



VanDusen  
BOTANICAL GARDEN

## Pond Peering | Grades 1-4 Pre-visit information and activities

Hidden beneath the surface of VanDusen's ponds, lakes and streams is a diverse world of beautiful and strange life. Students explore and learn about the pond environment, use nets to dip into a pond and identify the creatures they find.

### Learning Objectives:

Students will:

1. Observe the ponds at VanDusen, looking for plants and animals that live in and around them.
2. Collect aquatic invertebrates with nets and attempt to identify them using visual references
3. Keep a record of the plants and animals they discover during the program
4. Learn about food webs and chains that exist in the pond habitat

## Curriculum Connections

### Grade 1

- Processes of Science
  - Communicate their observations
  - Classify organisms
- Needs of Living Things
  - Classify living and non-living things

### Grade 2/3

- Animal Growth and Change/Plant Growth and Change
  - Describe some changes that affect animals
  - Describe ways in which animals are important to other living things and the environment
  - Describe ways in which plants are important to other living things and environments

### Grade 4

- Habitats and Communities
  - explain why organisms are found in specific local habitats, based on their structures and behaviours

## Preparing students for their visit to a Botanical Garden

### Visiting a botanical garden

A botanical garden is a place of beauty, where students will get to see and learn about a variety of plants. Have a discussion about what the students think a botanical garden is and what they might be able to see at a botanical garden. Refer to our General Pre-visit package for more info.

### Garden Visitor Guidelines

Refer to our Garden Visitor Guidelines sheet in our General Pre-visit Information package, and discuss with your students why it is important not to pick any living plants in the Garden:

- If you pick a living plant, it can no longer grow or be enjoyed by other visitors to the Garden
- Plants and their parts, such as seeds, cones and leaves are all food sources for wildlife or a home for insects.

## Preparing students for the program

*These interdisciplinary activities are designed to integrate science, visual art and language arts in preparation or as a follow up to your visit to VanDusen. Feel free to adapt the activities to be relevant to the age group and experience of your students.*

## Learning about the Pond Habitat

### Activity: A Web of Pond Life

#### PART 1: Introductory Discussion- Ponds

- Brainstorm these ideas with your students: What is a pond? What makes a pond different to other water bodies? Which plants and animals can be found living in and around a pond?
- Generate a list of general differences between ponds and other water bodies (sea, ocean, streams, lake, river etc...)
- Generate a list of the plants and animals found in and around a pond. Stick with what the student's ideas are at this stage because we will introduce them to less-known animals on their guided tour.
- Have an art session where your students chose one plant or one animal from the pond habitat to make a picture of. These pictures will be used in a later activity so you will need pictures of a variety of organisms.

Tell your students that the pond and its surroundings are home to many living things, both animals and plants and that we call their home a habitat. Tell them that a habitat must have everything that the organism needs to survive. Discuss these needs. Relate this to their everyday needs and whether these are met in their homes (food, water, shelter etc...).

## **PART 2: Food Chain/Web Game**

**Objective:** Introduce the idea that organisms interact and depend on each other for survival

The students' pictures will now be used to teach them about food chains/webs. You will need to do a bit of preparation for this activity. You will need to make pictures of the sun, water and air to add to the game.

- Punch two holes in the top of the pictures and thread string through to make into a 'necklace' that can be hung around the student's shoulders. Alternatively, they can hold their pictures.
- Cut lengths of string (2m/200cm), enough for each students (and some spares)
- Gather your class into a circle in a large space
- Hand out their pictures and give everyone a piece of string. Have the students wear or hold out their picture so everyone can see it.
- Tell them that they are the plant or animal that they are holding
- Tell them that they are all part of the Pond Habitat and you are going to play a game to show them how they link together
- Select a student, representing one of the animals in the pond habitat to begin with. Ask them if they can see what they eat around the circle. Tell them to hold one end of their string. Take the other end and give it to the food source. Tell the group that these two are joined in the habitat as one is food for the other.
- Introduce the vocabulary, herbivore/carnivore/predator/prey
- Continue this process, working through the group until all the students are linked and interlinked together (one is eaten by... but eats...) by their string. This is a fun game where it will be tricky for you to keep joining your students by the string. As the game progresses they will see a big web of string joining them all together!

As you play their game use habitat vocabulary relevant to your age group:

- Consumer, producer, web, chain, herbivore, carnivore, predator, prey, energy

Round up this activity by explaining that they will soon be visiting VanDusen to discover what is living in and around the ponds at the garden and learning more about the pond habitat.

Place the pictures on a wall of the habitat they generated. Connect them with string, labelling organisms with the habitat words. After your visit to the garden you may want to add new animals and plants seen to expand your food web.

## Websites and Links to Support Learning

### **Water Striders and Water Tension Video Clip: for Grades 3 and 4**

This short video demonstrates the way in which water striders move atop of water by placing them on food coloured water. You will also see scientist David Hu's water strider robots. Watch and discuss surface tension. How do these delicate insects stay afloat?  
<http://www.sciencefriday.com/videos/watch/10404>

### **Take a Virtual Pond Dip at Microscopy-UK's interactive weblink: for Grades 3 and 4**

Take a virtual pond dip to discover the algae, arthropods, aquatic insects and microscopic pond life that coexist to create a balanced and healthy pond ecosystem.  
<http://www.microscopy-uk.org.uk/ponddip/>

**Smart Board Pond Life Activity:** <http://exchange.smarttech.com/details.html?id=fbe5f54e-959a-42d8-a299-c2b1b60e89ea>

## Literature Activities – all titles available through VSB and VPL

### Early Primary

- **Lily Pad Pond – by Bianca Lavies**

This short story of a lily pond habitat and the creatures that live there is an excellent introduction to a pond community, the significance of lily pads and simple pond food webs.

**Questions for discussion:** How does the lily pad benefit the tadpole (shelter from predators), dragon fly nymph (a ladder to the surface) and the fisher spider (a cool shelter)?

**Food web activity:** Match the stories characters to display who eats and is eaten by whom.

- **Strange Beginnings – by Karen Needham and Launi Lucas**

This is a short but useful introduction to the common aquatic insects students will be looking for during the guided program. An excellent resource to look at before visiting and after pond dipping.

- **Pond Seasons – Sue Ann Alderson**

This story details how the creatures of a pond habitat adapt to the changing seasons through charming poetic text. An excellent introduction to a pond community big and small and great inspiration for student-written poems.

**Suggested Activity:** Visualization Activity. Give each student a quartered landscape piece of paper. Read the story Pond Seasons aloud without showing pictures. Students can sit with clipboard and pencil and label and sketch each season at the pond based on the author's words. Give extra time to add detail at each. Finally, regroup and reread showing pictures and spotlight student work in a circle.

Upper Primary / Early Intermediate

- **Water Insects – by Sylvia A. Johnson**

This book is an excellent read-aloud for grades 2-4. Text and beautiful detailed pictures explore topics from classifying the difference between bugs and beetles; aquatic insect adaptations and life cycle.

- **A Freshwater Pond – by Adam Hibbert**

An excellent introduction to pond plant life (p.8-11) such as algae, duckweed, hornwort, bladderwort, pond lilies, reeds and rushes as well as aquatic insects and mammals. Accessible text for independent student research.

- **Minibeasts In a Pond – by Sarah Ridley**

Excellent clear, large pictures of the common aquatic insects and information on the lifecycle of mosquitoes and dragonflies. Accessible text for independent student research.

- **Song of the Water Boatman and Other Pond Poems – by Joyce Sidman**

This anthology of pond poems is elegant and accessible.

**Suggested activity:** Read a few poems from the book to your class, then have students write their own concrete poem for the aquatic insect of their choice. The poem should take on the shape and character of the insect's movement pattern: whirling, striding, diving or paddling...

## Art Activity

### Lily Pad Life Cycle Wheel: Grades K-1



#### What You Need:

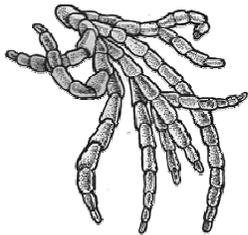
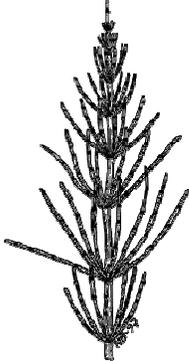
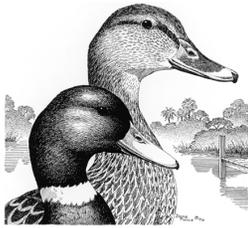
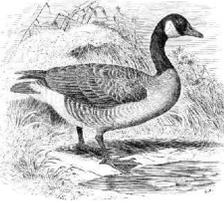
- Scissors
- Glue sticks
- Green construction paper for lily pad
- 1 copy per student of life cycle of: dragonfly or greater boatman or whirligig beetle
- 1 round head fastener per student
- 1 white cupcake sleeve per student
- 1 small piece of yellow tissue per student

#### What You Do:

1. Cut out green lily pad template.
2. Open cupcake cream or yellow cupcake cup and cut small slits to make petals.
3. Crinkle yellow tissue in center of lily and glue in place.
4. Cut out circle template and glue the 3 or 4 life stages of chosen aquatic insect in the correct order
5. Fasten lily pad to info. Sheet with a round head fastener and turn tail ends up to secure.

Background information for teachers

Some Plants and Animals we may see at VanDusen Botanical Garden

			 gunnera			
algae	bald cypress	water lily		duckweed	horsetail	iris
						
skunk cabbage	duck	great blue heron	turtle	Canada Goose	fish	buck-bean

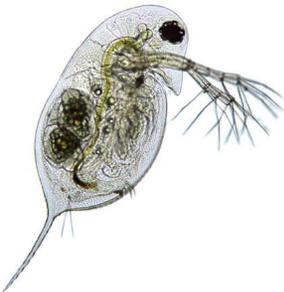
## Some facts on pond life we may see at VanDusen Botanical Garden

### ALGAE

- form pond scums and hairy growths on underwater surfaces such as rocks
- plants range in size from single cells to dense growths and sometimes join together in chains
- some single-celled algae swim like one-celled animals
- They release oxygen into the water, however if there is a lot of algae in the water, sometimes their decay reduces oxygen and can kill other aquatic plants and animals
- the algae we see most at VanDusen is called green algae

### DUCKWEED

- tiny floating plants, a favourite food of waterfowl
- has tiny flowers that rarely reproduce. Most reproduction is by division of plant body
- there are about 25 species. Some common examples:
  - o GREAT DUCKWEED: several rootlets beneath plant body, undersurface is often purplish. Grows in quiet waters and sluggish streams, sometimes forming dense mats on the surface
  - o SMALL DUCKWEED: has a single rootlet hanging below plant body. Common In ponds and slow streams and forms floating mats that cover pond's surface
  - o IVY DUCKWEED: plants often interlock, leaf-like bodies joined to form lattice-like sheets on the surface or just beneath. Plants may lack roots.
  - o Want to know more? Here is a site all about it: <http://www.rduckweed.org>



### WATER FLEA (*Daphnia pulex*)

- Crustacean (*Caldocera*)
- abundant in fresh water, swim jerkily by means of a second pair of enlarged antennae
- scavenger: eat algae, microscopic organisms and organic debris swept into their mouth in current of water created by waving their legs
- are eaten in great numbers by small fishes
- there are other types of water fleas, but *Daphnia pulex* seem to be what we see most at the Garden



### SCUDS

- crustacean (*Amphipoda*)
- flattened sidewise like fleas, usually live close to bottom or among submerged objects – avoid light
- scavengers on plant and animal debris
- eaten by fishes
- intermediate hosts for tapeworms and other parasites of frogs, fishes and birds



### COPEPODS

- crustacean (*Copepoda*)
- type of Copepod usually seen at VanDusen: *Cyclops bicuspidatus*: have antennae about as long as trunk region of body
- found in shallow water, some cling to vegetation
- during breeding season, one or two egg sacs (see photo at left) develop on each female and resemble another 'tail' near the end of its body
- Omnivorous: feed on algae, bacteria, organic debris. Seize and bite small prey

### WATER BOATMAN

- Slender with long hind legs flattened for swimming. Air taken at the surface usually surrounds the insect in a silvery envelope.
- Must hold onto objects to remain submerged
- Adults are strong fliers and are attracted to light
- Feed on algae or decaying plant and animal matter sucked from bottom ooze
- 115 species of water boatmen are known in north American waters

### MOSQUITO

- **Larvae:** eat microscopic plants and animals or organic debris filtered through brushes that surround their mouth. Larvae breath through gills at the end of the abdomen
- **Pupae:** head and thorax are fused into one unit (unlike larvae) and breathe through tubes in their thorax. In contrast to pupae of most other insects, they are active and can swim by using leaf-like tail appendages
- Only female mosquitoes drink blood and often need a blood meal before laying eggs. They also drink nectar prior to mating.
- Male mosquitoes feed on nectar and ripe fruit. Mosquitoes are known pollinators of goldenrod and bog orchids
- Mosquitoes survive winter and periods of drought in the egg stage, hatching as soon as conditions are favorable
- About 120 species of mosquitoes occur in North America