Field Study Planner

North Vancouver School District
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Overview			
Field Study:	Pond bioblitz	**Conceptual Lens:**	Systems
Overview:	In this field study, students will participate in a bioblitz, an event that focusses on finding and identifying as many organisms as possible within a certain time frame. First, students will explore a pond ecosystem and search for interesting organisms. Next, students will use a dichotomous key to identify which organisms are in the pond. Then, each student will select an organism to study and ask questions that can be answered through observation alone. They ask simple questions about the organism's obvious structures, then move onto questions about organism's behavior, habitat and relationships to other organisms. Students share out with partners and then the whole group how a pond *organism relies on internal systems to survive, reproduce & interact in the environment* (Reference: Beetles). Finally, students use collected data to make explanations about water quality, discuss some threats to wetlands, and examine their personal connection to water systems.		
Grade:	6		
Duration:	2 hours	**Season:**	Fall-winter

Stage 1 – Desired Results

Big Ideas

Multi-cellular organisms rely on internal systems to survive, reproduce, and interact with their environment (Science 6).

Core Competencies

Communication: Students will use scientific language to exchange ideas with peers

Critical Thinking: Students will use observation and reasoning to make explanations regarding water quality. Students will ask & answer questions through observation.

Personal Awareness & Responsibility: Students will explore human impacts, and how they can contribute to caring for wetlands (water system)

Concepts	Field Study Understandings	Transfer Goals	Essential Questions
Systems Organism Interdependence Survival Adaptation Reproduction Interactions Environment Stewardship	**Students will understand that…** A living organism is made up of many interdependent body systems that interact to sustain life. All organisms require food, water, and shelter for survival. All organisms also need energy, which can be traced back through food chains to plants and sun. All organisms have predictable life cycles. Organisms reproduce in a variety of ways including: sexual and asexual reproduction. Organisms have adaptations to help them survive in particular habitats. Adaptations can be visible, invisible (physiological), or behavioural. Organisms interact with each other in a variety of ways including: competition, predator-prey, symbiotic, and parasitic relationships. Organisms also interact with the surrounding environment (abiotic factors) including: energy, water, air	**By the end of the field study, students will be able to independently use their learning to…** Understand an organism using a systems perspective Compare and contrast how a variety organisms rely on internal systems to survive, reproduce, and interact with their environment Use systems thinking to understand the interconnectedness of all living things Connect to place and understand their role and responsibility as stewards of the environment Develop a plan of action to address a selected problem or issue	**Students will keep considering…** What is a living organism? What do all organisms need for survival? What adaptations help the organism survive in its environment? What interactions do you observe -- between organisms, and between the organism and environment? How am I connected to the organism(s) I've experienced during field studies? What does it mean to be a steward of the environment? **What is a system?** **What does it mean to think using a systems approach?** **How have I experienced 'Systems' at ODS? (e.g.** in what ways is a pond a living system?) **How am I connected to 'Systems' in my everyday life?**

	and soil. All organisms are connected, including us. My actions (both positive and negative) impact the organism's ability to survive.		

Cheakamus Centre Principles

How does the field study reflect Cheakamus Centre Principles (Place, Community, Inquiry, Personal Connections, and First Peoples' Perspectives)?

Place: Students will explore and make observations in & of organisms within the pond ecosystem.

Inquiry: Students will ask questions that can be answered through observation.

Community: Students participate in citizen science by sharing data with other field study groups.

Alignment Check:

Are your concepts, unit understandings, transfer goals, and essential questions connected and supportive of your Big Idea?

Curricular Competencies	Content
Students will be skilled at… Demonstrate curiosity about a scientific topic or problem (Science 6) Make observations in familiar and unfamiliar contexts (Science 6) Identify questions to answer or problems to solve through scientific inquiry (Science 6) Observe, measure, and record data, using appropriate tools (Science 6) Experience and interpret the local environment (Science 6) Demonstrate an understanding and appreciation of evidence (Science 6) Identify some of the social, ethical, and environmental implications of their findings (Science 6) Express and reflect on personal, shared, others' experience of place (Science 6)	**Students will know that…** Sunlight provides energy for pond plants to grow. The plants provide food for many organisms. Many insects live near the surface of the pond. Small insects and fish provide food for larger creatures. Nearby mammals and birds depend on pond life (food chain). Aquatic organisms reproduce in a variety of ways (amphibians: sexual, external), invertebrate: complete vs. incomplete metamorphosis). Living and non-living factors affect aquatic organisms' ability to survive. Aquatic organisms have adaptations to help them survive in their habitat. Aquatic organisms fill many ecological niches. Some are predators, others are omnivores, and others are herbivores. Aquatic organisms are susceptible to a range of predators, including fish, birds, larger insects, and mammals. Aquatic organisms are susceptible to a variety of human threats. Aquatic organisms have different levels of pollution tolerance, and the presence of specific organisms can be used to indicate water quality. They are personally connected to (& rely on) water systems, and wetlands.

Stage 2 – Evidence: Assessing for Understanding

Assess: Field Study

Formative: Checkpoints for students to show their knowledge and skills during the field study	Summative: Final assessments of knowledge and skills at the end of the Field Study
Teachers should consider how formative assessment in outdoor learning is informal, varied, and ongoing throughout the field study.	Teachers should consider how summative assessments revisit essential questions, involve self-reflection, and builds towards Final Task.
Assessing prior knowledge: Walk and Talk to pond: 1. What is a pond? Bigger than _____, smaller than _____ 2. What are some questions you have about ponds & the organisms that live there? Students will demonstrate their knowledge, skills & understanding by: -collecting qualitative & quantitative data from the pond & surrounding area -collecting organism samples -exploring the pond in a sensory way (smell, hearing, sight) -drawing a sketch of the pond -demonstrating proper use of a hand lens or microscope -observing organisms under a hand lens or microscope -using a dichotomous key to identify different organisms -making a list of species found (type & #) -constructing a food chain -learning information about pond organisms from Pond Critter cards -pair-sharing observations, questions, reminds me… -pair-sharing and group sharing of interview questions -using observation and reasoning to make explanations about the health of the pond ecosystem -possible walk and talk questions: 1. How did the organisms get into the pond? 2. What adaptations do organisms have to survive in the pond? 3. Where do the majority of organisms live? Why? 4. What do plants growing around the pond tell us? How about where they are growing? 5. Which species are pollution tolerant? Pollution intolerant? 6. What other mammals, insects, birds are these organisms supporting? 7. In what ways is a pond a living system? 8. How do you know if the pond is a healthy ecosystem?	Final group circle question options: 1. How is the pond a system? 2. How am I connected to ponds (i.e. 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 ponds and the organisms that live in them?

Stage 3 – Executing the Learning Plan

These learning events/activities are suggested activities. Teachers should add, revise, and adapt based on the needs of their students, their own personal preferences for resources, and a variety of instructional techniques.

Introducing the Pond Bioblitz!

1. **What is a bioblitz?**

   A *BioBlitz* is an event that focuses on finding and identifying as many species as possible in a specific area over a short period of time.

Preparing to be interviewers (15 minutes)

1. **Today, we'll find and interview an organism.** Tell students they're going to explore and check out a bunch of pond organisms in the Pond bioblitz, then pick one that they're 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 can't talk!
2. **Model an interview of a person in which person can't talk**. Choose a student volunteer (or counsellor) and explain that you're going to show some types of questions that can be asked by "interviewing" this volunteer. The person won't answer back verbally. Instead, you'll 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's see, you're about one foot shorter than me.*
   - *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's not a question that can be answered.*
   - *How many other organisms of the same species nearby? Let's see, I believe I count 16…*
3. **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).*

Assembling the Bioblitz toolkit

1. Arrange students in teams of 2-3. Give each team a net & a small bucket. Tell students that we are going on a short walk to the Hydro Pond, where we will conduct the bioblitz.

Walking to the Hydro Pond (10 minutes)

1. 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 (Pond Big Picture) @ Hydro Pond

1. **Talk about the importance about thinking about organisms' surroundings.** Point out to students that it's easier to come up with deeper questions and understand organisms when you know a bit about where an organism lives and what it's like there.
2. 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: rain water, seepage, stream? (vision)*
   - *What kind of plant life is growing in and around the pond (terrestrial vs. aquatic plants) (vision)*
   - *What mammals, birds, 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.
3. Bring group back together & ask a few students to share their observations with the whole group.
4. Students draw a quick sketch of the pond, and surrounding area (optional).

5. **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.*
6. Brainstorm interview questions specific to the pond ecosystem for:
   - *Food*
   - *Shelter*
   - *Avoiding Predators*

Preparing to Explore

1. **Invite students to slow down, get down, look around for organisms.** Encourage students to think about how the surroundings might affect where they find organisms.
2. **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.
3. 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. Refer to *Pond Field Study Orientation* for more information.

Back at Aquatics Lab (45 minutes)

Interviewing Organisms

1. Students observe organisms using hand lens or microscopes, then choose one organism to focus on. As students explore, help those that are having trouble finding organisms. Focus on being a co-explorer. After 10 minutes, remind students to select an organism to interview.
2. **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're saying by drawing it on a white board.
   - *When you find an organism you're going to make a scientific sketch of it. That means you don't have to worry about making a pretty picture –you'll 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're sketching and interviewing your organism, write down questions you ask the organism and any information you get as an answer. If you're referring to specific parts of the organism in your writing, you can use arrows to show what part of the organism you're 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.*
3. 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.

4. 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.
5. 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. Discussion topics could include the following:
6. Briefly discuss different ways aquatic organisms reproduce (visual aids).
    - *Amphibians (sexual, external)*
    - *Invertebrate (complete vs. incomplete metamorphosis)*

      Complete: whirlgig beetle, caddisfly

      Incomplete: dragonfly, damselfly, stonefly, mayfly
7. Briefly discuss what adaptations aquatic organisms have to survive in the pond (relate to body systems).
    - *Whirlgig Beetle: Adults live on water surface, and have split eyes for seeing above & below 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.*
8. 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, camouflage, speed to escape predators, being active at times when their predators are not, and having noxious qualities that make them unappetizing to predators.*

Identifying the Organism (to be completed before or after interview)

1. Tell students they'll use a dichotomous key to identify their organism.
2. Demonstrate how to use the dichotomous key.
3. Students use the key in teams to figure out what their organism is.
4. Circulate, trouble-shoot, be a co-investigator, and ask questions.
5. Students have the option to use Pond Critter Cards to find out more information about the organism.

Discussing Findings

1. 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)*
2. Focus the discussion on the relationship between organisms
    - *Can we construct a food chain with organisms found (on whiteboard)*
3. Ask students: What do these organisms tell us about the health of the pond ecosystem?
    - *Organisms have different levels of pollution tolerance, and the presence of specific organisms can be used to indicate water quality.*
    - *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*

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?*
2. 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.
3. Have counsellors release organisms back into the pond habitat as close as possible to where they found them.

Resources:

ODS Pond Orientation

Beetles: Hand Lens Intro

Beetles: Walk and Talk

Beetles: I notice, I wonder, It reminds me of

Utah State University: Pond Critter Cards

Strange Beginnings by Karen Needham and Launi Lucas

bioblitz Canada

Key to Macroinvertebrate Life in the River

Teacher: Field Study Reflection

What aspects of the field study went well?

What did students struggle with?

What did you struggle with?

What would you add/revise the next time you taught this field study?

What connections can I make back to my school learning community?
Examine human body systems. Compare and contrast with organisms investigated during ODS Program.
Organize a bioblitz event in your school yard or in nearby nature.
Develop a plan of action to address a selected environmental problem or issue related to water systems