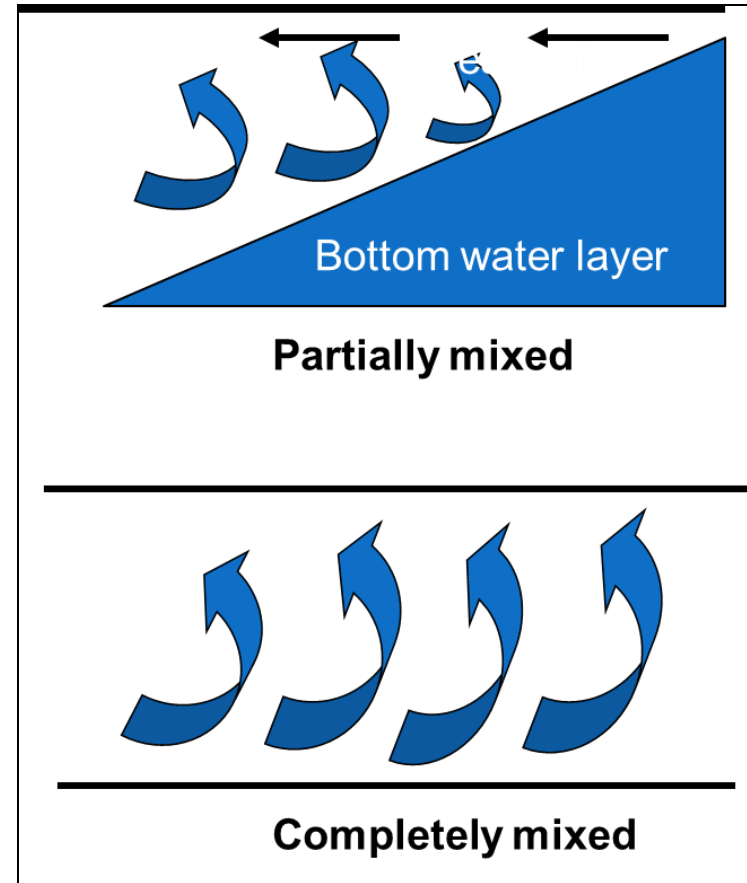


# VERTICAL CIRCULATION

- Surface water can be warmer and less salty in calm conditions and floats on top of the cooler, saltier deep water.
- When a water column is separated into surface and deep water masses that do not mix, the water column is termed **stratified**.
- Stratification changes back and forth between partially and completely mixed waters as shown in the diagram.
  - A partially mixed estuary separates surface and deep water, trapping nutrients in the bottom water layer.
  - Completely mixed estuary mixes deep and surface water, causing upwelling the deep water nutrients to the surface.
- Upwelling, often caused by storms, mixes nutrients in the surface water and availability to sunlight causing phytoplankton to bloom providing food into the food web.

## Partial/complete mixing



# WATER COLUMN STRATIFICATION

- When a water column is stratified, the top layer is called the epilimnion and the deeper water is the hypolimnion.
- The depth where the hypolimnion separates from the epilimnion is called the thermocline.
- Since deeper water does not mix with the surfaced water, there is a sudden temperature change at the thermocline
  - An interesting fact: The epilimnion is colder in the winter and warmer in the summer because the surface water temperature is affected by the air temperature.

