



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada



Ocean
School

ocean wise.



Sea Smart

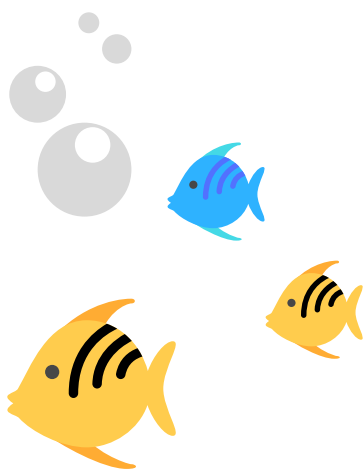


STUDENTS ON ICE

FOUNDATION • FONDATION



PLASTIC EDUCATION KIT



A RESOURCE GUIDE FOR

**TEACHERS LEADING
CHANGE**

GRADES 7-8

www.plasticsedkit.ocean.org

TABLE OF CONTENTS



1 **WHY IT MATTERS**

2 **DEAR TEACHERS**

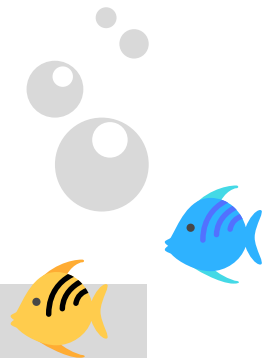
3-9 **7 LESSONS**

10 **CURRICULUM**

11 **OUR PARTNERS**

Help us inspire our youth to break the plastic pattern...

and protect our ocean.



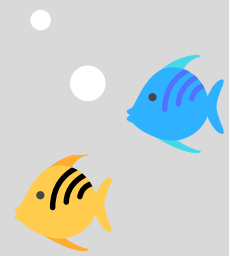
At least **8 million tonnes** of plastics leak into the ocean each year.



But why does the ocean matter?



- No oceans, no us!
- Life on Earth cannot exist without our oceans
- Our oceans produce over 50% of the oxygen we breathe
- Our oceans control weather and temperature
- 40% of carbon dioxide gets absorbed by our oceans
- 4.3 billion people rely on seafood for protein



Why is plastic pollution a problem?

- More than 500 billion kg of plastic is produced every year
- Forty percent of all plastic produced is designed for single use
- Plastic never disappears, instead it breaks up into smaller pieces, absorbing and releasing poisons along the way
- Over 90 % of marine birds have plastic pieces in their stomachs
- Plastic is killing more than 100,000 sea turtles, birds, whales, dolphins, and other animals each year from ingestion and entanglement.
- Plastic and other forms of pollution are ending up in our marine life, and it's making its way into our food chain. Fish eat plastic - we eat fish.
- Other toxins from plastic disposal are ending up in our bodies.
- Plastic is in our tap and bottled water, seafood and in the air we breathe



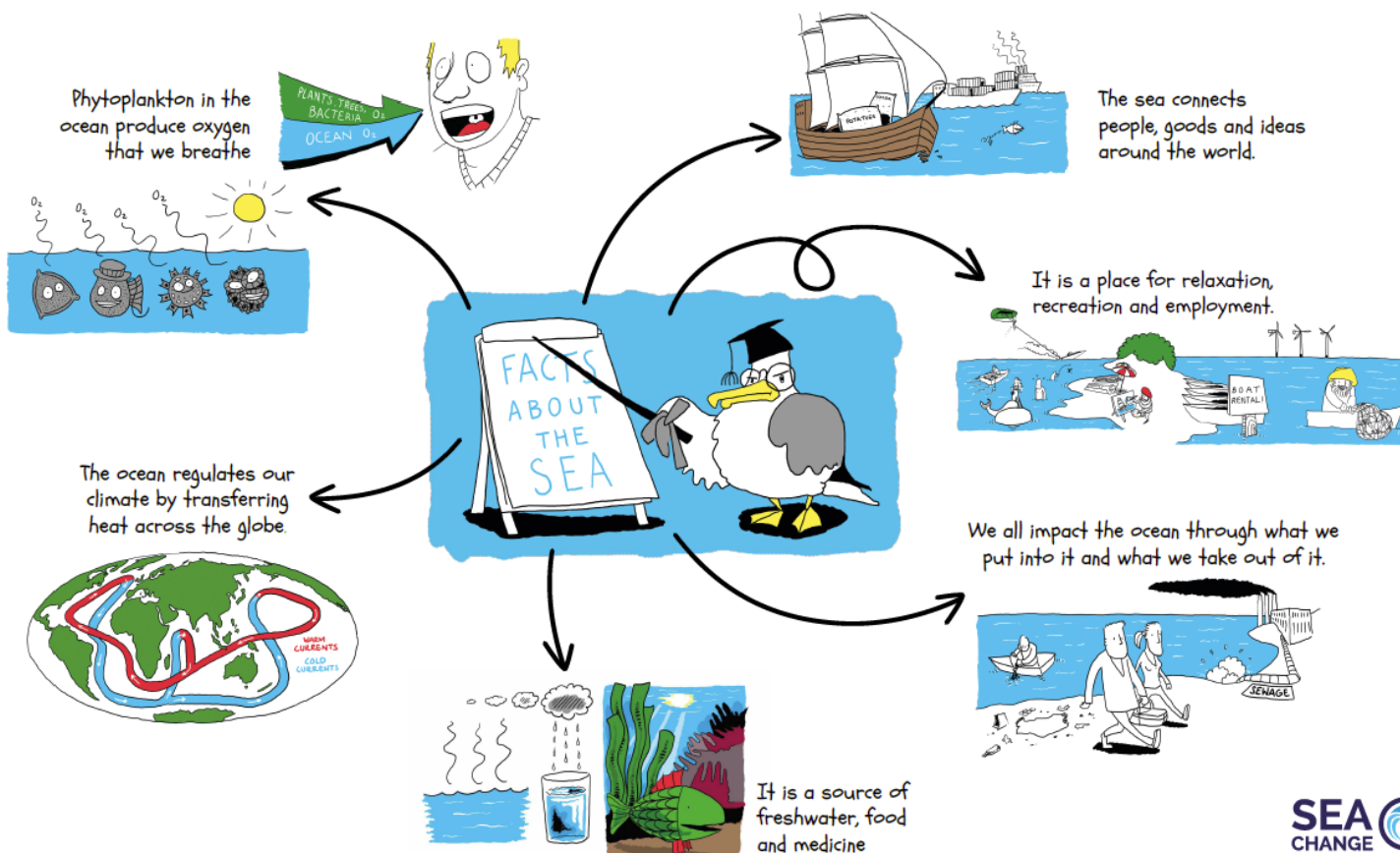
Dear Teachers...

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 your help.** Our youth need to be made 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 become leaders of change - and this all starts in your classroom. Thank you for caring and helping us break this pattern!

Why Canada?

- Canada has 243,000 km of coastline - the longest coastline in the WORLD!
- Of the five ocean basins, Canada's coast touches three of these; the Atlantic, Arctic and Pacific Oceans
- We also have more surface area covered by lakes than any other country in the world.
- Canada has North America's strongest current - located in the Discovery Passage in BC, with speeds up to 17km/hr.
- With millions of lakes, Canada has more lake area than any other in the world!

UNDERSTANDING OUR OCEAN



“I pledge to walk around my neighborhood and pick up garbage.”

LESSON
1
GRADES
7-8

Students will be able to:

- ✓ Describe the chemical composition of plastic.
- ✓ Describe, interpret and respond to an artist’s interpretation of the plastic in the oceans.

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 working 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 we can do to help it. Students will also consider an artist’s expression by using their critical thinking and observation skills.

The ocean and life in the ocean shapes the earth.



Plastic is changing the ocean environment.

Materials

- Student Workbook
- Pen/Pencil
- Audio/visual system

 **CRITICAL QUESTIONS**

What is Plastic? How does plastic impact the ocean? How has the ocean changed our environment? What happens when plastic is added to an environment?

 **LESSON GUIDE**

1. Watch Videos; **What is Plastic - Brain Waves Episode 1** and **The Majestic Plastic Bag**
2. **Workbook Page 1:** Give the students 5 minutes to brainstorm each bubble and then come back as a class and share their ideas. Check to ensure students understand what plastic is. They should also add the ideas of others to their own map. *Ex. Water is a unique resource as it gives us a variety of benefits; food, medicine, travel, climate, etc.*
3. Discuss in pairs or small groups what a mockumentary is and why the artist used this technique to present this information.
4. **Workbook page 2:** Have students complete questions on the videos.
5. Discuss the ocean pledge: *I will walk around my neighborhood picking up garbage and disposing of it correctly.*

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.

 **RESOURCES (Click on them!)**

- OW: *Take the Pledge*
- OW: *Virtual Meeting*
- OW: *What is Plastic*
- UNESCO: *Ocean Literacy For All*
- SC: *Understanding our Ocean*
- OW: *Ocean Literacy Course*
- *Heal The Bay: The majestic plastic bag*
- OW: *6 Countries*

“I pledge to modify any hazardous plastics in my recycling bin.”

LESSON
2
GRADES
7-8

Students will be able to:

- ✓ Describe ways the ocean influences their life and they influence the ocean.
- ✓ Investigate and describe how plastics impede an animal’s ability to meet basic survival needs.

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 encourages students to consider the impact plastics have on marine animals. Specifically, students will research marine animals known to be affected by plastics, and explore ways to help reduce the impacts plastics have on ocean life.

 **CRITICAL QUESTIONS**

How has the ocean made the earth habitable? How does plastic impact the ocean? How are animals impacted by plastic in the ocean?

The ocean made the earth habitable.

 **LESSON GUIDE**

Marine life consumes plastic every day.

- 1) Watch video; **Oceans are Life.**
- 2) **Workbook page 3:** Divide the class into four groups and have each group complete two questions. Use the Jigsaw strategy to have students share their responses.
- 3) Ask students what they think and know about plastics in the ocean and how they affect marine life. Responses can be shared as a large group.
- 4) Watch video; **People Free Sea Lion Entangled in Garbage**
- 5) **Workbook Page 4:** Have the students work on the Plastics and Marine Animals Investigation Worksheet. Assign or have students choose a marine animal they think is affected by marine plastic. *Examples of animals mistaking plastic for food are sea turtles and sea birds. Examples of animals entrapped or entangled by plastics are sea lions, seals, humpback whales.*
- 6) Discuss the ocean pledge; *I will go through my recycling bin at home, and identify the plastics that would be most harmful they found their way into the ocean. I will modify the plastic to be less hazardous, Ex. cut 6-pack rings, put lids on plastic bottles, etc.*

- Materials**
- Student Workbook
 - Pen/Pencil
 - Computers, iPads or Notebooks
 - Audio visual system
 - Computers

 **RESOURCES (Click on them!)**

- OW: [Reusable Containers!](#)
- OW: [Article: All About Lunches](#)
- WE: [Go Green Action Campaign](#)
- OW: [Our People](#)
- C3: [Oceans are Life](#)
- OW: [Dissection Worksheets](#)
- UN: [Plastic Ocean](#)
- FNEC: [Unit 8 Ocean Connections](#)
- [Mysteries of Ancient Clam Gardens](#)

“I pledge to take a reusable bag when I go shopping.”

LESSON
3
GRADES
7-8

Students will be able to:

- ✓ Explain how plastic gets to the ocean.
- ✓ Explain if plastic is biodegradable.

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 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. This lesson encourages students to consider the way plastics move about the earth. They will investigate the decomposition of plastics.

 **CRITICAL QUESTIONS**

How does plastic end up in the ocean? Is plastic biodegradable?

 **LESSON GUIDE**

- 1) Watch video; **How Does Plastic End Up in the Ocean**. In small groups have students describe the path of plastics to the ocean.
- 2) Show students the Marine Debris and Giant Pacific Garbage Patch posters and discuss briefly (linked in Materials Section).
- 3) **Workbook Page 5:** Take students outside and clean up garbage from the play area. Students create a comic strip for primary students that shows some plastic garbage and its travels from your schoolyard to the ocean. Encourage students to use in their comic an example of garbage that was found in the area.
- 4) Watch the Clean Seas (UN) video **Turn the Tide on Plastic** and take the **Clean Seas Pledge**. If students are not comfortable with pledging at this time, they could revisit the site at a later date.
- 5) Discuss the ocean pledge; *I will take a reusable bag with me when I go shopping.*
- 6) **Workbook Page 6:** Exit slip: 3-2-1 students write the following on a piece of paper or share verbally with a partner; 3 Facts I learned today, 2 Ways plastics negatively impact the ocean and 1 further question I now have about plastic and the ocean

 **RESOURCES (Click on them!)**

- OW: *How does plastic end up in the ocean?*
- OW: *How does plastic end up in the Arctic?*
- OW: *A Year of Ocean Stories*
- UN Clean Seas: *Turn the Tide on Plastic*
- OW: *Here's How Videos*
- OW: *Vortex*
- OW: *Vortex Virtual AquaClass*
- CS: *Taking the Pledge*

The earth has one big ocean with many features.



Plastic litter knows no borders.

Materials

- Student Workbook
- Pen/Pencil
- Audio visual system
- Posters – [Marine Debris](#) and
- [Giant Pacific Garbage Patch](#)

“I pledge to do a shoreline clean-up.”

LESSON
4
GRADES
7-8

Ocean ecosystems are numerous and diverse. They are defined by environmental factors and by the community of organisms living there. These factors include available oxygen and nutrients, salinity, temperature, pH, light, pressure, substrate and circulation. These include microbes, invertebrates, fishes, marine mammals, plants and birds. These are all interconnected with the environmental conditions in which they occur in their ecosystems. Plastics in the ocean affect marine animals in a variety of ways. By removing plastics and other litter from around and in waterways we can reduce this harm. In this lesson students will participate in a litter cleanup. Any area can be used for the cleanup. The shoreline can be a local stream, creek, river, ocean or even local streets. Storm drains ultimately all lead to the ocean!

Students will be able to:

- ✓ Participate in a local activity to clean up litter.
- ✓ Understand ways that plastic litter impacts an ecosystem and the animals within it.

The ocean supports a great diversity of life and ecosystems.



Plastic is changing the ecosystems of marine life.

Materials

- Student Workbook
- Pen/Pencil
- Audio visual system
- Computers to plan shoreline clean-up

 **CRITICAL QUESTIONS**

How does plastic impact living things in the ocean? What can we do to help the oceans and these animals?

 **LESSON GUIDE**

- 1) Watch video; [Saving Sea Lions: Why Marine Plastic Matters](#).
- 2) **Workbook Page 7:** In small groups have students answer the questions and discuss the methods used to assist the sea lions.
- 3) Watch video; [How to Host a Shoreline Cleanup](#).
- 4) Have the students predict 5 items of garbage they expect to find and which item they think will be found most frequently. Have the students research the answers to these questions.
- 5) Have the students organize a Great Canadian Shoreline Cleanup of their own (links and lesson plans below). Have them record the types of litter collected and consolidate the data.
- 6) **Workbook Page 8:** Exit slip 3-2-1; students write the following on a piece of paper or share verbally with a partner; 3 facts I learned today, 2 ways I can reduce how plastics negatively impact marine animals, 1 question I now have about plastic and the ocean (from Sea Smart)
- 7) Discuss the ocean pledge; *I will participate in a local shore-line cleanup.*

 **RESOURCES (Click on them!)**

- OW: [Shoreline Lesson Guides](#)
- OW: [Shoreline Clean-up](#)
- OW: [Host a Clean-up](#)
- OW: [Killer Whales](#)
- OW: [Ocean Bridge Leaders](#)
- OW: [Saving Sea Lions](#)
- SA: [Plastic Pollution May Change Cattle DNA](#)
- C3: [Oceans are Life](#)

“I pledge to reduce the plastic litter in my lunches.”

LESSON 5 GRADES 7-8

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. This lesson helps students to understand the path of litter from land to the Arctic ocean. Students will also conduct a short experiment on the effect of plastic on water temperature.

Students will be able to:

- ✓ Explain how plastic travels to the arctic ocean.
- ✓ Illustrate how plastic can increase the temperature in water.

The ocean is a major influence on climate and weather.



Plastic in our ocean is impacting the climate and weather.

Materials

- Student Workbook
- Pen/Pencil
- Audio visual system
- Atlases or maps of Canada with waterways labelled
- 3 glasses, 3 thermometers, plastic wrap, tape (per group)
- Dark Construction paper

? CRITICAL QUESTIONS

How does the ocean influence the earth’s climate? How would plastic in the ocean change the climate and weather? How does this impact us?

▷ LESSON GUIDE

- 1) Watch video; **The Ocean – A Driving Force for Weather and Climate**
- 2) **Workbook page 9:** Show students the Thermocline Circulation map. Answer and discuss questions about the video.
- 3) Watch videos; **It’s not me, It’s you** and **How does your Plastic end up in the Arctic**
- 4) Have students work in pairs to trace the potential path of plastic litter from their schoolyard to the Arctic ocean on a map. You may need several maps to show local, regional, provincial/territorial and national waterways.
- 5) **Workbook page 10:** Do the following science experiment: Fill 3 glass jars with an equal amount of water and place a thermometer in each. Place a thin piece of (recycled) plastic over one of the jars and dark construction paper over the other. Have the students measure the temperature of each jar. They should be equal. Record the temperatures again after 2 hours and then at the end of the day. Draw similarities to the coloured plastic in the ocean in the giant pacific garbage patch.
- 6) Discuss the ocean pledge; *I will reduce the amount of plastic litter in my lunches.*

💡 RESOURCES (Click on them!)

- OW: *How is Climate Change Affecting Arctic Communities?*
- OW: *What happens to your plastic bottle when you recycle it?*
- UNESCO: *How does ocean acidification occur?*
- CS: *Humans are turning the world into Plastic*

“I pledge to reduce my use of products with microbeads.”

LESSON
6
GRADES
7-8

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 microfibrils from our clothes. In this lesson students will learn how plastics change over time in the ocean. They will define microplastics and identify the sources of microplastics in the environment. Students will also examine possible alternatives to the use of microplastics.

Students will be able to:

- ✓ Recognize that plastic impedes an animal's ability to meet basic survival needs.
- ✓ Understand the physical and chemical ways plastic changes over time.
- ✓ Identify sources of microplastics and potential alternatives to their use.

The ocean is largely unexplored.

 **CRITICAL QUESTIONS**

What are microplastics? What aspects of the ocean have not been explored? Can plastic travel to these places? How? What can we do to help the oceans?

 **LESSON GUIDE**

- 1) Watch video; **What are Microplastics - 60 Seconds**
- 2) **Workbook page 11:** Have students write a description of microplastics.
- 3) **Workbook page 11:** Watch video; **C3 Microplastics** and respond to questions.
- 4) Divide the students into three groups. Give each group sufficient copies of one of the articles (linked under Materials) for each student to read and take notes. Have each group of students read and summarize one article on microplastics in personal hygiene products.
- 5) Have students share the information they learned using the jigsaw strategy, then discuss and summarize the information as a class. Explain that they can make natural body scrubs at home.
- 6) Discuss the ocean pledge; *I pledge to reduce my use of products with microbeads.*
- 7) **Workbook Page 12:** Exit Slip 3-2-1 students write the following on a piece of paper or share verbally with a partner: 3 facts I learned today, 2 ways I can reduce microplastics in the environment and 1 further question I now have about plastics and the ocean. (Sea Smart)

 **RESOURCES (Click on them!)**

- OW: [Microplastics](#)
- OW: [Microplastics Explained](#)
- OW: [The Plastic Invasion](#)
- C3: [Microplastics](#)
- C3: [Finding Plastic](#)
- ON: [Endeavour Hydrothermal Vents](#)



Microplastics are everywhere!

Materials

- Student Workbook
- Pen/Pencil
- Audio visual system
- Computers, iPads or Notebooks
- Printed articles;
 1. [Plastic Ingredients in Cosmetics](#)
 2. [Impacts of Microbeads](#)
 3. [How to: Plastic Free Hygiene](#)

“I pledge to spread my knowledge about using plastics with others.”

LESSON
7
GRADES
7-8

Students will be able to:

- ✓ Recognize the interconnection of oceans to other systems.
- ✓ Know cultural significance of water in a local environment.
- ✓ Understand the impact of plastics and the need to care for our oceans.

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](#)). This lesson encourages students to consider the impact plastics have on marine life and to recognize actions are being taken to reduce that impact. There are positive actions being taken around the world to change the tide of plastics in the ocean. Students will learn about some of the innovators who have taken on the challenge of reducing plastics in the ocean.

CRITICAL QUESTIONS

Why should, and how can, we reduce the need for single use plastics? What can we do to keep plastics out of the ocean?

The ocean and humans are connected.



We can all become wiser with our use of plastic.

Materials

- Student Workbook
- Pen/Pencil
- Audio visual system
- Computer, iPads or Notebooks
- [Teacher Debate Guide](#)
- [Rubric for Debate presentation](#)

LESSON GUIDE

- 1) Watch videos; [Modern Science](#), [Native Knowledge](#) and [UN Plastic Ocean](#).
- 2) **Workbook Page 13:** Ask students to complete a Think-Know-Wonder chart of ways people are working to reduce the impact of plastics in the ocean.
- 3) Debrief the students on all they have learned in the previous six lessons about alternatives to plastics and the positive changes they can make moving forward.
- 4) **Workbook Page 14:** Organize a debate on plastic use. Example topics include the argument for banning plastic shopping bags or single use water bottles. Use the Middle School Debate Format example and Middle School Public Debate Program (linked in Materials) to help plan the debate.
- 5) Additional suggestion; organize a Plastic Aware Fair for the school community. Students can make body scrubs, t-shirt shopping bags, homemade cleaning products and other “earth-friendly” items for show or sale. Invite a representative from a local store that has banned plastic bags or plastic straws or that is zero waste to present.
- 6) Discuss the ocean pledge; *I will spread my knowledge about how we can improve our oceans.*

Schedule a virtual meeting to see Douglas Coupland’s [Vortex](#) on Marine Plastic. More info at onlinelearning@ocean.org.

RESOURCES (Click on them!)

- OW: [Reduce, Reuse, Recycle](#)
- OW: [Our Ocean Needs You](#)
- OW: [Virtual Trip to the Vortex](#)
- C3: [Expedition Videos](#)
- CS: [Clean Seas Education Pack](#)

Rubric for Teachers: Unit Evaluation

This rubric can be used as an evaluation of the student's performance throughout this unit. You will find the same rubric in the student workbook to help them understand how they may be evaluated.

Engagement in Activities - /20			
Standard of Excellence 17-20	Proficient 13-16	Acceptable 10-12	Not Acceptable 0-9
Students readily engaged in activities and consistently showed leadership in each of the assigned activities.	Students willingly engaged in activities and frequently showed leadership in each of the assigned activities.	Students engaged in activities and occasionally showed leadership in each of the activities.	Students reluctantly engaged in activities and rarely showed leadership in the activities.

Responses / Reflections - /10			
Standard of Excellence 9-10	Proficient 7-8	Acceptable 5-6	Not Acceptable 0-4
Responses demonstrate a thorough understanding of the complexity of the issues. Students develop a sound judgment based on solid evidence.	Responses demonstrate an understanding of the complexity of the issues and the ability to support their opinion.	Responses demonstrate an ability to summarize and restate the key issues.	Responses indicate a lack of conceptual understanding. Issues are dealt with at a superficial level and/or in isolation.

Presentation - /10			
Standard of Excellence 9-10	Proficient 7-8	Acceptable 5-6	Not Acceptable 0-4
Contribution demonstrates a thorough understanding of topic. Effective and competent communication of key concepts.	Contribution demonstrates an understanding of topic. Effective communication of key concepts.	Contribution demonstrates a general understanding of topic. Communication of key concepts is evident.	Contribution indicates a lack of conceptual understanding. Issues are dealt with at a superficial level and/or in isolation.

Thanks to our Partners!



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