

MARINE PLASTIC: ELEMENTARY LEVEL

Grade: 2/3	Marine Plastic Unit
Big Ideas:	<ul style="list-style-type: none"> • Water is essential to all living things, and it cycles through the environment. • Materials can be changed through physical and chemical processes. • Living things are diverse, can be grouped, and interact in their ecosystems. • Wind, water and ice change the shape of the land.
Critical Questions:	<ul style="list-style-type: none"> • Why is the ocean important to us? How does plastic end up in the ocean? How does plastic change the ocean environment? How do animals adapt to this new environment? How does plastic in our ocean impact us? Why is it important to stop using so many plastics? What can we do to help the oceans?
Unit Rationale:	<ul style="list-style-type: none"> • The Earth’s oceans, and the interconnected cycle of water and waterways, are utterly vital to every living thing on Earth. And yet the health of these oceans, and by extension the wellbeing of all life on Earth, is at risk due largely to the impacts of human activity. Plastic is everywhere in our oceans and it’s going to take a deep, transformational change in humanity’s consciousness and activities regarding the oceans to ensure healthy, sustainable life on this planet. We believe this is possible – but we need to work together. Our youth must become aware of their own plastic use and how their actions will have a direct impact on the environment around them. Through these lessons we hope our youth will be come leaders of change - and this all starts in your classroom.
Students will do the following COMPETENCIES:	<ul style="list-style-type: none"> • Questioning and predicting; demonstrate curiosity, observe objects and events in similar contexts, ask questions, make predictions. • Planning and conducting; make and record observations, safely manipulate materials. • Processing and analyzing information; compare observations with predictions through discussions, identify patterns and connections. • Evaluating; compare observations with that of others, demonstrate an understanding. • Applying and innovating; transferring knowledge to real-life scenarios. • Communicating; share ideas and findings, reflect on learning.
Students will know the following CONTENT:	<ul style="list-style-type: none"> • Physical and chemical ways of changing materials, ex. They way plastic changes into microplastics over time. • Types of forces; the way certain materials move; the way objects move in water and the motion caused by different strengths of forces, ex. Bags moving like jellyfish in the sea • Water sources, ex. The ocean acts as a massive water source. • The water cycle - the water cycle is driven by the sun and includes evaporation, condensation, precipitation, and runoff. The water cycle is also a major component of weather (e.g., precipitation, clouds). • Interconnection to other systems; cultural significance of water (i.e., water is essential for all interconnected forms of life) interconnection between living and non-living things in the local environment; our shared responsibility to care for the local environment (i.e., stewardship)

	<ul style="list-style-type: none"> • Biodiversity: the variety of different types of living things in an ecosystem, characteristics of local plants, animals and fungi • Ecosystems; population: all the members of the same type of living thing (species) in an area • Energy is needed for life; food chains: the flow of food energy from one organism to another (e.g., grass to rabbit to lynx) food webs: interconnecting food chains (e.g., a rabbit may be eaten by a lynx or a wolf)
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RESOURCE GUIDE LAYOUT

- Page 1:** Cover Page; Marine Plastic: A Resource Guide for Teachers Leading Change
Page 2: Table of Contents
Page 3-4: Importance of the Ocean, facts on plastic, facts Canada’s coastline
Page 5: Connections to Canada-wide curriculum
Pages 6-12: Seven Lesson Plans for teachers – all aligned with the 7 Ocean Principles
Page 13: Resource Page
 - Links to other ocean education- related organizations, initiatives and networks in Canada
 - Does your class have a story you would like to share? Send it here and share it with our news section! <https://ocean.org/plastic-wise/>

LESSON PLANS: #1-7

	Topic	Objectives	Information & Activities	Resources	Assessment
1	The ocean and life in the ocean shapes the earth ~ <i>Plastic is changing the ocean environment.</i>	Students will be able to: [1] Explain ways the ocean helps us. [2] Understand how we are harming the oceans. [3] Explain what makes up a healthy ocean	Critical Questions: How does the ocean help us? How can we help the ocean? What happens when plastic is added to an ocean environment? Background Information: The action of the ocean changes the shape of the land. It does this by the slow, continuous movement of seawater, erosion of land deposition of the ocean sediments across geological eras worked together to create the landscape. Not only has the ocean changed our landscape, we also rely on it for our every day life. It gives us food, energy, medicine, transportation, recreation, travel, tourism and even our climate! In this lesson students will reflect on the importance of our oceans, ways we harm the ocean and what	<ul style="list-style-type: none"> • OW: Take the Pledge • OW: Virtual Meeting • C3: Oceans are Life • SC: Understanding our Ocean • OW: Ocean Literacy Course • OW: 6 Countries • UNESCO: Ocean Literacy For All Tool Kit 	Formative; can students identify ways that the ocean helps us? Opportunity to use an exit slip or a 1-2-3 response.

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		<p>some aspects of the environment within it.</p>	<p>we can do to help it. This lesson should be interactive, where students can communicate their thoughts their thoughts with the class.</p> <p>Task:</p> <ol style="list-style-type: none"> 1) Workbook Page __: Give the students 5 minutes to brainstorm each bubble and then come back as a class and share their ideas. Ensure they add the ideas of others to their own map. <i>Ex. We can help by waste-reduced shopping, beach clean-ups, local ban on straws, reduce snack and lunch box packaging, buy fewer plastic toys and plastic stickers, stop washing acrylic paint down the drain.</i> 2) Workbook Page __: Discuss aspects found in the ocean; plants, animals, oxygen, sand, rocks, etc. Have the students consider what makes the ocean “happy” (or healthy) and how plastic litter will lead to an unhealthy ocean environment. Once complete, have students draw out their “happy” ocean. 3) Discuss the ocean promise; to respect the ocean and appreciate what it provides. Ask the students – what does this mean? Why is this important? Have the students discuss what it means to be respectful versus disrespectful to the ocean environment. <p><i>Want to start the unit with a bang? Schedule a virtual meeting with the Vancouver Aquarium and get a tour on how plastics are harming the ocean environment. More info at onlinelearning@ocean.org.</i></p> <p>Action: <i>My ocean promise is to respect the ocean and appreciate what it gives me.</i></p>		
2	<p>The earth has one big ocean with many features ~</p> <p><i>Plastic litter knows no borders.</i></p>	<p>Students will be able to:</p> <p>[1] Explain ways water moves around the earth.</p> <p>[2] Understand how the ocean moves plants, animals and objects from one place to another.</p>	<p>Critical Questions: <i>How does water move around the planet? How do plastics end up in our oceans? What can we do to stop it?</i></p> <p>Background Information: Water is everywhere! It covers 70% of the earth's surface. Of all that water 97% is found in the ocean. There are 5 major ocean basins around the world and all of these basins together form one big world ocean. Water in the ocean is always moving, all around the world. Waves, tides and the rotation of the</p>	<ul style="list-style-type: none"> • OW: How does plastic end up in the ocean? • OW: How does plastic end up in the Arctic? 	<p>Formative; Can students identify what the differences are between reducing, reusing and recycling? Can they give examples of this?</p>

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		<p>[3] Differentiate between reducing, reusing and recycling litter.</p>	<p>earth move the water, nutrients and even animals all over the planet. This movement helps to maintain balance in the world, and keeps the planet healthy. In this lesson students will look at how the ocean moves from place to place and carries animals, plants and plastic with it. Students will consider how their own litter can end up in the ocean and take time to consider the three big R's.</p> <p>Task:</p> <ol style="list-style-type: none"> 1) Play the video How does plastic end up in the ocean? 2) Workbook Page __: Answer the questions based off the video (you may need to play it twice). Once complete, ask the students to get up and walk around the class and find plastic items – look in their lunches too. Discuss as a group; what did you see? Why was this made from plastic? Could it have been made from another type of material? The key point here is that plastic is EVERYWHERE! 3) Tell the students that they will be going outside to pick up plastic garbage. Ensure they understand what safe garbage is. Tell the students that everyone should try to find at least 2 pieces of plastic garbage if possible. 4) Workbook Page __: Have the students draw the items they found. Play the song Reduce, Reuse, Recycle. Discuss the differences between these. 5) Workbook Page __: Have the students complete the chart based on the plastic garbage they found. Ensure the students understand that there is always wiser choice to make when throwing away plastic litter. Go to Recycle BC (or the program in your province) to become familiar with what is and is not acceptable – students will need some guidance as to what is and is not recyclable. <p>Action: <i>My ocean promise is to pick up garbage when I go outside and play.</i></p>	<ul style="list-style-type: none"> • OW: A Year of Ocean Stories • Recycle BC 	

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3	<p>The ocean supports a great diversity of life and ecosystems. ~</p> <p><i>Plastic is changing the ecosystems of marine life.</i></p>	<p>Students will be able to:</p> <p>[1] Explain what an ecosystem and biodiversity are.</p> <p>[2] Students can understand the different types of living and non-living things in an ecosystem.</p> <p>[3] Understand how plastic impacts the ecosystem of marine life.</p>	<p>Critical Questions: How do plants and animals live in certain ecosystems? How does plastic change these ecosystems? Can the animals adapt?</p> <p>Background Information: The ocean has a lot of diversity in its plants and animals. These adaptations are based on the ecosystem in which they are living in. In this lesson students will learn about biodiversity and ecosystems. They will have a chance to place different marine plants and animals in an ecosystem and discuss why and how they can survive. Students will then place different pieces of garbage into that ecosystem and discuss where the plastic comes from, who it affects and what to do about it.</p> <p>Task:</p> <p>1) Before: Prepare a simple ocean background on your whiteboard/chalkboard. Cut out the pictures of ocean animals from the student workbook. Read over animal facts. Collect different single use plastics or print pictures of single use plastic items.</p> <p>2) During: Discuss the terms “Ecosystem” and “Biodiversity”.</p> <p>3) Worksheet Page ____: Have the students cut out the images and place the animals in their ecosystem (Do not have them glue it yet!). Come back as a class and ask the students – where did you put this animal? Why? <i>Note: It is more important that the students have a valid reason for putting the animal there than for them to be exactly right. Allow this to be an exploratory activity.</i></p> <p>3) Once students have created their ecosystem, introduce the plastic objects/pictures. Allow students to place them in the ecosystem. Ask the students; Do these belong in this ecosystem? How did they get there? Are they good for the animals? How will the animals react to them?</p> <p>4) Discuss the ocean promise; the importance of a shoreline clean-up and ways to either join one or lead one. Note: You don’t have to live by the shore to take part in this! More information here.</p>	<ul style="list-style-type: none"> • OW: Shoreline Clean-up • OW: Ocean Bridge Leaders • OW: Host a Clean-up • OW: Shoreline Lesson Guides • C3: Environmental DNA 	<p>Formative; can students explain what an ecosystem is? Can they give a good reason why an animal would be in an area of the ecosystem?</p>

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			<p>Action: <i>My ocean promise is to do a shoreline clean-up with my friends.</i></p>		
4	<p>The ocean made the earth habitable ~</p> <p><i>Marine life consumes plastic every day.</i></p>	<p>Students will be able to:</p> <p>[1] Explain what a food chain is and how food energy flows from one organism to another.</p> <p>[2] Place animals in the proper order in a food chain.</p> <p>[3] Understand how introducing plastic will negatively impact the food chain.</p>	<p>Critical Questions: <i>What is a food chain? How does it work? How does plastic impact the food chain? What happens when one animal is taken out of the food chain?</i></p> <p>Background Information: Scientists have theorized that life on Earth most likely originated in the sea. The ocean is not only where life is thought to originate but it has also generated much of the oxygen that is required by many of Earth’s organisms. Phytoplankton living in the ocean’s surface waters produce oxygen through photosynthesis. They are the base of the aquatic food chain as they are consumed by zoo plankton, which are consumed by fish larvae, consumed by small fish, consumed by other predators. This lesson will introduce the students to the food chain and will encourage discussion around the flow of energy from one organism to another. Students will also consider how plastic will impact this food chain – especially considering many animals will eat it, mistaking it for food.</p> <p>Task:</p> <p>1) Discuss food. Ask the students; what is your favourite food? What happens if you don’t eat your lunch? Explain how food gives us energy to live through the vitamins and nutrients in it. The same is true for marine life and the food they eat.</p> <p>2) Ask the students if they eat meat or fish. How did these animals get energy to live? What do they eat? Take some examples from the students and draw it on the board. Ex. Student → Hamburger (Cow) → Grass. Do several examples with the students until they understand this concept.</p> <p>3) Workbook Page __: Have the students draw arrows to what eats what in the Arctic ocean picture. Once they have tried this individually, go over it as a class.</p> <p>4) Workbook Page __: Have the students discuss in small groups. What happens when plastic is introduced? How will this impact the animals?</p>	<ul style="list-style-type: none"> • OW: Reusable Containers! • OW: Article: All About Lunches • The Majestic Plastic Bag • UN: Plastic Ocean 	<p>Formative; Can they understand how energy moves from organism to organism? Can they understand the proper order and why it takes place like this?</p>

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			<p>5) Discuss the ocean promise; I will reduce the plastic in my lunches. Play the video Reusable Containers! to encourage understanding.</p> <p>Action: <i>My ocean promise is to reduce the amount of plastic in my lunches.</i></p>		
5	<p>The ocean is a major influence on climate and weather ~</p> <p><i>Plastic in our ocean is impacting the climate and weather.</i></p>	<p>Students will be able to:</p> <p>[1] Explain the water cycle.</p> <p>[2] Understand how the ocean impacts the earth's climate and weather.</p> <p>[3] Describe how plastic in the ocean changes the earth's climate.</p>	<p>Critical Questions: What is the water cycle? How does the ocean influence the earth's climate? How does plastic impact this climate change?</p> <p>Background Information : The oceans are the prime regulators of climate, they absorb 90% of the planet's heat, 30% of the planet's carbon dioxide and give the planet 50% of the oxygen that we need. Ocean currents allow the ocean to absorb, store and transfer of heat. These abilities allow the ocean to have a major influence on climate. Most rain that falls on land originally evaporated from the ocean. As water evaporates from the ocean it transforms into water vapor that is incorporated into the atmosphere. Some of this water vapor rises and helps to form the clouds from which rain falls. In this lesson, students will learn about the water cycle and will consider the impact of plastic in the ocean on climate.</p> <p>Task:</p> <p>1) Discuss how the ocean is the prime regulator of the planet and how this is possible. To help with understanding, show the video Weather vs. Climate.</p> <p>2) Workbook Page ____: Have the students learn about the water cycle and complete the activity.</p> <p>3) Workbook Page ____: Do a science experiment; place two glass jars in the window. Fill both up with an equal amount of water. Place thermometers in both and place a thin piece of plastic (ideally recycled from a bag) over the top of one of the jars. Have the students measure the temperature of the water in both jars – they should be equal. Have the students respond to questions in their workbook. Then have them measure the temperature after two hours and again at the end of the day. Look back at the</p>	<ul style="list-style-type: none"> OW: How is Climate Change Affecting Arctic Communities? OW: What happens to your plastic bottle when you recycle it? 	<p>Formative (or summative if preferred); responses to worksheet on the water cycle.</p>

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			<p>temperature the next day – has it gone up in one of the glass jars? What does this mean? Make reference to the ocean garbage patch.</p> <p>4) Discuss the ocean promise; that water bottles should be reusable.</p> <p>Action: <i>My ocean promise is to use reusable water bottles at school and at home.</i></p>		
6	<p>The ocean is largely unexplored ~ <i>Microplastics are everywhere!</i></p>	<p>Students will be able to:</p> <p>[1] Differentiate between physical versus chemical ways of changing materials.</p> <p>[2] Understand the issue of microplastics in the ocean and how they get there.</p> <p>[3] Recognize the 12 most common pieces of plastic litter and what can be done with them.</p>	<p>Critical Questions: What aspects of the ocean have not been explored? Why? What are microplastics? How do they end up in the depths of the ocean?</p> <p>Background Information: Our lives are connected to the ocean depths. There are challenges and opportunities in this previously hidden realm, and yet, despite the size and importance of the ocean, less than 10% of it has been explored. The global map of the ocean floor is less detailed than maps of Mars, the Moon or Venus. Still, large organisms in the depth of the ocean are being found with plastics in their stomachs. These come from plastics breaking down, from microbeads in cleaners and microfibres from our clothes. In this lesson, students are going to look at physical and chemical ways of changing materials and how this relates to microplastics in the ocean.</p> <p>Task:</p> <ol style="list-style-type: none"> 1) Watch the video: Microplastics in the Ocean 2) Show the students each item (see left) or pictures of them. Ask them – how will this turn into a microplastic? Pass them around. Explain the differences between physical and chemical changes. 3) Workbook Page __: Have write a journal entry about their thoughts. 4) Workbook Page __: These are pictures of common items found on the beach. Have the students try to find the items listed. Ask them – How can we reduce these items? How could we reuse them? How can we recycle them? 	<ul style="list-style-type: none"> • OW: Microplastics • OW: Microplastics Explained • OW: The Plastic Invasion • C3: Microplastics • C3: Finding Plastic 	<p>Formative; can they they understand what microplastics are? Can they explain where these come from?</p>

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			<p>5) Discuss the ocean promise; to repurpose the plastics I was going to throw away. Ensure the student understand the word repurpose – and what this looks like. Here are some suggestions to share.</p> <p>Action: <i>My ocean promise is to repurpose a plastic I was going to throw away.</i></p>		
7	<p>The ocean and humans are interconnected</p> <p>~</p> <p><i>We can all become wiser with our plastic.</i></p>	<p>Students will be able to:</p> <p>[1] Relate the cultural importance of water in Indigenous communities to their own value of water.</p> <p>[2] Reflect on their learning on the importance of taking care of the oceans.</p> <p>[3] Demonstrate their learning through the creation of a poster on becoming plastic wise.</p>	<p>Critical Questions: Why does water have this cultural importance in indigenous communities? How does our learning help our community and the land? How can we respect our ocean? How can we help it?</p> <p>Background Information: Water is not just a resource – it also has a cultural importance to Indigenous communities in Canada. For Indigenous peoples, water is a living thing and a spiritual entity with “life-giving” forces. With this there are certain duties and responsibilities to ensure that it is respected, protected, and nurtured. For Indigenous peoples, water quantity and quality are not only ecological and health issues but also parts of a much broader holistic perspective which recognizes that all aspects of creation are interrelated. Water is not only for drinking but also has traditionally and continuously been used in ceremonies, to grow medicines, and for cleansing and purification. (Excerpt taken from The Solutions Journal: Found here). In this lesson, students will consider why water has a cultural significance in indigenous communities. They will relate these to two First People’s Principles of Learning and demonstrate their learning through poster to share with the class and school.</p> <p>Task:</p> <p>1) Bring the students into a circle. Discuss the idea that water has a cultural importance to Indigenous communities. Explain that water is used in their ceremonies and has “life-giving forces” They believe all aspects of creation interrelated with it. Tie in the First Peoples Principles of Learning; <i>Learning supports the well-being of the self, the family, the community, the land, the spirits and the ancestors and learning involves recognizing the consequences of one’s actions.</i></p> <p>2) Worksheet Pages ____: Students will brainstorm ideas for their poster based on their learning. It should contain 3 aspects;</p>	<ul style="list-style-type: none"> • OW: Reduce, Reuse, Recycle • CS: Take the Pledge • OW: Break-up with Plastic • OW: Vortex Art Exhibit 	<p>Summative; Poster on learning with 3 criteria.</p>

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			<p>a. One way plastic creates a problem in the ocean → <i>Ex. Sea turtles are mistaking plastic bags for food. This makes them sick.</i></p> <p>b. A focus on either reducing, reusing or recycling an item → <i>Ex. We should reduce the plastic bags we use.</i></p> <p>c. Call to action → <i>Ex. An ocean promise they discussed or a new one.</i></p> <p>3) Discuss the ocean promise; to spread their knowledge about using plastics wisely with others.</p> <p><i>Schedule a virtual meeting to see Douglas Coupland's Vortex. More info at onlinelearning@ocean.org.</i></p> <p>Action: <i>My ocean promise is to help spread my knowledge about using plastics with others.</i></p>		