Regional Class Research Vessel

Oregon State University

# Engineering a Solution to Marine Debris

## Timeframe

1 fifty minute class period

## Target Audience

Grades 4th- 6th

## Suggested Materials

- Engineering a Solution to Marine Debris PowerPoint
- Drawing paper
- Construction paper
- Graph paper
- Drawing utensils
- Rulers, protractors, and compasses
- Additional options: Legos or additional materials to build models

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## Description

Students will learn about the most prevalent type of marine debris: plastics and microplastics. Students explore a variety of ways scientists have engineered solutions to marine debris. Students will design their own trash collectors to remove marine debris from the oceans, and beaches, or prevent it from entering the waterways.

## Objectives

Students will:

- Learn about what scientists are doing to clean plastics and microplastics from our oceans
- Design a device/structure to remove existing marine debris
- Learn about devices currently being used to remove existing marine debris
- Learn about microplastics and the difficulty removing them from Earth's oceans

## Essential Questions

What are some creative solutions to removing plastics from the ocean?

## Background Information

Marine debris is a global problem, impacting all of the world's oceans. The source of pollutants includes decades of industrial waste, raw sewage overflows, runoff from cities, and mining operations. Once debris reaches the ocean, it is difficult to remove!

Plastic is the most prevalent type of marine debris found in our ocean. Plastic debris can come in all shapes and sizes, but those that are less than five millimeters in length (about the size of a sesame seed) are called microplastics. Microplastics are the result of a variety of sources including the degradation of larger plastic already in the oceans, the disposal and breakdown of consumer products, and industrial waste. Microplastics are even more difficult to filter out, because of their small size. Even plankton, an essential creature of the marine food chain, have been found to eat microplastic

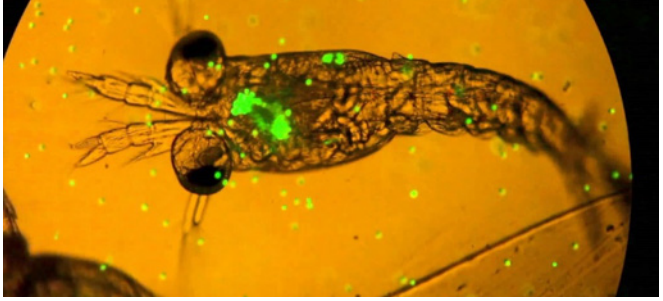

**Figure 1**. Plankton munching microplastics that have been colored with fluorescent dye.

## Activity Introduction

Have students watch the following video. Don't provide any introduction.

https://www.youtube.com/watch?v=2oQeXhURTgY

Discuss: what did you see? What did you wonder about it? What do you wonder?

Ask students if they have ever seen trash in their community in places where it doesn't belong? How might it have got there?

## Activity:

1. Remind students of what they have already learned about Marine Debris (or provide them with background information on marine debris using the *Marine Debris Powerpoint*.

2. Let them know that marine debris and microplastics are a big problem in our oceans and there are many ways that scientists are working to find a solution. Tell students that they are going to work to design a solution to this problem.

3. Tell students that they are going to be designing their own trash collector to remove marine debris from the oceans, and beaches, or prevent it from entering the water ways. Devices should not harm or interfere with wildlife. If students want a challenge, allow them to design a device that cleans both plastics and microplastics!

4. Have students sketch their ideas.

5. Have students write a few sentences about what they want their machine to do and look like. Students should draw inspiration from the Engineering a Solution to Marine Debris PowerPoint.

6. Have students share their drawings or models in pairs,

## Next Generation Science Standards

### PERFORMANCE EXPECTATIONS:

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

### DISCIPLINARY CORE IDEAS:

ESS3.C.: Human Impacts on Earth Systems

### SCIENCE AND ENGINEERING PRACTICES:

Obtaining, Evaluating, and Communicating Information

### CROSSCUTTING CONCEPTS:

Systems and Systems Models
Science Addresses Questions About the Natural and Material World

explaining their concepts while the other student asks questions.

Extended: If there is time, have students prototype their designs using materials such as: Legos, straws, paper tubes, popsicle sticks, etc.

### Wrap Up

As a class, have individuals share their concepts and designs. With a large poster paper, have students sign their name on a pledge stating, "I pledge to help decrease the contribution of plastic pollutions in our oceans! By taking small steps every day, I can make a huge difference!" Students can sign their name, and add an additonal note with one step they can make to help prevent or clean up plastic pollution!

This project is supported by the Regional Class Research Vessel Program in the College of Earth, Ocean, and Atmospheric Sciences at Oregon State University.

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### Adapted From:

An Educator's Guide to Marine Debris: Lesson Two: Trapping Trash
https://marinedebris.noaa.gov/sites/default/files/publications-files/NAMEPALearningGuideFinal.pdf

### References

https://response.restoration.noaa.gov/about/media/innovative-solutions-tackling-plastic-pollution-ocean.html

http://oregoncoaststem.oregonstate.edu/sites/oregoncoaststem.oregonstate.edu/files/MD/mitigatingmicroplasticscurriculum.pdf

https://oceanservice.noaa.gov/facts/microplastics.html

https://marinedebris.noaa.gov/sites/default/files/publications-files/NAMEPALearningGuideFinal.pdf

https://www.youtube.com/watch?v=nBVL3lp9fGo

https://www.youtube.com/watch?v=QCozwkSQ7g0