

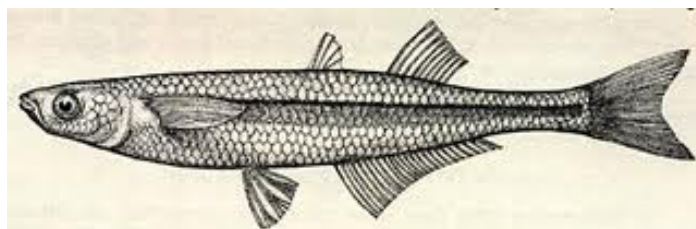
Testing the Salt Front Model

Background: The location of the **salt front** - the leading edge of seawater in the estuary - is defined as the area in the river where chloride concentration reaches 100 parts per million [ppm]. The U.S. Geological Survey [USGS] model for locating the salt front in the Hudson River is based on measurements from gages at Piermont, West Point, and Poughkeepsie. This activity explores two questions: *In the absence of technical models, what biological indicators of the salt front might we rely on? And, How do 'Day in the Life' student-collected data compare to USGS model results?*

One potential biological indicator is the presence or absence of certain fish species. The **spottail shiner** is a small freshwater fish commonly found near or north of the Hudson's salt front. The **Atlantic silverside** prefers saltier water south of the salt front. In fact, the silverside's range seems to shift north and south, matching the salt front's movements. **Does the student data confirm this?**



spottail shiner



Atlantic silverside

Activity: The Day in the Life salinity and fish catch data sheets for 2008, 2009, and 2010 show actual data that students collected each year. Real data can be tricky to work with and may require you to make decisions. At times a single data point may occur that is not representative of the full set of data. Not every group measures all the parameters, and not every parameter is measured with the same method, or recorded in the same units.

1. Use the data sheets to complete the charts for each year shown below. Indicate the northernmost site where silversides were caught, and the southernmost site where spottails were netted.
2. Next, use the site participant sheet, and enter the name and River Mile [RM] of the site where the salinity reading was **closest to 100 ppm chloride [Cl⁻]**. This might involve selecting a range or section in the river if the data does not clearly point to one location. *(Note that Hudson RMs are measured north from the Battery at the tip of Manhattan.)*
3. On the attached Hudson River map, label the locations entered in the charts below using the appropriate RM. The map is already marked every five RMs.

2008	Site	RM	Notes
Northernmost Silversides			
Southernmost Spottails			
Salinity reading closest to 100ppm			Salinity recorded:
Salt front location according to USGS	Just north of Newburgh	63.4	



2009	Site	RM	Notes
Northernmost Silversides			
Southernmost Spottails			
Salinity reading closest to 100ppm			Salinity:
Salt front location according to USGS	Newburgh	60.3	

2010	Site	RM	Notes
Northernmost Silversides			
Southernmost Spottails			
Salinity reading closest to 100ppm			Salinity:
Salt front location according to USGS	Haverstraw Bay	35.0	

4. Assuming that silverside and spottail ranges meet near the salt front, compare the student collected field data and USGS model results with the biological indicator. How do the three sets of data match up? You may want to plot the data on the map.

Discussion Questions:

5. What does movement of the salt front mean for fish species like spottail shiners and silversides?

6. What is the value of comparing field measurements with models?

7. What suggestions would you have for improving the USGS model?

8. Consider what you know about the Earth System. What are some of the factors that might affect the salt front?

9. Select another year of data from the project website and see how it matches up against the modeled salt front data.