TIDES & CURRENTS MEASUREMENTS

The Hudson River is a tidal system. In fact it is tidal for 153 miles from the mouth of the Harbor all the way up to the Troy Dam at Albany. The tidal reach is long because of how little the river elevation changes over that distance.

TIDES:

Tides are the tugging of the water up and down that are a result of gravitational attraction of the lunar cycles.

Collecting Measurements:

- Using a pre-marked line you will be measuring (A) from the dock down to the bottom of the river and then (B) from the dock down to the water surface. Deduct (B) from (A) to get (C) water depth.
- Students then can calculate how quickly the tide is rising or falling by dividing the change in height by the time between recordings. Think of the basic definition of speed as distance traveled divided by the time of travel. To calculate subtract the time from prior reading from this reading time for the time 'of travel' (or time elapsed). Next calculate the change in height from your prior reading (for the distance traveled) by subtracting these two numbers. Now divide the change in height by the time elapsed and record in column (D). This is the rate (speed) of tidal change.
- In the final column note if the tide is rising or falling

Time	(A) PIER TO THE BOTTOM	(B) PIER TO WATER SURFACE	(C) WATER DEPTH	(D) RATE/ CHANGE (cm/min)	RISING OR FALLING

CURRENTS:

Currents are the internal pull of the river water as a result of the tides. Currents move forward and backward NOT up and down like the tides. Don't confuse the direction of waves with the direction of the current; surface waves and current are different things. Using an orange toss it as far as you can out into the river. Note which direction it moves. The current moving downriver towards the sea is called the ebb; the current moving upriver is the flood.

Measure: For a more exact measure you can calculate the speed (distance traveled divided by time traveled) by using a tape and a stopwatch to measure how fast the current is moving. Toss the stick or orange in to the water at a marked starting point (use a student to align with the start). Stop your watch after 30 or 60 seconds on a stop watch and place a student at the end point. Now have your students measure the distance between the two student markers with a measuring tape. Record this in column 2. Calculate distance per second by dividing the total distance by 60 secs. Record column 3.

Extra Activity If Time Allows:

USE A CALCULATOR: If the students have time to calculate the rate of travel in knots use the calculation above (the distance in cm for 60 seconds) to compute this. Let's think this through.

1 kt. = 6076 ft. per hr. But we have cm so we need to convert ft. to cm. 1 ft. = 30.48 cm. so multiple these two to compute cm/hr or 185196.5 cm/hr. Now divide by 60 for cm per minute (3086.6 cm/min.) now by 60 again for cm/sec. What you find is that 1 kt =51.44 cm/sec. So to compute Knots from cm/sec use the following equation:

kts = cm/sec divided by 51.4. Record this as knots in column 4.

Example: If the stick traveled 125 cms in 60 seconds divide 125/60 = 2.08 cm sec. /51.4 = .04 kts.

CURRENT					
Time	**Cm/60 secs**	**Cm/sec**	**Knots (cm/sec)/51.4**	**North/ South**	**Ebb/Flood/Still (E/F/S)**

Is there anything about the river or shoreline here that may cause the current near shore to flow in a different direction than the current out in the middle of the Hudson (a protected embayment, a pier jutting out causing an unusual swirling).