



**Science Unit: *Marine Critters & Communities***

**Lesson 3: *Animals & Plants of BC's Rocky Shore - Species Interactions***

School Year: 2007/2008

Developed for: L'École Bilingue, Vancouver School District

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Grade level: Presented to grades 2 - 3; appropriate for grades 1 – 6 with age appropriate modifications; Présenté au niveau de la 2e et 3e année; approprié aux niveaux de la 1re à la 6e année en y apportant les modifications nécessaires.

Duration of lesson: 1 hour and 20 minutes

Notes: This lesson was taught in a French immersion school.

**Objectives**

1. Learn about food chains (who eats who)
2. Discover that species interactions like predation and grazing influence the structure of communities

**Background Information**

Ecological communities are structured by two main forces: the interactions of species with their environment (abiotic interactions) and the interaction of species with each other (biotic or species interactions). Lesson #2 explored how abiotic interactions (i.e. habitat preferences) can organize an ecological community, and this lesson will explore how biotic interactions are also influential. In particular, Lesson #3 will focus on how who-eats-who, or food chains, are a major force in structuring communities. We will explore how predation and grazing greatly influence the structure of BC's rocky shore communities.

**Vocabulary**

Community	The collection of animals and plants that live in a specific place (i.e. the rocky shore)
Food chain	The order that animals feed on other plants and animals is called a "food chain".
Primary producer	Organisms at the base of the food chain, as they rely on external energy (i.e. sun or chemical energy) to create their own food. In most ecosystems, plants are the base of the food chain
Primary consumer	Organisms that eat the primary producers
Secondary consumer	Organisms that eat the primary consumers (there are also tertiary consumers, quaternary consumers etc. depending on how many steps there are in the food chain)
Herbivore	An animal that eats plant material only
Omnivore	An animal that eats both plants and animals
Carnivore	An animal that only eats other animals
Phytoplankton	Microscopic plants that live in the photic zone of the ocean (e.g. diatoms)
Zooplankton	Small (usually microscopic) animals that live in the ocean who primary feed on phytoplankton (e.g. copepods)
Predator	An animal that kills and eats other animals



## SCIENTIST IN RESIDENCE PROGRAM

Grazer	An animal that feeds on marine algae
Prey	An animal hunted or killed for food by another animal

### **Materials**

\* note: all lessons in this unit require a scrap book that each student keeps for the duration of the 6-week curriculum (for pasting in their activity sheets, drawings etc.)

#### Materials For Activity 1

- Worksheets 1 and 2
- Scissors
- Glue
- Scrap book

#### Materials For Activity 2

- Outlines of sea stars, sea otters and kelp for coloring  
\*note: numbers depend on the size of the mural. If following the abundances given in Lesson #2, you will need 5 sea stars, 2 sea otters and 4 kelp
- Crayons, coloring pencils
- Tape
- Scissors

### **In the Classroom**

#### **Introductory Discussion**

1. HOOK: Show a picture of a simple food chain and discuss the ecological roles of the component species (primary producer, primary consumer, secondary consumer). Introduce the related terms of herbivore, omnivore and carnivore. Also introduce phytoplankton; tiny plants that live in the ocean that are usually the base of oceanic food chains. Before Activity #2, take a few minutes to discuss, using visual aids, how sea stars, sea otters and sea urchins feed (food chains given below).
2. OTHER ITEMS TO REVIEW: Review from lesson #2 that organisms (plants & animals) have specific requirements for their habitat, and these requirements cause in part the structure of a community. In Lesson #2 we saw that many different marine plants and animals make their home along BC's rocky shore and all the organisms in this place is called the rocky shore "community".
3. BRIEF DESCRIPTION OF SCIENCE ACTIVITIES: (1) Critter food chain matching game, (2) Mural predation extension

#### **Science Activity/Experiment**

##### **Activity 1: Critter food chain matching game**

Pre-class setup:

- a) create a sheet with small drawings of all the mural animals and plants (Worksheet 1)
- b) create a worksheet with 4 categories: primary producer, herbivore, omnivore, carnivore (Worksheet 2)

In-class instructions:

- a) ask students to cut out the small drawings of all the animals and plants from Worksheet 1
- b) students then guess which ecological category the individual species belong to, and place them in the corresponding box (Worksheet 2)
- c) before the students paste the organism into their boxes, have a class discussion explaining briefly how each organism eats. Students make any changes to place organisms in their correct boxes and paste them in.



d) ask students which organism(s) surprised them

### **Activity 2: Mural extension: adding predation**

Pre-class setup:

- a) Prepare outlines of the new species to be added to the mural for coloring: sea stars, sea otters and kelp.
- b) Prepare rules for adding a predator to the mural for each of the student groups (about 4 students per group works well).

In-class instructions:

- a) Explain these two food webs to the students:  
plankton → mussels → sea stars  
kelp → sea urchins → sea otters
- b) Explain that we are introducing 2 predators to the mural (sea stars and sea otters) and one plant (kelp).
- c) Explain the rules for adding a predator to the mural:

#### Sea Star Rules

START: 15 mussel clumps (= 120 mussels), added in lesson #2

RULES: To add 1 sea star, 1 clump of mussels must be taken off (8 mussels). Add five sea stars to the mural

END: 10 mussel clumps (=80 mussels), 5 sea stars

#### Sea otters and kelp

START: 20 sea urchins, added in lesson #2

RULES: To add 1 sea otter, 8 sea urchins must be taken off. For every 4 urchins taken off, add 1 bull kelp. Add 2 sea otters and 4 bull kelp.

END: 4 sea urchins, 2 sea otters, 4 bull kelp

Finish with a discussion that after the introduction of the sea star and the sea otter, visually the community looks very different!!!

### **Closure Discussion**

Finish with a discussion in front of the completed mural. As the students:

- Does the mural look different than before the predators were added?
- Why has the structure of the community changed?
- What would happen to the community if sea otters disappear?
- What would happen to the community if sea stars disappear?
- What would happen to the community if sea urchins disappear?

### **Lesson Extension**

- (1) Students can select one of the 4 mural zones and create a food chain of that zone.
- (2) Color a drawing of a kelp forest with and without sea otters (see Reference #3). See Worksheet 3.

### **References**

1. Sheldon, I. 1998. Seashore of British Columbia. Lone Pine Publishing, Vancouver, BC, Canada.
2. Harbo, R.M. 1999. Whelks to Whales, Coastal marine life of the Pacific Northwest. Harbour Publishing, Madeira Park, BC, Canada.
3. Niesen, T.M. 1982. The Marine Biology Coloring Book. Coloring Concepts, Inc. Oakville, CA, USA.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## **Animals & Plants of BC's Rocky Shore**

**Paste each organism in one box**

<p><b>Plants (Primary Producer)</b></p>	<p><b>Herbivores (Primary Consumer)</b></p>
<p><b>Omnivores</b></p>	<p><b>Carnivores (Secondary Consumers)</b></p>

**Colle chaque organisme dans une des cases**

<p><b>Plantes (Producteur primaire)</b></p>	<p><b>Herbivores (Consommateur primaire)</b></p>
<p><b>Omnivores</b></p>	<p><b>Carnivores (Consommateur secondaire)</b></p>