Border Free Bees

Art, Science, and Pollinators

A Teacher's Guide

Developed by Border Free Bees, a research project of
The University of British Columbia Okanagan and Emily Carr University of Art + Design

Nancy Holmes and Cameron Cartiere

Photo by Robert Lalonde

Okanagan Edition

UBC a place of mind

EMILY CARR UNIVERSITY OF ART + DESIGN

Social Sciences and Humanities Research Council of Canada

Conseil de recherches en sciences humaines du Canada

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Dear Teachers

There are few creatures as marvellous as the bee. Studying and helping bees can engage young people in a wide range of learning—writing, art, science, history, and culture. This guide contains information about pollinators in the Okanagan, especially bees, and some art-related classroom activities that will help you to prepare your students for various projects that are coming to your community. The suggested activities can require a minimum of materials or a much greater investment. All are adaptable to the needs of different grade levels. We have included some resource links for further exploration of this fascinating subject, as well as links to art projects that are bee-related and science-focussed.

Program Goals

The goals of this guide are as follows:

- to help teachers deliver programming that fits with the new BC curriculum
- to support teachers who want to create courses, modules, thematic units or learning experiences that focus on local contexts—in this case the plight of pollinators in the Okanagan
- to provide tools for a unit that can fit into the social responsibility mandate of the new curriculum: especially the mandates to consider the interdependence of people with each other and the natural environment; and to contribute positively to one's family, community, society, and the environment.
- to provide some basic facts about bees and pollinators in the Okanagan so that students can understand the relationship between them and the wider world
- to inspire artworks using ideas inspired by imagination, inquiry, experimentation and purposeful play

Milkweed Planting, Ecole Dorothea Walker School May 2016 Photo by Fionncara MacEoin

Pollinators in General

What are Pollinators?

Pollinator species are animals and insects that distribute pollen from one flower to another, thus allowing plants to create seeds for the next generation of plants. We normally think of bees when we think of pollinators, and they are probably the most important pollinators on the planet. However, beetles, wasps, hummingbirds, butterflies and (in some places) even bats can pollinate plants. All these animals play a crucial role in both sustaining the natural environment and maintaining our food sources. AS MUCH AS ONE IN THREE BITES OF FOOD WE EAT IS THE RESULT OF POLLINATION!

What's the Problem?

Pollinator species numbers are declining, especially the numbers of wild pollinators. They are suffering from diseases, pesticide use, and loss of habitat. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was established in 2012, and is roughly modelled on the Intergovernmental Panel on Climate Change (IPCC). Its first report, released in early 2016, warns that the ongoing decline in the number of pollinating insects and animals seriously threatens global crop production.

Faced with this complex and troubling issue, people can feel overwhelmed. With major ecological crises, it is difficult to believe you can make a difference. Fortunately, there are simple and powerful ways for us all to contribute to the sustainability of bees and other pollinators: namely, the creation of pollinator-friendly habitats in our community. Children are wonderful participants in this hopeful and useful project to save bees! And there are many projects ongoing that would welcome the help of you and your students.

Border Free Bees uses art and art methods to educate and support children, teachers, and all community members to take an active role in habitat solutions.

Link to BC Teacher Science Toolkit from Bees Matter:
http://www.beesmatter.ca/wp-content/uploads/2015/05/BeeMatter_BC_TeacherToolKit.pdf

Activity: Have students list all the foods they and their families normally eat for breakfast. Research what foods need pollinators. Create a breakfast (in reality or through photographs) of "before" and "after" – if "after" is what would happen when all the foods that need pollination are removed. Write stories and make artwork that visualize a world with no pollinators.

> *Coffee, berries and fruit, and even chocolate need pollinators! Even though dairy products don't seem to need pollinators, cows eat crops like clover and alfalfa that DO. Cooking oils from sunflower and canola also need pollinators.*

Okanagan Pollinator Information

There are over 20,000 bee species in the world, over 800 are found in Canada. About 450 are found in British Columbia and **a whopping over 350 bee species are native to the Okanagan.** From bumble bees to mason bees, miner bees and leafcutter bees to the famous honey bees, there are more types of bees in this region than anywhere else in the country.

Most people think of honey bees when they think of bees, but honey bees are not native to North America. They were brought over by European settlers. Honey bees are amazing animals to study and learn about but they are usually managed bees—in other words, they are like farm animals. For the most part, they are kept and maintained by human beings.

The many many other bees in our valley are generally wild and native to this place. All bees are part of the same biological family, but they are widely diverse species. Many bees are not striped yellow and black. Some can be black, blue or bright green. Very few live in hives—about 80% live in the ground. Very few bees are social; most live by themselves. Most do not make honey, especially not enough for us. Some bees are bigger than your thumb, others are smaller than a grain of rice.

Bees descended from the wasp branch of the insect world about 100 million years ago; they are, in fact, vegetarian wasps. Wasps are omnivorous as you know when you sit in your backyard in August and the yellow jackets come for the BBQ steak; nearly every bee eats just nectar and pollen. Wild bees are hard to identify or even notice for the average person, even gardeners and farmers. However, as all recent research is showing, wild bees and some other insects do the bulk of the pollination of our food.

The Okanagan, like all agricultural places, depends on bee pollinators for its economy. Most research is showing that wild bees are key pollinators, even when honey bees are around. Wild bees are extremely efficient. Wild bees also pollinate flowers in the forests and meadows that create food for wild animals like birds and bears. It is very important that we preserve the wild bees! And in the Okanagan, we have SO many to learn about and to protect!

A great resource for Bees of the Southern Interior is Dr. Elizabeth Elle's Pollinator Lab at Simon Fraser University: hhttps://www.sfu.ca/people/eelle/bee_info.html

Activity: The western bumble bee (Bombus occidentalis) is one of the Okanagan's most threatened bees. Unlike the honey bee, the western bumble bee is native to this area. Bumble bees are very important pollinators as they pollinate more flowers than honeybees, and there are many flowers that can only be pollinated by bumblebees through a process called "buzz pollination": see this great info and video: http://www.anneleonard.com/buzz-pollination/ Essentially the bumblebees "sing" to the flowers so they release their pollen. There are many art, writing and science projects you can do with this wonderful piece of information:

- write poems that convey the song of the bumble bee to their flowers
- research what plants need buzz pollination- create an artistically interesting menu of buzz pollinated foods
- music classes can create songs that include the famous "buzz" sound of the buzz pollination
- draw and paint impressions of flowers releasing their pollen
- create sculptural models of bees and flowers engaged in buzz pollination
- in spring go out and film bumbles buzz-pollinating

See our webpage that has the winning poems for the Pollinator Poetry Contest:
https://blogs.ubc.ca/theecoartincubator/pollinator-poetry-post/

A great bumble bee resource is found on Hinterland Who's Who:
http://www.hww.ca/en/wildlife/invertebrates/bumble-bees.html

Bumble bee
photo by Robert Lalonde

How do you tell the difference between a bee and a wasp? Bees and wasps have four wings and flies have only two wings. Dr. Elle says "bees have cute faces and wasps look mean!" Wasps often have narrow waists and are smooth and shiny; bees are more often hairy. But wasps are good pollinators and have other functions in the environment – so we need them too!

GET INVOLVED IN COMMUNITY PROJECTS with *Border Free Bees*

1. KELOWNA'S PUBLIC ART POLLINATOR PASTURE

In April 2016, UBC Okanagan and the City of Kelowna agreed to partner on a habitat restoration project at the Brent's Grist Mill Heritage site located near the Dilworth and Leckie intersection in Kelowna BC. We are creating a Pollinator Pasture on this site. The goal is to plant the entire pasture area with native and naturalized seed beneficial to a broad range of pollinators. We also have a wildlife apiary on site and special plots of milkweed planted by several grade one and two classes in May 2016. We have installed bumble bee boxes and we create organic fertilizer on site from stinging nettle.

How you can participate:

- grow native plants and then come to field trip on the site and plant them
- visit the site and help us identify the numbers of pollinators on the site
- create mason bee and bumble bee homes and put them on the site
- help us prepare the pasture for planting in spring or seeding and planting in fall
- help us make nettle tea fertilizer
- ask Border Free Bees for a field trip tour!

Contact kelowna@borderfreebees.com if you would like more information.

2. POLLINATOR BLOG

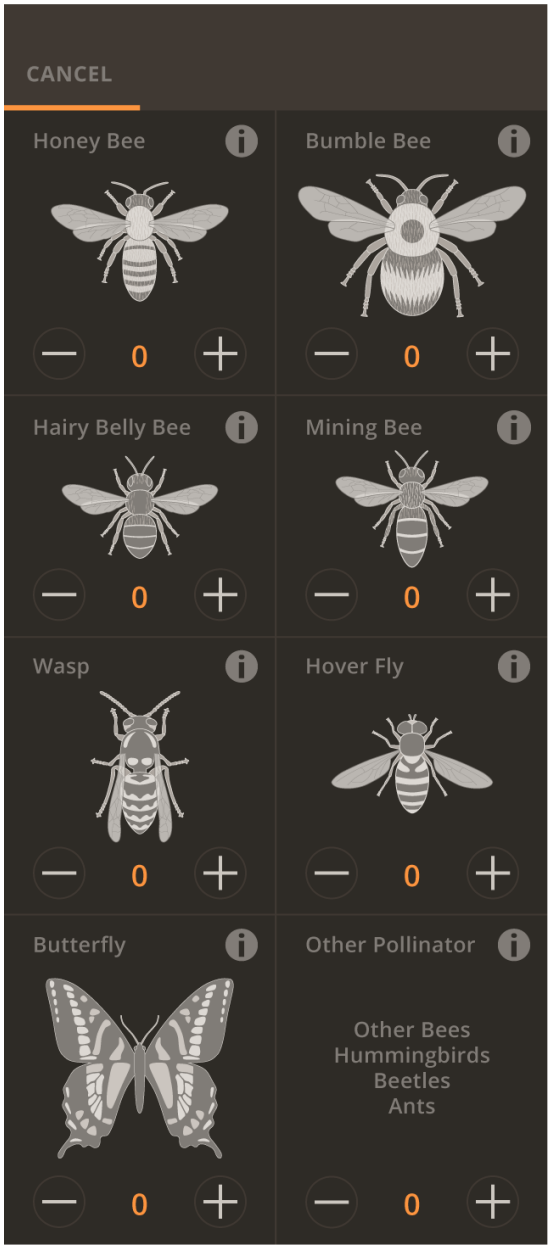
Inkswarm is the blog of the Writer-in-Residence of Kelowna's Public Art Pollinator Pasture. The writer, poet and MFA Creative Writing graduate, Fionncara MacEoin, blogs about thoughts, experiences, and ideas that relate in diverse ways to the Pollinator Pasture project. She would welcome contributions from writers in the schools - poems, photos, stories, ideas are all welcome! The blog is found on this site: http://blogs.ubc.ca/inkswarm/ Contact Fionncara at info@borderfreebees.com if you would like to create work for this page. After a visit to the Pasture, this would be a terrific place to share your art, journaling, poems, drawings, thoughts.

3. THE KELOWNA NECTAR TRAIL

A nectar trail is a series of flowering patches that helps pollinators move safely through a landscape. In the spring and summer of 2017, we created a network of flowery stepping-stones through the south Mission neighbourhood. Over 100 homes, schools, community gardens, organic farms, churches and shops along the route have committed to creating and maintaining a trail of bee-friendly one-square- meter flowering plots, each between 100 to 200 meters apart. This project has kick-started other Nectar Trails in Kelowna: one on the UBC Okanagan campus and one in an area around Redlich Pond. YOU can try to create a Nectar Trail in your community. It can be as easy as identifying already great bee-gardens in the neighbourhood, linking your school into a route you've charted out, and getting families to sign on!

4. CITIZEN SCIENCE APP

With bumble bees, honey bees and other important pollinators facing population decline, there is a growing need for data that will help scientists determine the density and diversity of pollinators across different environments. We have developed a web-based Smart Phone app called *Insight* to make it easy to participate in this essential research and learn about the different types of pollinators. Sign on, take the video to learn how to use it, and begin! This project is for older students. They will need to create an account and login. See information about the app here: http://www.insightcitizenscience.com/



Pesticides- Since the mid-2000s, beekeepers began to notice massive die-offs of honey bee colonies. This has been called Colony Collapse Disorder. Research seems to be indicating that there are several serious stresses on bees—both honey bees and wild bees--including diseases and parasites such as mites; serious habitat loss as wild lands are developed; and monoculture agriculture providing very limited food. Recently, the use of fungicides and pesticides is also being blamed for contributing to the terrible plight of the bee. Research suggests that exposure to insecticides made with neonicotinoids may be especially responsible for the loss of bees. One of the most important things you can do for bees is to NOT USE pesticides in general and especially to avoid "neonics." A book for teachers is Bee Time *by B.C. scientist Mark Winston—it is a great read to learn more about the state of bees today. It would make a good book club selection!*

MORE ACTIVITIES- EASY

1. Build a Bee Bath

You can make an easy and beautiful bath for bees for your garden or school. Like all animals, bees need water. It's easy to make a bath for bees. A shallow dish, some well-placed stones and rocks and some water. See instructions on this website:

http://www.davidsuzuki.org/blogs/queen-of-green/2015/06/how-to-make-a-bee-bath/

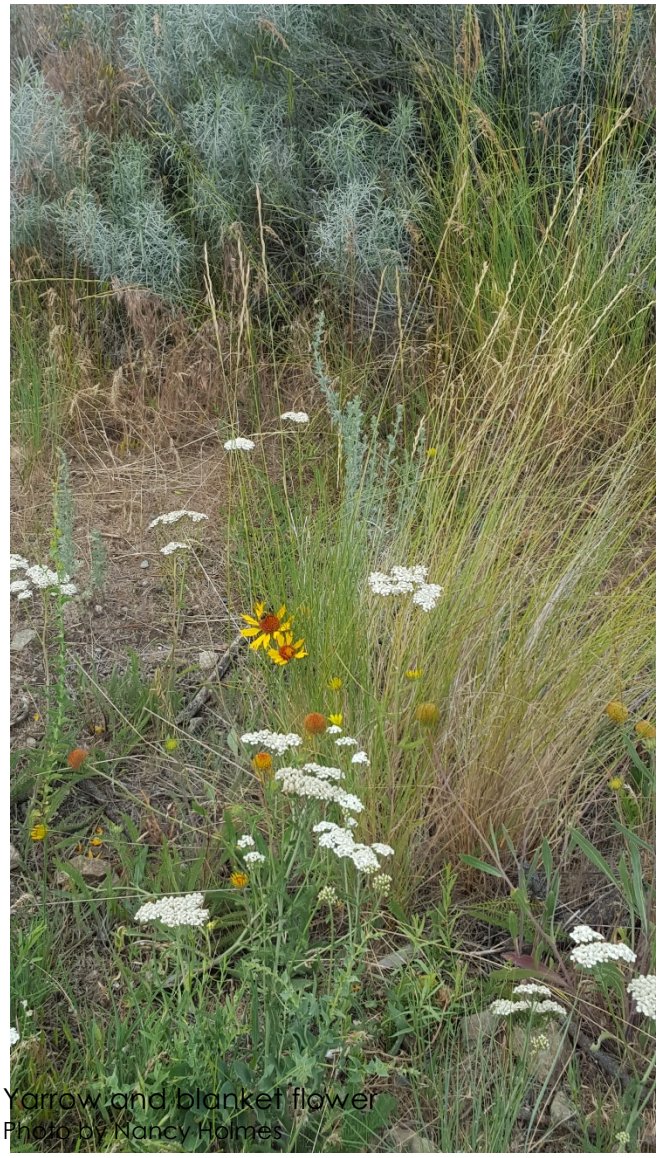
Children can take this home and put in their own gardens or gardens of friends and families. This makes a great Christmas gift for gardeners. If you make one for your school, you'll not be able to leave it out all summer unless someone is tending your garden as the water will evaporate.

Make this a beautiful object, and set it somewhere where you can watch the insects come to the water on warm, sunny days.

A great place to go see an amazing number of bees is at the UnH20 Xeriscape Demonstration Garden on Gordon Road in Kelowna.

These gardens are full of plants that are great for Okanagan gardens- they require little water—and they are gorgeous! These gardens are buzzing from spring to fall.

See their website:
http://okanaganxeriscape.org/



Yarrow and blanket flower
Photo by Nancy Holmes

2. Create a Pollinator Menu

Identify foods created through pollination. Then create a restaurant menu! Use a symbol, such as a bee, on your menu to indicate which foods require pollinators. People will be surprised at how much of the food they eat is brought to them by pollinators.

Children can design the menu, do the research, decorate and create menus for their "own" restaurant. As a bonus, they could host a special picnic or lunch featuring only foods and recipes created with the help of pollinators. Not only will this activity increase awareness of pollinators, people will also receive your tasty treats at this event.

3. Make Ground-Nesting Bee Signs

About 70% of bee species nest in the ground, not in hives or in colonies. They often live by themselves (they don't have "queens" and "workers"). These bees will use many different types of soil and landscape conditions though they prefer to build nests in bare, sunny locations with un-mulched sandy soil. Although they live by themselves, some of them like building nesting sites near to each other.

Ground nesting bee going into her nest. *Photo by Robert Lalonde.*

Many ground nesting bees use vertical tunnels with side passages leading to egg chambers. These nests are often accidentally destroyed by gardeners unaware of these native bees in their yards and gardens. Setting aside an area of sparsely covered, sandy soil in a sunny location will help provide a safe habitat to encourage these little pollinators to nest in your area.

A great activity is to get children to bring a plain wooden spoon to school. Get them to paint the wooden spoon with outdoor-resistant paint. They can decorate with flowers, bees, and designs. Get them to think about the colours that bees like best (see textbox on Page 11). Get them to leave room to write (or have someone write for them) with a Sharpie or with paint "GROUND BEES LIVE HERE" or something like that!

A cluster of mining bee holes.
Photo by Nancy Holmes

Then a great activity is to walk around the school ground and look for bee holes- find sandy or bare patches of lawn. Chances are if there are a bunch of little holes, they are bee habitat—though it could be ants! If you see holes in bare ground, sit and watch for a while to see if bees fly in and out. If they do, put your "Bees Live Here" sign there! Or the children can take their signs home and educate their families!

See info on ground nesters on http://beefriendly.ca/

Ground Nesting Bee Signs created by students in Kelowna. *Photo by Fionncara MacEoin.*

MORE ACTIVITIES- MEDIUM EFFORT AND TIME REQUIRED

1. Make Mason Bee Homes

Follow the instructions at the end of this guide for building a mason bee home.

Mason Bees are SUPER pollinators- they can pollinate more than 400 times the number of flowers than honey bees. They are sometimes called orchard bees or blue orchard bees. Make mason bee homes for gardens and your school!

Children should bring from home a one litre plasticized milk carton (the plasticized paper cartons are best) or any water proof container that is at least seven inches deep/long. You will also need a roll of newsprint paper or kraft paper to roll into seven- inch long tubes. Pencils help with the rolling and you'll want to tape the tubes so they won't unroll. The goal is to fill the container with tubes. See instructions at the end of this guide!

Mason bee house, photo by John Hritiz, creative commons license, https://www.flickr.com/photos/jhritz/4549220650

Mason Bee, Photo by Robert Lalonde

2. Design Your Own Seed Packets

Research the best seeds for pollinators in a dry climate like the Okanagan. Create a Pollinator Seed Mix. Purchase packets—probably at least two or three packs of seeds of each type are needed for one class and you should probably have about 4 – 6 species. Split the seeds among all your packets—each packet should have 18 – 25 seeds.

You can find easy seed packet templates on the Internet (especially on Pinterest). Print off the templates or create your own artistic envelopes. Use stencils that you have created or draw, collage, stamp or paint the packets.

Cut, fold and fill the packets. These can be used for gifts or sold as a fundraiser to create your school garden or insect hotel.

Some good plants for Okanagan gardens:

Yarrow
Cat mint
Garlic chives
Chives
Hyssop
Lavender
Sunflower
Alyssum
Sedum
Borage
Blanket flower
Sage
Oregano
Aster

Bee on sagebrush buttercup, Photo by Robert Lalonde

Native plants are best, but they are hard to grow from seed. A good pollinator garden in the Okanagan is fine with many of the plants above as long as it gets some water.

What Colours do Bees Like Best?
Blue, purple, white and yellow flowers seem to be most attractive to bees.

ACTIVITES LONG TERM

1. Plant a Pollinator Garden

As noted in the section on Nectar Trails, you can plant a pollinator garden at your school. This is one of the best things you can do especially if you are aware of how your garden links to other gardens in the area. You can continue to add beautiful features to it such as bee baths and bee homes. This is a long-term commitment but it can be one of the most enjoyable things your students can do. They can have their classes outdoors and learn from the greatest teacher of them all: Nature. You should contact your principal and the school district horticulture and facilities people. Please let Border Free Bees know what you're doing and we'd be happy to celebrate you. SEE THE NECTAR TRAIL PART OF THIS GUIDE!

2. Make an Insect Hotel or Apiary

Creating a fabulous structure near your garden is a great way to provide huge learning opportunities for your students and to help your garden. Learning what different insects need to overwinter and to lay their eggs is interesting and helps everyone keep good habitat for bees.

You can visit the Public Art Pollinator Pasture and see our Wildlife Apiary. The Kelowna Orchard Museum also has a bee hotel. You can find many wonderful images online. We built our insect hotels by stuffing wooden fruit boxes with habitat materials such as logs with holes drilled in them, mason bee paper tubes, pine cones, hollow sticks and other gorgeous stuff. Here is a photo of our habitat boxes:

Habitat boxes for Kelowna's Wildlife Apiary, *photo by Melisa Hernandez*

Here is a photo of the boxes in our wildlife apiary:

Photo by Melisa Hernandez

Here is the wildlife apiary at the Public Art Pollinator Pasture:

Photo by Melisa Hernandez

3. Make Bumble Bee Houses

Making houses for bumble bees is more complicated than Mason bee homes and requires more woodworking skills. Check out our *Short Guide to Bumble Bees*; you can find it online at http://blogs.ubc.ca/theecoartincubator/files/2016/04/Bumble-Bee-Guide.pdf It contains lots of interesting facts about bumble bees and instructions on how to build a home.

Building bumble bee homes at Okanagan Regional Library March 2016, photo by Emily Macmillen

Installing bumble bee homes at Pollinator Pasture, May 2016, photo by Fionncara MacEoin

LINKS TO MANY RESOURCES

Child-friendly activities and information about Bumble bees and other bees:

http://www.buzzaboutbees.net/

https://bumblebeeconservation.org/get-involved/bumble-kids/activities/

http://beefriendly.ca/ (good video about bumble bees)

http://www.buzzaboutbees.net/bee-plants.html

https://bumblebeeconservation.org/get-involved/gardening-for-bees

Plants:

http://bcfarmsandfood.com/plant-a-bee-attracting-garden/

http://beefriendly.ca/25-plants-for-bees-in-your-garden/

http://www.davidsuzuki.org/what-you-can-do/downloads/Pollinators_fact_sheet.pdf

http://www.davidsuzuki.org/what-you-can-do/food-and-our-planet/create-a-bee-friendly-garden/

http://www.davidsuzuki.org/what-you-can-do/POLLINATOR_PLANT_GUIDE.pdf

Okanagan Plants information:

http://okanaganxeriscape.org/plant-database

Pesticides information:

http://action2.davidsuzuki.org/neonics

http://libcloud.s3.amazonaws.com/93/e9/4/4703/Tips_for_Gardeners.pdf

http://webiva-downton.s3.amazonaws.com/877/a1/5/8972/GardenersBewareFollowupReport_4.pdf

http://foecanada.org/en/retailer-actions-on-neonicotinoids/

http://www.foe.org/projects/food-and-technology/beeaction

Artists Who Work with Bees:

Cameron Cartiere and the Chart Collective: http://borderfreebees.com/projects/for-all-is-for-yourself/

Aganetha Dyck http://www.aganethadyck.ca/

Jasna Guy: https://vimeo.com/149811418

Anne Marie Maes: http://annemariemaes.net/works/bee-laboratory-works/the-transparent-beehive-2/

Lori Weidenhammer http://beespeakersaijiki.blogspot.ca/

We have a series of great filmed talks on our website on this page:

https://blogs.ubc.ca/theecoartincubator/the-pollinizing-sessions/

There is a great deal of poetry written about bees:

Emily Dickinson: https://www.poets.org/poetsorg/poem/make-prairie-1755

Pablo Neruda: http://odetobeesproject.weebly.com/ode-to-bees.html

Jo Shapcott: http://poetrysociety.org.uk/poems/six-bee-poems/

Here are a few golden oldies: http://www.buzzaboutbees.net/a-poem-about-bees.html

There is a terrific new anthology of bee poems, *If Bees Are Few*:
https://www.upress.umn.edu/book-division/books/if-bees-are-few

Films:

Queen of the Sun: what are the bees telling us? (2010) *by Taggart Siegel- documentary (for older kids and adults)*

Great little video about honey bees short, good for kids:
http://thekidshouldseethis.com/post/46937771628

CONTACT US

Border Free Bees is happy to share resources and talk to you about bee-related projects in your schools. Don't hesitate to contact us at info@borderfreebees.com. Also visit our website at http://borderfreebees.com/ which has links to many other resources and information about projects in both Richmond and Kelowna BC. The contact for the Kelowna projects is Nancy Holmes at nancy.holmes@ubc.ca

ABOUT

Border Free Bees is a long-term public art initiative headed by Dr. Cameron Cartiere, Associate Professor at Emily Carr University of Art + Design and Nancy Holmes, Associate Professor at The University of British Columbia, Okanagan, in collaboration with numerous strategic partners. The initiative's mission is to raise awareness of the plight of wild pollinators, empower communities to actively engage in solutions for habitat loss, and transform under-utilized urban sites into aesthetically pleasing and scientifically viable pollinator pastures.

Border Free Bees consists of several related projects in partnership with scientists, specialists, community groups, businesses, and municipalities. Their work is supported by the Social Sciences and Humanities Research Council of Canada.

Do Bees sting? *Yes, some bees sting (though not all.) Only the females sting when they are threatened, angry or in distress. Bees are more interested in collecting their pollen and nectar than they are interested in stinging people. If you have reason to think you or any child may be seriously allergic to bee venom, you should carry an Epipen. If you are not allergic (the majority of us are not) but you DO get stung by a bee (or nettle) learn to recognize the common weed plantain - chew it up, spit the chewed up leaf and saliva on the sting.*

Making apiary boxes, Kelowna Art Gallery, Photo by Melisa Hernandez

APPENDICES

Mason Bee Home Instructions attached. These last two pages can be copied and sent home so that families know how to look after their boxes.

MASON BEE HOMES

How To Make a Small Mason Bee House

Mason Bees, the Super-pollinator
It takes 30,000 honey bees to pollinate 1 acre of land.
It takes 400 Mason Bees to pollinate 1 acre of land.
Mason bees are friendly; they rarely sting.
The female Mason Bee visits about 1875 blossoms a day!

Mason bees (or blue orchard bees, or *Osmia lignaria*) nest in tubes, not hives.

Container of house: You can use many things to house your mason bees: a tin can (big one), a waxed milk carton, a brick, a piece of wood with holes drilled in it (7.5 inches deep), a wooden box that you already have, or you can build a small box. If you use a piece of wood, the best size hole is 1/4 inch but drill the holes 3/8th inch so your tube fits in. You want the house to be **at least 7 inches deep/ long.***

Weatherproof: The important thing is your house needs to be waterproof and have a roof big enough to cover the front to keep it out of the wind and rain.

Nesting material: Mason bees are called mason bees because they use mud made of clay and water to line their tubes and separate each laid egg. Dig a little area close to your house down to the clay and make sure there's water close by for this tube liner.

Tubes: Once you have a container, you need to make the tubes. Use plain brown paper, that's the best. (newspaper and other papers have dyes that are not good for bees). Cut strips that are 7 inches long by 2.5-3.5 inches wide. Roll the paper over a regular pencil and tape it closed in a couple places. Make enough so they fit snuggly into your container. A one litre milk carton will need about 30 tubes.

*** important that tubes are at least 7 inches long because female bees incubate in the back 3-4 inches and male bees incubate in the front 3-4 inches. If your tube is too short your mason bees will not be balanced in terms of gender.**

Placement: Now put the tubes in your container. Then, put your container at least 4 feet off the ground facing east (south is too hot for the bees in the Okanagan). Do not put your container in a tree; rather screw it to the side of a garden shed, house, fence or similar regular-shaped, broad, flat surface. You want to make it easy for the bees to find their home when they are flying fast. Make sure it is stable and doesn't swing around in the wind.

***if you drilled holes in a piece of wood make sure the holes are a little longer than your tube, there needs to be a 'back' at the end of the tube to block light- tubes are open on one end only.**

This handout was created by Lori Mairs for Border Free Bees with help from Brian Campbell.

Life Cycle of a Mason Bee

March/April: cocoons hatch and adult bees mate and begin to forage	*Provide a house with tubes and lots of water and dirt to make mud so females can make their mud partitions in the tubes for their eggs.*
April/May: bees forage and lay eggs in the tubes (females seal up each egg and a ball of pollen with a mud partition)	*Provide lots of flowers and flowering trees for pollen*
May/June: eggs grow into larvae in the tubes and eat the pollen	*Adult Mason Bee life cycle begins to come to an end and they begin to die off.*
June/July: larvae weave cocoons in their little partitions in the tube	*When you notice the bees are no longer coming back and forth to their mason bee house, bring the house inside - this will prevent parasitic wasps taking over the cocoons.*
July/August: larvae inside cocoons begin to develop into young bees	*Continue to store the house somewhere warm and dry indoors.*
Sept- February/March: young bees inside the cocoons "hibernate"	*Remove cocoons from tubes (see below) in mid to late fall and then store in a cold and dry place (refrigerator).*
March/April: cocoons hatch and adult bees emerge to begin cycle over again	*When early blooms are beginning, put cocoons outside and reinstall the mason bee house with new tubes in it.*

Caring for your Mason Bees

It takes about 2.5 hours a year to care for your mason bees.

- In June, when most of the ends of the tubes are filled with mud and the female bees are no longer active, bring the house indoors somewhere high and dry (top of fridge, cupboard, garage, basement). Do not unravel tubes- leave the cocoons in the tubes and in their house- the larvae are developing inside the tubes.
- In late September or October, take the tubes out of the house and carefully open the tubes up. Gently remove cocoons, clean them off in a sieve—water won't hurt them-- get rid of any cocoons that are damaged or just shells- these aren't viable- and put the good ones in a small box. Dry them off for a couple of hours. Close the lid.
- In winter, keep the box in a dark cool place: fridge, garage or unheated basement is fine (the bees can emerge from dormancy in as little as 3-5 hours at room temperature, so cool and dark is important).
- In the spring, when you see the very first blossoms in bloom (apricots, plums, willows) make new paper tubes for your mason bee house. Go and get your mason bee cocoons and take them outside. Put them in a paper bag that is open or in a box with a hole in it (make sure they stay dry until they hatch- DO NOT PUT THEM IN TUBES!). Put your mason bee house where they can easily find it; add fresh new tubes for them to lay eggs in. Remember to scrape a hole in the ground down to clay and provide water so they can start building nesting chambers again.
- March- June, you can watch the action as the bees work tirelessly pollinating and

provisioning for their young in the mason bee house!