

Dear Current and Future Volunteers and Friends of CUSH,

I hope you'll make a cup of tea, get really comfortable, and read the following when you have some time to think about it. We'll start with a brief review of what we do and where; for details on why, visit <http://www.uri.edu/ce/wq/ww/Factsheets.htm>. Tomorrow there will be yet another report, this time on the plans for extending and improving our water monitoring project in the coming year.

What we test for: In 2010 we continued the sampling pattern begun when we started up in 2008: Every 2 weeks we collect samples to test for dissolved oxygen and temperature, and other samples to filter for lab testing of chlorophyll-a, a measure of algae. Once a month we collect additional samples for salinity as well as lab testing of nitrogen, phosphorus, pH, and bacteria.

Where we monitor: We began this enterprise in 2008 by monitoring sites in and near Stonington Harbor. In 2009 we added Mystic Harbor, Mystic River, Pequotsepos Cove, and Wequetequock Cove.

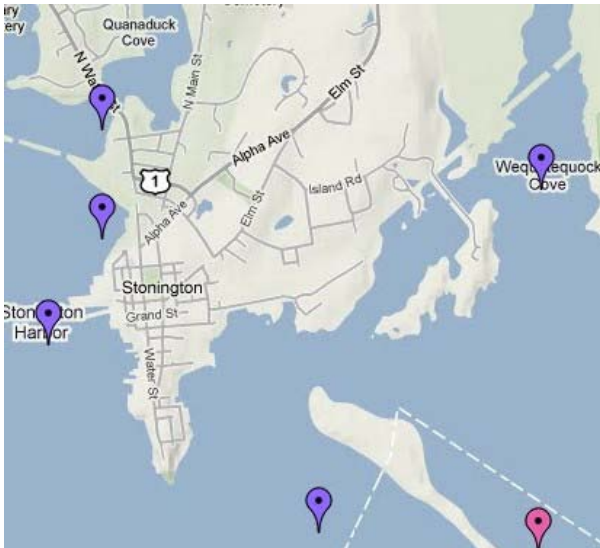
In both 2009 and 2010, as you will see below, we found a full spectrum of water quality, from excellent (Sandy Point) to abysmal (the head of Wequetequock Cove). We now have enough information to formulate strategies and a grounding philosophy for water-quality monitoring in the near future and beyond; 2011 is going to be an exciting season.

Regulatory limits for maintaining healthy aquatic life:

- dissolved oxygen (DO) at least 4.8 ppm (parts per million)
- chlorophyll (algae) below 10 ppb (parts per billion)
- total nitrogen below 600 and preferably below 400 ppb.
- For bacteria, the enterococci limit for swimming is 104 for a single day and a seasonal average of 35; the fecal coliform limit is 14 for shellfishing.

Data: What follows are the most representative values for water quality from the point of view of aquatic life. Full details available upon request.

Stonington Harbor sampling sites are pictured below. From south to north through the harbor, they are Sandy Point (west of the Point); Mid-Harbor off the Town dock (site of the Stonington Borough sewage treatment plant outfall); Dodson's Boatyard, and Lambert's Cove at Don's Dock. This view also includes the mouth of Wequetequock Cove to the east. The pink marker east of Sandy Point is one of several Save the Bay sites in Little Narragansett Bay.



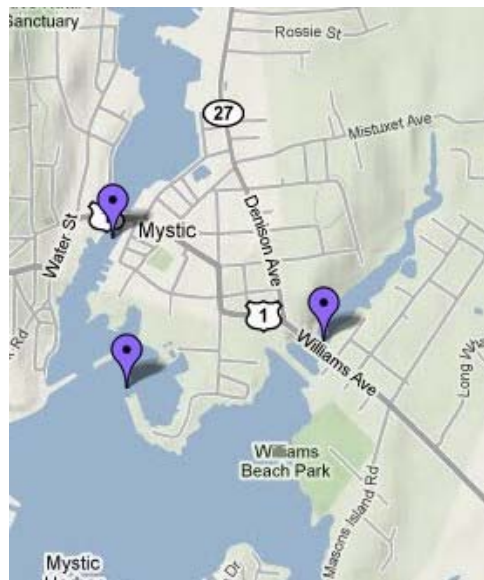
All the Stonington Harbor area sites continue to show good water quality: as they did last year, summer average values include dissolved oxygen 6.0 ppm or more (7.6 at Sandy Point), chlorophyll less than 5 ppb, and total nitrogen less than 400 ppb. Deep samples from the Mid Harbor site were significantly improved from 2009. Interestingly, a brief dip in DO was observed at Dodson's Boatyard on one monitoring day: from the previous value of 6 ppm to 2.7 ppm and up to 7.6 ppm an hour later. Although the cause is unknowable, a boat discharge is a plausible hypothesis, and the boatyard owner took advantage of the finding to remind his customers that the site is monitored.

Mystic Harbor/River sites are pictured below; from south to north they include Mason's Island at Ram's Point, Murphy's Point at Brewer's Yacht Yard (site of the Mystic treatment plant outfall), and Mystic River Park on the River near the drawbridge.



Summer average DO at Mason's Island was similar to the 2009 average of around 6.0 ppm; however, at both Murphy's Pt. and Mystic River Park, DO averages dropped to 6 ppm from around 7 ppm in 2009. This difference may reflect the wet summer of 2009 versus the very dry post-flood summer of 2010. Average summer chlorophyll was less than 9 ppb (Mason's Island 4, the others around 8). Average summer total nitrogen (TN) increased with distance from the Harbor, from less than 300 ppb at Mason's Island to 500 ppb at Murphy's Pt. and 600 ppb (poor) at Mystic River Park. At Murphy's Pt. the 500 ppb average represents improvement from 646 ppb in 2009.

Pequotsepos Cove is pictured below, showing its position east of the Mystic River:



Water quality in Pequotsepos Cove was borderline, with average summer DO at 5 ppm, chlorophyll just under 9 ppb, and TN 500. These DO and chlorophyll values represent significant improvements from the 2009 averages of 4 ppm and 13 ppb, respectively. On most sampling days, samples were collected on both ebb and flood tides; chlorophyll and fecal coliform average values were at least 20% lower on the flood tide, whereas the average inorganic nitrogen was lower on the ebb tide. We intend to follow up on these findings in the coming season.

The head of Wequetequock Cove is pictured below in the upper right corner.



At this site, the average summer dissolved oxygen concentration in both 2009 (a wet summer) and 2010 (a dry summer) was 3.9 ppm; 56% of all the summer values were 3 ppm or less (the concentration at which fish find somewhere else to be), and on average the water held only half as much oxygen as it could have held. Average summer chlorophyll was a whopping 16.4, spiking to 76 ppb in July--off the charts except for the 96 ppb spike in September 2009. Average summer total nitrogen was near 700 ppb, spiking to 1360 in July (to 2530 in Sept. 2009).

Conclusions:

- 1) Stonington Harbor is flushed by strong tidal currents entering from Block Island Sound through Watch Hill Passage, and with some exceptions has consistently shown good water quality. This probably indicates removal of most pollutants before they can be measured, as evidenced by the transient decrease in DO at Dodson's Boatyard.
- 2) The overall water quality in Mystic Harbor and the Mystic River is a bit below that of Stonington Harbor, probably because Mystic Harbor is not as well flushed, lying several miles west of Watch Hill Passage and several miles east of the Race; the Mystic River also tends to stratify, with salt water at the bottom and fresh water layered on the top, which can trap pollutants.
- 3) With the exception of Lambert's Cove, water quality in areas north of the railroad is significantly poorer because of their restricted flow and, in dry weather, limited freshwater input. They deserve further study--and they are going to get it. Stay tuned.

Thanks to you all for your good and careful work,

Claire