



Making a difference...together

LIVING AT THE BEACH

Educators Guide

Program at a Glance

Living at the beach is no picnic! Hands-on exploration and discovery allow students to investigate how a diversity of creatures survive in an environment where they are either all wet or left high and dry. This program fosters curiosity and a sense of wonder about our unique intertidal zone and the tough marine organisms that survive in this changing environment. Following a fun and engaging introduction, students will use their hands to carefully explore and discover the sandy and rocky beach environments. Respectful treatment of seashore creatures and stewardship will be a focus. Students will be encouraged to think of the seashore as a unique interconnected community with needs similar to our own.



In this program, your students will...

- Observe and learn about a diversity of intertidal life
- Explore different habitats in the intertidal zone (sand, rocks and tide pools) and discover the unique creatures that inhabit them
- Understand that the intertidal zone is an extreme environment where animals are subjected to many challenges
- Discover the unique value that all living things have at the seashore
- Evaluate the impact of our actions on intertidal creatures and their home

Curriculum Connections

Our place based school programs directly relate to the K-5 science curricula. Below you will find some big ideas, curricular competencies and content that will be addressed on your program.

Big Ideas from BC Curriculum:

- Living things are diverse, can be grouped, and interact in their ecosystems (Grade 3)

- All living things sense and respond to their environment (Grade 4)
- The motions of Earth and the moon cause observable patterns that affect living and non-living systems (Grade 4)
- Multicellular organisms have organ systems that enable them to survive and interact within their environment (Grade 5)

Curricular Competencies from BC Curriculum:

- Demonstrate curiosity and a sense of wonder about the world
- Observe objects and events in familiar contexts
- Make observations in familiar or unfamiliar contexts
- Ask questions about familiar objects and events
- Make predictions based on prior knowledge
- Make and record simple measurements using informal or non-standard methods
- Make observations about living and non-living things in the local environment
- Experience and interpret the local environment
- Demonstrate an openness to new ideas and consideration of alternatives
- Transfer and apply learning to new situations
- Identify some simple environmental implications of their and others' actions
- Share observations and ideas orally and in role-play
- Express and reflect on personal experiences of place

Content from BC Curriculum:

- Biodiversity in the local environment (Grade 3)
- Energy is needed for life (Grade 3)
- Observable changes in the local environment caused by erosion and deposition by wind, water and ice (Grade 3)
- Sensing and responding: humans, other animals, plants (Grade 4)
- Local changes caused by Earth's axis, rotation, and orbit (Grade 4)
- The nature of sustainable practices around BC's resources (Grade 5)
- First Peoples concepts of interconnectedness in the environment (Grade 5)

Suggested Pre-Trip Activities

- On the classroom bulletin board have students draw pictures on the field trip topic or write predictions about what they might see.

- Create a K-W-L chart (what I know, what I want to know, and what I learned) about marine life and fill out the first two categories.
- Show photographs of some of Vancouver Island’s local intertidal life, such as shore crabs, hermit crabs, shrimp, and barnacles.
- Read stories in class about the seashore.

Suggested Follow-Up Activities

- Have students return to the class bulletin board to make changes in their drawings or predictions based on their new knowledge gained from the field trip.
- Revisit the K-W-L chart and fill in the “L” (What I learned).
- Draw food chains and webs involving intertidal creatures.
- Discuss how intertidal creature bodies are different from human bodies. What role does each body part play in helping them survive? Have students think of ways their bodies would have to change before they could survive in a seashore environment.

Background Information

Where land meets sea: The Intertidal Zone

The sea's edge is where two very different environments - land and sea - come together to form a completely unique habitat, which is home to an abundance of animals and plants. The intertidal zone is the area of the marine shoreline that is exposed to air at low tide, and covered with seawater when the tide is high. The marine organisms that inhabit this zone have adapted to survive in this often challenging environment. At low tide they must be able to survive prolonged exposure to the air, large fluctuations in temperature and salinity, and extremes in wave action. During low tide, intertidal organisms are vulnerable to predation from land animals, such as raccoons and birds, and by marine predators like sea stars and fish when the tide is in. Starvation is also a risk when the tide is out since most intertidal animals feed only when they are submerged. Also, most intertidal animals need to be underwater to breathe and this can be a limiting factor affecting their distribution on the shore. Within the intertidal zone there are distinct communities of plants and animals, whose distribution upon the shoreline is determined by how much of these stressors they are able to withstand.

Tidal Influences

Over three hundred years ago, Sir Isaac Newton first explained that the tides result from the

gravitational attraction of the sun and moon on the oceans of the earth. Because planet Earth is so much closer to the moon than to the sun, our tides are dominated by the gravitational forces of the moon. The moon's gravity pulls the oceans on Earth towards the moon, forming a bulge on either side of the planet (that area of ocean closest to the moon and on the opposite side of the Earth), which shifts in location as the Earth rotates on its axis and as the moon revolves around Earth. The bulge of water is high tide and the adjacent flat areas are low tide.

On the West Coast of North America there are typically two high tides and two low tides per day with the tides changing every 6 hours and 12 minutes. Tide levels are governed by the positions of the earth, sun and moon in relation to one another. Barometric pressure and winds influence tides to a smaller extent; local conditions, such as the shape of the shoreline, also play a role in determining the magnitude of the tides. Regional Parks' interpreters schedule the marine school programs at Island View Beach and Witty's Lagoon regional parks based on the days and times that are predicted to have the lowest low tides, best for exploring the largest area of exposed beach in the intertidal zone.

Intertidal Zone Creatures

Despite the environmental challenges of the intertidal zone, there is a great diversity of marine life that inhabit this ecosystem. The marine waters of the Pacific Northwest support a rich and diverse intertidal marine community, due in part to upwelling currents that bring nutrient-rich waters up to the surface. Vancouver Island's marine life is particularly abundant and varied because we are located in the transition zone between two marine currents—the California Current and Alaska Current—so we have organisms representative of regions both further south and further north.

Some types of intertidal species and their survival strategies include:

- Mobile species such as crabs, limpets and snails hide under rocks, in moist crevices or under seaweeds to escape the sun and keep from drying out.
- Some attached animals like barnacles and mussels can hold a small amount of seawater within their shells, and close up tightly during low tide.
- Some marine algae (such as *Porphyra*, *Fucus* and *Enteromorpha*) have the remarkable ability to survive losing 60-90% of their moisture, to the point of becoming brittle; when the tide comes back in, they reabsorb water.

- Many sedentary species are adapted to withstand high wave action. For example, kelps attach to the substrate with strong holdfasts, barnacles stick to rocks by secreting cement, and sea stars have thousands of tube feet that hug the shore with tiny suction cups. Mussels secrete strong pliable “byssus” threads that anchor them to the shore.

Witty’s Lagoon and Island View Beach regional parks are primarily sandy shore environments but with microhabitats of different substrates. Both beaches have rocky areas with gravel and cobblestones. Witty’s Lagoon Regional Park has areas of mudflats and eelgrass meadows and Island View Beach has a regionally significant sand dune ecosystem. As a result, the beaches at both of these Regional Parks have diverse and fascinating marine intertidal life, with elements of both the sandy and rocky beach intertidal zones.

Online Resources

BC Ministry of Water, Land and Air Protection

A printable pamphlet about the intertidal zone

<http://www.env.gov.bc.ca/bcparks/conservation/lifeattheedge.pdf>

Capital Regional District

Information about our local intertidal zones

<https://www.crd.bc.ca/education/our-environment/ecosystems/coastal-marine/intertidal-zone>

NatureWatch

NatureWatch is a community that engages all Canadians in collecting scientific information on nature to understand our changing environment. Find out how you can be a citizen scientist in your local area.

<https://www.naturewatch.ca/>

Kingfisher Press

Based out of Sooke BC, produces recommended marine education resources

<http://www.kingfisherpress.ca/index.html>

The Wild Classroom

Features videos, podcast and great resources for students

<http://www.thewildclassroom.com/biomes/intertidal.html>

Additional Resources

Some useful field guides to our local marine environments include:

Harbo, Rick M. *Whelks to Whales: Coastal Marine Life of the Pacific Northwest*. Harbour Publishing, 2011.

Sept, Duane J. *The Beachcomber's Guide to Seashore Life in the Pacific Northwest*. Harbour Publishing, Revised Edition 2009.

Sheldon, Ian. *Seashore of British Columbia*. Lone Pine Publishing, 1998.

Snively, Gloria. *Exploring the Seashore in British Columbia, Washington and Oregon. A Guide to Shorebirds and Intertidal Plants and Animals*. Vancouver: Gordon Soules Book Publishers, 2003.

Coulombe, Deborah A. *The Seaside Naturalist*. Touchstone Press, 1990.
teachers.