ESTUARIES

These are coastal regions where the freshwater from rivers, meets and mixes with, the salt water from the ocean.

Estuaries are semi-enclosed areas and represent a close interaction between the land and the sea.

This water is neither fresh or salt, it is called "Brackish".

These areas are considered to be the "nurseries" of the marine world.

Estuaries are highly productive.

They have muddy bottoms, which is made up of the sediments that are carried down from the rivers and settle to the bottom.

SALT MARSHES

Salt mashes are grassy areas that extend inland from the mud flats.
They are also called "nurseries".
They have muddy bottoms.
These areas are dominated by hardy grasses and other salt tolerant plants.
Marshes provide nesting and breeding grounds or many birds, amphibians, and reptiles.

MUDFLATS

DARK MUDDY SAND.

No grasses.
Little or no aeration in the sand.
Considered the "graveyards" of the estuary.
Mud Flats are caused by decomposing bacteria turning the wastes In the sand into a dark mud.
Decomposers cause decaying organisms to produce H_2S (foul smelling odor).

MANGROVES

Found in warmer, tropical areas.

Inlets and bays are covered by mangrove trees.
Mangrove swamps protect the shore from erosion.
Mangrove swamps act like giant sponges and absorb the impact of storms and high waters.

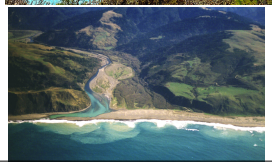
ESTUARIES

3 TYPES: MUDFLATS, MANGROVES, SALT MARSHES

- Estuaries are formed where fresh water meets and mixes with ocean water.
- Estuaries are found where rivers meet the sea.
- Estuaries are found where rivers meet chemically distinct lakes.

ESTUARY FEATURES AND LANDFORMS

- Each estuary includes a variety of habitats. Some may be bordered by marshes.
- Estuary features such as swamps or lagoons form behind barrier islands and beaches.



FEATURES AND LANDFORMS

- Bays, harbors, sounds, and inlets are all estuaries.
- Bayous are formed by channels of slow moving water leading from a river or lake.

FEATURES AND LANDFORMS

- Salt marshes form in estuaries in areas protected from high-energy waves.
- Tidal flats are part of many estuaries. Oyster and clams are harvested here.

ESTUARIES

FEATURES AND LANDFORMS

- Mangrove forests surround wetland areas in southern estuaries.
- In mountainous areas, estuaries may be found in seaside fjords.

TEXT

ESTUARY LIFE

- Many types of plants grow in estuaries. One of the most common is cordgrass.
- Eelgrass is another common plant that grows in brackish water.

TEXT

Residents of Estuaries

- Many bivalves, such as oysters (above), and mussels (below), inhabit estuaries.
- Blue crabs are harvested to eat.
- Diamondback terrapins are the only turtle that lives in brackish water.

TEXT

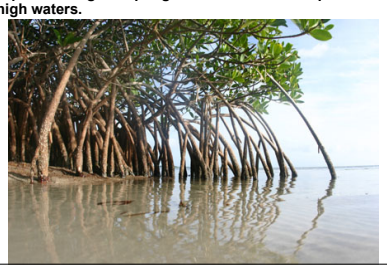
MUDFLATS

Has dark muddy sand.
No grasses.
Little or no aeration in the sand.
Considered the "graveyards" of the estuary.
Mud Flats are caused by decomposing bacteria turning the wastes In the sand into a dark mud.
Decomposers cause decaying organisms to produce H_2S (foul smelling odor).

TEXT

MANGROVE

Found in warmer, tropical areas.
Inlets and bays are covered by mangrove trees.
Mangrove swamps protect the shore from erosion.
Mangrove swamps act like giant sponges and absorb the impact of storms and high waters.



TEXT

CORAL REEFS

Has the most biodiversity of all the marine environments.
Found in tropical and sub-tropical zones.
Reefs are built from the sea floor by coral polyps.
Reefs will grow up to the surface, but will not grow out of the water.
Australia's Great Barrier Reef is the world's largest natural made structure (2000km), and contains over 1500 species of fish.
Each coral is unique in its shape and color.
Coral Reefs are extremely productive.
Coral Reefs are extremely fragile and pieces of coral break off easily.
Many reefs are now in danger of being destroyed because of over fishing, diving, pollution, and poor handling of educating the public on the importance of maintaining the vitality of coral reef populations.

TEXT

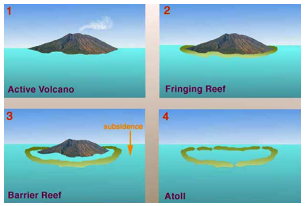
TYPES OF CORAL REEF FORMATIONS

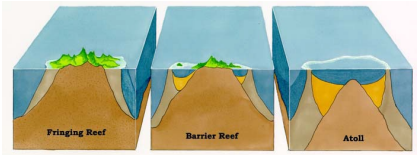
A **fringing Reef** is a reef that develops directly alongside the line of a coast.
They are common in tropical and subtropical waters where there is a hard surface on which the coral larvae can settle.
The largest fringing reef is found along the coasts of the Red Sea. It is 2,500 miles long.

A **barrier reef** is separated from the shore by a lagoon of open water.
They develop where the coastline is gradually subsiding alongside a fringing reef.
The largest barrier reef is Australia's Great Barrier Reef. It is 1,250 miles long and for most of its length is separated from the mainland by a lagoon that is at least 25 miles wide.

A **coral atoll** is a final stage in coral reef development on volcanic islands.
As the volcanic island subsides below the sea surface, a ring of coral called an atoll is formed.
Coral atolls are associated with the volcanic islands of the Indian and Pacific oceans.

TEXT

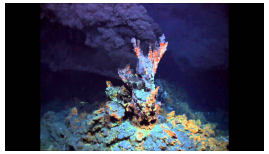




TEXT

HYDROTHERMAL VENTS

The mid-ocean ridge is a point in the middle of the ocean where plates are diverging
Moving apart
This is known as a **central rift valley**
Water seeps into the crack that forms
This water forces its way back to the surface through hydrothermal vents or deep-sea hot springs



TEXT

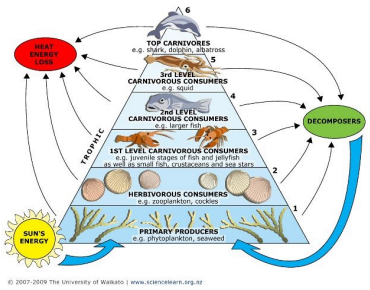
HYDROTHERMAL VENTS

The water coming from the vents is hot
This is much hotter than the surrounding water
A few are upwards of 750 F

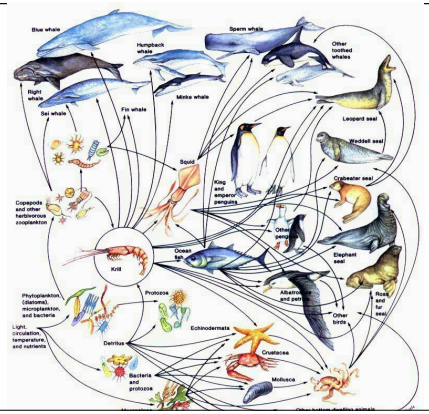
The water coming from these vents is filled with minerals
mainly sulfides
The warm water cools when it hits the ocean
The minerals cool and solidify, depositing the minerals around the vent
Black smokers are one type of mineral deposits around hydrothermal vents

The mineral deposits build up around the vents creating chimney-like structures
The smoke is a cloud of dense mineral particles
In this dark cold portion of the planet the “smokers” give life
The heat from the vents warms
The water is rich in nutrients and minerals
All types of life exists by the vents

Trophic Levels



FOOD CHAIN



ENERGY TRANSFER