Tides & Currents

Boston Harbor experiences about a ten-foot tidal difference every six hours, and because of the vertical change in sea level, there's a lot of water pouring into and out of the harbor! When navigating in tidal waters, you must take into account both the height of the tide (vertical) and the current (horizontal flow) associated with it.

Fortunately there are many resources available to mariners which provide information on tides and currents. Tide tables will tell you when high and low tides will occur on a given date, as well as their height above the depths shown on your chart. For example, if high tide is 8.8 ft and the depth on the chart at my position is 21 ft, at high tide I will be in 29.8 ft of water. If low tide is -1.0 ft, at low tide I will be in 20 ft of water.

Tide Table - Deer Island - May 24th through 27th, 2013

		HIGH				LOW					
		AM	hgt	PM	hgt	AM	hgt	PM	hgt	sunrise	sunset
Friday	24	11:08	10.08 ft	11:21	11.58 ft	4:56	-1.11 ft	5:10	-0.35 ft	5:14	8:07
Saturday	25	12:00 PM	10.31 ft			5:47	-1.55 ft	6:01	-0.55 ft	5:13	8:08
Sunday	26	12:13	11.83 ft	12:53	10.44 ft	6:39	-1.79 ft	6:53	-0.63 ft	5:12	8:09
Monday	27	1:05	11.89 ft	1:47	10.45 ft	7:30	-1.83 ft	7:46	-0.58 ft	5:12	8:10

This table only provides the height of the water at four times per day. If you want to know the height of the tide at 2:00 PM on Saturday May 25th, you need to do some basic calculations to get a good estimate. The height of the tide can be represented by a sine wave, but if you don't carry around a graphing calculator or slide rule, here's a simple trick you can use to estimate the height of the tide.

The Rule of Twelfths goes like this: one twelfth of the tide comes or goes in the first hour, two twelfths in the second hour, three twelfths in the third hour, three in the fourth, two in the fifth, and one in the sixth. Since high tide was two hours before 2:00 PM, we need to find three twelfths (one for the first hour, two for the second) of the 10.8 ft tidal difference. One twelfth of 10.8 is .9, .9x3 is 2.7, so we subtract 2.7 ft from the height at 12:00 PM (10.31 ft) for a height of 7.6 ft above charted depth.

This sort of precision is not required for everyday navigation, since you will always be giving yourself a significant buffer zone between your keel (Rhodes 19 is 3'3"deep, j/22 is 3'11",

don’t go into less than 8’ of water on purpose) and the bottom. It will usually suffice to know high and low tide times and heights, and to know that half way between these times, half of the water will have come or gone. Make a conservative estimate based on this knowledge and navigate accordingly.

Currents are a direct consequence of the rise and fall of the tide, and therefore flow in a similar pattern. If only 1/12th of the water leaves during the first hour after high tide, but 3/12ths leave during the third hour, then it stands to reason that the tide will be much stronger during the third hour. In fact, peak ebb (the fastest current flowing out of the harbor) is about 3.5 hours after high tide. Similarly, peak flood (fastest current into the harbor) is about 3.5 hours after low tide.

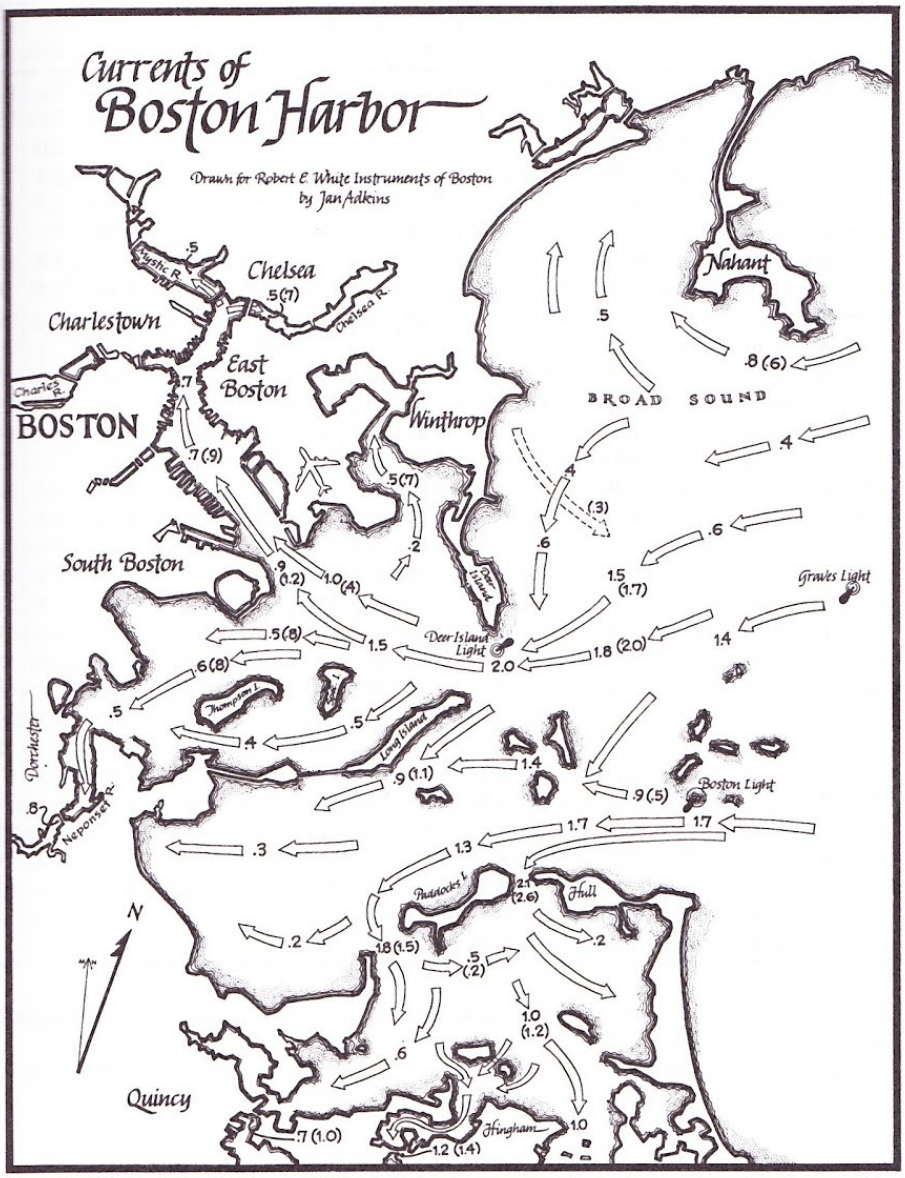
The final piece of this puzzle is figuring out where all the water is going. In a simple harbor, the answer is either “in” or “out”, but in a harbor complicated by islands and peninsulas, a visual aid such as this one can be useful.

Boston Harbor Currents

This diagram shows the direction of the Flood Currents in Boston Harbor at the Maximum* Flood velocity, generally 3.5 hours after Low Water at Boston.

The Ebb Currents flow in precisely the opposite direction (note one exception, shown by dotted arrow east of Winthrop), and reach these maximum velocities about 4 hours after High Water at Boston.

The velocities of the Ebb Currents are about the same as those of the Flood Currents. Where the Ebb Current differs by .2 kts., the velocity of the Ebb is shown in parentheses.



*The Velocities shown on this Current Diagram are the **maximums** normally encountered each month at Full Moon and at New Moon. At other times the velocities will be lower. As a rule of thumb, the velocities shown are those found on days when High Water at Boston is 11.0' to 11.5' (see Boston High Water Tables pp. 38-43). When the height of High Water is 10.5', subtract 10% from the velocities shown; at 10.0', subtract 20%; at 9.0', 30%; at 8.0', 40%; below 7.5', 50%.