Anglophone School District - North

Grade 7 Science - Unit Lesson Guide

Interaction within Ecosystems

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The Aim of Science Education - Scientific Literacy

The aim of science education in the Atlantic Provinces is to develop scientific literacy.

Scientific Literacy is an evolving combination of the science-related attitudes, skills, and knowledge students need to develop inquiry, problem-solving, and decision-making abilities; to become lifelong learners; and to maintain a sense of wonder about the world around them. To develop scientific literacy, students require diverse learning experiences that provide opportunities to explore, analyze, evaluate, synthesize, appreciate, and understand the interrelationships among science, technology, society, and the environment.

The Three Processes of Scientific Literacy

An individual can be considered Scientifically Literate when he/she is familiar with, and able to engage in, three processes: Inquiry, problem solving, and decision making.

Inquiry

Scientific inquiry involves posing questions and developing explanation for phenomena. While there is a general agreement that there is no such sing as the scientific method, students require certain skills to participate in the activities of science. Skills such as questioning, observing, inferring, predicting, measuring, hypothesizing, classifying, designing experiments, collecting data, analysing data, and interpreting data are fundamental to engaging science. These activities provide students with opportunities to understand and practise the process of theory development in science and the nature of science.

Problem Solving

The process of problem solving involves seeking solutions to human problems. It consists of proposing, creating, and testing prototypes, products, and techniques to determine the best solution to a given problem.

Decision Making

The process of decision making involves determining what we, as citizens, should do in a particular context or in response to a given situation. Decision-making situations are important to their own right, and they also provide a relevant context for engaging in scientific inquiry and/or problem solving.

Science Assessment Overview

Science is a hybrid term that houses different disciplines such as: Physics, Chemistry, Biology, Environmental Studies, Engineering, Math, etc. Given this broad spectrum, it is not realistic that we can paint science assessment with a single brush in terms of probes that work for every science activity. However, regardless of school subject, let alone science, the frequency of assessment should be unbalanced with formative assessment occupying 80% of practise and summative with the remaining 20%.

80% Formative - 20% Summative

Formative Assessment
Formative assessment is a range of formal and informal assessment procedures employed by teachers during their learning process in order to modify teaching and learning activities to improve student attainment. It typically involves qualitative feedback (rather than scores) for both students and teacher that focuses on the detail of content and performance. Feedback is the central function of formative assessment. It typically involves a focus on the detailed content of what is being learnt.

Science Formative Assessment falls into 2 distinct categories, and they are divided about how feedback is given. Please be aware that an activity could be informal or formal, it is the purpose of the task that determines purpose.

Informal Formative
Informal Formative Science Assessment acts as a monitoring probe and is distinct because it is not graded.

Formal Formative
Formal Formative Science Assessment provides specific feedback to students, the teachers corresponds via anecdotal feedback, rubrics, and written responses to offer progress to student attainment.

Summative Assessment
Summative assessment seeks to monitor educational outcomes, often for the purposes of external accountability. Usually occurring at the end of a learning unit and determines if the content being taught was retained.

Interaction Within Ecosystems

Focus and Context

This unit's focusses are decision making and inquiry and are concentrated on students' collections and analyses of data and information from field trips, investigations, and other sources. Students can explore and investigate a range of relationships within a familiar environment while determining the factors that enhance or threaten the existence of a particular local habitat of an organism. Students should be given the opportunity to examine and discuss real-world situations in which wildlife habitat are threatened, in order to make informed decisions on various courses of action. The context of the unit will depend on local or regional issues involving wildlife or habitat loss.

Unit Instructional Overview

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Or

Activity - Protecting This Area</td></tr>
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* - EECD Grade 7 Inquiry package - available at https://portal.nbed.nb.ca/tr/lr/k-8Science/Pages/default.aspx

Interactions Within Ecosystems - Curriculum Outcomes

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<tr><td rowspan="3">Components of an Ecosystem*</td><td>208-2, 208-3 Identify, delimit, and investigate questions related to a local ecosystem such as “What types of species live in a particular ecosystem?”</td><td>209-3 use instruments effectively and accurately to investigate components of an ecosystem</td><td>209-4 organize and record data collected in an investigation of an ecosystem</td></tr>
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<tr><td>109-12 distinguish between the following terms: consumers, decomposers, producers, ecosystems, habitat, photosynthesis</td><td>304-1 explain how biological classification takes into account the diversity of life on Earth, using the terms producer, consumer, decomposer</td><td>109-1 explain that observations and identification of similar characteristics in an ecosystem</td></tr>
<tr><td rowspan="2">Food Webs</td><td>109-13 demonstrate the importance of choosing works that are scientifically appropriate by using these words in context: niche, habitat, population, community, ecosystem</td><td>210-2, 306-1 prepare a chart that describes how energy is supplied to, and how it flows through, a food web</td><td>210-3 identify the strengths and weaknesses of a diagram showing the flow of energy in an ecosystem</td></tr>
<tr><td>111-6 apply the concept of a flood web as a tool for interpreting the structure and interactions of a natural system</td><td>306-2 describe how matter is recycled in an ecosystem through interactions among plants, animals, fungi, and microorganisms</td><td>210-12 identify and evaluate potential applications of the recycling of matter in an ecosystem</td></tr>
<tr><td>Decomposers</td><td colspan="2">304-3 describe conditions essential to the growth and reproduction of plants and microorganisms in an ecosystem, and relate these conditions to various aspects of the human food supply: air, temperature, light, moisture</td><td>111-1 provide examples of how knowledge of microorganisms has resulted in the development of food production and preservation techniques:
-describe techniques used in the past (pickling, salting, drying, smoking) to preserve food</td></tr>
<tr><td>Ecological Succession</td><td colspan="2">306-4 identify signs of ecological succession in a local ecosystem: pioneer species, climax community, primary succession, secondary succession</td><td>208-5 predict what an ecosystem will look like in the future on the basis of the characteristics of the area and the long-term changes (succession) observed in the site</td></tr>
<tr><td>Action</td><td>113-11, 211-5 propose and defend a course of action to protect the local habitat of a particular organism</td><td>133-10 provide examples of problems that arise in the environment that cannot be solved using scientific or technological knowledge</td><td>133-10 provide examples of problems that arise in the environment that cannot be solved using scientific or technological knowledge</td></tr>
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Interactions Within Ecosystems

Strand - Components of an Ecosystem

General Curriculum Outcomes	Specific Curriculum Outcomes
208-2 identify questions to investigate arising from practical problems and issues	208-2, 208-3 identify, delimit, and investigate questions related to a local ecosystem such as “What types of species live in a particular ecosystem?”
208-3 define and delimit questions and problems to facilitate investigation	
209-3 use instruments effectively and accurately for collecting data	209-3 Use instruments effectively and accurately to investigate components of an ecosystem
209-4 organize data, using a format that is appropriate to the task or experiment	209-4 organize and record data collected in an investigation of an ecosystem
306-3 describe interactions between biotic and abiotic factors in an ecosystem	306-3 describe interactions between biotic and abiotic factors in an ecosystem
304-2 identify the roles of producers, consumers, and decomposers in a local ecosystem and describe both their diversity and their interactions	304-2 identify the roles of producers, consumers, and decomposers in a local ecosystem and describe both their diversity and their interactions
210-1 use or construct a classification key	210-1 classify organisms as producers, consumers, and decomposers
109-12 distinguish between terms that are scientific or technological and those that are not	109-12 distinguish between the following science terms: Consumer Decomposer Producer Ecosystem Habitat Photosynthesis
304-1 explain how biological classification takes into account the diversity of life on Earth	304-1Explain how biological classification takes into account the diversity of life on Earth, using the terms, producer, consumer, and decomposer
109-1 describe the role of collecting evidence, finding relationships, and proposing explanations in the development of scientific knowledge	109-1 explain that observations and identification of similar characteristics enables classification in an ecosystem

Science Resource Package: Grade 7

Interactions within Ecosystems: Components of an Ecosystem

New Brunswick Department of Education

September 2009

Prior Knowledge:

- In gr.4, students studied habitats.
- In gr.6, students have looked at the variety of life in a local ecosystem, classification and characteristics of organisms.

Common Misconceptions:

Dead organisms are abiotic.

Did You Know?

Ecosystem: all the interacting biotic and abiotic parts of an area; an ecosystem can be large or small, but must contain all of the abiotic and biotic features.

Habitat: the natural environment where an organism lives

Biome: areas of similar climate containing certain kinds of organisms, particularly plants; examples are desert, grassland, and forest

Population: a collection of organisms of the same species found in a specific geographic area

Abiotic: a term applied to non-living physical or chemical factors in the environment; for example: air, water, and soil

Biotic: a term applied to living components in the environment such as humans, plants, birds, microorganisms, and insects

Producer: organism that makes its own food using abiotic components such as water, air, nutrients, and sunlight

Consumer: organism that cannot make its own food; eats other organisms

Decomposer: organism that feeds on dead plants or animals; breaks complex molecules into simpler nutrients.

Further information on decomposers can be found at:

http://www.nhptv.org/NatureWorks/nwep11b.htm
http://www.rspb.org.uk/youth/learn/foodchains/decomposers.asp
Microorganism decomposers http://www.musee-afrappier.qc.ca/en/index.php?pageid=3112b&page=3112b-water-e

Instructional Plan

Access Prior Knowledge

- Say: *Scientists make observations. What does this mean? How do you do it?*

  How do scientists collect data on the natural world?

The purpose is to get students thinking about using their 4 senses (not taste) to observe the world around them and to really slow down, be still and observe instead of taking a quick look and jumping to conclusions. By slowing down and taking the time to observe, students may notice things they wouldn't notice otherwise and making more interesting discoveries.

Activity (optional)

Tell students: *We're going to be studying ecosystems and will need to fine-tune our observation skills.*

- Have bags with different kinds of uncooked pasta mixed together, hold one up at the front of the class and ask students what they observe. Have students make a list. Try to get them to realize that what looks all the same may not be.
- Have one student at each group hold a bag of pasta about one meter from the group. What observations can the other group members add to their lists?
- Have the bag of pasta placed on the table in the center of the group. Have students add further observations to their list.
- Ask: *What have you noticed about making observations?* Expect ideas like: can see more details close up; what looked the same really is not

In small groups, have students discuss the natural world – *What is in the natural world? What are habitats? What other words are about nature?* They should make a list of vocabulary and an explanation of as many as they can. They should write the words on half sheets of paper, large index cards or large sticky notes with marker.

- Ask the groups to share one idea at a time, round robin style. Arrange the cards on a wall or bulletin board, clustering those that go together. These will be revisited during subsequent classes.

✓ **Assessment:**

Note the concepts and misconceptions students are expressing. You will need to know these to plan effective questions for subsequent activities and discussions so that students will examine and adjust their alternate conceptions.

In science, words often have precise meanings. Sometimes the meaning is somewhat different from when it is used in regular, non-scientific ways.

Students will make a foldable for vocabulary in this portion of the unit.

- Take a sheet of paper and fold it in half the long way (a hot dog fold).
- Fold the paper top to bottom three times to divide the length into eight equal parts.
- Cut along these lines on the front only to create 8 flaps.
- The vocabulary words will be printed on the front of the flap with its meaning written inside when the flap is opened. Small diagrams may also be used.

Habitat has been used in the discussion so it will be the first term placed on the foldable.

Options for storing foldables:

- in a large zippered plastic bag. The bag can be hole-punched and put inside a duotang or binder. A strip of wide tape folded over the left edge of the bag before punching the holes will keep the bag from ripping.
- glue into notebooks or duotangs
- display them on bulletin boards

Post student versions of curricular outcomes on chart paper (see page 21). Inform students that these outcomes will be addressed over the next portion of the unit. Point out to students which outcomes are being addressed in each activity.

🚲 1st Cycle

✪ Curriculum Outcomes

109-13 Explain the importance of choosing words that are scientifically and technologically appropriate.
208-3 Define and delimit questions and problems to facilitate investigation.
209-4 Organize data, using a format that is appropriate to the task or experiment.
306-3 Describe interactions between biotic and abiotic factors in an ecosystem.

Remind students about the idea of habitat and introduce the term ecosystem.

You may find Bill Nye's "Biodiversity" video helpful. Watch the section called Ecosystems. It can be found at http://learning.aliant.net/school/index.asp Type the title into the search box. When you click on the picture, the video will start with a table of contents to the right of it. Click on the ecosystem subheading to go to that portion. There is no need to view the entire video. (You need to register to use the videos on the Aliant site. Registration is free. If you try to watch the video without logging in, you are prompted to do so.)

Have students add "ecosystem" to their vocabulary foldable.

✋ Biotic and Abiotic Activities

Part 1

Take students outside to a local ecosystem (schoolyard, suburban street, stream, field, forest). Have students work with a partner to observe living and non-living things in the ecosystem. Things observed should be classified as living and non-living and recorded on a chart. Remind the students to use a variety of senses and like with the pasta, more details can be observed from close up.

Back in the classroom, have students share results with the whole class and make a class chart of living and nonliving things.

Introduce terms: biotic and abiotic. Have students add these terms to the vocabulary foldable.

The video "Habitats and Biomes: Ecosystems of the World" describes ecosystems, biotic, abiotic, habitat. View these sections: Introduction, What is an Ecosystem, Living Within an Ecosystem, Different Ecosystems – Different Living Things. It can be found at http://learning.aliant.net/school/index.asp Type the title into the search box. When you click on the picture, the video will start with a table of contents to the right of it.

Part 2

Use pictures (some pictures are provided on pages 23-26 or calendar pictures are sometimes good) or watch a video of a particular ecosystem. The following site has virtual tours of several ecosystems and other supporting information that might be helpful http://virtualmuseum.ca/Exhibitions/Flora/english/virtual.html#

Have students, in small groups or partners, create a chart of biotic and abiotic parts of the ecosystem.

✓ **Assessment:**
During the student activity, make notes on outcomes (or parts of outcomes) you observe being addressed. Process skill outcomes are part of the curriculum and should be assessed. Using the observation chart or the checklist (see pages 28-31) on a clipboard may be helpful to you. Develop your own code for quick notes.

A suggested code:
√ observed and appropriate,
WD with difficulty,
RTT refused to try,
A absent.

This chart may be used on multiple days, using a different coloured pen or pencil each day and putting the date in the corner. You may not have a symbol or note for every child every day. Some teachers like to focus on a group or two each time. However you choose to make note of your observations, you will always have a sense of who you need to take more notice of and who might need extra support. The information will also help you when it is reporting time.

A variety of videos can be found at http://learning.aliant.net/school/index.asp Type the title into the search box. When you click on the picture, the video will start with a table of contents to the right of it. Some possible found at this site are:

Coastal Dunes – sections: Lithosphere to Fauna
Deserts – a Bill Nye video
Forest Habitats
Fragile Ecosystems – section on Reef Ecology
Ocean Life – a Bill Nye video on ocean ecosystems
Ocean Habitats: Shoreline and Reef
The Tropical Rainforest Habitat

Reflection: Class Discussion

- Have students share their observations and thoughts on biotic and abiotic components of ecosystems. See teacher's note about encouraging classroom talk on pages 18-19.

- Revisit the cards created during the Accessing Prior Knowledge activity on page 4. *Does any of this information need to be revised or added to? Is there other information we should put on cards to add?*

Reflection: Journaling

Which is more important - biotic or abiotic parts of the ecosystem? Why?

✓ **Assessment:**

Journal entries should not receive a score or mark. A positive comment followed by a question to refocus attention or suggest the next step in learning is very effective.

Note which students show an understanding of the difference between the biotic and abiotic parts of an ecosystem and that they interact.

Possible extension:

Investigate the abiotic and biotic factors of your habitat. Discover Your Place in Your Habitat Activity described at http://www.hww.ca/hww2.asp?id=117

Other activities from http://www.hww.ca/hww.asp?id=5&pid=0 might be used as extension activities throughout this unit.

🚲 2nd Cycle

✪ Curriculum Outcomes

109-1 Explain that observations and identification of similar characteristics enables classification in an ecosystem.
109-12 Distinguish between terms that are scientific or technological and those that are not.
109-13 Explain the importance of choosing words that are scientifically and technologically appropriate.
209-4 Organize data, using a format that is appropriate to the task or experiment.
211-5 Defend a given position on an issue or problem on the basis of their findings.
306-3 Describe interactions between biotic and abiotic factors in an ecosystem.
304-2 Identify the roles of producers, consumers, and decomposers in a local ecosystem, and describe both their diversity and their interactions.

✋ Biotic Roles Activity

Provide the class with a list of living things (see page 22) and have a discussion about how we could organize these organisms. Make a list of possible ways. The list generated by the student should be somewhat diverse (e.g., size, plants/animals/others, nocturnal, herbivores/carnivores, etc.)

Discuss how there are many ways to classify things. Scientists work to classify organisms and the way they classify them depends on what they are looking at or for.

Ask the students to sort the organisms by the job they do.

✓ Assessment:
On observation chart (or other record), note how students are performing on the skill outcomes.

Reflection: Class Discussion

What types of headings did students come up with? Which headings from different groups are kind of the same?

Share the sorting rules (kinds of jobs) the students came up with. Tell students the names scientists give to the groups they have come up with. (For example, organisms that eat other animals are carnivores), other terms: herbivores, omnivores, consumers, producers, decomposers (note: that carnivore and herbivore are apt to fit groups the students create but the curriculum talks about consumers – want to get to consumers, producers and decomposers).

Have students add the terms consumer, producer, decomposer to their vocabulary foldable.

Reflection: Journaling

Look at pictures of an ecosystem (or books on ecosystems/biomes or video of): identify and list consumers, producers, decomposers. Name some characteristics of each group.

✓ **Assessment:**

Journal entries should not receive a score or mark. A positive comment followed by a question to refocus attention or suggest the next step in learning is very effective.

Make a note of which students show an understanding of the differences among consumers, producers, and decomposers.

✓ **Assessment:**

You have traveled to the island of Ecomagic. You observe an interesting and previously unknown creature. Is it a consumer, producer, or decomposer? Describe your creature, whether it is a consumer, producer or decomposer and provide evidence that supports your conclusion.

Biotic roles: living things list

alders
algae
ants
bacteria
bats
beetles
birch
black flies
blue jay
bobcats
chipmunks
coyotes
dandelions
deer
dragonflies
earthworms
foxes
grass
groundhogs
houseflies
fir
leeches
lily pads
maple
mosquitoes
moss
mould
mushrooms
owls
pine
poplar
porcupine
raccoons
raspberries
robins
salmon
skunks
spiders
spruce
squirrels
termites
trout
violets

🚲 3rd Cycle

✪ Curriculum Outcomes

208-2 Identify questions to investigate arising from practical problems and issues.
209-1 Carry out procedures controlling the major variables.
209-4 Organize data, using a format that is appropriate to the task or experiment.
306-2 Describe how matter is recycled in an ecosystem through interactions among plants, animals, fungi, and microorganisms.
306-3 Describe interactions between biotic and abiotic factors in an ecosystem.

Students tend to understand the roles of consumers and producers because they are very familiar with many of these sorts of organisms. Decomposers are less familiar.

Ask students: *Think of your school or community – what happens to the waste that nobody wants?* (Expect answers like: some goes to the landfill, some gets recycled, some is sewage)

Ask: *What wastes are produced in nature? How does nature get rid of waste?* - Dead animals, dead plants, leaves, scat (manure).

http://www.teachersdomain.org/asset/tdc02_vid_decompose/ A good 3 minute video showing time lapse decomposing.

More on Decomposers Activity

Note that if the rubric is to be used for assessing student work, it should be given to students and discussed **before** the investigation. Examples of previous experimental write ups should be displayed. If this is new to students, the process should be modeled by the teacher several times before expecting students to complete one independently.

Have students demonstrate that earthworms help break down dead organic material. They will make a pop bottle ecosystem for earthworms (with earthworms and dead leaves), and compare it to an ecosystem without earthworms (dead leaves only) and perhaps to another with no earthworms or dead leaves.

Note that it will take time to see the results from this investigation. If materials are difficult to collect make one set of containers for the whole class to observe. Involve students in writing the question and determining how to control variables.

Materials:

- 2 L pop bottles with covers or dish pans or aquaria
- Soil
- Dead leaves
- Earthworms (from a garden or from the pavement when it rains)

Have students generate a question they can investigate about whether earthworms help break down organic material.

They will design and carry out a procedure to get data to answer their question.

Information about earthworms and making a pop bottle ecosystem are given at the following site.
http://www.icewatch.ca/english/wormwatch/programs/introduction.html
http://www.icewatch.ca/english/wormwatch/activities/bottle.html constructing a pop bottle ecosystem for earthworms
http://www.icewatch.ca/english/wormwatch/activities/invest2.html Earthworms in action

There is also an activity described in Project WILD called Eco-Enrichers. This activity book is obtained by attending an inservice. More information can be found at http://www.wildeducation.org/programs/project_wild/prog_wld.asp

> ✓ **Assessment:**
> On observation chart (or other record), note how students are performing on the skill outcomes.

- Students should write up their question, materials and procedure to hand in.
- Have students self-assess their write up before handing it in to you. Give students the guidelines (see "got it" column) and ask them to comment on how well their work meets each criteria. The third column will be for you to give feedback (see sheet on page 27).

> ✓ **Assessment:**
> Note if students are able to write up a lab report or if mini-lessons on specific parts of the report are needed. The following rubric may be helpful.

Got it	Nearly there	Not yet
Question is **stated clearly** and in a **testable** form	Question is **clear** but not in a testable form.	Question is **unclear**.
Materials list includes **all necessary** and **appropriate** items.	Materials list **incomplete**.	Materials list **incomplete** and contains **unnecessary** items.
Written steps **are detailed** and in **sequential order**. Steps are detailed enough that **variables are controlled**. Procedure **could be replicated.**	Some steps **are unclear or missing** and/or steps are **out of order**. **Missing** some **details** that would **control one or more variables** during the replication.	Steps are **not accurate** or there is **not enough detail** to replicate procedure.
Spelling and grammar **errors are absent or rare**.	**Some** spelling and grammar **errors**.	Spelling and grammar **errors common**.

Reflection: Class Discussion

Ask: *What do you think the world would be like without decomposers?*
Who has a compost pile at their house? Can you tell us what your family does to it?

Revisit this discussion after their ecosystems have had a chance to work.

Reflection: Journaling

You create (put in a number) kg of compost weekly. How big would your compost pile be after a year? Are compost piles really that big? Why or why not?

✓ **Assessment:**

Journal entries should not receive a score or mark. A positive comment followed by a question to refocus attention or suggest the next step in learning is very effective.

Make a note of which students show an understanding that decomposition changes materials so that they may be recycled.

Possible Extension:

Look at an ecosystem with reduced decomposition such as a bog. Museums sometimes have artifacts discovered buried in bogs that would have rotted in many environments. These artifacts, made of materials such as leather and wood, have lasted because of reduced decomposition.

The Project WET resource has an activity called "People of the Bog" in which students create a bog environment with some buried artifacts and compare it to a mini-composter.

More information about the *Project WET K-12 Curriculum and Activity Guide* (1995) can be found at http://www.cwra.org/branches/ProjectWet/goals.aspx This resource is obtained by attending a Project WET inservice. Information about facilitators can be obtained from Susan Bone, Education & Engagement Unit – Atlantic Environment Canada, Dartmouth, NS (ph) 902-426-1704

🚲 *4^th Cycle*

✪ Curriculum Outcomes

211-5 Defend a given position on an issue or problem on the basis of their findings.
304-2 Identify the roles of producers, consumers, and decomposers in a local ecosystem, and describe both their diversity and their interactions.

Interactions in an Ecosystem Activity

- Bring students to an area where they are able to form a large circle.
- Assign each student a role - either a biotic or an abiotic component. (air, water, falcon, bear, flower…) Make sure you have visible name tags for each student, so that everyone knows who is what.
- Give a ball of twine to the student that is "Air" and ask: "What relationship can AIR have with one other component in this circle?" Have that student say that relationship *("Bear needs air to live.")* and toss the ball of twine to the student that has "Bear" name tag.
- That student (Bear) looks around to find what relationship a bear might have with another component in the circle. Student says "Bear eats Salmon", then toss the ball of twine to the "Salmon" student. Keep going for 10 minutes. You might have to intervene and suggest possible interaction to ensure all students get included in the exercise.
- After the game, ask students to identify what they have observed. Here are possible observations:
    - The string looks like a spider web.
    - All organisms have relationships to at least one other organism
    - All organisms need air and water

An alternate game:

Demonstrate interactions among organisms in this "Interdependence Shuffle" http://www.fieldmuseum.org/thisoldhabitat/pdfs/Activity4.pdf

Each student is given a component of an ecosystem (the site above has cards to print) and a piece of string about 2 m long. One at a time students read their card and give the other end of their string to an organism that they have an interaction with.

After all are linked, find out which organisms are holding the most strings and which the least. (Predators will have the least, producers and decomposers the most.)

Additional activities:

- The Explore Learning site has simulations called Gizmos. The simulations may be useful to further explore the interactions among living things. Try "Food Chain", "Interdependence of Plants and Animals", or "Rabbit Population by Season" at

http://www.explorelearning.com/index.cfm?method=cResource.dspResourcesForCourse&CourseID=306

The "Gizmo" site allows unregistered users to run each Gizmo for 5 minutes a day. It is also possible to sign up for a free trial. Membership is not free.

- Or have your students explore an estruary ecosystem as they restore it to health at http://games.noaa.gov/oscar/

Think like a scientist

Asking good questions is an important skill in science. Initially students will need support. Model the skill with the whole class and students will begin to have the confidence to contribute. After some practice, students will be able to generate questions successfully individually.

Present students with a situation and ask them to generate questions that could be investigated scientifically. (These situations and questions do not have to be limited to those that can be done in a classroom.)

Situation:

> There are an increasing number of non-native plant and animal species that have been introduced or found their way into ecosystems in Canada and around the world. For example: fire ants in Nova Scotia, moose in Newfoundland, zebra mussels in the Great Lakes, and rabbits in Australia. European earwigs, European starlings, pigeons, dandelions and purple loosestrife are some examples that can be found in New Brunswick.
>
> Write a question concerning the impact of a non-native species on local ecosystems that could be investigated scientifically.

Reflection: Journaling

Think about an individual organism. What does it need? Draw its relationships. What does it need to have in its ecosystem/community?

✓ **Assessment:**

Journal entries should not receive a score or mark. A positive comment followed by a question to refocus attention or suggest the next step in learning is very effective.

Make a note of which students show an understanding that an organism has a variety of relationships. Do they include both biotic and abiotic relationships?

Possible Videos

The Bill Nye video "Food Web" may help review and summarize at this point, especially the following sections: Introduction, The Tangled Web, Plants are Important, Where Does Food Come From, Check It Out - The Food Web, and The Food Pyramid.

It can be found at http://learning.aliant.net/school/index.asp Type food web into the search box. When you click on the picture, the video will start with a table of contents to the right of it. Note that you can click on any part of the contents list to go to that portion. There is no need to view the entire video. (You need to register to use the videos on the Aliant site. Registration is free. If you try to watch the video without logging in, you are prompted to do so.)

The same site also has "The Pond". The following sections may be especially useful: Steps in the Food Chain and The Detritus Pathway.

✓ **Assessment:**

The town is going to (fill in a situation with a local connection), how will that affect the community/ecosystem?

(For example: build a new highway through the forest, fill in a marsh for building a new bowling alley, build a causeway across an inlet)

➢ Other Resources

Clive Dobson & Gregory Gilpin Beck, WATERSHEDS: a practical handbook for healthy water Firefly Books, 1999

The Federation of Ontario Naturalists, Bugwise Kids Can Press, 1990

William A. Andrews, Investigating Aquatic Ecosystems Prentice Hall, 1987

Possible Extensions:

http://www.hww.ca/hww.asp?id=5&pid=0 has lesson plans on a variety of habitat and ecosystem issues

Forest ecosystem

Drawn by Odette Barr

Field ecosystem

Mixed forest ecosystem

Tidepool ecosystem

Interactions Within Ecosystems

Strand - Food Webs

General Curriculum Outcomes	Specific Curriculum Outcomes
109-13 explain the importance of choosing words that are scientifically and technologically appropriate	109-13 Demonstrate the importance of choosing words that are scientifically appropriate by using these words in context: Niche Habitat Population Community Ecosystem
210-2 compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs, line graphs, and scatter plots	210-2, 306-1 prepare a chart that describes how energy is supplied to, and how it flows through, a food web
306-1 describe how energy is supplied to, and how it flows through, a food web	
210-3 identify strengths and weaknesses of different methods of collecting and displaying data	210-3 identify the strengths and weaknesses of a diagram showing the flow of energy in an ecosystem
111-6 apply the concept of system as a tool for interpreting the structure and interactions of natural and technological systems	111-6 apply the concept of a food web as a tool for interpreting the structure and interactions of a natural system
306-2 describe how matter is recycled in an ecosystem through interactions among plants, animals, fungi, and microorganisms	306-2 describe how matter is recycles in an ecosystem through interactions among plants, animals, fungi, and microorganisms
210-12 identify and evaluate potential applications of findings	210-12 identify and evaluate potential applications of the recycling of matter in an ecosystem

Using Ecosystem Terms

Outcomes:
109-3 Demonstrate the importance of choosing words that are scientifically appropriate by using these words in context:
- niche - habitat - population - community - ecosystem

Lesson Activity Overview
The intent of this lesson is not for student to regurgitate textbook definitions of these terms. Rather, these terms should be introduced in context and assessed in sense-making assessment activities.

Begin with Brainstorm for each of the terms. The goal is to identify what students already know about the each term. Design instruction so that students are competent using each of the terms in the correct context.

<u>Tasks for Instruction</u>

Tell me how you could explain the following terms so that a grade 3 or 4 student would understand their meanings and relationships:
- niche - ecosystem - community (109-13)
- population - habitat

Describe the niche of a fungus. (109-13)

Give examples of populations of plants in your backyard. (109-13)

Assessment:Informal Formative
Ensure that students are able to use and explain each of the identified terms in the context they were intended.

Assessment:Formal Formative
Based on the tasks chosen, ensure that students were able to appropriately complete the task as defined in the expectations.

Creating Models of Food Webs

Outcomes:
210-2, 306-1 prepare a chart that describes how energy is supplied to, and how it flows through, a food web
210-3 Identify the strengths and weaknesses of a diagram showing the flow of energy in an ecosystem
111-6 Apply the concept of a food web as a tool for interpreting the structure and interactions of a natural system

Lesson Activity Overview
The intent of this lesson is for students to explore various ecosystems (most likely this has been done in the previous strand) or use knowledge they have of local areas. From this content, students should be creating food chains, similar to what they have done in grade 4 habitats.
The connection her is that a food chain explains the flow of energy in a habitat, while a food web represents an ecosystem. From the various food chains that are created, all levels (producers, consumers) can be combined to form a model of a food web.

> Draw a food web of organisms researched, using various print and electronic sources. Illustrate the flow of energy throughout the food web in the form of a poster.(111-6,210-2,306-1)

As a follow-up, or for non-visual learners, write a short story that illustrates the flow of energy through a food chain or a sample food web. (111-6, 306-1)

<u>Journal Activity</u>
What are some of the ideas that you can communicate well, using a food web? What are some ideas that cannot be communicated well? (111-6)

Evaluate the strengths and weaknesses of the diagram of the food web (210-3)

<u>Classroom Extension Activity</u>
Construct a three-dimensional model of a food web. (111-6)

Assessment:Informal Formative
Ensure that students participate in creating food chains in their group 210-2

Ensure that students participate in creating a food web based on classroom created food chains 210-2

Assessment:Formal Formative
Ensure that students have create a journal entry related to communication competencies 111-6

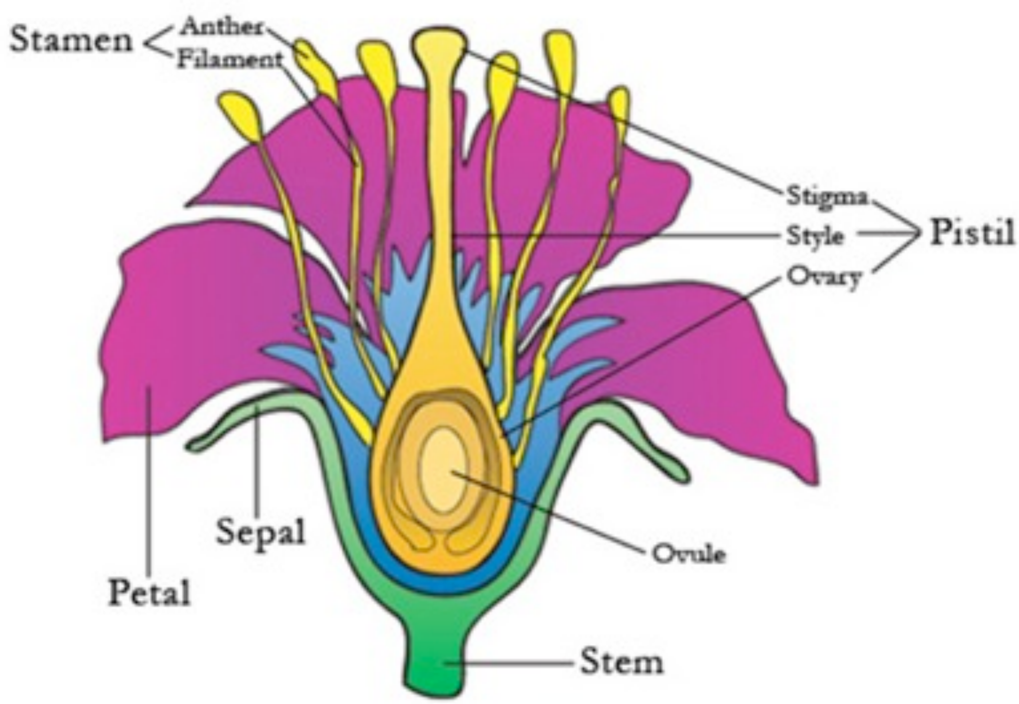
Ensure that students have created a journal entry related to the strengths and weaknesses of their food web 210-3

Please Pass the Pollen: Flowering Plants, Pollination, and Insect Pollinators

Outcomes:
306-1 Describe how energy is supplied to, and how it flows through, a food web

Materials:
• Flowering plants (Use plants already on the school grounds and/or potted plants - check with a local nursery or the internet to determine the most pollinator-friendly plant for your bio-region
• Hand lenses (and/or dissecting or compound microscopes if available)
• Ken-A-Vision microscope
• Calculators

Image:



Inquiry Lesson:
1. Begin by asking students to name foods they eat that come from plants. List their responses on the board; the list will most likely be long. Point out that many of those plants would not grow if it weren't for pollinators, which spread the plants' pollen from flower to flower and allow the plants to reproduce and grow fruits and vegetables. We therefore rely on pollinators for much of our food, and many flowering plants relay on

2. pollinators for this very survival. Ask the student what they know about pollinators and pollination.
   Take the class outside to observe some flowers on campus (these can be in the ground or in pots, but the more the better.) Have students record their observations of any pollination activity they can see: what sort of pollinators, which flowers are most often visited, etc. Return to the classroom and have students report their findings. Ask,
   - What do you want to know about flower, pollen, and pollinators?
   - How can we investigate and find answers to your questions?

   Be sure to adjust the following procedures to students' own notions of experimentation in order to offer opportunities for them to understand effective experimental techniques through trial and error.

3. Devise investigations to encourage students to find out more about their questions regarding pollination and pollinators by direct observation. This process will be much more valuable if you allow the student groups to devise their own investigations, scaffolded by your comments and suggestions. They will practice determining the empirical means to answer their own questions.
   For instance,
   - How often are flowers visited by pollinators? (students can predict and count the number of pollinators visiting a particular flower or a particular area of the flower within a certain time, such as 10 minutes. Then they can determine how many pollinators would be expected to visit that flower or area in an hour or a day.)
   - Is pollination more likely to occur in morning or afternoon? (Students can make observations at different time of the day and compare their results.)
   - Are different pollinators active at different times of the day (e.g., morning versus afternoon)? (Again, observations made throughout the day may be compared to provide insight.)
   - Do different flowers attract different pollinators? Does flower color seem to have anything to do with pollinator type or number of visits? (Compare data to find out.)

4. Bring some flowers both large and small, into the classroom for observation with hand lenses and microscopes. Students can carefully dissect the flowers under a lens and watch for small or hidden insects. Are there any insects pollinators present that you might have missed seeing in the field?

   Clearly, students have unlimited opportunities to use math to analyze pollinator behavior:
   - How long does a butterfly remain on a particular flower?
   - What does it do while it's on the flower?
   - Does it move on a nearby flower or fly away, and approximately how far does it move?
   - How many flowers does it visit before leaving the area? Within a given time on a particular flower, how many insects are present?

(Consider comparing the *mean,* i.e., the average, with the *mode*, i.e., the most frequently occurring number, of insects on a particular flower.) Data can also be used to create bar graphs, such as three bars comparing the number of insects seen on three different types of flowers. Students should see that by combining individual data, they have more evidence on which to base their conclusions. They should also be encouraged to reflect on their methodologies, before and after carrying out their investigations. For instance, ask students,

- Do yo foresee and problems with this experimental technique?
- What were some sources of error in your investigations?
- How would you proceed differently if you were to do this investigation again?

Extension:

1. Students can do more in-depth studies of flower anatomy, which might include pressing various flowers (in a plant press, see image below). Pressed flowers make beautiful and useful displays when glued onto paper.

Discussion Questions:

1. For what food to we depend on pollinators? In what other ways do pollinators affect our lives?

2. Pollination can be thought of like an "arranged deal" between the flower and the pollinator, with both parties benefiting from the relationship.. How does the flower benefit? How does the pollinator benefit? Who or what else benefits? (In scientific jargon, we might call the relationship in which both parties benefit a *mutualistic* instance of *symbiosis*)

3. How are flowers adapted for insect pollination? How are the insect pollinators adapted for pollinating flowers?

4. How did you use mathematics in your studies of pollination? How would your pollination experiments or investigations have been different if you had not used math?

5. How would our lives be different without insect pollinators? What can we do to ensure that insect pollinators survive and thrive?

Assessment:

1. Were students able to effectively design experiments to test their ideas and predictions about pollination? (Use the outcomes of Procedure 2 as performance assessment.)

2. Did students reach accurate and thoughtful conclusions regarding pollination based on their observations? (Use Discussion Questions 1-5 as embedded assessments or as prompts for writing science journal entries.)

3. Were students able to successfully apply mathematics to their investigations of pollinators and pollination? (Use Discussion Question 4 as embedded assessment or as a prompt for writing a science journal entry.)

Rubric:

	Developing 1	Proficient 2	Exemplary 3
Were students able to effectively design experiments to test their ideas and predictions about pollination?	Attempted to design a experiment but were unsuccessful to any significant extent	Successfully designed and carried out a pollination-related experiment	Successfully designed and carried out a pollination related experiment and were able to explain their investigation in detail using appropriate terminology
Did students reach accurate and thoughtful conclusions regarding pollination based on their observations?	Attempted to reach thoughtful conclusions but were unable to do so to any significant extent	Successfully reached accurate and thoughtful conclusions based on their observations	Successfully reached accurate and thoughtful conclusions based on their observations and were able to explain their work in detail using appropriate terminology
Were students able to successfully apply mathematics to their investigations of pollinators and pollination?	Attempted to apply math to their inquiry but were unsuccessful to any significant extent	Successfully applied math to their pollination inquiry	Successfully applied math to their pollination inquiry and were able to explain their work in detail using appropriate terminology

Flow of Energy in Ecosystems

Outcomes:
306-2 describe how matter is recycled in an ecosystem through interactions among plants, animals, fungi, and microorganisms
210-12 Identify and evaluate potential application of the recycling of matter in an ecosystem

Lesson Activity Overview
The intent of this lesson is for students to understand how when they eat it is gaining energy from another source. In the case of an ecosystem, food webs explain how this energy recycling and transfer.

Students should investigate and explore what happens to consumers that have no predators and other biotic material that is not consumed. This will help the students to gain an appreciation of the role of the decomposers. It will also help to further their understanding of the systematic and cyclic nature of matter and energy in ecosystems, as well as overpopulation of some species.

<u>Tasks for Instruction:</u>

In an essay, describe how matter (hay for cattle, for example) is recycled in the ecosystem. Describe the roles of plants, animals and decomposers. (306-2)

Interview a hog farmer to learn how pig manure is recycled and used as a fertilizer. Report to the class. (306-2)

Research and report on the composting of organic/biotic material in a local Waste Watch program. (210-12)

Assessment:Informal Formative
Ensure that students participate in discussion related to how energy in ecosystems is recycled 306-2

Assessment:Formal Formative
Based on the tasks chosen, ensure that students were able to appropriately complete the task as defined in the expectations. 306-2

Ensure that students have appropriately researched and reported on composing 210-12

Interactions Within Ecosystems

Strand - Decomposers

General Curriculum Outcomes	Specific Curriculum Outcomes
304-3 describe conditions essential to the growth and reproduction of plants and microorganisms in an ecosystem, and relate these conditions to various aspects of the human food supply	304-3 describe conditions essential to the growth and reproduction of plants and microorganisms in an ecosystem, and relate these conditions to various aspects of the human food supply: air temperature light moisture
111-1 provide examples of scientific knowledge that have resulted in the development of technologies	111-1 provide examples of how knowledge of microorganisms has resulted in the development of food production and preservation techniques: - describe techniques used in the past (pickling, salting, drying, smoking) to preserve food - describe more recent food preservation techniques that have been developed to preserve food (refrigeration, freeze-drying, radiation, canning)

Decomposition of Food

Outcomes:
304-3 describe conditions essential to the growth and reproduction of plants and microorganisms in an ecosystem, and relate these conditions to various aspects of the human food supply:
Air
Temperature
Light
Moisture

Lesson Activity Overview
The intent of this lesson is for students to create a fair test in which they control conditions related to the food supply (Air, Temperature, Light, Moisture). The logical connection is for students to explore food molding. The purpose is so they understand how microorganisms act to decompose food. *The connection should be made from their test of mold to conditions in an ecosystem.*

Students should use the worksheet below to complete their fair test.

Extension Activities
Analyse your results in a fair-test activity to explain why cold rooms were important storage areas in many farmhouses in the past. (304-3)

Interview a person who composts in order to learn about conditions required for decomposition of wastes. (304-3)

Plants are producers and fungi are decomposers. Which conditions essential for growth and development might be common for both? (304-3)

Assessment:Informal Formative
Ensure that students have participated in an investigation related to decomposition of food 304-3

Assessment:Formal Formative
Ensure that students have appropriately completed each science skill in an investigation related to decomposition of food

Write a lab/activity summary describing the results of a fair test to determine conditions essential to the growth of plants and/or microorganisms. (304-3)

Testable Question	**Write a testable question that explain what you are trying to test**

Controlled Variables (many)	**Tested Variable (1)**

Hypothesis	**Predict what you expect to happen based on what your previous knowledge of the concept**

Develop a Plan	Detail an operational plan with clear sequence with outlines materials	
How long will you test your design?	How will you record your observations?	How often will you record your observations?
Detail your Plan:		

Based on your plan, record your observation in your science notebook

Claims and Evidence	Students use the data they collected from observations to make sense of meaning from the investigation (Data is your Evidence)
Claims	**Evidence**
I claim that...	I claim this because...
I know that ...	I know this because ...

Drawing Conclusion	Conclusions are the justification that links the claims and evidence together
Drawing conclusions involves students finding patterns in their results. Students should be asked to examine the evidence i to determine what changed that lead to other changes in the data collected.	

Next Steps	Reflect and think of new questions

Analysing Food Preservation

Outcomes:
111-1 provide examples of scientific knowledge that have resulted in the development of food production and preservation technologies

Lesson Activity Overview
This lesson has two distinct sections.

First, students should be looking at foods in their world and understand how STEM professionals use technologies to avoid food being spoiled. It is suggested that an interview take place either a a local food Growing - Farmer or for Miramichi Are Food Processing - Food Technologist (Northumberland Co-op). The purpose is to connect foods we eat and the microorganisms that also depend on and at times spoil the food grown and processed

Next, the focus is on having students understand how things in the last 100 years have changed in terms of preserving foods. They may not realize that deep freezers, and refrigerators have not always existed. Its suggested that students Interview Parents, Grandparent, Older Person to compare how food was preserved in the past compared to today. Simply, Interview a senior in your community to learn about what types of foods were pickled, salted, dried, and smoked in the past to preserve them. Report to the class. (111-1)

<u>Tasks for Instruction:</u>

Prepare a collage of food preservation techniques used in the present and in the past. (111-1)

Describe how twenty food items in your house are preserved. Give the name of the food and the preservation technique used to keep it safe to eat. (111-1)

Assessment:Informal Formative
Ensure that students have participated in activities associated with STEM professionals using technologies to preserve food.

Ensure that students have interviewed a older person to understand how preservation techniques have changed

Assessment:Formal Formative
Based on the tasks chosen, ensure that students were able to appropriately complete the task as defined in the expectations. 111-1

Interactions Within Ecosystems

Strand - Ecological Succession

General Curriculum Outcomes	Specific Curriculum Outcomes
306-4 identify signs of ecological succession in a local ecosystem	306-4 Identify signs of ecological succession in a local ecosystem: pioneer species climax community primary succession secondary succession
208-5 state a prediction and a hypothesis based on background information or an observed pattern of events	208-5 predict what an ecosystem will look like in the future on the basis of the characteristics of the area and the long-term changes (succession) observed in the site

Observing a Local Area for Evidence of Succession

Outcomes:
306-4 identify signs of ecological succession in a local ecosystem:
pioneer species
climax community
primary succession
secondary succession
208-5 predict what an ecosystem will look like in the future on the basis of the characteristics of the area and the long-term changes (succession) observed in the site

Lesson Activity Overview
Students should come to understand that ecosystems are very dynamic. The change may be slow and difficult to perceive over short periods of time, such as in the establishment of **pioneer species** such as mosses and lichens in a mined-over area, or it may be rapid as in the case of a forest fire. Ultimately, most ecosystems reach a fairly stable stage compared to those that preceded it. This is called a **climax community**. Two types of ecological succession are generally recognized and should be addressed. First, there is **primary succession** which takes place in areas lacking soil (bare rocks, sand dunes, surface mining areas, and cooled volcanic lava). More common and recognizable to most students is **secondary succession**. This occurs in areas that were previously inhabited (abandoned farm land, burned forests, and polluted areas).

View pictures, film strips, videos, or other media to study the various stages of succession in a particular area. Preferably, students can participate in a field trip to areas that are in various stages of ecological succession, such as old farm fields and “scrubby” (pin cherry, alders, aspen) areas. If the opportunity for students to visit an area in a particular stage of ecological succession is at hand, students can observe and describe the ecosystem in detail. 306-4

Students can be asked to prepare before and after pictures of the above- mentioned scenarios. The teacher can also ask students to predict what will happen further into the future with regard to the environments previously mentioned 208-5

Tasks for Instruction:
Compare and contrast historical and recent photographs of areas in which primary and/ or secondary succession has taken place. (306-4)

Create a model that illustrates various stages of succession from pioneer species to a climax community. (306-4)

Draw a ditch/pond/flower bed/woodlot, and so forth, 20 years ago, at present, and 20 years in the future. (208-5)

Assessment:Informal Formative
Ensure that students have participated in some manner into an investigation of parts of an ecosystem to understand ecological succession 306-4

Assessment:Formal Formative
Ensure that students are able to differentiate between: pioneer species, climax community, primary succession, secondary succession 306-4

Ensure that students have made a reasonable prediction about the future look of an ecosystem 208-5

Mobile Science - Succession Activity at FFC

Outcomes:
306-4 identify signs of ecological succession in a local ecosystem:
pioneer species
climax community
primary succession
secondary succession
209-3 Use instrument effectively and accurately for collecting data
211-5 Defend a given position on an issue or problem on the basis of their findings

Lesson Activity Overview
Students should come to understand that ecosystems are very dynamic. The change may be slow and difficult to perceive over short periods of time, such as in the establishment of **pioneer species** such as mosses and lichens in a mined-over area, or it may be rapid as in the case of a forest fire. Ultimately, most ecosystems reach a fairly stable stage compared to those that preceded it. This is called a **climax community**. Two types of ecological succession are generally recognized and should be addressed. First, there is **primary succession** which takes place in areas lacking soil (bare rocks, sand dunes, surface mining areas, and cooled volcanic lava). More common and recognizable to most students is **secondary succession**. This occurs in areas that were previously inhabited (abandoned farm land, burned forests, and polluted areas).

ASD-N has 10 iPods that are available for loan. The purpose of these devices is to allow students to take pictures, video, record notes, and use apps to solve science related problems. French Fort Cove in Miramichi is a great area for students to explore for several examples of succession. In other parts of New Brunswick, this activity can be easily adapted to based on the ecosystem explored.

Starting Point:
Just up the path from the Historical Hut, on the Nordin side of the cove, is evidence of succession of tree species. At this site please observe what are the older species and as a contrast what are the newer species. Are they the same type of species? What factors would lead to them being different. Also at this site, notice the stream that is running down the hill. Try to trace the origin of the water source.

Activity:
During your walk around the cove, please take a picture of any other examples of succession that you see. For each different example of succession that you have please be prepared to prove which type of succession it is.

Classroom Follow up:
Remove pictures and videos from devices and have students categorize the images based on each of the categories: pioneer species, climax community, primary succession, secondary succession.
Have students defend their claims to the class in a media presentation.

Assessment:Informal Formative
Ensure that students participate in an technology based investigation of an ecosystem in which evidence of succession is the purpose. 209-3

Assessment:Formal Formative
Ensure that students have correctly categorized media they recorded as evidence related to pioneer species, climax community, primary succession, secondary succession 306-4

Ensure that students are able to defend their claims based on evidence gathered in the investigation 211-5

Interactions Within Ecosystems

Strand - Action

General Curriculum Outcomes	Specific Curriculum Outcomes
113-11 propose a course of action on social issues related to science and technology, taking into account personal need	113-11, 211-5 propose and defend a course of action of protect the local habitat of a particular organism
211-5 defend a given position on an issue or problem on the basis of their findings	
133-10 provided examples of problems that arise at home, in an industrial setting, or in the environment that cannot be solved using scientific and technological knowledge	113-10 provide examples of problems that arise in the environment that cannot be solved using scientific or technological knowledge
112-4 provide examples of Canadian Institutions that support scientific and technological endeavors	112-4, 112-8, 209-5 use various print and electronic sources to research individuals or groups in Canada interested in protecting the environment
112-8 provide examples to illustrate that scientific and technological activities take place in a variety of individual or group settings	
209-5 select and integrate information from various print and electronic sources or from several parts of the same source	

Debating a Course of Action

Outcomes:
113-11, 211-5 propose and defend a course of action to protect the local habitat of a particular organism

Lesson Activity Overview
During the study of this unit, students have gathered and organized data and information about the local habitat being investigated as well as at least one organism that lives in the habitat. Students have acquired enough information to produce and defend a recommendation to protect the local habitat of the organism they have investigated. Students should be encouraged to reflect upon a variety of possible courses of action to protect the habitat and choose and act upon one of them.

As a class create a scenario based on things that have been investigated in this unit. Have students participate in a role-play/debate in which various points of view are put forth regarding the preservation or utilization of a local habitat. Develop a scoring rubric for your preparation on work and your participation in the debate. (211-5)

As a follow up, have students choose one of the following tasks:
Research and prepare a report based on protecting the local habitat of a particular organism. (113-11)

Prepare and deliver an oral presentation based on the preservation and protection of a particular habitat. (113-11)

Assessment:Informal Formative
Ensure that students have participated in a debate related to a class selected scenario 211-5

Assessment:Formal Formative
Based on the tasks chosen, ensure that students were able to appropriately complete the task as defined in the expectations 113-11

Protecting This Area

Outcomes:
113-11, 211-5 propose and defend a course of action to protect the local habitat of a particular organism

Lesson Activity Overview
ASD-N has 10 iPods that are available for loan. The purpose of these devices is to allow students to take pictures, video, record notes, and use apps to solve science related problems. French Fort Cove in Miramichi is a great area for students to explore for several examples of succession. In other parts of New Brunswick, this activity can be easily adapted to based on the ecosystem explored.

Background Info:
This area is located on the Newcastle side of the cove, just above the covered bridge. You will notice when you go down the stairs that it is a boggy area below and the water from here feeds to the main cove and eventually to the Miramichi River. Generally, in areas like this, the plant life is dependent on water source for survival. Information about this area is cited on an information board just above this stair case. Please take notice of the process for the purification of water at this site.

Activity:
Please read the information on the information board and cross-reference it with the plant apps on your device.
Suppose a group of developers were planning on putting a canteen on this location. Propose and defend a course of action to protect the local habitat.

Assessment:Informal Formative
Ensure that students participate in discussion related to protecting an ecosystem 113-11

Assessment:Formal Formative
Ensure students have prepared and delivered an oral presentation based on the preservation and protection of a particular habitat. (113-11)

What the Frack?

Outcomes:
113-10 provide examples of problems that arise in the environment that cannot be solved using scientific or technological knowledge

Lesson Activity Overview
The intent of this outcome is for students to understand that issues in society have more factors other then science when it comes to decision making. Students should be given the chance to identify problems and situations that cannot be wholly solved by using scientific or technological knowledge.

Since 2010 hydro-fracking has been a contentious issue in New Brunswick. This issue is different based on political standpoint, while there may be compelling scientific evidence, but it might not be a popular or desirable one in a particular community or region because of other factors.

Involve students in discussions about hydro-fracking or other ecological issues.

Based on discussions, assign students to tasks:
Describe one problem in the environment that cannot be solved using scientific or technological knowledge and explain why it is seen as a problem for people. (113-10)

Interview a politician or community leader about a decision made to alter an ecosystem, and find out how/if science was used to make the decision. Prepare a short report. (113-10)

Students should be encouraged to theme their task to a local issue (i.e. hydro-fracking)

Assessment:Informal Formative
Ensure that students have participated in discussion related to ecological issues that involve more than just science in decision making 113-10

Assessment:Formal Formative
Based on the tasks chosen, ensure that students were able to appropriately complete the task as defined in the expectations 113-11

Canadian Contributions to Protecting the Environment

Outcomes:
112-4, 112-8, 209-5 use various print and electronic sources to research individuals or groups in Canada interested in protecting the environment

Lesson Activity Overview
The intent of this lesson has three distinct sections that all lead to one common exploration. Students should be using *various sources* of information to research *Canadians and/or Canadian organizations* that are interested in *protecting the environment.*

Students should be involved in discussion (brainstorm) about issues that are currently being studied. This could be a springboard activity from the previous learning. However, the focus is not on the nature or content in question. Rather, students should be working on their research skill while focussing Canadian contributions to protecting the environment.
Students can investigate environmental organisms such as the Canadian Nature Federation, Friends of the Earth, Project Green, the Sierra Club of Canada, the World Wildlife Fund of Canada, and Ducks Unlimited.

<u>Task for Instruction:</u>
Give an oral presentation based on the research of a Canadian environmental organization. (112-4, 112-8, 209-5)

Assessment:Informal Formative
Ensure that students have participated in discussion related to Canadian Contributions to protecting the environment 112-4

Assessment:Formal Formative
Ensure that students have used multiple sources in their research 209-5

Ensure that students have appropriately highlighted individual or groups 112-8 that are Canadian 112-4 in their research and presentation