Title: Marine Debris Clean Up

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Theme: Preventing and cleaning-up marine debris is critical to the health of coastal and marine ecosystems.

Objectives:

- Students will gather, identify, and analyze marine debris in a local area.
- Students will learn about and participate in international efforts to minimize marine debris.
- Students will understand the effects of marine debris on ecosystems, communities, and economies.

Duration: 90-120 minutes

Age Range: 6th-12th Grade

Materials:

- Clipboards (1 per group)
- International Coastal Clean Up Data Sheet
- Pens or pencils
- Garbage Bags
- Rubber Gloves
- Variety of Marine Debris
- Notecards with marine debris vectors and effects
- Scale
- Whiteboard or posterboard
- Dry Erase Markers or colored markers
- Cardstock
- Tape, glue, string, staples

Background:

Millions of pounds of trash, much of it petroleum-based, makes its way into coastal and marine ecosystems every year. This marine debris poses a variety of threats to ecosystems, as well as human health, communities, and economies. Marine and coastal organisms are endangered by entanglement in, ingestion of, and smothering by marine debris. In addition, some of the marine debris contains dangerous toxins that leach into the marine environment, and many debris such as Styrofoam act as sponges to soak up, transport, and concentrate dangerous pollution. In many ways,

the issue of marine debris is like a slow-motion, persistent oil spill.

The International Coastal Cleanup (ICC) event takes place in late September every year, but you can gather data for ICC at any time. Students can participate in an international monitoring program, gain a better understanding of the marine debris issue, and make a difference in their local area and beyond by picking up, recording, and analyzing marine debris. This works best at a beach, coast, or inland waterway. However students can also take part in a "pre-marine debris" cleanup in any outdoor location.

Preparation:

Before conducting a cleanup, especially a "pre-marine debris" cleanup, discuss with students the many pathways, or vectors, by which trash can make its way into the marine environment. This mockumentary documents the journey of a plastic bag to the ocean: http://www.youtube.com/watch?v=GLgh9h2ePYw

If you would like your data to be included in the ICC database, please be sure to use the data card included in this curriculum and submit it to a regional coordinator or the address provided. Visit the ICC webpage for updates and more information: http://www.oceanconservancy.org/our-work/international-coastal-cleanup/

The Center for Alaskan Coastal Studies (CACS) has a portal for Alaskans participating in the ICC clean up. CACS can also loan teachers a kit containing a variety of marine debris for teaching purposes, and the CoastWatch Program provides a variety of extension activities relevant to coastal monitoring. Contact CACS for more information (http://www.akcoastalstudies.org).

Be sure students are safe during the clean-up process. Provide each student with gloves, and remind them not to pick up potentially dangerous objects.

Introduction:

Explain to students that they will be participating in a project to clean-up and document marine debris. Ask them what marine debris is. NOAA defines marine debris as any man-made object discarded, disposed of, or abandoned that enters the coastal or marine environment. Brainstorm pathways that this trash enters these environments. Discuss ways that marine debris affects animals, plants, and people.

Activities & Procedures:

Display a variety of marine debris at the front of the classroom. Divide students into teams of 4-6 for a relay race. Place notecards with labels for marine debris vectors (terrestrial trash; objects from commercial, industrial, and pleasure boats and marine vessels; container-ship spills; natural disasters; etc.) about ten steps away

from each relay team. The first member of each team should run or speedwalk to a piece of marine debris, place it with the correct (or most plausible) vector label, and return to tag their next teammate. Continue until all of the marine debris has been sorted. The group with the most marine debris in the correct category wins. Move on to round two, replace the vector labels with likely effects on marine and coastal organisms (entanglement, ingestion, smothering, toxins, etc.) and mix the marine debris back up for a second relay. Finally, provide students with a copy of the ICC data card and have them practice sorting the debris. Explain that their data will be combined with data from around the world. Share with them some of the ICC data from 2012: http://www.oceanconservancy.org/our-work/international-coastal-cleanup/2012-ocean-trash-index.html

Take students to a local beach, coastal area, waterway, or location where there is litter. Divide students into groups of 4-6 (you may choose to stick with the relay teams) and provide each group with an ICC data card, clipboard, pencil, and garbage bag. Give each student gloves. Remind them of safety precautions. They should not pick up anything sharp or potentially harmful like broken glass, syringes, or dog poop. Have students come get you if they find something dangerous or too large to pick up.

After 20-45 minutes of cleaning up, reconvene students. Weigh the marine debris collected before taking it to be disposed. In the classroom, have each group analyze their data. They should identify their total count, as well as totals for each category, the most frequently encountered type of marine debris (the mode) and the strangest object found. Have each group share their data, and compile it on the board. Work together to create a simple pie-graph or bar graph illustrating the different types of marine debris found. Discuss the likely sources of the most frequently found marine debris. Ask students to brainstorm how this marine debris might affect marine and coastal ecosystems as well as human health, communities, and economies. Then discuss how this type of marine debris could be prevented.

Wrap-Up:

Have each student pick one piece of marine debris that they collected and glue, tape, staple, or tie it to a piece of cardstock. Then, each student should write a plausible story for that marine debris, including its origins, journey through the ocean to the beach, and potential impacts on ecosystems. Have each student share their story with the class. As a group, brainstorm ways that these stories of marine debris could be rewritten – what can be done to minimize the amount of trash in the ocean and the amount of damage it causes? Have students create a poster to go along with their story illustrating way(s) to address the problem of marine debris. Display these posters in visible places, and consider submitting them to the annual NOAA Marine Debris Art Contest: http://marinedebris.noaa.gov/outreach/artcontest.html

Evaluation:

Assess marine debris stories and posters for student understanding of the origins of marine debris and ways to address the problem. Evaluate student data sheets and analysis for completeness and neatness. Observe student cooperation, participation, and adherence to safety guidelines during group work.

VOLUNTEER
OCEAN TRASH DATA FORM

Ocean Conservancy

Ocean and waterway trash ranks as one of the most serious pollution problems choking our planet. Far more than an eyesore, a rising tide of marine debris threatens human health, wildlife, communities and economies around the world. The ocean faces many challenges, but trash should not be one of them. Ocean trash is entirely preventable, and data you collect are part of the solution. The International Coastal Cleanup is the world's largest volunteer effort on behalf of ocean and waterway health.

HERE IS HOW IT WORKS:

1 CLEAN UP TRASH & COLLECT DATA

2 ORGANIZE & ANALYZE DATA

3 PUBLISH RESULTS

4 REDUCE OUR IMPACT

SITE INFORMATION:

Cleanup Site Name:

State or Province:

Zone or County:

Country:

Nearest Crossroad or Landmark:

NUMBER OF VOLUNTEERS WORKING ON THIS CARD:

adults

children (under 12)

MOST UNUSUAL ITEM COLLECTED:

TYPE OF CLEANUP:

Land: ☐ Underwater: ☐ Watercraft: ☐

Make positive changes every day by downloading our free mobile app, **RIPPL**

OCEAN CONSERVANCY'S International Coastal Cleanup®

Please return this form to your area coordinator.
If you are unable to do so, please mail or email it to:

Ocean Conservancy
Attn: International Coastal Cleanup
1300 19th Street, NW, 8th Floor
Washington, DC 20036
cleanup@oceanconservancy.org

Trash Free Seas: www.oceanconservancy.org/cleanup
Be a Green Boater: www.oceanconservancy.org/do-your-part/green-boating
Sponsors: www.oceanconservancy.org/cleanupsponsors

TRASH COLLECTED

Citizen scientist: Pick up all trash and record all items you find below. No matter how small the items, the data you collect are important for Trash Free Seas.®

EXAMPLE: TOTAL #

Plastic Bags: 𝍸 | | | = 8

Please DO NOT use words or check marks. Only **numbers** are useful data.

MOST LIKELY TO FIND ITEMS:

TOTAL #

Cigarette Butts: =

Food Wrappers (candy, chips, etc.): =

Take Out/Away Containers (Plastic): =

Take Out/Away Containers (Foam): =

Bottle Caps (Plastic) =

Bottle Caps (Metal) =

Lids (Plastic) : =

Straws/Stirrers: =

Forks, Knives, Spoons: =

Beverage Bottles (Plastic): =

Beverage Bottles (Glass): =

Beverage Cans: =

Grocery Bags (Plastic): =

Other Plastic Bags: =

Paper Bags: =

Cups & Plates (Paper): =

Cups & Plates (Plastic): =

Cups & Plates (Foam): =

FISHING GEAR:

TOTAL #

Fishing Buoys, Pots & Traps: =

Fishing Net & Pieces: =

Rope (1 yard/meter = 1 piece): =

Fishing Line (1 yard/meter = 1 piece): =

PACKAGING MATERIALS:

TOTAL #

6-Pack Holders =

Other Plastic/Foam Packaging: =

Other Plastic Bottles (oil, bleach, etc.): =

Strapping Bands: =

Tobacco Packaging/Wrap: =

OTHER TRASH:

TOTAL #

Appliances (refrigerators, washers, etc.): =

Balloons: =

Cigar Tips: =

Cigarette Lighters: =

Construction Materials: =

Fireworks: =

Tires: =

PERSONAL HYGIENE:

TOTAL #

Condoms: =

Diapers: =

Syringes: =

Tampons/Tampon Applicators: =

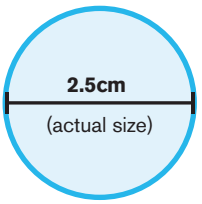
TINY TRASH LESS THAN 2.5CM:

TOTAL #

Foam Pieces =

Glass Pieces =

Plastic Pieces =



DEAD/INJURED ANIMAL	STATUS	ENTANGLED	TYPE OF ENTANGLEMENT ITEM
	Dead or **Injured**	**Yes** or **No**	

ITEMS OF LOCAL CONCERN:

1. 2. 3.

CLEANUP SUMMARY (circle units)

Number of Trash Bags Filled: **Weight of Trash Collected:** lbs/kgs **Distance Cleaned:** miles/km

Marine Debris Clean Up Standards

Science As Inquiry and Process: Students develop an understanding of the processes and applications of scientific inquiry.

SA1
Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments

The student demonstrates an understanding of the processes of science by:

[6, 7, 8, 9] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating

SA3
Students develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and that local applications provide opportunity for understanding scientific concepts and global issues.

The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by:

[6] SA3.1 gathering data to build a knowledge base that contributes to the development of questions about the local environment (e.g., moose browsing, trail usage, river erosion)

[7] SA3.1 designing and conducting a simple investigation about the local environment

Science and Technology: Students develop an understanding of the relationships among science, technology, and society.

SE1
Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.

The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by:

[6] SE1.1 recognizing that technology cannot always provide successful solutions for problems or fulfill every human need

[7] SE1.1 describing how public policy affects the student's life (e.g., public waste disposal)

[8] SE1.1 describing how public policy affects the student's life and participating diplomatically in evidence-based discussions relating to the student's community

SE2
Students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.

The student demonstrates an understanding that solving problems involves different ways of thinking by:

[6] SE2.1 identifying and designing a solution to a problem

[7, 8] SE2.1 identifying, designing, testing, and revising solutions to a local problem

[6, 7] SE2.2 comparing the student's work to the work of peers in order to identify multiple paths that can be used to investigate a question or problem

[8] SE2.2 comparing the student's work to the work of peers in order to identify multiple paths that can be used to investigate and evaluate potential solutions to a question or problem