Species at Risk in the Classroom

A Guidebook for Educators on the South Coast of British Columbia

Module 3 - Discovering Ecological Communities at Risk in the South Coast Region of BC

South Coast Conservation Program

South Coast Conservation Program
Conserving and Restoring at Risk Species and Ecosystems on the BC South Coast
www.sccp.ca

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Module 3 - Discovering Ecological Communities at Risk in the South Coast Region of BC



South Coast Conservation Program

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Image: watercolour painting of Skunk Cabbage by Carrielynn Victor.

Module 3

Discovering Ecological Communities at Risk in the South Coast Region of BC

Introduction to Module 3

The South Coast of British Columbia features many different ecosystems. From the cool, coastal waters of the Pacific Ocean to the snowy peaks of the mountains with a wide range of different landscapes in between. These unique ecosystems are able to support a variety of plant and animal life. The competition for resources as the human population increases is greater pressure on these fragile ecosystems putting many plants and animals at risk. One of the key factors in protecting species at-risk is preserving the distinct ecosystems in which they live.

What is an ecosystem and an ecological community? An ecosystem is a complex interaction of plants, animals, and abiotic (non-living) factors, such as soil, sunlight, water, air, and landforms. The term ecological community has been adopted by the BC Conservation Data Centre (CDC) and the NatureServe network to represent the variety of unique ecosystems in BC - "ecological" refers to the inclusion of non-living factors and "community" refers to the interactions of living organisms and the relationships between the living and non-living factors in the system.

Most of the ecological communities in BC have been named based on the predominant vegetation in an area. The Biogeoclimatic Ecosystem Classification (BEC) provide a complex criteria for categorizing ecological communities based on native terrestrial plants. Some examples of ecological communities that have been identified are Coastal Douglas-fir, Coastal Western Hemlock, Garry Oak, and Arbutus.

Douglas-fir Ecosystem. Photo: Mike Coulthard.

For the purposes of this module the terms ecosystem and ecological community may be used interchangeably. There are currently nine distinct ecological

communities at-risk on the South Coast. This module will highlight three of these unique communities: Wetlands, which include swamps, bogs, and marshes - Coastal Douglas-fir - and Coastal Sand ecosystems. There are numerous plants and animals at-risk in these unique ecosystems. Ecosystems are part of what makes BC such a wonderful place to live, for all species.

Photos: Wetland (top left) - Pamela Zevit, Coastal Sand Ecosystem (bottom left) - T. Baker, Coastal Douglas-fir (right) - Mike Coulthard.

Module 3: Activity Summary

Activity name:	Description of activity:
Activity 1 Habitats, Ecosystems, and Ecological Communities - Parts of an Ecosystems	Students learn the meaning of ecosystem and ecological community. They also learn about a few of the ecological communities at-risk on the South Coast of BC and work together to discover how they can help protect them.
Activity 2 Wetlands - Simon Says SWAMP, MARSH, BOG	Students learn about three types of wetland communities as well as some of the plants and animals that live in wetland habitats while doing some high energy activities.
Activity 3 Coastal Douglas-fir - A Tree Story	Students learn about why trees are so important to humans and what a tree looks like on the inside. Students then create a textured cross-section of a tree on paper.
Activity 4 Coastal Sand Ecosystems - Amazing Adaptations	Description of activity: Students investigate Coastal Sand communities and discover how plants adapt to the often difficult living conditions in these ecosystems.
Activity 5 Coastal Sand Ecosystems - Think Like a Bird	Students try to “think like a bird” and construct the perfect nest for different types of habitats.

Activity 1: Habitats, Ecosystems, and Ecological Communities - Parts of an Ecosystem

The South Coast of British Columbia features many different ecosystems. From the cool, coastal waters of the Pacific Ocean to the snowy peaks of the Cascade Mountains with a wide range of different landscapes in between. These unique ecosystems are able to support a wide variety of plant and animal life. The competition for natural resources as the human population increases is putting greater pressure on these fragile ecosystems. Many of these plants and animals are now classified as endangered or species at-risk. One of the key factors in protecting species at-risk is preserving the distinct ecosystems in which they live.

Materials:

- highlighters or coloured pencils
- pencil
- paper

Time required:

45-60 Minutes

Audience:

Grades 4 - 7

Objectives:

Students will be able to:

- define the terms habitat, ecosystem and ecological community;
- identify differences between habitat, ecosystem, and ecological community;
- understand why protecting ecosystems is important.

Procedure:

1. Write the words Animals and Habitat on the board. Tell students that British Columbia is Canada's fourth largest province, 95 million hectares (http://www2.gov.bc.ca/gov/content/governments/celebrating-british-columbia/bc-quick-facts). Ask them to think about all the different types of animals that can be found in BC. Tell them to try to think of a variety of animals for this challenge, be sure to include all different types such as mammals, insects, birds, etc. This activity can be done as a large group discussion or in smaller groups. Younger students may need more direction.

2. Next, ask students if anyone knows what a habitat is? A habitat is the natural home of a living organism. Tell students to list as many of the different habitats that can be found in BC.

Example:

Animals	Habitat
whale	ocean
frog - Northern Red-Legged Frog	marsh
bear	forest
fish - salmon (sockeye, chum)	river
snail	forest
turtle	ocean, beach, marsh
snake	grassland
starfish	ocean
clam	beach

Photos: River/Creek Ecosystem - Pamela Zevit, Pacific Water Shrew - Denis Knopp, Pacific Tailed Frog - Brad Moon, Dragonfly - Isabelle Houde.

Photos: Coastal Sand Ecosystem - Pamela Zevit, Adouins Night Stalking Tiger Beetle - Andy Teucher, Common Nighthawk - Andy Reago & Chrissy McClarren, Large Headed Sedge - T. Baker.

3. Have students examine their lists and ask them if they are likely to find all of the animals they listed living in the same place? Tell students to use highlighters or coloured pencils to group animals in their habitats or do as a whole group. Some of the animals might be found in more than one habitat.

   Example:

Animals	Habitat
bear	mountain
fish, frog, snake	creek, river, forest
frog, turtle, fish, snake	pond, swamp
frog, bear, snail, snake:	forest
whale, fish, starfish	ocean
starfish, clam, turtle	beach
snake	desert, grassland

4. Ask students what we call an area that contains a variety of different plants, and animals living together - an ecosystem. Ask "What is missing from our groups of animals and habitats that is part of an ecosystem?" All the plants and non-living parts. Add a few of these to the groups. With this new info, challenge older students to write a definition of an ecosystem - a biological community of interacting organisms and their physical environment.

   Example:

Animals	Habitat
bear, rocks, flowers, trees	mountain
fish, frog, snake, water, plants, insects	river, creek
frog, turtle, fish, snake, grasses, bullrushes, water, algae, pebbles	pond, swamp
frog, bear, snail, snake, trees	forest
whale, fish, starfish, water, seaweed	ocean
starfish, clam, turtle, sand, pebbles, water	beach
snake	grassland (e.g.: meadows, old-fields)

5. Tell students that scientists have further grouped ecosystems into ecological communities. Ecological communities are similar to ecosystems in that they are areas in which living organisms interact and the relationships that occur between living and non-living parts of the system. Ecological communities are usually based on the main plant species in the area. Write the words "forest" and "Coastal Douglas-fir" on the board. Tell students that they are both ecosystems but one is also known as an ecological community. Ask if they can guess which one - Coastal Douglas-fir.

Photos: Forest Ecosystem - Pamela Zevit, Oregon Forestsnail - Ryan Durand, Grizzly Bear - Ursula Easterbrook, Douglas-fir - Fiona Steele.

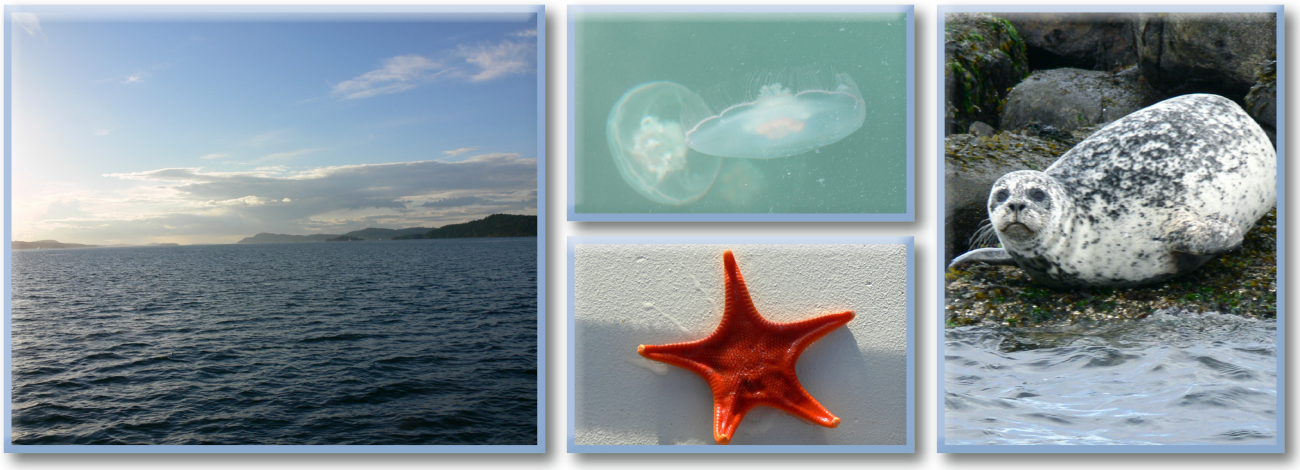
6. Tell students there are many ecological communities at-risk in BC. List the following on the board: Wetlands, Coastal Sand ecosystems, and Coastal Douglas-fir. These communities are important because they are red-listed or in some cases blue-listed in BC. Ask if any-one knows what red-listed and blue-listed means? Red-listed: ecological community is extirpated, endangered or threatened. Blue-listed: ecological community is of special concern but not currently extirpated, endangered or threatened. What does extirpated means?
7. Discuss why it is important to protect ecological communities - protect the species that live in them, and ways that students can protect ecological communities - clean up garbage, make posters to tell people about communities and species at-risk, etc.

Assessment:

Assess students oral responses during discussion and group work.

Extensions:

Put older students in groups and have them choose an ecological community out of the three listed above (Wetlands, Coastal Sand Ecosystem, and Coastal Douglas-fir). Each group will be responsible for finding information about their ecological community and presenting the info to the class. They will be trying to persuade the class to protect their chosen community. Presentations may take the form of a skit, a PowerPoint, or a poster board. Students should be encouraged to be as creative as possible!



Photos: Ocean Ecosystem, Moon Jelly, Vermillion Starfish, Harbour Seal - Isabelle Houde.

Activity 2: Wetlands - Simon Says SWAMP, MARSH, BOG!

Wetlands come in many different and unique forms. There are bogs, marshes, and swamps to name a few. These fragile ecosystems serve many purposes, they provide natural, free water filtration, are home to many unique plant and animal species, and reduce flooding in neighbouring areas.

Bogs are an increasingly rare wetland community on the South Coast. Burn's Bog, located in the Fraser River estuary in Delta, is one of the most well-known bogs in the area. It is actually a globally rare type of bog called a domed sphagnum bog. Bogs represent 3% of land cover globally, but provide natural water filtration for 10% of the earths freshwater.

Materials:

- large indoor or outdoor area
- posters with the words: SWAMP, MARSH, and BOG (for younger students)

Time required:

45 Minutes

Audience:

Grades K-7

Marshes, with their easily recognizable cattails, are another type of wetland found on the South Coast. They tend to have open, permanent water, that varies in depth and temperature. Marshes provide essential habitat for many species at-risk, such as Oregon Spotted Frog, Northern Red-legged Frog, and the Western Painted Turtle.

Swamps are usually associated with forested areas. Swamps don't usually have permanent water but instead have standing or gently moving water that ebbs and flows seasonally leaving the ground waterlogged most of the time. Swamps have nutrient rich soils that support a range of vegetation from, Skunk Cabbage, sedge species, Red Alder, and Western Redcedar. Species such as the at-risk Northern Red-legged Frog, who rely on both forested habitats and wetlands, need intact swamp communities.

Objectives:

Students will be able to: identify three types of wetlands; identify common wetland species and species at-risk in wetland communities.

Procedure:

1. Take students to a large indoor or outdoor area. Have students sit in a circle for instructions. Tell them that they are going to pretend that they are scientists who study wetlands. They have just arrived at an area renowned for its beautiful and diverse wetlands, the South Coast of BC!
2. Tell students that they will be playing a game to help them get to know some of the different types of wetlands and the plants and animals that live in them.
3. Tell them that to the north a swamp has been discovered. To the west a bog is located, and to the east there is a marsh. Place posters around the area to mark it for younger players. Get students to practice running to the right location when you call out swamp, marsh and bog
4. Demonstrate the following actions for students:
   - Smell a Skunk Cabbage - run to the swamp and plug your nose and say "Ewww!"
   - Jump like a Northern Red-legged Frog - jump all the way to the swamp and then jump up and down.
   - Fall into a Sticky Sundew plant - run to the bog and lay down on the floor.
   - Take a picture of a Western Bog Laurel (a beautiful pink flower) - run to the bog and bend down and pretend to take a picture.

Sundew plant. Photo: Pamela Zevit.

- Sun your Western Painted Turtle shell on a log - find a friend or two and run to the marsh and sit on all fours to sun your shell.
- Be a Cattail waving in the wind - run to the marsh and stand up straight and wave back and forth.

Bog Laurel. Photo: Pamela Zevit.

5. Get students to practice the actions in the centre of the playing area and then remind them that they need to go to the correct location to perform the action.
6. Before the game starts remind students that they will need to listen for the signal (use a whistle or say stop) so they know when to freeze to listen for the next instruction.
7. This game can be played as a warm-up activity or as an elimination game. The last student that arrives to the correct location and performs the action can be eliminated. Students could also take turns leading the game and calling out the actions.

Assessment:

- Watch to see who can follow instructions and go to the correct location in the gym.
- After you play the game, quiz students in what type of wetland they might find the following species: Skunk Cabbage, Western Bog Laurel, Western Painted Turtles, Cattails, Sundew plants, and Northern Reg-legged Frogs.

Different Types of Wetlands

Bogs are peatlands that are generally unaffected by groundwater or surface runoff; precipitation is the major water input. This lack of water flow results in lower nutrient availability. Sphagnum moss is a dominant group of plants, and is largely responsible for creating the acidic and nutrient poor conditions associated with bog ecosystems. Plants that grow in bogs must be tolerant of these harsh growing conditions.

Photo: David Blevins.

Photo: Pamela Zevit.

Marshes are the most nutrient rich of the wetlands. They are shallow, flooded wetlands with mineral substrate, and often have a fluctuating water table. On BC's South Coast, the most common marsh plants are non-shrubby species including Cattail, Hard-stemmed Bulrush and sedges. These wetlands are most heavily used by wildlife as they provide a productive growing environment for a large crop of edible vegetation.

Swamps are tree or shrub dominated wetlands that have a flowing or fluctuating water table near the surface. They can occur on both mineral soil and peatland. A common indicator plant of swamps on the South Coast is Skunk Cabbage.

Photo: Pamela Zevit.

Extensions:

Students can work together in groups to study a specific wetland. Tell students that they must find the key features of their wetland, including common plants and animals that live there, an example of where to find a wetland of this type, and species at-risk in this wetland. Groups can then present their info to the rest of the class in whatever form they like, such as song, poem, drama, poster board etc.

Image: watercolour painting of Bearded Sedge by Carrielynn Victor.

Activity 3: Coastal Douglas-fir - A Tree Story

Adapted from: Talk About Trees: Lesson 2 - The Nature of Trees (http://www.talkabouttrees.org/plans.html)

British Columbia is home to some of the world's largest trees, including some enormous Douglas-fir, Western Redcedar, and Sitka Spruce trees. This is mainly because of the climate conditions: mild year-round temperatures and lots of rainfall"(http://metronews.ca/news/vancouver/1166538/b-c-s-biggest-trees-can-now-be-found-online). Although BC is known for it's abundant, beautiful forests, development and demand for forest products place a constant strain on forest ecosystems.

Materials:

- photos of parts of a tree
- photos of species at-risk in Coastal Douglas-fir communities
- poster board
- glue
- coatings for tree picture (baking sprinkles (chocolate, yellow, and green), poppy seeds, sesame seeds, powdered milk, cinnamon)
- white paper
- pencils

Time required:

45 Minutes

Audience:

Grades K- 7

The South Coasts' Coastal Douglas-fir ecological community is the second rarest forest type in BC, next to Garry Oak. This community can only be found in a few areas along the coast from southeast Vancouver Island, Sunshine Coast, Howe Sound and patches along the Metro Vancouver Coastline to the Olympic Mountains in Washington State. It's proximity to prime real estate along the coastline is the main reason for it's decline as well as the easy access for timber harvesting. The few remaining large areas of Coastal Douglas-fir support a wide variety of species at-risk, including Northern Goshawk, Marbled Murrelet, Oregon Beaked Moss, and electrified Cats-tail Moss.

The UBC Faculty of Forestry has created a BC Big Tree Website, where people can go to record big trees they've found with the goal of educating and conserving the beautiful forest giants of BC (http://bigtrees.forestry.ubc.ca). This is an important step in preserving these precious trees.[1]

A number of actions can be done to protect mature trees in cities and local neighbourhoods. A discussion may be initiated with the students on how we can do a better job of protecting BC's old growth trees and forests (e.g.: creation of parks and protected areas, habitat restoration).

Objectives:

Students will be able to:

- learn the parts of a tree and their functions;
- investigate the importance of trees to humans;
- identify some species at-risk in Coastal Douglas-fir communities.

Procedure:

1. Tell students that BC is home to some of the largest, oldest tree species on earth. Invite students to check out UBC's BC BigTree website (http://bigtrees.forestry.ubc.ca) to check out some of the different species and sizes of trees found in BC.
2. Tell students that Coastal Douglas-fir (CDF) communities on the South Coast are the second rarest forest type in BC. Brainstorm some reasons for this - easy access to good-quality timber, desirable coastal real estate for development. The largest Coastal Douglas-fir listed on the BC Big Tree registry, is located in

[1]Unfortunately, in May, 2014 BC Supreme Court Justice, Gordon Weatherill, ruled that duty to protect the trees was discretionary, not mandatory (http://www.vancouverobserver.com/news/fight-provide-greater-protection-risk-coastal-douglas-fir-tree-fails-bc). Proving that a sustainable forestry industry may still be a long way off.

Port Renfrew on Vancouver Island. It is 74.0 m tall and has a circumference of 13.28 m (bcbigtree.ca). CDF communities also support a number of at-risk plants and animals including Northern Goshawk, Marbled Murrelet, Garry Oak as well as species such as Salal, Dull Oregon Grape and Ocean Spray, Oregon beaked moss and electrified Cats-tail Moss (show photos if possible).

3. Ask students to brainstorm some of the benefits that trees provide - shade and cool places, recreation opportunities, such as hiking and camping, release oxygen into the air, clean air by removing and storing carbon dioxide, roots hold soil in place, fallen leaves provide nutrients for the soil, provide homes and food for wildlife and humans, wood provides many products that we use everyday.
4. Provide students with a tree vocabulary list (for grade 2-7). Read through the list together, show pictures of the different parts from the internet if possible.
5. Compare the different parts of the tree to parts of a human and see if students can add these to their chart - outer bark (skin), inner bark (digestive system), cambium (we don't have any rings inside but we do get wrinkles as we age, we can't count wrinkles to determine someone's age though), sapwood, (circulatory system - blood and veins), heartwood (spine, skeleton), leaves and needles with chlorophyll (lungs).
6. Have students create a cross-section of a tree, labelling the all the parts from the vocabulary list. Next, have students glue their drawings to poster board or construction paper.
7. Tell students to apply glue to one section at a time, being careful to avoid the vocabulary word. Provide students with a variety of coatings so they can make a texture diagram of the parts of a tree.

NOTE: To reduce waste during the sprinkling phase of the project, have the students GENTLY shake off the excess coating onto designated paper plates, one for each type of coating. Other students can then make use of these materials.

SUGGESTIONS FOR COATINGS:

- chocolate baking sprinkles for inner bark;
- poppy seeds for outside bark;
- sesame seeds or powdered milk for cambium layer;
- yellow baking sprinkles or powdered mustard for sapwood layer;
- paprika, cinnamon, or chilli powder for the heartwood ;
- green baking sprinkles or green sugar crystals for the needles.

Image: watercolour painting of Dull Oregon Grape by Carrielynn Victor.

Assessment:

Assess the students drawings to make sure they are accurately labelled.

Extensions:

Take students to a forested area and have a competition to see who can find the tallest tree and the tree with the biggest circumference (see the BC tree registry for info on how to measure trees - http://bigtrees.forestry.ubc.ca/measuring-trees).

Amazing Tree Vocabulary

Part	Function
Outer Bark	The protective outside covering of a woody stem or root.
Inner Bark (Phloem)	Layer of inner bark cells that transport food made by photo-synthesis in the leaves to the rest of the plant.
Cambium	Thin layer of living cells that produce a new layer of wood each year, forming tree rings, which we can count to tell the age of a tree. The cambium lies between the xylem and phloem layers.
Sapwood (Xylem)	Newly formed wood cells that lie just inside the cambium. It acts as a major conductor of water and minerals for the tree; also called xylem.
Heartwood	The hard, inactive wood at the centre of the tree.
Chlorophyll	The green substance found in leaves and needles that capture's the sun's energy which is used in photosynthesis to combine light energy with carbon dioxide and water to produce oxygen, and glucose (food).

Adapted from: http://www.talkabouttrees.org/docs/lesson2.pdf

Activity 4: Coastal Sand Ecosystems -Amazing Adaptations

Of the three different ecosystems examined in this Module, the Coastal Sand Ecosystem (CSE) is perhaps the most distinctive and recognizably West Coast. Located where terrestrial realms, such as forests and salt marsh communities end, and adjacent to the ocean, where the marine community takes over, the CSE may appear deceptively simple. It is made up of determined plant and animal species that have adapted to live in an ever changing environment of sand, wind, tides, storms, and ocean spray. Not only are Coastal Sand Ecosystems a pleasure for people to visit and explore but they also serve as vital habitat for rare plant associations, invertebrates and birds. (http://www.sccp.ca/projects/coastal-sand-ecosystems-project).

Materials:

- paper
- pencil/pen
- pictures of plants that live in CSE

Time required:

45 Minutes

Audience:

Grades 4- 7

Many CSE's have been impacted due to development and modification of shoreline habitats. The most significant sand ecosystems remaining on the South Coast are located in portions of Boundary Bay (Delta), Iona Beach Regional Park (Richmond), Spanish Banks (Vancouver), and on the Sunshine Coast on Thormanby Island and farther north on Savary Island.

Objectives:

Students will be able to:

- identify plants common to the Coastal Sand Ecosystem;
- describe forces that affect the formation of sand ecosystems;
- learn how plants and animals are adapted to live in Coastal Sand Ecosystems.

Procedure:

1. Tell students that a walk inland from the ocean over the sand (keeping on the paths) and into the neighbouring forest and other adjacent areas is actually a walk back in time. As the plants that grow on the beach battle the elements, the plants that die accumulate in the soil. The further from the ocean you go the better the soil gets, making it possible for a greater variety of plant and animal species to thrive. (http://www.env.gov.bc.ca/wld/documents/sand_dunes_brchr06.pdf).
2. Ask students to brainstorm the elements that form sandy beaches (wind, tides, storms, sand, deposits from rivers, ocean action - waves, salty spray). Ask students if the beaches always stay the same? - No they don't and that is one of the key features of a CSE. Ask students what would stop a beach from changing? - Seawalls, other shoreline barriers and developments.
3. Tell students that animals and plants develop adaptations that allow them to be better suited for the environment they live in. Working in groups or pairs have students make a chart listing environmental challenges faced by plants living in CSE, the effect this challenge has on the plant, and the adaptation developed by the plant.
4. Show pictures of common CSE plant species (if possible). Ask students if these plants support their ideas (hypotheses) of what type of adaptations plants would need to live in CSE?

Example:

Environmental Challenge	Effect on Plant	Adaptation
Salty winds	Dry out leaves	Waterproof, shiny leaves
Strong winds	Damage fragile plants	Grow low to the ground.
Strong winds	Sand doesn't hold nutrients very well	Roots go under the sand to find nutrients and water
Rocky or sandy places	Hard for roots to hold on to and don't hold much water	Thick, tough roots that can cling to rocks
Hot temperatures in summer	Dry out leaves	Thick leaves that hold water

Adapted from: Coastal Plants (http://www.kcc.org.nz/dune-plants)

Assessment:

Assess charts made by students to see if they understand the concept of adaptation, also asses oral responses made by students during discussion time.

Extensions:

Group projects to protect CSE, including clean-up of shore and beach, and poster campaign to increase awareness of this fragile ecosystem and the species at-risk who live there.

Image: watercolour painting of Large-headed Sedge by Carrielynn Victor.

Activity 5: Coastal Sand Ecosystems - Think Like a Bird

Adapted from: http://www.nps.gov/grsa/forteachers/classrooms/think-like-a-bird.htm

The hardy and unique plant communities that live in Coastal Sand Ecosystems (CSE) make it possible for a wide variety of rare and interesting animal life, including birds, insects, and snakes. Some birds depend on sand communities for seasonal and year round nesting and foraging. Many CSE have already been lost along the South Coast. Two species of songbird, the Streaked Horned Lark and the Vesper Sparrow, are already extirpated on the South Coast.

Objectives:

Students will be able to:

- identify some common CSE birds;
- learn about the complexities of nest building;
- examine animal adaptations to their environment.

Materials:

- pictures of Common Nighthawk, Killdeer, Streaked Horned Lark
- materials to use as bird eggs - clay, or small rounded rocks
- nest building materials recycled materials from home (newspaper, cardboard, string, etc) or materials collected from the schoolyard (leaves, twigs, grass, sand, etc)
- small container to hold nest
- outdoor area
- paper
- pencil

Time required:

45 Minutes

Audience:

Grades 2- 7

Procedure:

1. Tell students that Coastal Sand Ecosystems provide essential habitat for many migratory birds. Ask students to brainstorm why CSE might be good habitat for birds, what might birds use CSE for? - Nesting, food.
2. Show them some examples of birds who use CSE some of them are now thought to be extirpated (gone from the area) in BC (http://www.sccp.ca/species-habitat/coastal-sand-ecosystems):
   a. Common Nighthawk - uses dunes and beaches for nesting, listed as threatened.
   b. Killdeer - uses a variety of habitats for nesting, including CSE, populations used to be very small but under protection from the North American Migratory Bird Convention, have now recovered. FYI it sometimes uses the clumps of silver burweed to hide its nests.
   c. Streaked Horned Lark - Used to use CSE for breeding and nesting but is now extirpated and listed as endangered.
3. Tell students that birds build nests almost anywhere out of an amazing assortment of items, both natural and human-made; The Burrowing Owl, which lives in the interior of BC, makes its nest underground (http://www.hww.ca/en/wildlife/birds/burrowing-owl.html), Bald Eagles use giant trees to build the largest nests of any bird in North America (http://www.hww.ca/en/wildlife/birds/bald-eagle.html), in cities enterprising crows have even been found to use old coat hangers to build their nests! (http://www.amusingplanet.com). Birds will also use leaves, mud, saliva, garbage, string, and feathers to make their nests (http://www.nps.gov/grsa/forteachers). Birds that nest on CSE have relatively simpler needs for their nests - Nighthawks prefer to nest in habitats free of vegetation, like beaches.

4. Take students to an outdoor area and have them investigate the area for suitable bird habitat. Have students make a list of what natural materials are available that might be used for nest building.
5. Discuss the coastal sand environment and what birds would need to make safe nests - protection from predators. Discuss what type of material the birds would use for nest building :
    - Strength material - helps to hold the nest together in strong winds and during storms;
    - Binders - something to hold the nest together;
    - Liners - to make the nest soft and warm;
    - Protection from predators - camouflage YUP! This is most important for birds in CSE areas.
6. Allow students time to gather materials but make sure they are not collecting materials from protected or sensitive habitats. In the classroom have students sort materials into the four categories for nest building and then construct their nests.

Assessment:

Observe students building their nests, assess their methodology and final construction. Check for deeper understanding by asking questions such as, “Do birds ‘think’ while building their nests? How do they ‘know’ how to build their nests? When birds build their nests are they acting creatively?”

Extensions:

Try constructing different kinds of nests for different types of birds. For example: a hanging nest, a nest on a ledge, a mud nest attached to a cliff or wall, a nest in the grass, a nest made of coat hangers etc.

Appendices

1 Curriculum Connections

2 References

Appendix

1 Curriculum Connections

The following is a list of some of the BC Prescribed Learning Outcomes that are met by the activities in this guidebook. It is expected that students will:

Grade K.

- Use the five senses to make observations [Processes and Skills of Science].
- Describe features of local plants and animals [Life Science: Characteristics of Living Things].
- Compare common animals [Life Science: Characteristics of Living Things].

Grade 1.

- Classify objects, events, and organisms [Processes and Skills of Science].
- Describe the basic needs of local plants and animals [Life Science: Needs of Living Things].
- Describe how the basic needs of plants and animals are met in their environment [Life Science: Needs of Living Things].

Grade 2.

- Classify familiar animals according to similarities and differences in appearance, behaviour, and life cycles [Life Science: Animal Growth and Change].
- Describe ways in which animals are important to other living things and the environment [Life Science: Animal Growth and Changes].
- Explain why air, water, and soil are important for living things [Earth and Space Science: Air, Water, and Soil].

Grade 3:

- Classify familiar animals according to their similarities and differences in appearance, behaviour and life cycles [Life Science: Animal Growth and Changes].
- Explain why air, water, and soil are important for living things [Earth and Space Science: Air, Water, and Soil].

Grade 4:

- Ask questions that foster investigations and explorations relevant to the content [Processes and Skills of Science].
- Compare the structures and behaviours of local animals and plants in different habitats and communities [Life Science: Habitats and Communities].
- Determine how personal choices and actions have environmental consequences [Life Science: Habitats and Communities].

Grade 5:

- Describe potential environmental impacts of using BC's living and non-living resources [Earth and Space Science: Renewable and Non-renewable Resources].

Grade 6 and 7:

- Analyze how different organisms adapt to their environments [Life Science: Diversity of Life].

Appendix

2 References

BC Ministry of Environment - http://www.env.gov.bc.ca/atrisk/faq4.html

BC Ministry of Forests and Range - http://www.for.gov.bc.ca/hre/becweb

South Coast Conservation Program - www.sccp.ca

US National Parks Service - http://www.nps.gov/grsa/forteachers/classrooms/think-like-a-bird.htm

Hinterland Who's Who (Bald Eagle) - http://www.hww.ca/en/wildlife/birds/bald-eagle.html

Hinterland Who's Who (Burrowing Owl) http://www.hww.ca/en/wildlife/birds/burrowing-owl.html

Status Report on Coastal Sands Ecosystems in BC - http://www.raincoastappliedecology.ca/wp-content/uploads/2010/09/2011-Coastal-Sand-Ecosystem-Status-Report.pdf

Kiwi Conservation Club - http://www.kcc.org.nz/dune-plants

BC Tree Registry - bcbigtree.ca

Talk About Trees - http://www.talkabouttrees.org/docs/lesson2.pdf

Government of British Columbia - http://www2.gov.bc.ca/gov/content/governments/celebrating-british-columbia/bc-quick-facts

Image: watercolour painting of Common Nighthawk by Carrielynn Victor.