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| Subject: | Pond | Grade: | 6 | Duration: | 2 hours |

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| Big Ideas: | Summative Assessment: |
| Multicellular organisms rely on internal systems to survive, reproduce, and interact with their environment. (Science, grade 6) | **Students will ask and answer questions through observation.** 1. How is a pond a system?
2. How am I connected to a pond (water system) in my everyday life?
3. How did I use systems thinking in this field study?
4. What questions do I still have about the pond and the organisms that live in them?
5. What is water quality?
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| Unit Understandings: |  | Content: |
| * All organisms are connected and interact with each other (competition, predatory-prey, symbiotic, parasitic relationships)
* Organisms also interact with the surrounding environment (abiotic factors) including energy, water, air and soil.
* How our actions impact an organism’s (positive and negative) ability to survive
* Living organisms have interdependent body systems that interact to sustain life
 |  | The basic structures and functions of body systems: * Excretory
* Reproductive
* Hormonal
* Nervous
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| Transfer: |  | Essential Questions: |
| * Understand that a variety organisms rely on internal systems to survive, reproduce, and interact with their environment
* Understand the interconnectedness of all living things
* Connect to place and understand their role and responsibility as stewards of the environment
 |  | * How am I interacting with systems in my everyday life?
* How can changes in the environment affect a community of organisms?
* How do living organisms adapt to, and interact with, their environment?
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|  | Concepts: |  |  | Curricular Competencies: |
|  | * System
* Interdependence
* Environment
 |  |  | * Experience and interpret local environment
* Demonstrate curiosity about the natural world
* Make observations
* Make ethical judgements about events, decisions and actions that consider the conditions of a particular time and place and assess appropriate ways to respond (ethical judgement)
* Make questions to answer or problems to solve through scientific inquiry
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| First People’s Principles of Learning: |  |
| Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place). **Cheakamus Centre Principles:****Place:** Students will explore and observe organisms within the pond ecosystem. **Inquiry:** Students will ask and answer questions through observation.**Community**: Students participate in citizen science by sharing data with other field study groups.  |  |
| Core Competencies: |
| **Communication:** * I ask and respond to simple, direct questions
* I am an active listener; I support and encourage the person speaking
* I can recount simple experiences and activities and tell something I learned

**Thinking:*** I can ask open-ended questions and gather information
* I get ideas when I use my senses to explore

**Personal and Social Emotional Learning:*** I can participate in classroom schools, community, or natural world
* I can identify how my actions and the actions of others affect my community and the natural environmental and can work to make positive change
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Field Study Planning:

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| Pre-visit connections: | Resources: |
| **Leading questions to discuss with class prior to visit:** * What is a pond?
* What are the primary characteristics of a pond?
* What organisms live in a pond ecosystem?

Attend a local pond in your area.  | **Books:** ‘Project Wet ’, A curriculum and activity guide.**Websites:*** The Pacific Stream Keepers’ Federation: <https://www.pskf.ca/>
* Lynn Canyon Ecology Centre: <http://www.lynncanyonecologycentre.ca/>
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|  **Please see ‘during visit connections’ below for more ideas to explore before your students’ visit ODS** |  |

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| During visit connections: | Resources: |
| **Introducing the Pond Bio blitz:**1. **What is a bio blitz?**

A Bio Blitz is an event that focuses on finding and identifying as many species as possible in a specific area over a short period. Today students will take part in a pond Bio Blitz at Cheakamus to see how many organisms they can find and identify.**Preparing to be interviewers (15 minutes):****Today, we will find and interview an organism.** Tell students they are going to explore and observe pond organisms in a Pond bio blitz, and then pick one that they are going to “interview” to learn more about it. That means asking the organisms questions that can be answered by looking more closely at the organism, since it cannot talk!**Model an interview of a person in which person cannot talk**.Choose a student volunteer (or counsellor) and explain that you are going to show some types of questions that can be asked by “interviewing” this volunteer. The person will not answer back verbally. Instead, you will observe the volunteer closely and answer your own questions. For example:* *What colour eyes do you have? I see you have greenish brownish eyes.*
* *How tall are you? Let us see, you are about one foot shorter than I am.*
* *What are you doing? Hmmm…you seem to be standing still, fidgeting a little bit; you keep looking over at the wall, interesting…*
* *What are you thinking? Oops! That is not a question that can be answered.*
* *How many other organisms of the same species nearby? Let us see, I believe I count 16…*

**Explain the difference between simple and deeper questions – both are useful in an interview.*** *Simple questions can be answered immediately through observation, and don’t have very long answers, e.g. what colour is it? How big is it? What are the main structures of its body? (have students brainstorm some more simple questions)*
* *Deeper questions need more time for observation, and include the organism’s relationship to its habitat and to other organisms, e.g. what is it doing? How many are here? Do they hang out together? What is the climate like in its habitat? (Have students brainstorm some more deep questions).*
 | * [Beetles: Walk and Talk](http://beetlesproject.org/resources/for-field-instructors/walk-and-talk/)
* [Beetles: I notice, I wonder, It reminds me of](http://beetlesproject.org/resources/for-field-instructors/notice-wonder-reminds/)
* [Beetles: Interview an organism](http://beetlesproject.org/resources/for-field-instructors/interview-an-organism/)

**Apps:**To help identify organisms not identified on the dichotomous keys, please download the following app on to your phone before coming up to Cheakamus:[Inaturalist](https://www.inaturalist.org/)**Resources Available at Cheakamus:*** Pond life ID cards
* Good water quality indicator cards
* **Utah State University: Pond Critter Cards**
* Dichotomous Key to Macroinvertebrate Life in the Pond
* Microscopes
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| **Assembling the Bio Blitz toolkit:** Arrange students in teams of 2-3. Give each team a net & a small bucket. Tell students that they are going on a short walk to the Hydro Pond, where they will conduct the Bio Blitz. |  |
| **Walking to the Hydro Pond:** Ask students walk & talk questions while walking to the pond. e.g. What is a Pond? Bigger than a \_\_\_\_\_\_\_, smaller than a \_\_\_\_\_\_\_. What are some questions you have about ponds and the organisms that live there? How is the pond a system? |  |
| **Building Ecosystem Literacy at the Hydro Pond:** Talk about the importance about thinking about organisms’ surroundings.Point out to students that it is easier to come up with deeper questions and understand organisms when you know a bit about where an organism lives and what it is like there.At the pond, circle students up & perform a ‘Sensory Warmup’. Ask the students the following questions:* *What does the pond smell like? What caused these smells? (smell)*
* *How many sounds can you hear? (hearing)*
* *What does it look like? (vision)*
* *What is the source of the pond: rainwater, seepage, or stream? (vision)*
* *What kind of plant life is growing in and around the pond (terrestrial vs. aquatic plants) (vision)*
* *What mammals, birds, and insects does the pond support? What evidence is there around the pond? (Tracks, scat, visuals, nests?) (vision)*
* Optional: Teach I notice, I wonder it reminds me of… for pond and surroundings.

Bring group back together & ask a few students to share their observations with the whole group. Students draw a quick sketch of the pond, and surrounding area (optional).Build Ecosystem literacy with students by sharing a few things that in influence life in the pond ecosystem:* *Living and non-living factors effect organisms ability to survive in the Pond ecosystem:*
* *Water: Organisms have to deal with currents. If something is in moving water, it has to live in moving currents or avoid them. Those that live in moving water are strong swimmers, or rock clingers. Try to figure out how your organism deals with moving water.*
* *Breathing: Organisms have to deal with breathing. Aquatic organisms you find living in this pond need oxygen from water, but other go to the surface to get oxygen from the air. When you find organisms, look for structures and behaviours that help you understand how it breathes.*

Brainstorm interview questions specific to the pond ecosystem for:* *Food*
* *Shelter*
* *Avoiding Predators*
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| **Preparing to Explore:****Invite students to slow down, get down, and look around for organisms.** Encourage students to think about how the surroundings might affect where they find organisms.**Explain that students will collect a pond sample.** Let your students know they will have time back at the Aquatics lab (about 10 minutes) to explore and look at different creatures before choosing an organism to focus on.**Activity logistics:** student groups natural boundaries, materials and timing. Split students into groups of 2-3. Model sampling technique (counsellor). Set boundaries for exploration, and explain pond safety rules. Choose a signal to call the group back together before releasing them.  |  |
| **Back at Aquatics Lab: (45 minutes)****Interviewing Organisms:** Students observe organisms using hand lens or microscopes, and then choose one organism to focus on. As students explore, help those that are running into difficulties in finding organisms. Focus on being a co-explorer. After 10 minutes, remind students to select an organism to interview.**Draw and record information:** Tell students they will sketch their organisms and record the information they find out during their interview. It may be helpful to model what you are saying by drawing it on a white board.* *When you find an organism, you are going to make a scientific sketch of it. That means you do not have to worry about making a pretty picture. You will be making a diagram showing the organisms’ structures and your observations. Draw the organism as accurately as you can. If your organism is very small, though, you might choose to draw it larger than life on your page.*
* *As you are sketching and interviewing your organism, write down questions that you ask the organism and any information you get as an answer. If you are referring to specific parts of the organism in your writing, you can use arrows to show what part of the organism you are talking about. You could even draw a little map showing the surroundings where you found your organism. Make sure to include the date and location somewhere on your page.*

Students record questions & answers as they observe organisms. Circulate as students conduct their interviews, and make sure they are asking both simple and deep questions. If students are having trouble coming up with questions, remind them to consider the organisms’ habitat and surroundings. Make sure students use both drawing and writing to record information.Individuals share observations and questions with each other. When students have had time to do an in-depth interview, call the groups together, and have each team share their questions and observations with another team.Group sharing & discussion: Ask a few students to share an interesting question or observation. Depending on what they say, consider leading a discussion about the difference and similarities between organisms, or make some observations together as a group. Briefly discuss different ways aquatic organisms reproduce (visual aids).* *Amphibians (sexual, external)*
* *Invertebrate (complete vs. incomplete metamorphosis)*

*Complete: whirligig beetle, caddisfly* *Incomplete: dragonfly, damselfly, stonefly, mayfly*Briefly discuss what adaptations aquatic organisms have to survive in the pond (relate to body systems).* *Whirligig Beetle: Adults live on the water surface. They have split eyes for seeing above and below the water (used for foraging, and predator avoidance).*
* *Dragonfly: nymphs and adults both predators. Nymphs have lower jaws (called labrum) that extend out to catch insects. Looks like a bowl with pincers at the end of an extendible arm. They are ferocious predators that prey on anything they capture, including other aquatic insect larvae and small fish. Adults are aerial predators.*
* *Damselfly: nymphs have three gills at their tail end. Adults hold wings over their back (compared to dragonflies, which hold their wings open).*
* *Stonefly: nymphs have two tails, and gills in armpits. Adults hold wings flat over back.*
* *Mayfly: nymphs have three (sometimes two) tails, and have gills along abdomen. Adults hold wings straight up over back.*

Briefly discuss what adaptations aquatic organisms have to survive in the pond (relate to behaviours).* *Caddisfly: larvae live in cases or make nets to catch food suspended in flowing water. They attach themselves to side of rocks, where they build a net to capture algae, detritus, and small invertebrates suspended in flowing water. The nets filter water and funnel prey to where the caddisfly sits. Use a protective case to help them blend into local environment. In ponds surrounded by forests, caddisflies build “log cabin” case. In small pebble streams, caddisflies construct a cylinder shape. Other species build an elongated pyramid using plant matter.*
* *Aquatic insects are susceptible to a wide range of predators, including fish, birds, larger insects & an assortment of other animals. They have many methods to avoid predators, including vigilance, staying hidden, and camouflage, speed to escape predators, being active at times when their predators are not, and having noxious qualities that make them unappetizing to predators*.
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| **Identifying the Organism (to be completed before or after interview):*** Tell students they will use a dichotomous key to identify their organism.
* Demonstrate how to use the dichotomous key.
* Students use the key in teams to figure out what their organism is.
* Circulate, trouble-shoot, be a co-investigator, and ask questions.
* Students have the option to use Pond Critter Cards to find out more information about the organism.

**Discussing Findings:** Student share what organisms they found. Write list of organisms on white board. Summarize results:* *What aquatic organisms live in the pond?*
* *Where do we find the organisms? –shallow zone, middle/open water, bottom sediment (mud or sand?), near shoreline*
* *Diversity: - how many types of species in pond*
* *Quantity: how many organisms were found in total*
* *How does this compare to data collected by other field study groups (citizen science)*

Focus the discussion on the relationship between organisms* *Can we construct a food chain with organisms found (on whiteboard)*

Ask students, what do these organisms tell us about the health of the pond ecosystem? * *Organismslity.*
* *Pollution sensitive organisms found in good quality water: stonefly, caddisfly, riffle beetle, may fly*
* *Somewhat pollution tolerant organisms found in good or fair quality water: crayfish, crane fly, beetle larva, clam*
* *Pollution tolerant organisms found in any quality: aquatic worm, midge fly, leech, pond snails, water mite*
* *Human threats to wetlands: include trash dumping near streams, runoff from city storm drains where people dump chemicals, development of wetlands, agricultural run-off (fertilizers and pesticides), increased turbidity (sediment ) from logging & development practices*
* *Personal Connection: Ask students to ‘place’ themselves in the water system*
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| **Wrapping it up:**1. Revisit Essential Questions: Circle debrief*.*
* *How is a pond a system?*
* *What questions do you still have about pond ecosystems and the organisms that live in them?*
* *How am I connected to pond (water) systems in my everyday life?*
* *How have I used systems thinking in this field study?*
1. Encourage students to keep interviewing organisms while at Cheakamus Centre. Emphasize to students that they now have skills they can use with any organism anytime, and that scientists do this all the time. Ask students to think about simple and deep questions they could ask of organisms they encounter in other field studies.
2. Have counsellors release organisms back into the pond habitat as close as possible to where they found them.
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| Post-visit connections: | Resources: |
| * Build a schoolyard pond.
* Organize a bio blitz event in your schoolyard/community.
* Challenge your class or school to get involved in a meaningful action project that encourages pond/stream stewardship. (E.g. Storm drain marking)
* Develop a plan of action to address a selected environmental problem or issues related to water systems around your school.
* My special place (Get Outdoors p.59) students choose and explore a special natural place in their schoolyard, park or other area. They describe the local environmental using sensory details; they reflect on its importance, and they discover their own connections to it. Suggested reading list about special places and connections (Get Outdoors p.63)
 | **Books:**‘Project Wet ’ A curriculum and activity guide**Websites:*** Bio blitz Canada: <http://bioblitzcanada.ca/>
* School yard ponds: <http://www.schoolgrounds.ca/projects/ponds.html>
* <http://kbee.ca/handbook/> See Page 9 – ‘Bio blitz’
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