

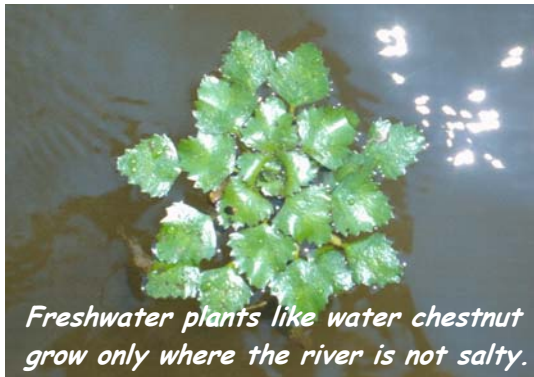
## Finding the Salt Front - Section 1

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 **seawater** entering the estuary is called the **salt front**. Its location influences where animals and plants live in the Hudson.

Saltiness in water is called **salinity**. Most of the salt in seawater is **sodium chloride**, the same compound as table salt. Measuring the amount of **chloride** in the water—its concentration—is one way to measure salinity. This concentration is given in units of milligrams per liter (mg/L), which is the weight of chloride in a set volume—one liter—of water.

In the Hudson, 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 salinity of fresh water further **upriver**, which is 20-50 mg/L.

The salt front's location is given in **Hudson River Miles** (abbreviated HRM). Hudson River Miles start at Manhattan's southern tip. This spot, called the Battery, is HRM 0. Going north, Yonkers is at HRM 18, Poughkeepsie at HRM 75.



*Freshwater plants like water chestnut grow only where the river is not salty.*

The salt front moves with the tides, weather, and seasons. For example, heavy rain increases the flow of fresh water into the estuary, pushing the salt front towards the sea. Cities and towns that take drinking water from the river track the salt front carefully. Sodium chloride might make their water taste funny, and can be a problem for people on low-salt diets.



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



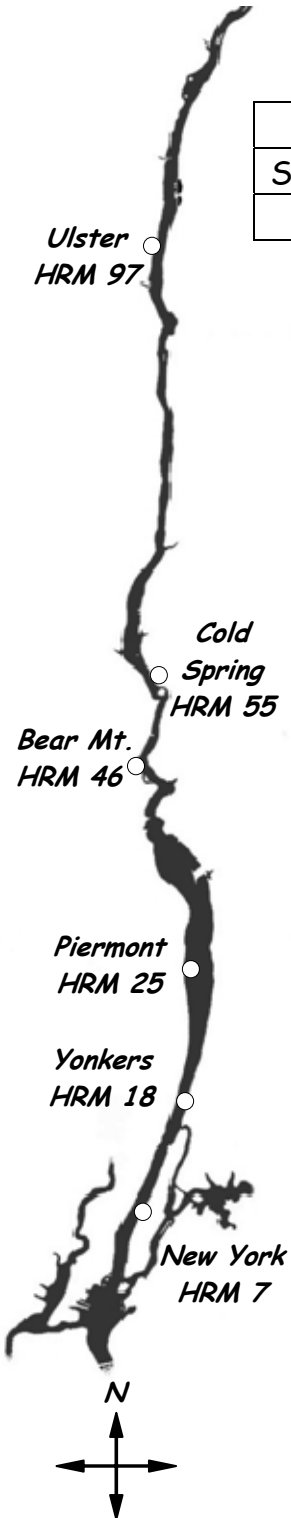
*Salt can be a problem for communities that get drinking water from the river.*

**Directions:** Use one of the colored pencils to plot salinity from Table 1 on the graph labeled "Hudson River Salt Front Location."

- Carefully draw a point showing each salinity measurement 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: October 6, 2004**  
Measured as mg/L of chloride; HRM = Hudson River Mile

| City                             | New York | Yonkers | Piermont | Bear Mt. | Cold Spring | Ulster |
|----------------------------------|----------|---------|----------|----------|-------------|--------|
| Salinity (mg/L Cl <sup>-</sup> ) | 1,805    | 1,162   | 300      | 50       | 47          | 34     |
| HRM                              | 7        | 18      | 25       | 46       | 55          | 97     |



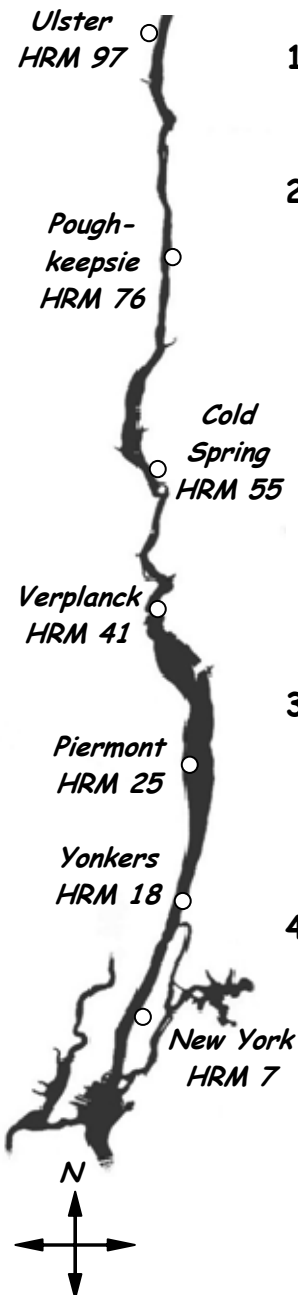
- Where (city & HRM) was salinity highest? \_\_\_\_\_ HRM \_\_\_\_\_
- Where was it lowest? \_\_\_\_\_ HRM \_\_\_\_\_
- Look at the graphed line between each pair of locations below.  
HRM 7 to HRM 46    HRM 25 to HRM 55    HRM 46 to HRM 97
  - Between which two locations is the graph steepest? \_\_\_\_\_
  - What is the change in salinity between these two locations?  
(subtract the lower salinity from the higher) \_\_\_\_\_
  - Between which two places is the graph flattest? \_\_\_\_\_
  - What is the change in salinity between these two places?  
(subtract the lower salinity from the higher) \_\_\_\_\_
- Between which two towns did salinity fall below 100 mg/L?  
\_\_\_\_\_
- The salt front is located where salinity equals 100 mg/L. Using your graph and the horizontal line at 100 mg/L, estimate (in river miles) the position of the salt front on October 6, 2004.    HRM \_\_\_\_\_
- Challenge: Why does salinity decrease between HRM 7 and HRM 46?

## Finding the Salt Front - Section 2

**Directions:** On the same graph sheet used in section 1, use the other colored pencil to plot salinity from Table 2. Follow the same steps as in section 1. Then answer the questions below.

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

| City                             | New York | Yonkers | Piermont | Verplanck | Cold Spring | Poughkeepsie | Ulster |
|----------------------------------|----------|---------|----------|-----------|-------------|--------------|--------|
| Salinity (mg/L Cl <sup>-</sup> ) | 7,362    | 4,041   | 3,177    | 830       | 50          | 30           | 64     |
| HRM                              | 7        | 18      | 25       | 41        | 55          | 76           | 97     |



1. Was salinity at Yonkers in 2006 higher or lower than salinity there 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
  - (a) Between which two locations is the graph steepest? \_\_\_\_\_
  - (b) What is the difference in salinity between the two locations? (subtract the lower salinity from the higher) \_\_\_\_\_
  - (c) Between which two places is the graph flattest? \_\_\_\_\_
  - (d) What is the difference in salinity between the two? (subtract the lower salinity from the higher) \_\_\_\_\_
  
3. (a) Where was the salt front on October 12, 2006? HRM \_\_\_\_\_  
 (b) Was it north or south of its October 6, 2004 location? \_\_\_\_\_  
 (c) 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

