

Note to users of wave forecasts

- The "seas" referred to in the Coastal Waters Forecast is the "Significant Wave Height" (H_s). H_s is defined as "the average of the highest one third of the waves." So the definition implies that THERE WILL BE HIGHER WAVES!
- According to wave theory:
 - 1 in 10 waves will be $1.25 H_s$
 - 1 in 100 waves will be $1.67 H_s$
 - 1 in 1000 waves will be $2H_s$
- Therefore for a forecast of 4 feet, expect frequent waves to 5 feet, occasional waves of 6-7 feet, and a few waves could even be as high as 8 feet!

Boaters need to keep in mind that there are potentially higher waves than what the forecast states. Sometimes this will be in the form of a higher swell, which might not be as noticeable to small boats in the open waters. However, if there are choppy, short period, wind waves present, then these occasional higher waves could have a substantial impact on a small vessel.

The following is a brief case study which was done after receiving a complaint about the Coastal Waters Forecast and Buoy 41009 data:

"The forecast was for seas 1-2 foot out to 20 miles and 2-3 foot from 20 to 60 miles. The seas were 3-4 immediately out of the port and remained that way for about 10 miles."

Buoy 41113:

#YY	MM	DD	hh	mm	WDIR	WSPD	GST	WVHT	DPD	APD	MWD	PRES	ATMP	WTMP
#yr	mo	dy	hr	mn	degT	m/s	m/s	m	sec	sec	degT	hPa	degC	degC
2007	07	13	10	21	MM	MM	MM	0.6	4	MM	MM	MM	MM	27.4
2007	07	13	09	51	MM	MM	MM	0.6	8	MM	MM	MM	MM	27.4

"Then they increased to 4-6 out to 30 miles."

Buoy 41009:

2007	07	13	12	20	200	6.0	7.0	0.9	4	MM	MM	1018.2	27.8	28.5
2007	07	13	11	50	200	6.0	8.0	0.9	4	MM	MM	1017.9	27.7	28.4
2007	07	13	11	20	210	6.0	7.0	0.9	4	MM	MM	1017.8	27.7	28.5
2007	07	13	10	50	200	6.0	7.0	0.9	4	MM	MM	1017.7	27.6	28.5
2007	07	13	10	20	200	7.0	8.0	1.0	4	MM	MM	1017.5	27.6	28.4
2007	07	13	09	50	210	7.0	8.0	0.9	4	MM	MM	1017.3	27.7	28.4

Buoy 41010:

2007	07	13	13	50	200	6.0	8.0	1.2	5	MM	MM	1018.4	28.5	28.5
2007	07	13	13	20	200	7.0	8.0	1.2	5	MM	MM	1018.4	28.5	28.5
2007	07	13	12	50	200	7.0	8.0	1.3	5	MM	MM	1017.9	28.5	28.6
2007	07	13	12	20	200	7.0	8.0	1.2	5	MM	MM	1017.9	28.4	28.6
2007	07	13	11	50	200	7.0	8.0	1.3	5	MM	MM	1018.0	28.4	28.6
2007	07	13	11	20	210	6.0	7.0	1.1	5	MM	MM	1018.2	28.4	28.6
2007	07	13	10	50	200	6.0	8.0	1.2	5	MM	MM	1017.8	28.4	28.6
2007	07	13	10	20	200	7.0	8.0	1.2	5	MM	MM	1017.6	28.4	28.6
2007	07	13	09	50	220	4.0	5.0	1.1	5	MM	MM	1017.4	27.2	28.6

The data above was pulled from the National Data Buoy Center and the wave heights (WVHT) were 0.6 meters (2 feet) near shore and 1.2 meters (4 feet) out at 120nm offshore. In between at 41009 the seas were 1 meter (~3 feet). Significant wave height that is measured by the buoys is the average of the highest one third of the waves. So this means that there will be occasional higher waves.

In fact, wave distribution studies have shown that one in 100 waves will be 1.67 times the significant wave height and one in 10 waves will be 1.25 times the significant wave height. So in a normal wave distribution, waves in this case would be 5 feet at 41009 every 6-7 minutes and there would be about three waves at 4 feet over a two minute period.

The one piece of data that is evident which made this trip a bit on the choppy side was the dominant wave period (DPD) of 4-5 seconds, which was produced by 10-15 knot south/southwest winds. If the wave period had been 8 seconds, the 5 foot waves would have occurred about every 13 minutes, which would have made for a much less choppy looking sea state. Wave period really matters! Generally when wave period comes close to being the same as the wave height (i.e. 4 feet at 4 seconds), waves are very steep and the seas are uncomfortably choppy.

There will always be problems that occur with the forecasts at times (winds can be fickle). Also, wave theory says that there will always be higher seas than the significant wave height, so boaters need to take this into account. Watch out for the wave period too.