

MARINE DEBRIS - Composition and Abundance

Materials for Grades 4-5

Overview	What is marine debris? Through classroom and field activities, students sort, categorize and come up with a common definition of marine debris. They identify characteristics common to marine debris by experimenting with different materials and analyzing collected samples.
Essential Questions	<ol style="list-style-type: none"> 1. What is marine debris? 2. Where do we find marine debris? 3. What physical characteristics do marine debris materials have in common?
Key Concepts	<ul style="list-style-type: none"> • Marine debris is any persistent solid material that is manufactured or processed and disposed of or abandoned into the marine environment. • Marine debris exists where humans can easily see it, as well as places where humans cannot easily see it. • The majority of marine debris is made of plastic materials.
NGSS (DCI) Connections	<p>PS1.A - Structure and Properties of Matter - <i>Measurements of a variety of observable properties can be used to identify particular materials.</i></p> <p>ESS3.C - Human Impacts on Earth Systems - <i>Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments.</i></p>

BACKGROUND INFORMATION

- *Marine debris* is any solid, persistent, human-created waste that has been deliberately or accidentally introduced into a waterway or ocean. Marine debris is a global problem which impacts ecosystems and organisms from shorelines to the ocean floor.
- Find a more comprehensive definition of marine debris can be found in this [National Geographic encyclopedia entry](#)
- Find several short videos that provide an overview of marine debris on the [NOAA Marine Debris Program website](#)

Lesson 1 - Beach Box Exploration [\[pdf\]](#)

Oregon Sea Grant

What is marine debris?

Bring the beach into the classroom. In this activity, students explore contents of ‘beach boxes’ in groups at tables, sorting contents into “marine debris”, “NOT marine debris” and “not sure”.

Reflection/Extensions:

What evidence did you use to decide if an item was marine debris or not? Did you detect any similarities or patterns in the box contents? Were you surprised to find particular objects in the box?

Lesson 2 - Human Impact Survey [\[link\]](#)

Alaska Seas and Rivers Curriculum, Alaska Sea Grant

Can we find evidence of marine debris on the beach?

Students explore a local riverbank or beach and carry out a survey to assess human impacts on the area. Students analyze and share their findings.

Reflection/Extensions: What were the main types of marine debris found at your study site? What further questions do you have about marine debris at your study site? How could you design an experiment to answer one of those questions?

Lesson 3 - Quantifying Marine Debris [\[pdf\]](#)

Plastic Beach Project from 5 Gyres (includes the NOAA Marine Debris Shoreline Survey Field Guide and data card)

How much and what kind of marine debris is on the beach?

Students use a sampling protocol to collect, sort and quantify (by number or by weight) marine debris collected from a beach. The 5 Gyres lesson provides data cards for macro and micro marine debris.

Reflection/Extensions: Create a graphical representation of the types and quantity of marine debris collected. What kind of conclusions can you draw from your results? Share your findings with a community audience. Create a field guide to marine debris that can be used by local student/community groups.

Resources:

1. Sorting picture card for small items (<2.5cm) [\[pdf\]](#)
2. TeachWild data card for sorting by color [\[link\]](#)
3. Example of how to report beach clean up data, from San Diego County - [\[link\]](#)

Lesson 4 - Trash Traits [\[pdf\]](#)

NOAA Marine Debris Turning the Tide on Trash

What are some characteristics of marine debris?

Students perform experiments to examine whether or not trash can float, blow around, or wash away.

Reflection/Extensions

Based on your experiments, which items have the greatest potential to become marine debris and why?

Resources

NOAA's "What we know about plastic marine debris" Fact sheet [[pdf](#)]

Lesson 5 - How Long Until It Is Gone? [[pdf](#)]

SMILE (Science and Math Investigative Learning Experiences) at Oregon State University

How long does marine debris persist in the environment?

Students identify decomposition rates for different types of marine debris and use the information to determine the significance of marine debris in the ocean.

Reflection/Extensions

Which objects persist the longest? How does the decomposition rate of marine debris relate to potential impacts of the debris on the ecosystem or various organisms? Could marine debris continue to impact ecosystems even after fragmentation?

Resources

- How Long Until It's Gone? infographic from NOAA [[pdf](#)]
- Do you have the space and want to get your students up and moving? Turn the lesson into a relay running game [[pdf](#)].