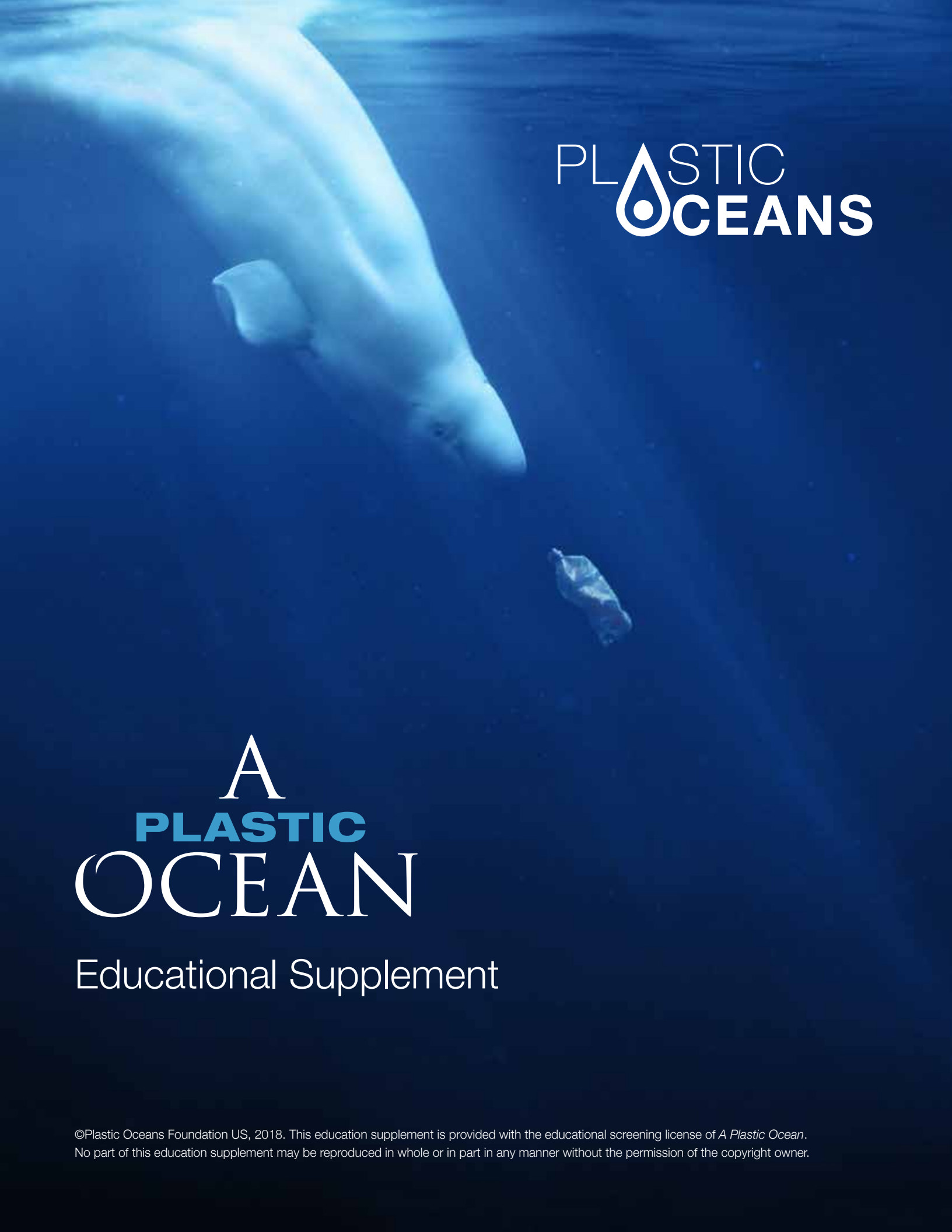


PLASTIC OCEANS

A PLASTIC OCEAN

Educational Supplement

Table of Contents

About This Guide

This companion guide to the film ***A Plastic Ocean*** helps educators teach their students to use the information presented in the documentary to learn about and create potential solutions to our plastic pollution problem. This guide is organized to follow along with the topics in the film ***A Plastic Ocean***.

How To Use This Guide

This guide is designed to help educators use the film ***A Plastic Ocean*** with their students. This guide offers a variety of activities and resources to help students explore the ideas and problems presented in the film and then consider potential solutions to our plastic problem. This guide was designed to be used as a whole, or you can select individual activities as you best see fit.

This Guide Includes:

- 100-minute or 22-min version of the film ***A Plastic Ocean***
- Key Facts Resource Sheet
- 1 Lesson Plan, containing:
    - 10 discussion questions
    - 5 In-classroom activities
- 8 Visual Key Facts Resource Sheets
- Further Resources
- ***A Plastic Ocean:*** Facilitator's Powerpoint: to guide you in leading a 20-minute discussion post-screening for your class

This Guide Is Designed For:

- Students, post-screening ***A Plastic Ocean***
- Classes, events, or trainings in areas such as:
    - Environmental Science
    - Marine Biology
    - Government and Politics
    - Business and Entrepreneurship
    - Science and Technology
    - Service Learning

About the Film

Scientists Solving a Jigsaw Puzzle ... Gyre by Gyre

In the center of the Pacific Ocean gyre our researchers found more plastic than plankton. ***A Plastic Ocean*** documents the newest science, proving how plastics, once they enter the oceans, break up into small particulates that enter the food chain where they attract toxins like a magnet. These toxins are stored in seafood's fatty tissues, and are eventually consumed by us.

If it was happening in one gyre, they suspected it was happening in all of them. But the filmmakers needed experts to prove it.

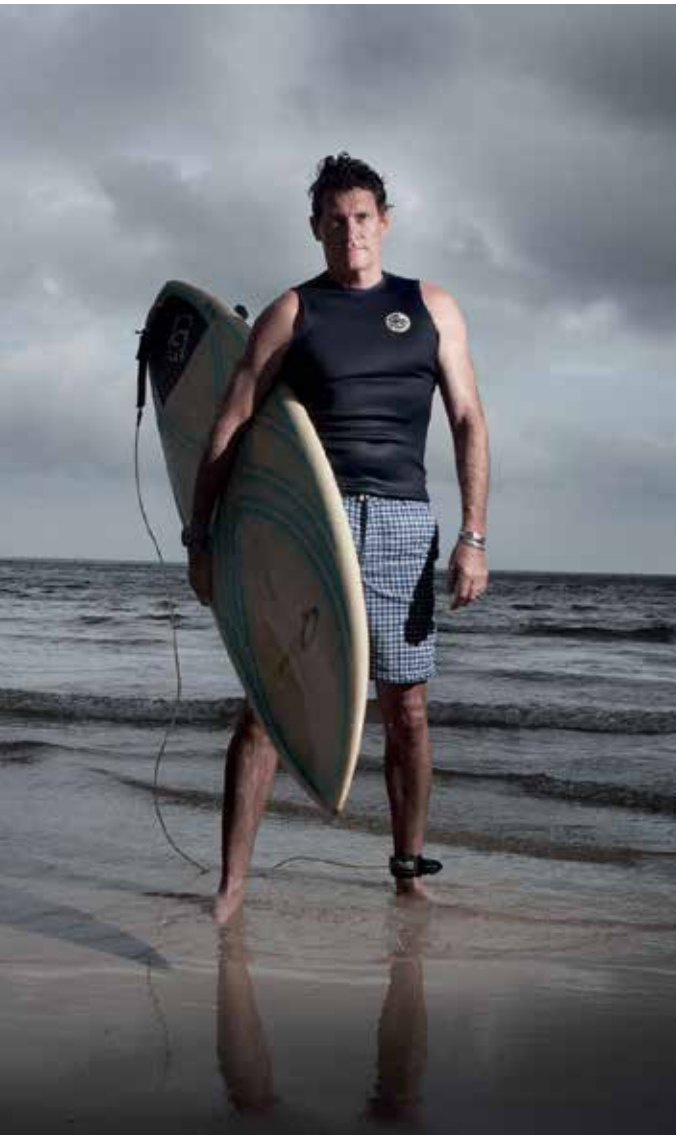
Scientists were brought in at each stage to analyze the findings from one part of the story to add their data to the overall report on the five gyres.

- Producer Jo Ruxton joined an expedition to the so-called Great Pacific Garbage Patch in the North Pacific Gyre, 1500 miles off the coast of San Francisco, to ascertain its impact. When the expedition discovered free-floating microplastics instead of an anticipated solid mass that could be contained, Jo knew she had to begin the film that would become ***A Plastic Ocean.***
- Jo had worked for the WWF International in Hong Kong and partnered with director and journalist Craig Leeson. Their first collaboration was on a documentary about endangered Pink Dolphins in Hong Kong.
- Jo and Craig brought on Dr. Lindsay Porter, an expert in cetaceans (whales and dolphins).
- Together they contacted the world's experts to see what was known about plastic pollution in the gyres.
- The team expanded to include Dr. Bonnie Monteleone who had already found microplastics in other gyres she had investigated. She joined the expedition to the South Pacific gyre.
- With new information emerging about the extent of the issue in each of the Ocean gyres, free diving champion Tanya Streeter joined the team. Together they set off on what would be a four-year global odyssey to explore the issue of plastics in our oceans and its effect on marine ecosystems and human health, including endocrine disruption.

Director's Q&A: *Craig Leeson*

Why did you want to get involved?

The creatures that inhabited the sea became a source of intrigue and study, the waves my playground. From an early age I noticed the severe effects industrial pollution was having on the Coastal waters where I grew up and also the effect it was having on me personally.



When did you start recognizing plastic as a global environmental issue?

In 2010, I became aware of one increasing source of pollution, which had until then escaped my notice. It was something I'd been told and taught was disposable. Plastic. From that moment, I noticed plastic everywhere and began to study intensely its effects on marine life and humans.

Why do you think this is such an important issue for the world to address?

Plastic is a man-made substance. It isn't supposed to be in the environment and the environment has no way of dealing with it, so it is building up and poisoning our earth like a disease. We live in a world where we are using up those resources faster than is sustainable. Very few of us are taught that our oceans keep us alive. As Dr Sylvia Earle says "without the blue there is no green." Our weather systems, oxygen, clean water, food sources, medicines, come from the oceans or are sustained by them.

What do you hope to accomplish with the film, A Plastic Ocean?

If you do not know, then you cannot care. With knowing comes caring. By raising this issue we hope to begin a discourse on the problem that will promote and invoke change. We need to recognize solutions that work and come up with others that solve the problem of plastic that is already in the environment. Only through the sharing of information on this issue will the public change policy on how we treat plastic.

How have you changed since taking on this project?

I've become more self aware of the impact I'm having on the world around me. Directly, I've become a megaphone for campaigning against single-use plastic: I find myself informing supermarket check-out people, takeaway servers, café owners, bankers, politicians and anyone who will listen about the detrimental impact of single use plastic. I have developed a keen interest in green and sustainable financial funds and businesses where profit is based on sustainability and environmental responsibility.

Key Facts

The Problem: Plastic is Indestructible.

Every item of plastic that has ever been created is still with us on the planet today. In the mid 50's we were told that plastic was suitable for single use and could simply be thrown away. We now know that to be untrue yet we continue to treat it as such.

Our Plastic Use

We produce more than **300 MILLION TONS OF PLASTIC** per year - That's almost **5 TIMES** more than what we produced 50 years ago!

Every day, we use **20 MILLION** plastic water bottles

It takes **250 ML OIL AND 3 LITERS** of water to make a **1 LITER** bottle of water.

In Europe **15,000,000 TONS** of end of life plastic goes to landfill each year.

The US alone throws away **38 BILLION BOTTLES** every year. That's 2 **MILLION** tons of plastic going into U.S. landfills.

63 BILLION GALLONS OF OIL are used every year – just to supply the US with plastic water bottles.

4,000 PLASTIC BOTTLES are used every second

MORE THAN 8 MILLION TONS of **PLASTIC** are dumped in our oceans **EVERY YEAR**

50% of all plastic is single use. Plastics have an average useful lifetime of **12 MINUTES**.

Beverage Bottles

100.7 billion plastic beverage bottles were sold in the U.S. in 2014, or 315 bottles per person, according to the Container Recycling Institute.

57% of those units were plastic water bottles: 57.3 billion plastic water bottles sold in 2014. This is up from 3.8 billion plastic water bottles sold in 1996.

The process of producing bottled water requires around 6 times as much water per bottle as there is in the container.

14% of all litter comes from beverage containers. When caps and labels are considered, the number is higher.

Plastic

Plastic is made from oil with a combination of chemical ingredients to form different types of plastics.

All plastics are made from synthetic polymers.

Plastics contain different chemicals that give them their unique structure, flexibility and use.

Many of the chemicals used mimic estrogenic activity. This happens when a chemical like BPA or phthalate leeches from the plastic and enters the body, mimicking the hormone estrogen.

Our Oceans and Plastic Pollution

There are five main ocean currents, also known as 'gyres' which are created by the Earth's rotation and the resulting predominant winds. These are: North & South Pacific, North & South Atlantic and Indian.

80%

of ocean waste originates from land. This waste travels to the center of the gyre where it collects.

Scientists estimate that it takes about

20 years

for waste to reach the center of the ocean.

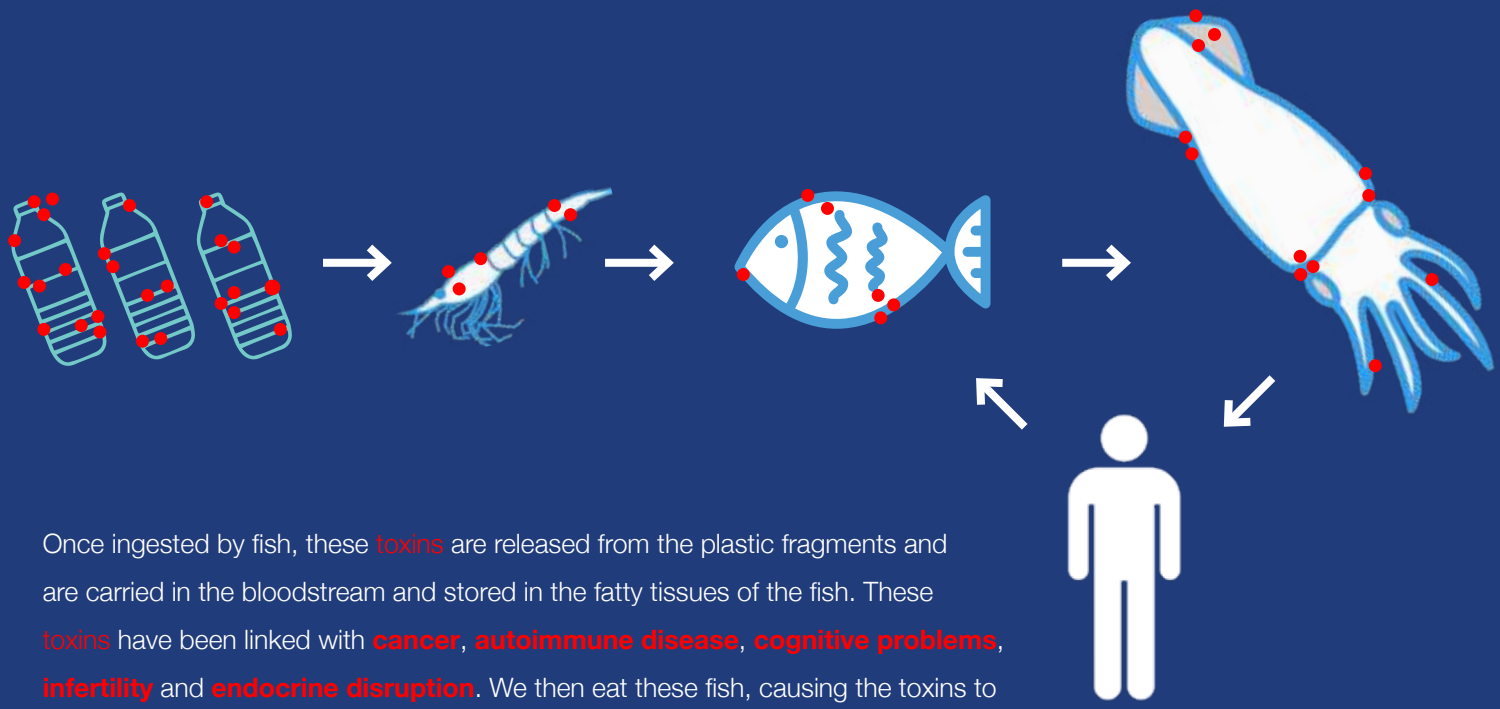
Plastic waste pieces break up into much smaller bits as they are eroded by sunlight, salt water, currents and waves. These pieces of plastic have rough, pitted surfaces.

More than **50%** of marine debris, including plastic, will sink.

The Food Chain and Plastics

There are two types of plankton: **zooplankton** (animals) and **phytoplankton** (plants). Zooplankton feed on phytoplankton, small fish feed on zooplankton, squid feed on small fish and so it goes on up the food chain.

Water born chemicals, from decades of industry and agriculture attract to plastic like a magnet. When these plastics mix with plankton, they are eaten by fish and become part of the food chain. These toxins 'hitch-hike' on plastics. Different types of plastics attract toxins at different rates, making some more potent than others.



Once ingested by fish, these toxins are released from the plastic fragments and are carried in the bloodstream and stored in the fatty tissues of the fish. These toxins have been linked with **cancer**, **autoimmune disease**, **cognitive problems**, **infertility** and **endocrine disruption**. We then eat these fish, causing the toxins to enter our bodies.

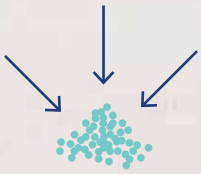
60%

of the world's population rely on fish as its main source of protein.

Nurdles:

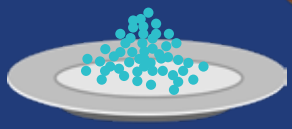
The pre-production raw pellets formed when you turn oil into plastic. People, animals and birds can confuse them for eggs/food. They are also known as mermaid tears.

Nurdles have been found on every single beach scientists have studied... even on the most remote islands of the planet. They were found in every surface trawl made during the filming of *A Plastic Ocean* and scientists have evidence that they have even made their way to the pristine waters of Antarctica.



Micro plastic beads are used in many health care and cleaning products as they are cheaper than pumice or rice. We are flushing these plastics straight into the ocean.

Scientists have found that plankton at the base of the food chain have eaten “micro plastics” such as nurdles.



The oceans provide more than

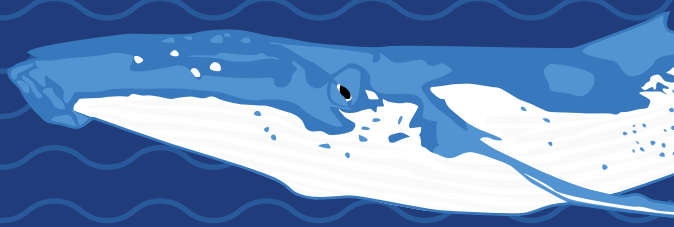
50%

of the oxygen we breathe – thanks to the phytoplankton – more than the rainforests.

Animals and Plastic Pollution

The Blue Whale filmed by the team in Sri Lanka ingests

75,000 liters



of water every time it opens its mouth. Imagine how much plastic it must take in!

Parent birds will eat what they see that is bright and reflective. Plastic pieces look like fish or squid to the parent birds who feed these to their young.

40%

of birds are dying of starvation, but their stomachs are full.

The record number of pieces of plastic found in one 90-day old seabird chick is

276 pieces

=

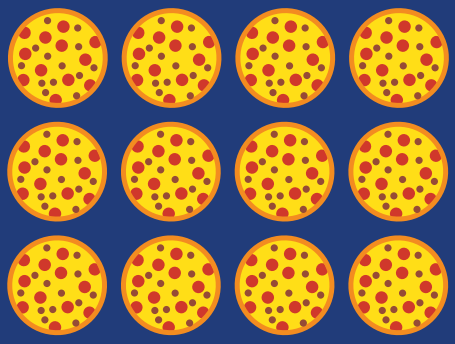
15%

of that bird's body mass.

Translated into human terms, that's 6-8 kilos of plastic, or the equivalent of

12 pizzas

inside your stomach.



Possible Solutions, Possible Problems

Long Term & Bridge Solutions

Our plastic problems can be addressed with a combination of solutions and all need to be incorporated to bring needed change. Long term solutions work to remove petrol-plastic and their by-products from the environment. Bridge solutions work at removing only some petrol-plastic products, but still leave behind some plastic product and their negative by-products. However, it is important to note that without the chance of our collective behavior and political will, these solutions will not be enough. Below are possible solutions, as well as their advantages and disadvantages.

Potential Solutions:

A. Rethink Plastic

B. Recycling

C. Incinceration

D. Thermal Cracking - Molten Metal Incineration

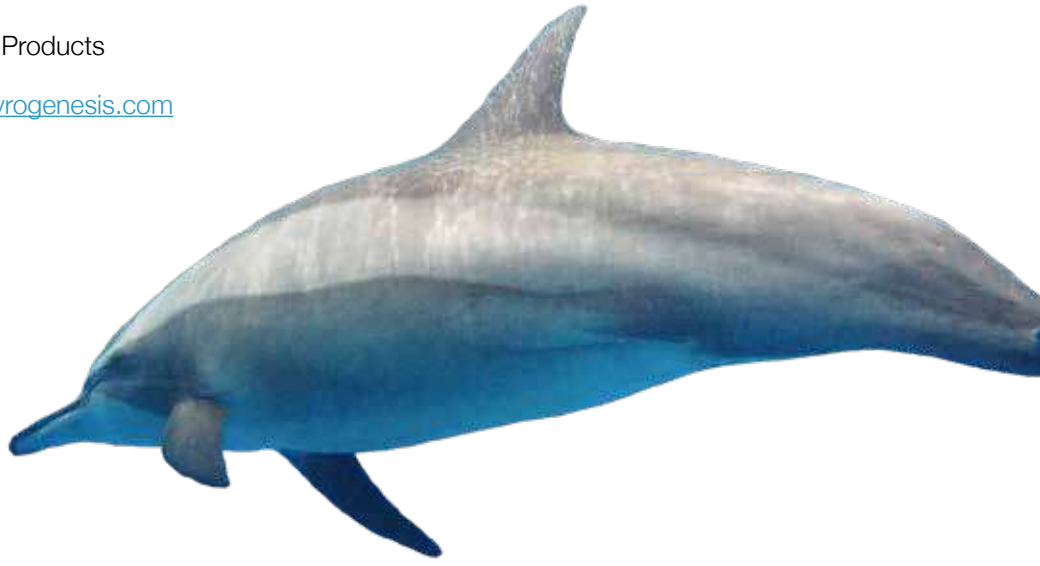
E. Reconfiguration

F. Pyrolisis

G. Re-use via deposit system

H. Biodegradable Plastic Products

I. Pyrogenesis – www.pyrogenesis.com



A. **Rethink Plastic:** For every item offered or chosen, consider an alternative that is not made of plastic. Do this by:

- **Refuse:** Single-use plastics end up in our oceans so ask for alternatives that can be used again.
- **Reduce:** Is it possible to reduce your plastic footprint by eliminating the amount of plastic products used? Eg: Use foil instead of plastic wrap for food
- **Re-use:** If you can't use an alternative to plastic, make sure you re-use it where possible and dispose of responsibly.
- **Recycle:** If you must purchase plastic, where possible, opt for those that are recyclable to reduce additional material ending up a in landfill.

B. **Recycling**

- Advantages
  - Reduces our requirement on virgin plastics, thus reduces our oil consumption
  - Prevents used plastic from ending up in the environment
- Disadvantages
  - Contaminants in food packaging are likely to concentrate over repeated recycling processes
  - Recycling makes us believe the perception that we can continue our dependency on disposables. Recycling should be considered a last resort for 'disposable' plastics after reducing, recovering, redesigning, reusing and replacing

1. Mixed Plastic Recycling (www.gruener-punkt.de)

- Advantages
  - Most plastics can be recycled including simple household items, buckets, plant pots, garden furniture
  - Relatively cheap
- Disadvantages
  - Limited use - mixing different colours tends to result in dark grey pellets
  - PVC and Styrenes still need to be separated

2. Separating Plastics for Recycling
    - Advantages
        - Higher value pellets
        - Clear and lighter colors have more uses
        - 'Closed loop' recycling is the most sustainable system available
    - Disadvantages
        - Higher initial investment cost for plant that separates types
        - Plastic should be separated at collection point, which adds considerable cost. This would only work efficiently if the public is willing to separate their plastic waste.
        - Legislation over food grade plastics places a burden on manufacturers

C. **Incineration**

- Advantages
    - Plastic can be converted into energy, including electricity
    - Prevents waste plastics from reaching the environment and raw material (oil) has a second life
- Disadvantages
    - Poisonous gases are bi-product and must be safely removed from the process
    - Not as sustainable as recycling, a process that can be repeated many times
    - Simple incineration without energy production may prevent material reaching the environment, but is costly and inefficient

D. **Thermal Cracking - Molten Metal Incineration** (www.stxmultifeed.com)

- Advantages
    - Plastic waste generates energy
    - Waste gases can be used in cooling systems – cleaner process
    - Higher efficiency rates that standard incineration
- Disadvantage
    - Initial investment is high

E. **Reconfiguration – using plastic, without changing with heat, as a raw material for other products –** www.affresol.com**,** www.cynarplc.com

- Advantage
  - Plastic is used as a raw material for other products, so there is no need to change its properties. However, chemicals or other products are added. For example: material for building blocks, clothing, cartons etc.
- Disadvantage
  - Limited use currently

F. **Pyrolisis - the thermal process using high temperatures to breakdown waste in the abscence of oxygen.**

- Advantages
  - Thermochemical decomposition of plastic changes its structure to produce oil for fuel
  - Profitable
  - Less dependence on fossil fuels
  - Can be very small scale for individual or company use – www.blest.co.jp
- Disadvantage
  - Could produce harmful gases if not treated correctly to remove these

G. **Re-use via Cash Deposit System**

- Advantages
  - Pricing for drinks in plastic bottles includes deposit paid by consumers – incentive to return them
  - Conveniently placed machines at supermarket entrance accepts bottles in exchange for vouchers, creating incentive for recycling
  - Machines sort bottles into plastic types on site ready for specific recycling
- Disadvantages
  - Water has to be potable – may not be option for developing countries

H. Biodegradable Plastic Products

- Advantages
  - Will degrade naturally given the right conditions – currently only available in commercial composting plants
  - Could replace many 'disposable' plastic products and therefore reduce dependence on oil reserves
  - Fungi and Algae are being used successfully to produce polymer chains that may eventually become more 'degradable'
- Disadvantages
  - Bioplastics are not necessarily biological and degradability issues also need to be considered. In an aerobic, sunlit environment bioplastics will degrade at a faster rate - but in oceans and landfill degradation is extremely slow and waste still must be dealt with
  - Using disposable items perpetuates the culture that using something once and throwing it away is acceptable
  - Monoculture is encouraged by this process and available land that could produce food would be reduced

I. Pyrogenesis (or Plasma Gasification) – an extreme thermal process using plasma which converts waste into a synthesis gas, primarily made up of organic matter, hydrogen, carbon and oxygen – www.pyrogenesis.com

- Advantages
  - A process that uses plasma to generate high temperatures which effectively vaporizes the waste
  - Pyrogenesis plants are small enough for very low-scale incineration such as onboard vessels at sea
  - Resultant solid residue is extremely small and benign
  - Gases are collected and removed before entering the atmosphere and can be recycled to generate energy needed to power the process
- Disadvantages
  - It is in no way a self sustaining system
  - There are initial limitations due to an inability to scale up plasma technology to beyond 50 tons a day - but now companies are starting to do this on a larger scale
  - High initial investment – best for dealing small-scale waste problems or in addition to pyrolysis or recycling plant

Discussion Questions

Instructions: When the film finishes, immediately begin a guided discussion. The following are some questions and topics to stimulate a discussion after the film. Please also refer to the Frequently Asked Questions (Page 21) to guide your discussion.

1. Where does plastic come from?
2. How does plastic get in our oceans?
3. What scene from the film most personally affected you? Why?
4. What does business and industry need to do to help our plastic pollution problem?
5. What does government need to do to help our plastic pollution problem?
6. What do we as a society need to do to help reduce our plastic pollution?
7. What are some ways we can galvanize our community to solve our plastic pollution problem? (i.e. call representatives, letter writing campaign, Plastic Free Pledges etc.)
8. How can we reduce our plastic use on this campus?
9. What can we do personally? (Also See Page 21 of the FAQ for Ideas)
10. How can we creatively and effectively spread this message?

Frequently Asked Questions

Instructions: The following are some questions and topics typically brought up after a screening. Please use this FAQ, along with the provided discussion questions, to guide your post-screening dialogue.

Frequently Asked Questions:

- Problems to Current Solutions
- Film Production

Problems To Current Solutions

Q. What can we do?

A. We need to stop using single-use plastic wherever that is possible. Here are some more potential solutions:

- Go to our website for inspiration and please donate if you can to help us: https://www.plasticoceans.org
- Bring your own bag to the shops
- Drink tap water and carry it in your own bottle
- Don't buy body scrubs - those tiny beads are usually made of plastic
- Choose fruit and vegetables that are not wrapped in plastic
- Use matches instead of 'disposable' lighters or use a re-fillable one
- Don't use 'single-use' plates, knives, forks etc. Wash up after you eat.
- Wherever you can, choose liquid products that can be re-filled rather than bought new.
- Refuse plastic straws in your drinks
- If you can't find an alternative to single-use plastic, make sure you recycle it
- Don't celebrate with balloon releases. The chances are the balloons will land in the ocean, choking seabirds, turtles and marine mammals
- Use crystal deodorants – they last far longer, are more effective and some even come with no plastic packaging at all
- Use good old-fashioned soap – it works as well as liquid soap and lasts longer
- Buy butter wrapped in paper instead of in a plastic tub

Q. Is compostable or biodegradable plastic the answer?

A. Not yet. They are both options that may have potential in the future and hopefully will be developed further.

- Compostable Plastic - is currently only an alternative if it is separated out from the waste stream, collected separately, and then placed in an industrial composter. Compostable plastic will not 'break down' in the ground. Compostable plastic needs light, oxygen and heat, none of which will be available in a landfill. Until that happens compostable plastic will act like normal plastic and can continue to harm wildlife.
- Biodegradable Plastic - is in its infancy and there are many unsuitable types on the market.
    - For example: biodegradable plastic bags bound together with vegetable components. Once the vegetable has degraded, small pieces of plastic remain in the environment and cause just as much harm as any other plastic.
    - In addition, these bags often look so much like non-biodegradable plastic, they are neither separated nor collected differently. Thus, the bags are likely to end up either in recycling – which will not work - or in a landfill where they still take years to degrade. And, if the bags do end up in our oceans, they will still harm wildlife via entanglement and ingestion, due to their long breakdown time.

Q. How can we remove the plastic that is already in the oceans?

A. At the moment there is no safe way to remove plastic from the oceans. This is because:

- The oceans are far too big
- The majority of the plastic has already sunk to the depths
- The plastic in our oceans breaks into tiny fragments that mix with plankton. Removing the plastic would also mean losing the plankton. This is especially problematic as plankton is the vital base of the marine food chain. Similarly, the plant element, phytoplankton, provides more than half of the Earth's oxygen supply and absorbs more of our CO_2 than our forests.
- Beach clean-ups can help prevent plastic on the beach reaching the oceans and causing harm. Beach clean-ups also raise awareness, as long as the plastic is sorted and recycled responsibly.
- Putting booms at river mouths can also help, as long as the collected waste is responsibly disposed of.
- In conclusion, stopping plastic at the source is our best solution.

Q. What about the 'Seabin' that sucks all the trash into it, as we've seen on YouTube?

A. The Seabin certainly sucks up things from the surface. However, the Seabin has potential problems:

- The Seabin needs to be plugged into an electricity supply, so the Seabin can only work in marinas and places close to that supply.
- The Seabin's waste needs to be collected, sorted, and disposed of effectively, so the Seabin potentially can remove the hard work of fishing for litter in coastal areas. However, the hard work often really begins once the plastic is brought to the shore.

Q. Is it dangerous to eat seafood? Do you eat seafood?

A. This is a hard one to answer, as we can't experiment on humans with toxins. Also, linking a disease or disorder to a fish that may have been eaten years before is almost impossible.

- What we do know from published science: the chemicals that are carried by or leach from plastics have been associated with diseases and disorders in the lab.
- Currently 25% of fish and 100% of mussels studied contained plastic. Even if this is at a level where it is not causing harm, we cannot afford to let it become worse.

Film Production

Q. How can we watch the film?

A. Please see our website: www.plasticoceans.org

Q. How much did the film cost to make?

A. Approximately US $3.5 million

Q. How long did the film take to make?

A. Actual filming was about 4 years

Q. Why did it take so long from beginning to end?

A. Fundraising began as the world descended into recession, making fundraising a huge challenge. Funds were raised throughout the production phase, and it was two years of research and fundraising before our first shoot - filming the Blue Whales in Sri Lanka.

Q. What was the hardest part of making the film?

A. Apart from raising the funds – the initial trip out to the so-called 'Great Pacific Garbage Patch' was the opposite of an 'eye opener.'

- We had expected to encounter a new continent, ten metres deep of plastic, stretching for hundreds of miles. We were already working out how to film it above, below, and around with all kinds of technical filming gear.
- Instead, we were met with a clear, blue, sparkling ocean.
- It wasn't until the surface plankton trawls were deployed that the real 'garbage patch' revealed its true horrors. The story had suddenly become far more serious and frightening - but how could we possibly make a film about something that was almost invisible? It would make a great scientific radio programme, but that would be something entirely different.

- And so, the progress began. We started with the question 'Which charismatic animal feeds on plankton?' Answer: Baleen whales!
- From there we brought in the 'boys toys,' including a submersible to dive into the depths below. The stories soon came thick and fast, but the funding could never keep up. On top of that, the weather was rarely our friend so very, very few trips happened easily.

Activities

Activity A: Possible Solutions, Possible Problems

1. Break the class into small groups. Research and brainstorm possible solutions to our plastic pollution problem for the following:
    - Group # 1: Recycling
    - Group # 2: Incineration
    - Group # 3: Biodegradable plastics
    - Group # 4: Pyrolysis (plastic to diesel)
2. 10 Minutes - Come back together as a big group. What are the advantages and disadvantages of each possible solution?
3. 10 Minutes - How can we share this message and move forward? Possible ideas include: school campaigns, presentations to other classes, letters to papers, beach cleans, lobbying local government, etc.

Activity B: Rethinking Plastic

Instructions: Read the following aloud to the class: "In order to reduce our plastic use, always consider an alternative to a plastic item offered. You can do this with The 4-Rs to Rethinking Plastic:

- **Refuse:** single use plastics end up in our oceans, so ask for alternatives that can be used again.
- **Reduce:** Is it possible to reduce your plastic footprint by eliminating the amount of plastic products used?
- **Re-use:** if you can't use an alternative to plastic, make sure you re-use it where possible and dispose of responsibly.
- **Recycle:** If you must purchase plastic, opt for items that are recyclable to reduce additional material ending up in landfills. From a sustainability perspective, recycling remains one of our key solutions. Recycling reduces our requirement on virgin plastics (thereby reducing our consumption of oil, as plastic is made from oil) and also prevents used plastic from ending up in the environment.

Now, let's brainstorm. How can you use the 4-R's to rethink plastic? For example:

- **Refuse:** Say no to single use plastic products, ask for alternatives to single use plastic plates, cutlery or cups when eating out, use bar soap instead of liquid.
- **Reduce:** Carry a refillable water bottle, use stainless steel straws, bring reusable shopping bags.
- **Re-use:** Refill a plastic water or soda bottle, turn plastic bottles into art.
- **Recycle:** Never let a balloon fly away.

Activity C: Creative Activism

- Ask each student to bring in a single-use plastic item from their household that would have been thrown away.
- Use these plastic items to create a public art display. Place the display somewhere prominent in the school to incite discussion and spread awareness.
- Example:

Activity D: Social Media Campaign

Instructions: Break the class into small groups. Each group will design, create, and execute a social media campaign to help further their knowledge, raise awareness, and create possible solutions to our plastic pollution problem. Have students complete the following:

1. Describe the problem.
2. Develop the social media plan. Remember to consider:
    - Shocking, interesting, or horrifying facts you want to share
    - Videos and pictures you want to share
    - Frequency and schedule of posting
    - Creating a video of yourself, making a call to action
3. Please use Plastic Oceans hashtags and handles to spread the word: **@PlasticOceans, #APlasticOcean #SaveOurSeas #PlasticPollution**
4. Instructions for Pixhug below:

Download on the App Store

Support the
Plastic Oceans Foundation
and help raise awareness and funds
by posting a photo of your pledge
to Pixhug.

1. Download the Pixhug iOS App* from the App Store and sign up with your Facebook account
2. Select the Plastic Oceans' campaign and tap "Support this Cause"
3. Write down your pledge on the reverse side of this paper and take a photo or upload it from your phone

For every 'like' your photo receives on Pixhug or Facebook, 10 cents will be donated by Pixhug to preserve our oceans.**

Let's get 10,000 likes!

*If you are an Android user, post your pledge to Facebook and/or Instagram and tag @PlasticOceans #awaveofchange, and @Pixhug (Facebook) or @PixhugMedia (Instagram) #Pixhug
**If you allow the Pixhug App to post to Facebook, the photo will be shared to your wall and all Facebook 'likes' will turn into donations. Pixhug will never post without your permission.

pixhug PLASTIC OCEANS

I’m Rethinking Plastic

by pledging to

pixhug

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Activity: Another Activity For College Students:

Some possible ideas for college activities:

E. Draft an Editorial

Instructions: Draft an editorial for your school newspaper. Persuade your campus to ban one of the following items: plastic bags, plastic takeout containers in the cafeteria, or plastic drinking straws. (Helpful hints for drafting a great editorial here: https://www.geneseo.edu/~bennett/EdWrite.htm)

C. Zero Waste Experiment Day

Instructions: For one day, instruct students to produce as little waste as possible. Have students keep a log of all the times during the 24-hour period they could have produced waste (i.e. purchasing coffee in a to-go cup), and what alternative method they used.

After this personal experiment have students journal about the following:

A. What surprised you about this Zero Waste Experiment? Do you create more or less waste than you thought?

B. When was it difficult for you to not create waste? (i.e. in the cafeteria, at Target, etc.)

C. When was it easier for you to not create waste?

D. After this Zero Waste Experiment, what are some things you would like to do from now on to reduce your overall waste?

N. Lobby Your Official

Instructions: Students will create one key piece of legislation (ban i.e. plastic bags) they would like to lobby their official on.

1. Create a lobbying campaign goal and mission.
2. Identify key problems or resistance and solutions to overcome these barriers.
3. Create a lobbying campaign strategy and design: letter writing, coordinated social media efforts, attending town hall events, meetings with your legislator, collecting a petition, a march, etc.
4. Identify partners who will advocate for your cause. How can you include these partners in your campaign strategy and design?
5. Implement your campaign.

*this activity could work for a city/town officials, or for the Student Government Association.

Activity E: Poster And T-Shirt Campaign

Instructions: Have students create a T-shirt design or poster to educate fellow students and school staff on our plastic use and plastic pollution.

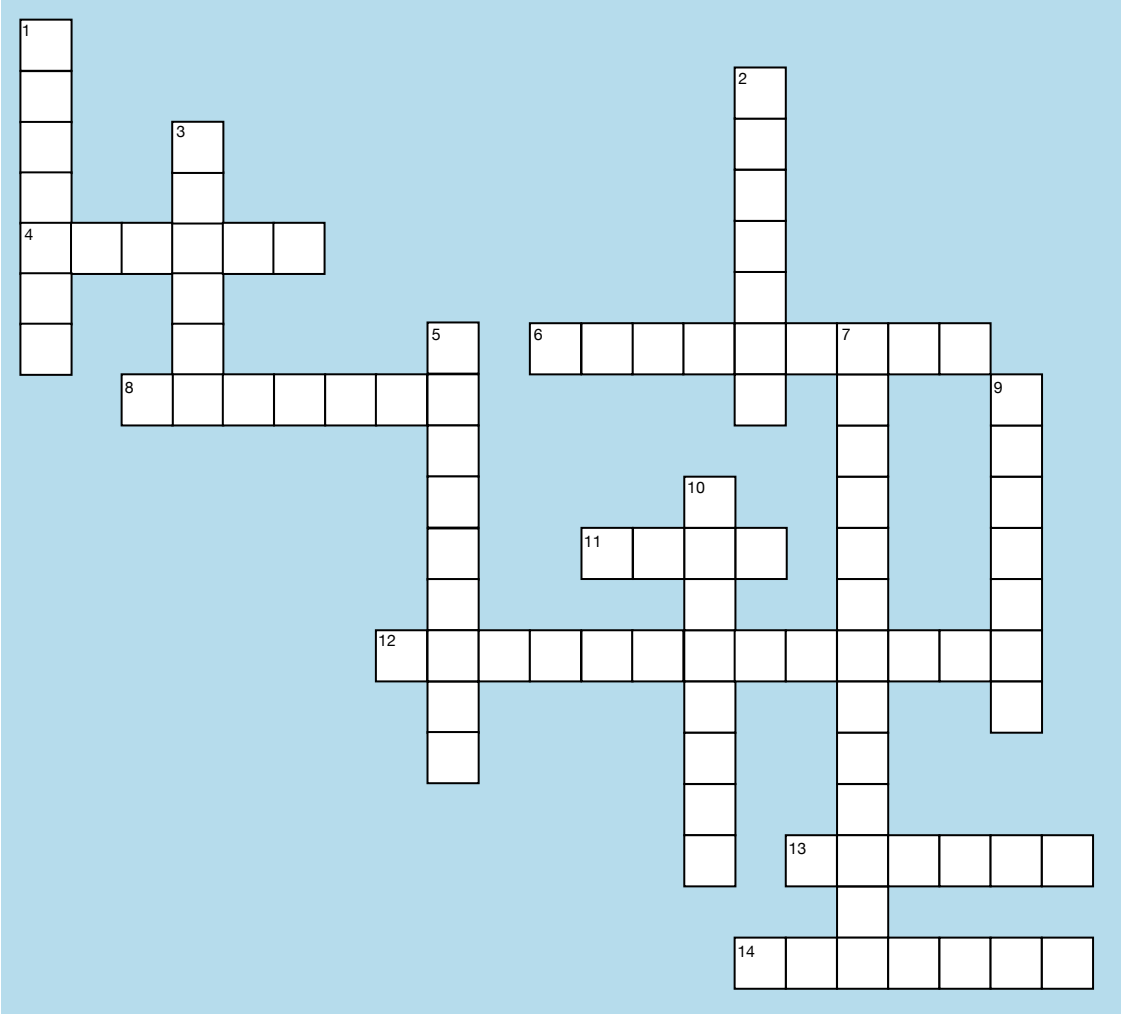
- Example:

Activity F: Plastic Ocean Word Search

C E Z B O O P X E D P E P T T
G E D C Z L R S R O W V L E U
L Y E U A V U I L D A I A G R
A A R S C E B I S T R T N N T
N V T E L A C R A Q T A K A L
D I G G E Y T S F H S N T H E
C U N S U S N I X O T R O C E
F I S O L U T I O N S E N V H
S N U R D L E B E N X T L N F
K N I H T E R L O L M L T I H
F P R I V E R S C T A A E H E
E S U E R E N M W Y T H O P A
W B L Y T O K G F N C L W L L
N Z N A V D N X A R N E E O T
V W W F I S H J A M W J R D H

ALTERNATIVE
BOTTLE
CHANGE
CURRENT
DOLPHIN
EDUCATION
FISH
GYRE
HEALTH
LAND
MAGNET
NURDLE
OCEAN
PLANKTON
PLASTIC
POLICY
RECYCLE
RETHINK
REUSE
RIVERS
SEABIRD
SINGLEUSE
STRAW
TOXINS
TURTLE
WATER
WHALE

Activity G: Plastic Ocean Crossword



Word List

AWARENESS
BIOACCUMULATE
CHANGE
ENTANGLEMENT
FOOD
JELLYFISH
MINUTES
NURDLES
PLASTIC
REFUSE
RECYCLE
RETHINK
SOLUTION
TUVALU

Across

4 The island paradise drowning in plastic

6 Behavioural change starts with this

8 The last Resort in the 3 R's

11 1 in 3 sea birds mistake plastic for this

12 When toxins travel up the food chain

13 The first choice to make in the 3 R's

14 What we want you to do when it comes to your plastic habits

Down

1 80% of marine litter is made up of this

2 Single Use Plastics have an average lifetime of just 12 of these

3 We are creating "a wave of"

5 A turtle's favorite food

7 A significant source of injury to marine life

9 Name of the raw pre-production plastic pellets made from oil

10 We want to be part of this and not the problem

Glossary

Glossary of Terms

Bioaccumulation

The gradual build up over time of one or more chemicals in a living organism.

Bio-plastic

Plastics derived from renewable biomass sources, such as vegetable fats and oils, cornstarch, or microbiota.

Booms

A barrier placed in a river, designed to collect and or contain flooding waste.

Bridge Solutions

A solution that works to remove only some petrol-plastic products, leaving behind some plastic product and their negative by-products to remain in the environment.

Closed-loop System

A production process in which waste is collected, recycled and used to make new products.

Downcycle

The process where the destruction or recycling of waste materials is created into something of lesser quality. (Some waste will go on to be reused over and over again, but not all materials are created equal, where some will be gradually destroyed by the recycling process.)

Entanglement

The process when an animals mobility is impaired due to being tangled in marine debris, predominantly plastic fishing nets, ropes, sheeting and bags. Entanglement leads to drowning, cuts, infections and starvation.

Gyre

A large rotating ocean current that collect marine debris and break down plastic into microplastic.

Long-term Solution

A solution that works to remove all petrol-plastic products and their by-products from the environment.

Microbeads

Tiny bits of plastic (particles of less than one millimeter) found in hundreds of personal care products such as toothpaste and soaps.

Glossary of Terms (continued)

Microfibers

Tiny synthetic fibers that are used in synthetic fabrics such a polyester. 60% of all clothing on earth is made of synthetic fiber and each time clothes are washed they release microfibers that flow down our drains, through water treatment plants, and out into our rivers, lakes and oceans by the billions.

Microplastic

Small plastic particles in the environment (less than 5 mm in diameter) that are harmful to our oceans and aquatic life. Microplastics can come from a variety of sources, including cosmetics (microbeads), clothing (microfibers), and industrial processes (nurdles).

Nurdles

A very small pellet of plastic that serves as raw material in the manufacture of plastic products.

Open-loop System

A production process in which waste is not indefinitely collected or recycled and is eventually excluded from the utilization loop and becomes waste.

Petro-plastic (or Petroleum-based Plastic)

Plastics derived from natural gas, feedstocks derived from natural gas processing, and feedstocks derived from crude oil refining, and synthetic polymers such as polyethylene, PVC, nylon, and styrene.

Plastic

A synthetic material made from a wide range of polymers that can be molded into shape while soft and then set into a rigid or slightly elastic form.

Recycle

The process of converting waste into reusable material or the return of material to a previous stage in a cyclic process. *(See Downcycle and Upcycle)*

Trawl

A method of fishing that involves pulling a fishing net through the water behind one or more boats. Trawling can be contrasted with trolling, where baited fishing lines instead of trawls are drawn through the water.

Upcycle

The process where the destruction or recycling of waste materials is created into something of higher quality or value than the original.

Take Action

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How You Can Help

7 Easy Things You Can Do to Reduce Plastic Pollution

1 Stop using plastic straws.

In the US and UK

550 Million

Thrown Away Every Day

2 Skip the plastic bottle...drink beverages from reusable bottles or mugs.

Worldwide, Over

500 Million

Plastic Bottles Used Every Year

3 Take your groceries home in reusable bags, not plastic.

Worldwide, Up To

1 Trillion

Plastic Bags Discarded Every Year

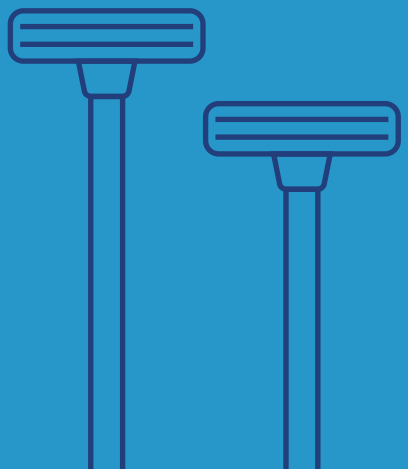
Use cloth diapers instead of disposables. 4

In the US, Over

27.4 Billion

Disposables Thrown Away Every Year

5 Ditch the disposable razor.



In the US, over

2 Billion

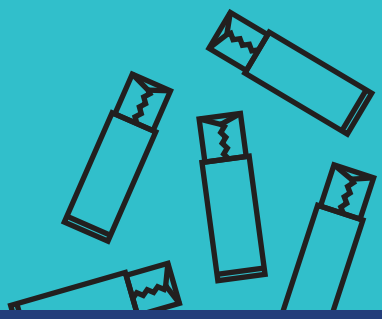
Thrown Away Every Year

6 Give up gum. It's made of synthetic rubber, which is a plastic.

Worldwide, Over

100,000 Tons

Discarded Every Year



7 Get the plastic off your face.

Over

300,000

Plastic Beads In A Tube of Facewash

With your help, we can create a wave of change and protect the planet for future generations.

SOURCES

1. http://www.ecocycle.org/bestrawfree/faqs

2. https://www.theguardian.com/environment/2017/jun/28/a-million-a-minute-worlds-plastic-bottle-binge-as-dangerous-as-climate-change

3. https://blog.epa.gov/blog/tag/plastic-bags/

4. http://content.time.com/time/magazine/article/0,9171,1702357,00.html

5. https://groundswell.org/2-billion-tossed-per-year-whats-the-most-wasteful-bathroom-product/

6. https://www.plasticoceans.org/100000-tons-of-plastic-pollution-from-your-mouth/

7. http://www.motherjones.com/environment/2015/05/microbeads-exfoliators-plastic-face-scrub-toothpaste/

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For more information, visit **PlasticOceans.org**

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Create A Wave of Change

Think Reusable, Not Disposable

- Refuse single-use plastics when you can
- Bring a reusable shopping bag with you to the store
- Carry a reusable container for water and coffee
- Skip the straw/stirrer and avoid plastic utensils
- If you must purchase plastic, please recycle!

SHARING IS CARING

Let others know how you care about protecting our oceans and beaches, and invite them to join our global movement **@PlasticOceans**

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A Plastic Ocean: Facilitator's Powerpoint

Instructions: Please use this PowerPoint to guide a 20-minute discussion immediately following your screening of ***A Plastic Ocean***.

INSERT: Link for instructor to access the powerpoint

Additional Resources

We would like to thank our educational sponsors Adessium and Hemera Foundations.

Click here for additional resources:

A Plastic Ocean Scientific Review

Orb Media Microplastic Research Vimeo

Orb Media Website

Plastic Pollution Coalition Guides (for Schools, Towns, Events, Eats)

Oceanic Society, Brian Hutchinson, "7 Ways to Reduce Plastic Pollution Today"

Monterey Bay Aquarium, "Ocean Plastic Pollution"

WasteWise, "Oceans and Plastic Pollution: A Quick Guide"

World Oceans Day, Take Action Guide, Aquatic Cleanup Guide, Talking about Plastic Factsheet, Additional Resources