Office of National Marine Sanctuaries
National Oceanic and Atmospheric Administration
in collaboration with Oikonos Ecosystem Knowledge

Education


Kure Atoll Beach – State of Hawaii, DLNR

Grade Level

- 6-8, with options for 9-12

Timeframe

- Two 45-minute class periods

Materials

- Chart paper
- Student worksheets
- Clipboards (recommended) - one per group
- Graph paper (optional)
- Garbage bags - one per group
- Recycle bags - one per group
- Gloves (one pair for each students - work gloves preferred, but latex or plastic gloves would also work)
- Lesson 5 Presentation

Key Words

- Watershed
- Marine debris
- Stewardship

WINGED AMBASSADORS
OCEAN LITERACY THROUGH THE EYES OF ALBATROSS

Lesson 5: Campus Debris Survey

Activity Summary

In this lesson, students will go outdoors and examine the potential sources of marine debris on their own campuses. They will analyze what they find and create a campaign to educate other students about marine debris and our own behaviors.

Learning Objectives

Students will be able to:

- Collect and analyze debris on their school grounds.
- Make connections between campus debris, marine debris, and ocean wildlife.
- Define the term ‘watershed’.
- Create a poster, brochure, or public service announcement to educate other students about how our own behaviors impact the ocean.

Outline

Engage – Litter and Albatross
Explore – Litter on Our School Campus
Explain – Analyzing Results
Elaborate – Our Litter and Albatross
Evaluate – Spreading the Word

Background Information

The amount of human trash in our oceans is increasing and affects many species, including seabirds and the fish we eat. The majority of marine debris comes from land sources. This includes intentional and accidental littering. Students will study their own school campus, and make connections to International Coastal Cleanup data as well as the albatross boluses that they examined in Lesson 4. The goal is for students to understand that changing our behaviors and choices can result in less marine debris and other pollution.

Preparation

- Gather materials for the campus debris survey
- Print Student Worksheets
- Visit campus locations to determine where you will have students gather debris. During this visit, decide which areas of campus you will send students to, how large of a plot groups should survey, etc.
- Share salient points of Lesson 4 with students, which focus on plastics and other litter consumed by seabirds.

**Note—you may wish to discuss this lesson with the school custodians to determine the days outdoor cleaning is conducted. Consider asking them to forgo cleaning up litter for a week or so to allow students to collect more data and for a greater learning impact.

Vocabulary

MARINE DEBRIS – any persistent non-natural solid material that is released into an ocean or large lake

BOLUS – mass of undigested material regurgitated by albatross chicks

RUNOFF – water flowing on earth's surface into bodies of water.

WATERSHED – the land area that drains into a body of water

Learning Procedure

Engage (5 minutes)

Ask students to share what they learned about marine debris in Lesson 4.

Explain that today they are going to survey debris on their own campus.

Ask students:

? What does litter on our own campus have to do with albatross?
Litter on land travels through wind and watersheds and can become marine debris.

? What kinds of items do you think we will find on our campus?
Answers will vary widely.

Record student answers on chart paper in order to later compare findings to their predictions.

Extension

On average, albatross chicks weigh 4,000 grams and are fed 25 grams of plastic in the 4 months before they fledge. To illustrate this amount, create an activity to scale up to a human stomach.

For example: This is equivalent to a high school senior (140 lbs) ingesting the weight of 150 bottle caps (2.5 g). This can be illustrated in a math and unit conversion activity, where students use ratios to make comparisons between albatross and humans.

Alternatively, students can create a model. They can collect the number of bottle caps equivalent to their own body weight and display this in a jar or bag that represents their stomach.

Explore (35 minutes)

Divide students into groups of about 3.

Explain to students the area(s) that each group will be responsible for and the length of time to spend in each area. The length of time will be of your choosing (suggested: 15 minutes). Leave enough time for a brief discussion before returning indoors.

Distribute gloves and trash/recycle bags, and review safety precautions, i.e., do not pick up anything sharp or potentially unsafe.

Distribute student worksheets and review the term "hypothesis," as well as the data table. Suggest that they use tally marks to record numbers of items. Remind students that they will be recording data as they pick up litter.

See Student Worksheet (Explore)

As students work in their groups, monitor their progress.

Regroup with students and ask them to share some of their initial impressions of the experience.

> **Differentiation:** With advanced students, consider measuring out equal areas of campus, i.e., quadrates, and calculating a rate of debris collection. This process introduces students to a common field technique used by scientists.

Explain (30 minutes)

Create a class summary data table on the board and ask groups to record their findings.

Groups should work together to answer the questions and create graphs. If using, distribute graph paper.

Review the graphs and questions as a class. Ask students to share some of the notes that they recorded while in the field. Point out that students collect both quantitative (numerical) and qualitative (descriptive) data, and that both are important.

Ask students to share their impressions of the data. Were they surprised by their findings? Why or why not?

Elaborate (15 minutes)

Through discussion and by reading the passage on the student worksheet, help students to make connections between their campus debris survey, marine debris, and marine animals such as albatross.

Review questions 8 and 9 as a class.

> **Differentiation:** Have advanced students analyze topographic maps of your local environment to determine where runoff flows.

? Which collected items might albatross (or other marine animals) eat?

? If your class completed the bolus analysis, did any of the items collected appear in the boluses you analyzed?
Answers may include bottle caps, Styrofoam, etc.

? Which collected items might entangle albatross or other animals?
Answers may include plastic bags, six pack holders, rope or string, etc.

Show students the slides that illustrate data collected by the Ocean Conservancy over the past 25 years, as well as impacts on marine organisms.

Ask students to make comparisons between their data and the data presented.

Ask students to talk with their group and to record some ideas for preventing this much debris from entering the ocean in the first place.

Discuss these ideas as a class. Which are feasible? Which are not?

Discuss the everyday materials that students and their family use.

? What are some things that you use that are only used once?
Answers may include plastic bags, water bottles, plastic utensils, straws, paper or plastic cups.

? Can they be replaced by other items/materials?
Many of these can be replaced, e.g., reusable bags, travel coffee mugs and water bottles.

? What does this have to do with litter and campus debris?
Single-use items are discarded and thrown in a landfill almost immediately. They also more often end up as litter.

Ask students how they might go about educating others about this issue.

Evaluate (Homework)

Introduce the Evaluate task, to be assigned for homework, which is for students to create a public outreach campaign about litter and marine debris. If possible, work with the technology teacher to create videos, brochures, podcasts, or websites, or art teacher to create posters, sculptures or other means of expression.

See Student Worksheets (Evaluate)

- Students can then share their work with other students and school community members
- Rubric in student worksheet

Extension

- Explore a video about the fate of 3,000 pieces of garbage tracked with similar technology used to follow albatross - Track Trash by MIT: http://senseable.mit.edu/trashtrack
- Have students consider how to influence others about the way garbage is managed on the campus, or within your community. Perhaps the student council or an afterschool club could help to work on suggesting and implementing changes.

Resources

- Marine debris information and education resources: http://www.marinedebris.noaa.gov
- Make a plastic bag rope – video from 5 Gyres: https://www.5gyres.org/education
- Education resources from Algalita Marine Research Foundation: http://www.algalita.org
- Plastic Pollution Coalition Toolkit https://www.plasticpollutioncoalition.org/pft/2015/8/27/marine-debris-campus-toolkit?rq=toolkit

Credits and More Information

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Please contact Oikonos or NOAA to request further use of any images, art, videos, data or text included in the Winged Ambassadors activities.

We appreciate feedback, corrections and questions. Please email WingedAmbassadors@oikonos.org

Free lessons and resources available at:

http://cordellbank.noaa/gov/education/teachers.html

http://oikonos.org/education

http://papahanaumokuakea.gov/education/wa.html

Education Standards

National Education Standards	NSES Grades 6-8: • Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models. • Current scientific knowledge and understanding guide scientific investigations. Different scientific domains employ different methods, core theories, and standards to advance scientific knowledge and understanding. • Mathematics is important in all aspects of scientific inquiry.
Ocean Literacy Principles	• 1g. The ocean is connected to major lakes, watersheds and waterways because all major watersheds on Earth drain to the ocean. Rivers and streams transport nutrients, salts, sediments and pollutants from watersheds to estuaries and to the ocean. • 6g. Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.
California	Grade 6: • 7a. Develop a hypothesis. • 7b. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data. • 7c. Construct appropriate graphs from data and develop qualitative statements about the relationships between variables. • 7d. Communicate the steps and results from an investigation in written reports and oral presentations. • 7e. Recognize whether evidence is consistent with a proposed explanation. Grade 7: • 7a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data. • 7b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project. • 7c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence. • 7e. Communicate the steps and results from an investigation in written reports and oral presentations.
Hawai'i	Grades 6–8: 2. Develop questions and hypotheses that can be answered through scientific investigations. • Design and conduct scientific investigations to answer questions or to test hypotheses. • Collect, organize, analyze and display data/ information, using tools, equipment, and techniques that will help in data collection, analysis, and interpretation. • Develop conclusions and explanations showing the relationship between evidence and results drawn. • Communicate and defend scientific procedure used and conclusion and explanation drawn from evidence. 3. Explain how methods for obtaining and using resources such as water, minerals, and fossil fuel have consequences on the environment. 4. Apply school, classroom, laboratory, and field trip rules, as appropriate, to maintain a safe learning environment. • Identify potentially unsafe conditions prior to the activity and explain how accidents can be prevented. • Use supplies, chemicals, and equipment as instructed and for the purposes they were intended under teacher supervision.