

## Hands-on Activities for Plastics and Marine Debris Education

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These three activities can be completed individually or as a set, all at once or spread across multiple sessions. Each activity takes between 10-25 minutes, depending on the group size and level of discussion.

- **Activity #1: Does it Sink or Float?**
- **Activity #2: Top Trash Types, with optional beach cleanup**
- **Activity #3: Single-use, Long-term use, Biodegradable Venn Diagram**

The activities can easily be adapted for either informal or classroom educators for a variety of group sizes and grade levels. Below are some of the national and Florida State Standards that these activities address:

All three activities:

- Ocean literacy principles
  - Principle 6: The ocean and humans are inextricably interconnected.
    - Humans affect the ocean in a variety of ways.
    - Everyone is responsible for caring for the ocean.
- Florida State Standards:
  - SC.1-5,7.L.17.2  
Both human activities and natural events can have major impacts on the environment.

Activity #1: Sink vs Float:

- Florida State Standards:
  - SC.1.P.8.1  
Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float.

- SC.2.P.8.1  
Observe and measure objects in terms of their properties, including size, shape, color, temperature, weight, texture, sinking or floating in water, and attraction and repulsion of magnets.
- SC.8.P.8.4  
Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.

### Activity #3: Single use, multi-use, biodegradable Venn Diagram

- Next Generation Science Standards:
  - K-ESS3-3  
Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
- Florida State Standards:
  - SC.35.CS-CS.2.1  
Solve age-appropriate problems using information organized using digital graphic organizers (e.g., concept maps and Venn-diagrams).
  - MA.912.LT.5.5  
Explore relationships and patterns and make arguments about relationships between sets using Venn Diagrams.

# Activity #1 Does it Sink or Float?

An activity involving the densities of different plastic resins

*Activity written by Carolyn Kovacs and Maia McGuire.*

**Summary:** Students will be introduced to the different types of plastics and will hypothesize whether they think each type will sink or float. They will then test their hypotheses by submerging small pieces of each type of plastic into water and recording whether the plastic sinks or floats.

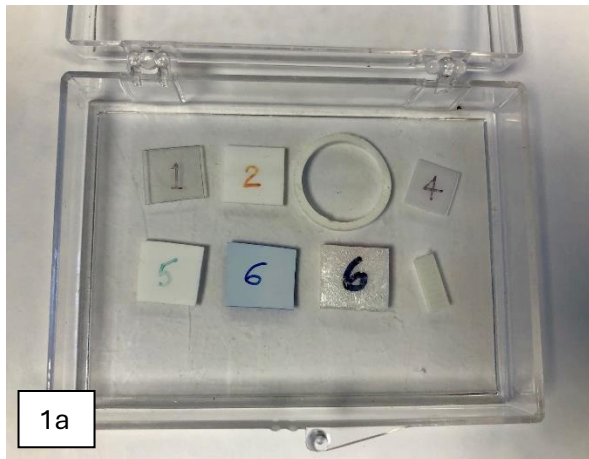
## Supplies:

- Items made from different plastic resins (at least 2 of each) e.g.
  - Plastic water bottle (PET, recycling code 1)
  - Milk jug (HDPE, recycling code 2)
  - ½" PVC pipe or cotton swab packaging (PVC, recycling code 3)
  - Lids from oatmeal containers (LDPE, recycling code 4)
  - Yogurt tub (PP, recycling code 5)
  - Solo cup (PS, recycling code 6)
  - Egg carton (EPS, recycling code 6)
  - Nylon cable ties (recycling code 7)
- Labels for items (see appendix for cards to print)
- Small containers to put/store plastic pieces in
- Very fine permanent markers (different colors are helpful) to label plastics
- Small containers of water (clear cups or bowls are good)
- Paper towels or small towels to dry plastic pieces after submerging
- Tweezers

## Set up:

If you wish to just have one set of plastics to use as a demonstration, you will only need to cut one piece of each type of plastic to create one kit. If you would like to have enough for a class to use individually or in small groups, make enough for each group.

1. Use scissors or a sharp craft knife to cut one of each type of plastic item into small squares (appx ¼" x ¼"). Exceptions: cut the cable ties into pieces that are approximately ¼" in length. If using PVC pipe, use a chop saw to cut it into approximately 1/8" rings (Figure 1a).
2. 2. Wherever possible, write the recycling number on each small square. It is recommended to use different colors for each type, that way if the number becomes hard to read, the color still identifies the item. Otherwise, it can be difficult to tell one clear or white square from another.
3. 3. Put one of each type of plastic in a small container.



1a



1b

Figure 1a. Pieces of each plastic type labeled in a small container for one group.

Figure 1b. Large plastic items of each type, labeled with the name and number.

4. Collect the second set of each item. If you would like to help with remembering the types of plastics for each while presenting, label the containers with the plastic type and recycling code (Figure 1b). There are labels in the appendix at the end of this document that can be printed. Note that there are two “6” items as there are both polystyrene and expanded polystyrene. In addition, you may want to use a clear plastic bag such as thin produce bags or product packaging bags as the representative item for type 4 rather than the oatmeal lid used in the experiment, as these are the most common LPDE plastic people encounter.

1. PET = polyethylene terephthalate
2. HDPE = high density polyethylene
3. PVC = polyvinyl chloride
4. LDPE = low density polyethylene
5. PP = polypropylene
6. PS = polystyrene
6. EPS = expanded polystyrene - this may simply be labeled PS on the product
7. Other = in this case, nylon

Optional: If this is something you will be using during outreach events outdoors, you can create a felt board with the words “float” and “sink” and put them on either side of the board using Velcro. You can also attach Velcro to the back of the plastic items above to attach to the board.

## Conducting the activity:

Ask the group if they think plastics float or sink. You will probably hear float, maybe some sink, maybe both – the answer is “it depends.” It depends on the type of plastic and its properties! You will now introduce the different types of plastics, allow participants to examine them, and ask them to hypothesize whether they think the item will float or sink. Asking the group to raise hands for “float” and “sink” works well. Place the item on the side of the table or felt board that is designed for floating or sinking items. Sometimes there is a big split in opinion – up to you as to whether you go with majority rules or put some in the middle. Introduce each type of plastic until you have all the items on the table or board.

Next, you will test the plastics. This can either be done as a demonstration or with participants doing the test themselves. Give each group a set of plastics, a clear cup with water, and a set of tweezers. Demonstrate how to safely use the tweezers to pick up a piece of plastic and fully submerge it in the water to ensure it breaks the surface tension. Remind the group of each type of plastic, the item made of that plastic, and whether they hypothesized if it would float or sink. Instruct the participants to pick up the first type of plastic, submerge it in the water, and report as to whether it floated or sank. Repeat for each item.

If doing a group demonstration, the educator can walk around the room and interact with different participants to have them be the main observer to report to the class whether each type of plastic sinks or floats.

Recap which items they hypothesized correctly, and which surprised them. You may wish to highlight each plastic item and move them to the “float” or “sink” side of the table or board as you go, or at the end.

What should they find?

- These plastics float: HDPE, LDPE, PP, and EPS
- These plastics sink: PET, PVC, PS and Nylon.

Possible discussion questions:

What is the scientific characteristic that determines whether plastic floats or sinks?

- Density

Is salt water denser or less dense than fresh water? If we were to use salt water, how might that affect our results?

- Salt water is denser, therefore more plastics may float. However, the overall results of this experiment would not change. Figure 2 (back of page) is a good resource for comparison of plastic types and densities.

Based on what you learned, what types of plastics would you most expect to find washed up on beaches?

- The plastics that floated in this experiment: Polyethylene (HDPE and LDPE), polypropylene, and expanded polystyrene.

# Which plastics float and which sink in seawater?

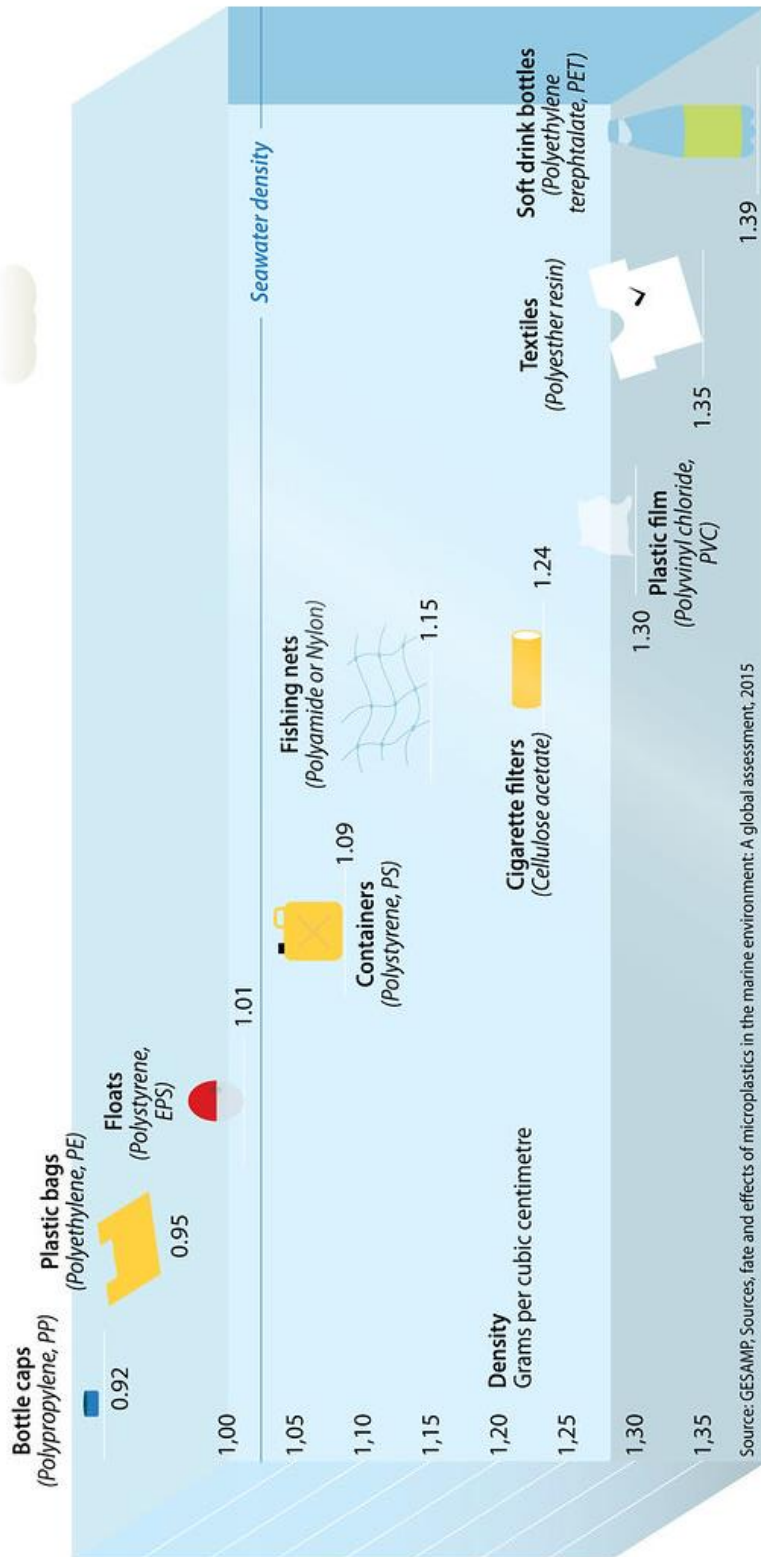


Figure 2. Reference figure on density of plastics in saltwater from UNEP

Source: <http://www.grida.no/resources/6930>

## Activity #2: Top Trash Types

**Summary:** Students will hypothesize which types of marine debris are found most often during beach cleanups, then compare their hypotheses with data from the International Coastal Cleanup.

### Supplies:

- Printed cards with names and photos of the top 10 types of debris found on beaches and list of data from the International Coastal Cleanup. See appendix for cards to print.
- If conducting a beach cleanup: buckets or bags, gloves or trash grabbers, and a data sheet and pencil to record data.

### Conducting the activity:

Provide each group of students (recommend working in groups of 2-4) with a set of cards. The items on these cards represent the top ten most common types of trash picked up worldwide during the International Coastal Cleanup. Ask each group to work as a team to arrange the cards in order from what they think is the most to least common type of trash collected on the beaches, worldwide. Then ask them to share with the class what their top three items were and why they thought these would be the most common.

Once everyone has shared, you may want to ask or point out items that groups had in common. Next, share the list of top items from the ICC worldwide data. Did we guess correctly with some of the items? You may also want to share the data specific to the United States and the state that you live in, and have students think about why there may be differences in your location.

### Discussion questions:

- Is there anything the top items have in common?
- Do you think these items are from a local land-based source (from people using the beach) or did they wash up with the waves (from an outside source)?
- Why do you think there may be differences in the international data versus data specific to the United States or your state?
- If you have done the plastic sink vs float experiment: What types of plastic are each of these items made of? Do you think that affects the types of items commonly found on the beach?



### Case study: Bottle caps

As discovered during the sink-float experiment, different types of plastics have varying densities, which affect whether they float. Bottle caps are made of polypropylene (type 5) or high density polyethylene (type 2) plastic, both of which have a lower density than water. This is one of the reasons we see so many bottle caps on beaches – they float at sea until washing up on shore. In comparison, plastic bottles are made of polyethylene terephthalate or PET (type 1 plastic). This is a denser plastic. If the bottle fills with water without a cap on, it will sink. If the plastic breaks into smaller pieces, those individual pieces will also sink. Therefore, we see the plastic bottle caps washing up on the beach, but the plastic bottles may be on the sea floor, where we do not see them.

Bottle caps are more common in Florida (#3 item) compared to worldwide (#6 item). The Gulf Stream travels along the southeast coast of Florida and can carry plastics that have been floating throughout the Caribbean Sea and Atlantic Ocean. These floating plastics can then be washed up on Florida beaches with storm events and waves. This is one of the reasons we have a higher percentage of plastic bottle caps on Florida beaches compared to other locations.

### Beach cleanup (optional)

Conduct a beach cleanup of a local beach as a group. Once you have collected the trash, sort it into different piles based on the categories from this assignment and then count and record how many pieces of trash from each category you collected.

### Discussion questions:

Did the most common items match the ICC data, or are they different? Why might that be?

- Think about the potential sources of local pollution or how the currents and waves in the area affect what washes up.

What might affect how much trash you find at this beach on different days?

- Examples to consider: Storms, high tide, holiday weekends with lots of visitors.

If you have done the plastic sink vs float experiment:

- Can you tell what types of plastic any of these items are made of?
- Do you think the items you found would float or sink?
- Fill a bucket with water and test some of them!

# Activity #3: Single-use, long-term use, biodegradable Venn diagram

Sorting activity to educate about single-use plastics and possible alternatives

**Summary:** Students will categorize items as single-use, long-term use, and/or biodegradable and then discuss choices we can make to reduce our use of single-use plastics.

## Supplies:

- Two large reusable bags with single-use and long-term use items inside (Table 1)
- Six hula hoops (or yarn cut into pieces about six feet, laid out as circles)
- Printed labels (“single-use”, “long-term use”, and “biodegradable”)
- Printed pledges or plain paper with writing and coloring utensils

*Notes:* The activity works best if you can have two sets of items (they do not need to be identical – it is good to have a few differences) and two leaders, one to work with each group. However, depending on your group size and set-up, you can do it in one group, or break up into more groups.

*Table 1. Suggestions for items to include in the activity. (B) indicates that the item is biodegradable. You do not need to include all items, and there are many not on the list you can use – take advantage of items you already have!*

Single-use	Long-term use
Plastic straw	Metal straw (or bamboo, glass, etc)
Plastic shopping bag	Reusable bag
Plastic water bottle	Reusable water bottle
Plastic cutlery set	Normal cutlery (can put in a cute bag to remember to take and reuse!)
Wooden cutlery (B)	
Plastic or foam plate	Regular plate
Paper plate (B)	
Plastic cup	Regular cup, travel mug
Paper cup (B if no plastic/wax lining)	
Foam or plastic-lined paper coffee cup	Reusable coffee mug
Paper napkin (B)	Cloth napkin (B)
Saran wrap	Beeswax wraps
Tin foil	Tupperware
Ziploc bag	Silicone bag
Foam or plastic take-away container	Tupperware (metal, plastic, or both)

Other items to consider: glass jar, yogurt container with lid

## Set up:

Fill two reusable plastic bags with various items that are single-use and long-term use. If you can find some items that have their equivalent in both categories that is great (i.e. plastic water bottle and reusable water bottle), but not required for all items. It is also good to find a mix of biodegradable (paper, cotton) and non-biodegradable products (plastic). You can find examples of possible items in Table 1, but it is open to what you can find or seems relevant to your audience.

Set up your Venn diagrams. We recommend using hula hoops, which you can lay on the ground and overlap – three hoops per set. Other options include yard set out in circles or drawing on the sidewalk with chalk. Print or write out the labels “single-use,” “long-term use,” and “biodegradable” on paper and set one in each circle.

## Conducting the activity:

Ask your students what it means for something to be single-use, long-term use, and biodegradable.

- Single-use – items designed to be disposed of directly after use.
- Long-term use – items designed to be reused many times; they are usually made of durable materials that can handle heavy use and washing.
- Biodegradable – able to be broken down naturally and return to nature without having a harmful impact on the environment.

Explain to the groups that each bag has a mix of items in it. Items are single-use or long-term use, and they may also be biodegradable. Students will take turns taking an item out of the bag and putting it in the Venn diagram where the items best fit. You can turn this into a relay race game by having the bag across the room or field from the Venn diagram and the group of students – one student can get an item out of the bag, and once they put it in the Venn diagram, the next student can pick an item out of the bag (if you do a relay race, make sure to have equal number of items in the two bags!) The bag itself is the final item!

Go for it! Encourage the group to help each other out if someone is not sure which category an item would be in. Depending on your group, they may be excited about the race aspect of it and try to get everything on the Venn diagram quicky and you will discuss at the end. Other groups may take it more slowly, in which case you can encourage discussion about the categories as you go.



## Reflection:

Once the groups finish, ask them to look at different sections of the Venn diagram. Encourage conversation about the categories and items they see.

## Discussion topics:

- What kinds of items are in the single-use nonbiodegradable section? What about the single-use biodegradable?
- Were there any items you put in the Venn-diagram section between single-use and long-term use? How many times do you have to use something for it to be considered long-term use? More than ten times? Plastic bags or plastic spoons are intended as single-use, but you could use them multiple times. However, will you still be able to use them in a month? In a year?
- Look at the biodegradable items. How long does something have to break down for it to be considered biodegradable? A month? A year? Ten years? One hundred years? What if that item ends up inside a plastic bag at the landfill, will it still biodegrade?

Now have students look at their single-use items and their long-term use items – are there any “matches” - meaning are any items in the long-term use you could use to replace single-use? Have students match up any items (you may need to work across groups for some of these). Are there any of these long-term use items they already use at home? Are there any they think they could get their families to adopt?

*Understanding the complexities:* We put items into categories during this exercise, but it is important to discuss that not everything fits perfectly in one category. Some items may seem to fall in between categories. Is it better to buy something new that is long-term use if you have a “single-use” item that you have been using over and over? Are there items in your home that you can already use rather than going out and buying something new? (Big yogurt containers or old salsa jars can make great storage for food or crafts!)

*Note:* There are new types of plastics labeled as biodegradable or compostable on the market now. However, most of these need a high temperature industrial composting facility to break them down, they won't just break down in your backyard compost pile or if left out in nature. If you don't have one of these facilities in your area, these plastics need to be put in the trash, as they cannot be recycled.

## Follow-up activity:

Have students write out a pledge for their plastic use. It can focus on remembering to bring and use a long-term use item they have or refusing a certain type of single-use plastic (take-out containers, plastic utensils, water bottles, straws). You can also have students access the Florida Microplastic Awareness Project pledge at <https://bit.ly/plasticpledge> and complete the pledge online.

## Labels to print for Activity 1



Polyethylene  
terephthalate



Polyvinyl chloride



High density  
polyethylene



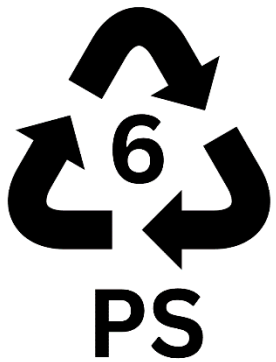
Low density  
polyethylene



Polypropylene



Expanded polystyrene



Polystyrene



# International Coastal Cleanup Data for Activity 2

The data below is from the 2025 International Coastal Cleanup (ICC) report based on data collected in 2024. Annual reports are available at: <https://oceanconservancy.org/work/plastics/cleanups-icc/annual-data-release/>

Thousands of ICC cleanups on the same day around the world collected a total of 17,820,206 pieces of trash. For this list, the ICC data of “grocery bags” and “other bags” were combined into one category of “plastic bags” and the category of tiny trash was included within the top 10 list.

## Worldwide, top 10 types of trash and the number of items collected:

1. Tiny trash <1 inch in size (plastic foam and pieces)	4,054,338
2. Food wrappers	1,442,860
3. Plastic beverage bottles	1,284,225
4. Cigarette butts	1,227,124
5. Plastic bottle caps	979,400
6. Plastic bags	948,765
7. Plastic food containers	523,998
8. Paper plates and cups	444,485
9. Plastic plates and cups	436,397
10. Foam food containers	404,636

The data on tiny trash is not included when the data is broken down by country and state. However, not including tiny trash, the top three items for North America and Florida are written out below. You can find the top three items for your country or state by accessing the most recent ICC report at <https://oceanconservancy.org/work/plastics/cleanups-icc/annual-data-release/>

### North America top three:

1. Cigarette butts
2. Plastic bottle caps
3. Food wrappers

### Florida top three:

1. Plastic bottle caps
2. Cigarette butts
3. Food wrappers

Source: 2025 International Coastal Cleanup Report

[https://oceanconservancy.org/wp-content/uploads/2025/09/FINAL\\_ICCAAnnualReport\\_Digital.pdf](https://oceanconservancy.org/wp-content/uploads/2025/09/FINAL_ICCAAnnualReport_Digital.pdf)

## Cards to print for Activity 2



Tiny trash  
(plastic and foam pieces <1 inch in size)



Plastic bags



Cigarette butts



Plastic beverage bottles



Food wrappers



Foam food containers



Plastic bottle caps



Plastic food containers



Paper cups and plates



Plastic plates and cups