LESSON 5
Marine Animal Life Cycles
Grades 4 - 7

Objectives
- To identify stages in the life cycle of a crab.
- To identify larval stages of other marine animals.

Materials
Crab moults, shells, pictures of crabs at different stages of their life cycle, pictures of other marine animals and their different life stages.

Concepts
- A life cycle includes several stages.
- The young of an animal might look entirely different from its adult form (metamorphosis similar to insects).
- To grow, a crab must grow a new covering inside its older shell, moult its hard older shell and then harden the new shell.

Activities

1. Crab puppet introduction to the crab's life cycle. *(Perform crab monologue with crab puppet showing pictures of life cycle stages when appropriate.)*
For older grades, the teacher may want to just explain the life cycle and show pictures of the crab at each stage of its life cycle.

2. Crab Moulting
A. Why is it good for a crab to have a hard outside shell or carapace?
A. To protect themselves from predators who want to eat them, and to protect from drying out if they are in the intertidal at low tide.

B. How do crabs grow bigger when they have a hard exoskeleton called a carapace?
A. Our skin grows with us and our skeleton is on the inside. The crab is very different - Its skeleton is on the outside like armour. When a crab outgrows its shell, it must somehow leave it's old shell that is too small and form a new bigger shell. To do this, the crab has formed a very soft new shell inside its old shell and when it is ready to leave the old shell, a crack forms along the back of the shell and the top and bottom of the shell separate. It then backs out of the old shell with the new soft shell already covering it. Once out of the old shell, the crab blows itself up with water to increase its size, much like blowing up a balloon, and then finds a good place to hide for a few days, like under a rock, until its shell hardens. The moult or shell it leaves behind has gills left in it and looks from the outside like a complete crab. The crab then goes about its business of finding food to eat and grow fresh new gills and start filling its larger shell.

C. Pass around crab shells and show moults.

3. Crab life cycle stages
A. Discuss each stage of a crab's life cycle: egg, zoea, megalops, juvenile crab, adult crab.

B. What does metamorphosis mean?
A: Metamorphosis is a process by which an animal changes form as it grows. The adults of the species look entirely different from the young. Just like butterflies or dragonflies change from egg to larva to pupa to adult, many sea creatures like crabs have different life stages and metamorphose from one to the next.

B. What do crabs eat at each stage of their life cycle?
- Egg – develop with a yolk sac and do not eat.
- Larva – eat plankton, capturing it with the spiny end of the abdomen and with bristles on "arms".

- Adult - crushes barnacles with claws, eats dead animals, tears apart seaweed, etc.

C. How does a crab move at each stage?
- Egg – carried around under its mother's belly (abdomen)
- Zoea larva – carried around by currents and also moves over short distances with "arms"
- Megalops larva – carried around by currents and can swim and crawl with "legs"
- Juvenile – walks along the bottom with its legs
- Adult – walks along the bottom with its legs

D. Give students handout with pictures of each life stage of a crab. *(Can use "Crab Life Cycle" on page 120 of Once Upon a Seashore: A Curriculum for Grades K-6)*
Have students put pictures of crab life cycle stages in order of development: egg, zoea larva, megalops larva, newly settled juvenile crab, adult crab. Alternatively, have students sketch pictures of the crab at each stage.

E. Have you noticed crabs carrying eggs? What time of the year was it?
A: spring/summer

F. How does the baby crab change?
A: It grows and changes shape many times, then is heavy enough to settle to the bottom and begin its life as an adult.

G. How do crabs protect themselves as larva? As juveniles? As adults?
Larva – have spikes on their body that makes them more difficult to eat!
Juveniles – hide under rocks, in crevices and under seaweed
Adults – hide same as juveniles, use claws to protect from predators

4. Males and Females
How can you tell the difference between male and female adult crabs?
A: Females have a wide U-shaped abdomen. It needs to be wide so that the female can carry lots of eggs. The males have a much narrower triangle or V-shaped abdomen.

5. Crab Varieties
How many different kinds of crabs are there in our area? Name some that you know.
A: kelp, decorator, purple shore, hairy shore, graceful, dungeness, porcelain, and many more!

Conclusion
- Review the life cycle stages of a crab.
- Look at the larval and adult stages of other creatures that are temporarily part of the zooplankton community.

Extension
Set up stations for students to learn more about crabs.

Station 1 – Crab Vision
To see the way a crab sees, have students look through a pair of compound eye glasses and look at a picture of the beach or other objects a crab might see. Students may try moving their hands towards the person who is looking through the eye glasses so they get an idea of what a crab sees when a person reaches to pick one up.

A. Why would crabs have the same kind of eyes as insects?
A. To be able to see in all directions, to detect movement easily.

B. Why are crabs' eyes on stalks?
A: To be able to see while they are buried in the sand.
C. Draw what you see when you look through the compound eye glasses.

Station 2 – Males and Females
Have students examine a male and a female crab moult, abdomen side up.

A. Look at the two crabs. Sketch the female crab's abdomen. Sketch the male crab's abdomen.

B. Compare the abdomen of the male and female crab. Notice how they are different. Why?
A. Females have a wider abdomen in order to carry the eggs until they hatch.

Station 3 – Crab Varieties
Show students Pacific Coast Clue cards from Once Upon a Seashore or pictures of different types of crabs.

A. List the names of the different crabs you see. Sketch them if you have time. (e.g. kelp crab, purple shore crab, red rock crab, Dungeness crab, hermit crab, porcelain crab)

B. How many legs do crabs have? Do all crabs have the same number of legs?

C. How do hermit crabs protect themselves?

D. How are hermit crabs different from true crabs?

Station 4 – Metamorphosis
Show students pictures of different larva (zooplankton) and their adult forms (e.g. sea urchin, sea star, octopus, barnacle, crab).

A. Match the zooplankton larva to the adult form. When you are finished, check the back of the card to see if you were right.

B. Sketch your favorite zooplankton and label it.

Station 5 – Filter Feeding Whales
Show students whale baleen, pictures of baleen, krill, gray and humpback whales. You can use the publications Whales, Dolphins and Porpoises of BC by DFO (1999) and Pacific Ocean Clue Cards from Once Upon a Seashore by Gloria Snively.

A. Talk about how baleen whales sift zooplankton out of the water for food.

B. Sketch the last thing a krill sees before a gray whale eats it (baleen).

Discuss what students have learned after they have gone through all the stations.

Adapted with permission from: Once Upon a Seashore: A Curriculum for Grades K-6 by Gloria Snively. This resource is available from www.kingfisherpress.ca or by fax at (250) 642-6902.