

OCEAN CLASSROOM LIVE!

Talking Trash about Ocean Pollution (S2, E2)

EDUCATOR SUPPORT MATERIALS

THE
UNIVERSITY
OF RHODE ISLAND
GRADUATE SCHOOL
OF OCEANOGRAPHY

Scientists continue to learn how plastic waste and dangerous chemicals make their way into the ocean environment and harm marine life. What and how are we learning about these issues? Where does this pollution come from? Where does it go? Join Coastal Resources Center director & GSO professor J.P. Walsh and GSO graduate student Matthew Dunn as they discuss the dangers posed by marine pollution and “forever chemicals” called PFAS, and what we need to do to address them.

Discussion Questions

- What are microplastics and where can they be found?
- How do microplastics impact the ocean?
- What are PFAS?
- What are the impacts of PFAS on humans and the ocean?

Resources

Graduate School of Oceanography

As one of the nation’s premier academic oceanographic institutions, the University of Rhode Island’s Graduate School of Oceanography (GSO) educates marine scientists, students, policymakers, business leaders and citizens and helps develop the knowledge and skills necessary to address present and future marine challenges.

- GSO: <https://web.uri.edu/gso/>
- Inner Space Center: <http://innerspacecenter.org/>
- Rhode Island Teachers At Sea: <https://web.uri.edu/gso/research/outreach/rhode-island-teachers-at-sea-program/>
- GSO Ocean Classroom: <https://web.uri.edu/gso/outreach/ocean-classroom/>
- GSO Facebook: <https://www.facebook.com/URIGSO/>
- GSO YouTube: <https://www.youtube.com/c/URIGraduateSchoolofOceanography>
- GSO Twitter: <https://twitter.com/urigso>
- Walsh COAST Lab: <https://web.uri.edu/gso/research/research-facilities/walsh-laboratory/>
- Coastal Resources Center: <https://web.uri.edu/crc/>

- STEEP: <https://web.uri.edu/steep/>
- STEEP Action for PFAS: <https://web.uri.edu/steep/pfas/action/>
- STEEP resources for education: <https://web.uri.edu/steep/resources/outreach/>

Other Resources

- Mapping Plastic from Shore to Seafloor:
<https://web.uri.edu/gso/walsh-lab-news/mapping-plastic-from-shore-to-seafloor-narragansett-bay/>
- Reducing Waste by Building Habits at Home
https://blog.marinedebris.noaa.gov/reducing-waste-building-habits-home?utm_medium=email&utm_source=GovDelivery
- Science Friday, Engineering a Fix for the Great Pacific Garbage Patch:
<https://www.sciencefriday.com/educational-resources/engineering-a-fix-for-the-great-pacific-garbage-patch/>
- Science Daily, *Lobster digestion of microplastics could further foul the food chain*
<https://www.sciencedaily.com/releases/2020/04/200408104929.htm>
- BRIDGE Ocean Education: www.bridgeoceaneducation.org

Suggested Standards

[Next Generation Science Standards](#) *K-12 Performance Expectations relating to Ocean Pollution.*

Elementary School

K: From Molecules to Organisms: Structures and Processes

- K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K: Earth's Systems

- K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Grade 1: From Molecules to Organisms: Structures and Processes

- 1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*

Grade 1: Heredity: Inheritance and Variation of Traits

- 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Grade 2: Biological Evolution: Unity and Diversity

- 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Grade 3: From Molecules to Organisms: Structures and Processes

- 3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.

Grade 3: Biological Evolution: Unity and Diversity

- 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- 3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change

Grade 5: Ecosystems: Interactions, Energy and Dynamics

- 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Grade 5: Earth and Human Activity

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

Grade 3-5: Engineering Design

- 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Middle School

MS: Ecosystems: Interactions, Energy, and Dynamics

- MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MS: From Molecules to Organisms: Structures and Processes

- MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS: Earth's Systems

- MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process
- MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

MS: Earth and Human Activity

- MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*
- MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

High School

HS: Ecosystems: Interactions, Energy and Dynamics

- HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- HS-LS2-6. Evaluate claims, evidence and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions but changing conditions may result in a new ecosystem.

- HS-LS2-7. Design, evaluate and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS: Heredity: Inheritance and /variation of Traits

- HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

HS: Biological Evolution: Unity and Diversity

- HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
- HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity

HS: Earth's Systems

- HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

HS: Earth and Human Activity

- HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
- HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

HS: Engineering Design

- HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

[Ocean Literacy Principles](#)

OLP1: The Earth has one big ocean with many features.

OLP5: The ocean supports a great diversity of life and ecosystems.

OLP6: The ocean and humans are inextricably interconnected.