Aquatic Ecosystems
Salinity

- Freshwater is defined as less than 1% salt.
- Salinity is the saltiness or dissolved salt content (such as sodium chloride, magnesium and calcium sulfates, and bicarbonates) of a body of water or in soil.
• Plankton (singular plankter) are any organisms that live in the water column and are incapable of swimming against a current. They provide a crucial source of food to many large aquatic organisms, such as fish and whales.
Nekton

- Nekton refers to the aggregate of actively swimming aquatic organisms in a body of water (usually oceans or lakes) able to move independently of water currents.

- Nekton can be contrasted with plankton which refers to the aggregate of passively floating, drifting, or somewhat motile organisms occurring in a body of water, primarily tiny algae and bacteria, small eggs and larvae of marine organisms, and protozoa and other minute predators.
Benthos

- Benthos is the community of organisms which live on, in, or near the seabed, also known as the benthic zone. This community lives in or near marine sedimentary environments, from tidal pools along the foreshore, out to the continental shelf, and then down to the abyssal depths.
Littoral Zone

- The littoral zone is the part of a sea, lake or river that is close to the shore. In coastal environments the littoral zone extends from the high water mark, which is rarely inundated, to shoreline areas that are permanently submerged. It always includes this intertidal zone and is often used to mean the same as the intertidal zone. However, the meaning of "littoral zone" can extend well beyond the intertidal zone.
Benthic Zones

- The benthic zone is the ecological region at the lowest level of a body of water such as an ocean or a lake, including the sediment surface and some sub-surface layers. Organisms living in this zone are called benthos. They generally live in close relationship with the substrate bottom; many such organisms are permanently attached to the bottom.
Eutrophication

- Eutrophication is the ecosystem response to the addition of artificial or natural substances, such as nitrates and phosphates, through fertilizers or sewage, to an aquatic system. One example is the "bloom" or great increase of phytoplankton in a water body as a response to increased levels of nutrients. Negative environmental effects include hypoxia, the depletion of oxygen in the water, which induces reductions in specific fish and other animal populations.
The term upriver refers to the direction leading to the source of the river, which is against the direction of flow. Likewise, the term downriver describes the direction towards the mouth of the river, in which the current flows.
River Mouth

- A river mouth or stream mouth is a part of a stream where it flows into another stream, river, lake, reservoir, sea, or ocean. At the mouth of a river a delta can form causing sediment pileup. A river can flow into a lake, sea or into an ocean.
Marsh

• A marsh is a type of wetland that is dominated by herbaceous rather than woody plant species. Marshes can often be found at the edges of lakes and streams, where they form a transition between the aquatic and terrestrial ecosystems. They are often dominated by grasses, rushes or reeds.
Swamp

- A swamp is a wetland that is forested. Many swamps occur along large rivers, where they are critically dependent upon natural water level fluctuations. Other swamps occur on the shores of large lakes.
A bog is a wetland that accumulates peat, a deposit of dead plant material. It is one of the four main types of wetlands. The gradual accumulation of decayed plant material in a bog functions as a carbon sink. Bogs occur where the water at the ground surface is acidic and low in nutrients.
Lagoon

- A lagoon is a shallow body of water separated from a larger body of water by barrier islands or reefs. Lagoons are commonly divided into coastal lagoons and atoll lagoons. There is an overlap between bodies of water classified as coastal lagoons and bodies of water classified as estuaries. Lagoons are common coastal features around the world.
Estuary

- Estuaries form a transition zone between river environments and ocean environments and are subject to both marine influences, such as tides, waves, and the influx of saline water; and riverine influences, such as flows of fresh water and sediment. The inflow of both seawater and freshwater provide high levels of nutrients in both the water column and sediment, making estuaries among the most productive natural habitats in the world.
Abundance and Diversity

- Abundance: an extremely plentiful or oversufficient quantity or supply
- Diversity: the condition of having or being composed of differing elements
Watershed

- A watershed carries water "shed" from the land after rain falls and snow melts. Drop by drop, water is channeled into soils, groundwaters, creeks, and streams, making its way to larger rivers and eventually the sea.
Hydrophytes

Aquatic plants are plants that have adapted to living in aquatic environments (saltwater or freshwater). They are also referred to as hydrophytes or aquatic macrophytes. These plants require special adaptations for living submerged in water, or at the water's surface.
Halophytes

- A halophyte is a plant that grows in waters of high salinity, coming into contact with saline water through its roots or by salt spray, such as in saline semi-deserts, mangrove swamps, marshes and sloughs, and seashores.
Ecosystem Services provided by wetlands

- They are sources of lucrative harvests of wild rice, furbearing animals, fish and shellfish.

- Wetlands limit the damaging effects of waves, convey and store floodwaters, trap sediment and reduce pollution. Named “Natures Kidneys”
Tides

- Tides are the rise and fall of sea levels caused by the combined effects of the gravitational forces exerted by the Moon and the Sun and the rotation of the Earth.

- Some shorelines experience two almost equal high tides and two low tides each day, called a semi-diurnal tide. Some locations experience only one high and one low tide each day, called a diurnal tide. Some locations experience two uneven tides a day, or sometimes one high and one low each day; this is called a mixed tide.
Ecosystem Services of Coral Reefs

- Provisioning (e.g., subsistence and commercial fisheries attained from healthy reefs)
- Regulating (protection of beaches and coastlines from storm surges and waves)
- Cultural (tourism and recreation)
- Supporting (nursery habitats)
Types of Reefs

• **Atoll** - a roughly circular (annular) oceanic reef system surrounding a central lagoon

• **Fringing Reef** - a reef system that grows fairly close to (or directly from) the shore, with an entirely shallow lagoon or none at all

• **Barrier Reef** - a reef system that parallels the shore and is separated from it by a wide lagoon that contains at least some deep portions
Marine Environments
WINTERKILL

• During the winter, oxygen normally enters the water of a frozen lake through the inlet water streams, cracks in the ice and slow diffusion though the ice. A thick snow cover on a lake can reduce the amount of oxygen passing through the ice.

• Fish and other aquatic plants and animals use oxygen throughout the winter. Despite this steady use, if lakes are deep enough, they may contain a sufficient volume of water to maintain oxygen above lethal levels. But in shallow lakes where the volume is low, winter kill will occur.
Summer Kill

- Summer kills happen regularly in some water bodies because they are shallow or have shallow bays where water temperatures rise and oxygen levels lower.

- High temperatures also cause algae to bloom and then suddenly die out. The decomposition of the algae by microscopic organisms further reduces the oxygen in the water.

- Lack of significant rainfall, which brings oxygenated water into the lake, can also contribute to summer kill.
The stratification or layering of water in the lakes is due to density changes caused by changes in temperature. The density of water increases as temperature decreases until it reaches its maximum density at about 4° Celsius (39° Fahrenheit). This causes thermal stratification, or the tendency of deep lakes to form distinct layers in the summer months. Deep water is insulated from the sun and stays cool and more dense, forming a lower layer called the 'hypolimnion'. Surface and nearshore waters are warmed by the sun, making them less dense so that they form a surface layer called the 'epilimnion'. As the summer progresses, temperature differences increase between the layers. A thin middle layer, or 'thermocline', develops in which a rapid transition in temperature occurs.