

# Estuaries.gov Quiz Question & Answer Sheet

*Note to the educator: These questions are intended to stimulate classroom discussion/debate and as a resource for assessment following lessons and activities. Please feel free to suggest additional questions and/or a different type of quiz that could complement your student's study about estuaries.*

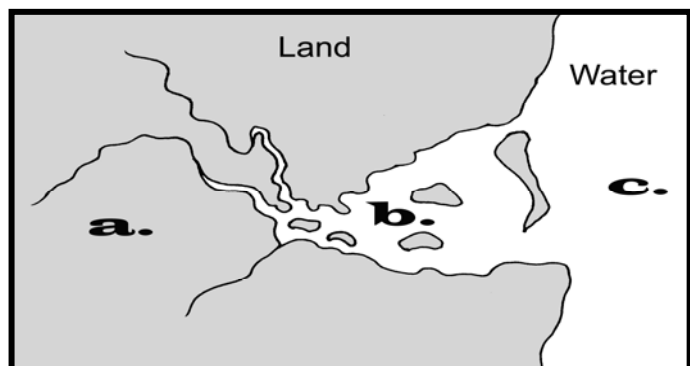
## 1. What is an estuary?

- a) The land area that drains water into a lake, river, or pond.
- b) The area where a river meets the ocean, where fresh and salt water mix.
- c) The large body of salt water that covers most of the earth's surface.
- d) The underground system that provides drinking water to an area.

Answer: (B) Estuaries are a partially enclosed body of water where two different water bodies meet and mix. Estuaries are places where fresh water from rivers or streams mix with salt water from the ocean, or where fresh water from rivers or streams mix with the chemically distinct water of a large lake.

## 2. Which letter marks the estuary on the diagram?

Answer: (B) Estuaries are places where fresh water from rivers or streams mix with salt water from the ocean, or where fresh water from rivers or streams mix with the chemically distinct water of a large lake



## 3. Estuaries have also been called:

- a) Bays
- b) Lagoons
- c) Sounds
- d) Sloughs
- e) All of the Above

Answer: (E) All of the Above. Estuaries are often known as bays, lagoons, harbors, inlets, sloughs or sounds. The important thing to remember is that not all water bodies by those names are necessarily estuaries; the defining feature of an estuary is the mixing of fresh and salt water, not the name. Some familiar examples of estuaries include San Francisco Bay, Puget Sound, Chesapeake Bay, and the New York/New Jersey Harbor.



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## 4. The Chesapeake Bay in Maryland is an example of what type of estuary?

- a) Coastal plain estuary
- b) Tectonic estuary
- c) Bar-built estuary
- d) Fjord

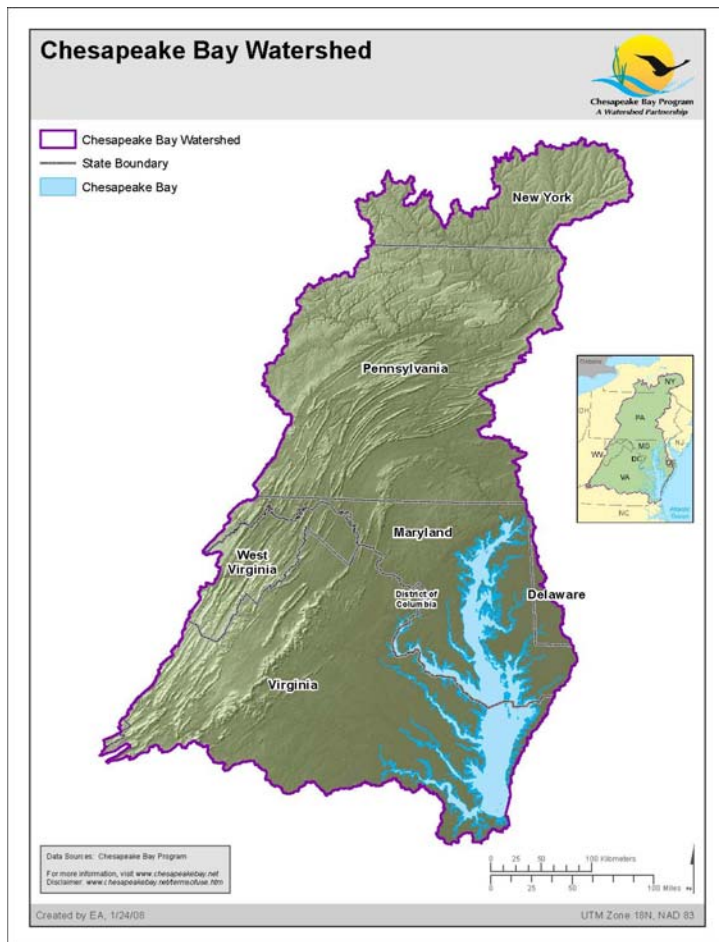
**Answer: (A)** The Chesapeake Bay is a coastal plain estuary. The five major types of estuaries classified by their geology are coastal plain, bar-built, deltas, tectonic and fjords. The Chesapeake Bay, like other coastal plain estuaries in North America, were formed at the end of the last ice age between 10,000-18,000 years ago. As glaciers receded and melted, sea levels rose and inundated low-lying river valleys. Coastal plain estuaries are also called drowned river valleys.

Other examples of coastal plain estuaries include the Hudson River in New York, Narragansett Bay in Rhode Island, the Thames River in England, the Ems River in Germany, the Seine River in France, the Si-Kiang River in Hong Kong, and the Murray River in Australia.

## 5. Why are estuaries important to our environment?

- a) They provide homes for many species of wildlife.
- b) They are important nursery areas for a variety of marine life.
- c) They help to filter pollutants from the water.
- d) All of the above

**Answer: (D)** All of the Above. Estuaries are important places because they provide goods and services that are economically and ecologically indispensable. Often called nurseries of the sea, estuaries provide vital nesting and feeding habitats for many aquatic plants and animals. Most fish and shellfish eaten in the United States, including salmon, herring, and oysters, complete all or part of their life cycles in estuaries. Estuaries can filter small amounts of pollutants and runoff. Vegetation helps filter and trap silt. However, too much nutrient or sediment input will create an unbalanced situation causing the health of the ecosystem to decline.



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6. The high productivity of estuaries has been attributed to the presence of several primary production units. Which of the following would NOT be considered a primary production unit in an estuary ecosystem?

- a) Phytoplankton suspended within the sunlight zone of the water column.
- b) Benthic algae, microscopic plants living on the sediment surface wherever sunlight reaches the bottom.
- c) Macroflora, such as marsh grasses which are the foundation of many food webs and provide nursery grounds for most coastal shellfish and finfish.
- d) Juvenile zooplankton brought to the estuary by tides after hatching offshore.



**Answer: (D)** Estuaries are known for their high productivity. One of the reasons given is the presence of several primary production units. These include: suspended phytoplankton, benthic algae, and marsh grasses.

7. The blue crab is one of the fastest swimming crabs in the world. Their incredible swimming speed can best be attributed to the crab's...

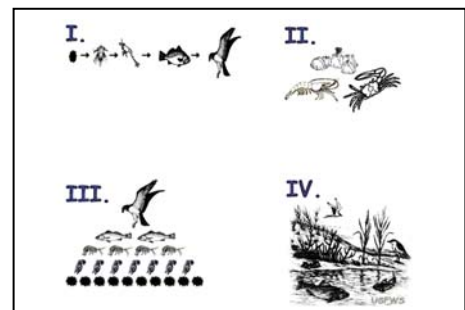
- a) large claws.
- b) jointed legs.
- c) body shape.
- d) "paddle-like" rear feet



**Answer: (D)** Blue Crabs are known as some of the fastest swimming crabs around. This is because their fifth pair of legs has been modified into "paddle-like" appendages, called "swimmerets". Blue crabs are an important estuarine resource for many seafood eaters around the world.

8. Which of the illustrations best represent energy flow in an estuary?

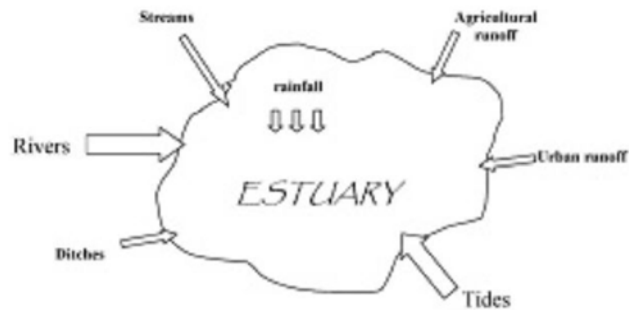
**Answer: (III)** Energy pyramids represent energy flow in a food web. Each tier represents an organism's position in the sequence of energy transfers. There are two obvious trends in an energy pyramid. First, there are large numbers of individual animals or plants at the bottom and the numbers decrease as you reach the top. Secondly, the sizes of the individual organisms generally increase as you reach higher levels.



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9. Water is brought to an estuary from a variety of sources. Which of the following is responsible for increasing the salinity in the estuary?

- a) Rivers
- b) Streams
- c) Urban runoff
- d) Tides



**Answer: (D)** Tides. Because of the tidal movements of sea water, the salinity of estuarine water constantly changes. The salinity at a particular location increases twice daily with the incoming tides and decreases twice daily with the outgoing tides.

10. Many shore birds feed on the mud flats of estuaries. When would be the best time for the birds to catch stranded fish and invertebrates?

- a) During tidal ebb.
- b) During tidal flow.

**Answer: (A)** During tidal ebb, the tide is pulling estuary water back to the sea. During this event, many creatures including shore birds rush to the mudflats to feed on the bounty of stranded fish and retreating invertebrates.



11. Water in most estuaries is *brackish* because of the mixing of fresh water from rivers and saltwater from incoming tides. A drought in the bay watershed would most likely cause the water in the bay to ...

- a) increase in salinity.
- b) decrease in salinity.
- c) stay the same.
- d) rise.

**Answer: (A)** Estuaries, by definition, are bodies of water where freshwater from rivers, streams and runoff mix with the salty waters brought in by the tides. A drought would reduce the amount of freshwater brought to an estuary resulting in higher salinity.

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12. If we totally removed plankton from the estuary, the estuarine foodweb would NOT be affected:

- a) True
- b) False

**Answer: (B) False.** Each organism within a food web is connected to and depends on others for food. Filter feeders like oysters, clams and menhaden must have enough plankton available to sustain themselves. Foodwebs begin with producers, such as plankton. Producers are the basis of all food and influence the production of all other organisms. Plankton are free-floating, generally microscopic plants, animals and bacteria that are part of the lower food web.



**Acknowledgements:** Some of the questions in this quiz were based on a series of Assessment and Discussion documents prepared by Brent Stafford for the Galveston Bay Estuary Program. These were adapted by Atziri Ibanez, National Education Coordinator from NOAA's National Estuarine Research Reserve.

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