

**BECOME A CITIZEN SCIENTIST!  
HELP US TRACK BUMBLE BEES ACROSS NORTH  
AMERICA USING BUMBLEBEEWATCH.ORG**



**General Survey Protocol  
September 2014 (updated June 2017)**

*By Victoria J. MacPhail and Sheila R. Colla, Wildlife Preservation Canada  
Updated by Sarah A. Johnson and Hayley J. Tompkins*

**BumbleBeeWatch.org Partners:**

**THE XERCES SOCIETY**  
FOR INVERTEBRATE CONSERVATION



## TABLE OF CONTENTS

BumbleBeeWatch.org: A citizen science program .....	3
How it works .....	4
Step 1. Grab a camera .....	4
Step 2. Find flowers .....	4
Step 3. Take photos of bumble bees .....	4
Step 4. Download, crop and rotate as necessary .....	5
Step 5. Upload photos to the web site .....	5
Create an account .....	5
Login .....	5
Your personal page .....	6
Add a bumble bee sighting .....	6
Step 6. Use the interactive key to identify your bee .....	6
Identifying male bumble bees .....	7
Verification status .....	7
More BumbleBeeWatch.org website features .....	8
Interesting results to-date .....	8
Bumble bee biology .....	8
Additional resources .....	10
Websites .....	10
Bumble bee and wildflower identification guides .....	10
Books .....	10
Acknowledgements .....	10

## BumbleBeeWatch.org: A citizen science program



Wildlife Preservation Canada, in partnership with the Xerces Society for Invertebrate Conservation, Montreal Insectarium, University of Ottawa, Natural History Museum (London), and BeeSpotter, launched the BumbleBeeWatch.org initiative in 2014. Goals of the program are to increase public awareness of bumble bee conservation, to engage citizen scientists in bumble bee surveys, and to locate rare and declining bumble bee species across North America.

There are 20 different species of native bumble bee in Ontario, and evidence suggests that up to a third of them are currently in decline. One example of the most extreme of declines is the Rusty-patched Bumble Bee (*Bombus affinis*): formerly among the most common species across its range, it is now listed as endangered both in Ontario and across Canada. Other declining species include the closely related Yellow-banded Bumble Bee (*B. terricola*; special concern) as well as the parasitic Gypsy Cuckoo Bumble Bee (*B. bohemicus*; endangered). Volunteer surveyors contribute invaluable information for bumble bee conservation, and that's where you, the citizen scientist, comes in!

At BumbleBeeWatch.org you can:

- Upload photos of bumble bees to start a virtual bumble bee collection
- Use an interactive guide to identify the bumble bees in your photos
- Have your identifications verified by experts
- Help determine the status and conservation needs of bumble bees
- Help locate rare or endangered populations
- Learn about bumble bees, their ecology, and ongoing conservation efforts
- Connect with other citizen scientists engaged in pollinator conservation

This survey protocol will act as a how-to guide for using BumbleBeeWatch.org. Want to learn more about bumble bees and other pollinators? See the resources section at the end of this document.

## **How it works**

The BumbleBeeWatch.org survey protocol is very easy to use – all you need is a camera and an internet connection! There are only six steps involved in photographing and submitting your bumble bee sightings to the website:

1. Grab a camera
2. Find some flowers
3. Take photos of bumble bees
4. Download, crop & rotate the photo as necessary
5. Upload photos to [www.BumbleBeeWatch.org](http://www.BumbleBeeWatch.org)
6. Use the interactive identification key to identify your bee

### **Step 1. Grab a camera**

Any type of camera will work, as long as you can download images to your computer and upload them to the website.

Examples of cameras that you might have around your home include:

- Camera phone
- Point-and-shoot camera
- DSLR camera (or similar)
- iPad or tablet camera

### **Step 2. Find flowers**

Flowers can be found almost anywhere, from rural to urban areas, parks, farms, and more. Bumble bees can be found on flowering plants from early spring through to late fall, early morning to late evening, and on both sunny and overcast days.

Observations are accepted from anywhere in North America, from the northern territories to the southern states. Keep your eyes open for bumble bees wherever you go. Your sightings will help us add even more observations to the map!

### **Step 3. Take photos of bumble bees**

Once you find a patch of flowers, keep an eye out for bumble bees moving from flower to flower. Once you spot a bumble bee, start taking photos! Bumble bees can move quickly, especially when they are drinking nectar and not collecting pollen. It may take a few tries before you get a good photo, but the beauty of digital photography is that you can take as many photos as you'd like.

When you submit your photo to BumbleBeeWatch.org, you will need to know details such as the date the photo was taken, the location, and the flower the bee was on. It may be helpful to have a small notebook with you in the field to record these details. The new smart phone app will allow you to upload your sighting while in the field, saving you from trying to remember all the details later. For more tips on how to photograph bumble bees in the field, refer to the BumbleBeeWatch.org Photography Guide!

#### **Step 4. Download, crop and rotate as necessary**

Once you have taken photos of a bumble bee, you can download and/or upload them to your computer. Please note that the website only accepts PNG, JPEG and GIF image formats. You may want to edit your photo before uploading it to the website, making it easier for experts to verify your observations.

Suggested edits may include:

- Increasing the brightness and/or contrast if necessary
- Cropping the photo (i.e. if the photo is taken at a distance, and you need to zoom in on the bumble bee)
  - This is more easily done before you upload to the BumbleBeeWatch.org website
- Reducing the file size of your photo (the maximum file size is 5MB per photo, so if it a high-resolution photo you may need to resize it)

#### **Step 5. Upload photos to the web site**

When you are ready to upload your photos, open your Internet browser (e.g., Internet Explorer, Google Chrome, Mozilla Firefox, Safari) and go to [www.BumbleBeeWatch.org](http://www.BumbleBeeWatch.org). To begin submitting your photos, you must sign in. If it is your first visit to the site, you can sign up for a free account. You can sign in or register by clicking the links in the top right corner of the page.

##### ***Create an account***

You can create your free account by filling in all the required fields (marked by a \*). Please choose a username and password that you will be able to remember. If you do not have an email address, you can get a free one, e.g., from Google, Outlook, or your internet provider. Your e-mail address will not be displayed anywhere on the website, and your email will only be used to contact you about a sighting, notify you that your sighting has been verified, or in case you forget your username or password.

You will have to accept the terms and conditions of the website (click the checkbox after reviewing them) to proceed. If you're registering to participate in a specific project, please select it. Click the "Sign Up" button at the bottom when you are finished.

##### ***Login***

After you have created an account, you can use your username and password to log in. If you forget your username and/or password, you can click on the link provided, and enter the e-mail address you used when you signed up. The information needed to recover your password will be emailed to you.

### *Your personal page*

After logging in, you will automatically be directed to your personal page. There you can view your past observations, or read any messages from the experts regarding your submitted photos (e.g., if they have a question about your sighting, or just to let you know that they have identified the bumble bees in your photos).

### *Add a bumble bee sighting*

You can access the “Record a Sighting” page from the top menu bar. To add a new sighting, choose this option from the menu bar, and then select “Bumble Bee Sighting” from the drop-down. There are three steps to submitting your observations: record, identify, and submit.

You can upload up to 3 photos per record of the same bee. Please do not submit photos of different bees in the same record. It is best if you can submit three different angles, but one high quality photo from the side is often acceptable for species verification.

To enter the location, please provide the latitude and longitude. If you do not have the latitude and longitude for your observation, you can pan through the map and drop a pin at your sighting, or enter the exact location in the “location search” bar (i.e., if your observation was observed at your home, type in your address). A tip: changing the map type to “Satellite view” can help make it easier to more precisely locate the correct location for your sighting, if you didn’t record the latitude and longitude.

Add a name for your survey site. If you are participating in a formal program with set survey sites, please use the site names provided. Fill out the rest of the required information, including observation date (note: this is the date you observed the bee, not the date you upload the photo to the website). If you know the flower the bee was foraging on, please provide it, along with any other additional information about the site or the observation. You must check to confirm that you have permission to upload the photo, and if you did not take the photo, enter the name of the photographer (e.g., if you are uploading it for a friend). Finally, if your observation is part of a project (e.g., Pinery Provincial Park Surveys), please select that project from the drop-down list. If the sighting is not part of a specific project, leave it as the default “Bumble Bee Watch”. When you have completed all of the fields, click “Next”.

### **Step 6. Use the interactive key to identify your bee**

A unique aspect of the BumbleBeeWatch.org website is that there is an interactive identification key that you can use to try and identify your bee on your own. It consists of a set of diagrams that show the different colour patterns on the faces, thoraxes, and abdomens of bumble bees.

Choose the image/detail in each set of options in the identification guide that best matches your bee. Do not worry if you cannot find or are unsure of which option fits your bee. There is a "Not Sure" option in each set of categories that you can select.

As you go through each question, the possible species will be narrowed down to only those that match the criteria you provided. You can then select the bumble bee species from the right hand side that best fits the bee in your photos. If you are not sure, you can also select "Not Sure" from the bottom of the list. Note that the diagrams are general examples only, and your bee's colour patterns could be slightly different (e.g. the guide may say "yellow band" but the band can be bigger than a single narrow stripe). If you are having trouble finding your bee in the list of species options after selecting one image/detail, you can go back and select a different image/detail that you think might also apply (e.g. for the abdomen, choose "black stripe" rather than "yellow then black"). Remember, you can always select "Not sure". Click "Submit" when you are finished.

### *Identifying male bumble bees*

Please note that the identification guide and associated diagrams are designed for identifying female bumble bees (queens and workers), and not male bees. Although you can try to use the identification guide for males, many will have colour patterns that are highly variable. However, we still welcome and value observations of males, so please submit them. Just select the "Not sure" option as needed.



#### **Male bees:**

- Are usually smaller than females, do not have a stinger, and have no pollen carrying structures
- Have longer antennae, a longer abdomen, and often have white or yellow facial hair (though females of some species do as well)
- Tend to emerge later in the season (typically August), and are more common than workers at the end of the summer

### *Verification status*

After identifying and submitting your bumble bee, your sighting is complete. Congratulations! It will have a question mark icon associated with it until a regional expert can verify your identification. Once your observation has been verified, the question mark will change to a check mark, and you will receive

email confirmation. From the “Thank-you” screen, you can immediately view your sighting, return to your profile page, provide feedback on the process, or access any of the other options available from the top menu.

## **More BumbleBeeWatch.org website features**

There is more to do on BumbleBeeWatch.org than simply submitting your observations. You can learn about all the different bumble bee species by reading their fact pages, browse the maps for other bumble bee and nest sightings (filter by species, area, etc.), learn more tips on photographing and identifying bees, review the frequently asked questions, and much more.

## **Interesting results to-date**

BumbleBeeWatch.org was launched in March 2014. Since that time, this project has already contributed lots of valuable data towards bumble bee conservation. Indeed, as of June 2017, we have recorded:

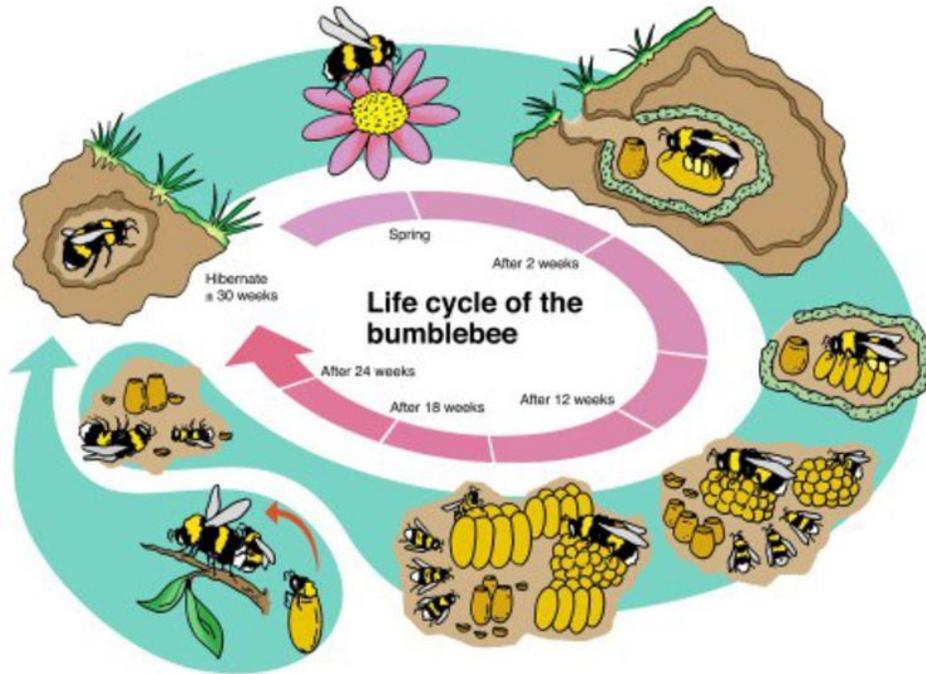
- Over 17,000 unique submissions, with almost 5,000 records from across Ontario;
- The common eastern bumble bee mating in British Columbia, well outside its normal range, and distant from any greenhouses (where the species is sometimes used as a managed pollinator and where they may have escaped into the wild from);
- 101 Rusty-patched Bumble Bee sightings in Wisconsin, Illinois, Minnesota, Ohio, Virginia, Maine, and Iowa, including 3 already in 2017, which is exciting! because this species is very rare;
- 44 Yellow-banded bumble sightings in Ontario including Thunder Bay, Timmins, Dryden, and other northern areas that are traditionally under-surveyed by researchers; and
- More records of declining species and records from remote locations.

## **Bumble bee biology**

Bumble bees are a eusocial taxon, with different castes that work together within a colony – a queen, workers, and males. Unlike the honey bee (*Apis mellifera*), bumble bees are an annual species, and most of the individuals in a colony only survive for a single season.

In the spring, solitary queens emerge from overwintering sites, forage for food to build up resources, and search for suitable nesting sites. Once a nest is found, a queen will lay eggs and continue to forage for pollen and nectar for herself and her offspring until the first brood of workers have emerged. From then on, the queen remains inside the nest, and the workers take over collecting food for the growing colony. Towards the end of the cycle, the queen begins to lay eggs that hatch into new queens and males instead of workers, and these reproductive individuals will leave the colony to mate.

All individuals in a founder colony die at the end of each season, save for the newly-mated queens of the next generation – they locate overwintering sites to await the following spring. The following two diagrams illustrate this fascinating way of life.



Life Cycle Illustration by Natupol



Nest Illustration by Alex Surcică

## Additional resources

Are you interested in learning more about bumble bees and what you can do to help? There are many wonderful educational resources out there: some of our favourites are listed below.

### Websites

- <http://www.wildlifepreservation.ca>
- <http://www.xerces.org>
- <http://www.pollinationguelph.ca>
- <http://www.pollinator.org>
- <http://www.bugguide.net>

### Bumble bee and wildflower identification guides

- Paul H. Williams, Robbin W. Thorp, Leif L. Richardson, and Sheila R. Colla. 2014. *Bumble Bees of North America: An Identification Guide*. Princeton University Press.
- Sheila Colla, Leif Richardson, and Paul Williams. 2011. *Bumble Bees of the Eastern United States*. USDA Forest Service and Pollinator Partnership. (*Use a search engine to find a free PDF online!*)
- Lawrence Newcomb. 1977. *Newcomb's Wildflower Guide*. Little, Brown, and Company.
- Roger Tory Peterson and Margaret McKenny. 1996. *Peterson Field Guides: Wildflower of Northeastern/North-central North America*. Houghton Mifflin Company.

### Books

- Committee on the Status of Pollinators in North America, National Research Council. 2007. *Status of Pollinators in North America*. The National Academies Press. ([http://www.xerces.org/wp-content/uploads/2008/09/Eastern\\_Bumble\\_Bee.pdf](http://www.xerces.org/wp-content/uploads/2008/09/Eastern_Bumble_Bee.pdf))
- Heather Holm. 2014. *Pollinators of Native Plants: Attract, Observe, and Identify Pollinators and Beneficial Insects with Native Plants*. Pollinator Press.
- Laurence Packer. 2010. *Keeping the Bees: Why All Bees are at Risk and What We Can Do to Save Them*. Harper Collins Publishers Ltd.
- Stephen L. Buchmann and Gary Paul Nabhan. 1996. *The Forgotten Pollinators*. Island Press/Shearwater Books.
- Xerces Society. 2011. *The Xerces Society Guide to Attracting Native Pollinators: Protecting North America's Bees and Butterflies*. Storey Publishing.

## Acknowledgements

We would like to thank all the individuals and organizations that have supported Wildlife Preservation Canada's Native Pollinators Initiative and the BumbleBeeWatch.org web site. In particular, the Ontario Species at Risk Stewardship Fund, W. Garfield Weston, Rogers, TD Friends of the Environment Foundation, and Environment and Climate Change Canada for providing the funds to launch the 2015 pilot program at Pinery Provincial Park, in collaboration with Ontario Parks.



TD Friends of the  
Environment  
Foundation

THE W. GARFIELD WESTON  
FOUNDATION

Rogers  
Foundation



Environment and  
Climate Change Canada

Environnement et  
Changement climatique Canada