

ECOLOGY OF THE ESTUARY

Grades 9 - 12

NJCCCS: 5.1, 5.2, 5.3, 5.4

Field Trip Overview:

Explore the interactions of the local tidal community. Through field collections, water chemistry and other observations, students will be exposed to the food web of an estuary and examine how humans have impacted the Meadowlands. There will also be a special lab focusing on the osmotic challenge of living in such a dynamic ecosystem.

Background Information:

An estuary is a partially enclosed body of water where saltwater from the sea mixes with freshwater from the rivers, streams and creeks. These areas of transition between the land and the sea are tidally driven, like the sea, but sheltered from the full force of ocean wind and waves, more like a river. Estuaries are generally enclosed in part by the coastline, marshes and wetlands; the seaward border may be the barrier islands, reefs and sand or mud flats.

Salt marshes which thrive along protected shorelines are a common habitat in estuaries. In the U.S., salt marshes can be found on every coast. Approximately half of the nation's salt marshes are located along the Gulf Coast. These intertidal habitats are essential for healthy fisheries, coastlines, and communities and they are an integral part of our economy and culture. They also provide essential food, refuge or nursery habitat for more than 75 percent of fisheries species, including shrimp, blue crab, and many finfish.

Salt marshes also protect shorelines from erosion by buffering wave action and trapping sediments. They reduce flooding by slowing and absorbing rainwater and protect water quality by filtering runoff, and by metabolizing excess nutrients. Many areas that suffer from frequent flooding do so as a result of habitat loss, specifically salt marshes, in that particular area.

Vocabulary:

Adaptation: Adjustment to environmental conditions; a behavior or body part that an organism has that helps it to survive

Brackish: A mixture of salt and fresh water

Consumers: Organisms that get their energy from other living things

Decomposers: Organisms that break down once-living things, releasing the energy stored in them

Detritus: Decaying plant and animal matter that serves as a nutrient-rich food source

Dissolved Oxygen: Oxygen that is dissolved in water and therefore available for use by plants (phytoplankton), shellfish, fish, and other animals

Estuary: Partly enclosed coastal body of water in which river water mixes with seawater

Fauna: Animals

Flora: Plants

Food Chain: The passage of energy (in the form of food) from producers through several levels of consumers and decomposers

Food Web: Complex network of many interconnected food chains and feeding relationships

Habitat: The environment in which an organism lives that provides necessities for survival

Plankton: Free-floating plants and animals that range in size from microscopic to large jellyfish; many microscopic plant-like plankton serve as an important food source for marsh animals

pH: Chemistry potential of Hydrogen; the logarithm of the reciprocal of hydrogen-ion concentration in gram atoms per liter; provides a measure on a scale from 0 to 14 of the acidity or alkalinity of a solution (where 7 is neutral and greater than 7 is acidic and less than 7 is basic).

Salinity: The concentration of dissolved salts in the water, measured as the number of units (parts) of salt per thousand units of water

Salt Marsh: Type of wetland semi-enclosed by land but having partial access to open ocean or river

Temperature: a measure of the warmth or coldness of an object or substance with reference to some standard value

Water: Binary compound that occurs at room temperature as a clear colorless odorless tasteless liquid; freezes into ice below 0 degrees centigrade and boils above 100 degrees centigrade; widely used as a solvent

Water Chemistry: The fundamental chemical property and information about water

Water Quality: A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose

Wetland: A landform characterized by the presence of water, hydric soils, and the hydrophytic plants

References / Resources:

- [NOAA: What is a Salt Marsh?](#)
- [NH DES: Salt Marsh Factsheet](#)
- [New Jersey Meadowlands Biodiversity: A Review and Synthesis](#)

ECOLOGY OF THE ESTUARY
Pre-Trip Activities

1. Wetland Science: Hydrology, Wetland Soils and Wetland Plants

This website from the Environmental Protection Agency introduces students to the concept of what a wetland is composed of. The first URL will link you to a variety of lesson plans that you can do with your students. The second URL takes you directly to the list of activities.

[EPA Wetlands Division Wetlands Education Materials](#)

[EPA Wetlands Division: Watershed / Wetland Activities](#)

2. Wetland Functions

These two websites will help your students learn the importance of wetlands in the environment. The first link guides them through the concepts while the second link has four different activities that exemplify the various functions of wetlands.

[EPA Wetlands Division: Wetland Functions](#)

[EPA Wetlands Division: Wetland Activities](#)

ECOLOGY OF THE ESTUARY
Post-Trip Activities

1. Protect Your Wetlands

This website walks you through the steps for teaching citizen advocacy in favor of wetlands. You could ask your students to create a Wetlands Awareness Program or Citizen Monitoring Program. The site also explains the regulatory process through which many of our wetlands are already protected.

[EPA Wetlands Division: Protect Your Wetland](#)

2. Mock Town Meeting

Students will gain first-hand experience in understanding the complex nature of making land use decisions by analyzing and making recommendations for a planned residential development project which will involve the filling of wetlands as proposed.

[EPA Wetlands Division: Mock Town Meeting](#)