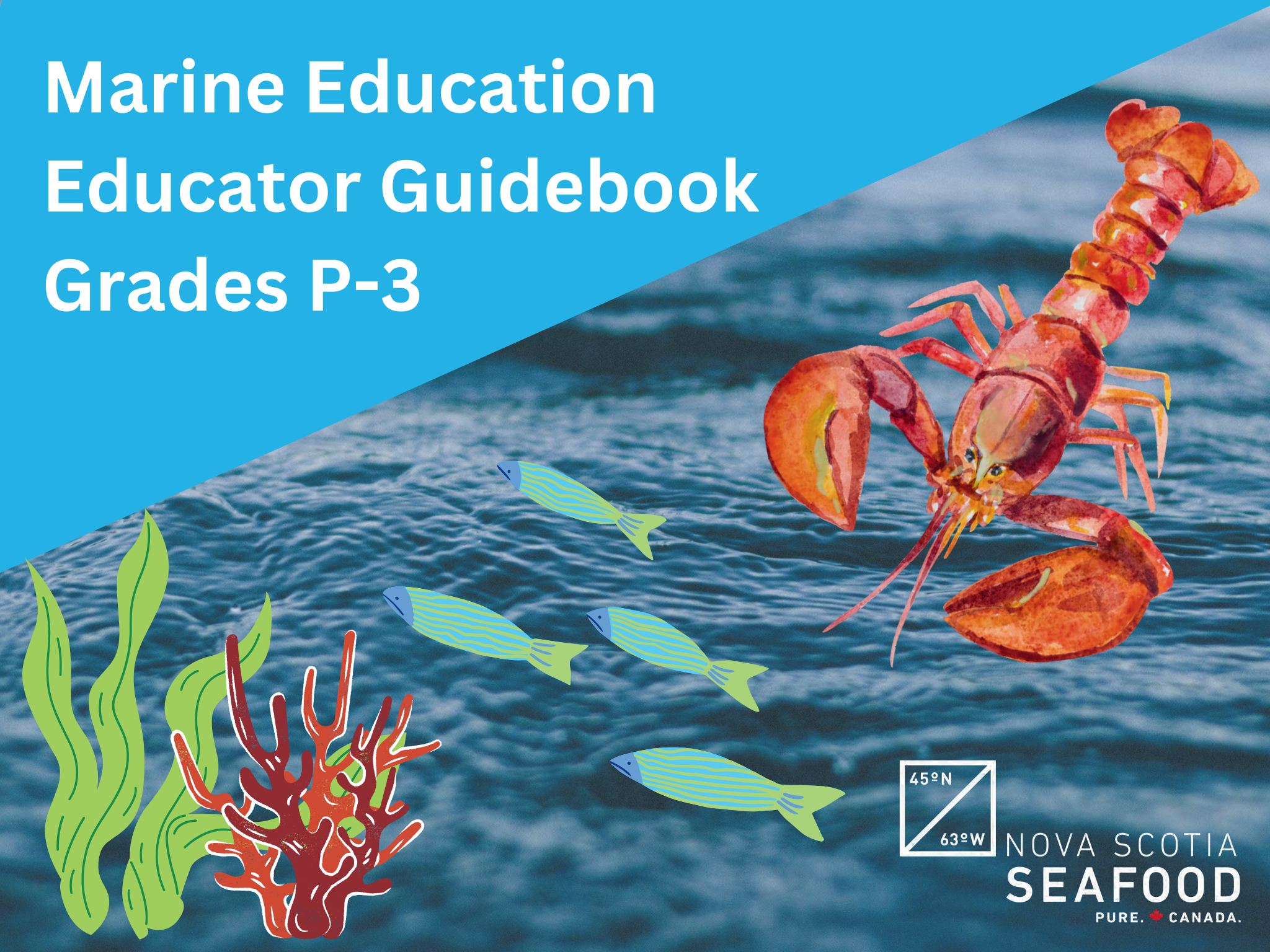
Marine Education Educator Guidebook Grades P-3



45ºN 63ºW

NOVA SCOTIA SEAFOOD

PURE. CANADA.

Acknowledgements

Materials were developed with financial support and input from the Province of Nova Scotia.

Curriculum collaboratively developed by Perennia Food & Agriculture Corp. and Sea Change CoLab..

45ºN 63ºW

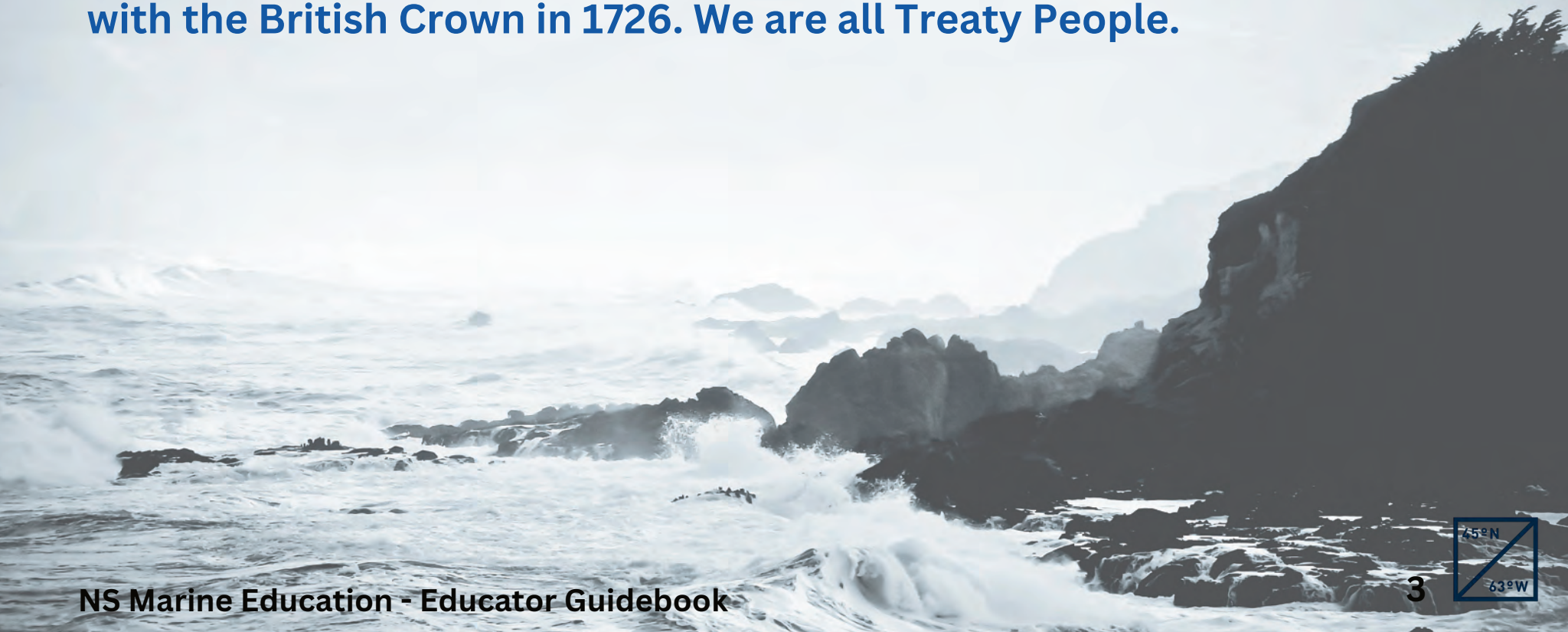
NOVA SCOTIA SEAFOOD

PURE. CANADA.

Contents

Land Acknowledgement

Before we begin it is important to acknowledge that we are in the ancestral and unceded territory of the Mi'kmaq People. This territory is covered by the "Treaties of Peace and Friendship" which Mi'kmaq, Wəlastəkwewiyik (Maliseet), and Passamaquoddy Peoples first signed with the British Crown in 1726. We are all Treaty People.



African Nova Scotian Acknowledgement

It is also important to acknowledge that people of African descent have been in Nova Scotia for over 400 years, and we honour and offer gratitude to those ancestors of African descent who came before us to this land.

Background

Goals of the Marine Education curriculum supplement:

- Raise awareness of Nova Scotia's marine and coastal ecosystems, effective coastal management, and the stewardship role of citizens;
- Establish the historical and future significance of marine and fisheries-based development to the social and economic prosperity of the province, communities, families and individual children or youth;
- Demonstrate the prevalence of social responsibility and science-based decision making in the management of Nova Scotia's coastal ecosystems and its fisheries;
- Communicate the diversity and quality of marine and fisheries-related careers, offering an alternative to any presenting biases about those careers;
- Generate curiosity and increased consideration of marine and fisheries-related careers to increase workforce supply, particularly in the fisheries-related sectors; and
- Prioritize the the lobster industry, as Nova Scotia's most economically important fishery.

Note to Educators

Each lesson follows the same format throughout the guidebook with critical questions and reflections built into the activities section.

The guide follows the overarching theme of interconnectedness, integrating scientific, conservation, and Indigenous knowledge. The thought book section prompts students to reflect, and consider what they have learned through drawing and/or writing.

The activities start with inquiry-based questions, to create curiosity, and explore what students already know and feel about the lesson topics. This could be done in small groups, or as a large group, through discussion, writing, visuals and graphic organizers, etc.

This guide inclues curriculum links, a general glossary, as well as a glossary and background information specific to each lesson.

Any text in green is a hyperlink to a video, website, or resource.

There is an accompanying student workbook, with shortened lesson titles, activities, and resources.

Key Messages:

- Fisheries are vital to Nova Scotia's future social and economic prosperity
- Marine and fisheries-related sectors' practices are among the most sustainable in the world
- The careers are modern, well-paying, and available in many communities in NS
- There are many different and exciting career options in the marine and fisheries sectors
- The fisheries sector has a role to play in addressing global challenges related to oceans and food security

Curriculum Links: P-3

	Social Studies	Science
P	• investigate how local people, including Acadians, African Nova Scotians, Gaels, Mi'kmaq, and various cultural groups, (AAGM+) have varied traditions, rituals, and celebrations. • investigate groups to which they belong.	• compare living things through the senses.
1	• investigate the diversity of cultural groups. • implement age-appropriate actions for responsible behaviour in caring for the environment. • investigate the locations of Mi'kmaw communities in Nova Scotia.	• analyze daily and seasonal change in the environment. • analyze interconnectiveness of living things and the environment.
2	• investigate how individuals and diverse cultural groups, including AAGM+ have contributed to change. • investigate how decisions are made as consumers. • analyze ways for supporting sustainable development in local communities.	• analyze the interconnectiveness of air and water in the environment, inclusive of a Mi'kmaw perspective. • analyze the relationship between animal growth and the environment.
3	• investigate the location of Nova Scotia in Atlantic Canada. • investigate various groups including AAGM+, through their expressions of culture. • investigate the rights and responsibilities of citizens in a democracy.	• investigate the interconnectedness between plants, the environment, and humans

Glossary

Source: Merriam Website Dictionary, unless otherwise indicated

AAGM+: Acadians, African Nova Scotians, Gaels, Mi'kmaq, and various cultural groups in Nova Scotia.

Carbon footprint: the amount of carbon dioxide, or greenhouse gases, produced as a result of our daily living.

Climate Change: refers to long-term shifts in temperatures and weather patterns. Increasing greenhouse gases warm our planet, and carbon emissions are changing rain and snow patterns, increasing the risk of intense storms and droughts.

Consumer: a person who buys goods or services for their own use.

Ecosystem: An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life. (National Geographic)

Etuaptmumk: (pronounced Ed-do-up-dim-moomk is Mi'kmaw for Two-Eyed Seeing) is a framework for bringing knowledge systems together grounded in Mi'kmaq understandings of the gift of multiple perspectives. Mi'kmaq Elder Albert Marshall describes Etuaptmumk as a process through which the strengths of Indigenous knowledges are seen through one eye, and the strengths of Western knowledges through the other, so that both distinct eyes may be used together for the benefit of all. (Bartlett, Marshall, and Marshall, 2012)

Food, Social and Ceremonial fishery: fish can be caught and must be consumed by the individual Mi'kmaw person or community, can be used for the purpose of harvesting other species of food and is not to be sold.

Global warming: the long-term trend of rising average global temperatures.

Glossary

Jakej: (pronounced ja-gej) Mi’kmaw word for lobster

Livelihood: (the way someone earns) The money people need to pay for food, a place to live, clothing, etc.

Marine ecosystems: include everything in the oceans, as well as the saltwater bays, seas and inlets, the shorelines and salt marshes. They are home to the smallest organisms like plankton and bacteria, as well as the world's largest living structure – the Great Barrier Reef, which can even be seen from the moon.

Netukulimk: (pronounced neh-doo-goo-limbk) is the use of the natural bounty provided by the Creator for the self-support and well-being of the individual and the community. Netukulimk is achieving adequate standards of community nutrition and economic well-being without jeopardizing the integrity, diversity, or productivity of our environment. (Source: Unama'ki Institute of Natural Resources)

Shell: The shell is the lobster’s skeleton and it cannot grow. A lobster must shed its shell in order to grow. This is called molting.

Stalks: Lobsters have eyes on long, thin structure called stalks.

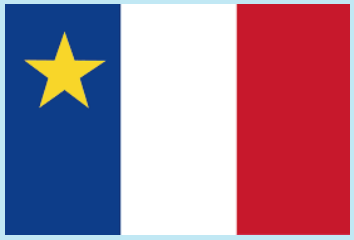
Stewardship: the careful and responsible management of something entrusted to one's care.

Wskitqamu: (pronounced sit-kah-moog) is Mi'kmaw for Mother Earth.

Lesson 1

People, The Ocean, and Lobsters

Background



Acadian flag

African Nova Scotian flag

Gaels of Nova Scotia symbol

Mi'kmaw flag

Nova Scotia is highly dependent on the oceans for our economic and social well-being. The ocean and marine life have been integral to people living in harmony in Mi'kma'ki (traditional Mi'kmaw territory that includes Atlantic provinces and parts of Québec and Maine).

Lobsters have been around for over 480 million years and have supported people and communities to live and thrive here. They are integral to sustaining and supporting social, economic, and cultural vibrancy in Nova Scotia.

Acadians, Gaels, African Nova Scotians, and Mi'kmaw people have long histories and storied connections to the Atlantic Ocean. Today, seafood is the province's most valuable export, much of it coming from the four major Acadian fishing areas. Seafood is also used for food, social events, and ceremonies.

Acadians- Acadians have a long history in Nova Scotia that began more than 400 years ago with the arrival of the first European settlers. In 1605, they established a settlement at Port Royal, in what would become known as Acadie. By the early 1700s, the colony's population grew to several thousands. Acadie encompassed fishing villages along the southern coast of Nova Scotia and farming communities to the north, stretching from Grand-Pré to Amherst and into New Brunswick. A distinct identity and culture emerged.

The sea shaped much of Acadian history, in both commerce and culture. Acadians created beautiful songs of the sea, including the famous "Partons la mer est belle". Their flag bears the "Star of the Sea" (Stella Mans) to guide them through storms and hardships. Today that tradition continues; Acadians play a vigorous part in fishing, processing, management, and every aspect of the Nova Scotia fishery.

Source: Department of Fisheries and Oceans, (2004). The Acadian Fishery in Nova Scotia.

Background

African Nova Scotians- The history and culture the history of Black people in Nova Scotia goes back to the 16th century well over 400 years ago with four major migrations that include the Black Loyalists, Jamaican Maroons, migrants of the war of 1812, and the later Caribbean migration. Those migrations created 52 historic communities that have called Nova Scotia home. People of African descent have contributed greatly to all aspects of Nova Scotia's community and society, particularly in the marine industry as fishers and processors, shippers, sailors, shipbuilders, and navigators.

There were enslaved Africans working in Louisburg's 18th century fishing stations. Black Loyalists turned to the sea for survival when left with few resources, and whole communities have both geographically and economically centered around the sea. Yet, the experiences and contributions of African Nova Scotian seafarers, and their coastal communities, have remained absent from most research regarding Nova Scotia's maritime industry.

Source: Black Cultural Centre of Nova Scotia, (2022). African Nova Scotian Seafaring Announcement.

Gaels of Nova Scotia- Nova Scotia Gaels are descendants of the Gaels of Scotland. They also have connections to Irish Gaels through language, culture, and origins. An estimated 50,000 Gaels immigrated to Nova Scotia from the Highlands and Islands of Scotland between 1773 and 1855. By the late 1800s, there were about 100,000 Gaelic speakers in Nova Scotia. One third of Nova Scotians have Gaelic heritage. Gaelic language, music, and oral traditions permeate Nova Scotia's culture. This has had a significant effect on the province's society and economy. Generations of Nova Scotia Gaels farmed, raised animals, fished, made textiles, took up trades, worked in the woods, and mined. This was how many made their living, supported their families, and contributed to building local communities. Gaels fished and used seaweeds as dyes in food and clothing.

In 2008, the symbol of the Gaels in Nova Scotia was developed. The symbol is that of a salmon in the shape of the letter 'G'. The salmon repesents the gifts of knowledge and wisdom in the Gaelic tradition in Nova Scotia, Scotland, Ireland, and on the Isle of Man. The 'G' represents Gaels as a people, and how their unique Gaelic language informs their culture, and identity.

Source: Government of Nova Scotia (2019). Gaelic Nova Scotia: A Resource Guide.

Background

Mi'kmaq- Mi’kma’ki is a vast area. Its diverse landscapes, seascapes, rivers, plants, animals, fish, rocks, and islands are inseparable from Mi’kmaw people, language, stories, history, and spirit. For more than 13,500 years the ancestors of the Mi’kmaq and other Lnu’k (native people) have lived in Mi’kma’ki.

Netukulimk is a Mi’kmaw concept which governs the physical, emotional, cognitional, social, and spiritual relationships a person has with everything. This includes the physical features of the land and oceans, and the rhythms and cycles and patterns of Wskitqamu (Mother Earth), and all her living beings and nonliving things. It is a profound way of “being and knowing” that guides one’s understandings of how to live within Wskitqamu and how to live in harmony.

The Mi’kmaq of Nova Scotia have been engaged in a Rights Implementation process with the Federal Government for a number of years. One of the key areas in the implementation of Aboriginal and Treaty Rights is fishing for either food, social, and ceremonial purposes, or for livelihood.

The Department of Fisheries and Oceans (DFO) issues special fishing licenses to First Nation communities. DFO recognizes two types of Mi’kmaw fisheries:

- Food, Social and Ceremonial fishery (under which fish must be consumed by the individual or community, can be used for the purpose of harvesting other species of food and is not to be sold); and
- Aboriginal Communal Commercial fishery (which are Band owned and operated Commercial Fishing licenses where the regulated catch is sold for economical gain).

In addition, Mi’kmaw communities in Nova Scotia have a treaty right to fish in pursuit of a moderate livelihood. This right was determined in what is known as the Marshall decision in 1993. The case went all the way to the Supreme Court of Canada which affirmed that Marshall and other Mi’kmaw people had the right to fish, including for lobster, in the pursuit of a moderate livelihood. Mi’kmaw communities fish under those rights across the province and manage conservation practices to ensure communities can continue to benefit from lobsters for generations to come.

Sources:

Kwilmu’kw Maw-klusuaqn, We are Seeking Consensus. Fisheries.
Mi'kmawey Debert Cultural Centre. Sa’qewe’l kmitkinal - Ancestors Live Here.

Students will be able to:

- **Investigate how the ocean relates to students' lives.**
- **Investigate the concept of Netukulimk (i.e., Interconnectedness).**
- **Provide examples of students' relationship to the ocean.**
- **Investigate biological characteristics of lobsters.**
- **Analyze the relationship between animal growth and the environment.**

Critical questions:

- **How does the ocean connect to you?**
- **What is Netukulimk?**
- **How are lobsters connected to the ocean?**
- **How is the ocean connected to the health of humans and lobsters?**

Resources:

Watch:

- Oceans of the World for Kids | Learn all about the 5 Oceans of the Earth (8:43)
- Facts: The American Lobster (2:57)
- Netukulimk (0:26)
- Inquiry tool – Netukulimk (3:40)
- Elders' Stories- Netukulimk (1:38)
- African NS Video (to be added)
- Gael Video (to be added)
- Acadian Video (to be added)
- Mi'kmaw video (to be added)

Ask:

- **How has the ocean helped people and communities to live and thrive in the past?**
- **How does the ocean help people and communities to live and thrive in the present?**
- **How might the concept of Netukulimk help maintain balance and harmony in the oceans?**

Listen:

- Larry Lobster Song (2:49)
- Pronounce Netukulimk

Activities

TEACHER LED ACTIVITIES

INQUIRE:

Have you ever been to the ocean? What creatures live in the ocean? Where are the oceans in the world? What are they called? What sea creatures do you know? Which ones have you seen in the ocean or on a beach?

CREATE A NET:

This can be done in the classroom, outside, or in a gym. Students can sit or stand in a circle or be distributed throughout the room. Using a skein of yarn, ask one student to hold a piece of yarn and name one way they are connected to the ocean or impacted or influenced by the ocean (e.g. a place to swim, to get food, etc.). The students will then hold on to the end of the string and throw the rest of the skein to the next student who will add a new idea, hold on to their part of the string and then throw it to the next student) – creating a web or net. Students will continue to hold their end of the string and will then have a net of all the ways the ocean connects or impacts them.

WATCH:

5 Things You Didn't Know About Lobster (2:33)

Any of the resources on the previous page that you choose, and invite students to reflect on the critical questions.

DANCE:

Have students identify how lobsters move in the ocean – Play the Larry Lobster song.

SHARING CIRCLE:

In a sharing and knowledge circle, students discuss the importance of Netukulimk and how to live in harmony with the environment.

WALL OF WORDS:

Support students to identify unfamiliar words and animals. Make a wall of words.

READ: The Oceans Around Us

Book by author Kate Boehm Nyquist

Follow a sea turtle' s adventures and learn about the features of the oceans and the ocean floor. Meet human divers and deep-sea creatures along the way.

Activities

STUDENT LED ACTIVITIES

1. LABEL THE OCEANS:

Students will write the names of the oceans. Using the map, students will properly label the oceans of the world, and compare the size of oceans to land mass.

2. COLOUR AND IDENTIFY PARTS OF A LOBSTER:

Students can colour and identify the different parts of a lobster. Most lobsters around the world are a mottled brown color, but sometimes you can see orange or blue lobsters. When lobsters are cooked, they turn bright red.

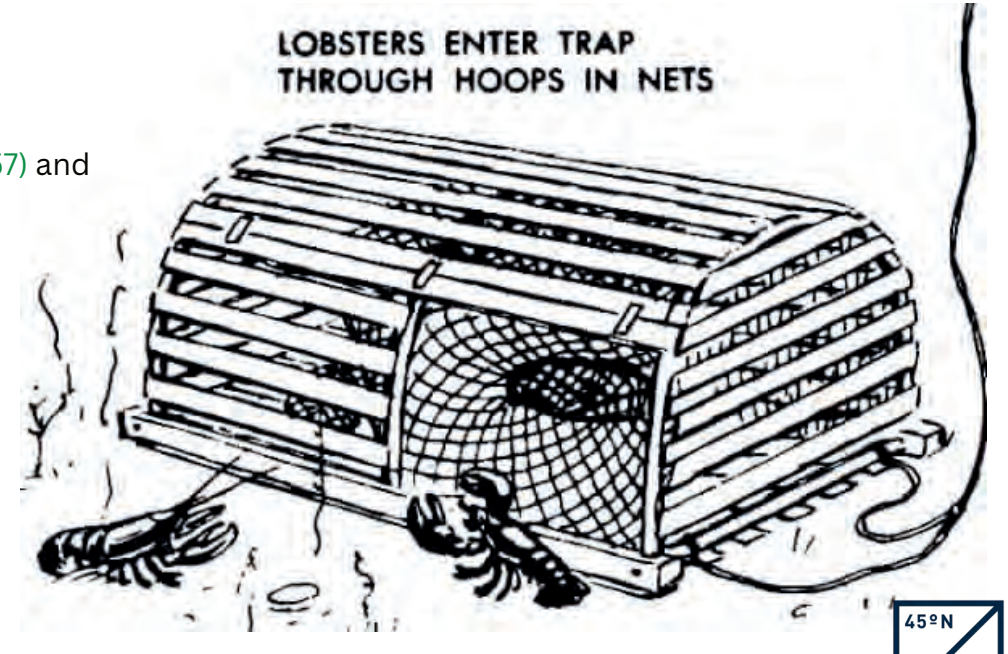
Antennas: Lobsters have four long and thin antennas covered by tiny hairs. Lobsters flick their antennas to smell.

Claws: Lobsters use their claws to catch food and battle predators and other lobsters. The larger of the two claws is called the crusher claw and the smaller claw is called the pincer or cutter claw. The claws are full of tender, sweet meat.

Knuckles: The two joints to connect the large claws to the body. People say the knuckle meat is the tastiest.

Legs: Lobsters have 10 legs. The four pairs of legs contain small strips of meat that take some work to remove. Lobsters use the eight back legs to walk. The front legs have claws called pincers. Lobsters will walk along the ocean floor at night in search of food.

Tails: The tail holds the biggest piece of meat in the lobster.



3. LOBSTER INVESTIGATION WORKSHEET:

Students will watch the video Facts- The American Lobster (2:57) and North American Lobster (3:41) and work in small groups to fill in the Lobster Investigation worksheet.

4. PRONOUNCE: Mi'kmaw, Acadian, and Gaelic words connected to lobster and the oceans.

5. MATCH EACH FLAG TO IT'S CULTURAL COMMUNITY:

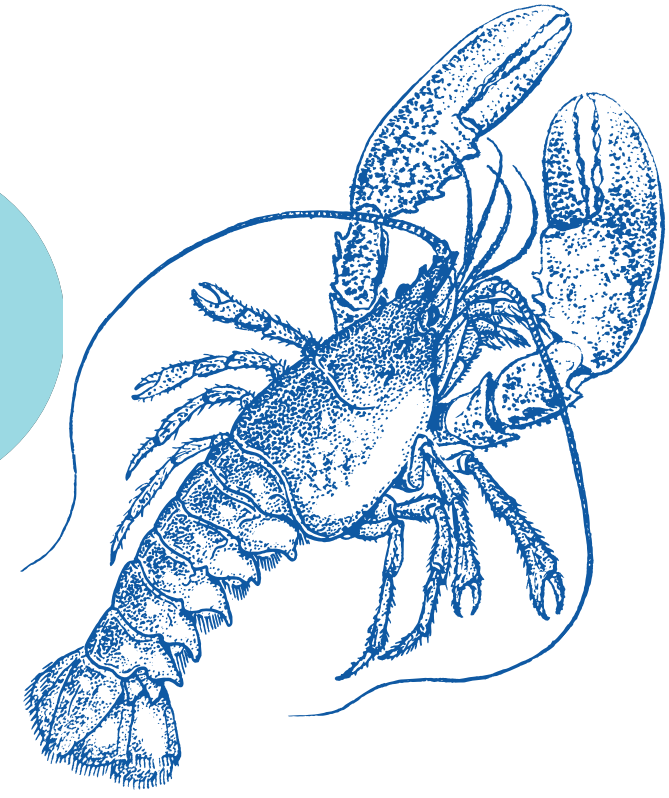
Students draw a line between the flag and the cultural community.

Thoughtbook

This lesson focused on the different ways the ocean relates to students' lives, including the connection to the health of humans and lobsters. Students will take time to journal their thoughts and things they have learned. They can draw a picture, a comic, or write a poem.

Reflect:

- **How does the ocean connect to you?**
- **How are lobsters connected to the ocean?**
- **How is the ocean connected to your health and the health of lobsters?**
- **What does Netukulimk mean to you?**



References:

- Overview of *Homarus americanus*: The American Lobster
- A Lobsters life on the bottom
- For more information on Netukulimk, as well as Mi'kmaw culture, history and language, see the guide Mi'kmawe'l Tan Teli-kina'muemk Teaching About the Mi'kmaq (p. 153).
- Mi'kmaw phonetic pronunciations from Mi'kmawey Debert Cultural Centre

Extension Activities

Read the story Rocky Waters

Inspired by a true story, Rocky Waters is about a young boy who wants nothing more than to fish for lobster with his dad. All day at school, Rocky stares out the window, imagining fishing boats sailing across the sky. He wants nothing more than to fish for lobster with his dad, and finally one season he's old enough to go along.

Before dawn, Rocky, Dad and sister Patsy untie their boat and head out to sea. Surrounded by the vast expanse of sky and water, Rocky feels as free as a seagull. His dad steers toward their first buoy, then pulls up a line of traps full of lobster. Rocky learns how to band their claws, then Patsy rebaits the traps and shoves them back into the sea. It takes a full day to haul up, empty, rebait and re-set three hundred traps, but Rocky loves every minute of it. "If the salt's still in your veins when you're Patsy's age, you can leave school and fish all you want," his dad tells him.

Anne Laurel Carter's story is inspired by the childhood memories of Rocky Gaudet, who grew up wanting to fish the sea like his Acadian ancestors. He continues to fish for lobster in Prince Edward Island and Nova Scotia today. Marianne Dumas' watercolor illustrations recall Rocky's first fishing experience.

Support students to:

Identify characters, settings, and major events in the story.

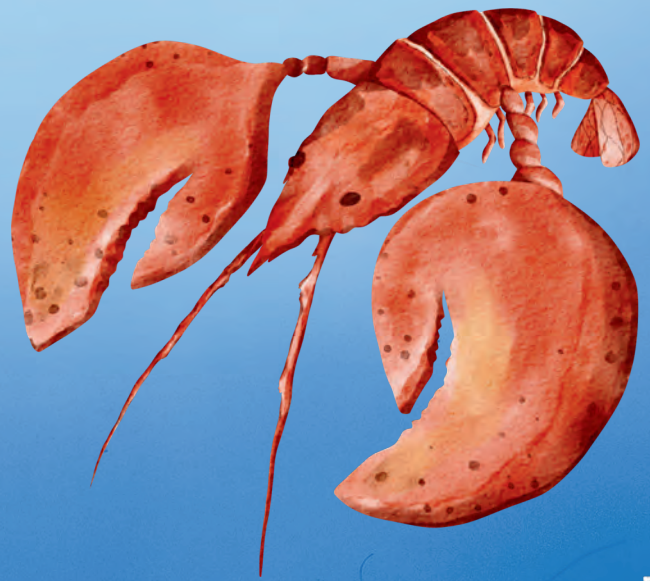
Describe characters in the story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events.

Additional Extension Activities:

- Our Wonderful Ocean Resources
- Our Ocean and Us

Lesson 2

Sustainable Practices: Marine and Lobster Stewardship



Background

Marine ecosystems are salty aquatic (water) environments. These include the open ocean, the deep-sea ocean, and coastal marine ecosystems, each of which has different physical and biological characteristics. The ocean that surrounds Nova Scotia includes many marine ecosystems that support plant and marine life. These marine ecosystem provides Nova Scotians with food as well as economic opportunities, such as tourism. Maintaining healthy marine environments ensures communities in Nova Scotia continue to benefit from the ocean.

By exploring marine life, such as lobsters, we can see how marine ecosystems have supported and continue to support and sustain our communities. Inshore lobster fishing can be traced back to pre-colonial times when it was an important food source for the Mi'kmaq. They harvested lobster (jakej) through the spring and fall using traps and spears.

The careful management of marine ecosystems guided by the Mi'kmaw concept of Netukulimk, requires the use of sustainable practices to ensure the resources we take from the environment will continue on for future generations. Mi'kmaw, Gaels, African Nova Scotian, and Acadian communities all have long histories in harvesting and managing lobsters off the shores of Nova Scotia.

Current marine management practices help to regulate industries which make use of marine ecosystems and help to sustain the environment. A number of measures address conservation in the fishery. A few examples include:

- Lobster fishers must have a license that allows them to fish in a particular Lobster Fishing Area (LFA's).
- LFA's are in place to regulate licenses and number of lobster traps to ensure the sustainability of the industry and to protect the environment.
- The timing of lobster fishing seasons varies across different lobster fishing areas in order to minimize negative impacts during important life stages. These stages include egg hatching, lobster molting, egg laying, and mating. In most areas, seasons are set to avoid harvesting during these important periods.
- Escape mechanisms in traps that enable undersized lobsters to exit traps.
- Rules governing the size, design, and type of trap.
- Maintaining catch logbooks and scientific field notebooks.

Sources:

DFO. 2021. Fishing Seasons for Inshore Lobster Fisheries.
DFO. 2022. Integrated Fisheries Management Plan.
DFO. 2014. Lobster in the Southern Gulf of Saint Lawrence.

Students will be able to:

- **Identify key components of marine and lobster ecosystems.**
- **Investigate the connections between the needs of lobsters and humans.**
- **Investigate lobster habitat and harvesting methods.**

Critical questions:

- **What is an ecosystem? What are some characteristics of ecosystems?**
- **How do these characteristics help marine life to survive? How are the survival needs of marine life like those of humans?**
- **How does ocean health depend on ecosystem relationships?**
- **What is unique about our marine ecosystem?**
- **What are the stressors on ocean ecosystems using the example of lobsters?**

Resources:

Watch:

- Ocean Habitats (4:16)
- Aquatic Ecosystems (3:35)
- Sustainable lobster fishing in NS (2:25)
- Why Sustainable seafood is important (1:29)
- Ecosystems for kids (9:16)
- Atlantic Canadian Lobster Sustainability (1:51)

Ask:

- What are characteristics of ecosystems?
- What is unique about our Atlantic Ocean ecosystem?

Ghost Gear and Marine Debris:

- Fighting for Trash Free Seas
- Ghost Gear Plaguing Ocean Wildlife
- A Win for Lobstermen and Right Whales (1:51)

Read additional background information:

- Ecosystems, National Geographic
- Marine Ecosystems, National Geographic

Activities

TEACHER LED

INQUIRE:

Invite students to brainstorm and share stories about lobsters. What do they know about ecosystems? What do they know about marine ecosystems? What do they know about lobsters? Have they ever seen or eaten a lobster? Do they know anyone who fishes? What do they want to know about lobsters?

WATCH:

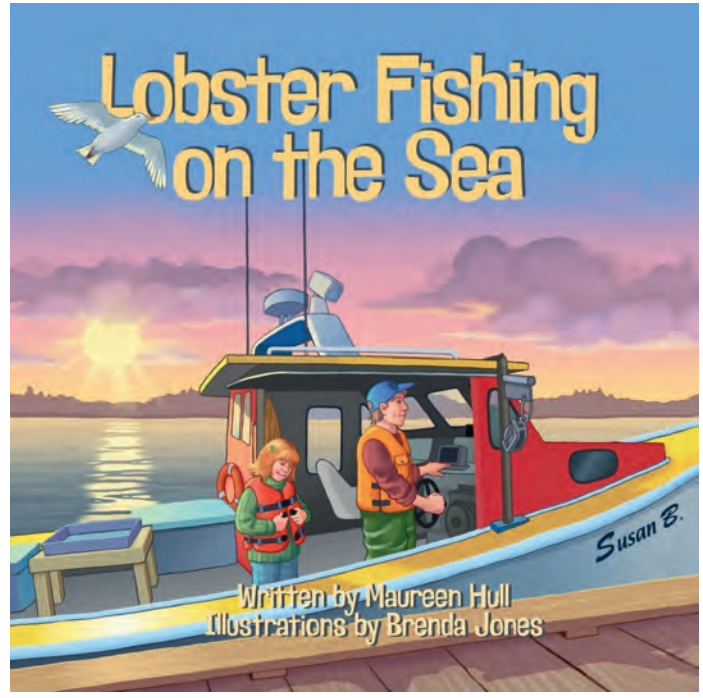
Any of the resources on the previous page that you choose, and invite students to reflect on the critical questions.
Ask: What are the five oceans in the world? What is unique about the Atlantic Ocean?

EXPLORE ECOSYSTEMS:

Brainstorm: Ask students what makes up the ecosystem they live in? (Living – plants, animals, fungi, microbes and nonliving elements – air, water, soil). Give examples of some of these and ask for other examples they can think of from their own life.

READ: Lobster Fishing on the Sea

Maureen Hull's Lobster Fishing on the Sea is a warm and welcoming picture book that tells a story from the main character, Susan's, perspective. Susan's father is a lobster fisher and he takes her on a full-day adventure on his commercial fishing boat in the Northumberland Strait. One Saturday morning, he lets Susan come on the boat with him. They empty their traps together and Susan sees all different sea creatures- rock crabs, sculpins, and more. From waking up, to working on the sea, and finally warming up by eating their catch for dinner, Susan's experience outlines a day-in-the-life-of a Canadian lobster fisher.



Watch this video of a teacher reading the book. (6:47)

Support students to identify unfamiliar words and animals. Make a wall of words.

Activities

People, Ocean, Lobsters | Taking Care of the Ocean | Climate Change | Food and Jobs

CREATE: Play Doh lobsters

Materials: Play Doh, googly eyes, plastic shaping tools.
Watch: Let's Make a cute Play Doh Lobster (3:19)
Step 1. Provide each student with Play Doh, googly eyes, and shaping tools.
Step 2. Play the video.
Step 3. Encourage each student to name their lobster and present it to the rest of the class.

MARINE YOGA:

Practice yoga poses that mimic species found in marine ecosystems.

STUDENT LED

1. CREATE YOUR OWN MINI ECOSYSTEM:

Step 1: Students can go outdoors and collect things they would want to put into their ecosystem (alternatively, they can bring some from home, or write elements on pieces of paper).
Step 2: In a large bucket, add soil and the elements student collected and create a mini-ecosystem.

Ask:

- What does the ecosystem need to survive?
- How would we need to take care of this ecosystem over the long term so it can be sustainable for generations to come?

2. CREATE A MARINE ECOSYSTEM:

Step 1: Brainstorm what would a lobster need to survive in a marine ecosystem?
Step 2: In a large bottle or container add what a lobster needs to live in its marine ecosystem (add water, salt, sand, rocks, etc).

Ask:

- How can we make sure the environment is protected so there are lobsters for future generations?

3. IDENTIFY AND LABEL MARINE CREATURES

Invite students to label all the marine creatures in their student guides, and **circle everything a lobster eats.**

Answer: everything.

Lobsters eat fish, crabs, oysters, mussels, sea urchins, starfish, and algae. Lobsters are also cannibalistic and sometimes will eat other lobsters. Baited traps also supply food for lobsters. Traps are baited primarily with fish such as herring or mackerel. Alternative baits include green crap and cunner (fish). Juvenile lobsters can move freely in and out of lobster traps, and adults can also move in and out of the traps. Thus, many feel bait provides a substantial source of food for inshore lobsters.

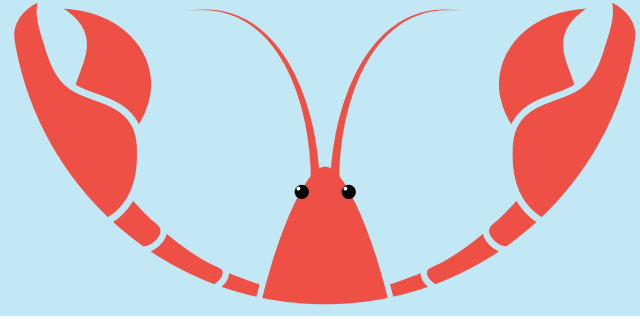
Lobsters frequently hunt for food at night. To find their prey in the dark, lobsters "smell" using four little antennae on their heads and detecting hairs all over their bodies. Their smell is so sensitive that they can detect a single amino acid in their favorite foods. Lobsters eat more as they lose their old shells because they require calcium to rebuild it. A newborn lobster will eat an 8cm jellyfish in four days.

Invite students to label all the marine creatures below, and **circle everything that eats a lobster.**

Answer: everything except the whale.

The biggest predators of the American lobster are humans! After humans, their next biggest predators are groundfish such as flounder and cod, sculpins, eels, rock gunnels, crabs, and seals.

WATCH: Fun fact - lobsters pee (expel urea) from their face. (0:44)



Activities

4. 10 WAYS TO HELP OUR OCEAN

Students are invited to view the infographic below and answer the question: What are two things you can do to protect the marine environment to make sure there are lobsters for future generations?

This video is also a great introduction to plastics in the ocean.

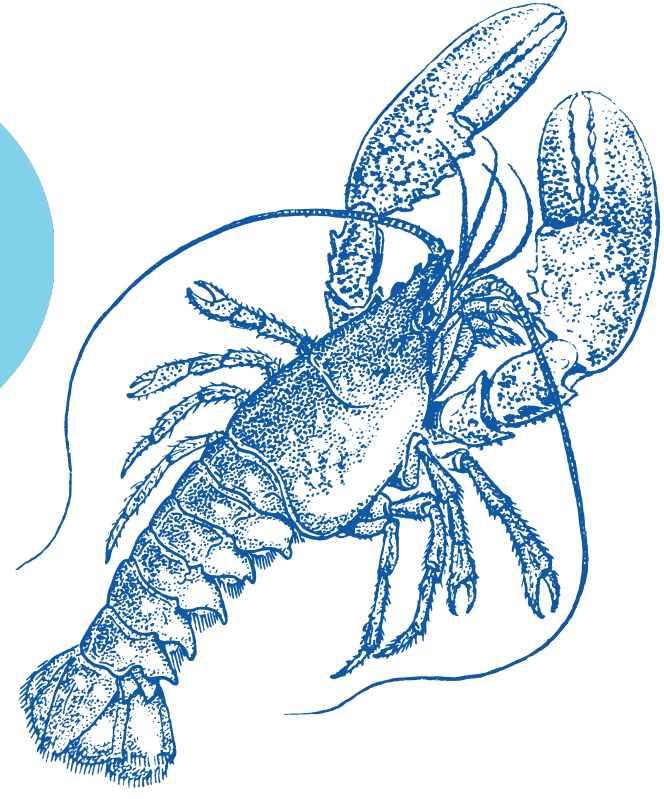
Students can write a paragraph, draw a picture, a comic strip, write a poem, or any other form of creative expression.

Thoughtbook

This lesson focused on marine ecosystems and the connection between lobsters and humans. Students will take time to journal their thoughts and things they have learned. They can draw a picture, a comic, or write a poem.

Reflect:

- **What is an ecosystem? What are some characteristics of ecosystems?**
- **How do these characteristics help marine life to survive? How are the survival needs of marine life like those of humans?**
- **What is unique about our marine ecosystem?**



References:

- What is an ecosystem | Ecosystem video for kids | Ecosystem Types (3:06)
- University of Maine Lobster Institute
- The American Lobster, Pictou-Antigonish Regional Library
- Ecosystems, National Geographic
- Marine Ecosystems, National Geographic

Extension Activities

Salt Water Experiment

Gather the following items:

- Small plastic jewels or small grapes
- Several clear cups full of water
- Salt
- Sugar
- Baking soda

*Feel free to test other substances like washing soda, baking powder, sand, cornstarch, etc. It's always fun to experiment to see what happens!

- Dissolve 2 tablespoons of salt in one cup, 2 tablespoons of sugar in another cup, and 2 tablespoons of baking soda in a third cup. Be sure to leave one cup as plain, fresh water. (This is the controlled variable.)
- Label each cup so everything stays organized.
- Have the kids think about what might happen when they drop the jewels/grapes into each cup. Will the jewels sink or float?
- Drop the jewels into each cup to find if the kids' guesses were correct!

The Science of the Salt Water Experiment

When you add salt to water it makes the water more dense. This means it gets heavier. Many objects that sink in fresh water will float in salt water!

Objects float in baking soda water because baking soda is a kind of salt. It dissolves in water to make the water more dense, just like table salt does. However, baking soda has another property that gave us a little bit of a surprise! When baking soda dissolves in water some of it reacts to form carbon dioxide gas. If you look carefully you will see tiny bubbles rising from the bottom of the cup.

Extension Activities

Ghost Gear and Marine Debris

Watch:

Christmas tree with a catch (2:04)

Ask: What is ghost gear? What happens to ghost gear left in the ocean? Who can it impact marine life and damage habitats?

Fighting for Trash Free Seas
Ghost Gear Plaguing Ocean Wildlife
A Win for Lobstermen and Right Whales (1:51)

Lesson 3

Climate Change: Environmental and Cultural Impacts

Background

For the past hundred or more years, human activities have caused the weather to change. This is known as climate change. The release of what are known as greenhouse gases, which include carbon dioxide that comes out of the exhaust of cars, has caused the Earth to become warmer. Greenhouse gases act like a greenhouse or a layer of insulation for the Earth: they trap heat and warm the planet. Why are carbon dioxide concentrations are on the rise? Human-caused activities (combustion of fossil fuels, agricultural practices, land use changes etc.). Climate change, by changing global human habitat, will cause profound impacts on water, resources, and the communities that rely on them.

It is not just the air that is getting warmer, but the oceans are too.

The increased temperature in the oceans has caused them to become more acidic and less oxygenated which affects the health of marine ecosystems. For instance, climate change is a particular concern to the lobster fishery in Nova Scotia. While warmer temperatures in the oceans have increased the presence of lobsters in Nova Scotia as they have moved here from warmer waters in the South, lobster habitats may start to decline over the next few decades if the warming continues unchecked. Warming waters can affect lobsters in a number of ways including softer shells, smaller size, and increased possibility of disease. The frequency and intensity of storms is also likely to increase which will make it harder and more dangerous for fishers to go out on the water.

Ocean warming is also negatively impacting fish species traditionally used as bait by the lobster fishing industry. Overexploitation, natural predation, and changing migratory patterns of Atlantic herring and Atlantic mackerel bait fisheries has resulted in fishers paying more for bait or having to find alternatives.

Communities can reduce the impact of climate change by taking actions to reduce greenhouse gas emissions and they can adapt to the changing climate to ensure people are able to continue to benefit from healthy and sustainable ecosystems.

Source: Managing Fisheries in an age of Climate Change

Students will be able to:

- **Investigate the link between climate change and the ocean.**
- **Investigate how Nova Scotia communities are adapting to climate change.**
- **Investigate how fishing communities and the lobster fishery in Nova Scotia are adapting to climate change.**

Critical questions:

- **What is the link between climate change and the ocean?**
- **How are Nova Scotia communities adapting to climate change?**
- **How are fishing communities and the lobster fishery in NS adapting to climate change?**
- **How does climate change affect marine animals, like lobsters?**
- **What are some of the ways marine animals can reduce the impacts of climate change?**

Resources:

Watch:

Climate Change Resources:

- Climate Change: Crash Course Kids (3:40)
- Oceans of climate change (3:49)
- 1 °C and its impacts: what does climate change mean for Canada? (2:48)

Cultural Traditions:

- Climate change impacting Mi'kmaw traditions (3:18)

Responding to climate change:

- Climate change and me (0:53)
- A Fisherman on the front line of climate change (1:30)
- Ecosystem Adaptation (3:43)
- Climate change and coastal fisheries (3:17)

Listen:

- Clap snap lobster (1:56)
- Planet Earth Song (3:17)

Ask:

What can you do to support clean and healthy oceans and help the lobsters?

Activities

TEACHER LED

INQUIRE:

Invite students to brainstorm and share stories about climate change. What do they know about climate change? Have they noticed any changes in weather? Do they hear about climate change on the news, or from their families? How do they think climate change will affect marine animals like lobsters?

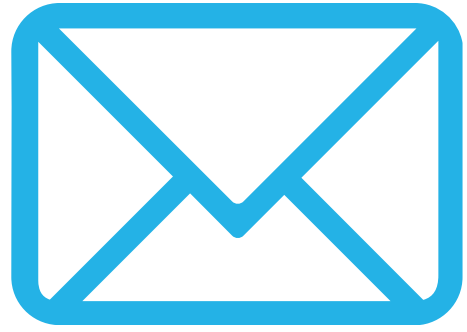
Lobsters can remain happy and healthy in waters up to 20°C (68°F). When oceans get warmer than this, it affects the way lobsters breathe, and can affect how they fight off diseases and even make their shells weaker. Lobsters adapt to warmer ocean temperatures by moving further north. While there may be more lobsters in Nova Scotia now that have moved north from Maine and further south, eventually, they may go further north, and leave Nova Scotia's shores.

WATCH:

Any of the resources on the previous page that you choose, and invite students to reflect on the critical questions.

STUDENT LED

1. LETTER OR VIDEO FOR THE FUTURE:



A. Write a letter or draw a picture of something you can do in your life to help the oceans and reduce the impacts of climate change.
B. Video tape each child sharing their picture and their action steps.

The student guide includes a graphic organizer with prompts for students.

- Tell the ocean something you like about it. Think about the sights and sounds, animals, and ecosystems.
- Ask the ocean some questions to get to know it better.
- Tell the ocean what you want to do to help make it healthy again.
- Tell the ocean why it's important to you.

2. LOBSTER COUNCIL: Talking to Humans

Sit in a circle and tell the students that they are all lobsters. Invite students to make claws with both hands (squeezing thumbs to fingers). Imagine they are lobsters living in the ocean that is warming up. Name 3 things they would ask humans to do to make sure your habitat is safe and healthy for future generations of lobsters.

Activities

3. REDUCING YOUR CARBON FOOTPRINT:

Many things we do create carbon dioxide or greenhouse gases. If you add up the number and amount of emissions our daily activity produces, you have an idea of the size of the impact we have on the environment. The link between carbon dioxide and ocean health is clear.

Watch: What is Ocean Acidification (2:51)

Materials: Bristol board, markers, or crayons.

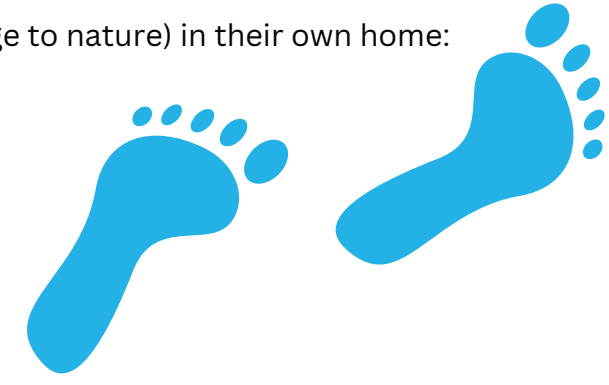
Step 1: In pairs, ask students to outline each other's feet onto the Bristol board.

Step 2: Ask students to write or draw things that cause more greenhouse gas emissions (or harm nature, for younger kids) and result in a larger carbon footprint (damage to nature). Draw or write their ideas on their left foot.
Examples:

- Driving a car – burning fuel (gasoline)
- Flying in a plane – burning fuel (jet fuel)
- Wasting energy in our house – burning fuel (natural gas/coal/nuclear energy)
- Buying imported food – food that travels great distances – burning fuel (gasoline/jet fuel)
- Buying non-organic food – pesticide production and transportation burn fuel
- Using inefficient lights – burning fuel (natural gas/coal/nuclear energy)
- Wasting water at home – cleaning water uses fuel (natural gas/coal/nuclear energy)

Step 3: Now ask students to identify ways to reduce the carbon footprint (damage to nature) in their own home:
Examples:

- Carpool
- Turn off the lights
- Don’t waste water
- Bike/walk/scooter when you can
- Recycle and reuse paper at home and at school
- Turn off the computer when it isn’t being used
- Avoid wasting food and compost what we can



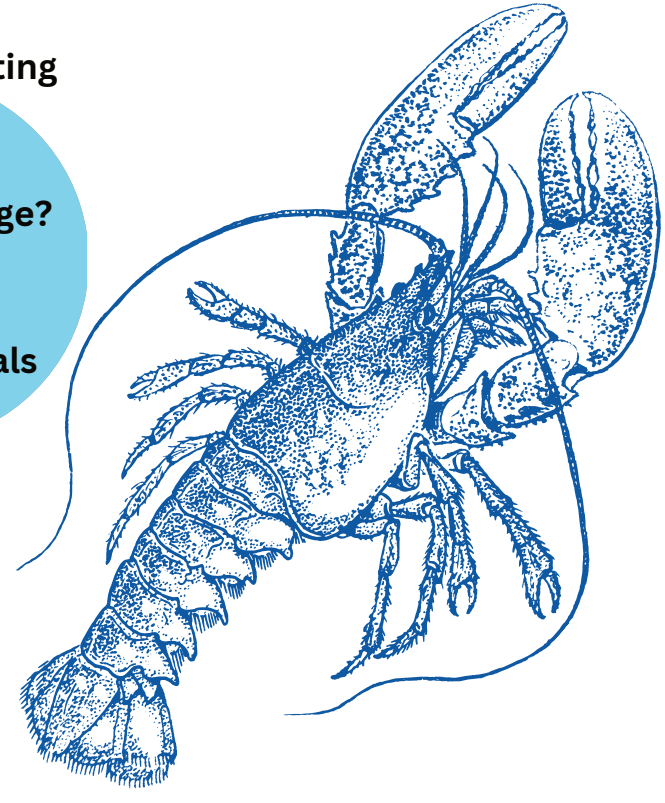
Step 4: Ask students to draw or write ways they can commit to reducing their carbon footprint in their life on the right foot.

Thoughtbook

This lesson focused on the connection between climate change and the ocean, as well as how Nova Scotian communities and the lobster fishing industry is adapting to change. Students will take time to journal their thoughts and things they have learned. They can draw a picture, a comic, or write a poem.

Reflect:

- **What is the link between climate change and the ocean?**
- **How are Nova Scotia communities adapting to climate change?**
- **How are fishing communities and the lobster fishery adapting to climate change?**
- **How does climate change affect marine animals, like lobsters?**
- **What are some of the ways marine animals can reduce the impacts of climate change?**



References:

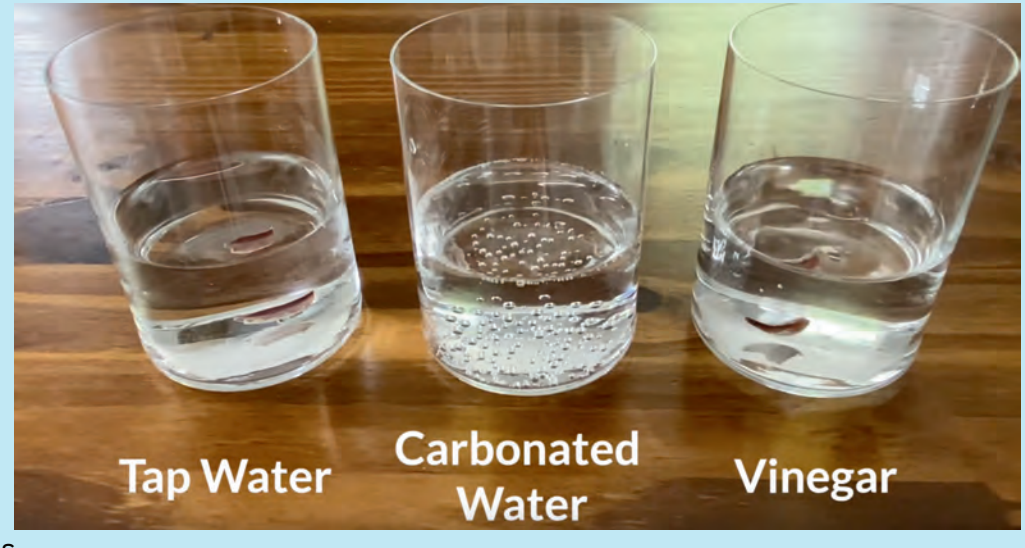
- What is an ecosystem | Ecosystem video for kids | Ecosystem Types (3:06)
- University of Maine Lobster Institute
- The American Lobster, Pictou-Antigonish Regional Library
- Ecosystems, National Geographic
- Marine Ecosystems, National Geographic

Extension Activities

Ocean Acidification- Impact on Shells

As the oceans absorb excess carbon dioxide from the atmosphere, scientists have observed that the ocean is becoming more acidic. This change in chemistry can be harmful to some animals found in our oceans, including shellfish and corals. With this activity, you will observe the impact of different acidic solutions on seashells.

Watch:
Ocean Acidification Activity (2:42)



Materials Needed:

- Tap water
- Carbonated water
- Vinegar
- Seashells or eggshells
- 3 clear glasses

Steps:

1. Add one cup of tap water to the first glass.
2. Add one cup of carbonated water to the second glass.
3. Add one cup of vinegar to the last glass.
4. Add thin seashells or eggshells to each glass.
5. Observe what happens every 15 minutes for the next 2 hours: Tap water has a neutral pH of 7. Carbonated water has a pH of 3-4. Vinegar has a pH of 2. Even a small change in pH can have a significant impact on marine life, including lobsters and many many of the marine creatures that lobsters eat.

Lesson 4
Food and Jobs

Background

The fishing industry is vital to Nova Scotia's economy. Over 18,000 people work directly in fishing, aquaculture, and seafood processing, with many more involved in support services such as research, equipment, sales and tourism. There are more people working in the seafood industry in Nova Scotia than in any other province in Canada. Nova Scotia also exports more than $2.3 billion of fish and seafood products throughout the world each year. (Nova Scotia Business Inc, 2022). Lobster landings have been experiencing an upward trend, and remain at one of the highest levels recorded this century. Nova Scotia landings have more than doubled over the past 20 years.

Lobsters are the most important seafood harvested from the ocean off the coast of Nova Scotia. Lobsters are caught, processed, and packaged here in Nova Scotia and exported to markets in the United States, Europe, and Asia. The Nova Scotian economy relies on revenue from the lobster industry. It is one of the most important products produced in this region. Lobster is served at restaurants, celebrated in feasts, and can be showcased in arts and culture throughout the entire province. Every region of the province is involved in or impacted by the lobster industry. The Municipality of Barrington is even known as the Lobster Capital of Canada.

There are many jobs and opportunities to develop a career in the lobster industry. There are jobs in fishing, processing as well as in science, research, sales, and equipment supplies. In addition there are jobs in cultural industries such as restaurants that serve lobster, and artists and craft makers who produce art and products celebrating and honouring lobsters.

Students will be able to:

- **Describe the importance of the lobster industry to the Nova Scotian economy.**
- **Identify key careers and opportunities in the fishing and marine industry.**
- **Identify key careers and opportunities specific to the lobster industry.**

Critical questions:

- **What jobs in Nova Scotia involve the ocean?**
- **How do Nova Scotians make a living from the ocean?**
- **What are the unique opportunities in the lobster industry?**

Resources:

Watch:

- 360 Virtual Reality Experience on a Canadian Lobster Fishing Boat (3:13)
- All female lobster crew (1:58)
- Videos on processing, tourism, etc. to be created and added

Read or Watch:

How to Catch a Keeper – Stephanie Mulligan (11:43)

Show:

Use the accompanying PowerPoint with this lesson that includes images with notes focused on jobs in the seafood industry.

Activities

TEACHER LED

INQUIRE:

Invite students to brainstorm and share stories about jobs in Nova Scotia that involve the ocean. How do Nova Scotians make a living from the ocean? What are the unique opportunities in the lobster industry?

STUDENT LED

JOBS CONNECTED TO THE OCEAN GOOGLE SLIDESHOW:

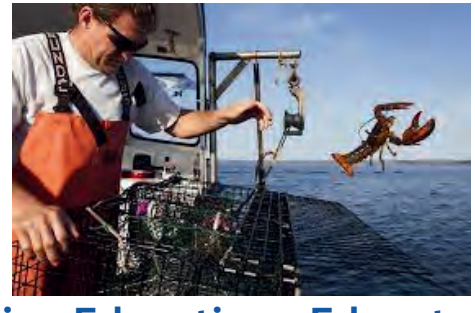
Step 1. Beyond fishing, there are many ways to have a job connected to the ocean. Use the accompanying Google slideshow to show images to the class, and describe the different jobs. Jobs include fishing, aquaculture, seafood processing, as well as support services such as research, equipment, sales, and tourism. Show students the slideshow.

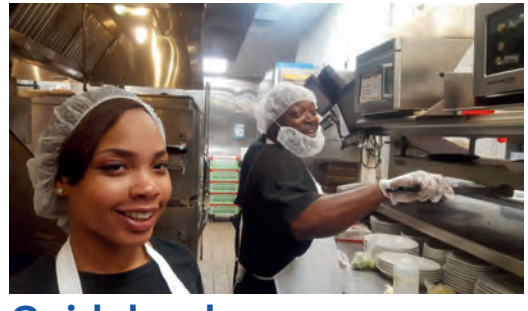
P-1:

Step 1: Invite students to choose the job that interests them most and ask them not to tell anyone which one they picked.
Step 2. Ask students to pretend they are doing the job and without using words (mime) out an action or movement they would do if they were doing that job (e.g. steering a boat, putting rubber bands on lobsters), etc.
Step 3. One at a time, students will mime their action and other students have to guess which job the student chose based on the action they see.
Step 4. Ask them why they chose that job – what interested them about it? OR Create groups from the different job choices.

2-3:

Step 1: Invite students to choose the job that interests them most and ask them not to tell anyone which one they picked.
Step 2. A Day in the Life activity- invite students to draw a picture or find an image and take a screenshot of someone doing that job, and write a paragraph about what their life might look like if they did that job.
Step 3. Invite students to present their work to the rest of the class.



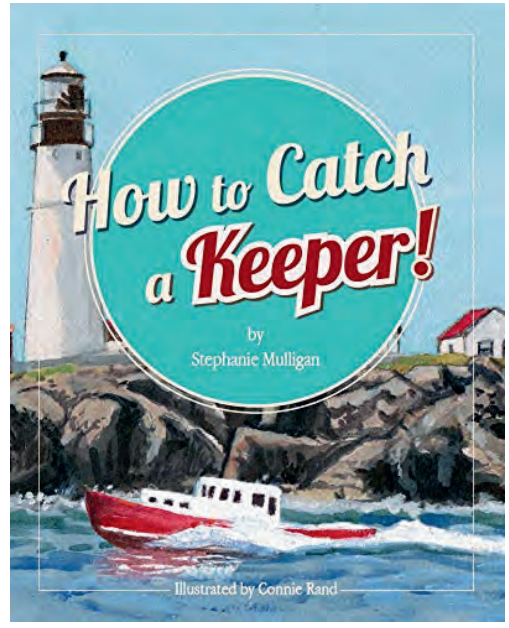


Activities

2. READ OR WATCH: How to Catch a Keeper

How to Catch a Keeper! – Stephanie Mulligan (11:43)

“How to Catch a Keeper!" give kids a Maine lobster boat experience, and follows the adventures of Luke and Layla as they take a trip to the Maine coast and explore its many ways to play. From how to catch a lobster, to measuring it for its legal harvesting, and understanding the lobster’s natural history, How to Catch a Keeper! is based on a real lobster boat’s operations, and invites kids to appreciate and understand both the lobster’s world and the appeal of a fishing town.



3. WATCH: Have you ever wondered how to cook and eat a lobster?

22 Ways to Enjoy Lobster in Nova Scotia (8:00)

P-1:

Ask students to think about their favourite way to eat lobster. If they've never tried it, encourage them to imagine. Each corner of the classroom represents a different kind of food with lobster: pasta with lobster, eggs with lobster, a lobster on its own (with butter for dipping of course), and a lobster roll. Invite students to choose one of the four corners, and ask them to share why they chose.

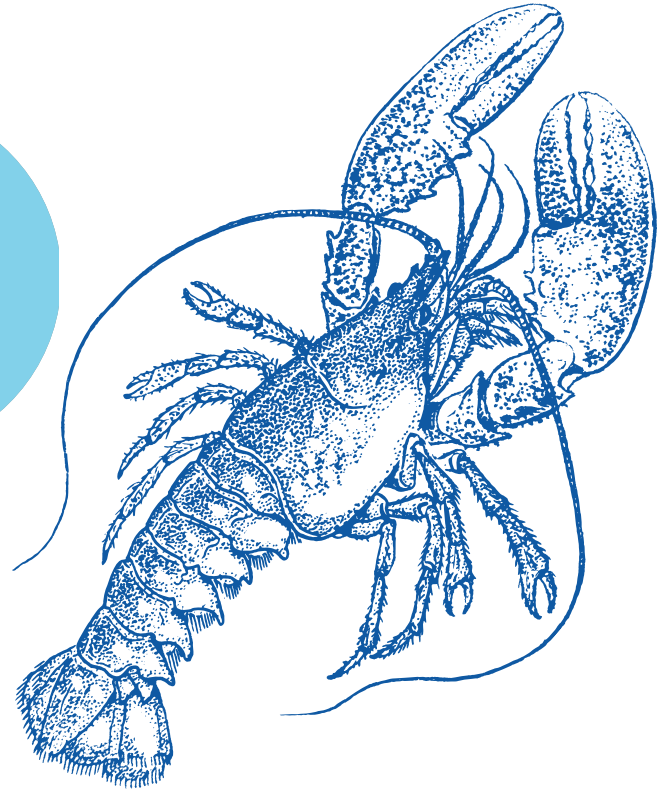
2-3:

Ask students to think about their favourite way to eat lobster. If they've never tried it, encourage them to imagine. Invite them to search for an image of their favourite lobster dish, take a screenshot, and write a caption.

This lesson focused on ocean jobs in Nova Scotia, and unique job opportunities in the lobster industry. Students will take time to journal their thoughts and things they have learned. They can draw a picture, a comic, or write a poem.

Reflect:

- **What jobs in Nova Scotia involve the ocean?**
- **How do Nova Scotians make a living from the ocean?**
- **What are the unique opportunities in the lobster industry?**



Extension Activities

Many restaurants in Nova Scotia and around the world serve lobster as part of their menu. Cooks and chefs prepare lobsters in a variety of ways.

Watch:
Ultimate Nova Scotia Lobster Crawl (4:46)
Ask: How many different ways did you see to eat lobster? What other ways was lobster celebrated in the video? (e.g. music, drink, art, etc.)

Do you want more ocean related classroom activities?
This Educational Resources Library has a list of ocean resources.
World Oceans Day for schools has a searchable database of activities by grade level.
Smithsonian Ocean Educator's Corner has a searchable database of activities by grade level.
Sailors for the Sea has many hands-on activities searchable by age level.