0 | D | 140 |
| | Horsetall milkweed Algerita Side-cats grama Fendler's ceanothus New Mesico thistle White praite clover Bare-stem larkspur Spectaclepod Aubber rabbithrush Spreading fleabane | Horsetall milkweed Ja. Algerita Fia-Jun Side-cats grama Jaio Sie Fendler's coanothus Jan-Ja. New Mexico thistle Mw White praite Gover Mw-Siz Bare-stem larkspur Mw-Mur Spectaclepod Mw-Jas Rubber rabbithnuth Aus-Oct Spreading fleabane Air-Oct | Horsetal milkweed Ja. P Algerita Fia-Jui P Side-cats grama Jax-Sa P Fendler's conothus Jax-Jui P New Mexico thistle Mer B P White praite cover Mex-Sa P Bare-stem larkspur Mex-Mar P Spectaclepoid Mix-Jai A Bubber rabbithrush Aux-Oct P | Horsetail milkweed Ja. P Q Algerita Fies-Jan P Side-oats grama Jan-See P Fendler's coanothus Jaw-Iak P New Mexico thistle Mer B / P Bare-stem larkspur Mer-Sar P Spectaclepod Mer-Sar A Subber rabbithough Ausc-Oct P Spectaclepod Reabane Av-Oct B | Horsetail milkweed Ja. P Q Algerita Algerita Fia-Jun P Q Q Q Side-cats grama Ja-Sa P Q Q Q Fendler's canothus Jae-Ju P Q Q Q New Mexico thistle Mw B / P Q Q Mite praite clover Mw-Sar P Q Q Bare-stem larkspur Mw-Mw P Q Q Spectaclepod Mw-Jak A Q Q Rubber rabbithush Auc-Oct P Q Q | Horsetal milkweed Ja. P |



Recommended Plants for Pollinators & Beneficial Insects

California Deserts ජ Southern Nevada



Plant Selection

The plants on this list are recommended for use in pollinator habitat restoration and enhancement projects in urban, rural, natural, and agricultural landscapes. These species have been selected because they are attractive to a diversity of different bee species and provide pollen and nectar resources throughout the season, provided that a minimum of three different plant species from esch blooming period (early, mid, and late season) are selected. A majority of plants recommended are native, drought tolerant, easy to establish, and don't serve as alternative hosts to crop pestor of diseases.

Native Species for Pollinators and Beneficial Insects

| SCIENTIFIC NAME | COMMON NAME | BLOOM | LIFE | FORM | SUN | WATER | SOILTEXTURE | ADDITIONAL DETAILS (1) |
|----------------------------|-------------------------|-----------|------|------|-----|-------|-----------------|------------------------|
| Asclepias fascicularis | Narrowleaf milkweed | Mid-Late | P | F | * | M | Any | WL S+8 |
| Asclepias subulata | Rush milkweed | ENRY-LATE | P | F. | \$ | L. | Material Covers | WL . |
| Atriplex canescens | Fourwing saltbush | EARY-MID | p | W | - | L. | ANY | 1.40 |
| Baccharis salicifalia | Mulefat | EARY-MD | PP 1 | W | * | M-H | Ani | WL+ |
| Baileya multiradiata | Desert marigold | EARY-MID | A.P | F | 0 | L | Micrum-Covest | |
| Chilopsis linearits | Desert willow | Mo | P | W | \$ | L | Anti | XL+400 |
| Encella actoni | Acton encelia | EARLY-MID | 4 | F | - | L. | COARSE | L |
| Encella farinosa | Brittlebush | EARY-MD | P. | F. | 0 | Ł | COVER | * |
| Epilobium canum | California fuchsia | LASS | 4 | F | 0 | L | Arev | 100 |
| Ericometia nauseosa | Rubber rabbitbrush | Lette | h | F. | 0 | L. | COVER | WL 0+ |
| Erioganum fasciculatum | California buckwheat | Min-Lars | 4 | F | 0 | L | Aser | L & + ® |
| Eriogonum umbellatum | Sulphurflower buckwheat | Mo-Last | p | F | 0 | L | Cover | WL S+ BR |
| Eriophyllum confertifiorum | Golden yarrow | EARLY-MID | P. | F | 0 | M | Arer | 1. 18 8 |
| Eschscholzia californica | California poppy | EARY-MD | A, P | F. | * | L | Ani | L * * * |
| Fouquieria splendens | Ocatillo | EABLY | P | 5. | 0 | L | COARSE | 1.0 |
| Hyptis emoryl | Desert lavender | EAR/-MD | h | F. | 0 | L. | COVER | L+® |
| Keckiella antimhinoides | Chaparral beard tongue | Mo | ą. | W | 0 | L | Arer | + |
| Lamea tridentata | Creosote bush | Ma | P | W | 0 | L | COVER | 1.+ |



Native Plants for Pollinators & Beneficial Insects: $Great \ Basin$



Plant Selection

Agasta Amelan

Artemis Ascleph Atriplex Bacchar Balsame Berberis Chamer Chamer Chamer Chamer

These plants are attractive to a diversity of pollinators, providing pollen and nectar to bese, butterflies, files, beetles, wasps, and moths. Some plants provide additional resources as caterpillar host plants or nesting sites and nesting materials for above-ground nesting bese. Many support specialist bees that require pollen from specific plants to survive and supplement beneficial insects that can help control pests of ornamental and crop plants. These plants are native to this region—determine if a species is native in your area at <u>plants.usda.gov</u>—and can be used to create or enhance pollinator habits across rural and urban landscapes. Resources Pollinator Conservation Resource Center: xerce.org/pollinator-resource-center

verses.org.polimator-resource-center
 ve. Bring Back The Pollinators:
 <u>BringBackthePollinators.org
 ve. Reducing Pesticide Use & Impacts:
 xerces.org/pesticides
 </u>

When purchasing plants, let your local garden center or nursery know you want plant material free of pesticides that may harm pollinators.

| TIFIC NAME | COMMON NAME | BLOOM | LIFE | FORM | SUN | SOIL | ADDITIONAL DETAILS 00 |
|---|-----------------------------|-----------------------|------|---------------------|--|--------------------------------|---|
| sche urticifolia* | Nettleleaf giant hyssop | Mar-Oct | P | ۵. | 00 | M | ** * ® |
| nchier alnifolia / utahensis | Saskatoon serviceberry | Mar-Ju. | P | 40 | 00 | D | LOV® |
| isia tridentata | Big sagebrush | Mar-Ja | Р | | Ó | D | LOK |
| las speciosa* | Showy milkweed | MAY-JUL | P | 0 | 00 | м | L |
| x canescens | Fourwing saltbush | Fin-Ju. | Р | | 00 | D | LOW |
| vis salicifolia | Mulesfat | Fig-Are | Р | | 00 | M-W | L |
| orhiza sagittata | Arrowleaf balsamroot | Fiz-Jui | Р | 0 | 0 | D | L-+ 0 * |
| s repens | Creeping barberry | Fig-Arg | Р | | | D | L * 8 |
| ebatiaria millefolium | Fernbush | Mar-Oct | Р | | 00 | D | LŦ |
| rion angustifolium | Fireweed | Aug-Oct | Р | 0 | 0 | W | LOS |
| thamnus viscidiflorus* | Yellow rabbitbrush | FEB-APR | P | 0 | 00 | D | L¥* |
| is ligusticifalia | Western white clematis | Fia-Oct | Р | 2 | 00 | M-W | LO |
| Cânnual Sas: Dy ★ Staff Bernial Moint Asean Derennial Moint | Form: 8 Forb & Sedge & Vine | Suic () Ful () Fai | - | Aso'L & Denale # | Lanalhot (b Supports sp Attracts ben | ulterfly, molt scialist bee | i) 'Bumble 💕 Nest materi ber plant 🌰 Nest thatch |



Nesting & Overwintering Habitat

Nesting & Overwintering Habitat for Pollinators & Other Beneficial Insects

STEPS TO CREATE NESTING & OVERWINTING HABITAT: Save the status Laws the Lawes Romen the "respect" Law Romen tow "tou use MALCH Save a save and "ruant" a Log Buildo a strick mea Buildo a strick means source Buildo a strick means source



Ecose 1: By selecting native plants and managing habitat purposefully, even small wildflower plots (left) can provide high-quality overwintering habitat to pollinators and beneficial insects, like these small carpenter bees hibernating in a pithy stem (right).

Moving Beyond Flowers

While flowering plants provide pollinators with food, insects also require suitable shelter for nesting and overwintering. Most bees and wasps create small nests beneath the soil or within dead plant stems or cavities in wood. Other beneficial insects such as butterlikes, wasps, moths, fireflies, lady beetles, and ground beetles seek shelter in places that offer protection from predators and the elements, such as leaf litter and brush placs. practices rarely leave enough natural resources to support pollinators and other wildlife. This guide focuses on a variety of natural nesting habitatif features that can be readily incorporated into most landscapes. Compared to artificial nesting options such as bee blocks and bee hotels, natural nesting habitat features often better minic the natural nest site density of insects, and also break down naturally with time, limiting disease and parasite issues. Moreover, natural nesting features often provide multiple conservation benefits. An appropriately managed wildflower planting, for example, can provide nesting sites, pollen, and nectar for bees, host plants and overwintering habitat for butterflies; and abundant food for songbirds.

Our Bring Back the Pollinators campaign is based on four principles:

BRING BACK

POLLINATORS

2. Protect and provide bee nest sites and caterpillar host plants;

1. Grow a variety of pollinator-friendly flowers:

You can participate by taking the Pollinator Protection Piedge and

registering your habitat on our

nationwide map at:

www.bringbackthepollinators.on

4. Spread the word!

3. Avoid using pesticides, especially insecticides; and

The More, The Better The primary habitat features used by pollinators and other

insects for shelter include stems and branches of trees, shrubs, and wildflowers; leaf litter; undisturbed ground; bare ground; dead wood, brush piles; and rock piles. Retaining and incorporating as many of these features as possible into your landscape (rather than "cleaning" them away) will help attract and support a diversity of bees and other beneficial insects.

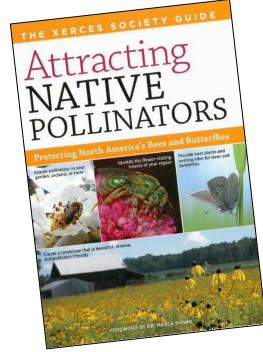
Why Natural Is Best

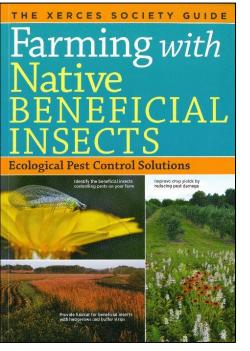
The availability of nesting and overwintering habitat is one of the most important factors influencing populations of native bees and other beneficial insects. Yet, traditional landscaping

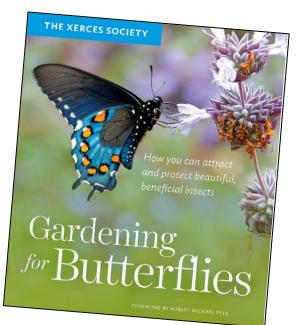


- Save the stems
- Leave the leaves
- Redefine the "perfect lawn"
- Rethink how you use mulch
- Save a snag and "plant" a log
- > Build a brush pile
- Build a rock pile or rock wall
- Provide a safe water source
- > Install a habitat sign

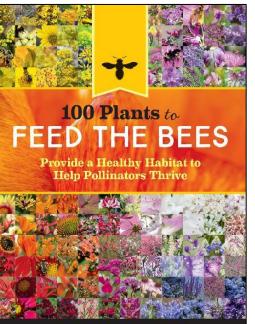












THE XERCES SOCIETY

BUMBLE BEE ATLAS

LEARN CONTRIBUTE CONSERVE

Visit <u>BumbleBeeAtlas.org</u> to learn more

Helping bumble bees on a larger scale...

Before we can help bumble bees, we need to know where they are, which habitats they're using, and what flowers they're depending on.





MOUNTAIN STATES BUMBLE BEE ATLAS

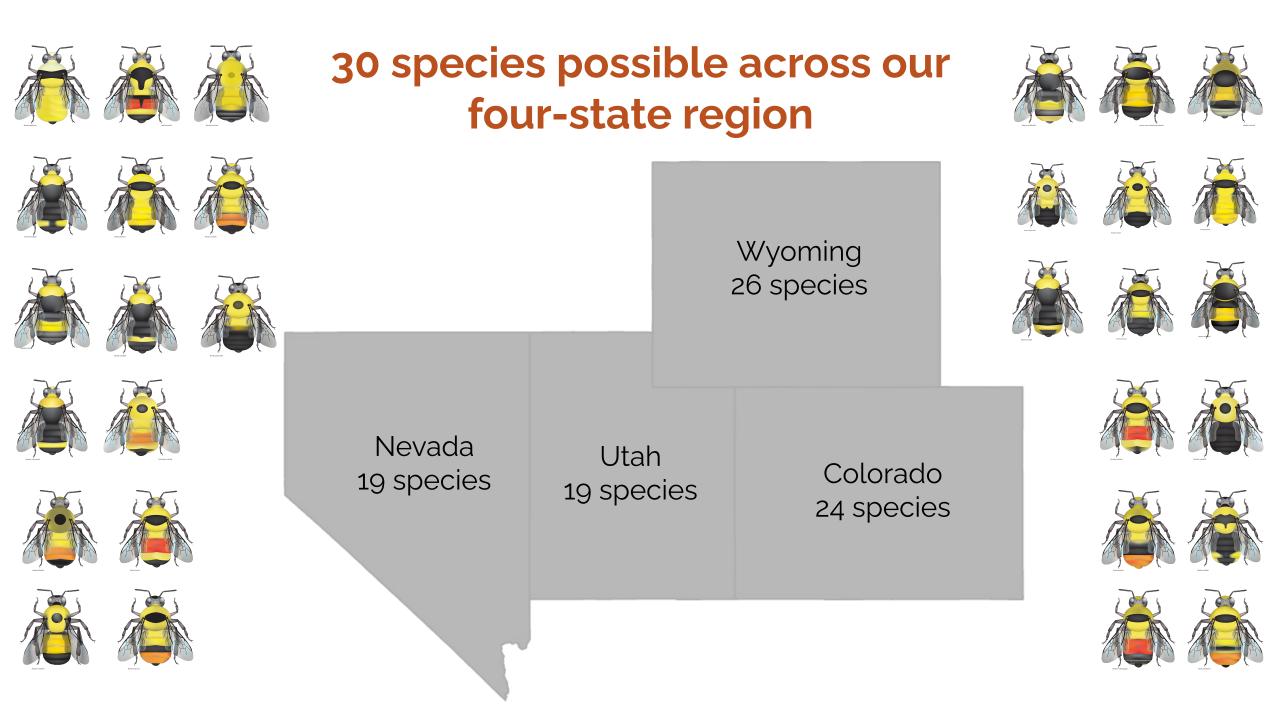
Colorado | Wyoming Utah | Nevada

Launched 2024

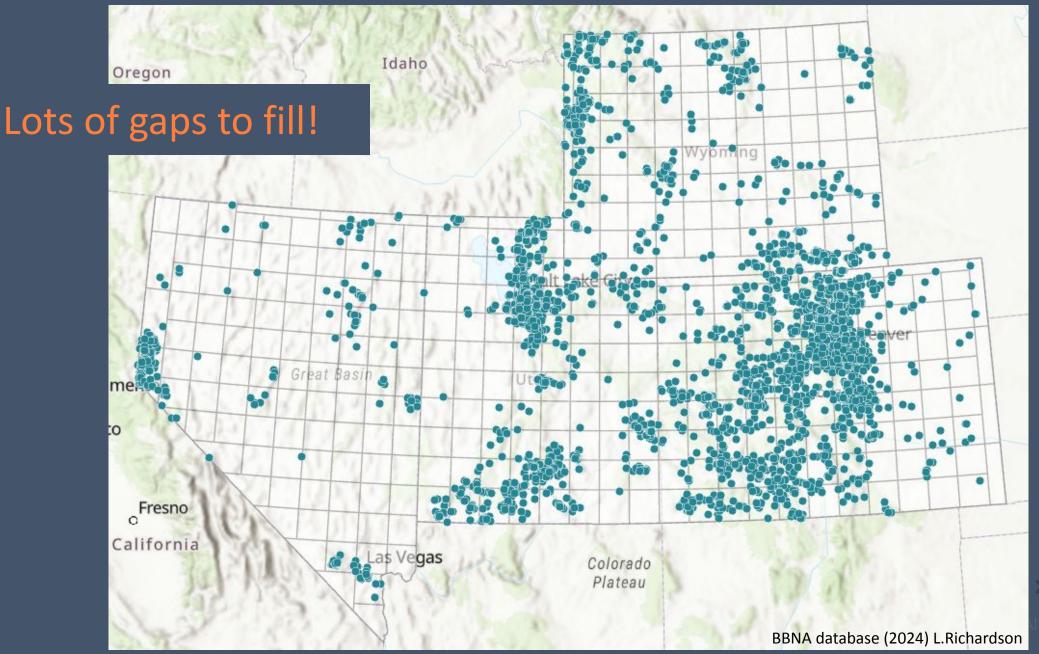
A partnership between the Xerces Society and the U.S. Bureau of Land Management with support from Colorado Parks and Wildlife.



Photos: K. Hayden; Xerces Society/Katie Lamke (2); Mason Lee; Sarah Bailey; Xerces Society/Katie Lamke



Bumble Bee Observations Since 2000



Collaborative data-gathering



Standardized protocol, effort based

Engaged citizens & agency partners

To learn

- Where are these bumble bee species?
- What habitats are they using?
- Which flowers are they relying on?

Powered by volunteers



Photos: Mike Cohn, Mason Lee, Xerces Society/Amy Dolan (x5), Xerces Society/ Sarah Foltz Jordan, Xerces Society/Molly Martin, BoCo Wild Writers (2)

Step 1: Training

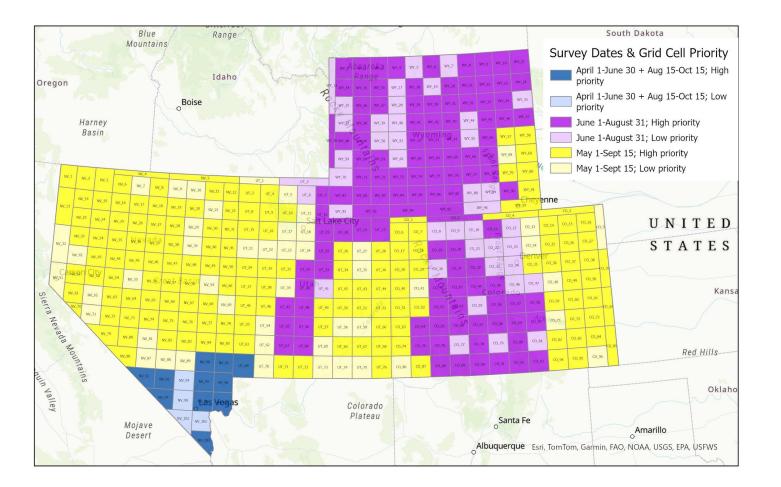
The Atlas follows a standardized protocol, important for volunteers to know and follow.

3 options for required training:





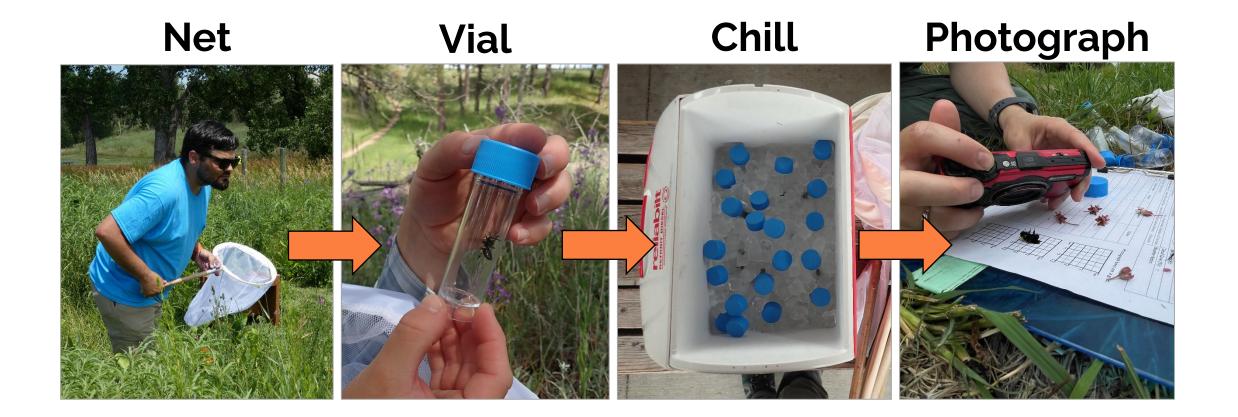
Step 2: Adopt a Grid Cell



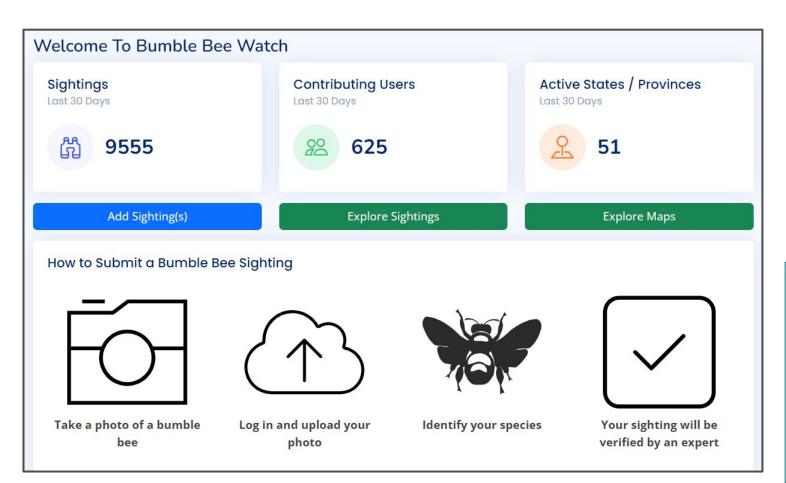
Choose a 50x50km grid cell on <u>BumbleBeeAtlas.org</u>

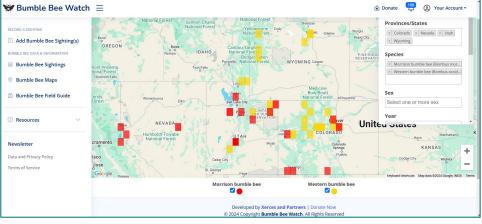
Adoption = A commitment to conduct two surveys in your grid cell during the field season

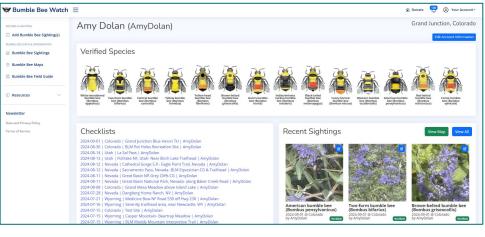
Step 3: Conduct 2 Surveys



Step 4: Upload Data to BumbleBeeWatch.org

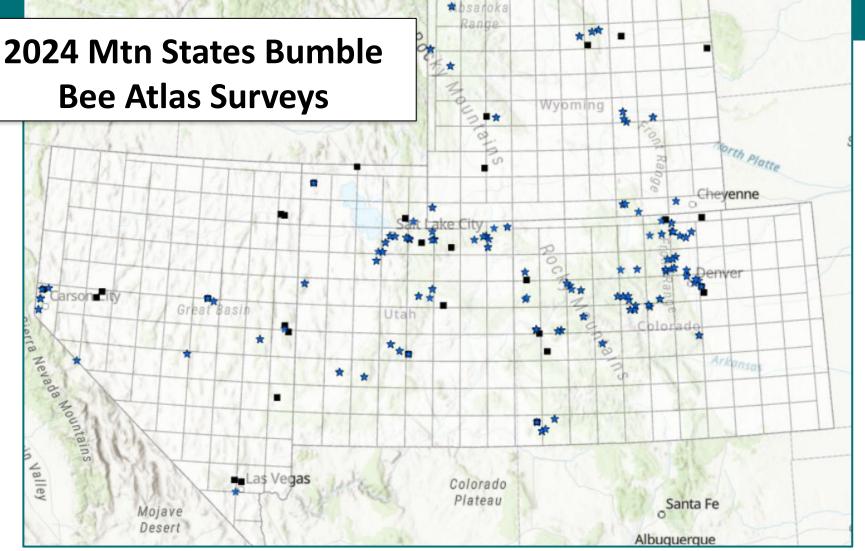






2024: Year One





68 adopted grid cells 177 surveys 1,700+ observations 23 species 4 conservation target species observed

You're invited to join the Atlas!



bumblebeeatlas.org/pages/mountain-states



Mountain States Bumble Bee Atlas 2025 Training Webinar Wednesday, April 23 6:30-8:30pm MT/ 5:30-7:30pm PT

> Join us to learn the what, why, and how of the Mountain States Bumble Bee Atlas and get prepared for the 2025 field season!

Please register in advance using the link below.

This webinar will be recorded and available on the project website.

Photo: Xerces Society/Amy Dolan

In-person training events bumblebeeatlas.org/pages/events



Colorado

Field Training Grand Junction April 24

Field Training Comanche NG May 17

Field Training Pawnee NG May 20

Mini-Workshop Butterfly Pavilion May 23

Workshop Colorado Springs May 24

> **Field Training** Durango June 14

Field Training CU MRS Nederland July 10

> **Field Training** Crested Butte July 20

Nevada

Workshop Las Vegas April 5

Field Training Winnemucca May 7

Bumble Bee Bioblitz Weekend Great Basin National Park June 19-21

Other events are being scheduled through UNR Master Gardener (Douglas County) program.

Utah

Field Training Red Cliffs NCA April 8

> **Field Training** GSENM April 17

Field Training Castle Valley May 3

Field Training Salt Lake City May 4

Workshop (with UPP) Salt Lake City May 10

Wyoming

Mini-Workshop Laramie June 1

Field Training Cheyenne June 2

Field Training Casper/Douglas June 6

> **Workshop** Buffalo June 7

Field Training (Michelle) Cody June 7

> Mini-Workshop Rawlins June 8

Field Training (Michelle) Grand Teton NP June 27

Field Training (Michelle) Yellowstone NP July 26

Field Training Event Tomorrow!

When: Thursday, April 17 | 12:30 pm - 4:00 pm MDT

Where: GSENM; Meet at BLM Visitor Center at 12:30pm

What to bring:

- Sturdy shoes and sun/weather protection
- Water and snacks
- A camera to practice taking pictures of bumble bees (cell phone cameras are ok)
- Your questions and enthusiasm

What to expect:

Planned agenda:

- Introduction/project overview
- Bumble Bee Atlas protocol description and demonstration Hands-on time to practice catching and chilling bumble bees How to complete the data sheet, photograph & release bees Questions/wrap-up



Thank You

mtnstatesbba@xerces.org

BumbleBeeAtlas.org



© The Xerces Society, Inc. All content, including text, images and graphics, as well as the arrangement of these elements within this presentation is either the intellectual property of The Xerces Society, Inc. or is used in this presentation with the permission of the copyright holder. Neither this presentation, nor any individual element from this presentation, may be used without the prior written consent of the the applicable copyright holder. All rights reserved.



Photo: Tom Kogut