

Things are Different Underwater

- As we descend under water, we experience changes in several variables.
- How do organisms adapt to these changes?
- What adaptations must scientists make in order to explore the depths?

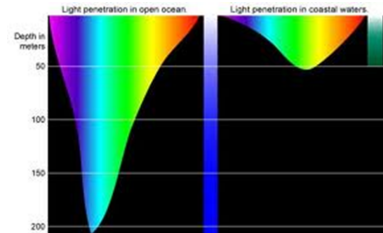


wild-facts.blogspot.com

Pressure Drives changes

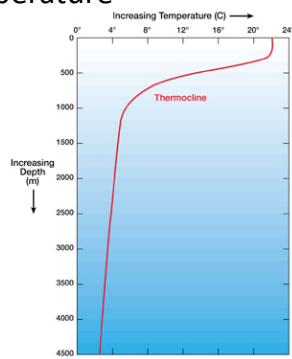
Basic relationships change as we descend:

- Light available decreases with depth
- Temperature decreases with depth
- Pressure increases with depth



Temperature

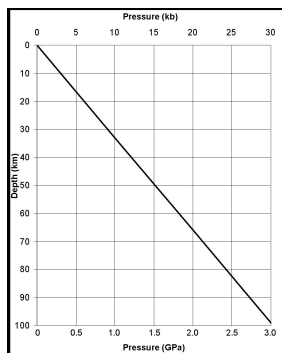
- At a temperature of **4°C** pure water reaches its maximum or peak density.
- Cooled further it expands and becomes less dense than the surrounding water which is why when water freezes at **0°C** it floats.
- https://www.youtube.com/watch?v=Ak9CBB1bTcc&feature=player_detailpage#t=46s



Windows2universe.org

Pressure

- At sea level we are used to 14.7psi (1bar) pushing down on us while the fluids in our body meet that pressure with equal force.
- As we descend, the pressure increases by 14.7psi every 10 meters (33ft).
- Challenger Deep is 10,900 meters (35,760ft) deep.
- *What will the pressure be at Challenger Deep?*



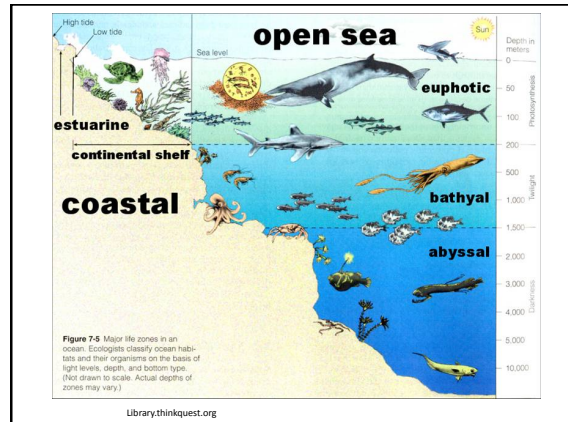
serc.carleton.edu

Life at Depth

- Other than lack of breathable air...
- The increased pressure and lack of visible light one would experience at depth are reasons why human life could not be sustained.
- Certain organisms have adaptations for living in the harsh conditions at great depths.
- When scientists want to study these animals, they must use special equipment.
- Some ROVs (remotely operated vehicles) can travel to about 6 miles down and collect samples and video while the scientist controls it from the surface.

Ocean Zones

- As we descend, we experience different layers or **zones** in the water column.
- With each zone, less visible light penetrates and pressure increases.
- The deepest zone is called the **Hadal Zone**.
- It is in the deepest trenches of the sea and it is one of the areas scientists want to explore.
- Scientists know more about outer space than they do about the ocean depths.



Deep Divers with Lungs

- Marine Mammals have lungs and other physiological structures in common with humans, but some can dive hundreds of meters deep.
- How do these organisms adapt between high pressure and low pressure?
- Weddell seals make the deepest and longest recorded dives of any marine mammal.



Deep Divers with Lungs

- How does the Weddell Seal do it?
- Their red blood cells store more oxygen per cell than ours.
- Before they dive they compress their lungs to a fraction of their original size.
- While diving, they transport oxygen rich blood to the central nervous system and heart.

http://www.youtube.com/watch?feature=player_detailpage&v=G4VZNa6AHk

Watch this video for a live look at Weddells

