Let's GO to the Pond!

Field Trip Ideas and Activities to Explore at Ponds and Wetlands in BC Parks and other Special Places in B.C.

K-3 MODULE

BRITISH COLUMBIA | BC Parks

HCTF Education

HABITAT CONSERVATION TRUST FOUNDATION

In this Module

"We have seen videos, read books on pond life and observed pond water under microscopes, but it wasn't until we were at [the pond] that the students finally made the connection to what we have been learning. There is nothing greater than experiencing it firsthand. I can tell by the discussion we had back in class, how much they recalled and connected to what we have been doing in class."

– Gilmore Community School, Burnaby, Grade 1

Meet the Pond

A pond is a shallow, still or slow-moving body of freshwater. Because ponds are smaller and shallower than lakes, they have consistent temperatures throughout and little or no wave action. Sunlight is able to penetrate to the bottom of a pond and support rooted plant growth.

Ponds are a type of wetland, which is simply any area of land that is permanently or seasonally saturated with water. There are many types of wetlands, which may be classified based on their salinity (fresh or saltwater), pH, water levels, frequency of flooding, the types of soil and plant life. Some other common wetland types include marsh, fen, bog, swamp and estuaries.

Wetlands are important. Wetlands have great biodiversity; most wildlife in B.C. use wetland habitat at some stage in their life cycle. Wetlands provide critical habitat for many threatened and endangered (Red and Blue listed) species. The ecological functions of wetlands are similar to that of some of our organ systems. They are the "kidneys of the earth"—protecting us from pollution by filtering and cleaning the water that flows through them. They can also be considered the earth's "bladder" due to their tremendous water storage ability-- one hectare (100m x 100m) of wetland can store between 9 and 14 million liters of water, preventing flooding and drought by absorbing water quickly and releasing it slowly. Wetlands are also like the earth's digestive tract for their role in transforming nutrients, and like the liver, in their ability to filter toxins.

Wetlands need protection. About half of all wetlands on earth have been lost. In Canada, 80-98% of the wetlands found close to major urban centres have been--and continue to be--drained or converted to urban, industrial or agricultural uses. The majority of Canada's remaining wetlands are found in remote areas. In B.C. wetlands currently comprise less than 6% of the land base. This is a small fraction of the extent of the wetlands before European settlement. For example, wetland loss has been documented at 70% in the Victoria region, 85-90% in the South Okanagan, and 70% in the Fraser River Delta, including a loss of 85% of the bogs and virtually all of the seasonal wet meadows. (Wetlands in British Columbia, Wetland Stewardship Partnership, 2010. *https://bcwetlandsca.files.wordpress.com/2016/11/wetlandprimer_wsp_2010.pdf*)

Wetlands are a great place for outdoor learning. Ponds and other wetlands make engaging field trip locations. They provide easy opportunities to view wildlife, to learn about their unique flora, to appreciate their beauty and importance, and for hands on exploration in activities such as pond dipping and water sampling.

Things to Learn at Ponds

Why Visit Ponds?

Pond ecosystems are biodiverse. Ponds provide habitat for aquatic life and attract birds and mammals to the water's edge. We can learn about interactions between animals and the environment at ponds. Ponds also provide an opportunity to learn about nutrient cycling, flood control, and water quality. There has been a significant loss of wetlands in British Columbia. Students can have a positive impact by learning about the ecosystem services that ponds provide and by becoming stewards to help protect the wetlands that remain.

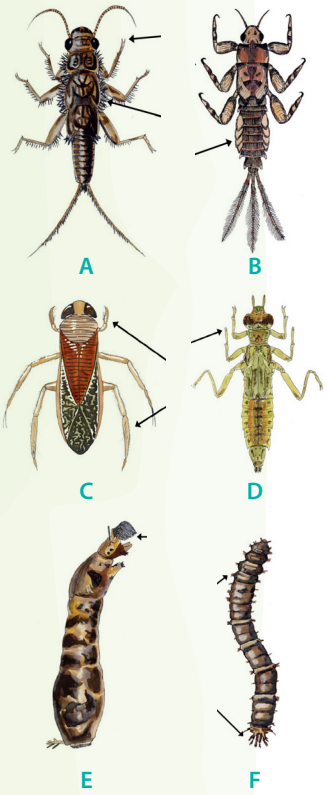
Curriculum Connections

Science curricular competencies met through outdoor learning include:

- *Demonstrate curiosity about the natural world*
- *Experience and interpret the local environment*
- *Express and reflect on experiences of place*

Some of the K-3 Science Big Ideas that may be addressed on a field trip to the pond include:

- *Plants and animals have observable features (K)*
- *Daily and seasonal changes affect all living things (K)*
- *Living things have features and behaviours that help them survive in their environment (1)*
- *Observable patterns and cycles occur in the local sky and landscape (1)*
- *Living things have life cycles adapted to their environment (2)*
- *Water is essential to all living things and it cycles through the environment (2)*
- *Living things are diverse, can be grouped, and interact in their ecosystems (3)*



- **(A)** *The Stonefly nymph has claws for capturing prey and holding on tight to rocky substrates.*
- **(A)** *The Stonefly nymph has gills in its "armpits" for breathing dissolved oxygen in fast flowing streams.*
- **(B)** *The Mayfly nymph has hooks for holding on tight to rocky substrates.*
- **(B)** *The Mayfly nymph has gills on its abdomen for breathing dissolved oxygen in fast flowing streams.*
- **(C)** *The Water boatman has paddlelike legs for swimming in slow moving water.*
- **(D)** *The Dragonfly nymph has claws on its legs for capturing prey and for climbing emergent vegetation.*
- **(E)***The Blackfly larva has a net on its head for collecting food.*
- **(F)** *The Cranefly larva has tiny hairs and suction cups along its body so it can hold on to rocks and hard substrates in fast flowing water.*

Animal Adaptations

One of the best things about being at a pond or other wetland is the opportunity to use dip nets to collect and take a closer look at the small animals that live in the water. These mini-creatures are known to biologists as **macroinvertebrates**. Macroinvertebrates are animals without a backbone that you can see with your unaided eyes, such as aquatic insects, shrimp, snails, clams, and worms. Macroinvertebrates have interesting adaptations. Many of the insects that we think of that live near freshwater — such as dragonflies, damselflies, and mosquitos — live out much of their juvenile life as aquatic invertebrates.

Features and Adaptations of some Freshwater Macroinvertebrates

Body Part	Adaptation	Items Representing Adaptations for Dress Up	Items Representing Adaptations for Craft
Legs, claws, hooked feet, suction cups, hairs on legs	Holding on to rocks and hard substrate, scraping algae off rocks, attacking prey	Water noodle with hooks on the end	Pipe cleaners
Tails	Swimming and maneuvering	Rope	Pipe cleaners
Compound Eyes	Help insect detect motion	Sunglasses with googly eyes glued on	Googly eyes (various sizes)
Hairs on head or body	Help detect movement or chemical changes in water	Wig or furry hat	Puff balls, feathers
Antennae	Sensing food, water, surroundings	Store bought or homemade antennae	Pipe cleaners
Gills	Breathing dissolved oxygen in the water	Feather boa	Feathers
Air bubble	Breathing oxygen from the surface air	Balloon, bouncy ball	Beads
Breathing tube	Breathing oxygen from the surface air	Straw	Straw
Specialized mouth parts for scraping, piercing, shredding, etc.	The mouth parts reflect food choices of the insect	Vampire teeth	Toothpicks
Device for catching food, net (made by the insect or part of their body structure) or hairs	Catching food in the current	Fishing net	Fabric netting and toothpicks, feathers

Adapted from Utah State University, Water Quality Extension. "Bugs don't Bug Me" *https://extension.usu.edu/waterquality/files-ou/Lesson-Plans/Aquatic-Macroinvertebrate-lesson-plans/BugsDontBugMe.pdf*

Life Cycles

Learn first hand about animal life cycles at the pond. Many adult animals that are common around the pond, such as dragonflies, damselflies, frogs, and mosquitos, undergo metamorphosis and look nothing like their juvenile forms that live in the water. Other animals, such as beavers, ducks and fish, have non-metamorphic life cycles. Look for animals at different stages of their life cycles. Can you find the exoskeleton (moult) of dragonfly nymph clinging to aquatic plants, where it emerged from the water and turned into its flying, adult form? Can you find a redwing blackbird calling from the cattails, attracting a mate or perhaps guarding its nest?

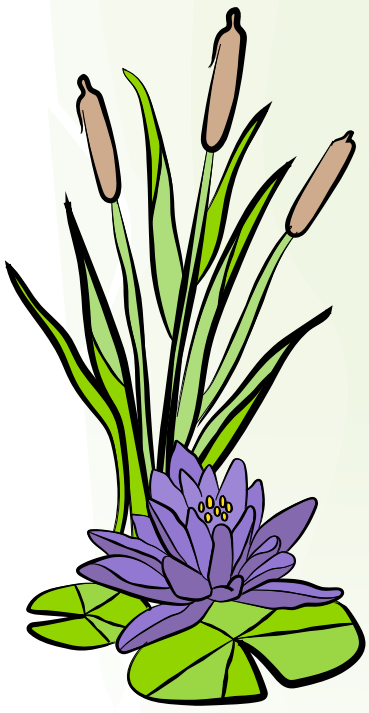
Food Chains

It's a bug eat bug world out there! Who eats who at the pond? On your field trip your students can learn about how pond life fits into the food chain or food web. Which organisms are producers, consumers and decomposers? Which ones are herbivores, omnivores, carnivores, or detritivores? See below for a list of some common aquatic animals and their trophic level.

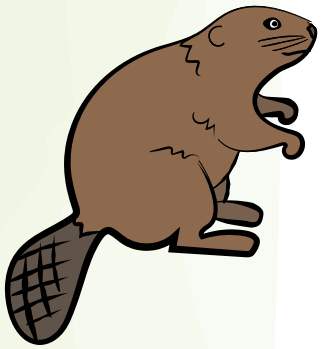
Trophic Level of Some Pond Animals

Species Name	Feeding or Trophic level
Pond snail	Herbivore/Detritivore
Phantom midge larvae	Carnivore
Midge larvae	Herbivore
Rat-tailed maggot	Detritivore
Leech	Carnivore
Flatworm	Carnivore
Mayfly nymph	Herbivore
Dragonfly nymph	Carnivore
Diving beetle	Carnivore
Water mite	Carnivore
Freshwater hoglouse	Detritivore
Freshwater shrimp	Detritivore
Water flea	Herbivore
Pea mussel	Herbivore
Greater water boatman	Carnivore
Lesser water boatman	Herbivore
Mosquito larva	Herbivore
Damselfly nymph	Carnivore
Water scorpion	Carnivore
Frog	Carnivore
Newt	Carnivore
Tadpole	Herbivore

Adapted from Holland Park Ecology Centre, *The Pond Pack*, Ecology Service 2010.
Royal Borough of Kensington and Chelsea

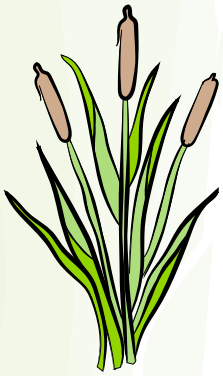


Quick Facts: Did You Know These Things About Pond Life?



Beavers

- Beavers have two sets of lips! The inside pair behind their teeth is like a trap door that stays shut when they are under water. This allows them to swim with sticks in their mouth without swallowing any water. Beavers also have built in ear plugs, nose plugs and an extra eye membrane that acts like swim goggles. Perfect for an animal that spends most of its life in the water.
- Beavers are accomplished engineers. When they construct their dams across flowing water, beavers create ponds and wetlands, which are home to diverse animal and plant communities. Beavers build their homes, called lodges, in the middle of the ponds where they are safe from predators, such as bears and wolves.
- Beaver babies are called kits and they can swim when they are born!
- The longest beaver dam ever discovered is in a remote area of Wood Buffalo National Park, in Northern Alberta. It is 850 m long and was only discovered by satellite imagery in 2007. Adventurer, Rob Mark, was the first person to visit the dam in 2014 by slogging for nine days across 124 miles of wetland and through clouds of biting insects that sounded like helicopters.



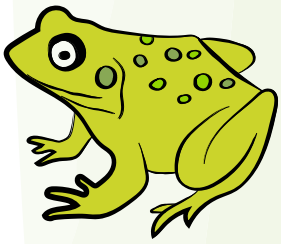
Cattail (also called bulrush)

- Cattail grow well submerged in the water and in waterlogged soils. Underwater, cattails provide habitat for fish and aquatic insects. They create a shelter from winter cold and wind for mammals and birds, and their leaves and seeds are a source of nesting material.
- They are named for their brown flower head "spikes" that may look like a cat's tail. Up to 1,000 tiny male flowers are on the top of the spike and fall off, leaving a narrow, bare area. The female flowers are below and produce fluffy, cottony seeds that are spread by the wind and water.
- All parts of the plants are useful and were important as food, medicine and fibers for many indigenous people.
    - All parts of the cattail plant, from the roots to the flower heads are edible at different times of year. In spring the young tender leaves can be eaten raw or cooked. In early summer before flowering, the stem can be peeled and eaten like asparagus. Before the male flower ripens it can be cooked and eaten like corn on the cob or roasted. The pollen can be used as flour and a sauce thickener. From late fall through the winter, the underground stems (rhizomes) can be boiled or roasted like potatoes, or dried and ground into a powdery flour.
    - The leaves and stalks were used for weaving mats, baskets, clothing, bags, and nets. The roots and pollen were used as medicine. The fluffy seeds were used as moccasin lining, pillow stuffing, and in diapers.
    - During WWII, fluffy cattail seeds were used to fill life jackets and line seat cushions in tanks and airplanes.

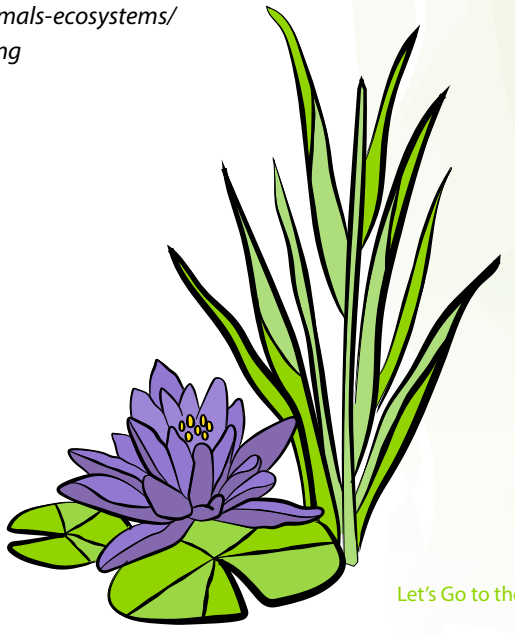
Mosquitos

- Only female mosquitos bite— they need a blood meal in order to lay their eggs in water. Male mosquitos are herbivores; they eat nectar and plant juices.
- Mosquito larvae, also called "wigglers", live in shallow and still pools of water and breathe through a tube called a siphon at the end of their body - their "bum snorkle"!
- You may not like them, but mosquitos are an important part of the food chain and a delicious feast for bats, salamanders, frogs, birds, and fish.

Invader Alert! American Bullfrog



- Bullfrogs are native to Eastern North America from Canada to Florida. They were introduced to B.C. in the 1930s by frog farmers who wanted to raise them for their meaty legs to serve in restaurants. As it turned out, B.C. diners weren't as enthusiastic about frog legs as French diners. The bullfrogs were released or escaped when the frog farms went bust.
- Bullfrogs are spreading in B.C. Currently they are found in freshwater ponds and lakes throughout the Lower Mainland, Southern Vancouver Island and the South Okanagan.
- Bullfrogs are HUGE. They are the largest frog in North America, reaching over 20 cm in length and can weigh over 600 g. They have HUGE appetites and eat anything that can fit in their mouths, including invertebrates, snakes, small mammals, ducklings, and our native frogs, many of which are already facing challenges due to habitat loss and pollution.
- What you can do:
    - Learn how to identify bullfrogs and their calls.
    - Never transport bullfrogs (including their eggs and tadpoles). You might accidentally contribute to their spread.
    - If you find a bullfrog, contact Frogwatch: *https://www.naturewatch.ca/frogwatch/british-columbia*
    - Become a Frog Watcher! Be a citizen scientist and help monitor amphibians in B.C.. *www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-conservation/amphibians-reptiles/frogwatching*



Planning and Preparation

You've decided to go on a field trip to the pond or other wetland. Exciting! But now what?

Learn how to incorporate place-based learning into your teaching and some easy solutions to overcome some challenges associated with outdoor learning.

- *https://hctfeducation.ca/file/c2c-place-based-activities.pdf*

Start here by following this step-by-step checklist of outdoor field trip planning:

- *https://hctfeducation.ca/file/field-trip-checklist.pdf*

When to Go?

Ponds and other wetlands are interesting places to visit in all seasons. In the fall, migratory birds may be passing through and congregating to feed and fuel up for their long journey south. Winter is a good time to consider animals' strategies to survive the cold. Who stays at the wetland and who leaves? Can you see signs, such as tracks, that reveal who is active in the winter? How do the turtles, frogs, fish and insects tolerate the cold temperatures or even a frozen pond? (Did you know that some turtles spend the winter burrowed in mud at the bottom of a pond, staying in a near frozen state and barely breathing?) In spring and summer the pond comes to life, with plant growth and flowering, birds nesting, amphibians calling to attract a mate, and eggs of many pond animals—frogs, turtles, invertebrates, and fish—hatching. Consider multiple field trips at different times of year to experience the changing seasons of the pond.

Where to Go?

Where is a good pond to take your class? First, ask other teachers if they know of a pond or other wetland where they bring students. Next, brainstorm ideas with your students.

Some considerations for a suitable location for your field trip:

- Visit the site ahead of time, especially if you are not familiar with the location.
- Where will drivers park? Is there space for the bus to turn around? Is there good parking for parent volunteer drivers?
- Are there any hazards at the site? Can they be mitigated?
- Are there toilet facilities/outhouses on site? Make sure you pack some toilet paper!
- Is there an easy and safe, shallow access to the water's edge?
- Are there any trails near the pond to allow for exploration of forest or other adjoining habitat?
- Are there any covered areas to gather in inclement weather, during nutrition breaks, and to leave belongings while exploring? If not, plan accordingly, such as by bringing a tarp to cover belongings or to sit upon.

Multiple trips? Try this:

- *Create a class seasonal wheel that can be added to after each trip to the pond.*
- *See https://earthzine.org/phenology-wheels-earth-observation-where-you-live/ for tips on using seasonal wheels and wheel templates, courtesy of Anne Forbes, Partners in Place, partnersinplace.com/wheels-of-time-and-place*

Finding a Pond or Wetland to Explore in British Columbia

Here are some suggested links and organizations to help you find ponds and other wetlands that may be near your school:

- BC Nature. Find parks and protected areas near you using the BC Nature Guide. *https://bcnature.org/find-a-bc-nature-site/*
- BC Wildlife Federation (BCWF) Bog Blog - A website for sharing information and ideas on wetland stewardship and education in B.C.. There is a map of B.C. organized into regions. Select your region and see the links to local organizations that support wetland stewardship and education. *www.bcwfbogblog.com/home*
- Contact your local Naturalists' Club for suggestions. *https://bcnature.org/find-a-bc-nature-club/*

- Contact local municipal or regional parks offices to see if their parks have ponds suitable for a class field trip

BC Parks with ponds or wetland sites:

The following sites are a few suggestions and it is recommended to contact your local BC Parks office to discuss ideal sites for field trips and to get the most current information regarding any special considerations at the site to be aware of such as season/life cycle stages, sensitive species and habitats, or other site or season specific considerations.

- Find parks near your school and filter by activity or facility.
  https://bcparks.ca/explore/parks/

Cariboo Chilcotin Coast Region

- Big Bar Lake Provincial Park - located near Clinton, B.C.
  www.env.gov.bc.ca/bcparks/explore/parkpgs/big_bar_lk/
- Lac le Jeune Provincial Park - located between Merritt and Kamloops, B.C.
  www.env.gov.bc.ca/bcparks/explore/parkpgs/laclejeune/#Nature
- Kentucky Alleyne Provincial Park - located 38 km south of Merrit
  www.env.gov.bc.ca/bcparks/explore/parkpgs/kentucky_alleyne/
- Mount Griffin Provincial Park - located near Revelstoke, B.C.
  www.env.gov.bc.ca/bcparks/explore/parkpgs/mt_griffin/
- Ten Mile Lake Provincial Park - located 12km north of Quesnel
  www.env.gov.bc.ca/bcparks/explore/parkpgs/ten_mile/

Kootenay Rockies

- Columbia Lake Provincial Park - located near Invermere, Canal Flat and Cranbrook, B.C.
  www.env.gov.bc.ca/bcparks/explore/parkpgs/columbia_lk/
- Grohman Narrows Provincial Park - located near Nelson, B.C.
  www.env.gov.bc.ca/bcparks/explore/parkpgs/grohman_narrows/

Northern B.C.

- Eskers Provincial Park - located near Prince George
  www.env.gov.bc.ca/bcparks/explore/parkpgs/eskers/

Thompson Okanagan

- Vaseuax Lake Provincial Park - located near Oliver and Okanagan Falls, B.C.
  www.env.gov.bc.ca/bcparks/explore/parkpgs/vaseux_lk/
- Fintry Provincial Park and Protected Area - locaed near Vernon, B.C.
  www.env.gov.bc.ca/bcparks/explore/parkpgs/fintry/

Vancouver, Coast and Mountains

- Sargeant Bay Provincial Park - located near Sechelt, B.C.
  www.env.gov.bc.ca/bcparks/explore/parkpgs/sargeant/
- Inland Lake Provinical Park- located 7km north of Powell River
  www.env.gov.bc.ca/bcparks/explore/parkpgs/inland_lk/
- Spirea Trail in Golden Ears Provincial Park - located 11km north of Maple Ridge
  www.env.gov.bc.ca/bcparks/explore/parkpgs/golden_ears/

- Rolley Lake Provincial Park - located 23km northwest of Mission
  www.env.gov.bc.ca/bcparks/explore/parkpgs/rolley_lk/
- Sasquatch Provincial Park (Beaver Pond Trail) - located 6km north of Harrison Hot Springs
  www.env.gov.bc.ca/bcparks/explore/parkpgs/sasquatch/

Vancouver Island

- Hemer Provincial Park - located near Nanaimo, B.C.
  www.env.gov.bc.ca/bcparks/explore/parkpgs/hemer/

Other pond or wetland sites:

Location (Nearby Town)	Name of Wetland	Link
Lower Mainland & Fraser Valley • Fraser Valley Wetland Coalition: *fvwc.ca* • University of the Fraser Valley: *ufv.ca* • Metro Vancouver Regional Parks: *metrovancouver.org/services/parks* • Fraser Valley Regional District Parks: *fvrd.ca/EN/main/parks-recreation/parks-trails.html* • Hope Mountain Centre for Outdoor Learning: *hopemountain.org*		
Mission	Hatzic Wetlands, Neilson Regional Park	*fvrd.ca/EN/main/parks-recreation/parks-trails/neilson-regional-park.html*
Chilliwack	Great Blue Heron Nature Reserve	*chilliwackblueheron.com*
Dewdney	Dewdney Slough	*fvrd.ca/EN/main/parks-recreation/parks-trails/dewdney-regional-park.html*
Dewdney	Chilqua Slough	-
Langley	Campbell Valley Regional Park	*metrovancouver.org/services/parks/parks-greenways-reserves/campbell-valley-regional-park*
Coquitlam	Minnekhada Regional Park	*metrovancouver.org/services/parks/parks-greenways-reserves/minnekhada-regional-park*
Popkum	Cheam Lake Wetlands Regional Park	*fvrd.ca/EN/main/parks-recreation/parks-trails/cheam-lake-wetlands-regional-park.html*
Hope	Thacker Marsh, Thacker Regional Park	*fvrd.ca/EN/main/parks-recreation/parks-trails/thacker-regional-park.html*

Location (Nearby Town)	Name of Wetland	Link
Kootenays • Columbia Basin Environmental Education Network: *cbeen.ca* • Creston Valley Wildlife Management Area: *crestonwildlife.ca* • Blue Lake Camp, Columbia Outdoor School: *https://columbiaoutdoorschool.com/day-programs*		
Cranbrook	Creston Valley Wildlife Management Area	*crestonwildlife.ca*
Cranbrook	Blue Lake	*columbiaoutdoorschool.com*
Vancouver Island • CRD Regional Parks: *crd.bc.ca/parks-recreation-culture/parks-trails/crd-regional-parks* • Cowichan Valley Regional District Parks: *cvrd.bc.ca/109/Regional-Parks* • Peninsula Streams Society: *peninsulastreams.ca*		
Victoria	Swan Lake	*swanlake.bc.ca/index.php*
Victoria	Rithet's Bog	*rithetsbog.org*

Preparing for Your Trip

Checklist

Make your field trip plan early. Gather all permissions and required forms, get your class prepared, and order or make your supplies.

Field Trip Materials

Having "exploration tools" for your field trip to the pond can help focus the students and enhance their learning. Basic materials, such as clipboards and sit-upons, can make outdoor learning more comfortable. Many tools are inexpensive and easy to make--making them together as a class can be a fun way to start learning about the field trip topic and activities.

Other ideas for making your own field studies equipment:

- *Outdoor Classroom Essentials: materials to make or bring outdoors with your students. https://hctfeducation.ca/file/outdoor-classroom-essentials.pdf*
- *Get Outdoors Basics Bag, available for purchase from https://resourceroom.hctfeducation.ca/products/get-outdoors-2*

Some Common Pond Equipment:

- Make or use the Pond Life Journal (see Copy Pages) to record observations.
- **Binoculars** - Bring or borrow if available or have younger students make their own out of toilet paper roll tubes. See How to Use Binoculars: *https://hctfeducation.ca/file/how-to-use-binoculars.pdf*
- **Field guides** - There are lots of great pond field guides available to use (see the Resource section for suggestions) or make your own field guides. Laminated identification sheets are ideal in the field or use ziploc bags to keep them dry. See Copy Pages for Pond Identification Cards.
- **Dip nets** - Can be purchased from an aquarium shop, or make your own out of a metal coat hanger and cheesecloth (see How to Make a Dip Net). Make enough to have one dip net for every 1-2 students. A few long-handled nets can also be made by securely attaching the handle of a kitchen sieve to a pole/old broomstick with duct tape.
- **Turkey basters** - For sucking up small samples of pond water. Do not use turkey basters to collect tadpoles or macroinvertebrates as they are too fragile and will be harmed.
- **Collection containers** - White plastic works best for viewing the critters. Fill them part way with water and put collected animals in them to observe. Numerous small recycled containers (e.g. from cottage cheese, yogurt) and white ice cube trays can be used to sort animals. Larger white basins can serve as an on-site "portable aquarium" for larger group observations and for sharing. Be sure to separate predators from their prey!

- **Spoons** - To gently transfer small animals from dip nets and vegetation to water-filled containers.
- **Magnifiers and pond scopes** - Look up close at the features of pond animals. Hand magnifiers with lanyards, or if available the pond scopes are great for younger students. Simple ones can be made by cutting open the bottom of an ice cream bucket and tightly securing plastic wrap along the top opening with a rubber band and duct tape. The plastic wrap serves as a lens that allows you to view the underwater world!
- **Rulers** - The size of the animals can help with identification.
- **Garbage bag** - Pick up trash that you find even if it isn't yours. Also handy for collecting and removing invasiveplant parts/seeds that you may find on your clothing and shoes.

Tip:

Attach brightly-coloured flagging tape on dip nets and magnifiers so they can be easily seen for collection in the grass and along the shore.

Things to Know Before You Go: Setting the Stage for Curiosity and Wonder

***"Asking 5 year old children to draw pictures** [at the pond] while being so excited was a lost cause. They wanted to run and explore. I'm glad I did so much pre-teaching!"*

- K teacher, Coquihalla Elementary School

Field trips in nature can be some of the most memorable and meaningful learning experiences for your students, opening a door of wonder and curiosity about the world. Help spark your students' interest by considering some inquiry questions before your trip. Foster a sense of social responsibility early to build appreciation for nature, encourage proper outdoor etiquette and minimize your impact in sensitive outdoor places.

Pond Inquiry

Introduce students to the animals, plants and habitats that you might see on your field trip. Play games to learn about life cycles, adaptations and pond habitats. Look at photos, read books, and watch videos about pond habitats and the life found there.

Sample Inquiry Questions

- What plants and animals can be found living in and around a pond? How are they similar or different to those found in other habitats that you may have been to or learned about?
- What are the life cycles of some animals at the pond? Which undergo metamorphosis? (frogs, butterflies, many aquatic insects like dragonflies and mosquitos).
- How are ponds and other water bodies similar or different?
- Was this pond always here? What might it have been like in the past? How did it form? What might it look like in the future?
- What happens at the pond in this season? At different times of year? Does the water freeze in the winter? What happens to the pond life when it gets cold?
- How might we tell if the pond is healthy or polluted?
- What else would students like to know about ponds? Give your students some time to come up with inquiry questions. Create a K/W/L (what I know, what I wonder, what I learned) chart, to guide pre-trip learning and to revisit after the field trip.

Social Responsibility

Start building an environmental ethic as early as possible in the school year to reinforce on outings in and around the schoolyard and on field trips. Have students collectively come up with rules on how to treat living things in the schoolyard and on the field trip (such as stay on the trail, leave flowers for all to enjoy, treat all animals with gentle care and respect). Create a pledge to care for nature and repeat it often ("With my pinky, I do swear, to respect nature everywhere…") Play games, do sensory awareness activities and sing songs to foster an environmental ethic among your students. See the sample pre-field trip activities to build social responsibility on the left, in the Additional Pond Activities and Resources section, and the Copy Page on Conservation Ethics.

Pre-Field Trip Learning

Features and Adaptations

Build a Bug

One way to learn more about these animals' features and adaptations before the field trip is to "build a bug" by dressing up someone in the class, or by making a macroinvertebrate out of clay using items that represent the animal's features. See the "Features and Adaptations Table" on page 4 for some drawings of common freshwater macroinvertebrates and their adaptations, and a table of items that could be used in a dress-up or make a macroinvertebrate craft.

Food Chains

Food Chain Tag

Have your students draw a pond food chain. Use the Trophic Level of Some Pond Animals table on page 5 as a reference and add other animals that the students suggest, such as fish, ducks, and beavers. Play tag where a pond predator tries to tag its prey (have the students decide which animals should be the predators and prey). You can make it simple where a single type of predator tries to tag its prey, or make it more complex. For example, the herons could tag the fish, who tag the dragonfly nymphs who tag the tadpoles. Anyone tagged gets frozen but can be released back into the circle of life by detritivores, such as freshwater shrimp, or decomposers, such as bacteria. How is energy transferred in the pond food chain?

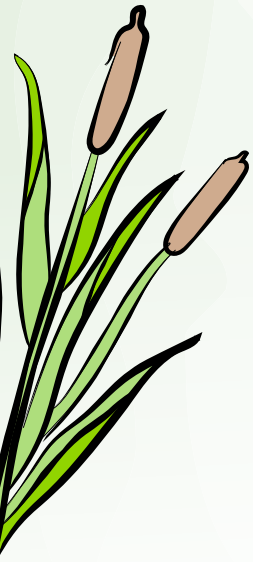
Life Cycles

Frog Spawn Relay

A relay race that simulates the life cycle of a frog from egg to tadpole to adult frog. Download the activity here: *https://hctfeducation.ca/file/frog-spawn-relay.pdf*

Sample pre-field trip activities to build social responsibility:

- ***Ethi-Thinking/ Des Activités Nuisibles (Project WILD/Atout FAUNE)*** *Students consider activities that are harmful to wildlife and the environment and why; recommend alternatives activities.*
- ***Playing Lightly on the Earth/ Nos Jeux Sont-ils Inoffensifs? (Project WILD; Atout FAUNE)*** *Evaluate the schoolyard for signs of games that have harmed the environment. What could have caused the damage and how could it be prevented? Create schoolyard games that don't harm the environment.*



You Made it to the Pond!

No doubt your students are excited to get out and explore. Before you begin you should review with the students the safety rules and conservation ethics that they helped develop. Remind them that they are guests here and that the quieter they are, the more likely they are to see the wildlife inhabitants.

Here are a few things for your students to remember so they can be good stewards of the pond, and for you to demonstrate to them before they begin their exploration.

Safety and Conservation Ethics

Review safety guidelines and conservation ethics (see Tips for Teaching Outdoors *https://hctfeducation.ca/file/field-trip-safety.pdf*). Have the students repeat their stewardship pledge. (Example Pond Protection Pledge: "I promise to treat all creatures with gentle care and respect. I will keep them in enough water at all times and I will return them to the same place where I found them.") Remind the students that they are guests in a special place; the pond is home to many animals and is a nursery for young animals.

Field Trip Activities

Begin with an Energy Burner!

Especially after a long drive, it can be helpful to start a field trip off with an active "energy burner" game before settling down for some focused exploration. Find an open area away from the water where the students can safely run around without disturbing wildlife or trampling plants.

Any version of tag can be transformed into a game of pond predator and prey, where several people who are "it" are the predators (such as dragonflies) and the others are its prey (such as mosquitos). Have the students choose their pond predators and prey based on their in-class learning. When the prey are tagged, they join the predators. After a given amount of time, any predator that hasn't tagged anyone becomes prey.

Frog Jump

Lay out 5-10 makers (cones, spot markers, etc) or use a rope it out as straight as possible. Create a "Start" line at one end. Tell the students pretend they are frogs and jump to each marker or if using a rope have them jump as far as they can then continue jumping along until end line where they will wait for the rest of the frogs. Begin by calling in each student with them singing the song:

Two little frogs sitting on a hill,
One named Jack and one named Jill.
"Jump" said Jack. "Jump" said Jill

Cycle through as many times as you need to burn off some of the energy!

Sensory Awareness

After burning off some energy, the students will be ready to focus their attention to explore and inquire about the pond and pond life. A sensory awareness activity is a great way to create a calming and centering activity that allows the outdoor field trip location to be fully experienced by warming up each of the senses. The sensory wake-up circle is a quick little activity to get things started.

Sensory Wake Up Circle (Get Outdoors!)

Everyone in the class forms a circle in silence and the teacher guides them to slowly focus on one sense at a time, "waking up" each sense. Wake up the sense of touch by rubbing your hands together vigorously. Feel all the energy that you create by rubbing your hands together. Put your energized hands over your eyes to wake them up. Then take them off, look up high and down low. Do you notice anything that you didn't see before? Rub your hands together again as fast as you can. Wake up your sense of smell by putting your hands over your nose. Remove your hands and take a big sniff. What do you smell? How would you describe the smells in the air? Is it different than at the school? Continue to do the same for all the senses: taste the air (or raindrops), close your eyes and count how many sounds you can hear and in which directions they are coming from. Use "deer ears" to channel sounds from in front and then from behind you.

Inquire and Investigate

As the students discover the pond environment using their senses, have them think of and record all the questions that arise. Tell them to resist temptation to answer the questions but simply to wonder and wonder some more. Discuss as a group the questions that arose and how they may go about further investigation during the field trip or back in class.

Tips and Tricks

- *Set boundaries right at the start. For example, there are 2 places to dipnet: around the small rocks near the bench or along the stretch of pond by the big rock.*
- *Transfer animals into larger buckets that are kept in the shade. Have some students monitor these buckets to ensure that the water isn't warming up. Warm water has less oxygen and can put stress on the aquatic animals. On hot days replenish the water supply in the observation buckets to keep the animals cool and make sure to gently return the animals to the location in which the animals were collected after short observation sessions.*
- *Cleaning up! In order to get a free ticket to snack/lunch, have each student bring a cleaned out bucket and a clean net to you. Otherwise you will be stuck doing it.*

Exploring Place with Inquiry

This activity can be used to ignite students in inquiry-based learning at the pond. Students are engaged outdoors in small groups using a selection of different tools to enhance their exploration. The physical tools (such as measuring tapes, magnifying glasses, thermometers, dip nets, trowels or other simple tools of choice) offer a means for interaction between student and nature, supporting student curiosity and playful exploration of the natural world around them. Students are tasked to come up with some questions from their explorations. The activity can stop there, or be extended to have these questions then become the basis for further inquiry-based learning, be it student-led or teacher guided. See *https://hctfeducation.ca/file/exploring-place-with-inquiry.pdf* for a full description of the activity.

Investigating Pond Life

If you do one hands-on activity at the pond, let pond dipping be it! Pond dipping is an easy, active activity that gives students the opportunity to learn about fascinating animals that they likely wouldn't encounter otherwise. The aquatic invertebrates that are collected when pond dipping are an essential link in wetland food chains, providing food for fish, birds, frogs, and other invertebrates.

Without a healthy invertebrate population we wouldn't have many wildlife species that we associate with wetlands. In fact, by looking closely at the types and numbers of invertebrates that are found at a wetland, we can characterize water quality. By gently collecting and observing aquatic invertebrates students can observe a world in miniature, where they can learn about adaptations to an underwater life, life cycles and metamorphosis, food chains and webs, wetland health and biodiversity, and our role as stewards of healthy wetlands.

Tips for Successful Pond Dipping:

1. **Put water in your bucket.** Ask the students what every creature needs to live.
2. **How to dip net.** Demonstrate how to dip net. Hold the net tightly and gently wave it through the water and submerged vegetation while drawing a figure 8. Ask where

critters might be found in the pond (such as among the cattails, in the mud, under a lilypad). Swipe your net through the water and even if you don't see anything right away, put the contents of the net into the WATER in your bucket because guaranteed there will be something living in the net and it needs WATER. They get very excited so you'll have to remind them of this a lot. Try not to dip into too much mud or vegetation or it will be difficult to see any animals, will make the water mucky, and could damage the dip net.

3. **How to transfer animals from net to bucket.** Transfer the animals by turning the net inside out into the container of water. Tip: Don't use your hands to transfer animals from the net to the water—you may accidentally harm the small and delicate animals. Also, some aquatic insects, such as water boatmen, backswimmers, and giant water bugs, can deliver a painful (but harmless) bite. Instead use spoons or turn the net inside out into the water if it isn't too muddy or full of vegetation.

    - Students should work with a buddy.
    - Each pair should have a container with water in it, a spoon, and dip net. Water viewers and turkey basters may also be useful.
    - Have a separate, central location designated as a group viewing area, with larger basins, magnifiers, and field guides.
    - Identify the dip netting locations and set clear boundaries. If dipping from a boardwalk, have the students lie on their bellies or kneel at the edge of the pond or boardwalk at a designated location where the water is not deep.
    - Students should take turns using dip nets, while their partner is ready with a spoon and the container with water. Try dipping in different parts of the pond such as along the water surface, around vegetation, and along the muddy bottom.

Activities to do after you have collected the animals from the pond:

- Even without identifying the animals, the students will discover so much about pond life!
- Use magnifiers to observe what they collected and watch how the animals move in the water. How do they breathe? How and what do they eat? Many more questions will arise. Write them all down to discuss and use for further investigation.
- Make sketches, take photographs, use rulers to estimate the size of the animals.
- Have the students sort the animals they collected and transfer them into larger collection containers with a corresponding drawing or photograph of the animal at the central location.
- Tally the number of different types of animals collected. Use field guides or ID cards to identify what was collected or to have a macroinvertebrate scavenger hunt or bingo. See Copy Pages for Pond Identification Cards..
- Use the animals collected to learn about life cycle stages. Are the animals adults or juveniles? Do they go through metamorphosis? Were any animals collected that were found in more than one stage of their life cycle (such as larva or nymph and adult forms)? How are the different stages alike or different?

Tip:

Show the students that it requires keen observation skills and patience to find small animals in the dip net. If your net has mud or vegetation in it, take a few moments to gently and carefully move the contents of the net around using spoons or other tools, looking for tiny organisms wriggling in the net. Use your tools to gently gather the animals from the nets and place into the container of water.

A Note on Field Identification:

Do not let a lack of knowledge on aquatic invertebrates hinder your exploration! In fact, learning and exploring together is highly recommended and builds a shared sense of wonder and excitement among teachers and students alike.

Make detailed observations and make up your own names for the animals that you find based on your observations- like the "three tailed feathery gilled quick swimmer"! Remember that many scientific names are in fact Latin descriptions for what naturalists observed. Take photographs or use field guides to help identify what you found. Consult with experts or use online sources to aid in identification upon your return home.

- Learn about and observe how macroinvertebrates feed, their mouthparts, and food chains. Follow up by playing "Macroinvertebrate Simon Says" (See description in Easy Wrap-up Ideas at the Pond)

Easy Wrap-up Ideas at the Pond

Here are some games that are a fun and easy way to wrap up the field trip either on site or back in the classroom.

Sharing Circle

Make sure to leave a few minutes before you go back to school to form a sharing and gratitude circle. Have the students share something that was special to them about the field trip and what they are grateful that the pond gave to them today. Ask the students what they can do to help to respect and protect ponds and wetlands.

Animal Parts Charades

Divide the class into groups of students, 4-5 in a team. Assign each team an animal that lives at the pond. Each group has to work together to collectively become the animal by moving and behaving as it would. Give the students a couple of minutes to come up with a strategy to become their animal and to practice, then have them perform in front of the rest of the class who has to try to guess their animal. (Adapted from: *Sharing Nature with Children*. 1998. Joseph Cornell. Dawn Publications, California.)

Macroinvertebrate Simon Says

Role play and learn about the different ways that macroinvertebrates feed, then play "Simon Says". This activity complements pond dipping.

- **Background:**
  - Macroinvertebrates can be classified into different groups based on their feeding habits. The feeding habits of some common macroinvertebrates are shredders, collectors, scrapers (or grazers), and predators.
  - Shredders chew on intact or large pieces of material. Leaves, needles, flowers, and twigs that fall from trees and shrubs on the shore into the water are the most common food for shredders. (Stoneflies)

- Collectors eat small particles of organic matter that is suspended in the water by catching it with net-like features or other adaptations. (Craneflies, blackflies)
- Scrapers (also called grazers) remove and eat the algae growing on rocks in shallow water. (Caddisflies, mayflies)
- Predators eat other animals. They have special mouthparts called mandibles that they use to pierce their prey and hold it while they eat. (Dragonflies)

- **Procedure:**

1. Divide the students into six groups: Dragonflies, Craneflies, Blackflies, Mayflies, Stoneflies, and Caddisflies.
2. Explain the different feeding habits of each group and assign them an action.
    - **Dragonflies** are predators. They have long mouthparts that extend and unfold to catch prey. For their action, have the students put their hands to their mouths with their elbows tucked down in front of them. To mimic eating, have the students straighten their elbows and make an upward scooping action. Students can also hold hands out with one up high and one down low and clap them together in a large "chomping" motion.
    - **Craneflies** are collectors. They wiggle around until they find a place to feed. The action should be a wiggly walk.
    - **Blackflies** are also collectors, but they collect with a large net-like feature on their head, which they use to gather food. They can lower it down to their mouths to eat. The action should be placing your hands above your head, and lowering them down to your mouth.
    - **Stoneflies** are shredders. They wait for leaves or other debris to fall into the water and then they tear off small pieces to eat. The action should be similar to tearing up a piece of paper.
    - **Caddisflies** and **mayflies** are scrapers. They scrape algae off rocks and sticks. This action should be similar to scratching someone's back.
3. After groups have learned their actions, have them learn all the other groups' actions. Have them act out their part at the same time for one minute.
4. Then test the students on all of the feeding habits by playing "Simon Says" with the actions. (Example: Simon says act like a blackfly. Everyone should have their hands above their head and lower it down to your mouth.)

(Adapted from *Bugs Don't Bug Me*. Utah State University, Water Quality Extension: *extension.usu.edu/waterquality/files-ou/Lesson-Plans/Aquatic-Macroinvertebrate-lesson-plans/BugsDontBugMe.pdf)*

Post Trip Learning Extensions and Connections

Back at school take some time to reflect upon and extend the field trip learning. Play pond games. Write stories about or make artwork based on the field trip experience. Share your experiences with a buddy class. See below for some suggested activities to do with your class after the field trip.

Evaluate

Revisit the K/W/L chart and inquiry questions. What did you learn? What was different than you expected? What else do we want to know about ponds?

Communicate

- **Aqua Words/À Vau-L'eau** - Students describe the importance of water to people and wildlife and write poetry inspired by water. (Project WILD/Atout FAUNE)
- Write a story describing a day in the life of an animal that lives at the pond or wetland.
- Have the students work together to create a mural or poster reflecting their visit to the wetland. If a class mural was made prior to the field trip, have the students add to it based on the field trip experience.
- Create "Dragontwigs" from twigs and maple seeds. Place two pairs of maple seeds ("helicopters") together with their seed ends meeting, to make the wings of the dragonfly. Add a drop of glue to each end, then rest a twig on top. Let the glue dry. Turn over the dragonfly and add a line of paint to the edge of each wing. Paint or glue small beads or googly eyes on the twig for eyes.
- Create (or add to) a pond seasonal wheel showing the natural cycles and events throughout the year.
- Have a slideshow with photos or artwork that the students created and with their comments, quotes and observations, and present it to another class.

Apply and Innovate

Now that you have learned so much from your field trip your students may be inspired to want to teach others about the importance of ponds and other wetlands and to take action to help protect them.

- Help clean up or restore a wetland. Find out about stewardship opportunities for students from local naturalists' groups, BC Parks, or environmental organizations. Look for wetland stewardship and conservation groups by region on the BC Wildlife Federation's Bog Blog: www.*bcwfbogblog.com/home*
- Participate in citizen science initiatives such as Frogwatch, to support wetland research and conservation. *www.naturewatch.ca/frogwatch/british-columbia*
- Celebrate World Wetlands Day (each year on February 2nd) or World Water Day (each year on March 22nd) by participating in stewardship projects, teaching others about wetlands, or by raising money to support an organization that protects wetlands.
- Take on an action project at a wetland. Read Take Action! Teacher and Student Guide by Ducks Unlimited Canada for ideas. *https://www.ducks.ca/resources/educators/taking-action-student-teacher-guide/*

Additional Pond Activities and Resources

There are so many learning opportunities at the pond! If you are looking for more ideas, here are some other favourite activities and resources to support you before you go, during your trip, and when you return.

Additional Classroom and Schoolyard Activities

Social Responsibility

Wildlife is Everywhere/La Faune est Partout

(Project WILD/Atout FAUNE; Growing Up Wild)

This activity builds an awareness that all living things deserve respect and have needs similar to our own. In this activity, the students go on a hunt for "mini-beasts", looking for signs of wildlife in the classroom (insect exoskeletons, spider webs near windows and baseboards, dead insects near lights, invertebrates living in plants). and realize that we share our environment with other living beings. Then the students go outside in the schoolyard to look for animals or signs that animals have been there (tracks, feathers, droppings, webs), using magnifiers or focusing tools to look closely. Record what is found in drawings or writing and discuss findings, emphasizing our shared spaces and homes.

No Trace Song

Teach the students the No Trace Song (modified from Scouting Ahead, A Leader's Guide to Teaching and Learning Leave No Trace. USDA Forest Service, 1993). Sung to the tune of Row, Row, Row Your Boat:

Sack, sack, sack your trash
Put it in a bag
Pack it out upon your back
'Cause leaving it's a drag

Sniff, sniff, sniff the flowers
Leave them where they grow
Endangered plants you pick today
Your kids may never know

Leave, leave, leave no trace
With your field trip gear
'Cause no one, no one at the park
Wants to see that you've been here

Think, plan, and be aware
In nature's fragile space
In wilderness we're visitors
Protect this special place

Pond and Wetland Habitats

Create a Pond

Have the class cooperatively paint a pond mural for the season/s in which you will visit the pond. Draw or cut out pictures of animals and plants found at a pond. Have the students place the animals and plants on the mural where they would expect them to be found (at the water's edge, under the water, on the surface of the water, in the air, on plants nearby, in surrounding forest, etc.). Revisit the pond mural after the field trip.

Wetland Metaphors/Terres Humides: Analogies

(Project WILD/Atout FAUNE)

Students learn about the ecological roles of wetlands and are then presented with "mystery objects", each representing a natural function of wetlands. Students work in teams to discuss and describe the relationship between their mystery object and the ecological roles that wetlands play. Some suggested objects and their wetland functions include:

Object	Wetland Metaphor
Sponge	Absorbs water from run off, retains moisture
Pillow	Resting place for migratory birds
Egg beater	Mixes nutrients and oxygen into the water
Cradle	A nursery that shelters, feeds, and protects young wildlife
Strainer	Strains silt and debris from the water
Coffee filter	Filters small impurities from the water
Antacid	Neutralizes toxins
Cereal	Provides nutrient-rich foods
Soap	Cleans the environment

Life Cycle Games

Are you Me?/Petit à Petit (Project WILD /Atout FAUNE)

- In this activity students learn about life cycles and the different forms that some aquatic animals have in their juvenile and adult forms. Students are given a card with a picture of an aquatic animal (see the links for the animal cards in French or English, below). Each animal has a pair: a young animal and its corresponding adult. Students find their "parent" or "baby" by circulating and finding someone else with the matching animal. Some young animals, such as birds and mammals, look very much like their adult form. Others, including many aquatic insects, undergo metamorphosis and have drastically different lifestyles and forms as juveniles and adults. (For pre-reading grade levels, learn about the animals that have metamorphosis in advance.)

- Download juvenile and adult aquatic Are You Me cards here:
  English: *https://hctfeducation.ca/file/are-you-me-cards.pdf*
  French: *https://hctfeducation.ca/file/are-you-me-cards-FR.pdf*

Are You Mine?

- Students learn about the life stages of a frog and put pictures of them in the correct order.
  https://hctfeducation.ca/file/are-you-mine.pdf

Additional Field Trip Activities

Energy Burners

Quick Frozen Critters/Proies et Prédateurs

(Project WILD/Atout FAUNE)

An active game of freeze tag between predators and prey. Choose pairs of predators and prey from animals that students have learned about that live at the pond, such as fish and aquatic insects (e.g. sunfish and mayflies), swallows and mosquitos, or wolves and beavers. Have the students move like their predator/prey animals. Prey are safe from predators if they are in designated temporary shelter areas or are "frozen" (representing that they are camouflaged). But prey can't stay frozen or sheltered indefinitely--to survive the prey need to gather a certain number of food tokens, which are scattered throughout the play area and predators need to tag at least two prey in order to survive. After several minutes see who has survived. Play again, allowing students who were predators to become prey and vice versa.

Hungry Frogs (a pond version of "Red Light, Green Light").

Assign a student to be a frog and position the frog at one end of a field, representing the pond. The other students are mosquitoes. The insects must fly across the pond when the frog's back is turned (green light) and freeze when the frog faces forward (red light). If the "frog" sees the "mosquito" they have to go back to the start—meaning that the insects are eaten by the frog's long tongue if the frog sees them moving.

Sensory Awareness

The wonders of nature are all around us. Discovering them simply requires a bit of patience and practice, and for us to take some time to unplug from our modern technological world and to reconnect with our senses. The following recommended activities are easily done in any location, including the schoolyard, and help to develop awareness and connections to nature.

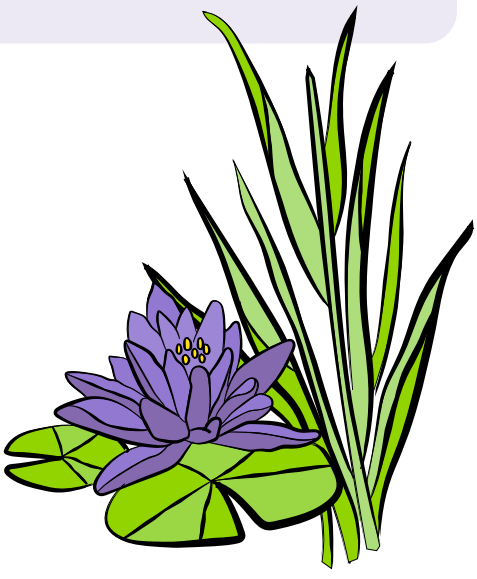
- **Sensory Awareness:** For Good Mind and Body. A selection of simple and engaging activities to build sensory awareness. *https://hctfeducation.ca/file/c2c-sensory-awareness.pdf*

- **Sense Walk:** Students use their five senses, one at a time, on a nature walk *https://hctfeducation.ca/file/sense-walk.pdf*

Stream Sense

In this activity students recognize how their senses provide them with details about aquatic ecosystems. The activity can be found here: *hctfeducation.ca/file/stream-sense.pdf*

- Guide students to the edge of the pond. Tell them they will be recording how they use their senses to observe the water. Choose a safe and appropriate location for the age group. (This activity can also be done away from the water's edge without touching the water, with a focus on observing the plant and animal life surrounding the pond.)
- Have students work with a buddy or in a small group.
- Review safety rules and conservation ethic.
- Hand out a Sensory Observation Sheet with areas to record information for each sense, pencil and clipboard.
- Explain that when they record their observations, students should write things down or draw things as they perceive them (when they look at things, they should describe shapes and colours. When they hear things they can write down imitations of that sound such as peep, gurgle, swish etc.).
- Throughout the trip, remind students about using their senses. Ask students to find a quiet spot near the water's edge and have them sit very still to look, smell, listen, and feel. (approx.15 minutes).
- Supply students with tools to improve the ability of their senses (such as a magnifier, dip net, binoculars, small container or ice cube tray)
- The following are questions that could be asked of students before, during, or after the pond visit:
    - **Sight:** What plants and animals do they see? Does the appearance of the water differ at different locations? Is the water moving?
    - **Sound:** What sounds does the water make? Can they hear animals? What does the wind sound like?
    - **Smell:** How do the smells near the water compare to those on the road or in a home? Does the water smell the same as the tap water?
    - **Touch:** What does the pond water feel like? How does the soil near the pond feel compared to soil in the woods? Are the rocks near the water's edge smooth or rough?
- Conclusion: Have students share their Sensory Observation Sheets with the class.
- As the students explore the pond environment using their senses and tools in Stream Sense, above, have them think of and record all the questions that arise. Tell them to resist temptation to answer the questions but simply to wonder and wonder some more. Discuss as a group the questions that arose and how they may go about further investigation during the field trip or back in class.



Inquire and Investigate

Discover Plants

Choose pairs of similar plants to compare and investigate, sketch and/or measure (e.g. grass and sedge), noticing their similar and different features.

- **Investigate Cattail:** Cattails are often found along the margins of ponds, creeks, rivers, lakes and even wet roadside ditches. If you are in a place where cattail is abundant and where collection is permitted, gather one to investigate the various parts of this important wetland plant. See Copy Pages for a cattail study and features to observe.
- **Plant Succession Transects**: Over time, ponds and their associated vegetation change. As plants around a pond die, they build up the soil and make it drier, allowing different plants to move in and outcompete plants that require greater soil moisture. Over long periods of time, a pond may eventually dry up due to this natural process, known as succession. Students can observe and document the differences in plants growing at the edge of the water (or in the water) where the soil is moist and as they move away from the water source, where the soil is drier. Students can work in small groups and follow a linear transect from the pond boundary and moving away from the pond. Have the students stop at pre-determined distance intervals to record what plants they find and investigate soil moisture along the transect. Draw a map of the pond and its surrounding area with successive circles of plant life surrounding, from wettest to driest. Imagine what the pond and surroundings looked like 100 years ago? What might it look like 100 years in the future? (Adapted from: Plant Succession Crawl, p. 64 in *Sharing Nature with Children*. 1998. Joseph Cornell. Dawn Publications, California. 1998.)

Bird Watching

Wetlands are bird magnets! Go on a "non-identification" bird watch. Instead of trying to identify birds, make a checklist of bird colours, sizes, locations (such as on the water, perched in a tree, in the cattails) and behaviours (singing, a flock flying together, catching food) and see how many you can find.

Catch Insects on Land

- Many insects found on land—such as damselflies, dragonflies, mayflies, craneflies and mosquitos—started off their lives in the pond. After exploring the macroinvertebrates in the water, look at what insects are found on land. Have two children hold the corners of an old white pillowcase (a "beat sheet") underneath bushes, trees, or other vegetation, while another child gently shakes the vegetation over the pillowcase. You will be amazed to see how many insects and spiders you can find! Use "pooters" to gather up these tiny insects and put them into magnifying boxes for closer viewing.
- **Make a pooter.** What is a pooter you ask? It's a simple, useful, easy to make tool that you can use to gather small critters from a net and put into a container for up-close observation. *https://hctfeducation.ca/file/pooter.pdf*

Make a sweep net net. Make a net that you can use to catch butterflies, dragonflies, and to sweep through tall grasses and see what hidden creatures can be found. *wnit.org/outdoorelements/pdf/sweep_net_instructions.pdf*

Books and Other Resources

Field Guides

- **Aquatic Invasive Plants in B.C.**
  https://bcwfbogblog.files.wordpress.com/2014/03/aquatic-invasive-species-factsheet-live-ver.pdf

- **A Children's Guide to Aquatic Insects.** Moriya Rufer M.S. in Entomology University of Minnesota
  https://www.rmbel.info/wp-content/uploads/2015/02/AquaticInsects-childrensguide.pdf

- **Freshwater Invertebrate Key**.
  https://www.imperial.ac.uk/media/imperial-college/research-centres-and-groups/opal/WATER-4pp-chart.pdf

- **Identification Keys for Amphibians and Reptiles**.
  https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-conservation/amphibians-reptiles/amphibians-in-b-c/identification-keys

- **Pond Life. Revised and Updated A Golden Guide.** Reid, George K. Golden Books, St. Martin's Press. New York. 2001.

Educator Guides

- **Getting Little Feet Wet.** Project WET Foundation. 2017.
  https://resourceroom.hctfeducation.ca/products/getting-little-feet-wet-2

- **Get Outdoors!: An Educator's Guide to Outdoor Classrooms in Parks, School grounds and Other Special Places.** HCTF Education. 2009.
  https://resourceroom.hctfeducation.ca/products/get-outdoors

- **Growing Up WILD. Council for Environmental Education.** 2012.
  https://resourceroom.hctfeducation.ca/products/growing-up-wild

- **Project WILD**. Canadian Wildlife Federation, 2010. (Published in French as Atout-FAUNE.)

Story Books

- **Wetland Book Reading List,** pre-K to Grade 12:
  epa.gov/wetlands/wetlands-reading-list-pre-kindergarten-through-grade-12

- ***Animals of the Pond and Streams***, Julie Becker. EMC Corporation, Minneapolis; 1977; 55 p.; Describes ten animals inhabiting ponds and streams: turtle, blue heron, crayfish, otter, mallard duck, frog, beaver, catfish and dragonfly. Suggests child visit pond or stream and watch quietly to observe the many inhabitants

- ***Come Out, Muskrats***, Jim Arnosky. Lothrop, Lee and Shepard Books, New York; 1989; 28 p.; Colorful, realistic, pastel illustrations of wetlands. In late afternoon, muskrats come out of houses to swim in shallow wetlands and eat green water weeds, swim between water lilies and race among cattails until dawn.

- ***Dragonflies***, Cynthia Overbeck. Lerner Publications, Minneapolis; 1982; 48 p.; Provides easy to understand information on dragonflies, common members of wetlands communities. Explains the three stage process of development these insects undergo beginning in wetlands and other water bodies. Emphasizes the value of dragonflies and that they are not harmful.

- ***Fish Eyes***, Lois Ehleert. Harcourt Brace Jovanovich, New York; 1990; 34 p.; Simple, easy to understand and written for the very young reader as she or he learns to count the brilliantly colored fish swimming through the pages. Actively involves the student in the lives of fishes while teaching the child to count the many fish as they begin their life cycle in wetlands. Invites reader to put on a suit of scales, fins and tail, then swim downriver (from where she or he is born into as a fish, perhaps in wetland adjacent to a river).

- ***In the Small, Small Pond***, Denise Fleming: Henry Holt and Company, New York;. 1998; 32 p.; A child explores the wonders of the natural world in this rhyming, beautiful bright colored picture storybook about the lives of small animals and insects living around a freshwater pond.

- ***Let's Find Out About Frogs***, Corrine J. Nadeen. Franklin Watts, Inc., New York; 1972; 44 p.; Nice illustrations of frogs in wetlands habitats. Contains factual material about frogs in easy reading format suitable for children in the latter months of grade one to grade three, with information on: differences between frogs and toads, growth stages from egg to tadpole to adult frog and the community in which they live.

- ***The Noisy Counting Book***, Susan Schade and Jon Butler. Random House, New York; 1987; 8 p.; Counting book with delightful, attractive and funny illustrations of a boy who goes to fish in a quiet pond but soon becomes frustrated as rising noise disrupts quiet when first one frog says, "Ga-Dunk," then two ducks say, "Wak," and noise increases until six mosquitos say, "Bzzz," at which point boy hollers, "QUIET!"

- ***Puddles And Ponds***, Rose Wyler. J. Messner, New York; 1990; 32 p.; Describes some of the many living things inhabiting or visiting puddles and ponds. Information generally accurate. Suggested hands-on activities throughout book.

- ***Wetlands: Bogs, Marshes, And Swamps***, Lewis Buck. Parents Magazine Press, New York; 1974; 64 p.; Identifies and describes three of the more familiar types of wetlands: bogs, marshes, and swamps. Examines the Prairie Pothole region in the Midwest and central Canada, the breeding grounds for one-third of the North American waterfowl population in the chapter, "Life in a Duck Factory."

- ***What's in the Pond?*** Anne Hunter. Houghton Mifflin Harcourt. 1999; 32 p.; A fascinating picture book brings to life the creatures that live in and around a pond, from a water strider and a tadpole to a painted turtle and a red-winged blackbird and features informative text on each animal's characteristics and habits.

Other recommended primary storybooks:

- ***Jo MacDonald Saw a Pond,*** Mary Quattlebaum. Quattlebaum. Dawn Publications, California; 2011; 32 p.; Blurp. Croak. Quack. What is making those sounds? Come along with Jo MacDonald and learn about the wild creatures at the pond on her grandfather's farm. You'll find fish, frogs, ducks - and a few surprises. This delightful riff on "Old MacDonald Had a Farm" playfully introduces youngsters to the concept of ecosystems. Author Mary Quattlebaum engages little ones with rhythm, repetition, wordplay, and onomatopoeia and illustrator Laura Bryant charms them with lively watercolors of a pond community. And check out the outdoor activities and games in the back, sure to encourage young naturalists at home and school.

- ***Near One Cattail,*** Anthony D. Fredericks. Cattail: Turtles, Logs, and Leaping Frogs, Anthony D. Fredericks. Dawn Publications, California; 2005; 32 p.; Here is another field

trips between covers from Tony Fredericks, a funny but very astute professor. Here he visits wetlands inhabited by leaping frogs and zip-zipping dragonflies. Teachers will appreciate the accurate science and great illustrations. Kids will appreciate the humor and cadence of the text, while learning how the wetland creatures interact in their community. Two pages of Field Notes and fun facts at the back of the book offer intriguing information on these creatures.

- ***One Hungry Heron***, Carolyn Beck. Beck. Fitzhenry and Whiteside, Toronto; 2014; 32 p.; Told in clever rhyme, this is a counting book with a difference. Numbers are spelled out in bold text, decorated numerals adorn each page, and amounts are depicted by groupings of swimming, flapping, paddling, darting pond creatures. Up to ten and down again, the count goes forwards and backwards, as thunder rumbles in the background. Plip, plop, the rain begins and lightning flashes. Everything dives for shelter and stays hidden — until the sun comes out. Then life returns to the pond providing a delightful search and count last page.

- ***Over and Under the Pond***, Kate Messner. Messner. Chronicle Books, San Francisco; 2017; 48 p.; Discover the plants and animals that make up the rich, interconnected ecosystem of a mountain pond. Over the pond, the water is a mirror, reflecting the sky. But under the pond is a hidden world of minnows darting, beavers diving, tadpoles growing. These and many other secrets are waiting to be discovered. . . over and under the pond.

- ***Pond,*** Jim LaMarche. LaMarche. Simon and Schuster, New York; 2016; 40 p.; When Matt is out for a late winter hike he sees a trickle of water in the old deserted and junk filled dirt pit at the edge of his neighborhood. With quiet appreciation, Matt can imagine the pond that must once have been there, shining in the early spring light, freezing in the winter for skating and the perfect place for swimming in the summer.Can Matt's discovery transform a forgotten pond to its natural wonder?

- ***Pond Circle***, Betsy Franco. Franco. Margaret K. McElderry Books, New York; 2009; 32 p.; On a summer night by a small pond, all seems still. But a closer look reveals a world of activity—mayflies dart, beetles dive, frogs spring, skunks shuffle, and owls swoop. As a young girl watches, the circle of life unfolds. Betsy Franco's rhythmic, cumulative text makes this a lively read-aloud, and rich, luminous paintings by Stefano Vitale capture the bold beauty of nature. Young readers will be inspired to journey into their own backyards and discover the wonder of the living, breathing world around them.

- ***Scoot!***, Kathryn Falwell. Falwell. Greenwillow Books, New York; 2008; 32 p.; While their neighbors in the pond . . .leap! lurch! scamper! and splash! six silent turtles sit still as stones.Will the turtles ever move? Read this book and find out. Falwell's use of collages brings a unique texture to the story that gives the animals a lifelike quality. There is also a quick guide as to how to make certain textures using every day items like tree bark, useful for craft ideas.

- ***The Sixth Street Wetlands Detectives***, Diane Swanson. Swanson. 2004. Available at *https://www.strongnations.com/store/item_list.php?it=1&cat=3013*. The Nature Detective Series is a set of five books and activity guides, written by award winning BC author, Diane Swanson, developed specifically to address learning standards in the BC science curriculum. The series tells the stories of groups of adventurous nature detectives as they discover the life in five different ecosystems. The Sixth Street Wetlands Detectives introduces readers to the wonderful wetlands. It shows how plants and animals interact and adapt themselves to the wetlands, how living things

depend on non-living things, such as water, light and soil, and also presents examples of fossil wetlands life, First Nations' uses of wetlands and the ways people harm-and help-the wetlands.

Pond Songs and Poems

- **Romp in the Swamp**, Billy B.
  https://www.billybproductions.com/show/romp-in-the-swamp/

- **Wetland Rap**, Lucas Miller.
  www.youtube.com/watch?v=X33FX8pG-Dc

- **In the Pond**, Sung to the tune of "The Farmer in the Dell"
  (Animal Piggyback Songs, Warren Pub. 1990)
  The frog lives in the pond
  Her tongue is oh, so long.
  It reaches high to catch a fly,
  The frog lives in the pond.

- **The Pond Song**, sung to the tune of "There's a Hole in the Bottom of the Sea" (Knee High Nature, Spring in Alberta. Hayley and Wishart, 1991)
  There's some mud in the bottom of the pond
  There's some mud in the bottom of the pond
  There's some mud, there's some mud
  There's some mud in the bottom of the pond
  There's a frog in the mud in the bottom of the pond (x2)There's a frog, there's a frog,
  In the mud in the bottom of the pond
  (Repeat pattern as established with the following verses):
  There's a minnow in the frog in the mud in the bottom of the pond….
  There's a bug in the minnow in the frog in the mud in the bottom of the pond…
  There's a shrimp in the bug in the minnow in the frog in the mud in the bottom of the pond…
  There's algae in the shrimp in the bug in the minnow in the frog in the mud in the bottom of the pond…

- **A pond/marsh/wetland poem**:
  (More on sedges, rushes and grasses at: *centralcoastbiodiversity.org/grasses-sedges-and-rushes.html*)
  Sedges have edges
  Rushes are round
  Grasses are hollow right up from the ground (OR...willows abound where marshes are found)

- **Turtle**
  There was a little turtle
  That lived in a pond. (put hands together to make a pond)
  He swam in a circle, (make swimming movements)
  And he climbed on the rocks.
  He snapped at a mosquito, (pretend "snap" with fingers, like turtle mouth)
  He snapped at a flea, (repeat "snap")
  He snapped at a minnow, (repeat "snap")
  And he snapped at me. (repeat "snap")
  He caught the mosquito, (hands clap together)
  He caught the flea, (repeat clap)
  He caught the minnow, (repeat clap)
  But he didn't catch me! (point to self)

Student Resources

- **Field Notebook** with tips on stewardship, making nature observations and sketches. Includes pages for notes and sketches. From Ducks Unlimited Canada. *https://www.ducks.ca/resources/educators/student-field-notebook/*
- **Hinterland Who's Who Wetlands**. Resources from the Canadian Wildlife Federation includes photos, videos, and facts about wetlands in Canada. *http://www.hww.ca/en/wild-spaces/wetlands.html*
- **#MysteryMacro Quiz**. Test your knowledge and try to identify macroinvertebrates from photographs. *https://stroudcenter.org/news/mystery-macro-quiz/*
- **Wetlands: Plunge In! A Take Home Booklet**. Activities, games, and identification guides for pond life. From the Kananaskis Country Pond Life Discovery Pack. https://albertaparks.ca/media/3322/plungina.pdf

Organizations

- **BC Nature, Federation of BC Naturalists.** BC Nature is a federation of local natural history groups and represents over 53 local nature clubs throughout BC. Local clubs may be a source of information and expertise on local nature. *http://bcnature.org*
- **BC Wildlife Federation Wetlands Education Program**. Includes educational resources to learn about, map, and protect nearby wetlands. *http://www.bcwf.bc.ca*
- **Ducks Unlimited British Columbia**. A charitable organization with the mission to conserve, restore and manage wetlands and associated habitats for North America's waterfowl. *https://www.ducks.ca/places/british-columbia/*
- **Wetland Stewardship Partnership of BC**. A multiagency and organizational partnership that works towards advancing wetland conservation in B.C. *https://bcwetlands.ca*

Videos

- **American Beaver.** Awesome Animals. National Geographic Kids. *https://m.youtube.com/watch?v=Ic3x8OVYe80*
- **Aquatic Insects in Food Webs.** Cornell University's Naturalist Outreach. *https://m.youtube.com/watch?v=h0ir6RBUuJA*
- **A Baby Dragonfly's Mouth Will Give You Nightmares.** Deep Look PBS. *https://m.youtube.com/watch?v=EHo_9wnnUTE*
- **Bugs of the Underworld** DVD showcases life cycles of many aquatic invertebrates, available for purchase at *http://www.flyline.com*; clips also available for viewing on *www.youtube.com*

- **Building a Beaver Pond**. PBS Kids, Wild Kratts
  https://thinktv.pbslearningmedia.org/resource/05477d3c-3c1e-460b-b362-9f65fa9620d7/05477d3c-3c1e-460b-b362-9f65fa9620d7/

- **Metamorphosis: Change of Plans.** (Frog, Dragonfly, and Butterfly life cycles PBS
  https://thinktv.pbslearningmedia.org/resource/tdc02.sci.life.cyc.metamorph/metamorphosis-change-of-plans/

- **Sticky. Stretchy. Waterproof. The Amazing Underwater Tape of the Caddisfly.**
  Deep Look PBS.
  https://m.youtube.com/watch?v=Z3BHrzDHoYo

Websites and Apps

- ***https://www.inaturalist.org*** A global, citizen science app to connect with nature, explore and share your observations from the natural world. View what species have been recorded by others in a map view. Have experts help identify species that you see.

- ***https://ebird.org*** eBird is the world's largest biodiversity-related citizen science project, with more than 100 million bird sightings contributed each year by eBirders around the world. View what birds have been found at specific locations and contribute your own sightings to the project.

- ***https://bugguide.net*** An online community of naturalists who enjoy learning about and sharing our observations of insects, spiders, and other related creatures. You can have insects identified by experts.

- ***https://www.naturewatch.ca*** NatureWatch monitoring programs on flowering plants, frogs, ice, and worms, are suitable for all levels and interests, designed to develop scientific observation and data collection skills so that you can actively contribute to scientific understanding of Canada's environment. NatureWatch is a partnership between Environment Canada, Nature Canada, and several other organizations, with the aim of getting the Canadian public to help researchers track changes in the natural environment.

- **ibiome-wetland** app (Springbay Studio Ltd.) (Free Lite version available).
  Award winning kids educational game on biodiversity. Come explore the wetland habitat and all the amazing species within. Build marshes and swamps from scratch. Challenge kids to make plants and animals flourish by learning and following the laws of nature. Explore freshwater marsh, salt water marsh, and mangrove swamp. Unlock more than 50 species from numerous taxonomic groups that live in wetlands. Reinforces learning about food webs, ecosystems, energy and dynamics.

- ***http://www.wetlandnetwork.ca*** Access to practical tools and resources to help Canadians better understand and conserve wetlands.