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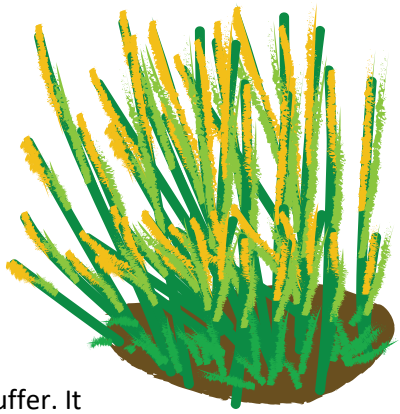
NERR or Far :

The Reserves Are Where You Are

Episode 3: Exploring Estuarine Habitats

First things first, what is an **estuary**? According to National Geographic, an estuary is "an area where a freshwater river or stream meets the ocean". When freshwater and seawater combine, the water becomes **brackish** or slightly salty. The saltiness, or **salinity**, of these estuaries can vary from season to season. In a rainy season, there's more freshwater, so it'll be less salty, also known as less saline. In a dry season, when there's less freshwater, it will be more salty. There are a number of estuarine habitats on our southeastern coast. A few that we'll be focusing on in this article are salt marshes, oyster reefs, maritime forests, and mangroves. Before we dig deeper into the benefits of estuaries, let's look at the differences between each of these individual estuarine habitats.

Salt marshes are a type of coastal wetland that is flooded and drained by saltwater that comes from **tides**. The soil within salt marshes is made up of a deep mud and **peat**. Now, peat is a very thick, spongy material that is made of a decomposing plant matter. Because the peat in marshes is usually underwater and decomposition is taking place, the amount of oxygen in this material can be super low. This state is known as **hypoxia**. "Hypo-" meaning under or beneath, and "-oxia" connects the word to oxygen. There are certain types of bacteria that love these hypoxic conditions, so they grow within the marsh soil. These bacteria produce **hydrogen sulfide**, which gives salt marshes a characteristic rotten egg smell. Now, there are a lot of different types of marsh grasses and different foliage that you can find in the salt marsh, but the most common salt marsh plant species in the southeast is Spartina (specifically, ***Spartina alterniflora***, or smooth cordgrass). Spartina helps with erosion control, acting as a stabilizer as well as a wind and wave buffer. It can also help remove pollutants, and when it dies, it forms what is called "**wrack**" and decomposes, returning nutrients to the system. This is a big reason why salt marshes are the second most **productive** ecosystem on the planet.



Another important habitat in estuaries is an **oyster reef**. Oysters like to live in brackish to salty coastal waters, making estuaries a perfect place to call home. Oysters often cluster on hard submerged surfaces and then fuse together as they grow, forming hard, rock-like reefs that can get to be 6 to 8 feet high! They'll make reefs on anything from piers to old discarded shells. That reef can then become a

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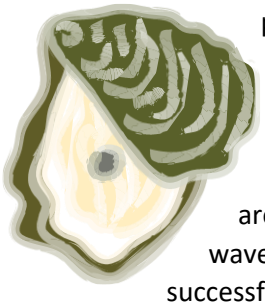
habitat for a wide range of other marine species. These structures are like little apartment complexes! Oysters are considered a keystone species, and a main reason for this designation is their role in providing habitat and shelter for crabs, worms, and all sorts of marine creatures.



It's quite an interrelated, connected ecosystem. A **keystone species** is any organism, whether it be an animal, bacteria or fungi, or a plant that serves as the glue holding the habitat together. If it were to disappear or be removed, the **biodiversity** and structure of that habitat could completely change. Oyster reefs are also great protectors. When waves get churned up in the bay, they buffer those waves so that when they hit the shoreline, they're not as strong and they won't be as successful in eroding away the shoreline. One way that **National Estuarine Research Reserves (NERRs)** in the southeast are supporting these reefs is through shell recycling programs. Reserve staff go to local restaurants that serve the oysters and recover the shell, clean it, dry it and then put it back out into the estuary!

Next up is the **maritime forest**. Maritime forests, a type of shoreline estuary along coastal barrier islands, are constantly changing and moving with a changing shoreline. These forests are typically surrounded by a layer of dunes on one side and salt marsh on the other, but don't completely escape the impacts of ocean winds and salt spray. For this reason, there's a canopy of shrub-like foliage to protect less tolerant interior trees. One state in the southeast that has a lot of maritime forest habitat is North Carolina.

Speaking of less tolerant trees, there is currently concern over an increase in what is known as "ghost forests" where once green, healthy woodlands and maritime forests used to exist. Sea level rise and an increased frequency of storms as a result of climate change is causing an excess of saltwater to advance and take over freshwater that deciduous trees need to survive along coastlines. Without the freshwater that they need to thrive, these trees die and remain in the brackish water, creating a spooky, soggy forest of gray, decaying trees. **Ghost forests** are not healthy forests, and because of this, they are unable to support the variety of life that they did before the impacts of **saltwater intrusion.** This also negatively impacts the forest's ability to store carbon, which can further fuel changes in our climate.

Lastly, **mangroves** are a type of tropical tree or shrub that live in the coastal **intertidal zone**. They're able to survive and thrive in conditions that many other trees could not. This hardy group tolerates brackish to salty coastal waters, and the never-ending **ebb** and flow of ocean tides. Their roots even create incredible underwater nursing environments for many marine species.

Storm protection, filtration and nursery are the three main benefits or ecosystem services of estuarine habitats. Let's look at storm protection. Estuaries have an incredible ability to serve as important **buffer zones**. These habitats soak up excess water during flooding and stabilize shorelines, absorbing wave energy, protecting streams and shores from excessive erosion. In the event of a hurricane or tropical storm, estuaries are a line of defense for inland habitats and communities. And it's not just flooding from hurricanes that estuaries can help control, they can help with any kind of flooding! If rivers flood their banks, the water can empty out onto the floodplain and spread out, flowing into **sloughs**, swamps and marshes before being absorbed. This process also demonstrates how

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estuarine habitats are incredible carbon sinks! A **carbon sink** is anything natural or unnatural that collects and stores some carbon containing compounds for an indefinite period of time. By doing this, they remove **carbon dioxide** from the atmosphere!

Our next benefit is filtration. Salt marshes and mangroves, with their spongy peat and marsh grasses or complex matrices of tree roots, are like the Brita filters of coastal communities. They filter out all sorts of things, from herbicides and pesticides, heavy metals from industry, to excess sediments and nutrients from runoff. This is an incredible benefit, but not something to be taken advantage of. Declines in estuarine water quality can endanger aquatic life and impact human health. The NERRs do an incredible job of monitoring water quality through their **System-Wide Monitoring Program** (also known as SWMP).

Lastly, estuaries serve as a nursery for many species, creating a unique space for reproduction and early life. The mud and food particles brought in by the tide settle in some parts of estuaries where the water is more still, and hard structures like mangrove roots provide a degree of protection. These safe conditions are ideal for organisms to grow, feed and have young. Estuaries provide such great benefits to our coastal communities and because of this, it's important to study and protect these habitats. That's the purpose of the NERRs, and it's something that we can also help out with. Our activities on land can have a big impact on the health of our estuaries, so let's be good environmental **stewards**!

QUESTION TIME

1. Why do salt marshes smell like rotten eggs?

2. Name a benefit of *Spartina*.

3. What is a keystone species? Can you name any other organisms that may be considered a keystone species?

4. Define carbon sink in your own words.

5. What structures serve as the main "filter" of salt marshes and mangroves?

6. What creates a ghost forest?