Water Quality Profiler – 2012 Summary Report

On 26 June 2012, the Maryland Department of Natural Resources (DNR) deployed a vertical profiler to monitor water quality conditions in Harris Creek, a tributary of the Choptank River and the site of a large scale oyster restoration project. The vertical profiler uses a winch system to lower a monitoring sonde through the water column while taking water quality readings at pre-determined depths. The profiler performs hourly measurements of temperature, salinity, turbidity, pH, dissolved oxygen, and chlorophyll.

Field Activities

For the period June-December 2012, field personnel visited the vertical profiler thirteen times. Regular maintenance of the site includes replacing the sonde with a freshly calibrated instrument and collecting water quality measurements to verify the profiler readings. Dates of the site visits are listed in Table 1.

Table 1. Visits to the vertical profiler by field monitoring personnel, June 2012-October 2012.

Date	Site Visit
26 Jun 2012	Initial deployment
02 Jul 2012	Scheduled maintenance
16 Jul 2012	Scheduled maintenance
30 Jul 2012	Scheduled maintenance
13 Aug 2012	Scheduled maintenance
27 Aug 2012	Scheduled maintenance
10 Sep 2012	Scheduled maintenance
26 Sep 2012	Scheduled maintenance
09 Oct 2012	Scheduled maintenance
22 Oct 2012	Scheduled maintenance
26 Oct 2012	Profiler removed in advance of Hurricane Sandy
31 Oct 2012	Profiler redeployed
18 Dec 2012	Scheduled maintenance

The vertical profiler was initially programmed to collect data at depths of 0.5m, 1.0m, and 2.0m below the surface. On 13 July 2012, the set-up parameters were reconfigured to include an additional reading at 1.5 m below the surface for a total of four readings during each vertical profile. The profiler continues to collect data (as of 19 December 2012), and will remain deployed as long as weather conditions allow.

Data Processing and Analysis

Data processing activities include weekly retrieval of the profiler data (via telemetry) and posting data files and graphics to the DNR “Eyes on the Bay” web site. On the web site, profiler data are presented as interpolated contour plots, showing water quality measurements throughout the water column over time. Figure 1 illustrates the data collected for the week of 21-28 August

2012. The data show water quality patterns typically observed at this site during the summer months. Turbidity values were higher at the bottom of the water column, while chlorophyll and dissolved oxygen were higher at the surface. Water quality parameters also showed some variability due to tidal influence. The water column is not strongly stratified at this location, as shown in the plot of salinity values. Throughout the monitoring period, water quality conditions at this location in Harris Creek were favorable for oyster growth and survival.

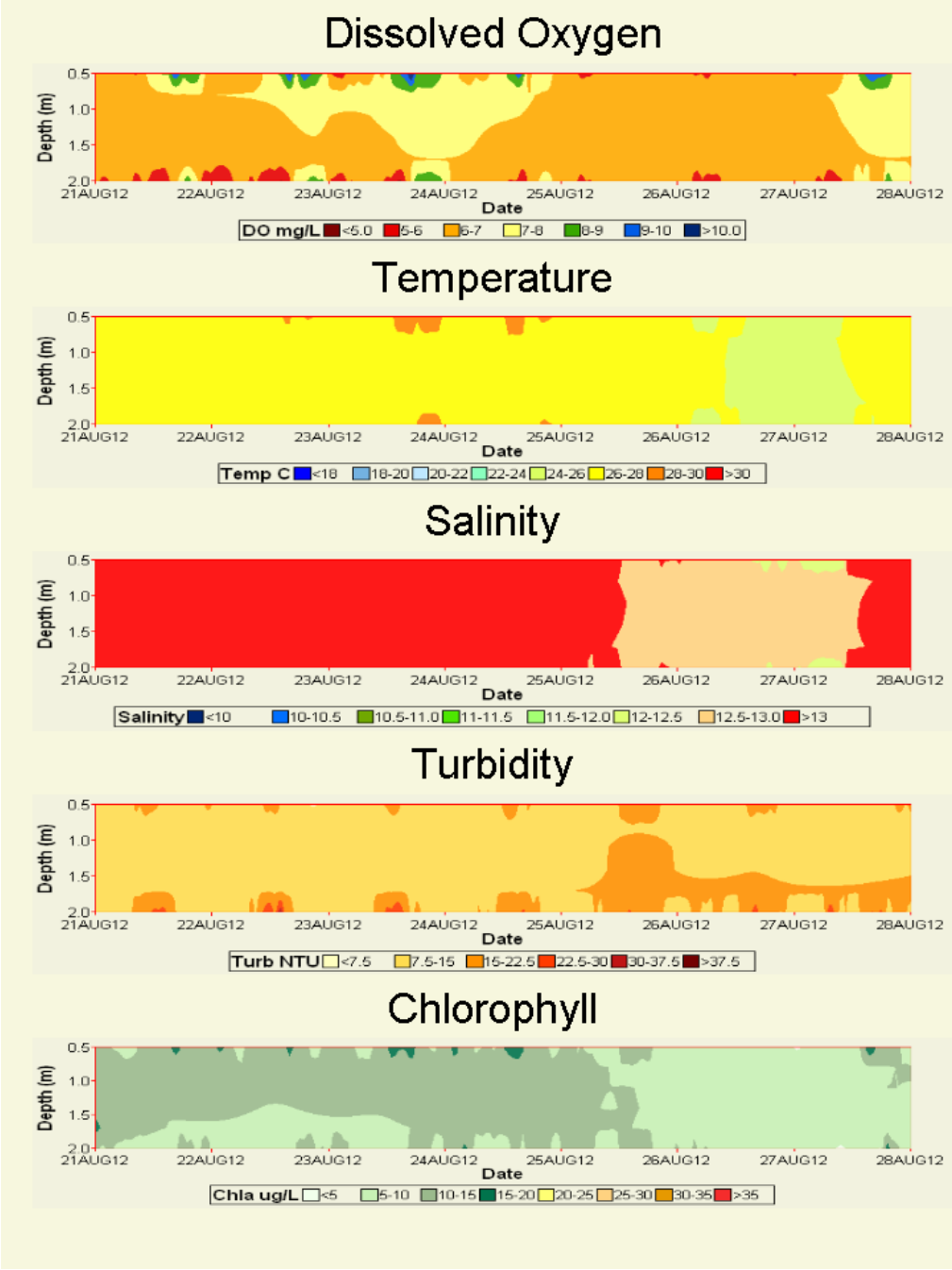

Figure 1. Vertical profiler data for the period 21-28 August 2012.

Occasionally, unusual events required more intensive data review. One such event was the arrival of Hurricane Sandy in the Chesapeake Bay region on 29-30 October 2012. A line graph of salinity values (Figure 2) shows conditions recorded by the profiler before and after Sandy (the monitoring instrument was not actively collecting data during the storm). Additionally, profiler data were more closely examined for 14 July 2012 (high turbidity event), 20-30 July 2012 (lower dissolved oxygen values), and 28-31 August 2012 (elevated chlorophyll values).

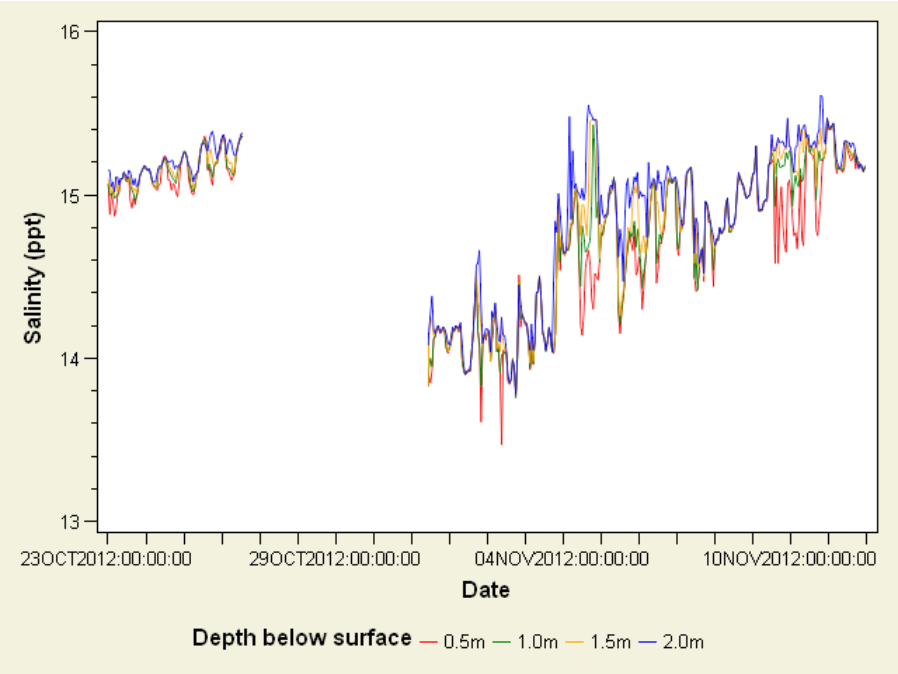

Figure 2. Vertical profiler readings for salinity before and after Hurricane Sandy.

Continuing Work

In order to provide timely data dissemination, contour plots of profiler data are posted to "Eyes on the Bay" before the data undergo thorough QA procedures. DNR staff are currently reviewing the data following a QA process that is similar to the one used by the DNR Shallow Water Monitoring Program (SWM) and documented in the SWM Quality Assurance Project Plan. To date, QA of the profiler data is complete through August 2012. Biofouling of the sonde probes was a common problem throughout the summer months. As a result, data QA required that some data values be flagged with error codes and masked in the final data set. When the entire data record is quality assured, the contour plots and the downloadable data files posted on "Eyes on the Bay" will be edited to reflect any changes made to the final data sets. Metadata for the profiler data will also be developed and made available.

Additionally, DNR staff are developing computer programs that will retrieve the profiler data and update the "Eyes on the Bay" web page automatically four times a day. Contour plots will be generated using the "R" statistical programming language. Automation of these tasks will

improve DNR’s ability to report data in a timely manner and will aid in the detection of unusual events or equipment malfunctions.