Field Study Planner

North Vancouver School District
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Overview			
Field Study:	The Case of the Disappearing Log	**Conceptual Lens:**	Systems
Overview:	In this field study, students will assume the role of detectives faced with a nature mystery in the coastal temperate rainforest. First, they explore a decomposing log and look for evidence of how the log is changing. They make possible explanations for what might be causing the log to disappear. Students then learn about common "suspects" – organisms that decompose wood, – how these organisms rely on internal systems to survive, reproduce & interact in the environment, and the signature evidence they each leave behind. In teams, students use a *Disappearing Log Key* to identify which organisms might have left behind evidence, and use this information to make explanations about what has happened to the log since it was a tree. Finally, using a systems approach, students learn that the log isn't really disappearing, it's turning into gases that are part of the cycling of matter in all ecosystems (Reference: BEETLES).		
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
Thinking: Creative & Critical Thinking: Students will use observation and reasoning to make explanations, including a possible sequence of events
Social Responsibility: Students will explore human impacts, and how they can contribute to caring for the temperate rainforest ecosystem

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 and soil.	**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 disappearing log a living system?) **How am I connected to 'Systems' in my everyday life?**

	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 the temperate rainforest ecosystem.

Inquiry: Students will explore fallen logs and find evidence for various impacts upon them.

FPP: Students will use observation and reasoning to make explanations about what happened to a culturally modified tree (CMT), and compare & contrast with examples of other 'disappearing logs' (e.g. forestry practices, and other signs of disturbance including: lightning, fire, wind fall).

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 Experience and interpret the local environment (Science 6) Develop a plan of action to address a selected problem or issue (SS 6) Identify First Peoples' perspectives and knowledge as sources of information (Science 6) Express and reflect on personal, shared, others' experience of place (Science 6)	**Students will know that…** Decomposers (fungi, bacteria and invertebrates) are organisms feed on dead or decaying matter. They break down dead plants and animals and help food energy inside the dead bodies get back into soil, water & air (nature's recyclers). Examples: banana slug, bracket fungi Decomposition is the process of plants and animals breaking down into smaller and simpler parts. Plants use the nutrients from the soil, not as food, but as vitamins that help run their body systems. Fallen logs & nurse stumps provide a nutrient-rich habitat for growing plants & young trees. Decomposers are important to ecosystems, because they make matter available to plants, which is an important part of matter cycling through ecosystems. Humans harvest forests for wood, which is used for a variety of purposes.

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: "Step into the circle if…" about solving mysteries. Gather students in a circle and tell them to step into the circle if the statement applies to them, then step back out. • You've ever watched a detective show or movie. • You've ever lost something and tried to figure out where it went • You've heard the word "evidence" (ask them to define it) • You know what a "suspect" is (ask them to define it) • You've ever tried to figure out a mystery (ask a few students to share) Students will demonstrate their knowledge, skills & understanding by: -learning information about log decomposers from Suspect and Evidence cards -using a key to identify evidence of different organisms and other impacts on logs -using observation and reasoning to make explanations about what has happened to the log, including a possible sequence of events. -demonstrating proper use of a hand lens -pair-sharing observations and evidence -turn & talking about possible explanations for what might have caused the evidence they observed -matching suspect with evidence, and sharing their cards aloud with each other -using a key to identify suspects & connect them with evidence -sharing explanations & sequence of events in small groups	Walk & Talk or group circle: 1. What are some questions you have about decomposing logs & the organisms that decompose them? 2. What other evidence would you like to explain that mystery? 3. What helped you learn today? 4. Are humans decomposers? Why or why not? 5. In what ways is a disappearing log a living system?

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 Activity

1. "Step into the circle if" about solving mysteries: Gather students in a circle and step into the circle if the statement applies to them, then step back out.
    - *You've ever watched a detective show or movie.*
    - *You've ever lost something & tried to figure out where it went.*
    - *You've heard the word "evidence"* (ask them to define it)
    - *You know what a "suspect" is* (ask them to define it)
    - *You've ever tried to figure out a mystery* (ask few to share)
2. Explain that they'll be trying to solve a nature mystery. Tell students that they'll be acting as detectives today, trying to explain a nature mystery based upon the evidence they find.
3. Hike for a few minutes towards the 'Cedar Pass Through'. Ask students to find a leaf on the ground. At a clearing, circle-up the group. Introduce a tool & skill needed to help them solve today's mystery: the hand lens & making observations. Hand out the hand lenses & have students find the 'sweet' spot' (the position of the lens where the leaf is crisp and clear). Introduce how to make observations ("I notice"). Ask students to share an "I notice" statement about their leaf.
4. Continue hiking to the decomposing log, & unveil the mystery – "The Case of the Disappearing Log."

    This log used to be a tree. People have been noticing that it, and other logs in the area, is slowly disappearing! It will be your job to figure out what's happening to the log.

Initial Explorations

1. Explain that they'll explore and observe the log together, looking for evidence that the log is disappearing.
2. While students explore, model & encourage making observations & asking questions (inquiry).
3. If students are losing interest, suggest that they change their perspective.

Initial Sharing

1. Bring group back together & tell students to share observations & evidence in pairs.
2. Ask a few students to share their observations with the whole group.
3. Help students make connections between cause & effect when discussing evidence of the disappearing log.
4. Ask students to 'Turn & Talk' about possible explanations for what might have caused the evidence they observed.
5. Ask a few students to share out explanations.

Meet the Suspects

1. Give each student either an "Evidence" or a "Suspect" card.
2. Tell Evidence card holders to stay put, while Suspect card holders move around looking for a match.
3. Once pairs have found each other, tell them they should share their cards out loud with each other.
4. Matched pairs mingle & introduce themselves to other evidence/suspect pairs.

Investigating with a Key (bring group to another large log, or tell each team to choose their own log in a designated area).

1. Tell students they will learn more about possible causes of evidence they have found.
2. Explain they'll use a key to identify suspects & connect them with evidence.
3. Demonstrate how to use the Disappearing Log Key.
4. Students use the key in teams to figure out what suspects caused the evidence on the log.
5. Encourage students to look for evidence of where the tree stood, make possible explanations for how it fell, & the order of suspects & events that impacted the log.
6. Circulate, trouble-shoot, be a co-investigator, and ask questions.

Discussing Explanations

1. Gather group & ask each team to share their explanations with another team.
2. Ask a few volunteers to tell the whole group their explanations & the sequence of what happened to the log.
3. Encourage respectful disagreement & ask for alternative explanations.
4. Focus the discussion on the relationship between suspects and the environment of the log. Ask:
    - *How many different organisms can you think of that might have benefitted from the log you investigated?*
    - *What do organisms that are breaking down the log get from the log?*
5. Point out that scientists have conversations like this to come up with best explanations.
    - *The point of science is to come up with explanations based upon all available evidence. Scientists need to be open to different explanations, and to think critically about each explanation.*
6. Describe how thinking about cause & effect relationships helps us to understand what has happened by developing possible explanations.
    - *Just like scientists, you observed evidence of what has happened, then made possible explanations for what caused the effects you observed.*
    - *Scientists use the idea of cause & effect to make explanations in all areas of science.*

Wrapping Up the Care - Reflection

1. Return the students' focus to the "Case of the Disappearing Log."
    - *What happened to the rest of the matter in the log? Where is the missing wood now? Where could it have gone?*
2. Suggest that some things that happen in nature don't always leave behind observable evidence.
3. Briefly discuss what decomposers do with matter from the log (relate to body systems).
    - *Decomposers consume food & nutrients from the wood for the purpose of their own survival (i.e. to run their own body systems):*
    - *Banana slugs feast on dead leaves & debris from the forest floor. Slugs use a tongue (rasping radula) covered in 27,000 teeth to scrape off pieces of live and dead plant tissue, fungi & bacteria.*

      A slug has two adaptations that allow it to live on land: 1) It carries its aquatic environment in the form of slime. The slime covering keeps the skin from drying out. Slime is toxic, and give protection from predators. 2) Slugs don't have gills, but uses a fleshy compartment that looks like a hump or shoulder (called the mantle) to act as a lung. There is a pore on the right side of the mantle through which air circulates. The breathing hole can open and close & is called a pneumostome.

      Banana slugs move along using a muscular foot to crawl along forest floor, on plants & trees.

      Banana slugs use sensory tentacles to feel their way about & for smelling. Eyes are on the ends of tentacles. They don't see in detail, but can sense the intensity of light. The tentacles can move about so the slug can see in all directions. If the slug senses danger it can pull these tentacles in to protect the eyes. If a predator bites off a tentacle, the slug can grow a new one.

      Banana slugs are hermaphrodites –organisms that contain both male & female reproductive organs.
    - *Fungi – look like plants but are heterotrophs, like animals. Fungi are parasites –organisms that live in or on another organism (its host) and benefits by deriving nutrients at the host's expense. A fungus must digest food to live, while plants make their own food through photosynthesis. Fungi contain mycelium (threadlike filament) which grows inside the tree, slowly breaking it down. Unlike animals, fungi don't digest food internally. They secrete digestive enzymes so that their food is "digested" outside of their bodies. A fungus then acquires its nutrients by absorption of the digested food through the mycelium. Fungi use asexual reproduction, via spores. Bracket fungi are the fruit of a much larger fungus.*

- *Mosses (bryophytes) Trees are covered in mosses. Mosses do not have large stems or a trunk to help them grown upwards, they must grow on solid surfaces, like rocks, compact soil or wood. They also do not have flowers or seeds, relying on water or high moisture to reproduce and disperse.*
- *Lichens can be found on trees and rocks in the ecosystem.*

4. Reveal that the matter in the log didn't actually disappear - -it just changed its form!
    - *Scientists know that matter can't be destroyed, or disappear into nothing!*
    - *We do know that matter can change its form – going between solid, liquid, and gas –and that gases can be invisible.*
5. Explain where the matter goes & why it is important for ecosystems.
    - *Decomposers are important to ecosystems because they make matter available to plants, which is an important part of matter cycling through ecosystems.*
6. Tell students to keep looking at the other wood in the forest along Cedar Grove for more mysteries & evidence. Locate a Culturally Modified Tree (Suspect: Coast Salish Peoples), Stumps (Suspect: Human), Big Snag (Suspect: Lightning), fallen tree with exposed roots (Suspect: Wind).
7. Walk & Talk questions (in pairs) or final circle:
    - *What are some questions you have about decomposing logs & the organisms that decompose them?*
    - *What other evidence would you like to explain this mystery?*
    - *Could humans be considered decomposers? Why or why not?*
    - *What helped you learn today?*
    - *In what ways is a disappearing log a living system?*
8. Walk & Talk application question: Tell students to imagine they're back at home and their family is worried that your house has some kind of infestation/the wood seems to be decaying. Ask students to discuss with a partner:
    - *What evidence would you look for to figure out if the wood is decomposing?*
    - *What might the organisms be in the wood of your house?*
9. Revisit the Essential Questions

Resources:

Beetles: Hand Lens Intro
Beetles: Walk and Talk
Beetles: I notice, I wonder, It reminds me of
Beetles: Case of Disappearing Log
Beetles: Decomposition Mission

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.
Develop a plan of action to address a selected environmental problem or issue