

Wetlands



Where water meets land


The term ~~wetlands~~ means "those areas that are ~~inundated~~(covered or flooded) by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.“

What Is a Wetland?

- ❑ *Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.*
- ❑ *Wetlands may support both aquatic and terrestrial species.*

- ❑ *The prolonged presence of water creates conditions that favor the growth of specially adapted plants and promote the development of characteristic wetlands soils.' Although wetlands are often wet, a wetland might not be wet year-round. In fact, some of the most important wetlands are only seasonally wet.*

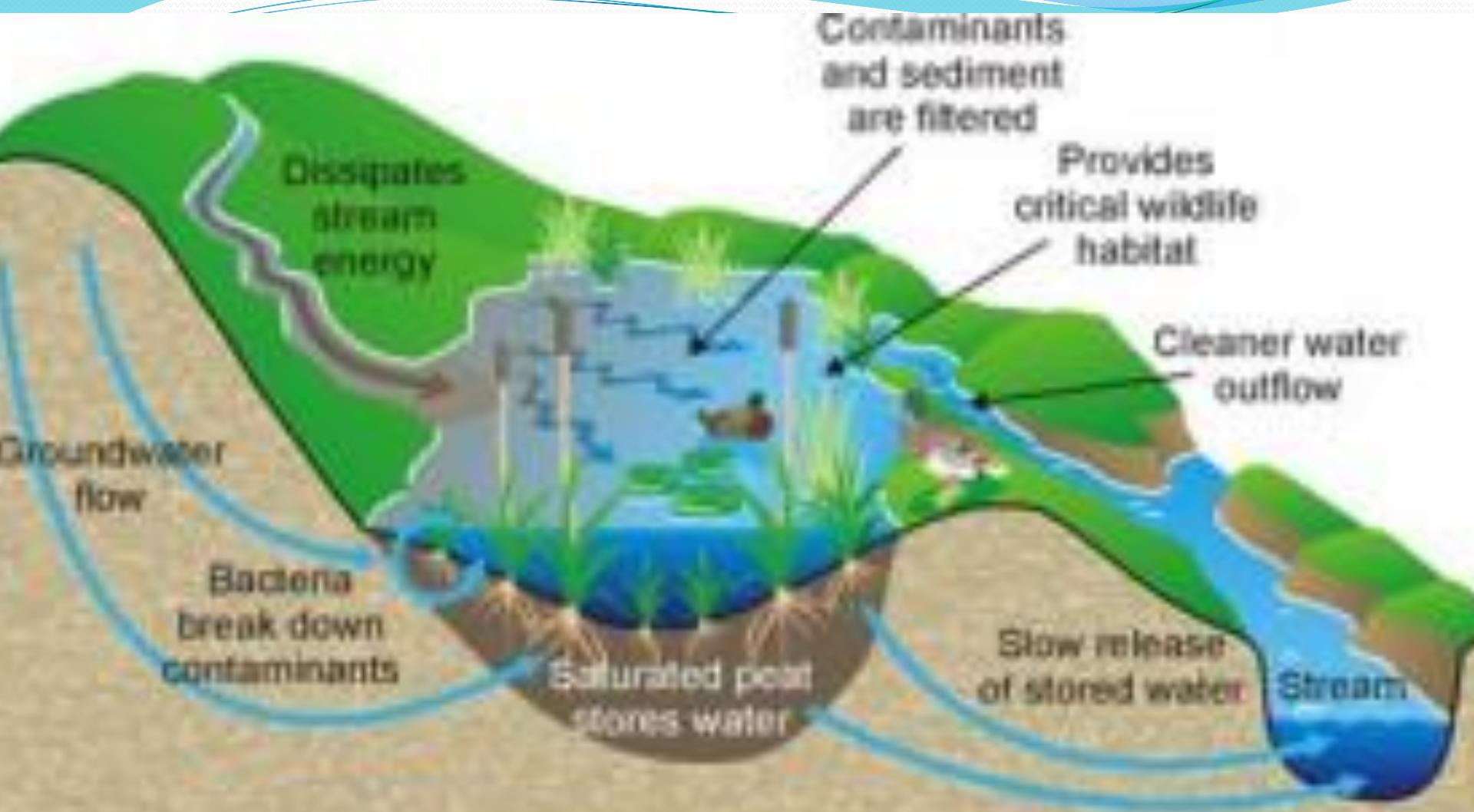
- ❑ *Wetlands are the link between the land and the water. They are transition zones where the flow of water, the cycling of nutrients, and the energy of the sun meet to produce a unique ecosystem.*



Wetlands are the link between land and water and are some of the most productive ecosystems in the world. Wetlands have many important functions that benefit people and wildlife.

- Provide habitat for a wide variety and number of wildlife and plants.
- Filter, clean and store water - in other words, acting like kidneys for other ecosystems!
- Collect and hold flood waters.
- Absorb wind and tidal forces.
- Provide places of beauty and many recreational activities

- ❑ Resting stopover sites for migratory birds, including: Canada goose, whooping crane, indigo bunting.
- ❑ Shelter and hiding places from predators like marsh hawks and raccoons for prey animals like rabbits and frogs.
- ❑ Homes and travel ways for: beaver, otter, bear, bobcat, muskrat(mammals)
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- ❑ Clean drinking water for all wildlife and people.
- ❑ Wetlands also act like sponges by holding flood waters and keeping rivers at normal levels.
- ❑ Wetlands filter and purify water as it flows through the wetland system. Plants found in wetlands help control water erosion.



How wetlands work

What makes a freshwater wetland?

Rivers and Streams

Bogs

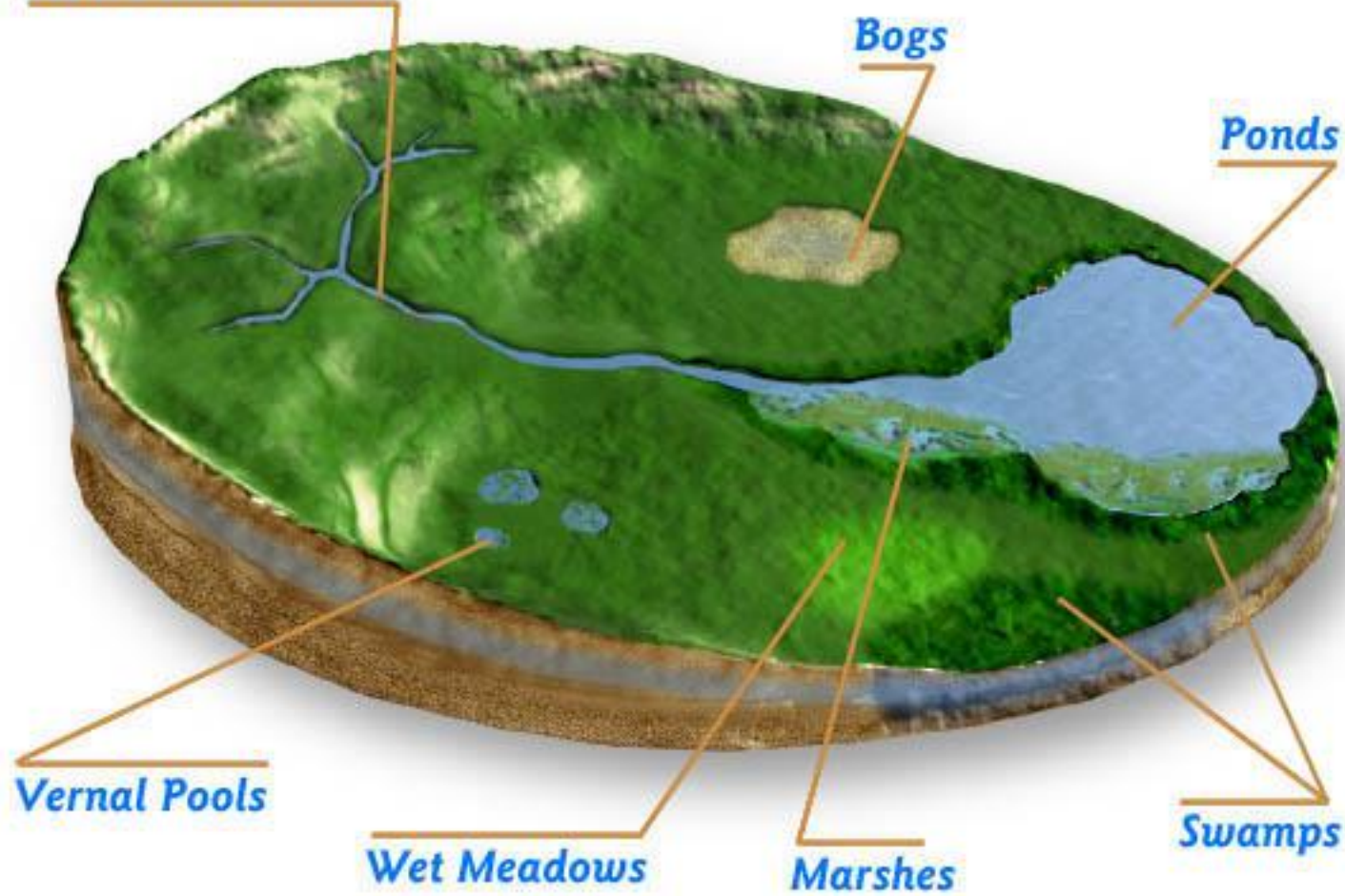
Ponds

Vernal Pools

Wet Meadows

Marshes

Swamps



Types of Wetlands



1) Marshes

Marshes are areas with shallow water that are mostly grasslands. Marshes can be freshwater or saltwater and the amount of water in a marsh can change with the seasons and in the case of salt water marshes, can also change with the tide.



Salt Marsh



Freshwater Marsh

Plants

Freshwater marshes have soft stemmed and herbaceous plants, like grasses, shrubs and wildflowers. Plants found in saltwater marshes include reeds, grasses and shrubs like rushes, sedges, and saltbush.

Animals

Marshes are home to a variety of animals, including beavers, alligators, newts, shrimp and turtles.

Soil

Marshes have soil with low mineral content.

Location

Freshwater marshes often occur along the edges of lakes and rivers. Saltwater marshes occur along coastlines, inlets and estuaries where they are affected by tides, and often have a source of fresh water from surrounding land, rivers or ground water.



Swamps

2) Swamps

Swamps are slow moving streams, rivers or isolated low areas with more open and deeper water than marshes.

Plants

Swamps have trees (for example, cypress trees in freshwater and mangrove trees in salty water) and woody shrubs rather than grasses and herbs. In African swamps, papyrus is the main plant.

Location

Swamps are found in low-lying areas near rivers or coastal areas. Examples include the Everglades in Florida.

Soil

Swamp soil is poorly-drained and water logged.

Animal

Swamp wildlife includes alligators, snakes, a variety of insects, bobcat, beaver, large diversity of birds and river otter.

3) Bogs and Fens

A **bog** is a fresh water wetland, usually formed in an old glacial lake with a spongy peat base. Most of the bog's water comes from rain.

Soil

Bogs have soil that is low in nutrients.

Plants

Evergreen trees and shrubs, and a floor covered by a thick carpet of sphagnum moss. Some species of carnivorous plants are also found in bogs.

Animals

There are only a few animals that are found in bogs. These include, red deer, Dragonflies and birds such as grouse and plover



Bog

A **fen** is a fresh water peat wetland covered mostly by grasses sedges, reeds, and wildflowers of high pH (alkaline) ground water.

Fens, like bogs, are peatlands, but because they are fed by groundwater they are not so acidic as bogs and have a higher nutrient level .

They are therefore able to support a much more diverse plant and animal community. Fens may be dominated by woody or herbaceous vegetation. These systems are often covered by grasses, sedges, rushes, and wildflowers.

Over time, peat may build up and separate the fen from its groundwater supply. When this happens, the fen receives fewer nutrients and may become a bog.



Fen



Estuary

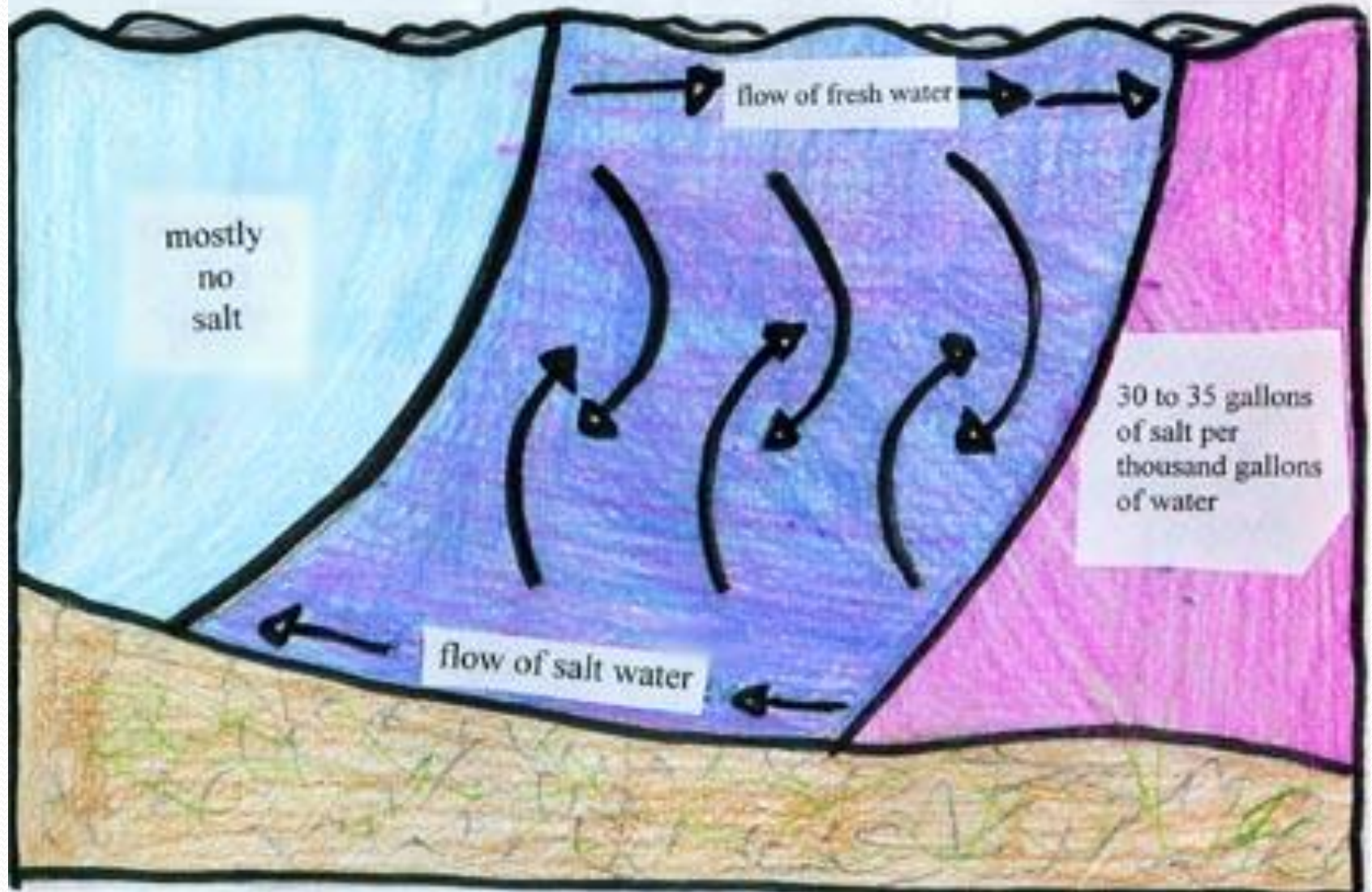


- ❖ An estuary is formed where rivers meet the sea.
- ❖ An estuary is a semi-enclosed river mouth or bay where salty seawater is diluted by freshwater from rivers and creeks.
- ❖ An estuary is made up of tidal marshes, tidal flats, and open water channels.
- ❖ An estuary is flooded by the tides.

Fresh Water

Estuary

Salt Water



mostly
no
salt

flow of fresh water

flow of salt water

30 to 35 gallons
of salt per
thousand gallons
of water


❑ Estuaries are created by the tide. They are mixtures of salt water coming in from the ocean and fresh water entering the ocean from the river.

❑ The salt water is pushed under the fresh water causing an abundance of sea life to live in the estuary. Yet animals that live in the estuaries still have adapt to the water change caused by the tides.

❑ They either have to leave the estuary at low or high tide, or adapt to both kinds of water. At low tide the water is mostly fresh water, and at high tide the water is mostly salty.

❑ Thousands of birds populate the area and depending on the food they eat they have to migrate maybe once, or two times a day.

❑ The tide changes twice a day and because of this fisherman also have to regulate their fishing around the schedule. So the saying nature prevails itself really adds truth to the state of an estuary

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- ❖ The tidal, sheltered waters of estuaries support unique communities of plants and animals, specially adapted for life at the margin of the sea.
 - ❖ Estuarine environments are among the most productive on earth, creating more organic matter each year than comparably-sized areas of forest, grassland, or agricultural land.
 - ❖ Many different habitat types are found in and around estuaries, including shallow open waters, freshwater and salt marshes, sandy beaches, mud and sand flats, rocky shores, mangrove forests, river deltas, sea grass and kelp beds, and swamps.

Tidal waters flood the estuary twice each day bringing nutrients, sediment, and oxygen rich waters from the ocean.

Tidal currents also transport flora such as algae and fauna such as fish, crabs, and shrimp into the estuary.

The tides shape the shoreline as they flood and ebb, moving tons of sediment and water each day.

The tidal habitat of the estuary is defined by three zones – tidal marshes, tide flats, and the open water channel. Each of these zones has special characteristics.

❖ Specially adapted rooted, flowering plants able to tolerate flooding with salty water are found on **tidal marshes**. These places are called salt marshes. These places are called tidal fresh marshes.

❖ Where rooted, flowering plants can not withstand the strong currents and salty, murky tidewater, **the mudflats** are found.

❖ At the lowest tides, the only visible water is contained in the **open water channel**.

High tides and low tides can make the same place look very different.



Water quality is an important factor in determining what kind of life is found in the estuary.

- ❖ Salinity or saltiness, turbidity or water clarity, pH or how acid or alkaline the water is, temperature and the amount of oxygen dissolved in the water all play a role.**
- ❖ For example, warm water can hold less dissolved oxygen than colder water. Animals that cannot survive in these conditions must move to a more favorable environment or have an adaptation to permit their survival until cool, oxygen rich waters return.**
- ❖ Turbidity is a measure of the amount of sediment and other particles suspended in water.**
- ❖ High turbidity caused soil erosion and dredging reduces water clarity limiting the depth reached by sunlight.**
- ❖ Low light levels impact plant growth and may clog the gills of aquatic animals that depend on dissolved oxygen in the water to breathe.**

Estuary zones – upper estuary

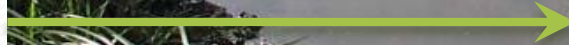
Tidal marsh



Tidal Flat



**Open water
Channel**



Estuary zones – lower estuary

Open water channel

Tidal flat

Tidal marsh



A. Salt marshes and tidal fresh marshes are some of the most productive environments on earth!



The mass of the plants produced in a single season of growth on the salt marsh (biomass) is greater than any comparable area of land anywhere else on earth. This is because the marshes are flooded with nutrient rich waters twice daily and have adapted to life in a salty environment.

B. Tidal flats of the estuary are usually made of sand, mud, or cobble.

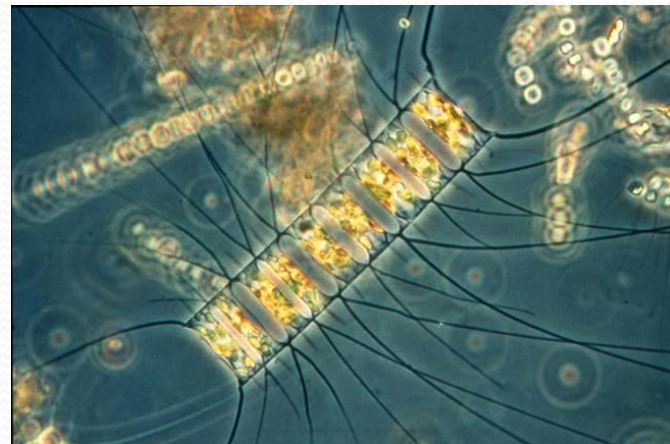


Low tide exposes the flats to predators such as herons, shorebirds, and raccoons.



At low tide, the mudflats and marshes are exposed to the air. A narrow channel of open water remains and aquatic creatures such as fish are concentrated in these areas. Here they may seek the cover of eelgrass meadows as they try to evade larger fish or even larger seals and sea lions.

The producers of the estuary are the plants. Whether they are microscopic phytoplankton or dense meadows of marsh grass, the flora of the estuary is the base of the food web. Some plants like eelgrass (lower right) are adapted to use low light levels in later winter and early spring to start on growing. The blades of this amazing plant will become coated with algae, diatoms, and the eggs of many invertebrates. Microscopic phytoplankton (upper right) grow rapidly in the shallow estuary waters where warmer temperatures and an abundance of nutrients support their growth..

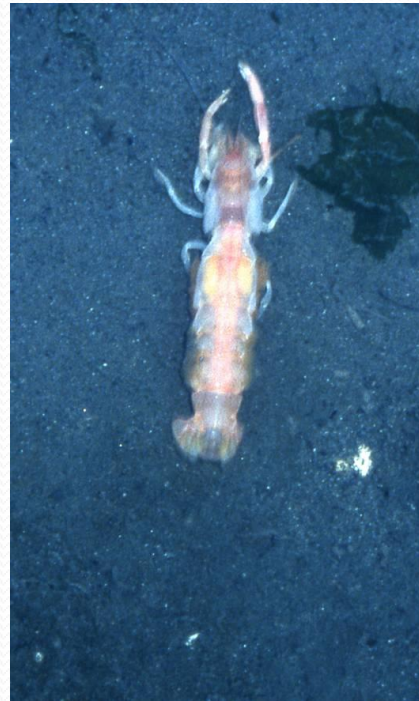


For salmon, the estuary is an essential part of a journey that will take them from the streams where they hatch to the ocean and back. They will feed and grow while hiding from predators as they make the change from living in fresh water to living in the salty ocean. In the ocean, they will grow larger and then return through the estuary to reach the headwaters of the rivers and creeks where they were born so that they may spawn and die, returning nutrients to the ecosystem.



Creatures living beneath the surface of the tidal flats are known as benthic dwellers.

Living below or on the bottom, they often feed on decaying plant and animal material called detritus. Some are filter feeders like clams and worms which draw the estuary waters into their burrows and strain the nutrient rich “soup” for food such as microscopic plankton. These animals depend on the dissolved oxygen in the tidewater and use their burrows for protection from predators. Ghost shrimp are called detritivores because they sift through decaying plant and animal material for food.



Migratory birds depend on the wetlands of the estuary for resting and feeding as they travel between nesting and wintering grounds.



Crabs live in many different types of habitat in the estuary.



Many animals begin their lives in the protective waters of the estuary. The complex and diverse habitat found in the estuary is well suited to rearing young animals. A kind of nursery, the unique conditions caused by the mixing of salty seawater and freshwater from rivers that occurs in the estuary limits adult predators from the ocean and rivers from entering. The wide variety and abundance of food available means that young animals will grow rapidly and be more fit as adults.

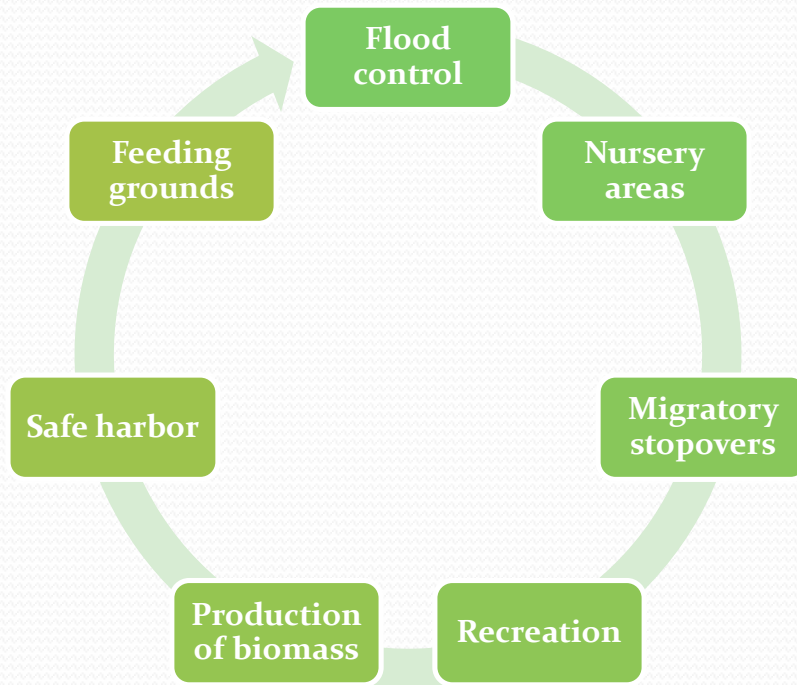


A larval crab



A juvenile English sole

Healthy estuaries can provide many different values and perform many important functions.



- ❖ During the summer months, biological activity is intense in estuaries. Tides, currents and wind carry nutritive substance on the surface of the water. The abundance of nutritive substances as well as shallow and warm water are ideal for all kinds of activities.
- ❖ Certain invertebrates, birds and fish can profit from these characteristics. Estuaries and other coastal ecosystems are zones of high productivity and they offer quality habitat to many animal species.
- ❖ Estuaries have a great economic importance.
- ❖ Many sustain a considerable commercial fishery not to mention sport fishing, wildlife activities and aquaculture.
- ❖ Finally, estuaries also serve as navigation routes.