

Green to Streams: An Exploration of Urban Water Quality

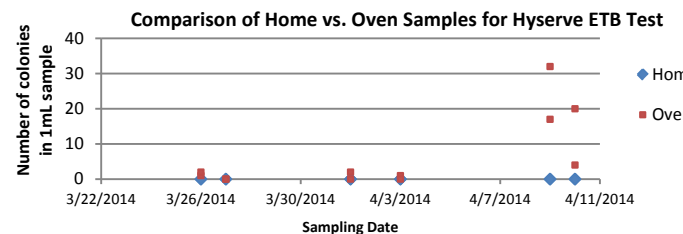
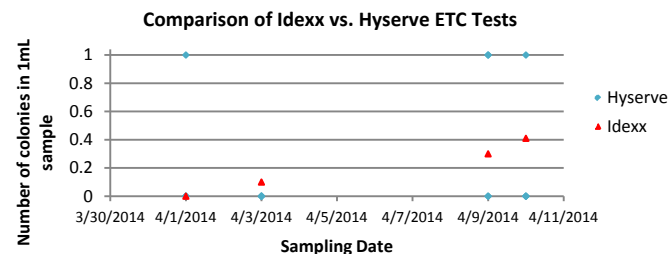
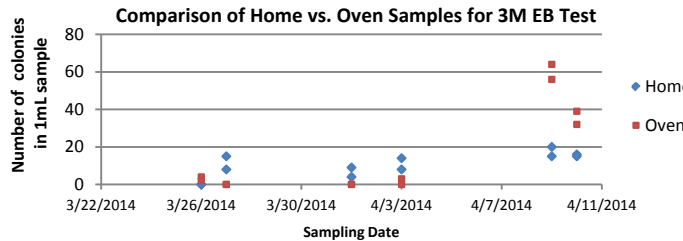
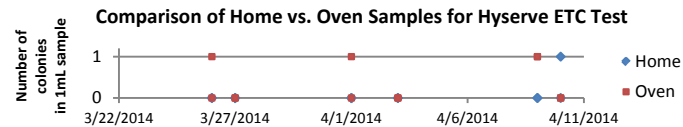
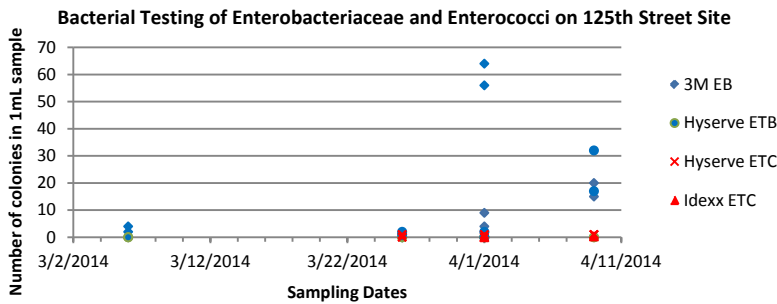
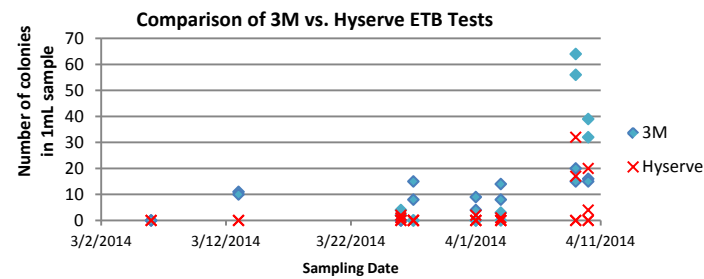
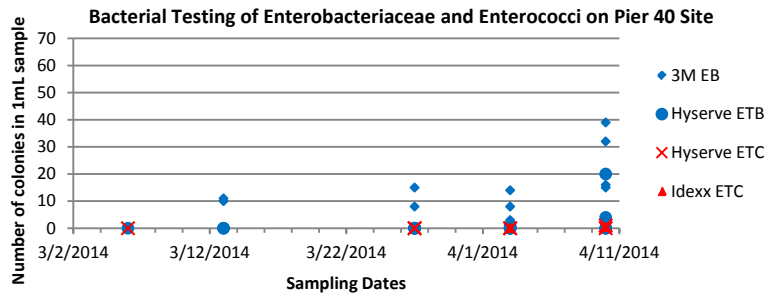
Which lab protocol best demonstrates bacteria levels in the Hudson River?

Columbia University – Earth Institute

Valentina Paiva-Acosta and Safa Chowdhury, Supervisors: Yun Zheng and Diana Hsueh

We have tested and compared three different lab procedures to analyze the presence of two families of bacteria: Enterobacteriaceae (ETB) and Enterococcus (ETC). These are indicative of the amount of raw sewage dumped into the Hudson River as a result of Combined Sewer Outflows (CSOs) during significant rain events. We further analyzed the testing procedures by comparing the results between samples that were placed in the oven and samples that were left to cultivate at room temperature. Our tasks as research assistants included sampling from two locations on the Hudson River: 125th Street Pier and Pier 40; measuring pH, nitrate, phosphate and turbidity levels of the river water on the field; preparing and analyzing samples for bacterial testing of ETB and ETC using three methods: 3M plates, Hyserve plates, and IDEXX Quanti-Trays; duplicating samples to test the difference between samples placed in the oven for cultivation and those placed at room temperature; and assessing trends of bacteria level with rain intensity.

RESULTS:



Our data shows that the 125th Street Pier site on the Hudson River has on average higher levels of Enterobacteriaceae than the Pier 40 site. They exhibit similar levels of Enterococci bacteria contamination. It was found that the 3M method of testing for ETB yields a higher number of colonies than the Hyserve method. For ETC, however, the Idexx and Hyserve methods give similar results. Moreover, our analysis of different testing methods shows that when a sample is incubated in an oven, more colonies grow for all testing methods. However, it is important to note that this is only true when the oven is set to the correct temperature for each testing method. If the oven's temperature is too high (as was the case in the beginning of our investigation) the heat can sterilize the sample, resulting in a lower number of colonies in the oven samples than in the room temperature samples.