

Teacher's Guide For: *Water Temperature and Salinity*

Experiment

Goal:

To give students an understanding that different water layers exist in large bodies of water and the layers are formed by differences in water density that are caused by differences in temperature and/or salinity. Cold water is more dense and sinks relative to warmer water. At certain times, freshwater flowing into an estuary will form a layer above the saltwater.

Observe:

The coldest water will sink to the bottom and the saltwater sinks relative to the freshwater.

Evaluate:

Cold water is more dense than hot water. Most everyone can remember feeling colder water on the bottom of a lake when swimming. Saltwater is more dense compared to freshwater. Therefore, saltwater sinks relative to freshwater and a person floats more easily when supported by a denser liquid (saltwater).

Enrichment:

Adding oil to the test tube simulates what happens when an oil spill occurs in the ocean. Oil is less dense and floats on the surface of the water. In an ocean oil spill, this exposes marine birds and other animals that live on or near the surface of the water. When the oil and water are stirred, similar to

the mixing actions of the ocean's waves, the oil actually becomes saturated with water over time and sinks to the bottom. In an oil spill, this poses a new hazard to the bottom (benthic) living organisms.

Extension:

Estuaries are highly productive and contain many species that are able to move between salt- and freshwater environments. Chesapeake Bay and San Francisco Bay are two well known and productive estuaries in the United States. The Volga River in Russia flows into the Caspian Sea and also forms an important estuary with very high biodiversity (with a large number of species). Many species reproduce in freshwater (river) habitats and migrate to the ocean. These are called anadromous.

Personal Experience:

The students should understand that even though large lakes and oceans sometimes appear the same, they are chemically and biologically very different. The salinity (typically about 30 parts per thousand or 0.3 %) changes the buoyancy of objects and requires fish and animals to adapt to saltwater.