

Ram Island YC Water Quality Monitoring Station

In early May 2021 the U.S. Geological Survey, through its office in East Hartford, established a monitoring station at the east end of the Ram Island Yacht Club (RIYC) dock in the Mystic River as part of an ongoing study of small estuaries in Connecticut. Another similar station has been established at Mystic Seaport. Each station monitors a number of water quality characteristics as well as current speed and direction at a point within the adjoining channel of the Mystic River. Current measurements at the selected location, near mid-channel, are obtained at a number of points over the vertical using a bottom mounted acoustic doppler current profiler or ADCP. This instrument uses an acoustic or sound pulse sent upwards from the bottom. Reflections of this pulse of sound from the waters are received back at the transmitter and analyzed to estimate flow speeds and flow directions at points over the vertical. This system requires only the bottom mounted instrument with nothing else in the water column that might interfere with boats moving past in the channel. Data gathered by the instrument are sent back to the data storage and transmission



module mounted on the end of the RIYC dock (See photo) via a cable laid along the bottom of the channel.

The current measurements complement water quality observations from an array of instruments attached to the east end of the RIYC dock. Sampling 10 times each hour, these instruments make measurements at two points over the vertical, near surface and near bottom. The characteristics sampled include water temperature, specific conductance, dissolved oxygen concentrations, percent saturation of dissolved oxygen, chlorophyll, and turbidity. Data can be viewed both in a simple tabular format or graphically by selecting the Output Format on the

homepage (see Link). Water temperatures are presented in degrees Celsius, the standard scientific format, which can be easily converted to degrees Fahrenheit. In

general water temperatures are lower near bottom than at the surface due to the effects of sunlight warming and the sinking of colder waters which tend to be heavier than warmer parcels. Reductions in differences between near bottom and surface water temperatures are often the result of mixing over the vertical due to the combined effects of current flow and surface wind waves. These factors can have profound effects on water quality. Tracking water temperatures and vertical gradients is often particularly interesting during changing seasons in the spring and fall.

Salt content or the salinity of a water sample is determined by measuring specific conductance. Again values at the bottom sampler will be slightly higher than those at the surface since the fresher waters supplied by the River are slightly less dense than those entering from the offshore areas. Values will display an evident tidal cycle as well as a longer seasonal cycle due to the changes in River flow associated with the seasonal rainfall cycle and possibly the late winter/ spring snow melt. Salinity and water temperature affect water quality directly through their effect on plants and animals in the water column and indirectly by influencing water column mixing and movements.

In contrast, dissolved oxygen, percent saturation, chlorophyll fluorescence, and turbidity are direct measures of water quality. Dissolved oxygen is of particular importance directly affecting the survival of most marine animals. DO values below 2-3 ppm or saturation levels below 30% are considered hypoxic . Portions of western Long Island Sound experience some degree of hypoxia each summer. Values in the Mystic River never reach these levels, a general indicator of excellent water quality. Chlorophyll fluorescence, a measure of the extent of plant (phytoplankton) photosynthetic activity and turbidity, an indicator of the clarity of the water column are additional indicators of factors that control the overall health of the estuarine ecosystem that is the Mystic River. The availability of times series data to be supplied by the USGS monitoring station over the next two years will provide a unique view of the dynamic nature of the River that most of us have never seen or studied. Expect some surprises !

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