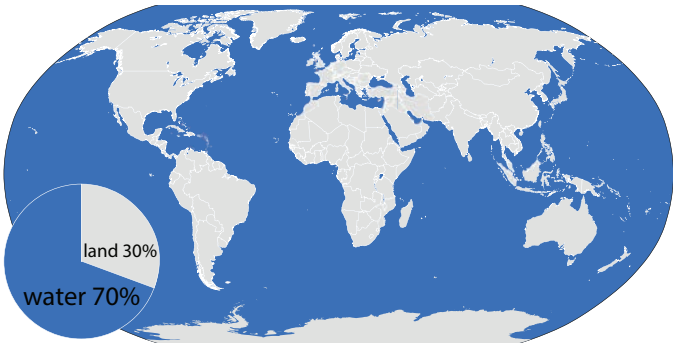
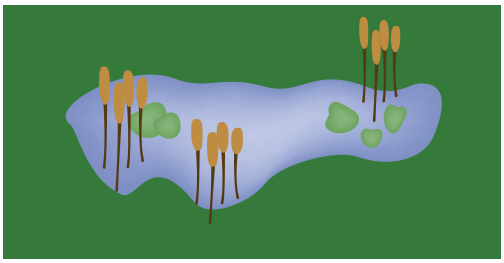
Fresh Water versus Salt Water Density

Vocabulary	
fresh water	salinity
brackish water	density
salt water	

Water takes up more than 70% of the Earth's surface. It's categorized into two groups: fresh water and salt water.

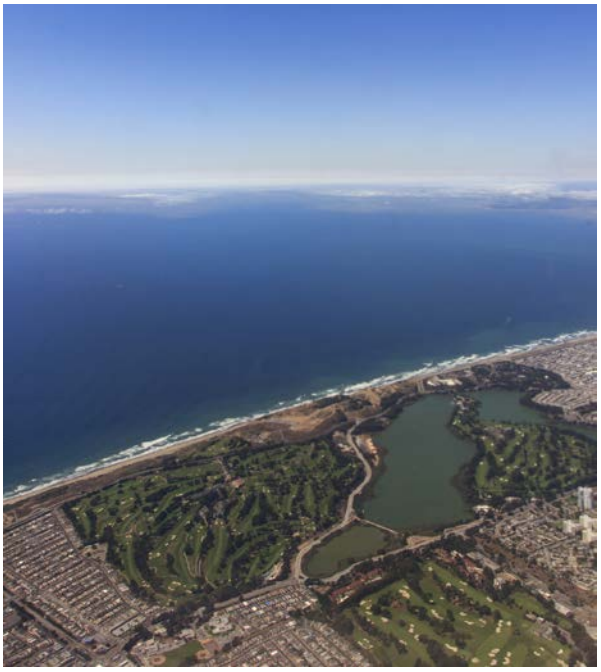
Fresh water is naturally occurring and can be found in ponds, lakes, rivers, streams, and the ground. It's characterized by having low concentrations of salts. Most fresh water comes from precipitation from the atmosphere in the form of rain and snow.





In coastal areas, windy conditions can sweep up drops of seawater into clouds that later deposit them into freshwater areas. This can elevate the levels of salts in freshwater areas. When fresh water meets with seawater, as in an estuary, brackish water occurs. **Brackish water** is saltier than fresh water but less salty than seawater.

Ocean water typically contains 3.47% salt, depending on where you measure it. Most of the salt in the oceans came from the land. Over millions of years, as waters washed over the rocks on land, the salts contained in rocks have leeched out and been carried away to the seas. Undersea volcanoes have also contributed to the salt content in the seas. When water evaporates from the oceans, it leaves behind the salt, and over millions of years, the oceans have developed a higher concentration of salt than fresh water.



So, **salt water** is denser than fresh water. The salts add mass to the water in which they are dissolved. This produces a greater mass or a greater density. There are more atoms in salt water than in the same amount of fresh water. The amount of salt dissolved in water is called **salinity**.

What Happens When Fresh Water Meets Salt Water?

Concepts

- Water forms layers due to its different densities.
- Denser water with more dissolved salts sinks to the bottom.
- Water with the least amount of dissolved salts (less dense) usually forms the top layer.

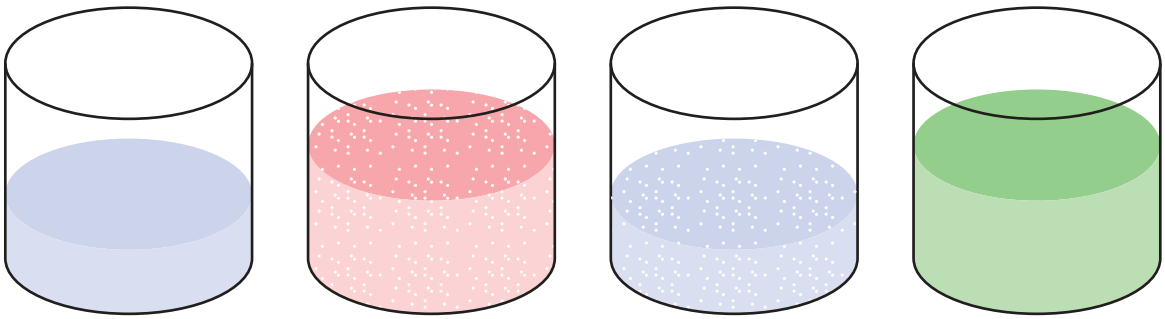
Let's investigate what happens when fresh water meets salt water.

Materials

- 1 gallon of fresh water (you can use store-bought spring water or tap water)
- 1 gallon of salt water – water with 1 cup of salt added
- 4 clear jars – it helps to label them A, B, C, and D
- 1 bottle of food coloring
- 2 siphons – clear tubes that you can get from the fish section of a pet store

Procedure

1. Make one gallon of salt water the day before by adding 1 cup of salt to a gallon of water and mixing well. Make sure you label the gallon, and then let it sit.
2. Think about what could happen when salt water meets fresh water. Write your hypothesis on the back of this sheet.
3. Fill one jar ⅓ full of fresh water (Jar A). Fill a second jar halfway with salt water and add a few drops of food coloring to it (Jar B).
4. Start a siphon by filling a plastic tube with colored water and keeping the colored salt water jar (Jar B) higher than the fresh water jar (Jar A). A colored salt solution layer will soon form.
5. Fill a third jar ⅓ full of clear salt water (Jar C). Fill the last jar halfway with fresh water and add a few drops of food coloring to it (Jar D).
6. Start a siphon by filling a plastic tube with colored water and keeping the fresh water jar (Jar D) higher than the salt water jar (Jar C). Colored fresh water will form a separate layer.
7. Record your observations and discuss it with a friend or family member.



Jar A - Fresh Water | **Jar B – Salt water (colored)** | **Jar C – Salt water** | **Jar D – Fresh water (colored)**

Questions

1. How many layers formed? _____
2. Which layer is salty? _____
3. Are the layers completely separated? What happens where they meet? _____
4. Draw the results of the demonstration.

Review Questions

1. What is the difference between fresh water and salt water?

_____

2. Why is salt water denser than fresh water?

_____

3. What happens when fresh water meets salt water? What type of water is this called?

_____

4. Fill in the definitions in the vocabulary box below.

Vocabulary	
fresh water	
brackish water	
salt water	
salinity	
density	