

IMPACTS ON ECOSYSTEMS

In the previous two objectives, participants explored what marine debris is, what it is made of, where it comes from, and how it travels.

“ASK: Now that we have talked all about marine debris, why should we care about the issue? Why is marine debris a bad thing for our ocean?

- Participants should talk about the negative impacts of marine debris.
- Marine debris negatively impacts the marine environment, animals and even you.

“EXPLAIN: Many of the things you are saying are called ecosystem impacts.

“SAY: Let's create definitions for the words *ecosystem* and *impact*. (Note: This is only necessary if needed by participants.)

To help participants: The origin of the word “Eco” is Greek, meaning house. So think about it like this: “house system.” Your home and school are part of your: _____, (ecosystem)

- **Remember** the word *impact* can also mean something positive. This will be discussed in more detail, but keep it in mind when defining *impact*.
- **The formal** definition of *impact* is: the effect or influence of one person, thing, or action on another (Oxford Dictionary).

ENTANGLEMENT

- **Entanglement is** one of the major issues caused by marine debris. Entanglement is when something becomes twisted or trapped by something else. Marine debris can easily entrap animals and cause serious problems.
- **Nets, ropes, lines,** fishing gear, ribbons, 6-pack rings and many other types of marine debris can entrap marine species, limiting their ability to move, eat and breathe.
- **Ghostfishing:** The phenomenon of animals (fish, marine mammals, turtles, etc.) getting caught in fishing nets, lines or traps that have been lost or released and are no longer being operated by people.
- **Entanglement** can result in injury, illness, suffocation, starvation and even death.
- **Animals spend** valuable time and energy trying to escape from entangled trash on their bodies, but they are often unable to do so.
- **In 2010,** 488 animals were found entangled by marine debris during the International Coastal Cleanup.
- **Although animals** such as seabirds, sea turtles, whales, seals and sea lions are often the most impacted by entanglement, any animal can be entangled by marine debris, even animals like coral and sea urchins.

“ASK: What kind of items might we find during our cleanup that could potentially entangle an animal? How?

ACTIVITY: RUBBER BAND ENTANGLEMENT

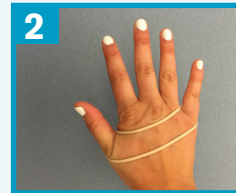
OBJECTIVE: Participants will gain an understanding of entanglement by simulating what this restriction may be like for marine wildlife.

MATERIALS:

- A rubber band for each participant. The rubber bands should be an average size; they will go once around the hand. The activity will not work if rubber bands are too large. Thicker bands are more of a challenge and are less likely to snap.

INSTRUCTIONS:

1. Each participant should hang the rubber band around his/her pinky finger of one hand.
2. Each participant should then stretch the rubber band across the back of their hand, and hook the rubber band on their thumb.
3. Have participants place their other hand (without the rubber band) behind their back.
4. Have participants now attempt to free the hand "entangled" in the rubber band without using their opposite hand, teeth or any other body part.
5. Allow participants 15 seconds to attempt to free their hands of the rubber bands.



DISCUSSION:

- Prompt the discussion by **ASKING: Were you able to free your hand from the rubber band? How did you feel while trying to remove the rubber band?**
- Explain that this activity mimics what it may be like for many marine animals when they become entangled in pieces of marine debris. Two common examples include seabirds becoming entangled in fishing line and sea turtles becoming wrapped in line, rope or other fishing gear. Explain that these animals, unlike us, do not have fingers or opposable thumbs that easily allow them to remove items.

INGESTION

ASK: Is there another way marine debris can hurt the ocean ecosystem or the animals living within the ocean ecosystem?

This is where participants should be eager to describe the potential for animals to ingest (eat) debris.

- **Ingestion is** another negative impact of marine debris on animals. Ingestion is when something, such as food, is taken into the body. More or less, ingestion is the same thing as eating something.
- **Many marine animals**, such as mammals, birds and sea turtles have been known to ingest marine debris by accident.
- **Marine debris** is often mistaken as a food source or is attached to a food source and ingested by an animal.
- **Debris ingestion** poses a serious health hazard and can lead to "loss of nutrition, internal injury, intestinal blockage, starvation, and death." (NOAA)
- **Plastics are** the most commonly ingested form of debris.

ASK: What items could we collect on our cleanup that might be mistaken for food and be ingested by marine wildlife if left in the marine environment?

ACTIVITY: FOOD OR FOE?

OBJECTIVE: Participants will come to understand how easily marine debris is mistaken for food and ingested by marine wildlife.

MATERIALS:

- Timer/stopwatch
- Vanilla pudding (1 cup per participant)
- Blue food dye
- Gummy bears (enough for about 6–8 per participant)
- Gummy worms (2 per participant)
- Container for each participant (small paper bowls work well)
- Napkins
- Spoons
- (Optional) Raisins or dried cranberries (spoonful per participant)
- (Optional) Sprinkles or Nerds candies (spoonful per participant)
- (Optional) Clean kitchen shears or knife and cutting board

SET-UP:

1. Scoop the pudding cups into individual bowls for each participant and add 2–3 drops of blue food dye to turn the pudding into an “ocean color”.
2. Rinse and keep the empty pudding cups for a fun upcycling craft to be completed later in the program.
3. Cut or tear gummy worms into quarters and put 6–8 quarters into each pudding ocean.
4. Put the same amount of gummy bears into each pudding ocean. (We recommend putting worm pieces and bears of the same color into each bowl—it is more challenging this way.)
5. Add a spoonful of raisins or cranberries to each bowl and mix all of the contents.

INSTRUCTIONS:

1. Each participant should have an ocean pudding bowl, spoon and napkin.
2. Inform participants that they should refrain from eating any pieces until after the game.
3. Tell participants that they are sea turtles trying to eat jellies. The jellies are squishy and can be clear or colorful for this activity.
4. Explain that they are going to be given 20 seconds to collect as much food as they can from their pudding ocean. Instruct them to pull food out one by one, using the spoon, and place each piece on their napkins as they go. Remind them not to eat their food yet.
5. Start the 20 second feeding period, and tell the participants when to stop.
6. Instruct participants to now look at what they collected more closely and take note of how many gummy bears they collected as well as how many gummy worm pieces. They look very similar when mixed in the pudding ocean. After counting, return all pieces to the pudding ocean. *Note: raisin/cranberry pieces are added as a non-food item, such as leaves or driftwood, but may also stump some participants.
7. Now tell participants that the gummy worm pieces are actually plastic pieces, and that gummy bears are their main diet. In the second feeding period, participants should only aim to collect gummy bears—their actual food.
8. Prompt a short discussion by **ASKING: Did you collect more plastic than your actual food? How might this same situation affect marine animals like sea birds that often ingest large amounts of plastic pieces?**
9. Run the next 20 second feeding period.
10. Have participants count the number of food pieces they collected. Did they accidentally collect “plastic” pieces again? Make note of everything collected and return all pieces once more to the pudding ocean.

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11. Prompt a short discussion by **ASKING: Now that you knew to avoid the plastic pieces, did you have a harder time searching for food? Did you collect fewer pieces overall than the first round because you spent more time avoiding plastic?**
12. (Optional) Finally, add a spoonful of sprinkles or Nerds candies to each participant's mix. Mix them into each pudding ocean. Explain that this new item represents microplastic pieces.
13. Repeat the last round (where participants are aiming to collect only their gummy bear food) but now they must also try to avoid microplastic pieces that will stick to everything.
14. Run the final 20 second feeding period.
15. Have participants count the number of each item they collected: food, plastics and microplastics.
16. Prompt a short discussion by **ASKING: Did you accidentally collect microplastic pieces? Were you frustrated by how many microplastic pieces there were and how they stuck to all of your food pieces?**
17. Now the game is over and participants may eat their pudding oceans if they wish!

DISCUSSION:

“ SAY: Many marine animals are unable to tell the difference between food and marine debris. They often unknowingly ingest both large and small items (macro and microplastics) among other marine debris items.

“ ASK: Why is this a problem for animals?

This is problematic for a number of reasons:

- Animals that eat marine debris can feel “full.” However, their bellies aren’t filled with the nourishing food that they need to survive, but instead they are filled with trash that cannot nourish them and may even hurt them.
- Certain marine debris items like fish hooks or sharp glass or plastic can cause serious harm to an animal when ingested and can lead to death.
- Ingested marine debris can clog the digestive pathways within animals, which can lead to their death.

For an alternate version of this activity that does not require pudding, please refer to the online activity bank.

Talking Trash & Taking Action is a marine debris education partnership between Ocean Conservancy and the NOAA Marine Debris Program. View the full curriculum at <https://marinedebris.noaa.gov/talking-trashand-taking-action>