

Name:

Lab: Barrier Islands of North Carolina

Background: Barrier Islands are highly dynamic, but North Carolina's Barrier Islands are exceptionally so--especially the islands that make up the Outer Banks. Much of eastern North America, from New Jersey southward all the way around Florida and then westward and south again to Mexico, has barrier island ecology characterized by low sandy islands that are easily affected by wind, tides and currents that protect the mainland from those forces. What makes North Carolina's islands unique is their distance from the mainland and their close proximity to the Continental Shelf and the Gulf Stream current.

As geologic features our islands are relatively young. At the close of the last ice-age--about 12,000 years ago-- sea levels were about 300 feet lower than today and the climate was considerably cooler. With a warmer climate came higher sea levels which are continuing to rise at a rate of about .5' to 1.5' per century. Barrier Islands probably first appeared as sea levels rose and flooded areas behind beach ridges. Sediments being washed down through the major river systems like the Roanoke, Tar, Neuse and Cape Fear rivers continue to feed sand for the formation of islands and the flow of water that must enter the sea keeps inlets open. Sand also erodes and accretes primarily from north to south along the coast as well. Though fragile, the barrier islands seem to have a mechanism in place to insure their continued existence in some form.

In northeast North Carolina, the land is subsiding (sinking) independent of sea-level rise, while in southeastern North Carolina the land is rising. This compound effect seems to be responsible for the northern islands increased distance from the mainland compared to the southern areas and is seen illustrated in the character of the river mouths that form the wide Albemarle and Pamlico Sounds compared to the Cape Fear River mouth which flows between substantial cliffs almost until it reaches the ocean, in the south. Rising sea-levels and predominant winds from the northeast cause a landward migration of the islands. During storms, overwash of the islands by the sea pushes sand to the mainland side in large quantities. Strong winter winds, blowing predominantly from the northeast, also push sand towards the land. As a result, dunes intrude into marine forests burying trees on the western sides of islands, while at the shoreline layers of peat and old tree stumps become visible. In some parts of the coast layers of shells are uncovered by eroding shorelines that are many thousands of years old relics of much earlier ocean inundations of the land. Though these forces have effects over hundreds and thousands of years, any large storm can bring incredible changes to the islands in a matter of a few hours. Erosion is constantly at work and poses threats to any hard structures that are placed on the beach. These same wind and weather patterns also move sand generally from north to south. At natural inlets sand tends to erode from the north and accrete (accumulate) on the south side.

A quick look at the map shows that Cape Hatteras is situated well out to sea. It is in fact only about 40 miles to the Continental Shelf and the Gulf Stream current. The Gulf Stream acts as a conduit for tropical weather systems like hurricanes to move north and the proximity to the deep waters beyond the Continental Shelf create very turbulent waters. Try as we might to protect our property and to manage these dynamic systems, our efforts can only postpone the inevitable when nature has other plans. We must be accepting of the fact that the islands exist today, but may change dramatically tomorrow. (source: NCNatural)

Procedure: Label the following locations on your map and answer the analysis questions.

Islands

Bald Head Island
Bodie Island
Cape Lookout
Hatteras Island
Ocracoke Island
Topsail Island

Sounds

Albemarle Sound
Bogue Sound
Core Sound
Currituck Sound
Pamlico Sound
Roanoke Sound

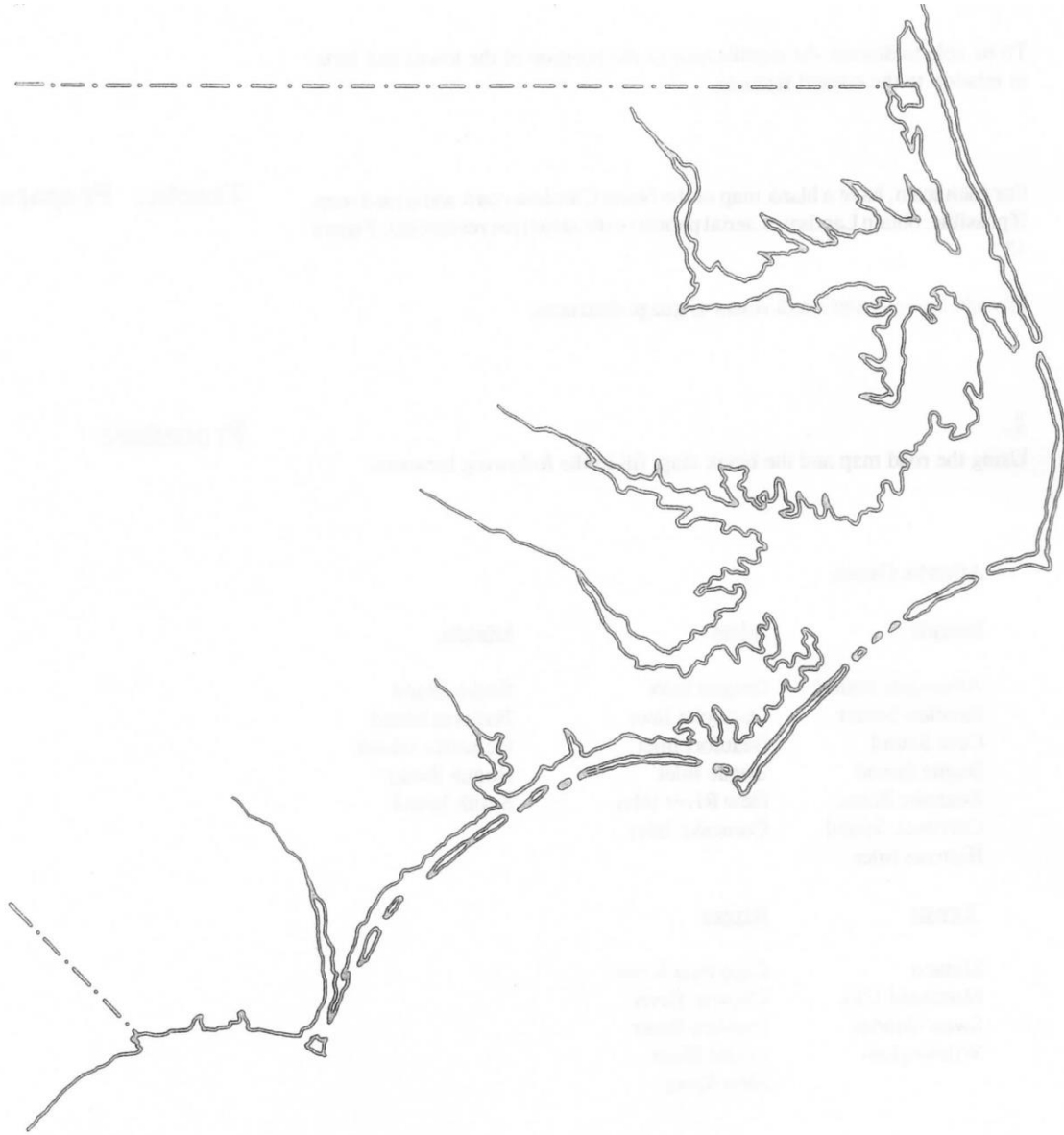
Rivers

Aliigator River
Cape Fear River
Chowan River
Neuse River
New River
Pamlico River

Towns

Beaufort
Duck
Manteo
Morehead City
Nags Head
Wilmington

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Analysis Questions:

1. What factors influence barrier island ecology?
2. Why are North Carolina barrier islands unique?
3. How did barrier islands appear?
4. How are the northeastern barrier islands different from the southwestern barrier islands?
5. How do storms influence barrier islands?
6. The gaps between barrier islands are called inlets. How many inlets can you count along the NC coast?
7. Do you see more inlets to the north or south of Hatteras? Why do you think this is?
8. The ocean side of barrier islands often consists of a beach, while the sound side often consists of a salt marsh. Why do you think this is?
9. How do barrier islands help protect the sound and mainland from the ocean and bad weather?
10. Most barrier islands run north-south along the coast, but a few run east-west. How would this orientation influence erosions and deposition on those islands.
11. Name two major cities west of I-95 along the Cape Fear River.
12. Name two major cities west of I-95 along the Neuse River.
13. How do cities so far from the coast influence barrier islands and the ocean?