

# Bay Area Scientists in Schools Presentation Plan

Lesson Name Global Ocean Currents and Fluid Densities  
Presenter(s) Jennifer Frederick  
Grade Level 5 Standards Connection(s) Most of earth's water is salt water in oceans; the oceans influence the weather and the water cycle plays a role in weather patterns.

## Abstract:

*Your opportunity to tell teachers and kids what's going to be fun and interesting about your visit!*

Students will be able to explain what liquid density is and how it is affected by temperature and salt. They will also be able to explain how differences in density drive ocean currents around the globe.

**Objective:** *As a result of your lesson, what will students learn? What will they be able to do?*

Show how temperature or solute concentration affects the density of water. Explain how water temperature drives ocean currents and how a large increase in fresh water from melting ice at the north and south pole can affect ocean currents.

## Vocabulary/Definitions:

*3 – 6 important (new) words*

Ocean currents  
Density  
Salinity

## Materials:

*What will you bring with you?*

1L or 2L soda bottles (clear) with tops cut off  
Eyedroppers  
Styrofoam cups  
Red & blue food coloring  
Thermos for hot water  
Ice for cold water  
Room temperature water  
Salt  
Stirring stick/spoon  
Paper towels (in case of spills)  
5-gallon bucket (for waste water)

*What should students have ready (pencils, paper, scissors)?*

None

## Classroom Set-up:



1611 San Pablo Avenue, Suite 10B  
Berkeley, California 94702  
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*Student grouping, Power/Water, A/V, Light/Dark, set-up/clean-up time needed*

Split classroom into groups of 4. Each group takes one 2L plastic bottle. Fill each group's 2L bottle with room temperature water. Tell students: DO NOT DISTURB THE WATER!

## Classroom Visit

### **1. Personal Introduction:** \_\_\_\_\_ 2 **Minutes**

*Who are you? What do you want to share with students and why? How will you connect this with students' interests and experiences?*

I'm a scientist. I study how climate change affects the North and South Pole, and what might happen if all of the ice melts. I also study how the ocean might react to all of the ice melting at the North and South Poles. Today we will be scientists and we will try to figure out what might happen by conducting an experiment.

### **Topic Introduction:** \_\_\_\_\_ 5 **Minutes**

*What questions will you ask to learn from students? Big Idea(s), vocabulary, assessing prior knowledge...*

Have you ever had an experience with an ocean current? The ocean has currents which circle the globe. How do these currents begin and why do they move? Show globe/map and point to ocean currents. What is the temperature of the water at the Equator or the North Pole? Do you think the temperatures drives the current? As a scientist, I am interested in answering these questions by doing experiments. Let's make our own currents by doing an experiment.

(Simultaneously set up a container of ice water (blue) and a thermos of hot water (red).)

### **2. Learning Experience(s):** \_\_\_\_\_ 30 **Minutes**

*What will you do, what will kids do? Demonstrations, hands-on activities, images, games, discussion, writing, measuring... Describe in order, including instructions to kids.*

Temperature Experiment:

Hand out two eyedroppers, two Styrofoam cups, and one worksheet to each group. Explain the hot-red/cold-blue water and what it represents. Show how to inject colored water into the 2L water with the eyedroppers. Explain that each group's recorder will have to fill out the worksheet. Fill each group's Styrofoam cups with some hot-red water and cold-blue water.

Temperature Experiment Review:

Ask the students what happened. Did everybody get the same results? If not, why? What was supposed to happen? Explain what density is: hotter water is less dense, colder water is more dense (draw on board). Dense water is heavier, while less dense water is lighter. Pass out sheet with ocean currents and relate it to the difference in density due to temperature.

### **3. Wrap-up: Sharing Experiences** \_\_\_\_\_ 10-15 **Minutes**

*Putting the pieces together - how will students share learning, interpret experience, build vocabulary?*

What is the difference between the ice at the North/South Pole and the ocean? (ice: cold, solid, fresh) (Ocean: warmer, liquid, salty). Show globe/map and point to polar ice and oceans. Ice is fresh and melts into very cold fresh water. Ocean water is salty and warmer. What happens if we mix fresh water and salty water? Do you think that salt affects the density? What do you think will happen? Form a 'hypothesis.'

Salty Water Demo

#### 4. Connections & Close: 5 Minutes

*What else might kids relate this to from their real-life experience? How can they learn more?  
Thanks and good-bye! Clean-up.*

Salty water is heavier (more dense) so it stays on the bottom while fresh water is lighter (less dense) so it stays at the top. We know cold water sinks and warm water rises, which causes the ocean currents. If a lot of very cold fresh water from the melting polar ice enters the warmer ocean, it will not sink because it isn't all salty! Ocean currents will STOP!

**Total 50 - 60 Minutes**

### **Follow-up – After Presentation**

*Suggest students write a letter explaining “How we learned about \_\_\_\_\_?”  
List or attach examples of activities, websites, connections for additional learning.  
Attach worksheets, hand-outs, visuals used in classroom presentation.*

Issues which may arise:

- We might run out of time. If this happens, we will have to cut out the salinity section and keep the lesson specifically about ocean currents to driven by temperature (and mention briefly how salt water in the oceans and fresh water in the North & South Pole play a role in possibly stopping these currents).
- The experiment may not work if the kids bump the water and create a lot of motion. In this case we should try to make a demo after they all tried it so that they know what it should have looked like.

Questions to ask the classroom teacher:

- Is there a water source near or in the classroom?
- Should we bring ice or will it be available at the school?
- Are there paper towels in the classroom or do we need to supply them?
- What have the students already learned about our topic?
- Is there a large map of the world to use while explaining ocean currents?
- Can we use a projector to show a map of ocean currents?