Estuaries:
Where Fresh Water Meets Salt Water

When a river flows into a bay of the ocean or when sea levels rise to flood a river's channel, estuaries form. Estuaries are the places where the fresh water of rivers mixes with the salt water of the oceans.

Estuary areas are very important to many forms of aquatic life. The nutrients washed in by the rivers provide a fertile environment for both plant and animal life. Organisms living in the area do, however, require some special adaptations for survival. When the river brings in extra water, such as during periods of flooding, the salinity, or the amount of salt, in the water of the bay will be reduced. On the other hand, if drought causes the flow of fresh water to diminish, then the salinity of the bay may be increased. This means that the plants and animals of estuary areas must be able to adapt to the changes in salinity or migrate out of the area.

The Susquehanna River system drains into Chesapeake Bay on the east coast of the United States. This is the largest estuary in the United States. Let's take a look at the way this estuary works because it is typical of most estuaries. (See map on page 18.)

The sediments that are washed into the Chesapeake Bay have formed more than half a million acres of marshland. These marshes are made up of wetland grasses that slow the flow of water and trap sediments. The plants absorb nutrients. They grow well until the winter freezes. Then they die back and their leaves and stems break down into small particles called detritus. The shallow waters of the bay also support beds of rooted aquatic plants that break down into detritus.

The sunlight and the fertile waters also support phytoplankton that are the microscopic, floating plants of the sea. The phytoplankton and detritus form the base of the bay's food chain.

Zooplankton, the microscopic animal life of the sea, feeds on the detritus and phytoplankton. The zooplankton is fed upon by small fish and filter feeders such as oysters and clams. Larger fish, birds, and mammals feed on the smaller animals, and thus, a food chain forms.

Although 259 species of fish have been found to live in the bay, only about 30 species of them are able to live there year-round. The other species migrate in and out, depending on the time of year and the salinity of the water. The large-mouthed bass, for instance, is basically a freshwater fish. It moves into slightly brackish (salty) water to feed on the abundant small fish and crustaceans. The white perch can tolerate the changing salinity of the bay year-round. It even travels up the fresh water river to spawn. The black seabass, on the other hand, is an ocean-dwelling fish that must spawn in the ocean. It travels into the saltier, lower bay to feed on the abundance of small fish and invertebrates living there.

So, there are about 30 species of freshwater fish, such as the large-mouthed bass, feeding in the upper bay with its fresher water. Then, there are a few species like white perch, anchovies, and rockfish that live in the estuary year-round. Finally, there are, in the salty, lower bay, visitors from the ocean including the black seabass, sandbar shark, blue fish, and flounder.

Estuaries are some of the most important areas of the ocean. They are nurseries where millions of ocean creatures begin their lives. They are fertile feeding grounds for vertebrates and invertebrates alike. The communities of plant and animal life have developed ways to cope with the changing salinity of the water. They are fragile communities, however, and haven't been able to adapt to some of the changes caused by people.

Dams on rivers have reduced the amount of water flowing into the estuaries, allowing salt water to flow into the areas that used to be mostly fresh water. Dams have also stopped the migration of fish into rivers for their annual spawning runs.

Another problem is that streams and rivers are often seen as easy places to dispose of waste products. Pollutants that have been dumped into rivers have killed complete communities of plants and animals.

People want to be part of the food chain of the estuary by harvesting oysters, crabs, clams, and fish. Food is plentiful in a healthy estuary. Since only a few species are normally found in an estuary year-round, these species can build up to incredibly large numbers. Man, as a part of the food chain, benefits from a plentiful harvest, so protecting and preserving the health of the estuary should be of primary importance.

Name: _____ Date: _____

For the Student:

1. What is an estuary?

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2. Would salinity increase or decrease in an estuary during spring floods?

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3. What is the largest estuary in the United States?

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4. What are phytoplankton and zooplankton?

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5. Look at the map on page 18. What is a species of fish that could be found. . .

A. in the upper part of the Chesapeake estuary?

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B. in the central part of the Chesapeake estuary?

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C. in the lower part of the Chesapeake estuary?

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6. Why are estuaries important?

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7. What are three ways that man can affect an estuary?

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Salinity Map of the Chesapeake Estuary