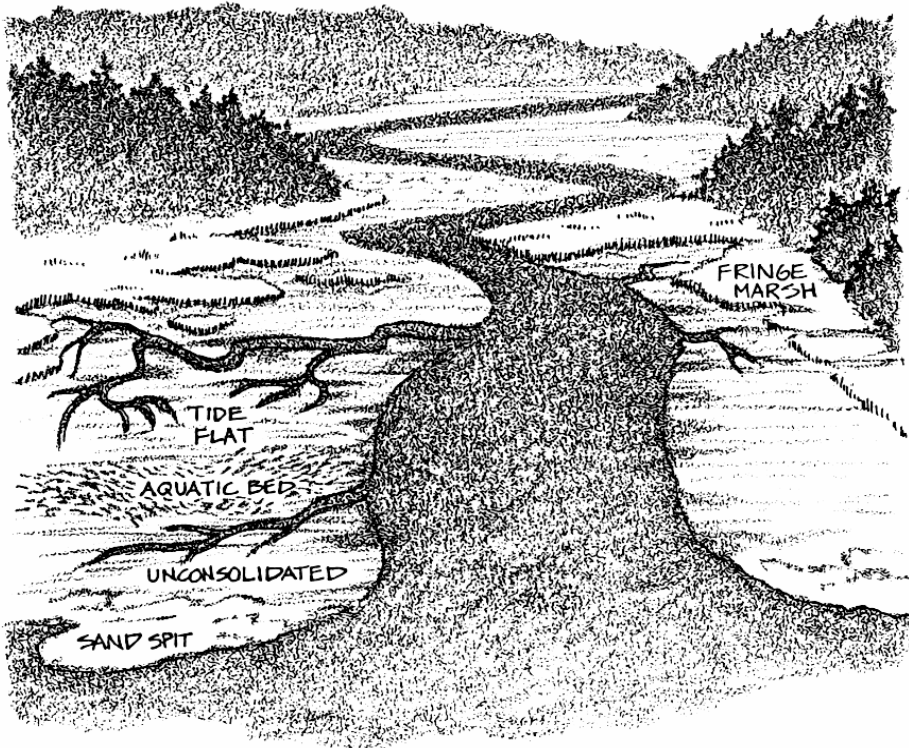


Classification of Estuaries

by Kenn Oberrecht



Although all estuaries are similar, in that they're semi-enclosed bodies of brackish water, scientists have used a variety of criteria to classify them. They once defined them according to their rate of freshwater evaporation, but they no longer use this restrictive system. Instead,

they categorize them with regard to geological characteristics, and further distinguish them on the basis of stratification and circulation patterns.

Most estuaries along the East Coast are coastal-plain estuaries; most on the West Coast are considered drowned river valleys.

Geologically Classified

According to their geological characteristics, estuaries are classified as drowned river valleys or coastal-plain estuaries, bar-built estuaries or lagoons, fjord-type estuaries, and tectonically caused estuaries.

Most estuaries along the East Coast are coastal-plain estuaries; most on the West Coast are considered drowned river valleys. Both types were formed by the gradual rise of sea level following the last glacial period, 10,000 years ago. Chesapeake Bay is the largest of these in the U.S.

It's sometimes difficult to distinguish a lagoon from a coastal-plain estuary, because there can be much overlapping of characteristics.

Generally, though, lagoons are usually situated parallel to the coastline. Many have narrow outlets to the sea and minimal freshwater inflow, often creating higher salinity levels than in coastal-plain and other estuaries. In the U.S., lagoons occur mainly along the Gulf Coast. There are also some small lagoons along the West Coast.

Fjord-type estuaries, created by glacial action, are characterized by the steep slope of adjacent lands and their great depth. They are common above 45 degrees of latitude, and in North America are most spectacular along the coast of Alaska and British Columbia.

Estuaries created by tectonic processes such as landslides, faulting, and volcanic eruptions are found along coasts where such activity is or has been common, such as the Pacific Coast of North America. These estuaries vary greatly and often share characteristics with other types. The largest of these in the U.S. is San Francisco Bay.

Classified by Stratification and Circulation

A salt-wedge estuary is highly stratified. Salt water moves into it in the shape of a wedge, with fresh water flowing over it. The velocity of the freshwater outflow is usually greater than that of the saltwater inflow, which keeps the salt water from extending very far up the estuary. The Mississippi River estuary is an example of this type, where the tidal range is small and incapable of mixing the stratified layers.

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The vertically homogenous or well-mixed estuary is characterized by low inflow of fresh water and large tidal ranges. In such estuaries, salt water and fresh water tend to mix vertically, and sometimes laterally as well.

Intermediate estuaries are partly mixed. They exhibit circulation patterns that are somewhere between those of the salt-wedge and vertically homogenous estuaries. This type of estuary, typical along the East Coast, has a moderate inflow of fresh water and moderate to large tidal range.

These ideally simplified categories are affected by so many variables as to make the subject of estuarine classification a complex matter. The fact is, estuaries don't exist in an ideal state. They are constantly affected by tidal and wave action, prevailing and changing winds, local and distant weather systems, and variations of rainfall runoff and river discharge.

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