

Ocean Sense Program

Nuċam̓at Module Overview






Explore multiple ways of knowing the beach environment with Hul̓qum̓iñuḡ* language, personal connections, and science. Experience the connection between the biosphere, hydrosphere, and Earth's daily rotation through a Stz'uminus creation story and a journey with plankton. The concept of system sustainability is central to the learning in this module, also represented by the meaning of the Hul̓qum̓iñuḡ word, Nuċam̓at (pronounced NUTS-a-maat), which translates to together as one, one piece.



Suggested sequence:



This module includes:

-  slide deck
-  sound clips
-  worksheet
-  video
-  interactive games

*The Hul̓qum̓iñuḡ orthography (spelling system) used in this lesson is as recommended by the Snuneymuxw First Nation. For more information about the orthography and the relationship to pronunciation, please review this Hul̓qum̓iñuḡ phonics webpage.

Downloadable resource packs:

- Lesson 1: **Experience the Beach and “Xeel’s the Creator”**
(includes a PDF for the lesson, the activity *Our Relatives the Beach*, the worksheet *Xeel’s the Creator Cloze Worksheet*, the activity *Beach Connections*, and the worksheet *Connections to Our Relatives at the Beach*)



slide deck



video



worksheet



interactive
games



sound clips

- Lesson 2: **“Tiny Food”**
(includes a PDF for the lesson and the activity *Plankton: Choose your own Adventure*)



slide deck



worksheet



interactive
games

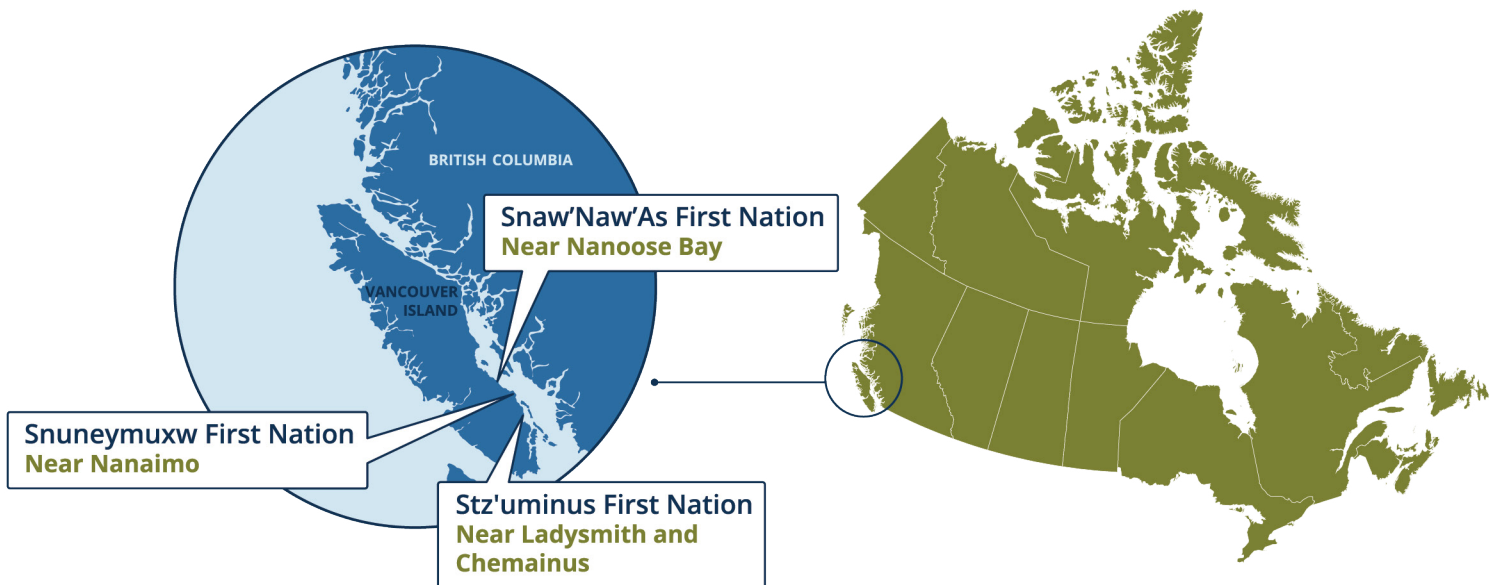


data dashboard

Community partners

The traditional knowledge in this module comes from the three First Nations upon whose traditional territory Nanaimo Ladysmith Public Schools are situated on: Stz’uminus First Nation near Ladysmith and Chemainus, Snuneymuxw First Nation near Nanaimo, and Snaw’Naw’As First Nation near Nanoose Bay.

Collaboration and partnership with the following organizations and individuals made this module a reality: Sq̓t̓x̓l̓enuhw George Seymour (from Stz’uminus), yutustanaat Gena Seward-Wilson (from Snuneymuxw), yutustanaat Mandy Jones (from Snuneymuxw), Tannis Reis Calder, Shelley Gvojich, Ted Cadwallader, and Nanaimo Ladysmith Public Schools.



Ocean Sense Program



Lesson 1

Module:

Nučamət

Time:

150 minutes (split into two 45 minute and one 60 minute class periods, with optional additional time for transportation to and from a local beach)

Learning pillars:

- Indigenous knowledge
- Ocean science

Grade & curriculum connection:

- **BC Science 9**
"The biosphere, geosphere, hydrosphere, & atmosphere are interconnected, as matter cycles and energy flows through them."

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Experiencing the Beach and "Xeel's the Creator"

Explore the concept of interconnected systems at the beach through *Xeel's the Creator* told by Squxulenuhw (George Seymour) of the Stz'uminus First Nation. Hulqumiñum language learning is infused throughout this lesson, and sharing personal stories about the beach is encouraged.

Squxulenuhw (George Seymour) shared this story while situated at Kulleet Bay on Stz'uminus First Nation land. The story demonstrates the concept of **interconnectedness** between spheres which is reflected in the name of this module, Nučama:t 'i čičuwatl 'i iyatl. The **organisms** in the story can be viewed from the beach or in the **intertidal zone**, and they have cultural significance to the Stz'uminus, Snuneymuxw, and Snaw'Naw'As First Nations who are **Coast Salish** peoples. Field guides, personal experiences and stories encourage the students to become more familiar with organisms at the beach.

Learning objectives

- Learn the Hulqumiñum names and facts about common species with cultural significance found at the beach.
- Discuss their experiences with and observations of the beach.
- Identify First Peoples' knowledge of interconnectedness through the telling of a story.

Materials

- Computer with internet connection
- Projector, screen, and speakers
- Slidedeck: **Nučamət**
- *Xeel's the Creator* video
- *Xeel's the Creator Cloze Worksheet*

- *Our Relatives at the Beach* activity and all materials listed therein
- *Connections to Our Relatives at the Beach* worksheet
- *Beach Connections* activity and all materials listed therein

Optional

- Transportation to and from a local beach

Teacher preparation

- Copy the worksheets, *Xeel's the Creator Cloze Worksheet* and *Connections to Our Relatives at the Beach*.
- Gather the materials for the two activities, *Our Relatives at the Beach* and *Beach Connections*.

Classroom instructions

Hook

1. In small groups or as a class, invite the students to share any of their experiences at local beaches. In particular, ask them to share the living and non-living things they observed at the beach.
2. Share that in Coast Salish understandings, many things that are considered in Western culture to be “not-alive” are considered to be alive and have a life force.

Step-by-step process

3. Share slides 1-3 to introduce where the Indigenous knowledge in this lesson comes from.
4. Share the location of Kulleet Bay on slides 4-6 to familiarize the students with the Indigenous knowledge and language that they will learn through this lesson.
5. If using, distribute the worksheet, *Cloze Activity and Discussion*.
6. Ask the students to pay close attention to the upcoming story in order to find examples of non-living things that are actually considered relatives by the Stz'uminus people.
7. Play the video: *Xeel's the Creator* using either the link or as embedded in the Activity Files slidedeck on slide 7.

8. In a manner that works best for your class, reflect on and discuss the story. You may wish to use the Xeel's The Creator Discussion Questions shown on slide 8.

- a. Discuss examples of non-living things that are connected and considered relatives in the story. Show the map on slide 9 to provide a hint.

Potential answer: Near the end of the story, the five species of salmon turn into the Gulf Islands around Kulleet Bay. Squxulenuhw (George Seymour) names a few of these islands specifically. This is one demonstration of how “non-living” things in Western culture are considered to be alive and have a life force in the Coast Salish understanding.

- b. How does the story show a connection between the biosphere, geosphere, hydrosphere, and atmosphere?

Potential answer: When Xeel's creates all life, he uses the Big Dipper (also known as Ursa Major) from the stars in the sky to scoop up lake water and pour it over a mountain. The water turns to ice and tumbles down the mountain side which then hits the ocean and creates a rainbow mist. This rainbow mist turns into the various living creatures.

8. Display the quote from Squxulenuhw (George Seymour) on slide 10 in which he describes the meaning of Nučam̓at. Discuss parallels between the message in the story *Xeel's the Creator* and the phrase, Nučam̓at.
9. Share that they will learn the Hul̓qumínuḡ names for some organisms found at and around Kulleet Bay beach using a game in Scratch (slide 11 & 12 for a preview). As they go through the next activity, ask the students to consider why these particular organisms may have been selected.
10. Complete the science, language and cultural activity, *Our Relatives at the Beach*.
11. In a manner that works best for the students, discuss what stood out to them in the activity, *Our Relatives at the Beach*. Encourage discussions about the cultural significance of the organisms and the Hul̓qumínuḡ words.
 - a. You may wish to use the worksheet *Connections to Our Relatives at the Beach* which uses the Project Zero Thinking Routine, *I Used to Think, Now I Think* (Harvard

Graduate School of Education, 2016). Students record how their thinking has changed as a result of learning about the organisms. For example, "I used to think that bull kelp is just fun to play with, now I know that bull kelp has many uses to the Coast Salish people including holding wooden pieces as they were steamed into hooks."

12. Complete the activity, *Beach Connections* ideally at a local beach. Options are presented if beach access is not possible.
13. Conclude the lesson by sharing the Hul̓qumínuṁ phrases on slide 13: take care of the Earth, take care of the water, take care of the air, and take care of your family. Celebrate the language learning and personal connections to the beach that the students have experienced and shared!

Modifications and adaptations

- Create a group in Flipgrid for students to share a recording of them practicing the Hul̓qumínuṁ words. This may allow some students to feel more comfortable sharing their practice pronouncing the words.
- Organism photos, English words and Hul̓qumínuṁ names could be printed out in advance for students to have on-hand.
- Pre-teach the vocabulary words in the glossary for this lesson.

Final remarks

Nučam̓at is a word used in Hulqumínum that means "together as one; one piece". Though often used to describe a community of people, the concept can also be used to describe a greater community and systems of ecology.

This lesson includes a great gift and treasure, a story shared by Squtxulenuhw (George Seymour). Indigenous peoples have always used stories as a way to transfer knowledge and teachings. Many of these stories belong to families and individuals and are shared for specific purposes. They are the intellectual property, the belongings, of those who shared them. George heard the story from his sqe'eq (cousin), Qwulhutstun (Willy Seymour), and he has graciously shared it for the purposes of this lesson. It remains the intellectual property of Willy Seymour and his family. We share this teaching with you and ask you to honour the protocol

of this territory about the respectful use of stories by listening to it, seeing the connections with the world around you and not retelling it without permission; we encourage you to share the video link instead. Hay ce:p ǵa (Thank you).

Assessment

- Demonstrate the Hul̓qumínuṁ names and cultural facts about common species with cultural significance to the Coast Salish people found at the beach.
- What are some observable features of a local beach?
- Describe an example of First Peoples' knowledge of interconnectedness in nature.

Extensions

- Take the students to the beach and encourage them to use the Hul̓qumínuṁ name for the organisms they see.
- Using the organisms from the Our Relatives at the Beach activity, ask students to make an energy web out of them. Which direction do the students think the energy flows? Why? How could chemical pollution in one sphere get spread to another sphere?
- Allow the students time to explore [Native-Land website](#) to see the geographic range where Hul̓qumínuṁ was and is spoken.

Glossary

(This lesson includes two glossaries due to the emphasis on Hul̓qumínuṁ language learning.)

Coast Salish: Indigneous peoples of the Pacific Northwest Coast; multiple languages and cultures are part of the Coast Salish group including the Stz'uminus First Nation near Ladysmith and Chemainus, Snuneymuxw First Nation near Nanaimo, and Snaw'Naw'As First Nation near Nanoose Bay.

Interconnectedness: Being connected with each other.

Intertidal: The area of land between high and low tides.

Organisms: Living things that are made up of cells, reproduce, grow, and respond to stimuli.

English	Hul̓qumínum (soundcloud recordings)	Definition including cultural significance to the Stz'uminus, Snuneymuxw and/or the Snaw'Naw'As First Nations
Butter clam	s'aḥwa'	<ul style="list-style-type: none"> • Shell is fairly smooth. • An abundant popular food, often smoked or dried.
Cockel	st̓ulá'am	<ul style="list-style-type: none"> • Shell has heavy ridges that run from the tapered end out towards the curved edge. • A favourite food of many and is dried over the fire or above the woodstove. • The siphon has often been used as a soother or pacifier.
Oyster	ṭluḥw̓ṭluḥw	<ul style="list-style-type: none"> • The native species can be found as deep as 50 metres. • Literally means "hard, hard" and can be steamed, roasted and then dried or eaten raw.
Swan	sxwuw'qun	<ul style="list-style-type: none"> • Large white bird with a low trumpeting call. • Has strong spiritual purposes and feathers are used for ceremonies.
Orca	q̓ulhánumucun	<ul style="list-style-type: none"> • Black marine mammal with white/grey patches on the eye, tummy and saddle (behind the dorsal fin) areas. • Known to be both a friend and lifesaver or an enemy. • Believed to be brother to the steke:ye (wolf).
Octopus	st̓ulxwuth	<ul style="list-style-type: none"> • Eight armed and soft bodied. • Traditionally caught with a gaff (spear). • Used in medicines.
Sea lion	shes	<ul style="list-style-type: none"> • Mammal with ear flaps and foreflippers that it can walk on when out of water. • Related to seals. • A source of food. • Hide was used to make drums, whiskers also used ceremonially in different societies.
Sockeye salmon	sthuqi'	<ul style="list-style-type: none"> • Fish species. • Males change shape and colour when spawning (reproducing). • The English word for sockeye comes from Hul̓qumínum. • Often smoked, this was often fished on the mainland while visiting relatives. • Traded in the Interior for mountain goat wool and soap berries.

English	Hul'qumínum (soundcloud recordings)	Definition including cultural significance to the Stz'uminus, Snuneymuxw and/or the Snaw'Naw'As First Nations
Bull kelp	qam'	<ul style="list-style-type: none"> • A fast growing algae species that anchors to the seafloor and has multiple blades growing from a sphere-like float, called a pneumatocyst. • The hollow stock was used for steaming wooden hooks, bows and hoops. • Has strong spiritual properties.
Sand flea	xwuxwiyem	<ul style="list-style-type: none"> • Jumping organism with two long antennae found in the sand. • There is a s̓wi'ém (story) about this tiny creature.
Deer	ha'put	<ul style="list-style-type: none"> • Terrestrial mammal that walks on four hooved legs. • An important food source and resource for tools. • Shin bones for spear points, antlers for tools, hooves for rattles, hide for drums and clothing. • In some of the origin stories, ha'put is said to be specially selected to nourish the people.
Plankton	syu'ilhtuns (literally "tiny food")	<ul style="list-style-type: none"> • Small to microscopic organisms that can be either plants or tiny animals, young larvae of larger animals, and weak swimmers. • Long ago people tried to transfer them into bay to encourage salmon and other fish, but they did not survive.

References:

Harvard Graduate School of Education. (2016). I used to think, now I think. *Project Zero' Thinking Routine Toolbox*. <http://www.pz.harvard.edu/resources/i-used-to-think-now-i-think>

Hul'qumínum Treaty Group. (2011). *Ecosystem Guide: A Hul'q'umi'num' language guide to plants and animals of southern Vancouver Island, the Gulf Islands and the Salish Sea*. <https://nlpslearns.sd68.bc.ca/resources/ecosystem-guide/>

Seaquaria Ocean Education. (n.d.) *Seaquaria in schools animal and plant guide*. <https://seaquaria.org/wp-content/uploads/2020/04/Seaquaria-Animal-Plant-Algae-Guide.pdf>

Ocean Sense Program



Activity 1

Module:

Nuɕamət

Lesson:

Experiencing the Beach and
"Xeel's the Creator"

Time:

45 minutes

Learning pillars:

- Indigenous knowledge
- Ocean science

Grade & curriculum connection:

• BC Science 9

"The biosphere, geosphere, hydrosphere, & atmosphere are interconnected, as matter cycles and energy flows through them."

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Our Relatives at the Beach

Learn the Hul̓qumínum̓ names and facts about common species with cultural significance found at the beach.


Materials

- Internet connected devices for each student or small groups of students
- Headphones and/or speakers for each student or small groups of students
- Scratch game [Our Relatives at the Beach](#)
- Soundcloud playlist [Hul̓qumínum̓ Animal Names](#)

Teacher preparation

- Ensure that students have access to headphones and/or a quiet place to listen to the pronunciation of the words in Hul̓qumínum̓.

Procedure

1. Allow the students to play the Scratch game, *Our Relatives at the Beach*.
 - You may remind them to hit the  icon in the top right corner above the game field so that the game appears larger.
2. In a manner that works best for the students, encourage them to say the organisms out loud multiple times in Hul̓qumínum̓. Lots of practice is important for accurate pronunciation!
3. Use the following chart and the SoundCloud playlist, *Hul̓qumínum̓ Animal Names*, to help guide discussion about the organisms featured in the game.

English	Hul̓qum̓ín̓um̓ (soundcloud recordings)	Definition including cultural significance to the Stz'uminus, Snuneymuxw and/or the Snaw'Naw'As First Nations
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Oyster	ṭluḥwṭluḥw	<ul style="list-style-type: none"> • The native species can be found as deep as 50 metres. • Literally means "hard, hard" and can be steamed, roasted and then dried or eaten raw.
Swan	sxwuw'qun	<ul style="list-style-type: none"> • Large white bird with a low trumpeting call. • Has strong spiritual purposes and feathers are used for ceremonies.
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Plankton	syu'ilhtuns (literally "tiny food")	<ul style="list-style-type: none"> • Small to microscopic organisms that can be either plants or tiny animals, young larvae of larger animals, and weak swimmers. • Long ago people tried to transfer them into bay to encourage salmon and other fish, but they did not survive.

Conclusion

Whenever possible, find opportunities for the students to practice the Hul̓qum̓ínum words they've learned.

Ocean Sense Program



Activity 2

Module:

Nuċamāt

Lesson:

Experiencing the Beach and "Xeel's the Creator"

Time:

60 minutes (20-30 minutes in class,
15-30 minutes outside)

Learning pillars:

- Indigenous knowledge
- Ocean science

Grade & curriculum connection:

• **BC Science 9**

"The biosphere, geosphere, hydrosphere, & atmosphere are interconnected, as matter cycles and energy flows through them."

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Beach Connections

Explore the beach, either first hand or through photos and video, hone observation skills, and practice the Hul'qumínum names for common species with cultural significance to the Coast Salish people.

Materials

- ~3 popsicle sticks or flat bamboo skewers/student
- ~3 copies/student of the worksheet: *Nature Gallery Cards*
- Species identification guides and other beach reference materials. Some online options include the following:
 - *Seaquaria in Schools: Animal and Plant Guide*
 - *Ecosystem Guide: A Hul'q'umi'num language guide to plants and animals of southern Vancouver Island, the Gulf Islands and the Salish Sea*
- Transportation to and from a local beach
 - *If a trip to the beach isn't possible, use the optional beach photos or gather a sample collection of beach organisms for the students (i.e. oyster, cockle, and clam shells, kelp, etc.)*

Optional:

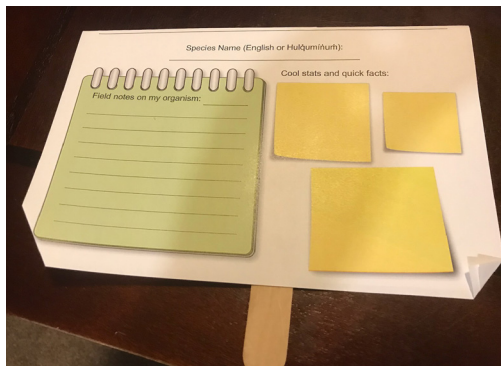
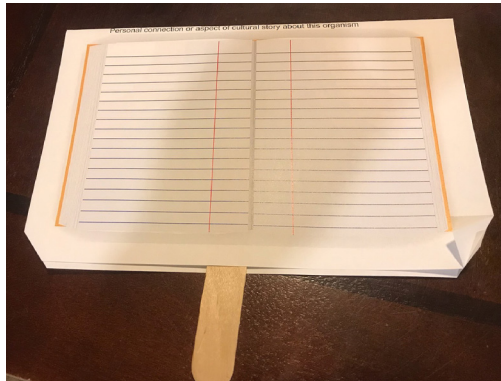
- Computers or device for each student or small groups of students if using the online identification guides
- Internet access if using the online identification guides

Teacher preparation

- Print *Nature Gallery Cards* for each student
- Prepare reference materials, and if using the suggested linked resources, ensure you have internet access and devices for the students

Procedure

1. Have the students select an organism of their choosing that they think they are likely to find at the beach (or is available in the collection).
2. Allow the students to fill out the *Nature Gallery Card* for their organism using the reference books, what they have learned in this module so far, and their own experiences.
3. When the students have finished writing, have them fold the paper in half along the line and fold the corners up in opposite directions. This will create a pocket with no glue. You can also use a stapleless paper stapler if available.
4. Insert a popsicle stick to create a gallery card/ marker for the organisms at the beach.



Nature Gallery Cards with the popsicle stick inserted.

5. Head to the beach and have the students find their chosen item in nature and identify it by placing their stick near the item they are sharing. This will create a natural “exhibit gallery” of the species they know and have learned about.

Conclusion

Encourage the students to see as many of the “exhibits” as possible on the beach and to share their own ideas about the ones they know. If it is reasonable for your class, you can record the event or take pictures of each student with their specimen and use this to create a poster/wall template to be shared with other students.

Name: _____

OCEAN
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"Xeel's, the Creator" Cloze Worksheet

Story as told by Squxulenuxw (George Seymour)

OK, Xeel's, the creator - he was standing in the mountain behind what we know as _____ today. And he had his arms folded and he was admiring - admiring the view, the ocean, the points, the beach, the creeks. Everything, he was admiring everything.

And Xeel's the creator, thought, "There's something missing."

So Xeel's grabbed the dipper. And at the foot of the mountain there's a lake. He filled the dipper, and it raised it over his head, and he dumps the water. And as the water hits the mountainside, it turns to _____, and it rumbles, and it tumbles and roars down the mountainside until it hits the ocean - the saltwater. And it creates a beautiful, beautiful ocean mist, a rainbow mist.

And out of the rainbow mist comes all the great _____: the orca qullhánumucun, the stúlxwuñ the octopus, sea lions, the seals. All the great sea creatures came out of there.

And once again Xeel's was happy to see the creation. And he thought, he kept looking at his creation and beautiful land, beautiful oceans, beautiful points and now all the beautiful giant sea creatures and he realizes there's still something missing.

So once again he reaches for the dipper at the foot of the mountain. He fills the dipper with the _____ from the lake, raises it over his head and he dumps the water. As the water hits the mountainside it turns to ice, and it rumbles and tumbles and roared on the mountainside again. As it hits the _____, it creates a beautiful, beautiful rainbow mist.

And this time, out of the rainbow mist flies all the beautiful, beautiful _____. If you could think of the swans, the eagles, the owls, the hummingbirds and all the different ducks. So, all the beautiful flying fowl flew out of that mist and he was happy. Happy to see, now all the beautiful birds, and then all the beautiful giant sea creatures.

He was able to really enjoy the beauty of his creation. And he thought again, arms folded, he really enjoyed it,

he says, "There's still something else missing."

And once again he reaches for the _____, and at the foot of the mountain, he holds the dipper. Raised it over his head. He dumps water and once again as the water hits the _____, and it rumbles and tumbles and roars down the mountainside and when it hits the saltwater, it creates a beautiful mist. And this time out of that mist walks all of the land creatures, the bear, the deer, the elk, and the wolves and all the beautiful land creatures that you could think of.

And now he's looking at all the land creatures. Then he sees all the beautiful birds, and he sees all the majestic sea creatures, animals, the whales or whatever.

And once again, he thought, "There's still something missing."

So once again he reaches with a big dipper into the lake and he raises it over his head. He dumps it, and as it hits the mountainside it turns to ice and rumbles and tumbles and roars down the mountainside.

And this time, it creates a huge rainbow mist. And it took a long time for that _____ to dissipate - disappear this time. And after it disappeared, dissipated, there was five, the five species of salmon that were waiting for the command of Xeel's on what they were going to do.

So it took few moments and Xeel's says, "I'm gonna send you to one of the beautiful _____ of your choice. You're going to go North. You're gonna go South. You're going to go East, you're going to go West. And you have to travel as fast as you can to the river of your choice. And he says, "If you don't reach that -your destination, some of you are gonna be transformed into _____, so those are the Gulf Islands we're looking at now. Valdes and Thetis Island, all the Gulf Islands: Salt Spring, Newcastle, all the Gulf Islands. The ones that make it up the river, you're going to become the people. And each time you're going to each area you're gonna speak a different _____.

So... and that's what happened. So he sent them on their way and they went as fast as they can, as a salmon could go and the time was up and they actually turned into the Gulf Islands. And he tells the Gulf Islands you're going to take care of your visitors. You're gonna _____ of the beach. You're gonna take care of the water you're gonna take care of the land.

And then he tells the people that became the _____ people, "You're gonna, you're gonna take care of the land. You're going to make sure you take care of your food, the salmon that were coming up.

"Xeel's, the Creator" Cloze Worksheet

Story as told by Squxulenuxw (George Seymour)

TEACHER ANSWER KEY (in order of appearance)

Ladysmith

ice

sea

creatures

water

saltwater

birds

Big

Dipper

mountainside

mist

rivers

Gulf

Islands

language

take

care

First

Nations

Name: _____



Connections to Our Relatives at the Beach

Use the following sheet to record how your understanding of the organisms has changed after completing the *Our Relatives at the Beach* activity.

English	Huḷqumínum	I used to think...	Now I think...
Butter clam	s'aḵwa'		
Cockel	stlulá'am		
Oyster	tluḵwtluḵw		
Swan	sxwuw'qun		
Orca	qullhánucun		
Octopus	stúlxwuth		
Sea lion	shes		

English	Hułqumínum	I used to think...	Now I think...
Sockeye salmon	sthuqi'		
Bull kelp	qam'		
Sand flea	xwuxwiyem		
Deer	ha'put		
Plankton	syu'ilhtuns (literally "tiny food")		

Ocean Sense Program



Lesson 2

Module:

Nuɕam̓at

Time:

75 minutes

Learning pillars:

- Indigenous knowledge
- Ocean science
- Data exploration

Grade & curriculum connection:

- **BC Science 9**

"The biosphere, geosphere, hydrosphere, & atmosphere are interconnected, as matter cycles and energy flows through them."

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"Tiny Food"

Examine how **syu'ilhtuns (plankton)**, some of the oceans' smallest creatures, sustain many of the marine food webs, including species introduced in the **Our Relatives at the Beach** activity. Plankton demonstrate an amazing connection between the biosphere, geosphere, hydrosphere, and atmosphere.

There are many connections between sea creatures in their ocean home, and often these connections link back to the **food web**. Plankton, or "tiny food" play a very important role at the base of many marine food webs. There are two types of plankton: **zooplankton** and **phytoplankton**. The process called **photosynthesis**, which occurs in the **chlorophyll** inside phytoplanktons' cells, takes **solar radiation** and transforms it into energy and oxygen, the latter of which cycles back into the atmosphere. Ocean Networks Canada measures the amount of chlorophyll in the ocean with an instrument called a **fluorometer**, thereby showing the **seasonal cycling** of phytoplankton. Zooplankton follow an amazing **diel vertical migration** pattern that is signalled by solar radiation. Ocean Networks Canada measures this migration with an instrument called a **zooplankton acoustic profiler** (ZAP).

Learning objectives

- Examine the connection between the biosphere, geosphere, hydrosphere, and atmosphere
- Explore seasonal energy cycles
- Examine daily migration patterns
- Explore how data allows us to observe marine phenomena

Materials

- Computer with internet connection
- Projector and screen
- Slidedeck: **Nuɕam̓at**

- *Plankton: Choose your own Adventure* activity

Teacher preparation

- Gather the materials for the activity, *Plankton: Choose your own Adventure*.

Classroom instructions

Hook

1. Share the images of plankton on slide 15 and tell the students that there are two major types of plankton. Ask them to guess at the two distinct types of plankton before making any clicks! Test their guess by clicking two more times!
 - *Phytoplankton will be highlighted with the first click, outlined in green.*
 - *Zooplankton will be highlighted with the second click, outlined in red.*
2. In a manner that works best for the students, ask them to compare and contrast the images of the two types of plankton. Some potential responses include:
 - *Size: phytoplankton are orders of magnitude smaller than zooplankton*
 - *Shape: zooplankton take many different shapes*
 - *Features: some zooplankton have recognizable features, like eye spots*

Step-by-step process

3. In a manner that works best for students, define phytoplankton and zooplankton.
 - a. Phytoplankton: tiny plant-like organisms that take the energy of the sun and change it into energy and oxygen, a process called photosynthesis.
 - b. Zooplankton: tiny animals, young larvae of larger animals, and weak swimmers.
4. Play the video of a zooplankton on slide 16.
5. Squitxulenuhw (George Seymour) shared that one Hulġumínum term for plankton, syu'ilhtuns, translates to "tiny food" (slide 17).
 - a. Show the relative size of a copepod (zooplankton) to a pen, a phytoplankton to a copepod on slide 17.
 - b. Show the food pyramid on slide 18.
6. Invite the students to discuss how the Hulġumínum translation of "tiny food" matches what they've learned about plankton so far. Some discussion points might include:
 - a. Plankton (both types) are very small.
 - b. Phytoplankton make the base of the pyramid, and they are considered primary producers.
 - c. Zooplankton eat the phytoplankton, and they are considered first order consumers.
 - d. The pyramid shape has to do with the mass of organisms at each level, therefore phytoplankton contribute the most, by mass, to a food source.
 - e. All consumers rely on the level below them as a source of food.
7. In a manner that works best for students, discuss how photosynthesis, which occurs in the chlorophyll inside phytoplanktons' cells, takes solar radiation and transforms it into energy and oxygen, the latter of which cycles back into the atmosphere.
8. Explain that Ocean Networks Canada collects data about phytoplankton biomass using an instrument called a fluorometer. Invite the students to examine slides 19-22 and try to explain the mysterious difference in the amount of phytoplankton in January compared to March. The explanation (also found in the Speakers' Notes in the slidedeck):
 - a. Every spring, phytoplankton grow rapidly.
 - b. The water colour can become visibly green.
 - c. This annual burst in productivity is referred to as the spring phytoplankton bloom.
9. Display slide 23 and invite the students to describe what they see. Provide them with the following hints to see if they can add more detail to their explanation:
 - a. The lighter colours (red, orange, yellow, green, teal) show greater amounts of what is being measured.
 - b. The scale on the y-axis is depth (in meters) below the ocean surface.

- c. The image shows data from June 26 to June 27, 2011. Day and night time are shown along the bottom of the image.
 - d. Night time corresponds to greater amounts of what's being measured at the ocean surface.
10. In a manner that works best for students, discuss how zooplankton are also signaled by solar radiation to make a daily journey called diel vertical migration.
- a. Zooplankton spend the day in deep dark water.
 - b. They use the darkness to protect themselves from predators.
 - c. At night, they travel to the water surface to feed on tiny plants called phytoplankton.
 - d. Because of their tiny size, zooplankton make the longest migration of any animal relative to their body size, every night and day.
11. Complete the activity, *Plankton: Choose Your Own Adventure*, which reviews what's been learned so far about plankton.
12. Conclude by discussing why data about plankton is important to gather. Some potential responses are:
- a. Plankton are an important source of food for many species in the ocean.
 - b. Phytoplankton are responsible for producing approximately 50% of our oxygen on Earth.
 - c. Plankton growth can point to seasonal changes.

Modifications and adaptations

- Turn the *Plankton: Choose Your Own Adventure* computer based activity into an active game when students travel from station to station.

Final remarks

Since 2012, ONC and BC Ferries have partnered on outfitting vessels servicing the west coast of Canada to support long-time series data collection. As passenger ferries make repeat daily transits through the Strait of Georgia, ONC's innovative sensor system is collecting high-quality measurements on ocean temperature, salinity, oxygen, turbidity, and chlorophyll concentration. Every time you travel on a BC Ferries vessel, your journey is helping collect oceanographic data! You can [view the data dashboard](#).

Assessment

- How are plankton related to the story told by Squxulenuhw, George Seymour?
- Describe how plankton show a connection between the biosphere, geosphere, hydrosphere, and atmosphere.
- Explain the seasonal energy cycle of plankton.
- Explain the daily migration pattern of plankton.
- How do data allow us to observe marine phenomena?
- Describe the importance of data collection in one place over a long period of time.

Extensions

- Examine additional ZAP images of zooplankton on slide 22 and discuss what could create the different scenarios.

Glossary

Chlorophyll: The most abundant photosynthetic pigments in phytoplankton.

Diel vertical migration: The daily vertical (up and down) movement of an organism from one area to another.

Fluorometer: Used to identify the presence and amount of chlorophyll in seawater. A fluorometer detects electromagnetic waves (e.g. light) which at depth usually is a measure of the fluorescence of a substance. Fluorescence is the emission of light by a substance that has absorbed light or other electromagnetic radiation.

Food web: The energy cycle of organisms in a particular ecosystem; made up of more than one food chain.

Photosynthesis: Converting solar energy into chemical energy.

Phytoplankton: Tiny plants in the water that photosynthesize.

Plankton: Small plants and organisms that make the base of many marine food webs. The word plankton comes from the Greek word “planktos” meaning wanderer.

Seasonal cycling: The seasonal effect of Earth’s orbit around the Sun. In the Pacific Ocean off the coast of Canada, the weather and climate conditions during fall, winter, spring and summer have impacts on marine habitats and organisms.

Solar radiation: Energy from the sun.

syu’ilhtuns: Huliċumínum for “tiny food” which is used as a term for plankton.

Zooplankton: Tiny animals, young larvae of larger animals, and weak swimmers in the ocean.

Zooplankton Acoustic Profiler (ZAP): A type of echosounder that uses sound to measure the abundance of zooplankton.

Ocean Sense Program



Activity 3

Module:

Nučam̓at

Lesson:

"Tiny Food"

Time:

30 minutes

Learning pillars:

- Indigenous knowledge
- Ocean science

Grade & curriculum connection:

- **BC Science 9**

"The biosphere, geosphere, hydrosphere, & atmosphere are interconnected, as matter cycles and energy flows through them."

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Plankton: Choose your own Adventure!

Materials

- Internet connected devices for each student or small groups of students
- Google Form, [Plankton: Choose Your Own Adventure](#)

Teacher preparation

- As this game requires reading, consider the students' reading levels and allow them to work individually or in small groups.

Procedure

1. Allow the students to play *Plankton: Choose Your Own Adventure*.
2. In a manner that works best for students, discuss the various outcomes of their journey as plankton.

Conclusion

Review the following concepts reinforced and learned through playing the game:

- Seasonal cycles impact plankton growth
- Plankton, both phytoplankton and zooplankton, demonstrate the interconnectedness of the marine ecosystem
- Data collection allows us to observe marine phenomena