

Learning Activities for
Youth Groups, Age 10-15

PLASTIC ELIMINATORS

Protecting California Shorelines



UNIVERSITY of CALIFORNIA
**Agriculture &
Natural Resources**
Publication 21608

PLASTIC ELIMINATORS

Protecting California Shoreline

These materials were developed by the California Aquatic Science Education Consortium

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The initial formation of the California Aquatic Science Education Consortium (CASEC) in 1990 was undertaken by the Graduate School of Education at the University of California at Santa Barbara with funding provided by the National Science Foundation. In 1995, CASEC moved to the Department of Human and Community Development at the University of California, Davis with the 4-H Youth Development Program taking leadership for its ongoing activities.

The mission of CASEC is to promote a greater scientific literacy, a more thorough understanding of the value and workings of freshwater and marine ecosystems, and an enhanced awareness of scientific, environmental and policy aspects of California water issues. CASEC continues as part of the Division of Agriculture and Natural Resources Science, Technology, and Environmental Literacy Workgroup in the development, and evaluation of community-based aquatic science literacy projects.

*Dedicated to
the youth of California
and their care of the earth.*



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Introduction

For thousands of years, humans have treated the oceans as their dumping ground. Rivers carry waste down from cities, towns, and farms and spew it into the ocean. Ships discard their refuse in the ocean. Beach-goers leave their trash at the ocean. Industry dumps its waste into the ocean.

In the past few years we have come to realize that trash dumped into the ocean does not simply go away. Humans are producing and discarding more trash, and the kind of trash being discarded has changed. The most prevalent type of beach debris is now plastic. Plastics may endure in human-made form for thousands of years, whereas paper or wood, although also a part of the litter problem, will eventually decompose. Beautiful beaches in the South Pacific are now fouled with mostly plastic debris from thousands of miles away. Rocky shores of Antarctica, seldom visited by humans, are strewn with trash including plastic beverage containers, fishing line, plastic netting, six-pack rings, styrofoam cups, and plastic sheeting and bags brought in by ocean currents.

Danger to marine life. As unsightly as this accumulated trash is, its greatest danger is to the lives of marine animals. Fish, dolphins, and whales become entangled in plastic fishing nets and sometimes suffocate. Birds also get caught in the discarded string, rope, and line, then starve because they can no longer seek food. Sea turtles eat floating plastic bags, mistaking them for jellyfish, and often die. Seals poke their heads through plastic crating straps and then have to “wear” the plastic for the rest of their lives.

Plastic marine debris is an extensive problem needing a solution, and, like most significant problems in the world, it will need more than one solution. Most environmentalists agree that many things can be done, including reducing the use of plastic packaging, recycling the plastic used, cleaning up beaches and waterways, and reducing or stopping the discharge of trash into the oceans by ships, coastal cities, industry, and vacationers.

An opportunity to learn. Plastic marine debris is also a problem that can be presented as an intriguing issue for youngsters to study. The activities that follow provide an opportunity to learn some principles of scientific inquiry and could motivate young people to get involved in solving real-life problems. Specifically, the set of activities in this package is designed to:

1. Involve youth in the active practice of science.
2. Increase youth's awareness about the environmental problems caused by plastic marine debris.
3. Offer youth an opportunity to be part of solving a real life problem of plastic debris.

“Doing” Science

Science is more than learning facts about the physical and natural worlds. Scientists do things that help them discover and understand the processes of these worlds. The *California Science Curriculum Framework* suggests eight separate kinds of thinking processes that characterize the scientific enterprise. These are:

- Observing
- Communicating
- Comparing
- Ordering
- Categorizing
- Relating
- Inferring
- Applying

Youth studying science should be able to participate in the same processes of *doing* science that practicing scientists use. Science students need the opportunity to practice *doing* science as scientists do it and participate in genuine activities that involve real life problems.

The various activities in this package engage youngsters in thinking processes and actions that are typically used by scientists. The young participants have the opportunity to organize and classify data, predict outcomes, verify their predictions, collaborate with others in the pursuit of solutions, and create new and different approaches to doing common things. Each activity description in this guide contains science exercises and identifies the particular thinking processes that youngsters will use to carry them out.

Increasing Awareness About the Problem

The first six activities in this package help youth learn about the problem of plastic debris, its effect on marine animals, and its source. These activities include:

1. The Harmful Effects of Plastics on Animals
2. Plastic in Its Many Forms
3. Animals' Feeding Ranges and Plastics
4. Animals' Feeding Habits and Plastics
5. Impairment of Marine Animals by Plastics
6. The Feeding Game: A Simulation of the Perils of Plastics

Taking Action to Solve the Problem

The remaining seven activities engage youngsters in explorations of ways to help solve the problems created by plastic marine debris. These activities include:

7. Plastics at the Supermarket
8. Recycling Plastics

-
9. Smart Packaging
 10. Trash Timeline
 11. Adopt-A-Beach Preparation
 12. Adopt-A-Beach
 13. Analyzing Shoreline Debris
 14. Be A Part of the Solution

Which Activities to Use

Although this package contains fourteen separate activities related to the topic of plastic marine debris, the group leader is encouraged to review and select the activities that best meet the qualities and needs of the youth involved.

For the most part, these are all independent activities, not necessarily designed to be used in any particular order. In some cases, two activities are quite similar, and it could be redundant to do both. In other cases, one activity follows and builds upon another and should not be undertaken if the prerequisite activity has not been completed. Specifics of these combinations include:

- Activity #5 uses a list generated in Activity #1 and should not be attempted unless #1 is done first.
- Activities #3 and #4 are similar. The content varies only slightly, one dealing with feeding habits and the other with feeding ranges.
- Activities #12 and #13 are similar, but each has unique advantages. Activity #12 requires them to use a predetermined beach debris classification system, developed by the Center for Marine Conservation. This limits organizational creativity, but allows youth to compare their analysis to findings on other beaches. If this activity is conducted in September as a part of Coastal Clean-up Week, the findings may be reported to the Center for Marine Conservation for inclusion in their growing database of marine debris. Activity #13 encourages creativity and independent thinking by requiring youngsters to create their own scheme for organizing and classifying beach debris.


What to Expect


Each activity presented in this book includes a question, a summary, and a list of materials needed for the activity.


The “Instrument Panel”

At the upper left of each activity sheet is a shaded box with specific information about the activity for quick review, including:

- An estimation of Academic Demand. Some activities require considerable thought and analysis on the part of youngsters. Other are less intellectually demanding.
- An estimation of the Physical Exertion Required. Some activities require considerable movement or exertion to complete, while others require less physical effort.
- A suggestion for the Number of Participants and Grouping. Some activities may require a large group, while others are best accomplished by individuals working alone, in pairs, or in small groups. The following symbols are used to signify different groupings:


 = Youngsters working individually


 = Youngsters working in pairs or small groups

 = Youngsters working in large groups

Note that it is often possible to use more than one grouping method with the same activity.

- An approximation of the Time Needed. All of the activities in this package require sessions of less than one hour to complete. Some activities may take less time while a few require multiple sessions. Estimates are given here to the nearest quarter hour.
- A suggestion as to the Setting that would be most appropriate for the activity. Two settings are presented:

 = The home or club room

 = The out-of-doors

Some activities may be accomplished in either setting.

The Question

The topic of the activity is presented in question form so that youngsters might more easily see that their task, like that of practicing scientists, is to seek answers for themselves, not merely to learn answers acquired by others.

Summary

A one- or two-sentence summary of the activity is presented as an overview. This should assist the leader in selecting activities and in planning for their use.

Materials

Each activity requires certain materials, many of which are included in this package. For example, most activities make use of included task cards and data sheets that can be photocopied and distributed to the youngsters to guide them through the activity. Additionally, some activities make use of a videotaped program (see Resources) and items that generally can be found around the home. All necessary materials are listed in this guide.

Purpose

Particular educational goals for each activity are listed in this guide to assist leaders in planning and executing the activity.

Activities

The learning actions of each activity are presented as a series of steps to be directed by the leader. These actions are often mirrored or elaborated on the Task Cards used by the youngsters. It is important to recognize that the activities are presented as suggestions. Individual group leaders should feel free to make alterations that they think might improve the experience for their particular group.

Keys to Success

This section offers suggestions derived from past experience that might help the group leader derive the maximum benefit from each activity.

Use by Youth Groups

The activities in this package have been designed to fit comfortably into a wide variety of educational programs offered by youth-service agencies. Below are specific suggestions concerning how they might be used in particular organizations.

Boys and Girls Clubs of America

These learning activities may be used as a guide for club activities in environmental education, one of the six core services provided by the Boys and Girls Clubs programs. The activities may also complement individual clubs' existing programs in recycling, litter education, or marine science.

Girl Scouts

Within the Junior Girl Scout Program, these learning activities can be used for:

- Working toward badges in the World of Today and Tomorrow (Science in Action; Water Wonders) or in the World of the Out-of-Doors (Eco-Action; Outdoor Surroundings).
- Participating in the Contemporary Issues Program, "Earth Matters," and earning the participation patch.
- Participating in environmental badge activities at Girl Scout summer day camp or long-term camp.
- Developing activities, under the Council Patch Program Plan, that involve community improvement projects and investigative and hands-on environmental awareness activities for a troop or council-wide event.

4-H Youth Development Program

These learning materials incorporate the science processes and the learning cycle method of instruction. The materials can be used by adult volunteer and teen leaders working with youth 10-15 years of age involved in 4-H projects focusing on Marine Biology, Oceanography, Citizenship, or Community Pride. The materials can be used in conjunction with the 4-H SERIES Recycle/Reuse Project materials and include activities to prepare the youngsters for their experience, on-site activities, and debriefing activities. In addition, individual activities can be led by teens at summer and day camps, fairs and other public events, used as a basis for 4-H demonstration projects, and National 4-H week events.

Camp Fire

These activities complement several projects in the Camp Fire Adventure, Discovery, and Horizon programs, including:

- Try-Ad projects and Action Crafts.
- Torch Bearer projects in Environmental Issues or Special Interest.
- Components for the national Project Good Earth.
- As one of the three issues explored in an individual's WoHeLo Medallion project.

The curriculum can also be used in resident and day camp programs located near beaches, lakes, and rivers.

Resources

Some of the learning activities presented in this package have been adapted from other sources that are listed in detail below. Also presented are additional resources that may be useful to the group leader who wants to take his or her group beyond the material presented here.

A Citizen's Guide to Plastics in the Ocean, Center for Marine Conservation, 1725 DeSales Street, NW, Suite 600, Washington, DC 20036. (202) 429-5609. Online at <www.cmc-ocean.org>.

Adopt-A-Beach program, California Coastal Commission, 45 Fremont Street, Suite 2000, San Francisco, CA 94105. (800) 262-7848. Online at <www.ceres.ca.gov/coastalcomm>.

A-Way With Waste, produced by the Washington Department of Ecology, PO Box 47600, Olympia, WA 98504. (360) 407-6000. Download from the internet at <www.wa.gov/ecology/pie/ee/index.html>.

Conservation Handbook, Boy Scouts of America, Publication #33570. Online at <www.bsa.scouting.org>.

4-H SERIES Program, Recycle/Reuse Project, University of California, Davis. (530) 752-9914.

National Association for PET Container Resources (NAPCOR), 2105 Water Ridge Parkway, Suite 570, Charlotte, NC 28217. (704) 423-9500. Online at <www.napcor.com>.

Oceans of Plastic, Report on a Workshop on Fisheries-Generated Marine Debris and Derelict Fishing Gear, Portland, OR. Alaska Sea Grant, NSGD#: AKU-W-88-001. Download from the internet at <www.nsgo.seagrant.org>.

Plastic Debris in Puget Sound, Marine Science Curriculum, Grades 4-6, Seattle Aquarium, Seattle, WA. (206) 386-4353. Online at <www.seattleaquarium.org>.

Science Framework for California Public Schools, Kindergarten through Grade 12.

Trashing the Oceans, videotape. Available for \$10, including shipping and handling, from: 4-H SERIES Office, Department of Human and Community Development, University of California, One Shields Ave., Davis, CA 95616.

THE HARMFUL EFFECTS OF PLASTICS ON ANIMALS

Academic Demand Lo Hi	Physical Exertion Required
Number of Participants 	
Time Needed 	
Setting 	

QUESTION: What are some of the ways that marine animals suffer when they encounter plastics?

SUMMARY: Youth watch the videotape "Trashing the Oceans" and then recall and list instances of marine animals suffering the harmful effects of their encounters with plastic.

MATERIALS:

- Task Card #1 (Photocopy one for each pair.)
- Videotape: "Trashing the Oceans" (see Resources list)
- Lab Notebook #1 (Photocopy one for each pair.)
- Pencils

PURPOSE:

To help youth:

1. Understand that marine animals may suffer injury or even death from their encounters with plastics.
2. Practice the skill of observing and recalling instances of a phenomenon, in this case, marine animals' encounters with discarded plastics.

ACTIVITIES: (Observing, Communicating, and Comparing)

1. Distribute the Task Card and prepare the youngsters to watch the videotape by pointing out that they will be asked to list different animals depicted in the videotape, as well as plastics that the animals encountered.
2. Show the videotape.
3. Distribute a Lab Notebook page to each pair of youngsters and direct them to list as many animals as they can remember from the videotape that encountered discarded plastic in their environment. The list should also include the plastic object that each animal encountered.
4. Direct each pair to compare its Lab Notebook entries with another pair. They should count (1) how many entries are the same, and (2) how many entries each pair has that are not found on the other pair's list.
5. When the comparisons are finished, gather everyone together and compare results among pairs. Did any pair record an animal that no other pair recorded?
6. Initiate a discussion by asking for feelings about what can happen to animals when they encounter discarded plastics in the ocean.
7. Be sure to collect and save the groups' lists to be used with Activity #5.

KEYS TO SUCCESS:

Casting this activity as a memory game helps youngsters to feel motivated as they watch the videotape and then write what they recall in the Lab Notebook. Working in pairs relieves any uneasiness that might result from being on the spot when working alone. It should be approached as a fun game to do, and not an academic job.

ANSWER KEY

ANIMALS DEPICTED IN "TRASHING THE OCEANS" AND THE PLASTICS THEY ENCOUNTERED

ANIMAL	PLASTIC ENCOUNTERED
Northern Fur Seal	Netting
Northern Sea Lion	Netting
Monk Seal	Fishing Gear
Sea Turtle	Netting
Sea Birds	Fishing Line
Fish	Fishing Line
Bird	6-pack rings
Albatross	Plastic Trash
Parakeet Auklett	Plastic Trash
Fish	Plastic Sheet
Sea Turtles	Plastic Bags
Seal	Netting

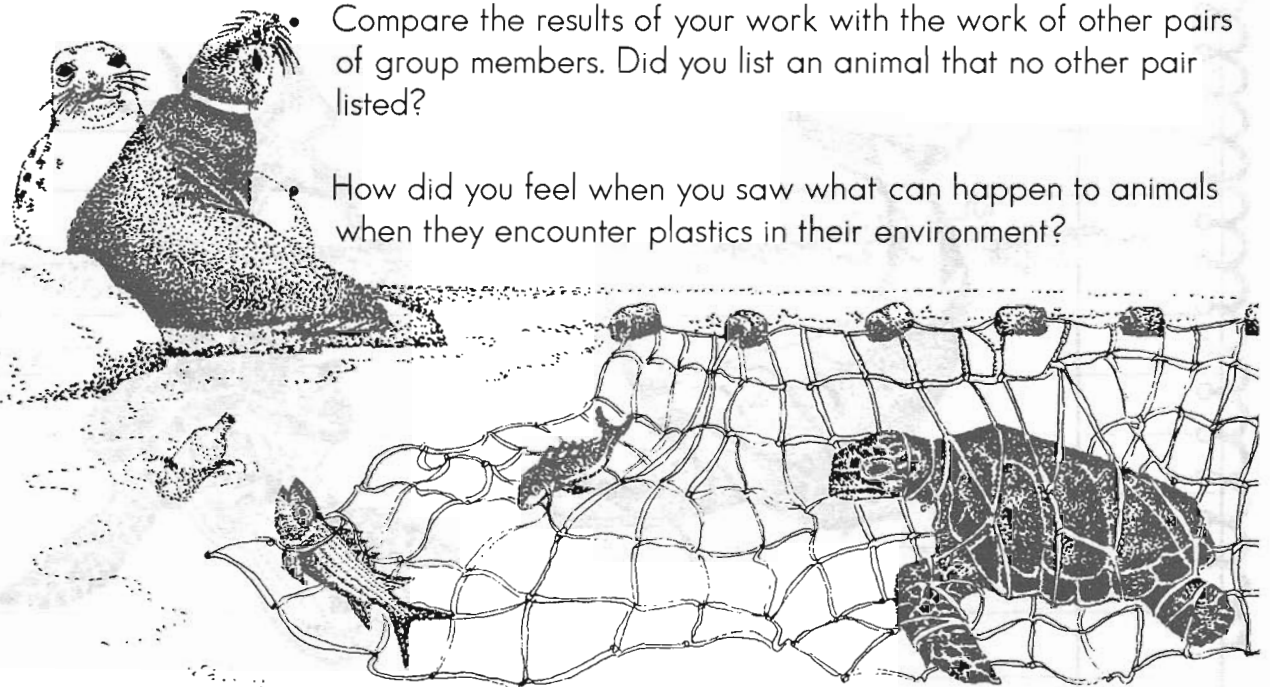
Task Card #1

The Harmful Effects of Plastics on Animals

Question: What are some things that cause marine animals to suffer when they encounter plastics?

Background: Many animals that live in the ocean come into contact with discarded plastic. Because this plastic is not natural to their environment, the animals don't recognize it or know what to do about it. Often they get entangled in it, are cut (lacerated) and injured by it, or think it is food and try to eat it.

- Your Activity:**
- Watch the video "Trashing the Oceans" which illustrates some problems of plastics in the ocean.
 - When the video is finished, from memory and working with a partner, list on your Lab Notebook page the animals that you saw and how each animal was suffering from its encounter with plastic.
 - Compare your list with the list made by another pair of people in your group.
 1. How many animals are on both lists?
 2. How many animals were on your list but not on the other?
 3. How many animals on the other list were not on yours?
 - Compare the results of your work with the work of other pairs of group members. Did you list an animal that no other pair listed?
 - How did you feel when you saw what can happen to animals when they encounter plastics in their environment?



The Harmful Effects of Plastics on Animals

*Animal**Plastic Encountered*

1.

2.

3.

4.

5.

6.

7.

8.

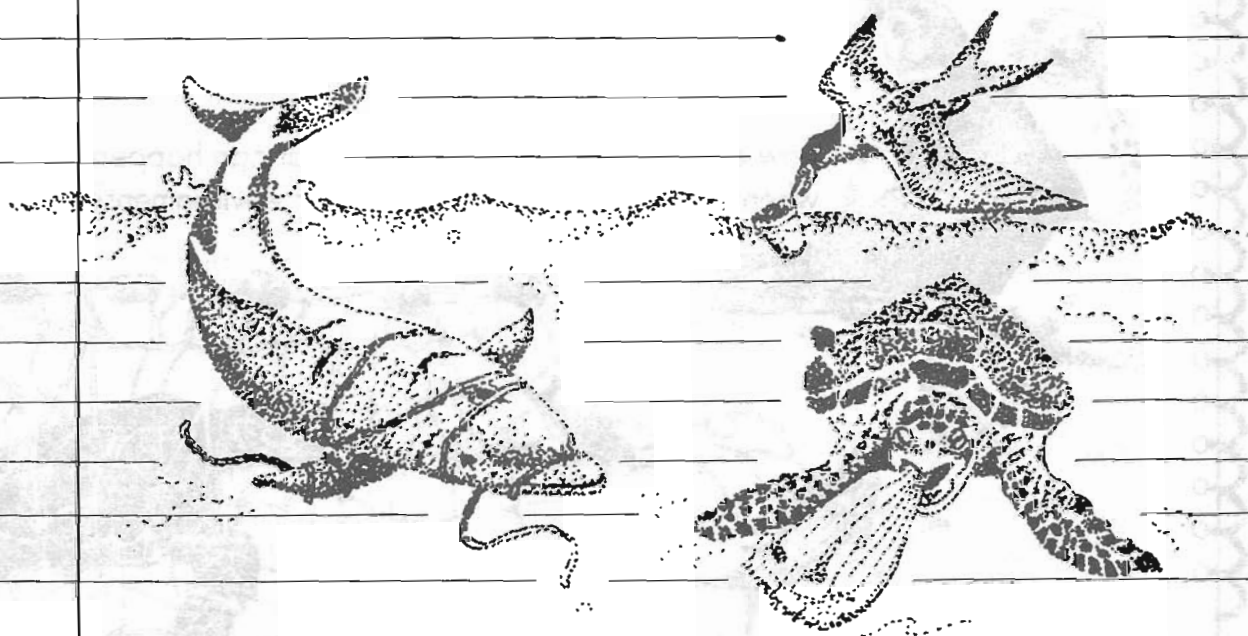
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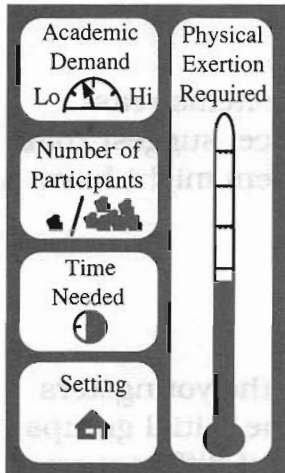
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12.

13.



PLASTIC IN ITS MANY FORMS



QUESTION: What forms and shapes does plastic come in?

SUMMARY: The youngsters sort plastic items into groups with common attributes.

MATERIALS:

- Task Card #2
- 15 to 20 items of plastic in a variety of shapes and types
- Pieces of paper, approximately 3 x 5-inches
- Marking pens

PURPOSE:

To help youth:

1. Practice the important scientific skills of classifying and organizing.
2. Understand that items in the world, in this case plastic items, can be organized and categorized in different ways, depending on what the organizer considers to be important qualities.
3. Recognize that there are different basic types of plastic.
4. Understand that some plastic items which might at first appear very different actually have key characteristics in common (e.g., made from the same type of plastic) and thus can be grouped together.

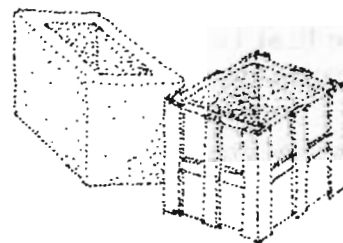
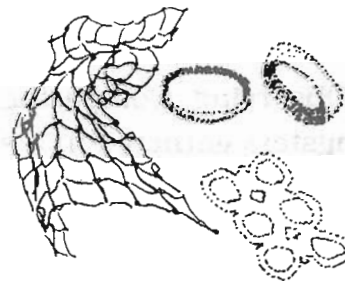
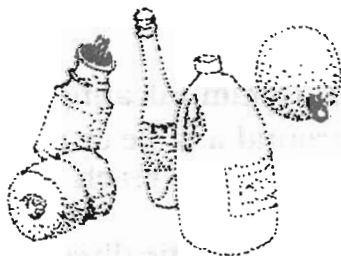
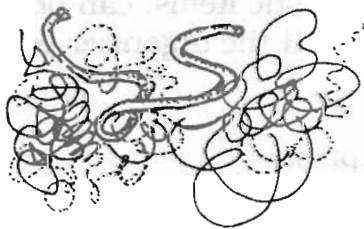
ACTIVITIES: (Observing, Comparing, Categorizing, Communicating, and Inferring)

1. With the youngsters gathered in a single group around a table or an open area on the floor, empty a sack of plastic items so they can see and reach them.
2. Distribute the Task Cards and ask one youngster to read the directions to the group. As you direct them to proceed, suggest that they begin by finding just two items that might go together. Then suggest they add a third item that also belongs with the first two or start new categories with the other items. Direct them to continue grouping the items until all of them are in an appropriate category.
3. As the youngsters group the items encourage them to explain why the grouping is being suggested.

4. When all of the objects have been placed in a group, ask youngsters to label the groups. When everyone has agreed on a label, direct one youngster to write it on a piece of paper and place it with the group.
5. When appropriate, suggest that the groups be broken-up and the items reassembled into new groups, based on different criteria. For instance, suggest that the youngsters try to re-group the items according to how each item might harm a sea animal.

KEYS TO SUCCESS:

It makes no difference how the initial groups are formed, as long as the youngsters have a valid reason for grouping the selected items together. Once the initial groups are formed, it is important to encourage the youngsters to think about different ways to group the same items. Thus, though initial groups might be made according to size or shape, new groups might be formed, based on the item's function or the characteristics of the plastic, e.g., soft, hard, or translucent.



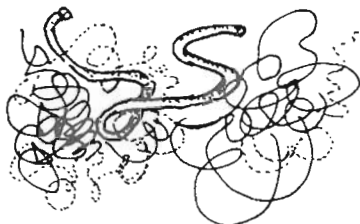
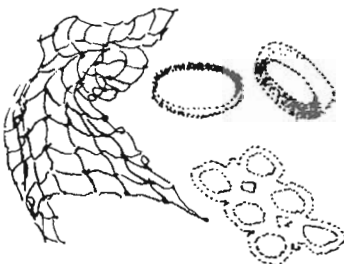
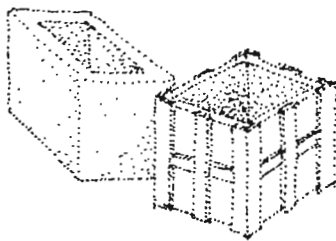
Task Card #2

Plastic in Its Many Forms






Question: What forms and shapes does plastic come in?

Your Activity: You have a number of plastic items that are often found discarded in the ocean. Each item is different in size, shape, or color from the others. But can they be put into groups?

- Locate two items that you think go together because they have some common quality. Is there a third item that has the same quality and therefore fits with the first two? A fourth? What do these three or four items have in common?
- Find two other items that fit together to form a different group. Why do they belong together? Do other items belong with them?
- Continue asking these questions until you have arranged all the items into groups.
- What names could you use to identify your groups?
- Can these items be arranged in different groups?



ANIMALS' FEEDING RANGES AND PLASTICS

Academic Demand Lo  Hi	Physical Exertion Required 
Number of Participants 	
Time Needed 	
Setting 	

QUESTION: What forms of plastic do animals encounter as they feed in different areas of the ocean?

SUMMARY: Youngsters sort drawings of marine animals according to their feeding ranges and the form of the plastic they have encountered.

MATERIALS:

- Task Card #3 (Photocopy one for each group.)
- Activity Chart #3 (Photocopy, cut, and paste one together for each group.)
- Animal Cards (Photocopy and cut apart one set for each group.)

PURPOSE:

To help youth understand that:

1. Marine animals encounter plastics in their environment primarily as a result of their feeding behavior.
2. The plastics that animals encounter can take a variety of forms, including:
 - One-dimensional (line, rope, strapping bands)
 - Two-dimensional (sheets, bags)
 - Reticulated (netting, six-pack rings)
 - Hollow bodied (bottles, floats)
 - Small particles (Styrofoam, pellets)
 - Angular (boxes, crates)
3. Animals that feed in different areas of the ocean (i.e., surface, pelagic, and benthic) encounter plastic in different forms.

ACTIVITIES: (Communicating, Comparing, Categorizing, and Inferring)

1. Youngsters may be organized into small groups, or they may undertake this activity individually or in pairs, if sufficient materials are available.
2. Distribute copies of the Task Card, the "plastics" Animal Cards, and the Activity Chart to the youngsters. Read and discuss the Background section on the Task Card with the youngsters and then discuss the steps of carrying out the activity.
3. Circulate among the participants and offer assistance as necessary.
4. After each group has completed the sorting activity, ask them to compare their results with those of other groups. They should concentrate on why differences might exist.

5. Use the answer key to detect any difficulties and suggest how the Animal Card drawings might be sorted.

KEYS TO SUCCESS:

This is a discussion-starting activity. The point is for youngsters to move beyond discussion of "What goes where?" to talk about "Why does it go there?" They should be given time to propose answers, discuss them, and wrestle with different conclusions before receiving the answers from the Answer Key.

ANSWER KEY						
FORMS OF PLASTIC						
FEEDING RANGES	1 1-Dimensional Objects	2 2-Dimensional Objects	3 Reticulated Objects	4 Hollow Objects	5 Small Particles	6 Angular Objects
Surface Feeders			9	7	3	
Pelagic Feeders	4,5	6	8	1	10	2
Benthic Feeders	4	6				2

Task Card #3

Animals' Feeding Ranges and Plastics

Question: What forms of plastic do animals encounter as they feed in different areas of the ocean?

Background: Scientists divide bodies of water into three basic areas.

1. The Surface area: The very top of the water where it meets the air and where things float.
2. The Pelagic area: The open water below the surface where fish swim.
3. The Benthic area: The bottom of the body of water that consists of mud, sand or rock.

Animals gather their food in different areas of the water. For example, some birds are *surface feeders*. They skim along just above the ocean's surface, and scoop up small bits of floating food. Many fish are *pelagic feeders*. They swim about, eating smaller animals, plankton, and other food that share the water with them. Many whales, turtles, seals, and diving birds are pelagic feeders. Other kinds of fish, as well as some turtles, whales, and sea otters, swim along the bottom, scooping up food that rests on the ocean floor. These are called *benthic feeders*.

Plastic comes in a wide variety of shapes and sizes. It might be possible to group all plastic into six basic forms.

1. *One-Dimensional objects* such as rope, fishing line, and strapping bands.
2. *Two-Dimensional objects* such as sheets and bags.
3. *Reticulated objects* such as nets and six-pack rings.
4. *Hollow objects* such as bottles and floats.
5. *Small particles* such as broken styrofoam and pellets.
6. *Angular objects* such as boxes and crates.

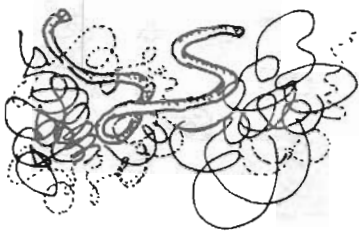





Task Card #3 (continued)

Background: (continued) Animals that feed in different areas of the ocean encounter different forms of plastic. For example, a bird skimming the surface of the ocean might accidentally scoop up bits of floating plastic pellets, thinking they were food, but he probably wouldn't accidentally scoop up a large floating angular object such as a styrofoam ice chest.

- Your Activity:**
- Arrange each of the Animal Cards on the chart so that each animal is located next to the name of the area of the water where it feeds and in the column under the form of plastic that caused problems for that animal.
 - Compare your chart with one sorted by another group. Are there any differences? Why or why not?

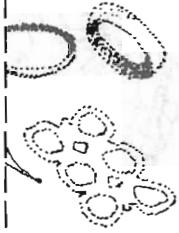


FORMS of PLASTIC AND

	 1-dimensional objects	 2-dimensional objects	 RETICULATED
Surface Feeders 			
Pelagic Feeders 			
Benthic Feeders 			



FEEDING RANGES of ANIMALS



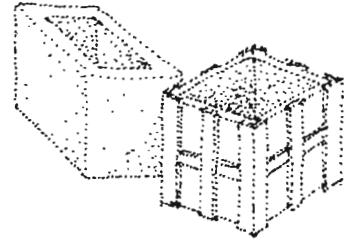
objects



Hollow objects



Small particles



ANGULAR objects

ANIMAL CARDS



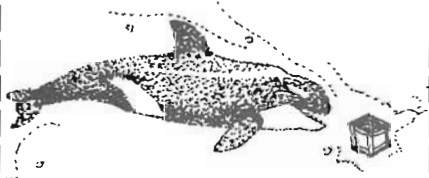
FOR USE WITH ACTIVITIES #3 AND #4.
PHOTOCOPY ONE SET FOR EACH GROUP
AND CUT APART ON DOTTED LINES.

1



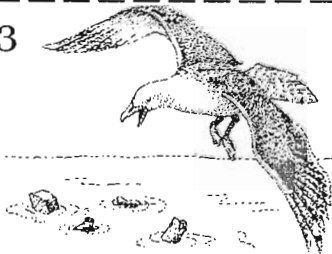
Bottlenose Dolphin — feeds on surf perch in the open water below the surface by grabbing them with its teeth.

2



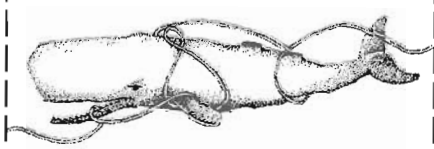
Killer Whale — eats fish such as salmon, by grabbing them with its teeth. Feed often in open water below the surface.

3



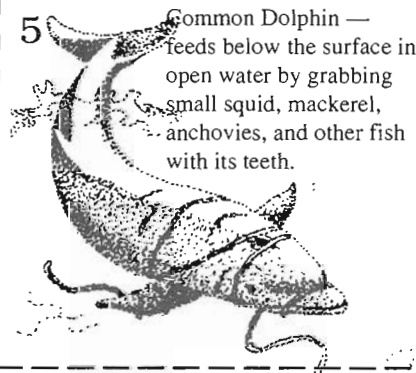
Seagull — eats fish and small intertidal organisms, as well as beach debris. Feeds on the shore and on top of the water, by grabbing the food with its mouth.

4



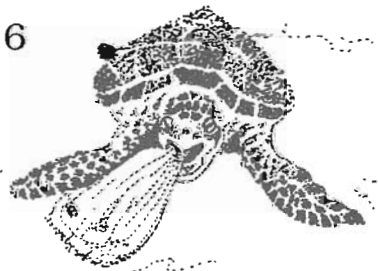
Sperm Whale — eats squid and fish in the area below the surface of the water. Quickly grabs the food with its long, narrow mouth.

5



Common Dolphin — feeds below the surface in open water by grabbing small squid, mackerel, anchovies, and other fish with its teeth.

6



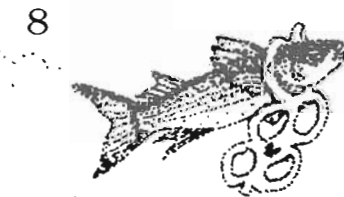
Loggerhead Sea Turtle — eats fish, eggs, kelp, mussels, clams, and crabs by grabbing them with its toothless mouth.

7



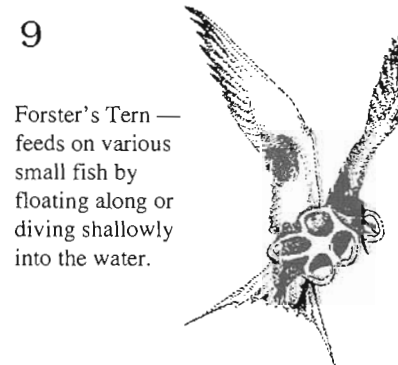
Elegant Tern — feeds on anchovies and other fish by floating along or diving shallowly into the water.

8



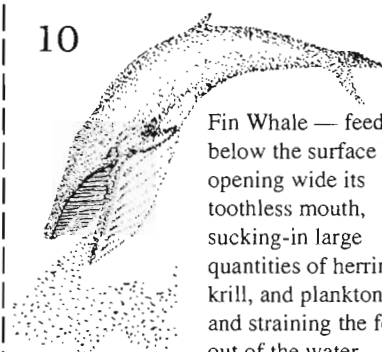
Sea Bass — swims and feeds below the surface in open water by sucking small fish such as herring, krill, and anchovies into its large mouth.

9



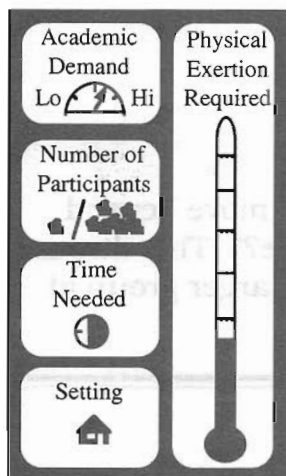
Forster's Tern — feeds on various small fish by floating along or diving shallowly into the water.

10



Fin Whale — feeds below the surface by opening wide its toothless mouth, sucking-in large quantities of herring, krill, and plankton, and straining the food out of the water.

ANIMALS' FEEDING HABITS AND PLASTICS



QUESTION: What forms of plastic do animals encounter as they feed in different areas of the ocean?

SUMMARY: Youngsters sort the drawings of marine animals according to the manner in which the animals feed and according to the forms of plastic they encountered.

MATERIALS:

- Task Card #4 (Photocopy one for each group.)
- Activity Chart #4 (Photocopy, cut, and paste one together for each group.)
- Animal Cards from Activity #3 (Photocopy and cut apart one set for each group.)

PURPOSE:

To help youth understand that:

1. The type of plastic that marine animals are likely to encounter in the environment depends primarily on their feeding behavior.
2. The plastics that animals encounter can take a variety of forms, including:
 - One-dimensional (line, rope, strapping bands)
 - Two-dimensional (sheets, bags)
 - Reticulated (netting, six-pack rings)
 - Hollow Bodied (bottles, floats)
 - Small Particles (Styrofoam, pellets)
 - Angular (boxes, crates)
3. Animals that have different feeding habits (i.e., filtering, snatching, gulping) encounter difficulties with different forms of plastic.

ACTIVITIES: (Observing, Communicating, Comparing, and Categorizing)

1. Youngsters may be organized in small groups or in pairs, or they may undertake this activity individually, if sufficient materials are available.
2. Distribute copies of the Task Card, the Animal Cards from Activity #3, and the Activity Chart to the participants. Read and discuss the background section with the youngsters and then discuss the steps of carrying out the activity.
3. Circulate among the participants and offer assistance as necessary.
4. After each group has completed the sorting activity, ask them to compare their results with those of other groups. They should concentrate on why differences might exist.

5. Use the answer key to detect any differences and suggest how and why the Animal Card drawings might be sorted.

Keys to Success:

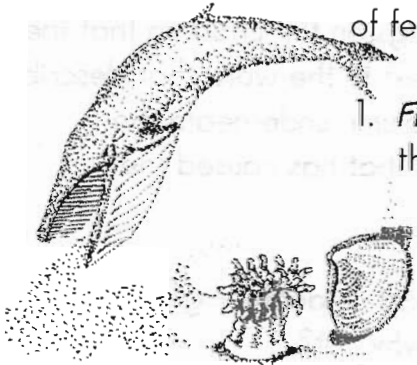
This is a discussion-starting activity. The point is for youngsters to move beyond discussion of "What goes where?" to talk about "Why does it go there?" This discussion should occur both within the working group and also with the larger group at the end of the activity.

ANSWER KEY						
FORMS of PLASTIC						
FEEDING HABITS	1 1-Dimensional Objects	2 2-Dimensional Objects	3 Reticulated Objects	4 Hollow Objects	5 Small Particles	6 Angular Objects
Filter					10	
Snatchers	5	6	9	1, 7	3	2
Gulpers	4		8			

Animal's Feeding Habits and Plastics

Question: Do different forms of plastic affect animals differently, depending on how they feed in different areas of the ocean?

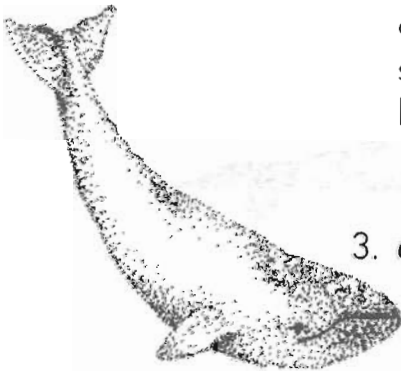
Background: Although animals appear to seek food in a wide variety of ways, scientists divide marine animals into three basic groups of feeders.



1. *Filter Feeders* strain small bits of food out of the water as they cruise along with their mouths open. Examples of filter feeders include some fish, basking sharks, clams, sea anemones, and blue whales.



2. *Snatchers* grab at food with their mouths as it passes within their reach. They often make good use of well-developed teeth. Examples of snatchers include many fish, sea birds, porpoises, dolphins, sharks, turtles, sea lions, and killer whales.



3. *Gulpers* suck food items into their normally toothless mouths. Examples of gulpers include some sea bass and ling cod.

Plastic comes in a wide variety of shapes and sizes. It might be possible to group all plastic into six basic forms.

1. *One-dimensional objects* such as rope, line and strapping bands.
2. *Two-dimensional objects* such as sheets and bags.
3. *Reticulated objects* such as nets and six-pack rings.
4. *Hollow objects* such as bottles and floats.
5. *Small particles* such as broken styrofoam and pellets.
6. *Angular objects* such as boxes and crates.

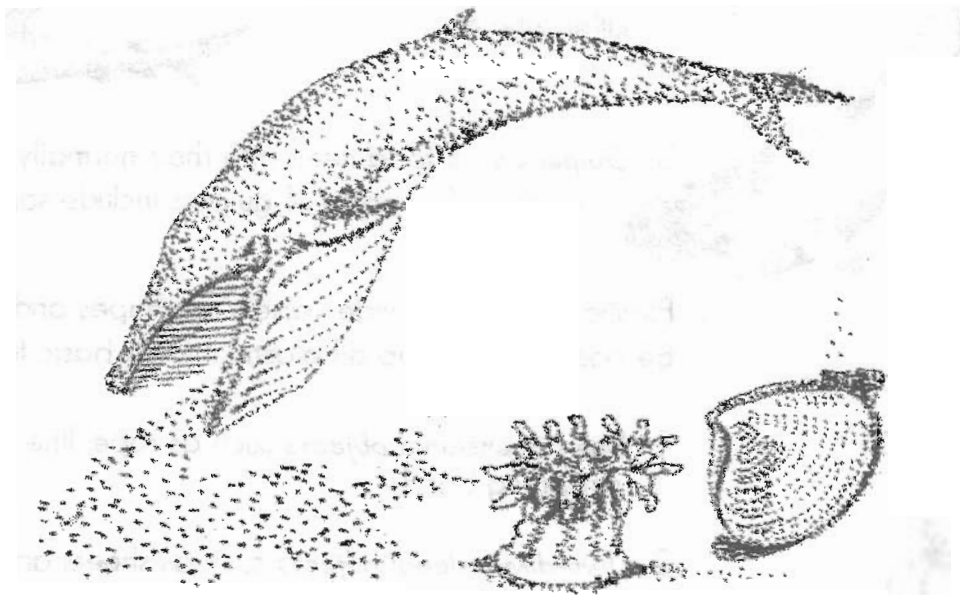


Task Card #4 (continued)

Animals that have different feeding habits might interact with different forms of plastic. For example, a filter-feeding fish might accidentally take into his mouth a floating plastic bag, but a gallon plastic milk bottle would probably be too big to fit into his mouth.

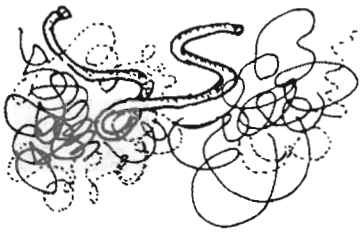


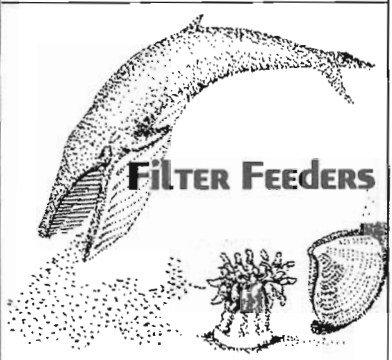

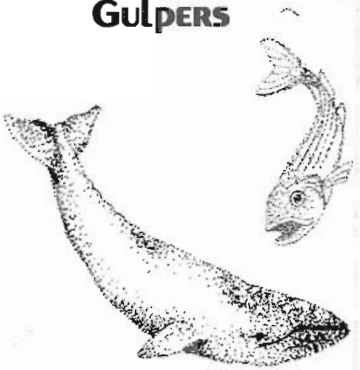
Your Activity:

- Arrange the Animal Card drawings on the chart so that the animals are placed in the row next to the word that describes their feeding habits and in the column underneath the description of the type of plastic that has caused their impairment.
- Compare your chart with the chart of another group. Are there any differences? Why or why not?





FORMS of PLASTIC AND

	 1-dimensional objects	 2-dimensional objects	 RETICULATED
 FILTER FEEDERS			
 SNATCHERS			
 GULPERS			



FEEDING HABITS OF ANIMALS



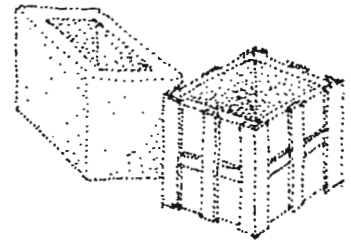
objects



Hollow objects








Small particles



Angular objects

IMPAIRMENT of MARINE ANIMALS by PLASTICS

Academic Demand Lo  Hi	Physical Exertion Required 
Number of Participants 	
Time Needed 	
Setting 	

QUESTION: What are some of the ways that marine animals are impaired when they encounter plastics in the ocean?

SUMMARY: Using the lists of sea animals and plastic impairments developed in Activity #1, youngsters develop a chart that shows types of plastics and the impairments they can cause.

MATERIALS:

- List developed in Activity #1
- Task Card #5 (Photocopy one for each group of 3 or 4 participants.)
- Activity Chart #5 (Photocopy, cut, and paste one together for each group.)
- A pad of 1-1/2 x 2-inch "Post-it Notes" or pieces of paper cut to that size and clear tape for attaching them to the chart.

PURPOSE:

To help youth:

1. Understand that aquatic animals may be harmed by plastic objects in a variety of ways, depending on the shape that the plastic takes.
2. Understand that discarded plastic comes in different shapes, including one- and two-dimensional, reticulated, hollow, particulated, and angular objects.
3. Understand that animals might be harmed by discarded plastics in a variety of ways, including entanglement, laceration, suffocation, and ingestion.
4. Practice the scientific skill of classification by assigning items to categories according to two shared attributes.

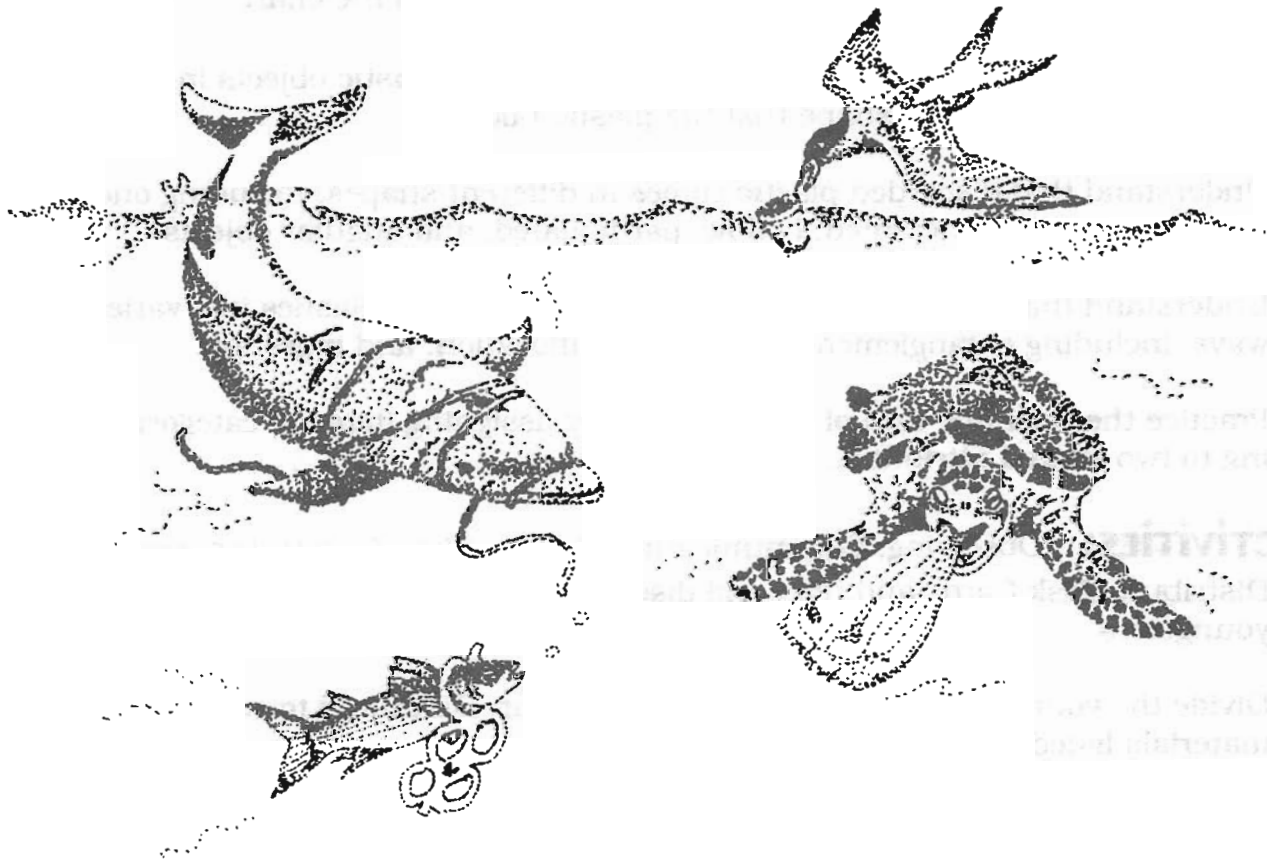
ACTIVITIES: (Observing, Communicating, Categorizing, Comparing, and Inferring)

1. Distribute Task Cards and read and discuss the "Background" section with the youngsters.
2. Divide the youngsters into groups of three or four. Distribute to each group the materials listed above.
3. Direct the youngsters to copy each item on their lists from Activity #1 onto the small, individual pieces of paper or "Post-it Notes."
4. Ask the youngsters to arrange these small papers in the appropriate places on the chart. Circulate among the groups, offering help where necessary.

5. When the classification is complete, direct the youngsters to assemble in a large group and share the results of their classifications. Ask them to note any discrepancies and try to explain why the same animal might have been put into different locations on the chart.

Keys to Success:

The difficulty here is to determine two qualities for each animal—the type of damage suffered and the type of plastic inducing the damage. Youngsters may need help keeping both qualities in mind and locating the place on the chart that represents them. It may be appropriate to talk through an example or two at the outset to show how the activity is done.

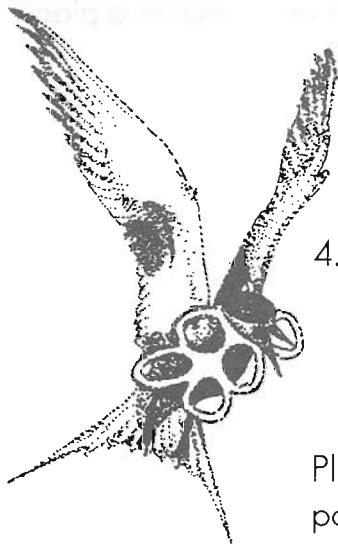


Impairment of Marine Animals by Plastics

Question: How are marine animals impaired by encountering plastics in the ocean?

Background: Scientists feel that there are four basic ways that animals can be impaired by (suffer damage from) plastics in the ocean:

1. **Entanglement** - When animals have their legs, fins, or their whole body caught in discarded plastic, they can have difficulty swimming and feeding.
2. **Laceration** - Many plastics have sharp edges which can cut an animal, causing pain, bleeding, and infection.
3. **Suffocation** - Animals can take plastic items into their mouths or wedge their heads into them. This can cause breathing problems and death for air-breathing animals such as seals and birds. In animals with gills, such as sharks and fish, plastics can prevent oxygen-rich water from circulating over their gills, causing death.
4. **Ingestion** - Some animals swallow plastic, thinking it is food or swallow it accidentally in the process of eating real food. This can cause injury to the digestive system and make it difficult for the animal to take-in more food, making the animal weak.

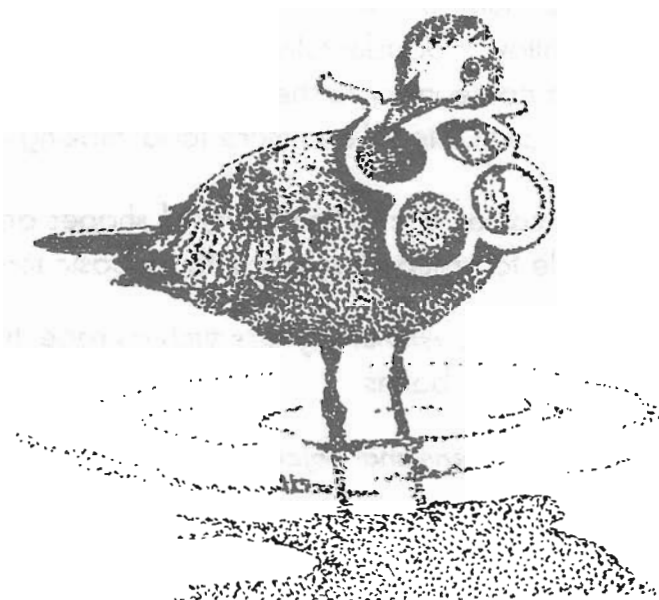


Plastic comes in a wide variety of shapes and sizes. It might be possible to group all plastic into six basic forms.

1. **One-Dimensional objects** such as rope, fishing line, and strapping bands.
2. **Two-Dimensional objects** such as sheets and bags.
3. **Reticulated objects** such as nets and six-pack rings. ("Reticulated" means a series of connected rings.)
4. **Hollow objects** such as bottles and floats.
5. **Small particles** such as broken styrofoam and pellets.
6. **Angular objects** such as plastic boxes and crates.




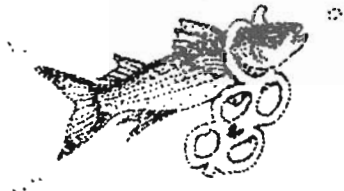
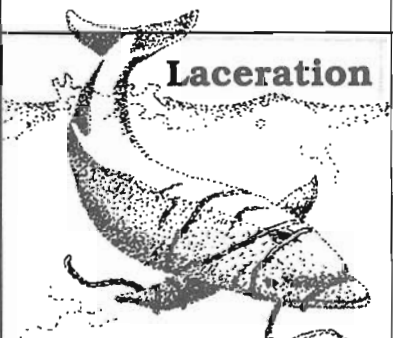


Task Card #5 (continued)

- Your Activity:**
- Working with two or three others and using your list of animals impaired by plastic which you wrote after watching the videotape, copy each different animal's name and how they were impaired by plastic onto a small piece of paper. For example, you might write, "Seal with fishing line around neck," on one piece of paper.
 - Place each piece of paper in a box on the chart according to the type of impairment and type of plastic encountered. For example, "Seal with fishing line around neck" would be placed in the box next to "Entanglement" and under "1-dimensional object" since the seal is entangled by a 1-dimensional object.
 - Compare your completed chart with the charts created by other groups. Does anybody else put an animal in a place different from yours? Why?





FORMS of PLASTIC AND

	 1-dimensional objects	 2-dimensional objects	 RETICULATED
Entanglement 			
Laceration 			
Suffocation 			
Ingestion 			



IMPAIRMENT of ANIMALS



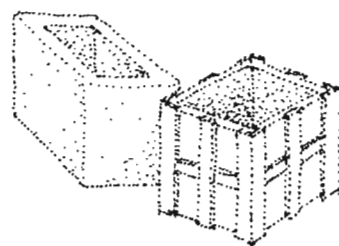
objects



Hollow objects

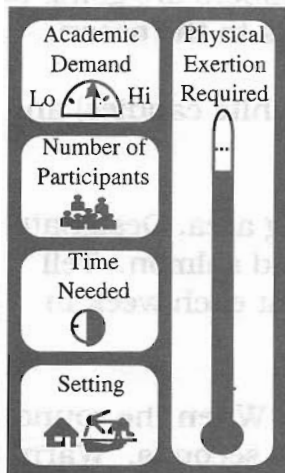


Small particles



ANGULAR objects

THE FEEDING GAME: A SIMULATION OF THE PERILS OF PLASTICS



QUESTION: Can plastic trash really endanger the lives of animals?

SUMMARY: This game simulates the negative effects that plastic trash can have on the feeding habits and survival of sea animals. In several rounds of play, players collect colored candies that represent the food of sea animals. In the first round, the players determine the number of calories their animal needs to stay alive. In subsequent rounds, the players are physically hindered in some way from gathering food in their normal way.

MATERIALS:

- Calorie Chart
- Score Card
- A large bag of small multi-colored candies. If the candies are not wrapped, they will get dirty in the course of the game and should not be eaten afterward. Multi-colored beads or other small items can be used instead of candy.

PURPOSE:

To help youth:

1. Experience, in a simulated setting, the negative effects that plastics can have on the feeding activities and health of marine animals.
2. Consider the effects of plastic debris in the oceans from a perspective that is different from their own.

BACKGROUND

Animals are harmed by plastic litter, either through entanglement, laceration, suffocation, or ingestion. Sea mammals, sea birds, and fish can become tangled in plastic fishing line, plastic strapping, 6-pack rings or other plastic trash that ends up in the oceans. Once tangled, they spend energy trying to free themselves which can make them weak, sick, or even cause them to die. Certain sea animals also can mistake plastic trash for food and harm or kill themselves by eating it. Sea turtles often mistake plastic bags for their favorite food, jellyfish, and sea birds often mistake plastic pellets for fish eggs.

Activity: (Observing, Comparing, Applying, Relating, and Inferring)

Round 1

1. Read the Background information to the group. Explain that members are going to play a game to learn how animals can be harmed by plastic debris in the ocean.
2. Remove all of the candies of one color from the bag (e.g., all the white candies) and set them aside for later.
3. Have the players stand along one wall or to the side of the playing area. Designate an equal number of the players as sea lions, sea gulls, turtles, and salmon. Tell the players that they will soon find out how much they need to eat each week in order to stay alive.
4. Explain that one round of the game represents a week of feeding. When the round begins, the players should collect as much food as they can in 30 seconds. Warn them to move safely and not to run into other players.
5. Scatter two handfuls of candies around the room (approx. 6-10 per player). Say "go," and then 30 seconds later call out "stop". The players should return to their positions along the wall with the candies they have collected.
6. Players should then count the number of candies they collected and calculate the "calories" by color, according to the Calorie Chart. Each player's total is the number of calories required by their sea animal each week and is the amount they will need to collect in the following rounds in order to stay alive. Have each player, one by one, call out the number of calories they will require in the following rounds and enter their names and the calories they gathered under Round #1 on the "Score Card".

Round 2

1. Collect the candies from the players, scatter them again, and explain the following:
 - The sea lions were curious about something they saw floating in the water and got caught up in a plastic strap. To symbolize this the sea lions must crouch down, grab their ankles with their hands, and waddle in this position, instead of walking or running, during the next round of play (they can still use their hands to pick up the candy).
 - The fish swam into a 6-pack ring and got stuck. To symbolize this the fish must keep their little fingers clasped together behind their backs at all times during the next round of play, even while picking up the candies.
 - The turtles tried to eat a plastic bag, which got caught in their throats, so now it is very hard to swallow anything else. To symbolize this, the turtles must put

one hand around their throat and may only use their free hand to pick up AND hold their candies once they've collected them.

- The gulls' feet got caught in plastic fishing line that was left on the beach. To symbolize this the gulls must hop on one foot during the next round.
2. Just before beginning the second round of play, designate one or two of each type of animal and tell them that they were lucky enough to have recovered from their troubles and can play this round unhindered. Then circle the Y or N on the Score Card to indicate which players are or are not impaired.
 3. Call out the beginning and end of the 30-second feeding period. Players should again return to the sidelines and calculate their calories according the chart. Enter the number of calories each player collected under Round 2 on the Score Card. Discuss the differences between calories collected in Rounds 1 and 2 for the hindered and unhindered animals.

Round 3

1. Collect the candies from all players, this time quietly adding the white candies that had been previously removed. Scatter them again in preparation for the final round.
2. Tell the players that were hindered last round that they remain hindered by the plastic debris, and those that were unhindered remain so as well.
3. Call out the beginning and ending of the 30-second feeding period.
4. Players should return to the sidelines and calculate their calories. Explain that the white candies represent plastic pellets that have no nutritional value, but instead waste energy as the animals try to digest them. For each white candy collected, each player must subtract 10 calories. Enter the number of calories each player collected under Round 3 on the Score Card.

Discussion

Discuss which players did and did not meet their caloric requirements. Find out if any of the hindered players improved their collection rate in the third round. If any did, explain that this may be due to them growing accustomed to their hindrance. Explain that entangled sea animals could also become accustomed to their hindrance, but that they may also weaken and die. Ask the players what kinds of trash they can think of that would represent a danger to sea animals, either through ingestion or entanglement.

Activity CHART #6

CALORIE CHART

Each piece of candy stands for an item of food for a marine animal.

Each color of candy represents a different number of calories.

Color

**NUMBER of
CALORIES**

Yellow

3



Red

5

Green

10



Orange

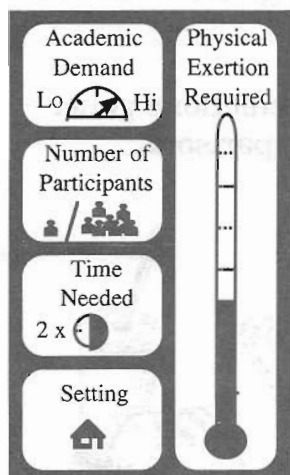
20

Add more colors and calorie numbers to the chart if necessary.

Activity Score Card #6

[illegible]

PLASTICS AT THE SUPERMARKET



QUESTION: How much of our food is packaged in plastic? Is the plastic packaging necessary?

SUMMARY: Youngsters make predictions and generate hypotheses about the preponderance of plastic in food packaging. They then gather data (by going to the grocery store and recording data about plastic packaging) and analyze their data in order to test their predictions.

MATERIALS:

- Task Card #7 (Photocopy one for each group.)
- Lab Notebook #7 (Photocopy one for each member.)
- Master Data Sheet for Activity #7 (Photocopy, cut, and paste one.)

PURPOSE:

To help youth:

1. Understand the extent to which food product packaging is made of plastic.
2. Practice the scientific skills of generating and gathering data to test hypotheses.

ACTIVITIES: (Observing, Communicating, Inferring, and Applying)

First Meeting

1. Distribute Task Card #7 and ask youngsters to read the Background section and the first paragraph of the Activity section. Then, have them record their estimates for the first part of the activity.
2. Ask youngsters to share with the group and compare their estimates. It may be expected that the estimates will vary widely. Collect and put these away for later reference.
3. Ask them to speculate how they might find out which estimates are the most accurate. Refer to the second part of the Activity section on the Task Card and discuss how this process might allow testing of their estimates.
4. Distribute the Lab Notebook pages and direct youngsters, over the period of time until the next meeting, to go to a supermarket and perform the actions described. Point out that it is important to select an aisle in the market that features packaged food. Note: Youngsters may wish to complete this activity in pairs.

Follow-up Meeting

5. At the next meeting, ask youngsters to enter the totals from their Lab Notebooks onto the "Master Data Sheet." Then use a calculator to compute grand totals and percentages.
6. Compare the totals and percentages computed above with the predictions generated by the youngsters at the previous meeting. Discuss the comparisons.

KEYS TO SUCCESS:

Youngsters should be helped to see that making predictions (hypotheses) and then figuring ways to test these predictions are things that scientists do. This activity gives practice with this most important scientific activity. Youngsters may need help in understanding how to tally. A demonstration during the first meeting may help. As an example, you could tally coins in your pocket or eye color in the group. Youngsters may also need help in understanding the idea of percentages and how to compute them.



Task Card # 7

Plastics at the Supermarket

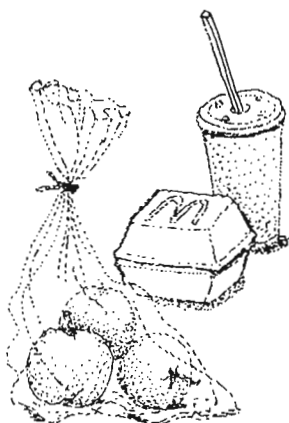
Question: How much of our food is packaged in plastic?

Background: One of the most important things in your life is the food you eat. Nobody can live without it. But in this day and age, with the exception of a few people who grow small gardens, most of us don't produce our own food. It comes to us from far away and is often cleaned, prepared, processed, and packaged before it reaches us. After eating the food, we are left with the package it came in which we often throw away. How much of this packaging that we discard is plastic?



Your Activity:

- Your first task is to make an estimate. If you went to a local supermarket and examined 100 different packaged food products carefully, how many would use plastic as the main material in packaging? Write your estimate on the Lab Notebook page.
- Your next task is to gather information that will allow you to check how good your estimate and the estimates of the others in your group were. Either alone or with a friend, go to a local supermarket and fill-in the information on the "Plastics at the Supermarket" Lab Notebook. To do this you will have to:
 1. Select one aisle in the supermarket.
 2. As you move down the aisle, carefully tally (count and mark down on the Data Sheet) the products you see, and note the packaging they come in. (See the sheet for specific instructions.)
 3. Figure the percentage of products you counted that use plastic in some way.
 4. Report your findings back to the group at your next meeting.



Plastics at the Supermarket

Data Collector's Name _____

Market Visited _____

Date of Visit _____

Out of 100 packaged food products at the supermarket, how many would use plastic as the main material? Estimate: _____

Data Gathering Procedure:

1. Select one aisle of the supermarket. What does the market's sign say is in the aisle?
2. Count the products in this aisle and record the packaging used by filling-in the Tally Chart below.
 - When you count the number of different products available in this aisle, count the product kinds, not the individual things. For example, if you selected the bakery aisle and there are ten packages of one kind of bread, this counts as one product. If there are six different kinds of bread, this counts as six products.
 - When you note the packaging type, if more than one type of material is used in the packaging of one product, count only the material that is used the most, for example, applesauce might come in a glass jar with a paper label. Because there is more glass than paper, count the package as glass.

TALLY CHART

Plastic

Total = _____

Paper

Total = _____

Glass

Total = _____

Metal

Total = _____

Other

Total = _____

Grand Total = _____

3. On the other side of this page add all the totals together and come up with a grand total.
4. Copy the totals and grand total from the Tally Chart into the Data Summary Chart below and then compute percentages and enter the results.
 - To compute the percentage for each package type, divide the total for that package type by the grand total of products in the aisle and multiply the result by 100. For example, if you counted 80 products in one aisle and 28 of them were packaged in plastic, you would divide 28 by 80 and get .35. Multiply this by 100 and you get 35% which is the percentage of all products in the aisle that are packaged in plastic.

DATA SUMMARY CHART

Products packaged in:	Totals	Percentages
Plastic		
Paper		
Glass		
Metal		
Other		
Grand Total		100%



OBSERVED PACKAGING TYPES



NAMES of DATA

PLASTIC

PAPER

GLASS

METAL

OTHER

TOTAL



IN SUPERMARKETS

GATHERERS					TOTALS	PERCENT- AGES
						100%

IN SUPERMARKETS






GATHERING

TOTALS PERCENT

AGE

100%

Recycling Plastics

Academic Demand Lo  Hi	Physical Exertion Required 
Number of Participants 	
Time Needed 	
Setting 	

QUESTION: Which kinds of plastic trash can and cannot be recycled?

SUMMARY: Group members learn about the plastic container identification system and how it helps people recycle plastics. They may also survey their homes to determine the types of plastics present and may contact a recycling center to learn about the types of plastics that are accepted locally.

MATERIALS:

- Plastic Container Identification Chart
- Activity Chart #8 and Lab Notebook #8 (Photocopy one for each group.)
- Master Data Sheet #8 (Photocopy, cut, and paste one.)
- A variety of plastic containers and other types of plastic trash including as many as possible of the following:

Plastic containers for soft drinks, milk, water, cooking oil, juice, shampoo, syrup, ketchup, or any other squeezable bottles; a piece of plastic wrap, a styrofoam cup, plastic eating utensils, plastic microwave disposable dishes, or any other plastic containers or throwaway items.

Purpose:

To help youth:

1. Recognize that everyday plastic containers are made of various types of plastic, only some of which are recyclable.
2. Become familiar with the plastic container identification system so they will be more aware of plastic recycling options.

Activities: (Observing, Communicating, Comparing, and Inferring)

First Meeting

1. Dump the plastic trash onto a table so all can see. Explain that these containers and pieces of trash are made out of a variety of types of plastics. Ask this question: How do you think people can identify the type of plastic these containers are made of? Allow group members to look over and handle the plastics for a few minutes while they talk about and try to answer the question.
2. Ask for group members to share their ideas on how one might be able to identify different types of plastics. (Some responses might be: "By how hard or squishy the plastic is." "By what comes in the container." "By the little triangle and number on the bottom of the container.")

3. Display the Plastic Container Identification Chart. Draw attention to the identification symbols on the containers. Explain that many producers of plastic containers put these marks on the bottom of their products in order to help identify the material used to make this plastic, which determines whether and where it can be recycled. Have a few group members separate the plastic containers that have code symbols. Using the chart, ask group members to identify the types of plastics these containers are made of.
4. Ask a couple of group members, one at a time, to predict which of the displayed plastic containers can be recycled. Afterward, tell them that they are technically correct, that ALL plastic containers COULD BE recycled, but only the soft drink PETE containers are accepted for recycling at most recycling centers. There are only a few recycling centers nationwide that accept other types of plastic. In most communities, all of these other containers and all other types of plastic trash are not recycled, but simply go into landfills or end up as plastic litter on the ground or in the water somewhere.
5. Either call a recycling center in your area from your meeting place (if you're meeting during their business hours), OR assign a group to telephone a recycling center in your area before the next meeting to ask the following questions. (1) What types of plastics do you accept? (2) Do you plan to begin accepting more types of plastic in the future? (3) Do you know of any other recycling centers in the area that accept other types of plastics? (4) Do you know where the nearest center is that accepts HDPE, vinyl, or LDPE?
6. Pass out the "Plastic Containers at Home" Lab Notebook to each group member who would like to do a home survey. Read over and discuss the directions. Ask them to fill out the data sheet by doing a home survey before the next meeting.
7. To conclude the activity, ask the youngsters to mentally answer these questions: What happens to plastic containers after they are thrown away? What effect could any of the plastic containers on display have on sea animals if any of them ended up in the ocean or waterways?

Follow-up Meeting

8. Ask the youngsters to enter the totals from their individual Lab Notebook pages onto the "Master Data Sheet". Then ask them, using a calculator, to compute the grand totals and percentages.
9. Compare the numbers and percentages of plastic containers found at home that can and cannot be recycled in your community. What might be done to increase the types of plastic containers that can be recycled? What might be done to decrease the amount of plastic thrown away daily at home and at school?

Plastic Containers at Home








Data Collector's Name: _____

Date of Survey: _____

Data Gathering Procedure:

1. At home, look on the kitchen shelves and cupboards, and in the refrigerator for plastic containers that hold food, beverages, or cleaning products. Look for any plastic recycling codes on the bottom of the containers. Make a tally mark in the Tally Chart beside each code symbol for each container you find.

TALLY CHART








		Line Totals
	PETE	
	HDPE	
	V	
	LDPE	
	PP	
	PS	
	other or mixed plastics	
	No Code	
Grand Total		

2. Count the tally marks on each line and enter the line totals in the column on the right.
3. Add the totals of each line and enter the grand total at the bottom of the righthand column.

4. Summarize your data. First, copy the totals from the Line Totals column of the Tally Chart to the Totals column of the Data Summary Chart below. Then, calculate the percentages and enter the results of these calculations in the Percentages column of the Data Summary Chart.

Note: To compute the percentages, divide the total for each type of plastic by the total number of containers (Grand Total). Then, multiply the result by 100. For example, if you counted 25 containers and 5 of them were made of PETE plastic, you would divide 5 by 25 and get .2. Multiply .2 by 100 which gives you 20. This, 20%, is the percentage of all containers you counted which were PETE containers.

DATA SUMMARY CHART

	Totals	Percentages
 PETE		
 HDPE		
 V		
 LDPE		
 PP		
 PS		
 Other or mixed plastics		
No Code		
Grand Total		100%

Activity Chart #8

Plastic Container Identification Chart

Types of Plastic

Examples

1 PETE (Polyethylene Terephthalate)	soft drinks, PEANUT BUTTER, cooking oil
2 HDPE (High Density Polyethylene)	gallon milk jugs, juice, MARGARINE, LOTION
3 V (Vinyl or Polyvinyl Chloride)	cooking oil, PEANUT BUTTER, SHAMPOO
4 LDPE (Low Density Polyethylene)	plastic wrap, mustard
5 PP (Polypropylene)	squeezable bottles, shampoo, lotion
6 PS (Polystyrene)	cooking oil, yogurt
7 OTHER OR MIXED PLASTICS	ketchup, squeezable bottles

Activity MASTER DATA SHEET #8

TYPES OF PLASTIC



NAMES of DATA



PETE



HDPE



V



LDPE



PP



PS



**Other or
mixed plastics**

No code

TOTAL



CONTAINERS AT HOME

GATHERERS					TOTALS	PERCENT- AGES
						100%

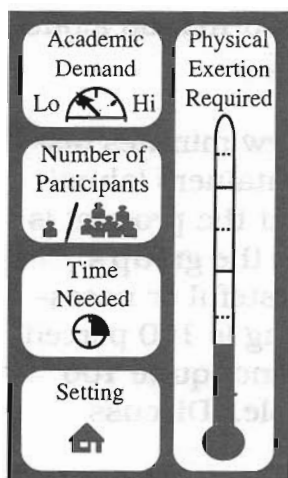
CONTAINERS AT HOME

GATHERERS

TOTALS PERCENT
AGES

100%

SMART PACKAGING



QUESTION: What kind of packaging can you design?

SUMMARY: Group members analyze packaged consumer goods and learn the benefits and drawbacks of varied styles of packaging. They then design their own packaging that reflects the importance of waste reduction, protection of the product, and other elements of smart packaging design.

MATERIALS:

- Task Card #9 (Photocopy one for each group.)
- Ten packaged products, including a boxed tube of toothpaste, an aluminum can, and a 2-liter plastic soft drink container.
- Activity Chart #9
- Art supplies (pencils, colored paper, cardboard, pens).

Purpose:

To help youth:

1. Understand the benefits and drawbacks of varied styles of packaging, especially from the perspective of impact on the environment.
2. Apply their knowledge of environmentally sound packaging to the creation of new packaging approaches.

Background

Most products we buy come in packages. Some products have so much packaging that the actual product is quite small in comparison. There are benefits and drawbacks — good and bad things — about packaging. Some of the drawbacks are that the majority of household trash is made up of packaging that is thrown away once the product is opened up. This packaging contributes unnecessarily to the problem of limited landfill space. Natural resources such as trees, water, and petroleum are also used to produce this packaging. Another drawback of packaging is that it may make the product appear better than it actually is, and it adds to the cost of the product. Some of the benefits of packaging are that many products we buy need to be packaged for protection during shipping. Packaging also serves to advertise products, identify the contents, preserve food freshness, and prevent spoiling of food.

Activity: (Observing, Communicating, Comparing, and Inferring)

1. Display the packaged products that you have gathered. Post Activity Chart #9, "Benefits and Drawbacks of Packaging." Read the Background information aloud to the group.
2. Draw the group's attention to the packages on display. Spend a few minutes discussing the packaging of the toothpaste and the two beverage containers (aluminum can and plastic bottle). With the toothpaste, emphasize that the product is the actual paste, but it comes packaged in a tube and a box. Get the group's ideas about why toothpaste might be packaged this way. Is it wasteful or necessary? With the aluminum beverage can, explain that the packaging is 100 percent recyclable. With the plastic beverage container, explain that it is not quite 100 percent recyclable, since the label, cap, and base are not recyclable. Discuss which items demonstrate smart packaging.
3. Divide the group into design teams of 3-6 members. Let each team choose one of the products from the display to analyze. Ask them to talk about the good things and bad things about the way the product is packaged. Tell them that they may consult the "Benefits and Drawbacks of Packaging" chart if they like. Afterward, by way of discussion, have each group share one or two of their ideas with the larger group. When appropriate, refer to ideas on the Activity Chart.
4. Continuing the discussion, ask for volunteers to identify any of the packages or parts of packaging that can be recycled or reused. Encourage them to be creative in coming up with ideas for reusing packaging materials. Discuss what will happen to the packaging that is not reused or recycled. How might it end up in a waterway? How might it harm an animal?
5. Pass out the Task Cards to each design team. Circulate among the teams, helping and encouraging them when necessary with the choice of a product and the design of their smart package.
6. When they are finished with their design (approximately 30 minutes), allow each team to present their design to the whole group, pointing out its features and why it is a smart package.
7. **OPTION.** If you would like to recognize their accomplishments in a more formal way, come up with categories that allow each team to receive positive recognition and awards, such as: Best re-design of the packaging of an existing product; Best reusable product packaging (jelly that comes in a jar that can later be reused as a glass); Most creative use of materials; Most environmentally sound; Best art work. Provide prizes or prompt the larger group to applaud these achievements.

Adapted from *A-Way with Waste*, Washington State Department of Ecology, and Adopt-a-Beach materials, California Coastal Commission

Task Card # 9

Smart Packaging

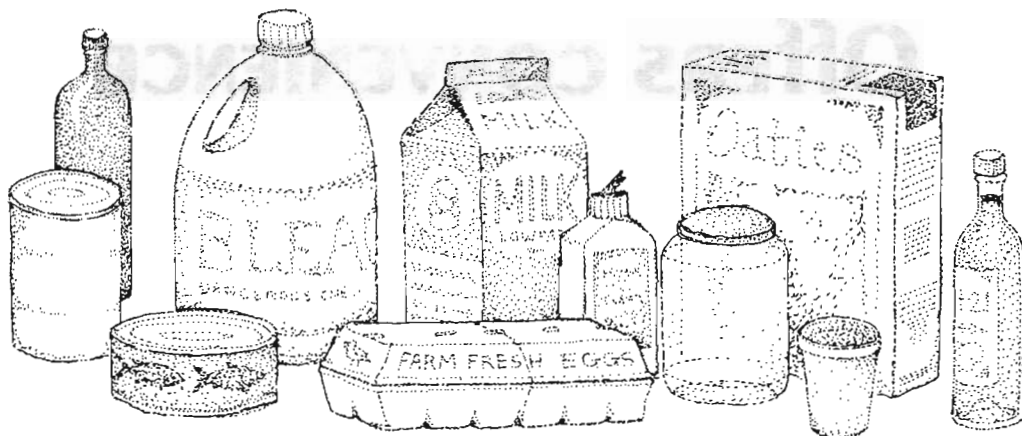
Question: What would be "smart" packaging?

Your Activity: Your job is to design some smart packaging. Choose a product – it can be anything that your team is interested in designing a package for.

- Smart packaging might include materials that can be recycled.
- Smart packaging might include materials that would have another use after the package has been opened, such as a jar of mustard that can later be used as a mug.
- Smart packaging would definitely not have lots of materials that are immediately thrown away once the package is opened.
- Smart packaging design would consider the benefits of packaging, but avoid many of the drawbacks.

Use the art materials provided to design your package. You can design it through drawings or by making an example of the product package.

When finished, someone on your team will present your package to the whole group, pointing out its features and explaining why it is an example of smart packaging.





BENEFITS OF PACKAGING

- 1. PRESERVES CONTENTS**
- 2. PROTECTS CONTENTS FROM DAMAGE**
- 3. IDENTIFIES CONTENTS**
- 4. PREVENTS THEFT**
- 5. PROVIDES INSTRUCTIONS FOR USE**
- 6. OFFERS CONVENIENCE**



DRAWBACKS OF PACKAGING

- 1. Rapidly filling our Landfills**
- 2. Harmful to animals**
- 3. Production consumes energy**
- 4. Production uses up
natural resources**
- 5. Production produces toxic
wastes**
- 6. Increases the cost of
the product**

DRAWBACKS OF PACKAGING

Rapidly filling our landfills
Harmful to animals

Production consumes energy

4. Production uses up

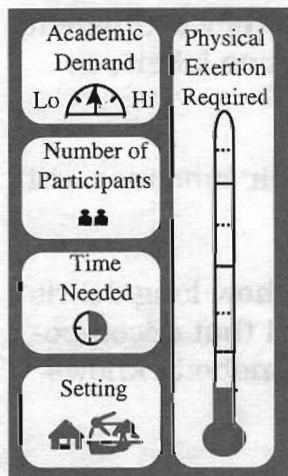
5. Production produces toxic

WASTES

6. Increases the cost of

the product

TRASH TIMELINE



QUESTION: How long does it take different kinds of trash to decompose?

SUMMARY: In small groups, youngsters create a debris timeline showing how long they think various objects will take to decompose. They then compare their timelines to a chart showing scientists' estimates. Lastly, the groups plan and perform a skit dramatizing an encounter between aquatic animals and plastic debris.

MATERIALS:

- Task Card # 10 (Photocopy one for each group.)
- A bag of trash for each group, containing approximately 10 items that one might find as beach debris, including items made of paper, cardboard, glass, and plastic.
- Construction paper and pens.
- Decomposition Chart
- String or yarn, approx. 3-feet per group

PURPOSE:

To help youth:

1. Understand that plastics may take hundreds of years to decompose.
2. Understand that plastics discarded today in the ocean may continue to pose a danger to sea animals for hundreds of years.
3. Practice making hypotheses (educated guesses) and then checking them to see if they are correct.

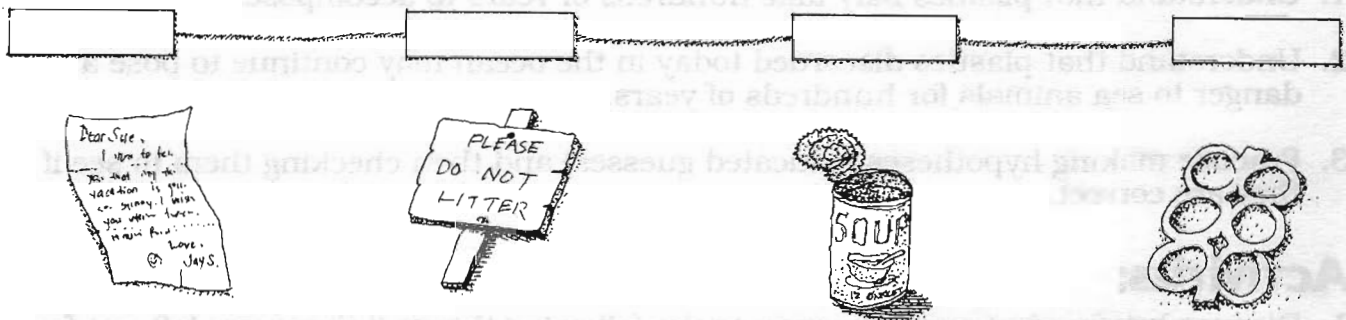
ACTIVITIES:

1. Discuss briefly what would happen to the following things if they were left out for a long time: apple core, plastic sandwich bag, piece of metal, half-eaten cookie, tissue, and beach ball. Explain that trash that is made of living or once-living substances (such as paper or an apple core) decompose biologically (biodegrade) relatively quickly as they are eaten by microorganisms. Trash that is made of non-living substances (such as metal or plastic) breaks down chemically over a much longer time, for example, rust (metal breaking down chemically). Discuss that we have never seen the effects of plastic breaking down chemically under normal circumstances because it takes so long, and plastics are a relatively new invention.
2. Hold up the contents of one of the bags of trash, one piece at a time. For each item, ask whether it would decompose biologically or chemically.

3. Pass out task cards and bags of debris to each group. Direct them to read the background information on their task cards.
4. Direct the youngsters to arrange the debris according to how long they estimate it will take each object to decompose. Have the members make timeline labels, as explained on their Task Cards.
5. When their timelines are finished, encourage them to compare their timelines with those of the other groups.
6. Display the Decomposition Chart showing scientists' estimates of how long debris takes to decompose. Emphasize that these are only estimates and that decomposition time can vary depending on the environment, and also that nobody knows for sure how long things like plastic and glass take to decompose.

Optional:

7. Direct the youth, still in their groups, to plan a skit that dramatizes sea animals encountering plastic debris.
8. Allow time for each group to perform a skit for the large group.



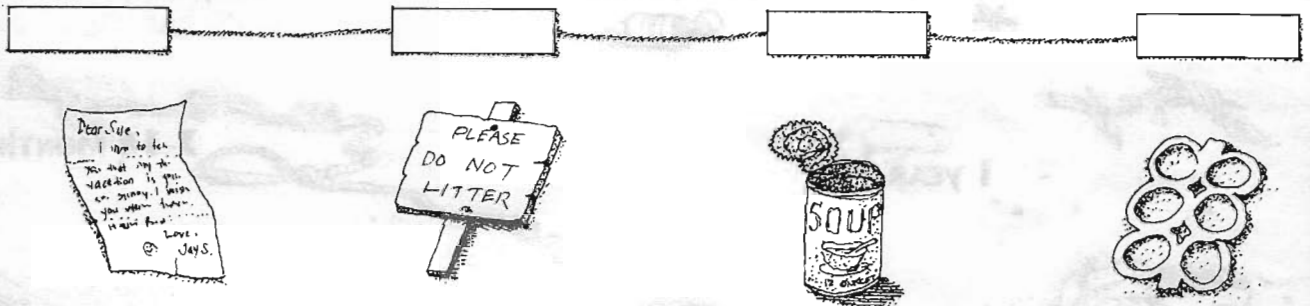
Task Card #10

Trash Timeline

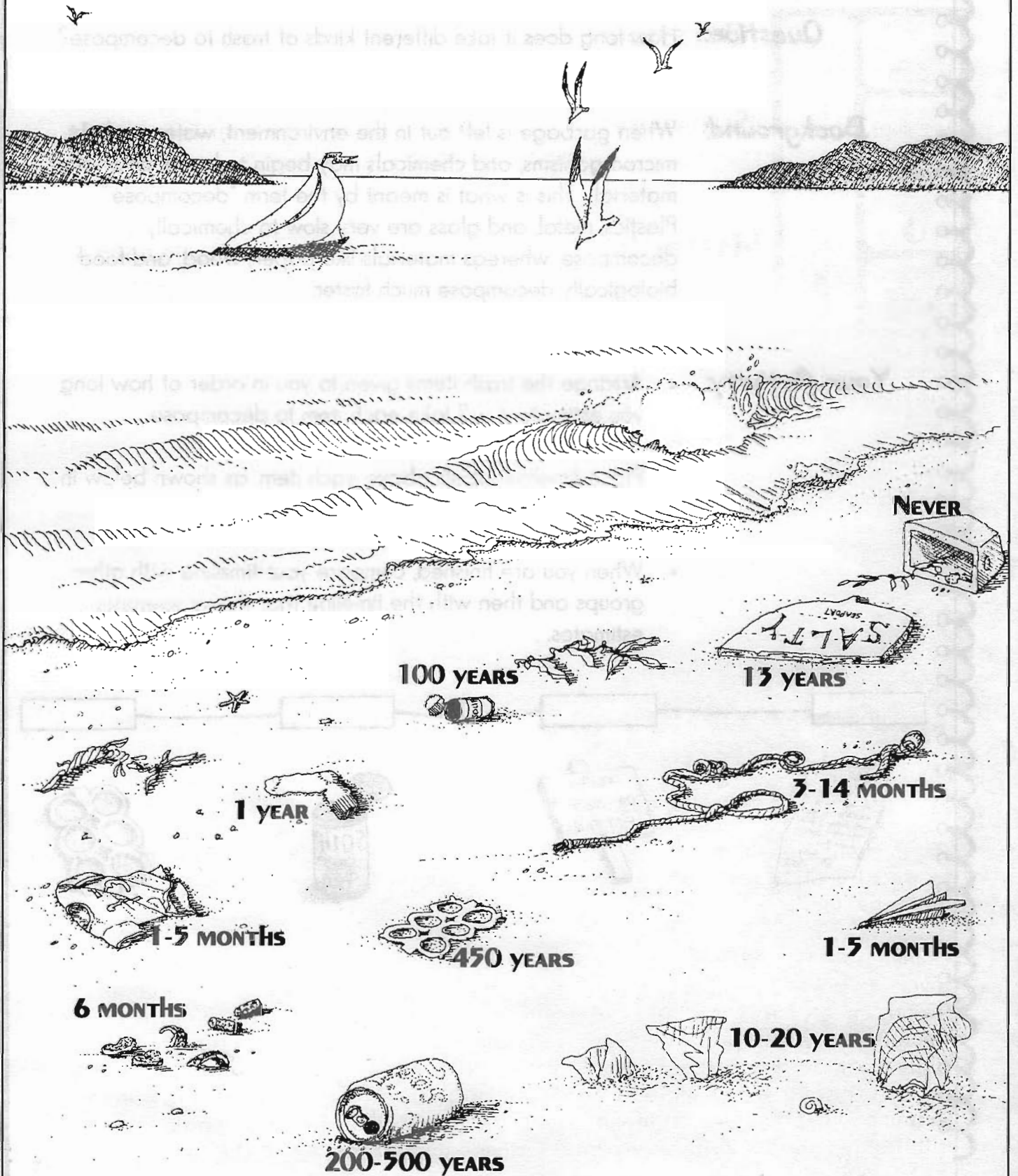
Question: How long does it take different kinds of trash to decompose?

Background: When garbage is left out in the environment, water, sunlight, microorganisms, and chemicals may begin to break down the material. This is what is meant by the term "decompose." Plastics, metal, and glass are very slow to chemically decompose, whereas materials like paper, wood, and food biologically decompose much faster.






- Your Activity:**
- Arrange the trash items given to you in order of how long you estimate it will take each item to decompose.
 - Place timeline labels above each item, as shown below in the drawing.
 - When you are finished, compare your timeline with other groups and then with the timeline that shows scientists' estimates.



DECOMPOSITION CHART



Adopt-A-Beach Preparation

Academic Demand Lo  Hi	Physical Exertion Required 
Number of Participants 	
Time Needed 	
Setting 	

QUESTION: What types of trash end up on the beach?

SUMMARY: Youth practice filling-out data cards for beach clean-up projects.

MATERIALS:

- Data Card #11 and pencil for each group of 3-5 youth.
- A small bag of litter (20 or more items) for each group.
- Gloves for all participants.

PURPOSE:

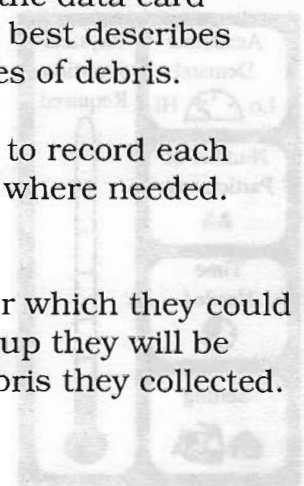
To help youth:

1. Become familiar with using the data card before participating in a beach clean-up.
2. Practice the scientific process of sorting individual items into categories.

ACTIVITIES: (Observing, Categorizing, and Communicating)

1. Explain the following:
 - A. For the beach clean-up, participants should pick up every piece of human-made debris they see, regardless of how tiny it is. Each piece will then be recorded on their data cards.
 - B. Participants should not pick up natural debris — things that were not left by humans. (Give examples of items and ask them to determine if they are natural or left by humans, i.e., sticks, rope, leaves, feathers).
 - C. Participants should not touch any medical debris, dead animals, or dangerous-looking or sharp debris. Instead, they should tell their group leader about any items like this that they see.
2. Pass out a data card and pencil to each group and direct the youngsters to read it over. Point out that the items on the card are organized by material, such as wood, metal, paper or plastic. Explain that during the actual beach clean-up, one member of each group will record every piece of debris they collect, by putting a tally mark on the card next to the name of the object. If they cannot find an object on the card, they should record it next to the "other" category and write in the name of what it is. When finished with the beach clean-up they should count up all the tally marks and put the total for each item in the box to the right.

3. Put on a pair of gloves, then hold up an item of debris and ask the group what material it is mainly composed of. Direct the groups to look on the data card under that material and put a tally mark next to the name that best describes that item of debris. Repeat this procedure with a few more pieces of debris.
4. Pass out gloves and a bag of debris to each group and ask them to record each item on their data cards. Roam among the groups, offering help where needed. Ask them to total their tallies when they are finished.
5. Afterward, discuss any difficulties they had -- such as objects for which they could not find categories -- and remind them that for the beach clean-up they will be using the same data cards to get an accurate count of beach debris they collected.



Purpose:

To help you:

1. Become familiar with using the data card before participating in a beach clean-up.
2. Practice the scientific process of sorting individual items into categories.

Activities: Observing, Categorizing, and Counting

1. Explain the following:
 - A. For the beach clean-up, participants should pick up every piece of human-made debris they see, regardless of how tiny it is. Each piece will then be recorded on their data cards.
 - B. Participants should not pick up natural debris -- things that were not left by humans. (Give examples of items and ask them to determine if they are natural or left by humans, i.e., sticks, rope, leaves, feathers).
 - C. Participants should not touch any natural debris, dead animals, or dangerous-looking or sharp debris. Instead, they should tell their group leader about any items like this that they see.

2. Pass out a data card and pencil to each group and direct the youngsters to read it over. Point out that the names on the card are organized by material, such as wood, metal, paper or plastic. Explain that during the actual beach clean-up, one member of each group will record every piece of debris they collect by putting a tally mark on the card next to the name of the object. If they cannot find an object on the card, they should record it next to the "other" category and write in the name of what it is. When finished with the beach clean-up they should count up all the tally marks and put the total for each item in the box to the right.

ITEMS COLLECTED

YOU MAY FIND IT HELPFUL TO WORK WITH A BUDDY AS YOU CLEAN THE BEACH, ONE OF YOU PICKING UP TRASH AND THE OTHER TAKING NOTES. AN EASY WAY TO KEEP TRACK OF THE ITEMS YOU FIND IS BY MAKING TALLY MARKS. THE BOX IS FOR TOTAL ITEMS; SEE SAMPLE BELOW.

PLASTIC

BAGS:

TRASH _____

SALT _____

OTHER _____

BOTTLES:

BEVERAGE, SODA _____

BLEACH, CLEANER _____

OIL, LUBE _____

OTHER _____

BUCKETS _____

CAPS, LIDS _____

CUPS, SPOONS, FORKS, STRAWS _____

DIAPERS _____

DISPOSABLE LIGHTERS _____

FISHING LINE _____

FISHING NET:

LONGER THAN 2 FEET _____

2 FEET OR SHORTER _____

FLOATS & LURES _____

HARDHATS _____

LIGHT STICKS _____

MILK, WATER GALLON JUGS _____

PIECES _____

PIPE THREAD PROTECTOR _____

ROPE:

LONGER THAN 2 FEET _____

2 FEET OR SHORTER _____

SHEETING:

LONGER THAN 2 FEET _____

2 FEET OR SHORTER _____

6-PACK HOLDERS _____

STRAPPING BANDS _____

SYRINGES _____

TOYS _____

VEGETABLE SACKS _____

OTHER (specify) _____

GLASS

BOTTLES:

BEVERAGE _____

FOOD _____

OTHER (specify) _____

FLUORESCENT LIGHT TUBES _____

LIGHT BULBS _____

PIECES _____

OTHER (specify) _____

STYROFOAM® (OR OTHER PLASTIC FOAM)

BUOYS _____

CUPS _____

EGG CARTONS _____

FAST-FOOD CONTAINERS _____

MEAT TRAYS _____

PIECES:

LARGER THAN A BASEBALL _____

SMALLER THAN A BASEBALL _____

OTHER (specify) _____

RUBBER

BALLOONS _____

GLOVES _____

TIRES _____

OTHER (specify) _____

METAL

BOTTLE CAPS _____

CANS:

AEROSOL _____

BEVERAGE _____

FOOD _____

OTHER _____

CRAB/FISH TRAPS _____

55 GALLON DRUMS:

RUSTY _____

NEW _____

PIECES _____

PULL TABS _____

WIRE _____

OTHER (specify) _____

PAPER

BAGS _____

CARDBOARD _____

CARTONS _____

CUPS _____

NEWSPAPER _____

PIECES _____

OTHER (specify) _____

WOOD

CRAB/LOBSTER TRAPS _____

CRATES _____

PALLETS _____

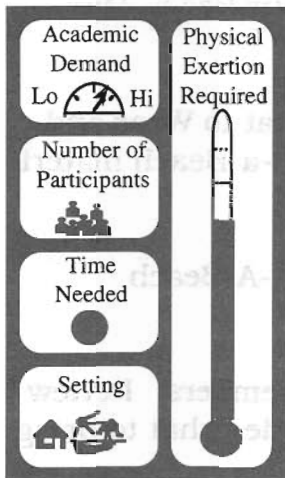
PIECES _____

OTHER (specify) _____

CLOTH

CLOTHING/PIECES _____

Adopt-A-Beach



QUESTION: What kinds of trash end up on our beaches?

SUMMARY: The youth group officially adopts a beach, conducts a clean-up, and participates in the Adopt-a-Beach program organized by the California Coastal Commission.

MATERIALS:

- Large plastic trash bags (one for every 2-3 people participating in the clean-up)
- Gloves for all participants
- Beach clean-up Data Cards from Activity #11
- Pencils

(Note: Some of these materials may be provided by the Beach Manager.)

PURPOSE:

To provide to youth:

1. The opportunity to free a beach of debris and help animals.
2. The experience and satisfaction of performing a community service.

TIME FRAME:

Approx. 1-1/2 hours for the clean-up, plus travel and recreation time after the clean-up.

ACTIVITIES: (Observing, Inferring, Comparing, Categorizing, and Communicating)
Preparation

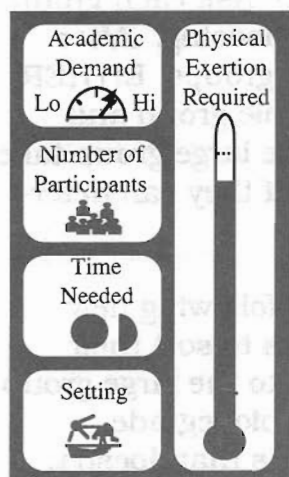
1. Contact the California Coastal Commission at (800) 262-7848 for a Beach Adoption application and Beach Adoption Kit. These materials will provide you with more details on the steps of adopting a beach. You will be assigned a beach to adopt and a Beach Manager to work with.
2. About two months before the clean-up, begin organizing your group, and assembling the materials and support you'll need. Check with your Beach Manager to find out which supplies will be provided to you and which you will need to provide yourself.
3. Begin to educate your group about why clean-ups are important. Share with them the information on the fact sheets provided in your Adopt-A-Beach materials and conduct some of the other suggested preparation activities listed there.
4. One month before the clean-up, scout the beach you have adopted, planning how you will physically organize the clean-up and noting the availability of facilities and any safety tips you will need to pass on to your group.

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5. One month before the clean-up, arrange for group transportation.
 6. Two weeks before the clean-up, reconfirm arrangements with your Beach Manager.
 7. Two weeks prior, send the “Parental Consent Form” and the “What to Wear and What to Bring to a Beach Clean-up” form included in your Adopt-a-Beach materials home with the group members to be signed and returned.
 8. At your last meeting prior to the clean-up, do Activity #11, Adopt-A-Beach Preparation.
 9. One week before the clean-up, review logistics with the group members. Review where and when to meet, what the activities of the day will include, what to bring.
 10. Also one week prior, review with your group the safety information included in your Adopt-a-Beach materials.

The Day of the Clean-up

11. At the beach on the day of the clean-up, meet the Beach manager and review safety precautions with the entire group upon arrival.
12. Organize the group and review the collecting guidelines as described in your Adopt-a-Beach materials.
13. Begin the clean-up. Check to be sure everyone is wearing gloves.
14. Sort the debris collected and complete the Data Cards according to the Adopt-a-Beach instructions.
15. Participate in some of the data collection activities as described in the Adopt-a-Beach materials. Some suggested topics to explore are:
 - What kind of litter was most often found?
 - Do you think most of that litter was left here by people on the shore, or dumped from boats?
 - Were any packaging materials found in the litter?
 - How does it make you feel to see the litter along our beach?
 - How does it make you feel to see the beach clean after your work?
16. Get your bags of collected debris ready for pickup or recycling.
17. Celebrate your excellent teamwork and enjoy your recreation time at the clean, adopted beach.

ANALYZING SHORELINE DEBRIS



QUESTION: What kind of trash ends up on California shorelines?

SUMMARY: The youth group takes a field trip to a shoreline, either at the ocean, a lake, or a river, and collects and analyzes the debris found there.

MATERIALS:

- Large plastic trash bags (one for every 2-3 people participating in the clean-up)
- Gloves
- Beach clean-up Data Sheets (see Activity 11)
- Pencils

PURPOSE:

To provide youth with:

1. The opportunity to free a shoreline of debris.
2. The experience and satisfaction of performing a community service.
3. The opportunity to apply their knowledge of various properties of debris by analyzing and categorizing the debris collected.

PREPARATION:

Determine a field trip destination. You may want to have adult volunteers or a small group of the members visit the shore once before the trip occurs to ensure that it is a likely place to find debris. The best time to clean up ocean shores are at low tides. Check with Parks & Recreation officials or whoever maintains the shoreline to ensure that your visit does not directly follow one of their scheduled clean-ups.

TIME FRAME:

Allow approximately 1-1/2 hours for the clean-up and analysis, plus travel and recreation time after the clean-up.

ACTIVITIES: (Observing, Communicating, Comparing, Classifying, Categorizing, and Inferring)

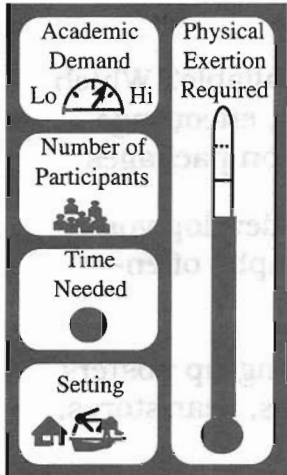
1. Remind the group not to remove wood or other natural materials (seaweed, shells, driftwood) and to avoid disturbing plants or animals. Pass out clean-up bags. Check to be sure that everyone is wearing gloves.
2. Separate your group into teams of 2-4. Designate a general area for each group to clean. Remind them of these safety features: never turn your back on the ocean, stay with your group; notify the group leader if any dangerous items (syringes, chemical containers) or stranded animals are found. Begin your clean-up.

3. Re-assemble the group and have each clean-up team, working separately, dump a portion of their bag's contents in a pile on the ground (approximately 20 items). (Remind them to keep their gloves on while handling the debris.) Ask each group to separate the trash items in their pile into categories of their choosing. After they have chosen categories and separated their trash piles into groups, EITHER have the teams, one at a time, explain their categories to the whole group and show an example of the trash items in each category OR have the large group take turns looking at each small group's separated trash piles to see if they can determine the categories chosen.
4. Next ask the groups to sort their trash piles using several of the following new categories. After naming each category, allow time for the groups to sort their trash piles and discuss, show, or explain their sorting decisions to the large group.
 - a. Arrange items according to how long it will take each item to biodegrade.
 - b. Separate the debris that harms aquatic wildlife from the debris that doesn't.
 - c. Classify the items in terms of how they might be perceived by aquatic wildlife as food, e.g., very likely to be perceived as food, somewhat likely, or unlikely. Identify the species which might attempt to eat the items.
 - d. Classify the items according to the likelihood of aquatic animals becoming entangled in them, e.g., very likely, somewhat likely, or unlikely.
 - e. Separate the debris that was left by beach goers from the debris that probably just washed ashore.
 - f. Separate into two groups the debris that can and cannot be recycled.
5. Re-pack the debris to be thrown away or recycled.
6. Congratulate yourself on your excellent teamwork. Take a last look at the amount of trash you collected. Enjoy your recreation time.

Option:

You may wish to fill-out beach clean-up data cards (Activity #11) and mail them to the California Coastal Commission when they are completed. Filling-out these cards is easiest when one team member carries the card and pencil and tallies each item as it gets picked up and put into the bag. The information recorded on the data cards is used in a national marine debris study to help policy makers develop solutions to the marine debris problem. Your information can help make a difference!

BE A PART OF THE SOLUTION



QUESTION: What can your group do to help fight the problems of plastic trash?

SUMMARY: Group members identify a problem caused by plastic debris in aquatic environments, then develop a plan and carry-out a project to help solve the problem.

MATERIALS:

- Task Card #14 (Photocopy one for each group.)
- Will vary according to the project selected

PURPOSE:

To help youth:

1. Recognize that their actions can help solve the problems caused by plastic debris.
2. Experience the satisfaction of planning and executing a community service project.

ACTIVITIES: (Communicating, Comparing, Classifying, and Applying)

First Meeting

1. Divide the group into small teams of 5-7 members. Distribute the Task Cards and allow about ten minutes for members to read and discuss ideas.
2. Reconvene the entire group. Brainstorm about problems of plastics in waterways (e.g., harms animals, does not decompose, is ugly, can tangle boat propellers), and share ideas for action. Accept all of ideas as valid. Below are some project ideas that may come up during the discussion:
 - a. Develop a presentation to educate others about plastic trash. It could be a skit, a song, a talk, a slide show.
 - b. Create and display a mural or window painting somewhere in your community illustrating the problems caused by plastic trash.
 - c. Produce a videotape about the problem and its solutions.
 - d. Produce a radio public service announcement about the problem and solution.
 - e. Adopt a launch ramp, marina, or beach and assess whether it has a problem with plastic debris. Work on ways to solve the problem (i.e., Does the area need more trash cans? Do people using the facility need to be educated about the problems caused by plastic debris?)

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- f. Organize and monitor a plastics recycling effort at a marina, dock, or beach.
 - g. Talk to boaters or fishermen about marine litter and refuse disposal. Find out how they dispose of their plastics.
 - h. Study the packaging for fishing bait. What kinds of bait are available? Which stores sell bait in degradable packages? Publicize your results, encourage producers to use degradable packaging, or put warning labels on packages.
 - i. Show the videotape "Trashing the Oceans" to other groups, or develop your own narrated slide show. (You may be able to borrow photographs of entangled animals from the Center for Marine Conservation.)
 - j. Educate the public about the problems of plastic litter by putting-up posters (designed by others or designed yourself) in bait shops, marinas, gear stores, places that sell fishing licenses, and at beaches.
 - k. Help educate the public by setting up a booth somewhere in the community and passing out brochures on the problems caused by plastic debris.
3. Through discussion, help your group identify one or two projects that they can actually carry out. The project chosen should be appropriate for your group's person power, skill level, and leadership abilities.
 4. Develop a written plan for the project. It should include a schedule showing who is going to do what and when they are going to do it. This is the time to ask again if your group has the skills needed to carry-out the project. The more carefully a project is planned the more smoothly it will run. During this planning phase be sure to identify the kind and amount of help your group will need from parents, experts, and others.

Field Work

5. As much of the actual plan as possible should be carried out by the group members. Encourage them to follow the project through to completion. Arrangements should be made for completing any work the group cannot accomplish.

Follow-up Meeting

6. Talk about the project after it is completed, focusing on what was done, what could have been done better, and what was learned. A few weeks after the project is completed, visit any sites where work was done or displayed and determine if additional work is needed. Recognition or reward for successful completion could be provided in the form of a trip, a party, pizza, or merit badges earned in conjunction with the project.

Portions adapted from a communique of the Pacific Marine Fisheries Commission, "Marine Debris: What Roles Can the Schools Play in Ending This Problem?" and from Boy Scouts of America, *Conservation Handbook*.

Task Card #14

Be A Part of the Solution

Question: What can your group do to help solve the problems caused by plastic trash?

Background: Fourteen billion pounds of garbage are dumped into the sea every year. That is more than 1.5 million pounds every hour. In times past, glass was the most common type of beach debris, but now the most common type is plastic, in all its shapes and forms. Plastic trash can harm or kill animals, ruin the beauty of our shorelines, and damage boat propellers which threatens human safety. Although it is illegal to litter, and also illegal to dump any plastic trash off of boats, people still continue to do so. What can be done about this?



By educating others about the problems of beach debris and by encouraging others to stop littering, your group can help solve some of the problems caused by plastic debris in the waterways. You really can help your community manage the problem of plastic debris in the waterways and on shore. You really can add to the beauty of your community, and you really can help protect the lives and health of sea animals.

Your Activity:

- Read the background information (above) out loud in your small group.
- In the next 5-10 minutes, come up with as many answers as possible to the following two questions:
 - a. What could your youth group do to help solve the problems caused by plastics and other debris in the waterways?
 - b. What could your youth group do to teach others about the problems of plastic trash?
- Choose one person from your small group to tell the larger group about two of your best ideas. Today, your youth group will select one or two projects that you will actually complete to help solve the problem of plastic debris.

