

**Contingency Plan Report**  
Third Quarter 2016

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**Ambient Monitoring**

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MWRA gathers data near the discharge outfall location in Massachusetts Bay on various thresholds in the Contingency Plan related to its Deer Island outfall NPDES discharge permit. **This report shows** ambient monitoring **results** for Contingency Plan thresholds **that became available July through September 2016**. Water column results in this report include bottom water dissolved oxygen, and *Alexandrium* abundance for May, June<sup>1</sup>, and July. Sediment study results available include sediment profile imaging results designed to assess sediment enrichment. There were no contingency plan threshold exceedances for the data in this report. Previous Contingency Plan reports are available at:  
<http://www.mwra.state.ma.us/harbor/html/archive.htm#cpq>.

**DISSOLVED OXYGEN (DO) – June - August 2016**

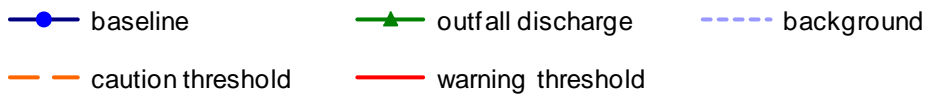
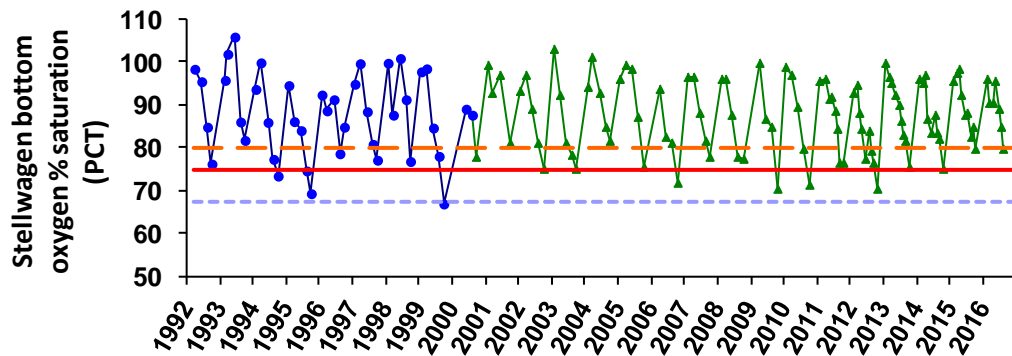
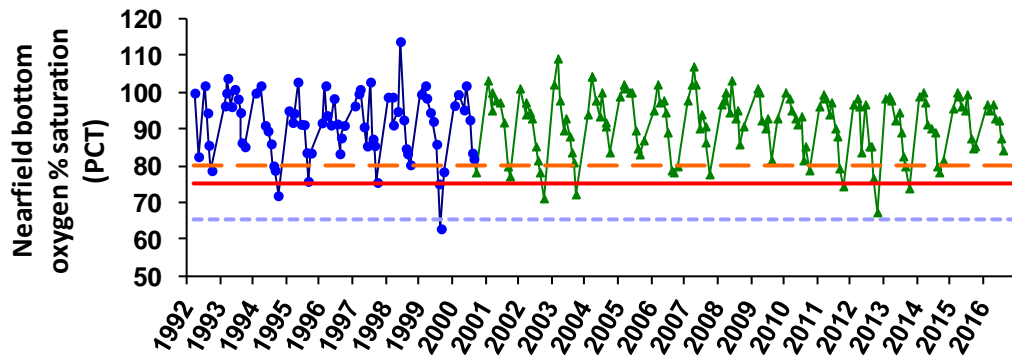
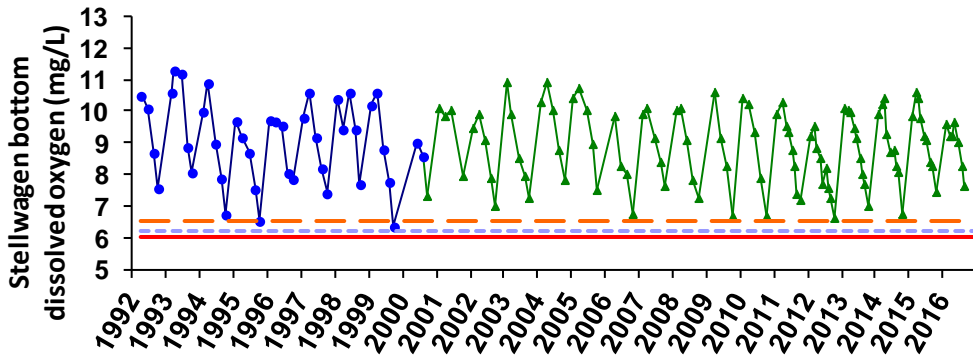
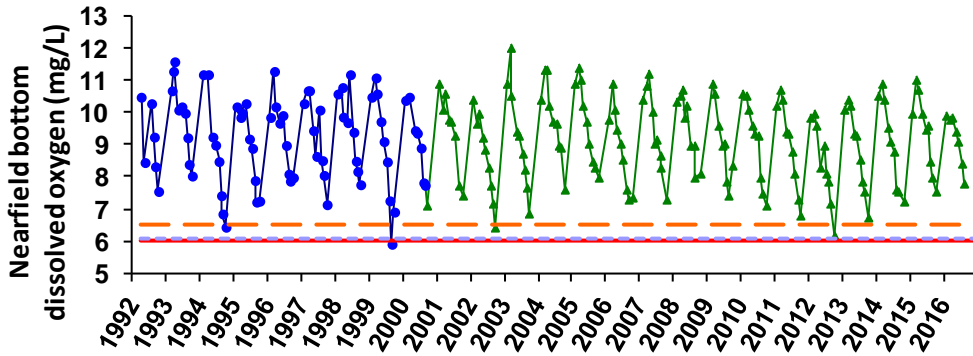
Dissolved oxygen (DO) thresholds are tested on results from June-October when lower solubility due to warmer temperatures has the potential to reduce oxygen concentration and saturation. There were no actionable threshold exceedances for these thresholds in summer 2016.

The current reporting period for [dissolved oxygen thresholds](#) is June-August 2016. During this period there were three surveys. The graphs below show the natural annual fluctuation of DO and percent saturation, which are typically lowest in early autumn. The 1992-2010 data shown are subsets of all data reflecting the modified design that began in 2011, *i.e.* nine surveys per year, and one station rather than four in Stellwagen Basin. This enables us to better compare the threshold results across years.

Nearfield bottom-water oxygen levels in August 2016 were among the lowest observed in post-discharge years in both the nearfield and Stellwagen Basin, but summertime values remain well above the caution threshold levels for DO concentration of 6.5 mg/L in both the nearfield and Stellwagen Basin and above the caution threshold for saturation of 80 percent saturation in the nearfield. The oxygen percent saturation in the one Stellwagen station dipped slightly below the caution threshold, but the state standard, on which this threshold was based, allows an exception to numerical thresholds if background conditions are lower; thus, the threshold was not exceeded because the percent saturation was above the background level of 67.17 percent.

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<sup>1</sup> June data were presented as preliminary in the second quarter report



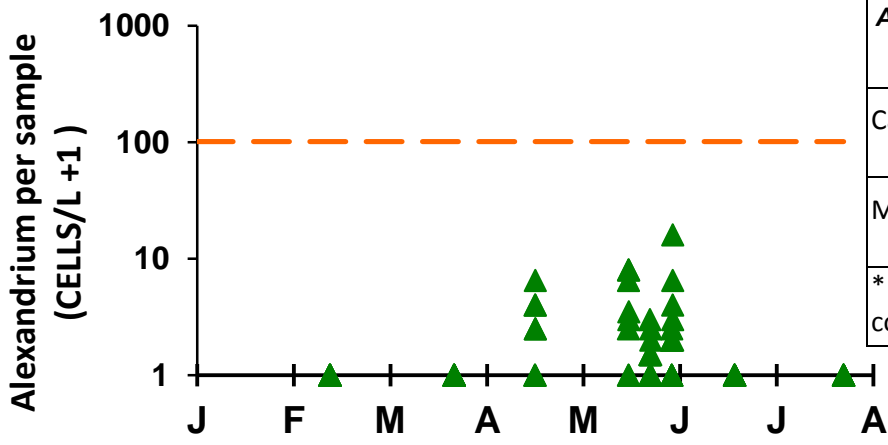
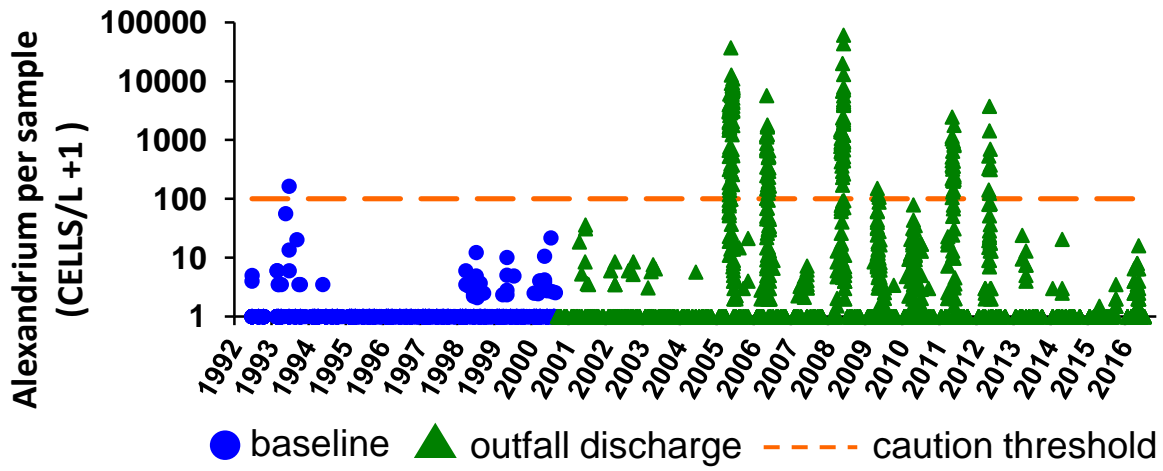
## NUISANCE ALGAE – MAY —JULY 2016

### ***ALEXANDRIUM***

The nuisance algae *Alexandrium fundyense* can cause paralytic shellfish poisoning (“red tide”) in Massachusetts Bay. MWRA measures *Alexandrium* abundance in its monitoring program, and also checks state fisheries agency observations of shellfish PSP toxicity to keep track of the course of Gulf of Maine *Alexandrium* blooms.

As reported in the second quarter report, preliminary data from stations distant from the MWRA outfall in the regularly scheduled survey triggered special weekly surveys of *Alexandrium* on May 25 and June 1 which ended when abundances of this species dropped to near-zero. This report shows the same data as final including the June 21 survey during which no *Alexandrium* cells were observed. There was no exceedance of the red tide Contingency Plan threshold throughout this period.

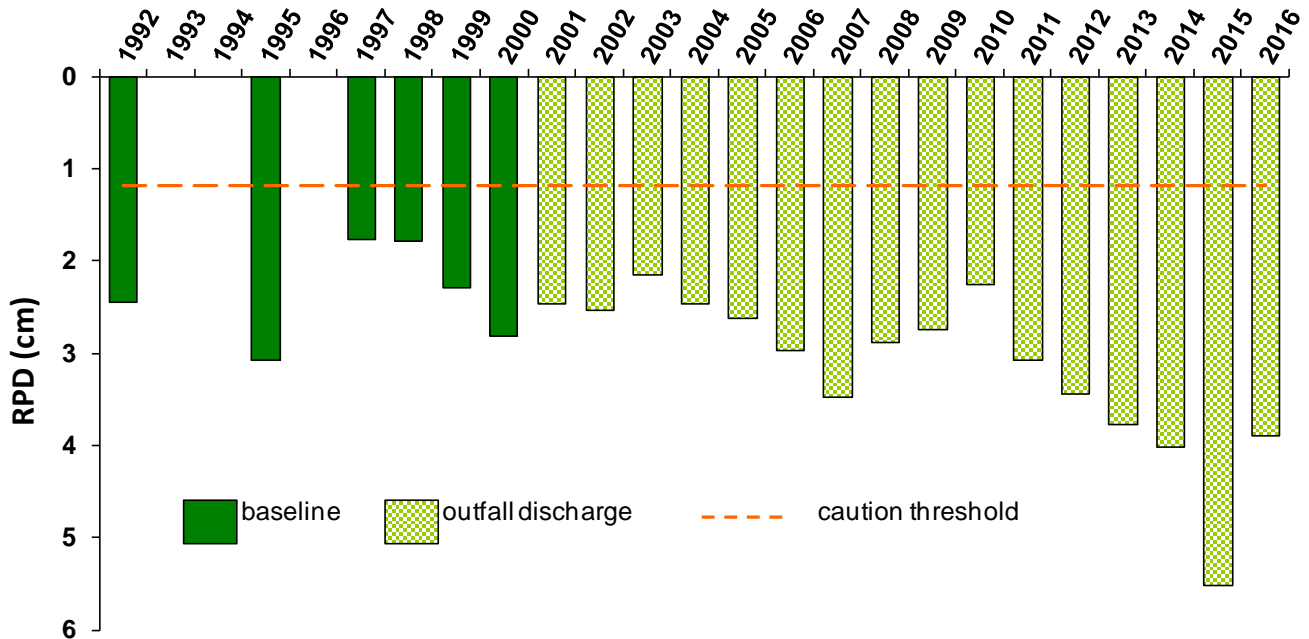
In the figures below, we compare *Alexandrium* data to the threshold for each sample through July 2016. The first figure includes data since the start of the monitoring program in 1992. To better display recent values, the second figure shows data for 2016 only, including five routine surveys and two special surveys. Note logarithmic scale for each graph.



<i>Alexandrium</i> per-sample abundance (cells/liter)	
Caution threshold	100
May - July 2016	15*
* maximum of all nearfield samples collected May through July, 2016	

## SEDIMENT ENRICHMENT - 2016

The 2016 annual sediment monitoring showed that the redox potential discontinuity (RPD) depth was among the deepest observed at the outfall site and did not exceed the threshold (did not fall below the minimum RPD threshold; see explanation below).



The depth of the oxygenated layer in marine sediment is a measure of ecosystem health. A diverse bottom-dwelling community includes organisms that mix water and oxygen down into the sediment. In an over-enriched environment, organic material deposited on the sediment surface can use up the available oxygen and smother the bottom-dwelling community. Such areas, including some areas of Boston Harbor, have a thin or nonexistent oxygenated layer. The thickness of the oxygenated layer is called the redox potential discontinuity (RPD) depth. In MWRA’s monitoring program, the RPD depth is estimated from sediment-profile images, cross-sections of the upper several centimeters of the sediment taken with a special mud-penetrating prism and camera. The depth of the RPD layer is conservatively estimated as the prism penetration depth when the prism does not reach the bottom of the oxygenated layer. The threshold for RPD is half the mean measured in the baseline period (that is, if the thickness of the oxygenated layer fell to less than half the thickness measured pre-discharge, a caution threshold would be exceeded.) Sediment profile imaging for MWRA monitoring is done in August.

The mean RPD depth was shallower in 2016 than in 2015 but similar to that seen in 2014, and it is well below the threshold depth of 1.18 centimeters. Sediments in the nearfield continue to remain well-oxygenated and are not experiencing habitat degradation due to organic matter enrichment.