



**ADAPTED AND MODIFIED FOR  
oceanchampions.ca TO FOCUS ON  
PLASTIC MARINE DEBRIS**

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## INTRODUCTION

We depend on our ocean for the food we eat, the water we drink and the air we breathe. But beyond these vital resources, there exists a multitude of other reasons why we love the water, from the creatures who call it home to the shores we visit and explore.

Marine debris is one of the greatest threats our ocean faces, but luckily it is an issue with which we can all play a part in the solution. Talking Trash & Taking Action is a marine debris education partnership between Ocean Conservancy and the NOAA Marine Debris Program. It was developed as a means to educate the next generation about ocean trash and, most importantly, how we all can prevent it.

This instructor's guide was designed in a flexible manner to fit your needs. Whether you have one hour, one day or one week, the information and activities in this guide will allow you to develop a personalized marine debris education program. The guide is designed to be a resource for activities and information that can fit into existing lesson plans or can be followed verbatim as its own set of lesson plans.

This guide can be used as a supplement to *Ocean Champions – A Journey into Seas of Plastic*, to engage students in classroom activities and to add to their knowledge of plastic (and other) debris in our oceans.

Some of the information in this guide is a review of what was covered in Ocean Champions and some is in addition to what students read about.

## OBJECTIVES:

### 1. To Define Plastic Marine Debris

- Where does it come from?
- Most common items found?

### 2. To Explore the Inland to Ocean Concept

- Debris travels
- Ocean Currents and Gyres

### 3. To Understand the Impacts of Plastic Debris

- On Ecosystems
- On Me and My Community

# The story of plastic is the story of all of us.

Plastic touches all of our lives, from the food packaging we buy to the computers we work with and the cars we drive. But many of the plastics you touch in your daily life are used only once and thrown away – these add up to more than half of the plastic in the world.

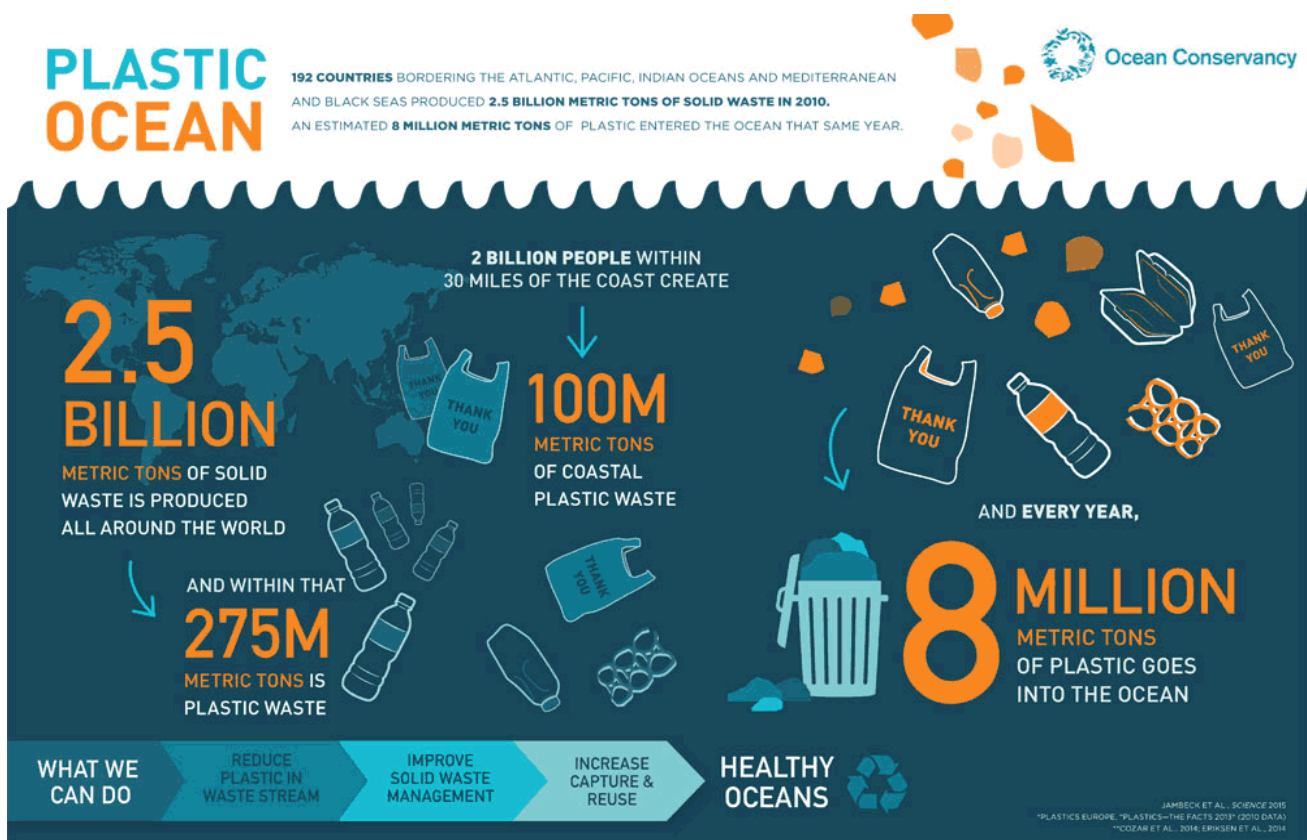
So much of this plastic is ending up in the ocean that it is predicted, unless we do something about the plastic entering the ocean, by 2050, there could be more plastic in the oceans than fish. The future of plastics in our ocean will be determined by the way we handle plastics on land. And you can be a champion in the story of plastics and the oceans.

## The Problem with Plastics

From the tiniest plankton to the largest whales, plastics impact nearly 700 species in our ocean.

Plastic has been found in more than 90% of all seabirds and in 100% of sea turtles species, that mistake plastic for food. And when animals ingest plastic, it can cause life-threatening problems, including reduced fitness, nutrient uptake and feeding efficiency—all vital for survival.

Every year, 8 million metric tons of plastics enter our ocean on top of the estimated 150 million metric tons that currently circulate our marine environments. Whether by errant plastic bags or plastic straws winding their way into gutters or large amounts of mismanaged plastic waste streaming from rapidly growing economies, that's like dumping one large garbage truck full of plastic into the ocean every minute of every day, which has a huge impact on ocean ecosystems.

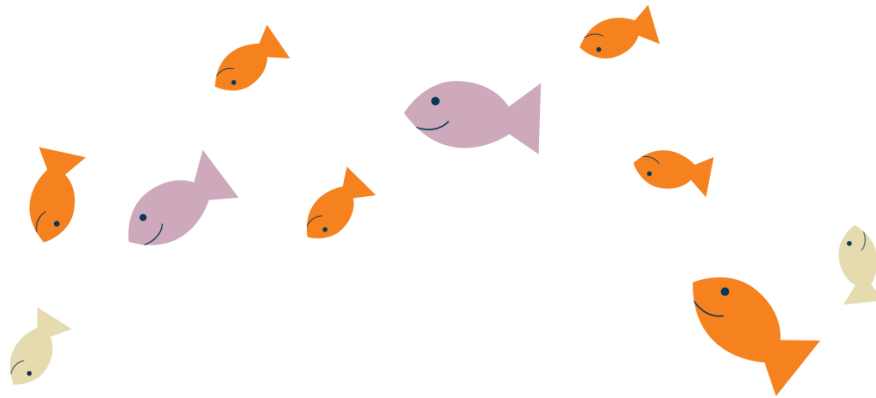


Plastic production and consumption are predicted to double over the next 10 years. That means that if we don't do something now, we could be facing 250 million metric tons in the ocean in less than 10 years. We can't stand by and watch the impacts of this tidal wave of plastic heading our way—neither failure nor inaction is an option. With plastic production increasing around the world, it's clear that the ultimate solution to make sure the accompanying wave of plastic waste never reaches our ocean.

"The clock is ticking; we must confront this challenge before plastics overwhelm the ocean."

**George Leonard**

Source: Ocean Conservancy @ <https://oceanconservancy.org/trash-free-seas/plastics-in-the-ocean/>



## INTRODUCTION

### QUESTIONNAIRE/PRE-SURVEY

The following survey can be done before doing any or all of the lessons/activities in this guide or, even before *Ocean Champions – A Journey into Seas of Plastic* is read, and then repeated at the end of the lessons/activities to gauge how much students have learned. OR, it can be skipped here and only done at the end, if more appropriate. The answer key is on page 29.

#### INSTRUCTIONS:

1. The survey can be conducted individually or as a group.
2. Explain that this survey is not being graded. If conducting individually: ask participants to fill out the survey and hand it back to you. It can be completed anonymously so participants do not think they are getting graded on the activity.
4. If completing as a group: ask participants to put their heads down or cover their eyes. They should raise their hand when they think they hear the correct answer. Write down the number of responses for each answer to compare to the results of the Post-Survey.
5. Tell participants that at the end of the program, everyone will take the survey again to see how much the group as a whole learned!

# SURVEY QUESTIONNAIRE

## 1. Which of these activities can lead to trash in the ocean?

- A. Throwing a gum wrapper out of a car window
- B. Accidentally leaving sand toys on the beach
- C. Wind blowing trash out of a full trash bin
- D. All of the above

## 2. Who is in charge of keeping trash out of the ocean?

- A. The leader of your country
- B. Beach visitors
- C. Trash collectors
- D. Everyone

## 3. True or False?

The foam cups used to keep hot drinks hot and cold drinks cold are made out of plastic.

## 4. Plastic and other marine debris is...

- A. An animal that lives in the deepest part of the ocean
- B. Any kind of trash that ends up in the ocean
- C. A small plant that floats on the surface of the ocean
- D. The seaweed that washes onto the beach

## 5. What is the main cause of plastic and other marine debris in the ocean?

- A. Land-based waste such as littering
- B. Ships dumping trash into the ocean
- C. Plants and animals in the ocean
- D. Tsunamis, hurricanes and tornados (storms) blowing debris into the ocean

## 6. True or False?

The ocean is always downstream.

## 7. Litter from which of the following can end up in the ocean?

- A. A street
- B. A beach
- C. A schoolground
- D. All of these places

## 8. Which of these is NOT a result of marine debris?

- A. A harmful bloom of algae (red tide)
- B. A seagull getting tangled in fishing line
- C. A person stepping on broken glass on the beach
- D. A turtle eating a plastic bag

## 9. The "Great Pacific Garbage Patch" is most like...

- A. A floating island of trash you can see from space
- B. A plastic soup
- C. A place for ships to take their trash
- D. All of the above

## 10. True or False?

Marine debris is too small to damage boats.

## ACTIVITY: INTRODUCTION TO PLASTIC DEBRIS

**OBJECTIVE:** The purpose of this activity is to provide a fun and entertaining introduction to plastic debris—what it is and where it comes from.

Plastic debris is any type of plastic that is directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment.

### INSTRUCTIONS:

1. This can be completed as a group or in pairs. If working in pairs, have the participants split up the word blanks.
2. Have participants provide words to fill in the blanks of the story and then read the group's story aloud or have paired participants read their story to another pair.

### PLASTIC GARBAGE TALE

It was a hot summer day. The park was crowded with children, parents and [ pet (plural) ]. Anna couldn't wait for her favorite afternoon treat. She perked up as the jingling sound of [ song title ] reached her ears. She ran up to the familiar colorful truck and ordered her favorite, a(n) [ food item ] with chocolate and sprinkles. It tasted [ adjective ], just as she expected! Then, she saw the other kids playing [ sport ] and she wanted to join. She saw an overflowing trash can nearby and quickly tossed her plastic wrapper on top and ran off to play.

That night, it was so windy and rained cats and [ animal (plural) ]. The plastic wrapper flew from his perch on top of the trash can and was swept away. He traveled down a shallow [ color ] river until he was suddenly sucked down a narrow hole. SWOOSH!! "[ exclamation ]!" he said, "It's so dark down here. I can't see a thing. And it smells [ adjective ]!". After many [ length of time ], the plastic wrapper reached the end of the tunnel and tumbled down into a river. He floated on top of the water and meandered his way past [ plant (plural) ] and [ animal (plural) ]. Suddenly the water become cold and salty, and the wrapper realized he had reached the ocean!

The sun was hot like [ something hot ]. The plastic wrapper sank beneath the surface and came face to face with a giant [ marine animal ]! "[ exclamation ]!" He floated with the ocean current, minding his own business, when suddenly he felt a tickle! A(n) [ marine animal ] was trying to eat him! It must think he is a(n) [ different marine animal ]! The little wrapper tried to [ action verb ] away but with no luck. Everything went dark.

Oh, if only Anna had taken the little wrapper home. The little plastic wrapper could have been warm and [ adjective ] back on land. He could have been re-used and made into a(n) [ item made of plastic ]. Don't let your trash get eaten. Always [ good thing for the environment ] or [ another good thing for the environment ]!

# OBJECTIVE 1: Defining Plastic Marine Debris, Sources, and Types

## PLASTIC DEBRIS

Plastics are different from the other materials that make up marine debris. Plastics do not biodegrade the way other materials do. Instead, they photodegrade. Explain that this means that instead of being broken down naturally by other organisms, plastics are broken down into smaller and smaller pieces by the sun, wind and waves, but they never completely go away and it is still plastic somewhere in the environment.



## ACTIVITY: PLASTIC BREAKDOWN

**OBJECTIVE:** Participants will understand the difference between the breakdown of plastics and the decomposition of other materials and will see firsthand how photodegradation works.

### MATERIALS:

- One piece of paper for each participant. It does not have to be particularly big. The size of your hand will do.

### INSTRUCTIONS:

1. Instruct participants to take their pieces of paper and see how many times they can break or rip that piece of paper into smaller and smaller pieces.
2. By the end, participants will likely have a pile of very small pieces that they can no longer rip.

### DISCUSSION:

- Explain that this activity mimics how plastics break down in the ocean. They are still there (as your piece of paper is), but they have simply been broken into many smaller pieces.
- Explain that these tiny pieces of plastic are called microplastics. Tiny plastic pieces are especially harmful as they are easily ingested by animals and are very difficult to remove from the marine environment.



# WHERE DOES PLASTIC DEBRIS COME FROM?

## 1. LAND-BASED SOURCES:

- Litter: Any trash that is not properly disposed of can end up in waterways and eventually in the ocean.
- Trash cans or recycling containers may not be readily available, which can lead to inappropriate disposal. Some people do not put trash where it belongs. Examples of littering include: leaving food wrappers at the park, leaving fishing line or pieces of fishing line on the beach, or releasing balloons into the sky.
- Littering can also be accidental. Examples include: a plastic grocery bag flying out of a car window or losing a ball at the beach.
- Dumping: Disposal facilities for large or hazardous items may be difficult to find, or they may charge fees. Rather than pay these fees, people may dump large materials such as construction materials, appliances, furniture, mattresses and hazardous waste near creeks or rivers.
- Storm Water Discharges: Storm drains carry litter and runoff to waterways that lead to the ocean. Any trash left along the street can easily wash into storm drains and eventually make it to the ocean.
- Poor Waste Infrastructure: In some parts of the world, there are no landfills or recycling centers for peoples' trash. In fact, in many places, trash cans do not exist and trash is simply piled on the street or in dry riverbeds. Without a confined place for trash, it is very easy for waste to end up in the ocean.
- Natural Disasters: Events such as tornados, hurricanes, floods and tsunamis can scatter debris into the marine environment.

## 2. OCEAN-BASED SOURCES:

- Fishing Vessels: Fishing gear such as fishing lines and traps can be lost from fishing boats (referred to as derelict fishing gear).
- Recreational Boaters: Trash and fishing gear can fall overboard if not stored properly.
- Stationary Platforms (Oil and gas drilling platforms): Hard hats, gloves, pipe protectors and other items can be lost from platforms.
- Cargo and Other Vessels: Ships caught in rough seas can lose a variety of items that are being transported, including entire shipping containers. Shipping containers carry many products long distances from where they were made to where they will be sold. Products from sneakers to bath toys have been lost from cargo ships.



## **ACTIVITY:** WHAT DOESN'T BELONG?

**OBJECTIVE:** Participants will learn what marine debris is and see how it doesn't belong in the natural marine environment.

**MATERIALS:** What Doesn't Belong? graphic

**INSTRUCTIONS:** Using the provided graphic, have participants find what doesn't belong in the picture.



## ACTIVITY: TRACING THE PATH OF PLASTIC DEBRIS

Bring in a laminated map of the area where you live and have volunteer(s) come up to the map and, using an erase marker, have the participant(s) imagine that an item or piece of plastic was dropped on the map and then have them trace the path that the plastic debris could take to end up in the ocean. End with a brief discussion about how easy it is for inland plastic to wind up in the ocean, even if that is not where it was intended to go.

**ASK:** How do you think plastic (and other) debris travels to the ocean?

- Debris is carried from its original resting spot via wind or rain to storm drains, which can carry garbage directly to the oceans or to streams or rivers, which can transport it debris to the ocean.

## THE MOST COMMON TYPES OF PLASTIC DEBRIS

**OBJECTIVE:** Participants will discover which plastic items are the most common plastic debris as compiled by the Ocean Conservancy from their shoreline cleanup programs.

### MATERIALS:

- Top Plastic Debris Items List (included at the end of this activity). Choose to look at your own country or the Earth. Canada and the United States are included here. For reports on other countries go to <http://www.coastalcleanupdata.org/reports>. (Of interest: note the differences between each list.)
- Print and cut out squares of top Plastic Debris items found at the end of this guide and choose the top 16 that correspond to the Top Plastic Debris list you are working with, or bring in the 16 items, cleaned.

### INSTRUCTIONS:

1. **SAY:** Now that we understand what plastic debris is, let's determine some of the types of plastic debris.
  2. Give one plastic debris item card (or the actual item, cleaned) to each of 16 volunteers if you have, or form more than one group if your class has more than 16 students who want to volunteer. If less than 16 students, give out only that many number of cards.
  3. Instruct participants to work together to determine what they think the most common collected plastic debris items are. Instruct them to line up in order, from the most common item to the 11<sup>th</sup> most common item or, if working in a group or groups, make sure participants place items or cards so that the entire group can see them.
  4. Have each participant in line state his or her item and, if time allows, why he or she is in that spot (i.e., "I have plastic grocery bags and we think this is the number one item because we use them every day and see a lot of them littered."). Start at what they believe the most collected item is and proceed down the line. Or, if working in group(s) have different students in the group explain why.
  5. Using the Top Items list, arrange the participants in the actual order of the top marine debris to see how close their guesses were.
- \* This activity can be done without cigarette butts. Follow the same instructions, but exclude the "cigarette butt" card/actual item. If you excluded cigarettes butts, reveal to the group that, in fact, cigarette butts/cigarettes are one of the most often found types of plastic debris.

## TOP 16 PLASTIC DEBRIS ITEMS FOUND ON SHORELINE CLEANUPS IN CANADA

RANK	PLASTIC DEBRIS ITEM	TOTAL COLLECTED	ADDITIONAL INFORMATION
1	Plastic Pieces (including Styrofoam)	370,412	167,743 Styrofoam pieces and 202,669 other plastic pieces
2	Cigarette Butts	308,993	
3	Food Wrappers (candy, chips, etc.)	63,643	Most food wrappers, including chip bags and candy wrappers are plastic.
4	Bottle Caps	41,762	
5	Plastic Bags (including Grocery/ Carryout)	33,272	19,123 grocery bags and 23,718 other plastic bags
6	Plastic Beverage Bottles	32,973	
7	Other Plastic/Styrofoam Packaging	30,438	Includes tarps, crates, fishing bait boxes, and Styrofoam packaging that surrounds items like appliances and electronics.
8	Straws and Stirrers	22,267	In the United States alone, 500 million straws are used and thrown away every single day. ( <a href="http://www.ecocycle.org/bestrawfree">www.ecocycle.org/bestrawfree</a> )
9	Take Out Containers (Styrofoam and other Plastic)	15,516	10,786 Styrofoam and 4,730 other plastic containers
10	Rope, Fishing Line (1 meter = 1 piece)	12,380	Ropes & fishing line are made from plastic/ synthetic materials. 9,621 rope and 2,759 fishing line. Often from fishermen.
11	Plastic Cups and Plates	10,467	
12	Plastic Lids	8,515	Includes lids for to-go drinks such as soda and coffee.
13	Forks, Knives, Spoons	8,438	This is listed as general cutler, but assume that most would be plastic.
14	Other Plastic Bottles (shampoo, oil, bleach, etc.)	5,225	
15	Balloons	3,761	Yes, balloons are made of plastic
16	Plastic Packing Straps	3,563	

Source: <http://www.coastalcleanupdata.org/reports> as of January 2017

Items collected: On land – 1,112,637; Underwater – 316; by watercraft – 1,258; Total – 1,114,211

170 animals, dead from entanglement, were also found during these cleanups. For details, go to

<http://oceanhampions.ca/wp-content/uploads/2018/01/EntangledAnimals-Canada.xlsx>

## TOP 16 PLASTIC DEBRIS ITEMS FOUND ON SHORELINE CLEANUPS IN THE U.S.

RANK	PLASTIC DEBRIS ITEM	TOTAL COLLECTED	ADDITIONAL INFORMATION
1	Plastic Pieces (including Styrofoam)	3,303,251	1,786,400 Styrofoam pieces and 1,516,851 other plastic pieces
2	Cigarette Butts	1,986,514	
3	Food Wrappers (candy, chips, etc.)	691,383	Most food wrappers, including chip bags and candy wrappers are plastic.
4	Bottle Caps	614,740	
5	Plastic Beverage Bottles	464,074	
6	Rope, Fishing Line (1 yard = 1 piece)	390,810	Ropes & fishing line are made from plastic/synthetic materials. 196,281 rope and 194,529 fishing line. Often from fishermen.
7	Plastic Bags (including Grocery/ Carryout)	343,343	188,869 grocery bags and 154,474 other plastic bags
9	Straws and Stirrers	273,482	In the United States alone, 500 million straws are used and thrown away every single day. ( <a href="http://www.ecocycle.org/bestrawfree">www.ecocycle.org/bestrawfree</a> )
9	Take Out Containers (Styrofoam and Plastic)	215,383	94,491 Styrofoam and 120,892 other plastic containers
10	Plastic Cups and Plates	207,352	93,709 Styrofoam and 113,643 other plastic
11	Other Plastic/Styrofoam Packaging	170,716	Includes tarps, crates, fishing bait boxes, and Styrofoam packaging that surrounds items like appliances and electronics.
12	Plastic Lids	160,686	Includes lids for to-go drinks such as soda and coffee.
13	Forks, Knives, Spoons	100,195	This is listed as general cutler, but assume that most would be plastic.
14	Cigar Tips	84,820	
15	Tobacco Packaging/Wrap	61,832	
16	Other Plastic Bottles (shampoo, oil, bleach, etc.)	47,349	

Source: <http://www.coastalcleanupdata.org/reports> as of January 2017

Items collected: On land – 10,398,654; Underwater – 12,238; by watercraft – 154,869; Total – 10,565,761

Many animals, dead from entanglement were also found during these cleanups. For details, go to

<http://oceanchampions.ca/wp-content/uploads/2018/01/EntangledAnimals-UnitedStates.xlsx>

## TOP 16 PLASTIC DEBRIS ITEMS FOUND ON SHORELINE CLEANUPS IN MEXICO

RANK	PLASTIC DEBRIS ITEM	TOTAL COLLECTED	ADDITIONAL INFORMATION
1	Plastic Beverage Bottles	566,157	
2	Plastic Pieces (including Styrofoam)	150,510	49,494 Styrofoam pieces and 101,016 other plastic pieces
3	Cigarette Butts	140,620	
4	Bottle Caps	63,288	
5	Plastic Bags (including Grocery/ Carryout)	45,518	24,198 grocery bags and 21,320 other plastic bags
6	Plastic Lids	35,743	Includes lids for to-go drinks such as soda and coffee.
7	Plastic Cups and Plates	34,475	14,767 Styrofoam and 19,708 other plastic
8	Food Wrappers (candy, chips, etc.)	30,233	Most food wrappers, including chip bags and candy wrappers are plastic.
9	Take Out Containers (Styrofoam and Plastic)	21,829	10,575 Styrofoam and 11,254 other plastic containers
10	Other Plastic/Styrofoam Packaging	22,511	Includes tarps, crates, fishing bait boxes, and Styrofoam packaging that surrounds items like appliances and electronics.
11	Forks, Knives, Spoons	22,365	This is listed as general cutler, but assume that most would be plastic.
12	Straws and Stirrers	21,206	In the United States alone, 500 million straws are used and thrown away every single day. ( <a href="http://www.ecocycle.org/bestrawfree">www.ecocycle.org/bestrawfree</a> )
13	Rope, Fishing Line (1 meter = 1 piece)	7,675	Ropes & fishing line are made from synthetic/plastic materials. 4,766 rope and 2,909 fishing line. Often from fishermen.
14	Other Plastic Bottles (shampoo, oil, bleach, etc.)	5,033	
15	Plastic 6-pack Holders	4,920	
16	Fishing Buoys, Pots & Traps	3,263	

Source: <http://www.coastalcleanupdata.org/reports> as of February 2017

Items collected: On land – 1,301,996; Underwater – 52; by watercraft – 345; Total – 1,302,393. Though the numbers for plastic debris from cleanups registered with Ocean Conservancy are smaller for Mexico, they are still indicative of the predominant types of plastic found. Many animals, dead from entanglement, were also found during these cleanups. E.g. Birds, Turtles, Dogs, Fish, and even a Calf.

## TOP 16 PLASTIC ITEMS FOUND ON SHORELINE CLEANUPS THROUGHOUT THE WORLD

RANK	PLASTIC DEBRIS ITEM	TOTAL COLLECTED	ADDITIONAL INFORMATION
1	Plastic Pieces (including Styrofoam)	6,415,053	3,241,037 Styrofoam pieces and 3,174,016 other plastic pieces
2	Cigarette Butts	4,506,258	
3	Plastic Beverage Bottles	3,201,900	
4	Food Wrappers (candy, chips, etc.)	2,579,005	Most food wrappers, including chip bags and candy wrappers are plastic.
5	Plastic Bags (including Grocery/ Carryout)	2,409,879	1,302,666 grocery bags and 1,107,213 other plastic bags
6	Bottle Caps	1,993,222	
7	Take Out Containers (Styrofoam and Plastic)	1,911,378	932,413 Styrofoam and 978,965 other plastic containers
8	Plastic Cups and Plates	1,268,498	475,606 Styrofoam and 792,892 other plastic
9	Straws and Stirrers	1,090,088	In the United States alone, 500 million straws are used and thrown away every single day. ( <a href="http://www.ecocycle.org/bestrawfree">www.ecocycle.org/bestrawfree</a> )
10	Plastic Lids	1,054,690	Includes lids for to-go drinks such as soda and coffee.
11	Other Plastic/Styrofoam Packaging	605,261	Includes tarps, crates, fishing bait boxes, and Styrofoam packaging that surrounds items like appliances and electronics.
12	Forks, Knives, Spoons	560,555	This is listed as general cutler, but assume that most would be plastic.
13	Other Plastic Bottles (shampoo, oil, bleach, etc.)	475,289	
14	Tobacco Packaging/Wrap	232,501	
15	Rope, Fishing Line (1 meter = 1 piece)	390,810	Ropes & fishing line are made from plastic/ synthetic materials. Rope 196,281 and fishing line 194,529. Often from fishermen.
16	Diapers	188,850	Yes, disposable diapers are made of plastic.

The next most found plastic items in cleanups throughout the world are: diapers, cigar tips, fishing nets & pieces, fishing buoys, pots & traps, balloons, cigarette lighters, strapping bands, toys, and 6-pack holders

Source: <http://www.coastalcleanupdata.org/reports> as of January 2017

Items collected: On land – 34,339,023; Underwater – 110,119; by watercraft – 202,511; Total – 34,651,653

Many animals, dead from entanglement, were also found during these cleanups. For details, go to

<http://oceanchampions.ca/wp-content/uploads/2018/01/EntangledAnimals-Earth.xlsx>

**DISCUSSION:** Ask participants these questions about the Top 16 list:

- Are you surprised by any of the items on the list?
- Where do you think these items came from?
- Do you use any of these items on a daily basis?

When this activity is over, keep the cards handy for the next activity.

## ACTIVITY: SOURCING PLASTIC DEBRIS

**OBJECTIVE:** For participants to learn the different sources of plastic debris by grouping different types of plastic debris together.

**MATERIALS:**

- Actual cleaned plastic items or all of the cards in the Plastic Debris Deck (end of guide).

**INSTRUCTIONS:**

1. **SAY:** Now let's look deeper into how items become plastic debris and what human activities they are coming from.
2. Make sure all participants have a card/item from the Plastic Debris Deck (previous activity), giving priority to the ones on the 'Top 16 list', if there are less than 32 students. If there are more than 32 participants, have students team up with another student.
3. Participants will have 2 minutes to group themselves based on what type of plastic marine debris card they have. Participants can group themselves in any way they think makes sense. For example, by source: fishing gear, food, shopping, other; by single-use plastic and re-usable plastics; etc.
4. After the allotted time, have each group explain why they grouped together.

**PROMPT,** if appropriate: What the item was used for?



## OBJECTIVE 2: Inland to Ocean Concept - Ocean Currents and Gyres

### INLAND TO OCEAN CONCEPT, OCEAN CURRENTS AND GYRES

In the previous objective, participants learned where plastic debris comes from and what types are most commonly found during beach cleanups. This section will discuss how plastic debris, once it is in the ocean, how it travels across oceans.

**ASK:** How do you think plastic (and other) debris travels to the ocean?

- Plastic debris is carried from its original resting spot via wind or rain to storm drains, which can carry garbage directly to the oceans, or to streams or rivers. Streams and rivers then transport the debris to the ocean.

#### PLASTIC DEBRIS TRAVELS ACROSS THE OCEAN

**SAY:** Okay, so now we understand how trash can reach the ocean even from places very far from the beach or shoreline. **ASK:** Does anyone have a guess for what happens once trash enters the ocean?

- Participants may start to discuss the impact to animals, such as “turtles eat it” with this question. While many of their answers will be correct, you are trying to elicit discussion about trash traveling around the world aided by currents and winds.
- Once in the ocean, currents and atmospheric winds carry debris and can move it 11 to 32 kilometers (7 to 20 miles) a day. These systems can transport debris thousands of miles from its original starting point. Factors that affect currents such as seasons and large storms can also affect debris movements (NOAA).

### ACTIVITY: CURRENTS AND PLASTIC DEBRIS

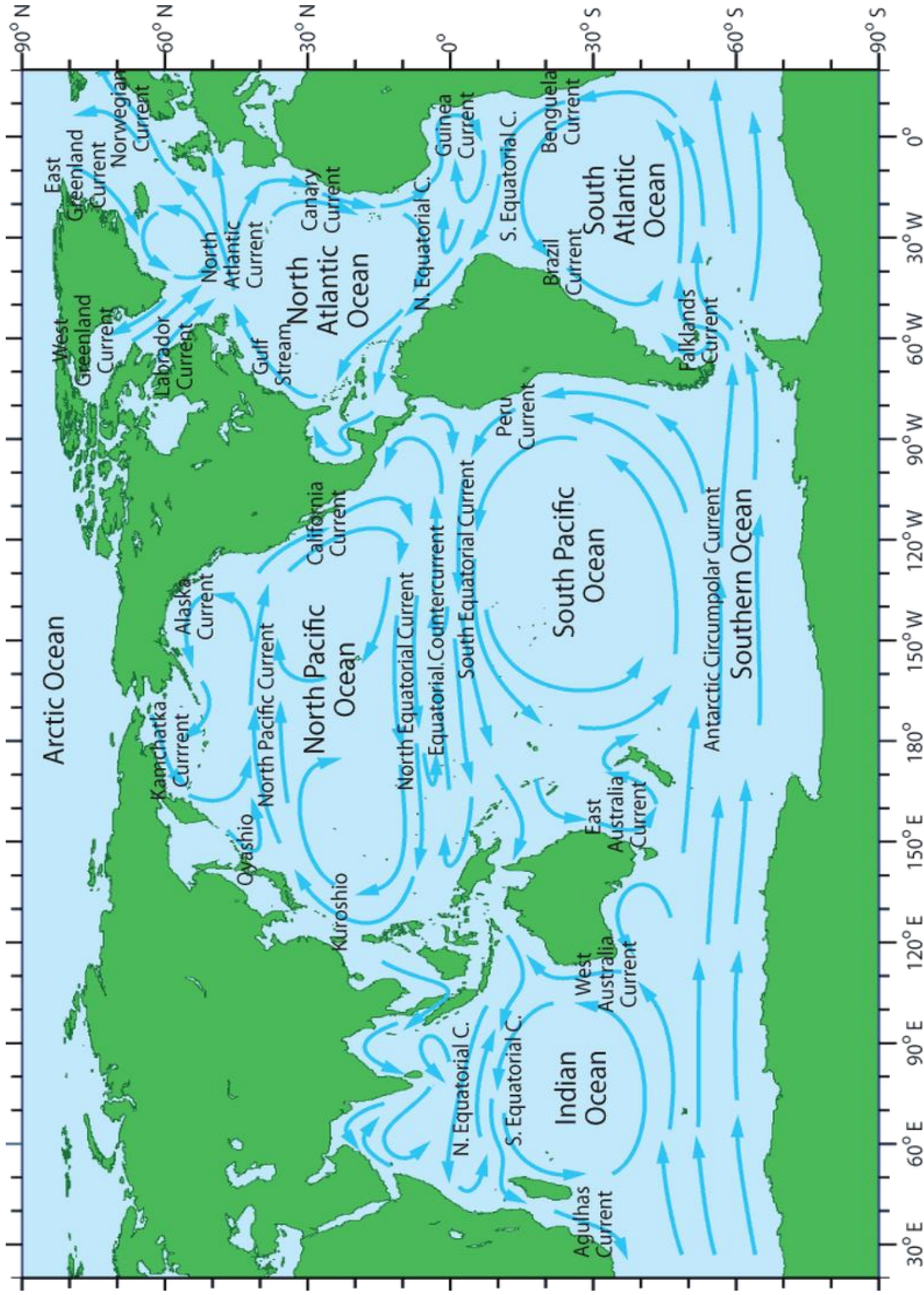
**OBJECTIVE:** Participants will learn about currents and how plastic travels in the oceans.

**MATERIALS:** Ocean Currents Map on the next page (Courtesy: Ocean Blue Project). If possible laminate it, so that wet erase markers can be used, or project the map so students can point on it.

#### INSTRUCTIONS:

1. **SAY:** Does anyone remember “Crush” from Finding Nemo? He spent a lot of his time in a current.
2. **ASK:** Are there any volunteers who would like to trace the potential path of a piece of plastic debris?
3. Using the wet erase marker, or a pointer, have the participant imagine that a piece of trash was dropped near where you live and have them trace the path the piece of trash would take by following the paths of the currents.

To see modelling visuals of examples of the movement of plastic debris see: *If you drop plastic in the ocean, where does it end up* at [https://www.theguardian.com/environment/2017/jun/29/if-you-drop-plastic-in-the-ocean-where-does-it-end-up?CMP=share\\_btn\\_fb](https://www.theguardian.com/environment/2017/jun/29/if-you-drop-plastic-in-the-ocean-where-does-it-end-up?CMP=share_btn_fb)



## OCEAN SURFACE CURRENTS: THE MARINE DEBRIS HIGHWAYS

**MATERIALS:** Use the current map as a visual aid to start to discuss gyres.

Surface ocean currents are mainly driven by global wind patterns. You can think of wind as a solid object that scrapes along the top of the ocean and pulls water in the direction that it's blowing. Ocean currents are made more complex because of land masses, the uneven heating of Earth, and the fact that Earth spins about its axis. (NOAA)

**SAY:** Currents are important because they carry nutrients and organisms (like Crush!) throughout the ocean, sustaining countless marine habitats and wildlife.

Currents are also important because they regulate Earth's climate. The Gulf Stream Current brings warm water from the equator along the east coast of the United States and Canada and eventually toward England. This current keeps Northern Europe much warmer than many places as far north.

Currents, both at the surface and deep within the ocean also carry plastic (and other) garbage. And circular currents cause the accumulation of marine debris in specific areas, called **Gyres**. The Ocean Gyres Map (following page), can be utilized now, or just continue using the current map.

- Gyres, or large rotating ocean currents, can trap trash and marine debris at their centers. This can also happen on a smaller scale as a result of eddies and other factors (NOAA).
- Gyre currents rotate clockwise in the Northern Hemisphere and counter clockwise in the Southern Hemisphere. Worldwide, there are five major subtropical oceanic gyres: The North and South Pacific Subtropical Gyres, the North and South Atlantic Subtropical Gyres, and the Indian Ocean Subtropical Gyre. (NOAA)
- One of the most well-known gyres is the North Pacific Gyre. This area is also referred to as the "Great Pacific Garbage Patch" or the "Pacific Trash Vortex".

**ASK:** Do you remember the children in the *Ocean Champions* story visiting the "Great Pacific Garbage Patch"?

**ASK:** What does this "garbage patch" look like? As we read in *Ocean Champions*, the garbage patch is an island of plastic\*, it is like a plastic soup. Imagine the garbage as the vegetables and the ocean as the broth.

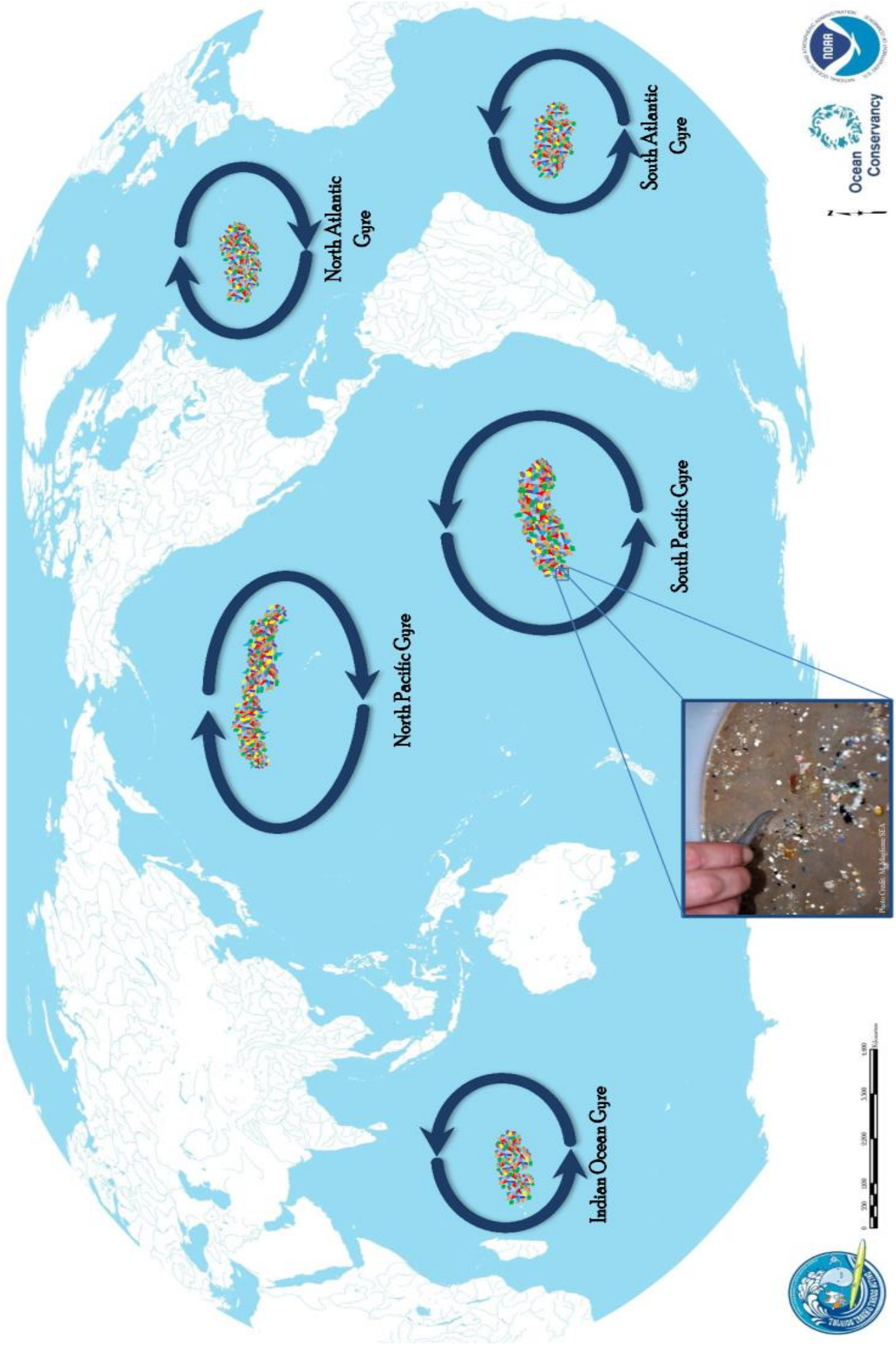
Higher concentrations of plastic (and other) debris can be found in this area, along with other debris such as derelict fishing nets, but most of the debris is very small pieces of plastic (NOAA). And just like in soup, the pieces of plastic in the gyre collect at different levels in the water column, not just at the surface. The debris is continuously mixed by wind and wave action and spread widely over huge surface areas and throughout the top portion of the water column (NOAA).

The North Pacific Gyre is well known for the debris that has gathered at its center; however, it is not the only plastic soup—marine debris accumulates in every ocean gyre.

\*The name "Great Pacific Garbage Patch" has led many to believe that this area is a large and continuous patch of easily visible marine debris, like an island that is visible from space. This is not accurate.



# Global Ocean Gyres: "Plastic Soup"



**PRE-ACTIVITY:** Have a volunteer, or the students together, look at the ocean current map or the ocean gyres map (above) and identify the five major gyres. (There are also several smaller ones.)



## ACTIVITY: MAKE YOUR OWN GYRE

**OBJECTIVE:** To understand that oceanic currents create gyres and to show how trash travels through those currents, accumulates within the gyre, and may be sent back to shore.

### MATERIALS:

- A medium size circular container or bowl (pie tin, plastic food storage container, etc)
- A lightweight breakfast cereal (Lucky Charms works well) or another collection of small items that float.
- A spoon
- Water

### INSTRUCTIONS:

1. Fill the container  $\frac{3}{4}$  of the way full of water.
2. Explain to participants that this bowl represents the Pacific Ocean and the sides of the bowl represent land masses, such as Asia and North America.
3. Add a small handful (no more than  $\frac{1}{4}$  cup) of the cereal to the water. The cereal represents marine debris.
4. Using a spoon, stir the water in a circular motion for about 10 seconds, keeping the spoon near the edges of the bowl.
5. Remove the spoon from the water and watch what happens—the cereal will follow the “currents” and then some will begin to accumulate and group together at the center of the currents while others will be shot out of the current and will stick to the sides of the bowl.
6. Explain to the participants that this represents what happens to trash when it travels through ocean currents and into a gyre. The trash can accumulate at the center of the gyre (like the “Great Pacific Garbage Patch”), or it can be sent back to shore, where it collects on beaches far away from where it originated.
7. (Optional): If you have enough materials available, split the participants into groups and allow each group to do the experiment on their own. The groups will see the same results.

## GO CLEAN UP THE GYRE?

“**ASK:** Do you think we can clean up the ocean gyres by removing all the trash?

“**SAY:** Unfortunately, the situation is much more complicated:

- **Never stationary:** The ocean and gyres are always moving and changing throughout the year.
- **Difficult to see:** Much of the debris is small pieces of plastic that cannot be easily spotted or collected. Other debris, like derelict fishing nets and traps, are difficult to remove without special equipment.
- **Other marine life:** These areas are also abundant with marine animals, some very small—even microscopic—that make removing only the trash difficult.
- **Cost:** The gyres are so immense that the cost of cleaning just 1% would cost anywhere from \$122 to \$489 million a year! (NOAA)

## OBJECTIVE 3: The Impacts of Marine Debris

### IMPACTS ON ECOSYSTEMS

**ASK:** Now that we have read and talked all about marine debris, in particular plastic debris, why should we care about the issue? Why is plastic debris a bad thing for our ocean?

- Plastic debris in our oceans negatively impacts the marine environment, animals and even you.

**EXPLAIN:** Many of the things you are saying are called ecosystem impacts.

**SAY:** Let's create definitions for the words ecosystem and impact. (Note: This is only necessary if needed by participants. To help participants: The origin of the word "Eco" is Greek, meaning house. So, think about it like this: "house system." Your home and school are part of your: \_\_\_\_\_. (ecosystem)

- Remember the word impact can also mean something positive. This will be discussed in more detail, but keep it in mind when defining impact. The formal definition of impact is: the effect or influence of one person, thing, or action on another (Oxford Dictionary).

### ENTANGLEMENT

- As we learned in *Ocean Champions*, entanglement is one of the major issues caused by marine debris. Entanglement is when an animal becomes twisted or trapped by something. Marine debris can easily entrap animals and cause serious problems.
- Nets, ropes, lines, fishing gear, ribbons, 6-pack rings and many other types of plastic debris can entrap marine species, limiting their ability to move, eat and breathe.
- Ghostfishing: The phenomenon of animals (fish, marine mammals, turtles, etc.) getting caught in fishing nets, lines or traps that have been lost or released and are no longer being operated by people.
- Entanglement can result in injury, illness, suffocation, starvation and even death.
- Animals spend valuable time and energy trying to escape from entangled trash on their bodies, but they are often unable to do so.
- Although animals such as seabirds, sea turtles, whales, seals and sea lions are often the most impacted by entanglement, any animal can be entangled by marine debris, even animals like coral and sea urchins.



## **ACTIVITY:** RUBBER BAND ENTANGLEMENT

**OBJECTIVE:** Participants will gain an understanding of entanglement by simulating what this restriction may be like for marine wildlife.

### **MATERIALS:**

- A rubber band for each participant. The rubber bands should be an average size; they will go once around the hand. The activity will not work if rubber bands are too large. Thicker bands are more of a challenge and are less likely to snap.

### **INSTRUCTIONS:**

1. Each participant should hang the rubber band around his/her pinky finger of one hand.
2. Each participant should then stretch the rubber band across the back of their hand, and hook the rubber band on their thumb.
3. Have participants place their other hand (without the rubber band) behind their back.
4. Have participants now attempt to free the hand "entangled" in the rubber band without using their opposite hand, teeth or any other body part.
5. Allow participants 15 seconds to attempt to free their hands of the rubber bands.



### **DISCUSSION:**

- Prompt the discussion by **ASKING:** Were you able to free your hand from the rubber band? How did you feel while trying to remove the rubber band?
- Explain that this activity mimics what it may be like for many marine animals when they become entangled in pieces of marine debris. Two common examples include seabirds becoming entangled in fishing line and sea turtles becoming wrapped in line, rope or other fishing gear. Explain that these animals, unlike us, do not have fingers or opposable thumbs that easily allow them to remove items.



## INGESTION

**ASK:** What other way can plastic debris can hurt the ocean ecosystem or the animals living within the ocean ecosystem? (We read about this in *Ocean Champions*.)

This is where participants should be eager to describe the potential for animals to ingest debris.

- Ingestion is another negative impact of marine debris on animals. Ingestion is when something, such as food, is taken into the body. Many marine animals, such as mammals, birds and sea turtles have been known to ingest marine debris by accident.
- Marine debris is often mistaken as a food source or is attached to a food source and ingested by an animal.
- Debris ingestion poses a serious health hazard and can lead to “loss of nutrition, internal injury, intestinal blockage, starvation, and death.” (NOAA)
- Plastics are the most commonly ingested form of debris.

**ASK:** What items could we collect on our cleanup that might be mistaken for food and be ingested by marine wildlife if left in the marine environment?

### **ACTIVITY:** FOOD OR FOE?

**OBJECTIVE:** Participants will come to understand how easily marine debris is mistaken for food and ingested by marine wildlife.

#### **MATERIALS:**

- Timer/stopwatch
- Vanilla pudding (1 cup per participant)
- Blue food dye
- Gummy bears (enough for about 6–8 per participant)
- Gummy worms (2 per participant)
- Container for each participant (small paper bowls work well)
- Napkins
- Spoons
- (Optional) Raisins or dried cranberries (spoonful per participant)
- (Optional) Sprinkles or Nerds candies (spoonful per participant)
- (Optional) Clean kitchen shears or knife and cutting board

#### **SET-UP:**

1. Scoop the pudding cups into individual bowls for each participant and add 2–3 drops of blue food dye to turn the pudding into an “ocean color”.
2. Rinse and keep the empty pudding cups for a fun upcycling craft to be completed later in the program.
3. Cut or tear gummy worms into quarters and put 6–8 quarters into each pudding ocean.
4. Put the same amount of gummy bears into each pudding ocean. (We recommend putting worm pieces and bears of the same color into each bowl—it is more challenging this way.)
5. Add a spoonful of raisins or cranberries to each bowl and mix all of the contents.

(continued on next page)

## INSTRUCTIONS:

1. Each participant should have an ocean pudding bowl, spoon and napkin.
2. Inform participants that they should refrain from eating any pieces until after the game.
3. Tell participants that they are sea turtles trying to eat jellies. The jellies are squishy and can be clear or colorful for this activity.
4. Explain that they are going to be given 20 seconds to collect as much food as they can from their pudding ocean. Instruct them to pull food out one by one, using the spoon, and place each piece on their napkins as they go. Remind them not to eat their food yet.
5. Start the 20 second feeding period, and tell the participants when to stop.
6. Instruct participants to now look at what they collected more closely and take note of how many gummy bears they collected as well as how many gummy worm pieces. They look very similar when mixed in the pudding ocean. After counting, return all pieces to the pudding ocean. \*Note: raisin/cranberry pieces are added as a non-food item, such as leaves or driftwood, but may also stump some participants.
7. Now tell participants that the gummy worm pieces are actually plastic pieces, and that gummy bears are their main diet. In the second feeding period, participants should only aim to collect gummy bears—their actual food.
8. Prompt a short discussion by **ASKING: Did you collect more plastic than your actual food? How might this same situation affect marine animals like sea birds that often ingest large amounts of plastic pieces?**
9. Run the next 20 second feeding period.
10. Have participants count the number of food pieces they collected. Did they accidentally collect “plastic” pieces again? Make note of everything collected and return all pieces once more to the pudding ocean.
11. Prompt a short discussion by **ASKING: Now that you knew to avoid the plastic pieces, did you have a harder time searching for food? Did you collect fewer pieces overall than the first round because you spent more time avoiding plastic?**
12. (Optional) Finally, add a spoonful of sprinkles or Nerds candies to each participant's mix. Mix them into each pudding ocean. Explain that this new item represents microplastic pieces.
13. Repeat the last round (where participants are aiming to collect only their gummy bear food) but now they must also try to avoid microplastic pieces that will stick to everything.
14. Run the final 20 second feeding period.
15. Have participants count the number of each item they collected: food, plastics and microplastics.
16. Prompt a short discussion by **ASKING: Did you accidentally collect microplastic pieces? Were you frustrated by how many microplastic pieces there were and how they stuck to all of your food pieces?**
17. Now the game is over and participants may eat their pudding oceans if they wish!

## DISCUSSION:

**SAY:** Many marine animals are unable to tell the difference between food and marine debris. They often unknowingly ingest both large and small items (macro and microplastics) among other marine debris items. **ASK:** Why is this a problem for animals?

- Animals that eat marine debris can feel “full.” However, their bellies aren’t filled with the nourishing food that they need to survive, but instead they are filled with trash that cannot nourish them and may even hurt them.
- Certain marine debris items like fish hooks or sharp glass or plastic can cause serious harm to an animal when ingested and can lead to death. Ingested marine debris can also clog the digestive pathways within animals, which can lead to their death.



# ACTIVITY: CURRENTS AND PLASTIC DEBRIS

**OBJECTIVE:** To learn about the diversity of plastic debris found in the marine environment, and why they are difficult to remove, in particular small pieces and, even more so, microplastics, which are 5mm (inch) or less in size. Because of their very small size, microplastics can be ingested/swallowed by a wider range of marine organisms, posing potential physical and toxicological risks to these organisms.

## MATERIALS:

- Several shallow trays or shoe boxes (pie tins work well)
- Sand to cover the bottoms of each tray or box
- A variety of small trash items, such as bottle caps,
- Pieces of larger trash items such as straws, food wrappers, plastic bags, etc. (items should be clean)
- A handful of small plastic pieces. Small beads and/or beanbag fill work well for this (both colorful and clear pieces)
- Clock or stopwatch to keep time
- Paper and pencils for participants to take notes
- (Optional) A variety of items naturally found on beaches such as shells, dried seaweed, twigs, etc.

## INSTRUCTIONS:

1. Add the trash, plastic pieces and natural items to the sand in the tray/box and gently shake it back and forth to mix everything evenly. Some items should become covered with sand so that not everything is on the surface of the sand.
2. Split the participants into small groups and provide each group with a tray/box.
3. Give participants between 30 seconds and 1 minute to retrieve as many trash items as possible from the tray/box.
4. When time is up, have participants record the trash they have collected.
5. **ASK:** Did you recover all of the trash from your tray? If not, what was left behind? What was the hardest thing to collect? More than likely, there will be small pieces left behind or hidden in the sand.
6. **EXPLAIN:** When trash enters the marine environment it often breaks into smaller and smaller pieces. This is especially true for plastics. Sometimes resin pellets (about the size of a grain of rice), the raw material that manufacturers use to create plastic produces, can also escape into the environment. These pellets, also called “nurdles”, are difficult to collect because they are tiny and often colorless.
7. **ASK** everyone to observe their trays again: their sand may appear clean, but there are most likely still pieces of plastic. **EXPLAIN:** While a beach may appear clean, there can still be trash hidden beneath the surface and in the sand. These small pieces can be just as harmful as larger pieces to the ecosystem and wildlife.
8. **ASK:** How might tiny plastics, or microplastics, affect the environment and wildlife? Why would it be difficult to recover spilled resin pellets in the environment? Do you think it would be easier to recover these pellets or prevent them from escaping into the environment in the first place?



**Hawaii Beach Sand**

Courtesy Colette Nic Éinrí

# ME AND MY COMMUNITY

**ASK:** Does marine debris only affect ecosystems or does it impact other things too?

**SAY:** Can we make a list of things other than ecosystems marine debris could impact?

These questions are trying to get participants to think about trash as ugly and something they don't want in their community. This is also the time to help spur discussion about the potential impact of marine debris on human health: if a small fish eats tiny pieces of plastic, then a bigger fish eats the smaller fish, and we eat bigger fish, what could that mean?

To facilitate this discussion, ASK: Where are some places you like to visit or vacation? Does anyone enjoy vacationing at the local landfill?

Plastic debris doesn't only affect ecosystems. It also has a negative impact on local communities, economies and even human health.

- **Tourism:** Plastic or other debris, on the beach is not aesthetically pleasing. It negatively impacts the beauty of seashores around the world. This can make people choose other locations for vacations. For towns that rely on beach visitors, marine debris can have a negative economic impact. For example, shops may have to close because there are no longer enough visitors to buy merchandise.
- **Cleanup Costs:** To keep beaches free of plastic and other debris, many towns will spend money to remove this garbage. This can cost a lot of money—thousands and even millions of dollars. This money could be spent in other ways, perhaps building playgrounds, sports fields or libraries.
- **Boat Damage:** Marine debris is often difficult to see when on a boat, and an encounter with marine debris can result in expensive damage. Large and small debris can be dangerous to boats and passengers. Large debris could crack the bottom of a boat, propellers may become entangled with fishing line, or system intakes can be clogged with a plastic bag.
- **Human Safety:** Marine debris can also be dangerous for people. Like other animals, swimmers can become entangled in debris. People can step on broken glass or needles. Passengers on boats that strike debris can be injured. Also, if people eat fish that have ingested plastics, what could that mean for our health? This is an emerging area of marine debris research, but a good start for a discussion on bioaccumulation.

Pose some or all of the following discussion questions to the participants:

- Would you rather visit a beach with trash or one without? Why?
- What are some reasons one beach may have less marine debris than another beach?
- Do you think an ice cream shop on a clean beach or on a beach with lots of trash would have more customers?
- How might a coastal community's economy be affected if its beach is littered with marine debris?





## ACTIVITY: TALKING TRASH & TAKING PRIDE

**OBJECTIVE:** Participants will think proactively about marine debris solutions after considering how trash could affect somewhere or something they feel significant pride towards.

### MATERIALS (OPTIONAL):

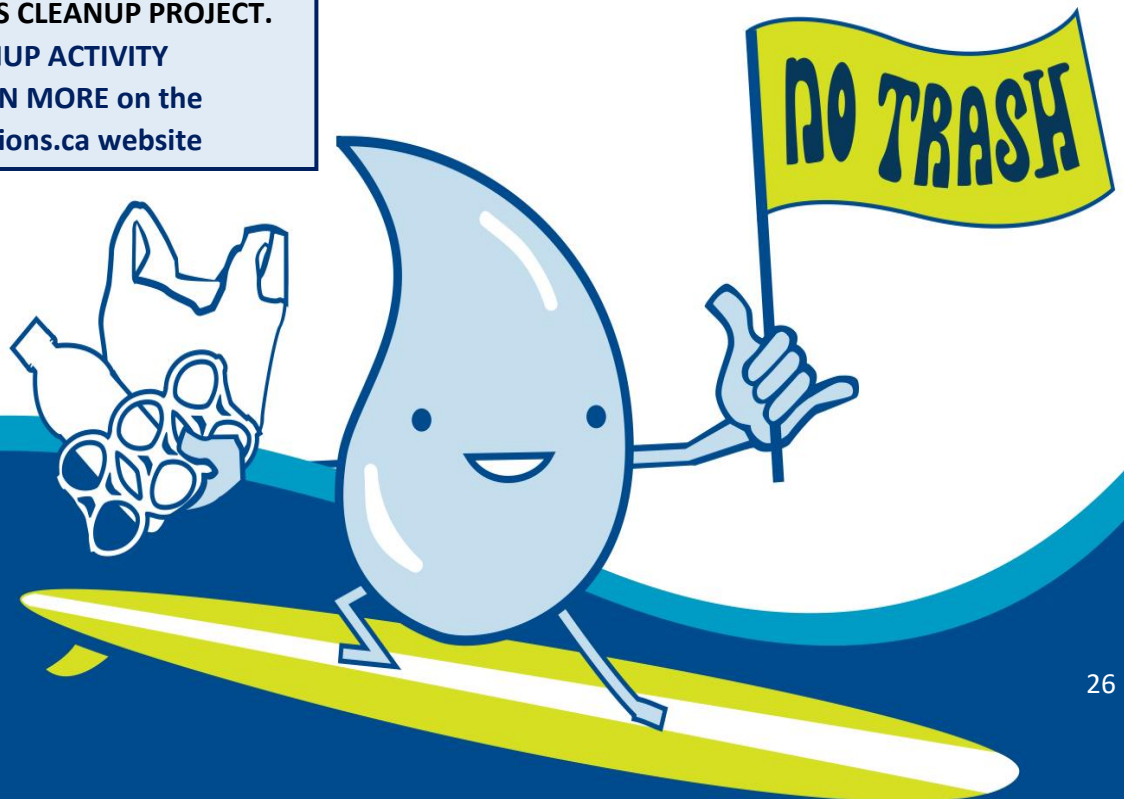
- Pens/pencils/markers and paper for each participant

### INSTRUCTIONS:

1. Instruct participants to think about their favorite place, person or activity.
2. Then ask participants to consider all the different ways trash and/or marine debris could impact that place, person or activity.
3. Have participants think about ways they can encourage others to take pride in this place, person or activity, and to prevent marine debris and trash from affecting this place, person or activity.
4. Ask participants to develop a catch phrase (no materials needed), poster, flag, flier or anything else they think would motivate their peers to also have pride in this favorite place, person or activity.
5. The end goal of the motivational piece is to develop broader pride so that people care enough to prevent trash and marine debris from having any negative impacts on the place, person or activity.
6. Example: A favorite activity could be surfing. The catch phrase could be: "Ride Waves NOT Waste; Put Trash in its Place!" or for soccer, a poster could have a picture of a young person kicking trash into a garbage can, and it reads: "Make the Game Winning Save, Kick the Littering Habit"

**IF APPROPRIATE AND TIME PERMITS,  
THIS IS A GOOD TIME TO HAVE STUDENTS  
DO AN OUTDOORS CLEANUP PROJECT.**

**SEE CLEANUP ACTIVITY  
UNDER LEARN MORE on the  
[oceanchampions.ca](http://oceanchampions.ca) website**



## **ACTIVITY:** PREVENTION CORNERS

**OBJECTIVE:** Participants will examine different prevention methods as they pertain to particular items of marine debris and think creatively on multiple options for marine debris prevention.

### **MATERIALS:**

- Plastic Debris Deck
- Open space or room to clearly divide into four corners
- (Optional) Half sheets of paper to make "signs" to label the four categories: Reduce, Reuse, Recycle, Other

### **INSTRUCTIONS:**

1. Pass a marine debris item card to each participant.
2. In an open space, designate four separate spaces or corners and label these the 3 R's: "Reduce", "Reuse" and "Recycle" plus one "Other" spot.
3. Explain the "Other" corner includes any of the ideas listed a few minutes ago and provides the chance to be creative when thinking about marine debris prevention.
4. Explain to participants that they must choose one of the corners as an alternative outcome for their item, instead of becoming marine debris. For instance, someone with "grocery bag" might choose the "Reduce" corner while someone with "beverage bottle" might choose the "Recycle" group.
5. Provide participants with about 2–3 minutes to move to their desired outcome corner, based on their individual items.

### **DISCUSSION:**

- Ask each participant to explain his or her choice for that marine debris item. Start in one corner and work around to all four categories. You can prompt students with these questions:

#### **“ASK:**

- **What is your item?**
  - **Why did you choose this corner?**
  - **If you chose "Reduce" or "Reuse," how would you reduce/reuse that item in a different way?**
  - **If you chose "Other," what outcome did you come up with for your item?** This can be as simple or creative as participants wish. For instance, someone with "microwave" may simply state "dispose of responsibly" or a participant with cigarette butts may say "outlaw smoking."
- Explain to participants there is no right or wrong answer. All of the items could go into multiple categories.
  - (Optional) Provide students an additional 2 minutes to choose a new category for their item and repeat the discussion prompts with a couple of the participants.



## ACTIVITY: REDUCE USE CORNERS

Because many types of plastic are not recyclable or reusable, or end up in the ocean for various reasons, the most important thing for us to do is REDUCE our use of plastic, especially single-use plastic items.

**OBJECTIVE:** Participants will examine different plastic items and try to pick ones that:

- We could stop using because it isn't necessary;
- We could replace for use with something else that isn't plastic; e.g. Toothbrushes with a bamboo handle; stainless steel straws
- Manufacturers could create from a biodegradable material or businesses could utilize a biodegradable product replacement for the plastic item in question; e.g. Paper straws, cardboard drink lids; degradable 6-pack rings
- Plastic items that are necessary or don't fall into any of the above three categories and must just be properly disposed of.

**MATERIALS:**

- Plastic Debris Deck
- Open space or room to clearly divide into four corners
- (Optional) Half sheets of paper to make "signs" to label the four categories: Stop using, We Replace, Companies Replace, Other

**INSTRUCTIONS:**

1. Pass a plastic debris item card to each participant.
2. In an open space, designate four separate spaces or corners and label these: "Stop Using", "We Replace", "Companies Replace", "Other".
3. Explain the "Other" corner includes any of the plastic items that are necessary or don't fall into any of the other three categories.
4. Explain to participants that they must choose one of the corners as an for their item that would help reduce our use of plastic. E.g. Balloons are not necessary, Straws are either not necessary or replace with SS/paper straw.
5. Provide participants with about 2–3 minutes to move to their desired reduce with their individual item.

**DISCUSSION:**

- Ask each participant to explain his or her choice for that plastic debris item. Start in one corner and work around to all four categories. You can prompt students with these questions:

**ASK:** What is your item? Why did you choose this corner and:

- If you chose "Stop Using", how hard would it be for you do do this?
- If you chose "We Replace," ask what they plan to use instead?
- If you chose "Companies Replace", ask what they should be using instead?
- If you chose "Other," ask what the best disposal of the item would be?
- Explain to participants that many of the items could go into more than one category.
- (Optional) Provide students an additional 2 minutes to choose a new category for their item and repeat the discussion prompts with a couple of the participants.



## **ACTIVITY (TAKE-HOME):** UPCYCLING CRAFT PROJECT

A day or two before this activity, ask participants to start collecting plastic bottle caps of any size. Advise them to wash and dry items thoroughly and bring the clean items for an activity.

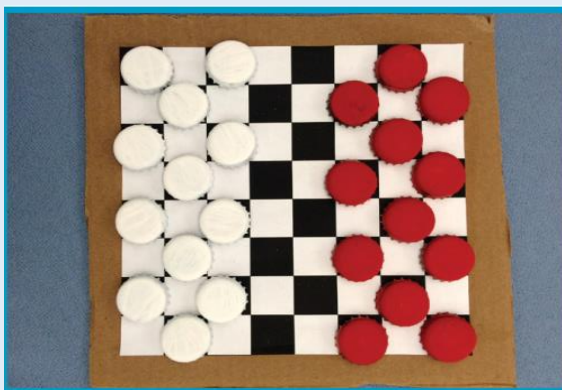
**OBJECTIVE:** Participants will learn about the art of upcycling and how to take an item that normally would be thrown away and repurpose it into an arts and crafts project.

### **MATERIALS:**

- Plastic bottle caps varying in sizes and colors
- Permanent markers
- Googley eyes (preferably with sticker backs)
- Scrap/recycled paper
- Glue (if using pipe cleaners or magnet strips)
- (Optional) Pipe Cleaners
- (Optional) Magnet strips

### **INSTRUCTIONS:**

1. Allow each participant to select one or two bottle caps.
2. Pass out the decorating supplies (googley eyes, markers, etc.)
3. Show examples of already made bottle cap monsters/faces.
4. Allow participants to decorate their bottle caps using their own creative ideas.
5. Assist younger participants with permanent markers!
6. Use self-adhesive round magnets, or use the following instructions with magnetic tape.
  - Pass out strips of 1" pre-cut magnet strips along with two bottle caps, one smaller than the other.
  - Glue the smaller of the bottle caps face up inside the other cap to create a platform on which the magnet strip can be stuck.
  - Have participants decorate the front of the bottle cap however they'd like using the art supplies.
  - Stick the magnet strip to the back (onto the second bottle cap) to create a magnet. OR create a checkers game:



## Plastic in the ocean is a people problem, which means everyone can help solve it

The main goal is to substantially reduce the amount of plastic entering the oceans.

The best solution is to transform the role that plastic plays in our lives and in the worldwide economy. And we need to act now. Plastic production is expected to double over the next ten years, and we need to do our best to stop the increased use of plastic by using less and decreasing demand.

And in countries with rapidly growing economies and little or no proper disposal system for plastic waste, we can demand that companies do more to provide funds to develop proper solid waste systems.



### Plastic Debris Survey

**What is one thing that you were surprised to learn?**

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**What did you find most interesting?**

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**What would you like to learn more about?**

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**What is one thing you can do to help?**

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## ACTIVITY: POST-SURVEY/QUESTIONNAIRE

Objective: The Post-Survey is to gauge how much participants learned about marine debris. These are the same questions participants were asked at the beginning of the program. The answers will be used solely to understand if marine debris knowledge increased after participating in the Talking Trash & Taking Action program.

### INSTRUCTIONS

1. The survey can be conducted individually or as a group.
2. Explain that this survey is not being graded; it is simply for Ocean Conservancy and all of us (participants) to see how much we learned by participating in this program.
3. If conducting individually: ask participants to fill out the survey. It can be completed anonymously so participants do not think they are getting graded on the activity. Collect the surveys to send back to Ocean Conservancy.
4. If completing as a group: ask participants to put their heads down or cover their eyes. They should raise their hand when they think they hear the correct answer. Write down the number of responses for each answer to compare to the results of the Pre-Survey.
5. Reveal to the group how much they learned over the course of this program by going over the answers and comparing the number of correct answers to the first time participants completed the survey.

### SURVEY

Please refer to Pre-/Post-Survey on page 5.

### ANSWER KEY

1. D | 2. D | 3. True | 4. B | 5. A | 6. True | 7. D | 8. A | 9. B | 10. False

### How to Print the following Plastic Debris Deck – 32 cards plus 8 blank cards:

The Plastic Debris Deck is designed like a deck of cards; one side has the item name and the reverse has a sample picture, except for the last page, which contains and additional 8 blank cards, should you wish to create other cards of your own.

Print the pages with plastic items double-sided so each card will have the item and the picture aligned on the front and back respectively. (The card deck will also be aligned if the entire guide is printed double-sided.)

## **Plastic Pieces**

(Styrofoam and other)

## **Cigarette Butts**

and Cigar Tips

## **Food Wrappers**

(candy, chips, etc.)

## **Plastic Beverage/Drink Bottles**

## **Other Plastic Bags**

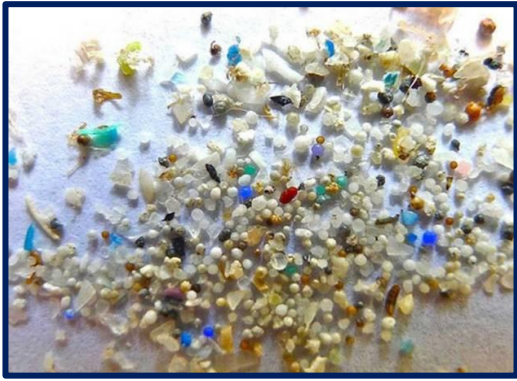
(including sandwich bags)

## **Plastic Grocery/ Carryout Bags**

## **Plastic Bottle Caps**

## **Plastic Straws** and Stirrers





## **Plastic Cups**

(Styrofoam and other)

## **Plastic Lids for Drink Cups**

## **Plastic Packaging**

(Styrofoam and other plastic,  
e.g. appliances and electronics,  
cabling, many household items)

## **Take Out Containers**

(Styrofoam and other plastic)

## **Knives, Forks and Spoons**

## **Other Plastic Bottles**

(shampoo, bleach, oil, etc.)

## **Plastic Plates**

(Styrofoam and other)

## **Balloons**





**Plastic Packing  
Straps**

**Rope**

**Fishing Line**

**Fishing nets &  
pieces of net**  
(which can become  
'Ghostnets')

**Other fishing  
gear**

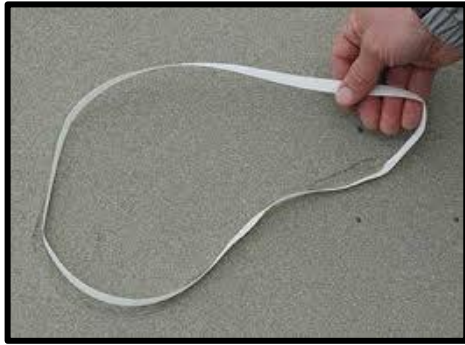
(e.g. Buoys, Lures, Pots & Traps)

**Package/Bottle  
Wrapping**

(e.g. Cigarettes, Soda bottles)

**Diapers**

**Lighters**



**Lollipop/Candy  
Sticks**

**Plastic  
Toothbrushes**

**Plastic  
Construction  
Materials**

**Food containers**  
(e.g. Yogurt and fruit cups,  
juice in 'Tetra Paks', sour  
cream)

**Plastic Toys**  
(e.g. water pistol, toy car,  
beach toy, kite, Frisbee)

**Plastic Shotgun  
and Fireworks  
Shells**

**6-pack Rings**  
(from Pop and Beer cans)

**Other Plastic items**  
(e.g. Flip-flops, pens, pacifiers,  
umbrella handle, rainboot)



This recently found yogurt cup, which is still in good condition, is from 1976.



Rubber duckies that were found floating in the ocean.







# 6 DEGREES OF SEPARATION

How does trash travel?

1 Plastic bag from a store in the city



2 blows from a trash can



3 into a storm drain



4 travels through pipes and downriver



5 into the ocean



6 where marine wildlife mistakes it for food.



# 9 TIPS FOR LIVING WITH LESS PLASTIC



1 Bring your own shopping bag



2 Carry a reusable water bottle



3 Bring your own cup



4 Pack your lunch in reusable containers



5 Say no to disposable straws & cutlery



6 Skip the plastic produce bags



7 Slow down and dine in



8 Store leftovers in glass jars



9 Share these tips with your friends

LESS PLASTIC.

#REFUSE SINGLE USE

#CHOOSE REUSABLES

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TYPE OF DEBRIS	DECOMPOSITION RATE
Paper Towel	2-4 weeks
Newspaper	6 weeks
Apple Core	2 months
Cardboard Box	2 months
Cotton Shirt	2-5 months
Waxed Carton	3 months
Plywood	1-3 years
Wool Sock	1-5 years
Plastic Grocery Bag	10-20 years*
Foam Cup	50 years*
Tin Can	50 years
Aluminum Cans	200 years
Disposable Diaper	450 years*
Plastic Beverage Bottle	450 years*
Fishing Line	600 years*

\*Items are made from a type of plastic. Although no one has lived for 450 or 600 years, many scientists believe plastics never entirely go away. These decomposition rates are estimates for the time it takes for these items to become microscopic and no longer be visible. Sources: EPA, Woods Hole Sea Grant