Currents and Pollution Spread

Description: Currents play a large role in the spread of pollution. Students will simulate ocean currents and observe how they affect the spread of pollution.

Audience: Middle School

Student Outcomes:
- Students will demonstrate the ocean currents.
- Students will observe the effects currents have on the spread of pollution.

Teacher Background:
Hurdles with Nurdles
The Great Nurdle Hunt- problem with nurdles
Nurdle Fact Sheet

Materials:
- Clear shallow container that is at least 2 inches deep.
- Water
- 2 rocks (about the size of your hand)
- Food coloring- Blue, Red, Yellow, Green
- Large ice cube (or several small ice cubes)
- Nurdles (4 per group)
- Student handout
- Colored pencils

Teacher Prep:
The teacher will need to prepare enough stations depending on the size of the class. It is recommended that no more than 5 students work at the same station.
Place one clear shallow container at each station and add the 2 rocks and 1 inch of water to each of them. The rocks will serve as continents so be sure to have them stick out of the water slightly. Each group will need their own set of food coloring.
The ice that the students will need should be placed nearby in a fridge, or container where it will not melt.

Alternative:
The teacher could do this whole group and project the experiment on a screen, but it is recommended that the students get the hands-on experience of the investigation.

Introduction:
View the following video with the class to review ocean currents.
Alien Deep: Ocean Conveyor Belt from National Geographic

Procedures:

1. Inform the students that they will be looking at how currents affect the spread of pollution such as nurdles.
2. The teacher will begin introducing Nurdles to the class by showing the following clip.
   Hurdles with Nurdles clip (Clip starts at :27, watch till 8:31)
3. After viewing the clip, pass around the vials of nurdles for the students to get a closer look. During this time allow for any questions or discussions to take place over the clip they just viewed. It is important to inform the students that some nurdles sink and some float because of the different densities. The ones we are viewing today are ones that float. The majority of nurdles we find on the beaches are ones that can float.
4. The teacher will explain the procedures for the experiment and divide the class into groups.
5. Once students are in their groups, they will add 1 large ice cube (or several small ones to their container).
6. Next, the students will carefully place
   a. 4 drops of blue between the 2 rocks
   b. 8 drops of yellow in the top right corner
   c. 4 drops of green in the middle top section
   d. 4 drops of red on the right side of the rock on the right.
   e. 4 nurdles anywhere in the tray.

   *Refer to diagram on recording sheet
7. Students will need to record on the diagram where the nurdles were originally placed.

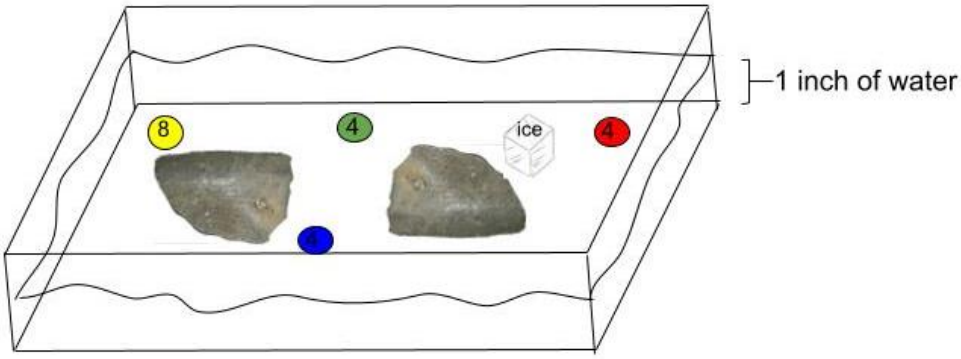
(It is very important that the students know not to bump or blow on the container and skew the results. The slightest movement will alter their demonstration.)

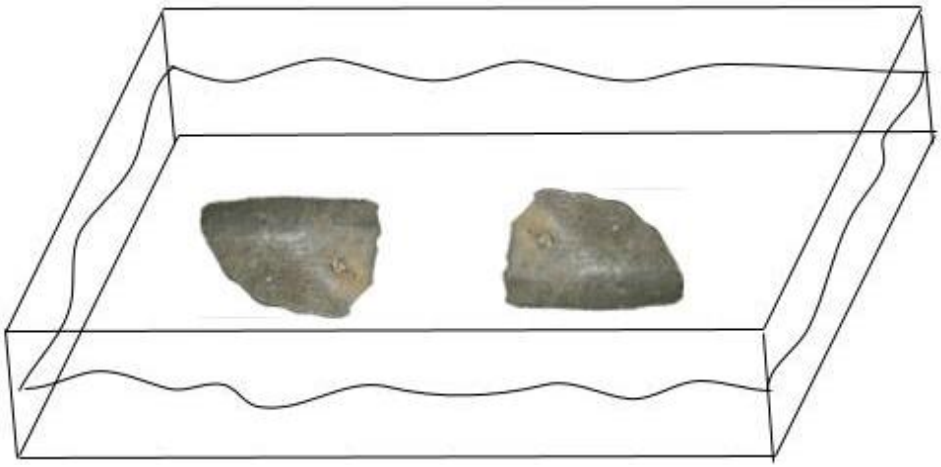
8. After 8 minutes have the students record on the blank diagram where the pollution ended up. You may have them use colored pencils to do this.

Questions/Discussion:

What kinds of pollution could these different colors represent?
How did the flow of the currents and the location of the continents affect where the pollution and nurdles spread?
What other factors would cause the nurdles to travel further or move at a faster rate?
What do you think happens to the nurdles with a higher density?

Adapted from “Spill Spread” from Ocean Currents Teacher’s Guide, published by Lawrence Hall of Science Great Explorations in Math and Science (GEMS).





1. Using the diagram above, illustrate your observations of what happened to each color of pollution when a current was present. Put an X on the area that had the most pollution. What do you think caused that area to have the most pollution?

   _____

   _____

2. Did the Nurdles get carried by the current? _____
3. What color of pollution had the farthest spread? _____
4. What effect did the continents have on the spread of pollution?

   _____

   _____

5. Did you notice a difference between the direction the current flowed at the surface level vs. the bottom? _____
   If yes, why do you think that happened?

   _____

   _____