

Worksheet: Locating the Salt Front - Section 1

The lower portion of the Hudson River is an estuary. Here fresh water flowing down the river meets salt water pushing in from the Atlantic Ocean. The leading edge of ocean water entering the estuary is called the salt front.

Most of the salt in seawater is sodium chloride, the same compound as table salt. Scientists often measure salinity (the amount of salt in the water) by finding out how much chloride is in the water—the concentration of chloride. This figure is given in units of milligrams per liter (mg/L), which is the weight of salt in a given volume—one liter—of water.

In the Hudson River, the salt front is where the chloride concentration reaches 100 mg/L. That's very weak compared to full-strength seawater, which has roughly 19,000 mg/L of chloride. But it is higher than the small amounts found in fresh water further upriver, which are usually only 20-50 mg/L.

The salt front's location is given in Hudson River Miles (abbreviated HRM). Hudson River Miles start at the southern tip of Manhattan. This spot, called The Battery, is HRM 0. The city of Yonkers is at HRM 18, Kingston at HRM 91.

The location of the salt front determines where different kinds of animals and plants live in the Hudson estuary.

Saltwater fish like this flounder move up and down the river with the salt front.



Freshwater plants like the water chestnut grow only where the river is rarely salty.



Directions: Use one of the colored pencils to plot salinity data from Table 1 on the graph labeled "Hudson River Salt Front Location." Carefully draw a point for each salinity concentration directly above the river mile where the measurement was made. Then use a ruler to draw a line from one point to the next. Start at the point for the lowest river mile, and work your way up to the highest. Finally, use the table and graph to answer the questions below.

Table 1. Hudson River Salinity Measurements: October 6, 2004
Recorded as mg/L of chloride; HRM = Hudson River Mile

City	Manhattan	Yonkers	Piermont	Bear Mt.	Cold Spring	Ulster
HRM	7	18	25	46	55	97
Salinity (mg/L)	3260	2100	540	50	47	34

1. Where (city and HRM) was salinity highest? Where was it lowest?
2. Look at the graphed line between each pair of locations listed below.

HRM 7 to HRM 46 HRM 25 to HRM 55 HRM 46 to HRM 97

Between which two locations is the graph steepest? How much does the salinity change between these two locations?

Between which two locations is the graph flattest? How much does the salinity change between these two locations?

3. Between which two towns did salinity fall below 100 mg/L?
4. The salt front is located where salinity equals 100 mg/L. Using the graph you drew and the horizontal line at 100 mg/L, estimate (in river miles) the position of the salt front on October 6, 2004.
5. Why does salinity decrease between HRM 7 and HRM 46?



Worksheet: Locating the Salt Front - Section 2

On the same graph sheet used in section 1, use the other colored pencil to plot salinity data from Table 2. Then answer the questions below.

Table 2. Hudson River Salinity Measurements: October 12, 2006
Recorded as mg/L of chloride; HRM = Hudson River Mile

City	Manhattan	Yonkers	Piermont	Verplanck	Cold Spring	Poughkeepsie	Ulster
HRM	7	18	25	41	55	76	97
Salinity (mg/L)	8000	7300	5740	1500	50	30	64

1. Was the salinity at HRM 18 in 2006 higher or lower than salinity at the same spot in 2004? How much higher or lower?

2. Look at the graphed line between each set of locations listed below.

HRM 7 to HRM 55

HRM 41 to HRM 76

HRM 55 to HRM 97

Between which two locations is the graph steepest? How much does the salinity change between these two locations?

Between which two locations is the graph flattest? How much does the salinity change between these two locations?

3. At what river mile was the salt front located on October 12, 2006? Was it up or down the river from its October 6, 2004 location? By how many miles?
4. What might have caused the salt front to be in a different location in 2006?



Hudson River Salt Front Location

