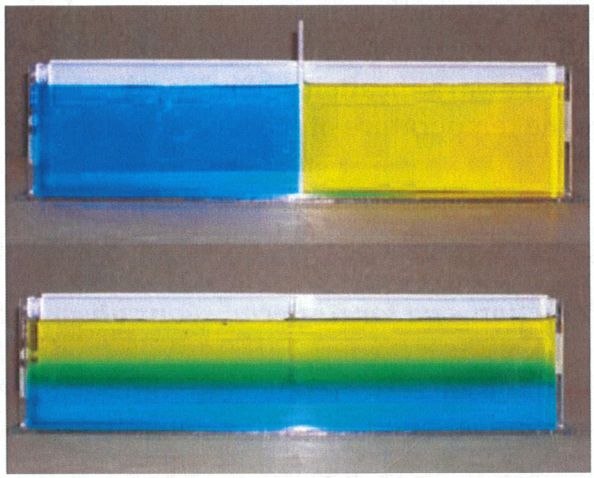
Activity III- *Investigating Density and Stratification*

Goals	*Investigate the effects of temperature and salinity on density and stratification*
Materials	*Weather Water density tanks, beakers, food coloring, salt, ice, hot water or electric tea kettle, spoons*
Journal	*Density Tanks instructions and observations*



Credit: TOS

(Activity adapted from The Oceanography Society, 2009 and M. Andres, WHOI)

Teacher intro:
Now that you have an understanding of density, let's investigate how it affects the layering of water in the ocean.

Density tanks activity – cold and hot, salt and fresh
1. Gather materials (6 tanks, so groups will be 3-4 students for this activity).
2. **First test is salty vs fresh** –fill the tank with water to 1 inch from top. Place divider firmly in the groove in the tank.
3. Mix in 2 teaspoons salt on one side of the divider and add a few drops blue food coloring. Add a few drops yellow food coloring on the other side.

- In your journals, draw the tank set-up. Write down a prediction of what will happen when you remove the divider. Now pull it out swiftly!

What do you observe? Can you see a wave form between the 2 layers? Is there a wave on the surface?

Now blow over the surface of the tank. Can you blow hard enough to mix the layers?

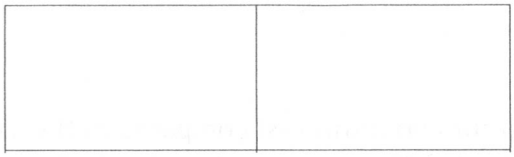
Put divider back in, mix up one side thoroughly with the spoon. What color does it turn? How would you describe the salinity of the mixed-up layer? Sketch the tank in your journal, make a prediction, then pull out divider again.

Water Density and Stratification Activity

Woods Hole Oceanographic Institution

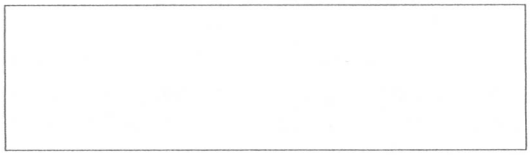
Experiment #1 - Salty vs. Fresh

1. Fill the tank with water to 1 inch from the top. Place the divider firmly in the groove in the tank.
2. Mix in 2 teaspoons salt on one side of the divider and add a few drops of blue food coloring. Add a few drops of yellow food coloring on the other side.
3. Color and label your initial tank set-up below. What do you predict will happen when you remove the divider? Why?



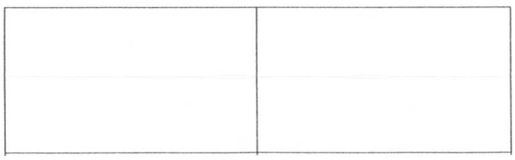
Hypothesis:

4. Swiftly pull out the divider. What do you observe?



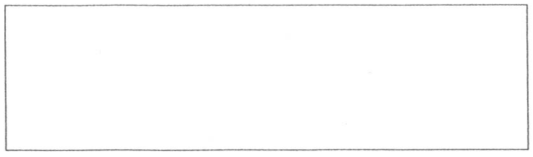
Can you see a wave form between the 2 layers? Is there a wave on the surface? What happens when you blow across the surface?

5. Put the divider back in place. Mix up one side thoroughly with the spoon. What color does it turn? How would you describe the salinity of the mixed-up layer? Color and label the tank below, make a prediction, then pull out divider again.



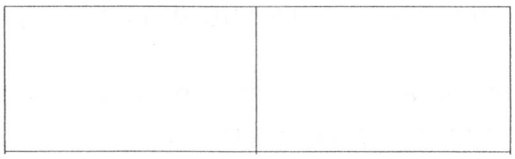
Hypothesis:

6. What happened? Was your hypothesis correct? Color and label the tank diagram below.



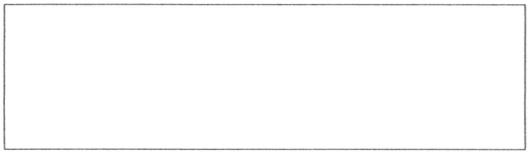
Experiment #2 – Cold vs. Warm

1. Get a beaker of warm water from your instructor, and add red food coloring.
2. Make cold water in a beaker by pouring water over ice. Add blue food coloring.
3. Repeat the steps above. Color and label the diagram below and make a prediction:



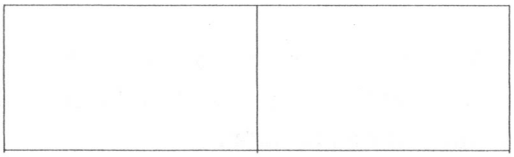
Hypothesis:

4. Do you notice anything different about this test compared to the salt and fresh?



Observations:

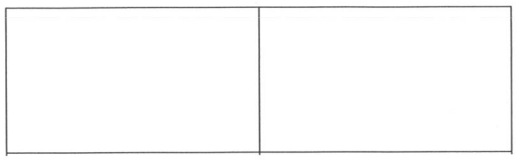
5. Put the divider back in place. Mix up one side thoroughly with the spoon. What color does it turn? How would you describe the temperature of the mixed-up layer? Color and label the tank below, make a prediction, then pull out divider again.

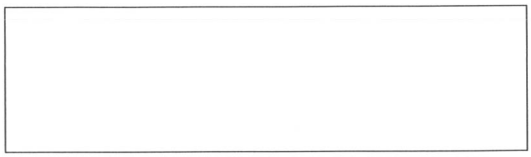


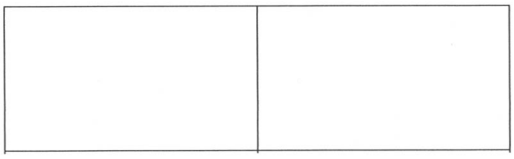
6. What happened? Was your hypothesis correct? Color and label the tank diagram below.

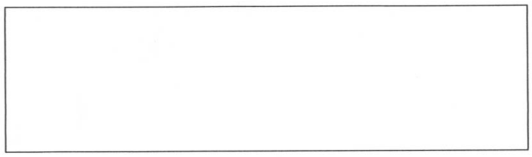
Experiment #3 – *Set up a test, make a prediction – go for it!*

Now – experiment! Campers create their own test. Try salt vs cold. Redo with more or less salt added. Have a "race" with the group next to you. What moves fastest? How does the internal wave change?
Make hypotheses and record your observations.









Experiment #4 - Overnight
Set up a color diffusion test – room temperature, fresh water with yellow on one side and blue on the other. Compare with a salinity-stratified tank the next morning. What do you predict will happen?