LESSON 5
Burnaby Narrows
Grades 4 to 7

Objectives

- Understand why Burnaby Narrows is so full of marine life.
- Understand why people are asked to float through rather than walk through Burnaby Narrows.
- Explain the advantage of regeneration for ocean creatures.
- Learn ways that bat stars can protect themselves.
- Explain how bat stars can be both grazers and scavengers.

Materials

Station 1: Pen, cord with yarn knots tied at equal intervals, then wrapped around the pen.

Station 2: 74 bat stars cut from coloured paper, 4 m of yarn, masking tape, bat star card (WWF), turban snail shells.

Station 3: Sand paper sea stars, crayons, pencil crayons, paper, pictures of different sea stars from the book: *Sea Stars of British Columbia* by Philip Lambert.

Station 4: Pictures of sunflower sea stars, six-rayed sea stars, sea stars that have regenerated rays, information about sea stars, close-up pictures of pedicillaria and spines from page 12 of the book: *Sea Stars of British Columbia* by Philip Lambert.

Station 5: Gwaii Haanas Board Game, large rubber dice.

Station 6: *Ocean Animal Clue Cards* (by Gloria Snively, Kingfisher Press. Fax: (250) 642-6902 or *KingFisherPress@pacificcoast.net*), marine life field identification books like Whelks to Whales by Rick Harbo, *Oceans Day* Poster from 2004 of Burnaby Narrows, Cover of 2003/2004 Queen Charlotte Islands Phone Book, Cover of *Western Living Magazine* May 1997

Publication: *Burnaby Narrows Ecosystem Study Final Report* by Haida Fisheries Program and Triton Environmental Consultants Ltd., 1993.

Video: *The Biology of Echinoderms* by Biomedia Associates (*www.ebiomedia.com*)

Map: Visitor or other map of Haida Gwaii and Gwaii Haanas to show location of Burnaby Narrows and other narrows.

Book: Oceans for Every Kid by Janice VanCleave.

Concepts

- Burnaby Narrows is a protected area within Gwaii Haanas National Park Reserve and Haida Heritage Site.
- Burnaby Narrows is a rich habitat due to its sheltered location with abundant tidal flushing that brings lots of food through.
- Burnaby Narrows is a unique habitat because there are many more bat stars and turban snails than in other areas and the abundant sea life is exposed at low tide and easy to see.
- Bat stars are different from some other sea stars.
- Humans can protect animals in the intertidal zone when studying them.

Activities

1. Introduction

Ask students if any of them of seen or been to Burnaby Narrows. Ask them if they have seen the cover of the 2003/04 Haida Gwaii/QCI phone book. Show them the cover with a picture of Burnaby Narrows.

What do they think would make Burnaby Narrows special?
A: There is more abundant life there than other narrows. Burnaby Narrows is a sheltered, high-current area where lots of plankton and nutrients are brought in with the tides.

What is a narrows? Do you know of any narrows around Haida Gwaii?
A: A narrows is a thin passage of water between two areas of land. Skidegate Narrows, Burnaby Narrows and Louise Narrows are all narrows around Haida Gwaii.

Show a visitor map of Haida Gwaii and Gwaii Haanas. Have students locate Burnaby Narrows between South Moresby Island and Burnaby Island. Show them where the other Narrows are located.

2. Sea Stars
Find out what students already know about sea stars and snails. What do they need in their habitat?
A: Most must have a hard surface to attach to and they must have enough food. Snails need seaweed and phytoplankton. Bat stars need both plants and animals to eat. They are both grazers and scavengers. They will even eat other sea stars but don't eat clams. They also need space. How much space do you think a sea star or snail would need?

What other animals do you notice in the photos of Burnaby Narrows?
A: Sea urchins, sea anemones, ochre sea stars, clams, sunflower sea star.

Activity Stations
Set up the 6 activity stations. Divide the class into 6 groups and rotate through the stations.

Details of each Station are in the accompanying Worksheet for Lessons 5. The answers to the questions are in italics.

Conclusion
- Review what students learned at the Activity Stations. Discuss the advantages of regeneration.
- Look at the photos of Burnaby Narrows at high tide and at low tide. Look at the charts of transects from the *Burnaby Narrows Ecosystem Study Final Report* so students can see the variety of creatures and the type of substrate.

Extension
- Make a bird's eye view mural of sea stars of all colours, types and sizes, snails, crabs and any other animals found at Burnaby Narrows.
- Watch parts of the video *The Biology of Echinoderms* by Biomedia Associates (*www.ebiomedia.com*) to learn more about sea stars and sea urchins.

Marine Matters **Curriculum 3**
Lesson 5 • Burnaby Narrows • Grades 4 – 7

Activity Stations

Station 1. Knots (from page 42 of Oceans for Every Kid by Janice VanCleave)

1. Person A holds a pen with both hands.
2. Person B holds the end of the cord and starts the stopwatch (or count one one thousand, two one thousand). When Person A says go, Person B slowly walks backwards away from Person A, allowing the cord to unwind. Person A counts the knots as they pass through his/her fingers. Stop after 2 seconds.
3. Rewind the cord around the pencil and then try it again only this time walk faster. Compare the number of knots unwound each time.

Results: The number of knots passing through your fingers is less when you walk slowly and more when you walk quickly.

Counting the knots as you moved at different speeds is similar to how sailors figured out the speed of a ship in the past. Knots were tied at regular intervals on a rope and a log was tied to one end. When the rope was thrown overboard, the log and rope trailed behind the ship. The sailor counted the number of knots that went through his hands in a given time. The more knots that moved through the sailor's hands, the faster the ship was going. Sailors used the word 'knot' to measure the speed of the ship. The word is still used today. A knot is 1 nautical mile per hour. A nautical mile is 1,823 m.

The current in Burnaby Narrows is 6 knots per hour. A modern tool used to figure out the speed of a current is a current meter. It has a propeller turned by moving water. The number of turns the propeller makes per unit of time is recorded. Then you know the speed of the current.

Worksheet 1 – Activity Stations

Station 2. Bat Stars

Set up a 1 m squared area with the 4m long piece of yarn.
Place the 74 bat star cut outs in the 1 m squared area.

See how that looks – it is the density of bat stars that can be seen in Burnaby Narrows. In other parts of the coast like Bamfield on the west coast of Vancouver Island, they found 3 bat stars per square metre area.

Why are there so many bat stars in Burnaby Narrows?
A: There is an abundance of food. With the sheltered location and strong current, a lot of food comes through. Though bat stars are normally grazers, they will eat other animals.

Read the bat star card to find out more about them.

Station 3. Sea Star Art

Sea stars belong to a group of animals called echinoderms. Echinoderm means spiny skin. Sea stars have spines and pinchers (pedicellaria) to protect them. Look at the different types of sea stars. Sea stars are not eaten by many other animals, but sea otters, gulls and other sea stars will eat them.

Do a rubbing of one of the sandpaper sea stars.

Why do you think sandpaper was chosen?
A: Because it has a similar texture to sea stars.

Worksheet 1 – Activity Stations

Station 4. Regeneration

Sea stars can grow new arms (rays). As long as there is a part of the central disk attached to a ray, a sea star can regenerate the other rays. When they look like the sea star in the picture, they are called sea comets. Notice the close up of sea star spines and pinchers (pedicellaria).

What other animals can regenerate limbs or tails?
A: Crabs can regenerate limbs, sea stars can regenerated rays and lizards can regenerate their tails.

The six-rayed sea star grows up to 5 cm. How big can a sunflower sea star get? Compare the size of the 2 sea stars.
A: The sunflower sea star can grow up to 80 cm. It grows much much larger than the six-rayed star.

How many arms does a six-rayed sea star have? How many arms (rays) can a sunflower sea star have?
A: The six-rayed star has 6 arns. The sunflower sea star can have up to 24 arms.

Look at the pictures showing development of a sea star. Notice how much it changes as it grows.

Worksheet 1 – Activity Stations

Station 5. Conservation

In Burnaby Narrows, visitors are asked to float through rather than walk through the area. Why? They also ask people not to collect things and to put animals back in their original habitat. Why?
A: Many people stomping and walking across the narrows means animals are crushed underfoot. If they float by, then animals are not damaged. Putting animals back in their original habitat means they can avoid predation by birds etc. People are asked not to collect shells because taking empty shells may deprive some invertebrate like a hermit crab of shelter. A park is a place where things are protected and nothing should be removed. The expression "take nothing but pictures and leave nothing but footprints" (except in Burnaby Narrows!) is a good guide.

Can you think of any other ideas for careful low tide exploration?
A: If you lift a rock up, carefully put it back so the creatures underneath are protected, not crushed and don't dry out.

Play the Gwaii Haanas Board Game. This is a large board game borrowed from Gwaii Haanas Parks Canada that allows students to become more familiar with the Park Reserve. Students move to different squares after rolling a large dice to discover Gwaii Haanas.

Worksheet 1 – Activity Stations

Station 6. Other Inhabitants

Many red turban snails are also found in Burnaby Narrows. They are grazers. Up to 50 have been found in 1 square metre. Why do your think there are so many?
A: There is lots of seaweed for turban snails to eat and lots of rocky substrate for them to attach to.

There are many other animals found in Burnaby Narrows including purple shore crabs, hermit crabs, isopods, coon-striped shrimp, spiny pink sea stars, many different clams, kelp greenlings (a fish), and juvenile (young) copper rockfish.

Look at the books and cards and sketch some of them.

Burnaby Narrows may act as a nursery for some invertebrates (animals with no backbone) and vertebrates (animals with backbones).

Why do you think Burnaby Narrows is a good nursery? What do baby animals need?
A: There is lots of shelter and an abundance of food for baby animals.