

Investigation Booklet
Exploring: Salt in Our Lives

1. Draw and describe your prediction of what will happen to the eggplant after the teacher applies salt to it.




Drawing of an eggplant with water droplets glistening on the outside.

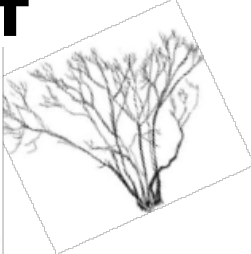
The eggplant will lose water, i.e. water droplets will appear on the outside of the eggplant. Any prediction is acceptable.

Use these ecosystem fact sheets to complete the table below:

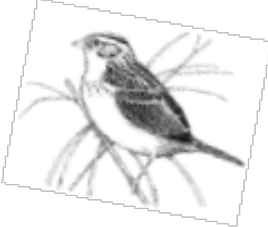
THE FOREST




PLANTS
The Mountain Holly and Tamarack plants cannot grow in salt levels higher than 170 mg/L.



ROOTS AND SEEDS
Salt levels of 100 mg/L can affect water absorption, root growth, seed sprouting. The loss of habitat harms animals that depend on the land for food, shelter, and breeding sites.




BIRDS
Seed eating birds may eat road salt crystals because they think they are seeds. These birds may then die.




SALT is not a normal part of this ecosystem.

DID YOU KNOW?
About 8 to 12 million tons of road salt is used per year in the United States.




MAMMALS
Moose, elk, & deer that drink salty water lose their fear of vehicles and humans and are commonly killed by traffic.


FRESHWATER



FISH
like rainbow trout will die if they swim in water of 1,000 mg/L of salt.




FROGS
can die in salt levels of 400 mg/L.



FRESHWATER means that the water is not **SALTY**.


DID YOU KNOW?
Most of the world's water is off limits for drinking! Only 3% of Earth's water is considered fresh, i.e. not salty. Most of it is locked up in ice as glaciers. Only 0.3% of Earth's water is found in rivers or lakes and 0.9% is found underground.



PEOPLE
can only drink freshwater. The Environmental Protection Agency (EPA) does not allow people to drink water with salt levels greater than 250 mg/L. Also, water begins to taste bad at this level.

BRACKISH WATER has 1,000 mg/L or more of salt and is considered to be too salty to drink.

BRINE WATER has 10,000 mg/L or more of salt and is considered to be very salty.



SMALL FRESHWATER PLANTS AND ANIMALS
that are the basis of the food web will begin to die at salt levels of 226 mg/L.

WETLANDS

A **SWAMP** is a wetland with woody plants like **trees** and often grows in freshwater.



WHAT IS THE DIFFERENCE BETWEEN A SWAMP AND A MARSH?

A **MARSH** is a wetland with **grasses**, but no trees. It often grows in brackish (1000 mg/L) or even saltier water.



MARSHES are **SALTY**.

SWAMPS are **NOT SALTY**.

NEW JERSEY MEADOWLANDS: FROM SWAMP TO MARSH

200 years ago—Cedar Tamarack Swamp

The New Jersey Meadowlands used to be filled with tall cedars and tamarack trees that grew in the wet swampy habitat. People cut them down, and they were also killed by **SALT!**



1922 to Today—Reedy Marsh

In 1922, the Hackensack River was dammed, cutting off the flow of freshwater to the Meadowlands. The water became saltier, killing trees and leading to the growth of the salt tolerant reedy grasses that you can see today.

ESTUARY

WHAT IS AN ESTUARY?

An estuary is a semi-enclosed area where fresh water meets and mixes with salty ocean water. It is often called “the cradle of the ocean” because it is filled with life.



SALT

in estuaries can range with the tide from 3,000 to 30,000 mg/L of salt.

DID YOU KNOW?
Organisms that live in estuaries are unique because they are able to live in huge ranges of salt, temperature, tides and sunlight.

TEMPERATURES

in shallow estuaries can range from freezing to more than 100 °F in the course of a year.

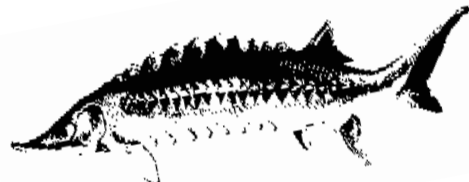
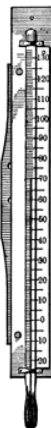


RIVER OTTERS

can sometimes be seen swimming at the mouth of the Hudson River.

ALEWIFE

is a species of herring less than 1 foot long. Its name comes from its round body that people thought looked like an overweight wife of a bar owner (ale wife)



ATLANTIC STURGEON

can be 15 ft long and weigh over 800 lbs. They are part of an ancient 200 million year old fish lineage – older than dinosaurs!



OCEAN



GREAT WHITE SHARK

is found in all oceans, including off the coast of Long Island and NJ. It can be 20 ft long and weigh almost 5,000 lbs. Like other sharks, Great Whites have rows and rows of teeth, one behind the next that move forward to replace broken and worn teeth.



SALT levels are as high as 32,000 mg/L in the open ocean.



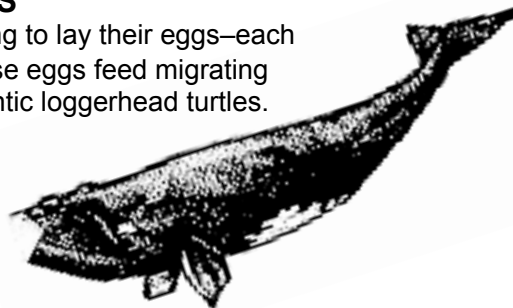
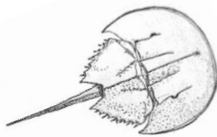
LOGGERHEAD SEA TURTLES

along with Green Turtles, Hawksbill Turtles, Leatherback Turtles, and Atlantic Ridley Turtles still sometimes swim in the Atlantic off the New York / New Jersey coast.

DID YOU KNOW?
97% of the Earth's water is salty and found in the oceans.

HORSESHOE CRABS

climb onshore in the spring to lay their eggs—each female lays 80,000! These eggs feed migrating shorebirds, fish, and Atlantic loggerhead turtles.



NORTH ATLANTIC RIGHT WHALES

along with fin, humpback, minke, sperm, blue and sei whales, dolphins, pilot whales and porpoises can all be spotted off the coast of Long Island. Right whales were given the name because they were the “right” whales to kill for their oil. Today less than 300 of the 50 foot, 70 ton animals remain.

A SALT CONCENTRATION GUIDE in mg/L:

67.5	Harms forest pine trees
100	Maximum allowed in NYC drinking water
226	Kills tiny freshwater plants and animals
250	Tastes salty Maximum allowed in drinking water by the Environmental Protection Agency
400	Will kill some freshwater frogs
1,000	Will kill some freshwater fish like trout Considered to be brackish or salty water
3,000	Lowest salt level found in the New York/New Jersey estuary
30,000	Highest level in the New York/New Jersey estuary
32,000	Average in ocean off of Long Island and New Jersey

	List at least two organisms that live in this ecosystem.	How will changing salt levels affect the organisms that live in this ecosystem?
FOREST	<ul style="list-style-type: none"> • <i>Mountain Holly</i> • <i>Tamarack Tree</i> • <i>Seed eating birds</i> • <i>Moose</i> • <i>Elk</i> • <i>Deer</i> 	<p><i>Too Much Salt Will:</i></p> <ul style="list-style-type: none"> • <i>Kill Mountain Holly and Tamarack</i> • <i>Interfere with water absorption, root growth and seed sprouting in plants</i> • <i>Increase the risk that seed-eating birds will ingest road salt crystals</i> • <i>Increase the risk of moose, elk, & deer being killed by traffic</i>
FRESH-WATER	<ul style="list-style-type: none"> • <i>Small freshwater plants and animals</i> • <i>Rainbow Trout</i> • <i>Frogs</i> 	<p><i>Too Much Salt Will:</i></p> <ul style="list-style-type: none"> • <i>Kill small freshwater plants and animals at 226 mg/L.</i> • <i>Kill frogs at 400 mg/L.</i> • <i>Kill rainbow trout at 1,000 mg/L.</i> • <i>Begin to taste badly. Government guidelines do not allow people to drink water with salt levels of 250mg/L.</i>
SWAMP	<ul style="list-style-type: none"> • <i>Cedar Trees</i> • <i>Tamarack trees</i> 	<p><i>Tamarack and cedar trees will die at high salt concentrations.</i></p>
MARSH	<ul style="list-style-type: none"> • <i>Reedy grasses</i> 	<p><i>Reedy grasses grow in brackish water.</i></p>
ESTUARY	<ul style="list-style-type: none"> • <i>River Otter</i> • <i>Alewife</i> • <i>Atlantic Sturgeon</i> 	<p><i>These organisms are adapted to live in a wide range of salt levels, so they will be unaffected by salt fluctuations.</i></p>
OCEAN	<ul style="list-style-type: none"> • <i>Great White Shark</i> • <i>Loggerhead Sea Turtle</i> • <i>Horseshoe Crab</i> • <i>North Atlantic Right Whale</i> 	<p><i>It is not possible for people to affect salt levels in the open ocean. However, these organisms will not be able to survive in freshwater tanks.</i></p>

2. Support the statement that the salt level isn't the problem for ecosystems; the problem is changing the amount of salt in an ecosystem. Give a specific example.

Ocean: Sharks, loggerhead turtles, and right whales need to live in salt water. If they are moved to an environment without salty water, they will die.

3. List three ways that salt can negatively affect organisms in a freshwater, forest or swamp ecosystem.

I. *226 mg/L: kills some freshwater plants*

II. *400 mg/L: some frogs die*

III. *The organisms that eat freshwater plants will also be affected if the plants that they eat die.*

IV. *Too much salt can change a swamp into a marsh.*