

**Contingency Plan Report**  
Third Quarter 2014

**Ambient Monitoring**

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**, relevant to Contingency Plan thresholds, **that became available in the July-September 2014 time period**. There was one Contingency Plan threshold exceedance in the results available in this time period.

**NUISANCE ALGAE – May - June 2014**

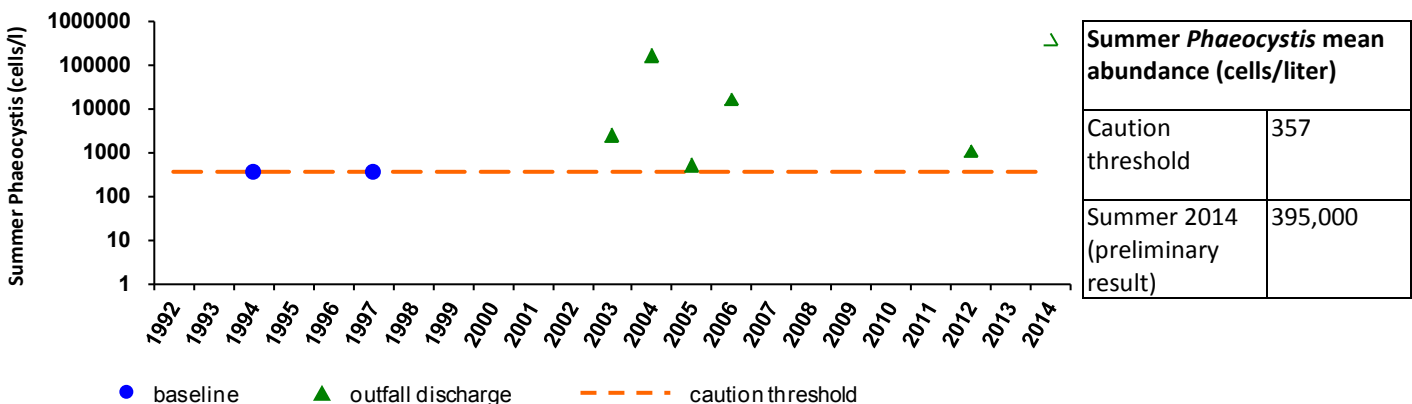
Results of the nuisance algae from sampling carried out through July 2014 were available at the time of preparation of this report. There was one exceedance of a [nuisance algae threshold](#) reported based on these data, a preliminary estimate of the summer average *Phaeocystis*. Even if there are no *Phaeocystis* in the August samples, the very low summer threshold will be exceeded based on the May through July 2014 data. Details of the exceedance are reported here [http://www.mwra.state.ma.us/harbor/pdf/20140905\\_amx.pdf](http://www.mwra.state.ma.us/harbor/pdf/20140905_amx.pdf).

**PHAEOCYSTIS**

For the nuisance alga *Phaeocystis pouchetii*, the average abundance for the summer season (May 1- August 31) exceeded the Caution Level threshold, even assuming no *Phaeocystis* in August samples, whose results are due at the end of October.

Unlike many recent years, there was no large bloom of *Phaeocystis pouchetii* in Massachusetts Bay in the February-April period; the peak of the bloom fell in May instead. The exceedance was discussed at a meeting of the Outfall Monitoring Science Advisory Panel on September 23, 2014. Since then, results of the July 2014 samples have been submitted, confirming that *Phaeocystis* was absent. While many factors contribute to why and when algae may bloom, it appears that this bloom can be explained, at least partially, by cold temperatures persisting later into the spring in 2014. *Phaeocystis* frequently blooms under these colder temperatures, but these typically occur earlier in the year. The winter-spring threshold for *Phaeocystis* is 2,860,000 cells/l.

In the figure below, we compare *Phaeocystis* summer averages, assuming zero values for August 2014, to the nuisance algae thresholds for summer. The graphs include data since the start of the monitoring program in 1992.



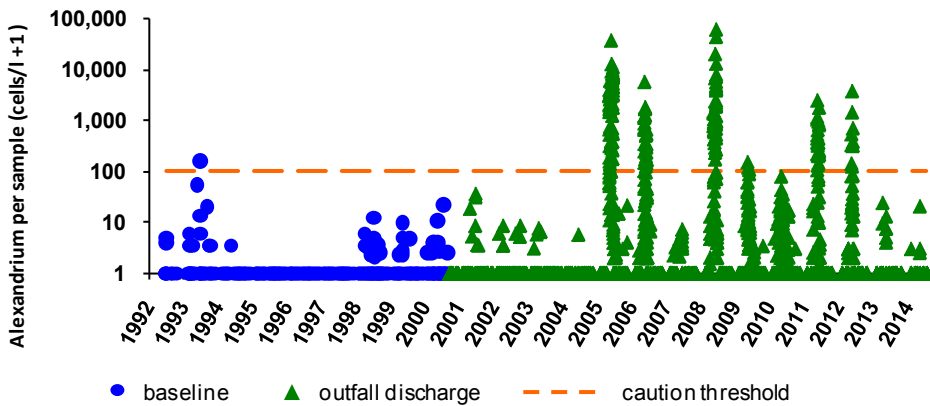
Note logarithmic scale. Years with no data point had zero summer average *Phaeocystis*.

**ALEXANDRIUM**

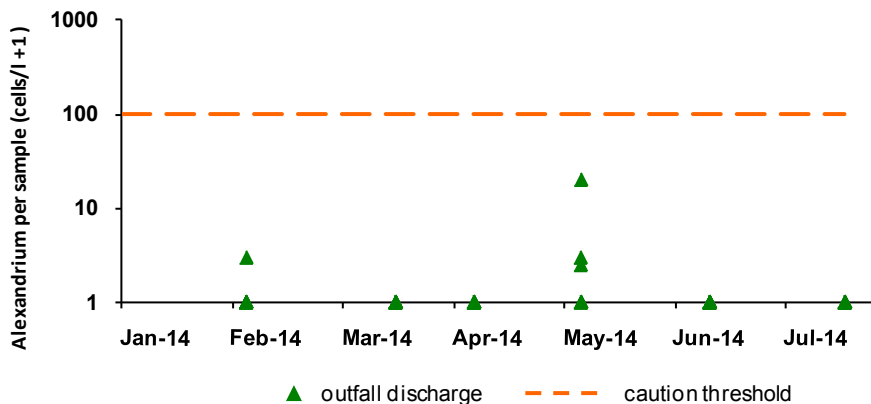
The [nuisance algae](#) *Alexandrium* (“red tide”) can cause paralytic shellfish poisoning (PSP) in Massachusetts Bay. MWRA measures *Alexandrium* abundance in its monitoring program, and also checks state fisheries agency observations of shellfish PSP toxicity to keep track of the course of Gulf of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

As reported previously, in 2014 *Alexandrium* has been almost entirely absent from Massachusetts Bay. Final data have been received for surveys in May through July. In the May-June time period when *Alexandrium* has historically bloomed in Massachusetts Bay, in 2014 the levels remained very low. The figure below shows *Alexandrium* in the nearfield since 1992. The bottom figure shows the same data but includes just February through July 2014; during this period there were seven routine surveys. Note logarithmic scale for graphs.

*Alexandrium* abundances from MWRA’s water quality monitoring surveys are consistent with the results of regional monitoring in 2014 for the paralytic shellfish poisoning (PSP) toxicity that *Alexandrium* causes. Shellfish beds in western Maine, coastal New Hampshire, and in Massachusetts north of Gloucester all developed toxicity in late May and early June, and were closed by state regulators. Moderately high counts of *Alexandrium* were observed in coastal and offshore waters north of Cape Ann at about the same time. Detectable PSP toxicity did not extend south of Cape Ann (Gloucester) into Massachusetts Bay, though, consistent with cell counts from MWRA’s monitoring. By late June, toxicity and cell counts were declining in North Shore shellfish and water samples.



February-July results for <i>Alexandrium</i> per-sample abundance (cells/liter)	
Caution threshold	100
early summer 2014	20*
* maximum of DNA-probe samples collected between May 2014 and July 2014.	

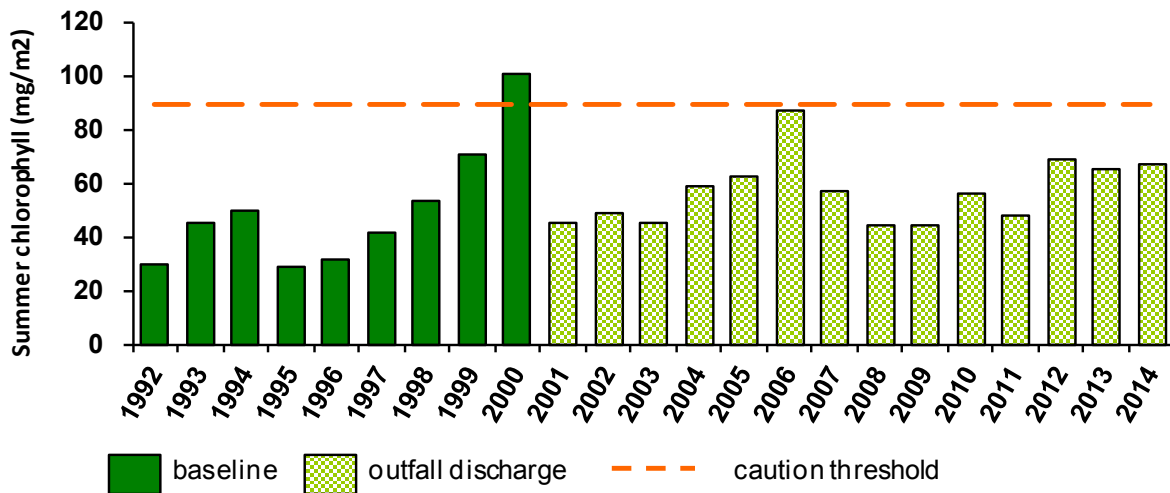


## CHLOROPHYLL May-August 2014

There were no [chlorophyll threshold](#) exceedances in this period. The nearfield mean areal average chlorophyll in summer 2014 (May-August) was 68 mg/m<sup>2</sup>, well below the caution level threshold for summer of 89 mg/m<sup>2</sup>. The summer 2014 value is similar to several previous baseline and post-diversion years.

The figure compares chlorophyll data for summer 2014 (May-August), which included four surveys, to the corresponding threshold. The graph includes data since the start of the monitoring program in 1992.

### Summer



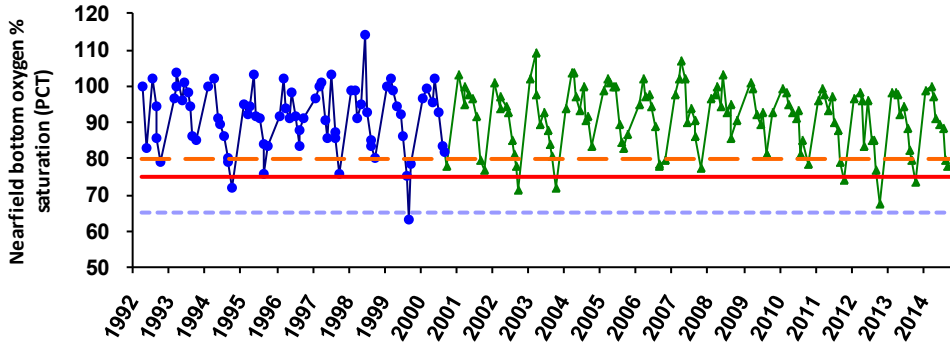
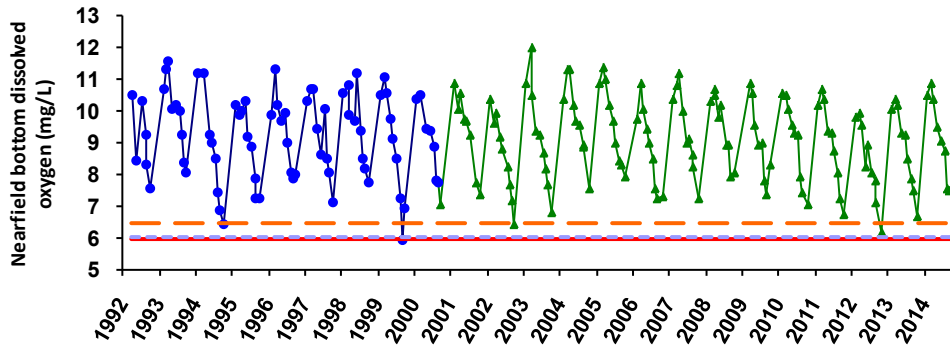
## DISSOLVED OXYGEN – July - September 2014

Measurements of dissolved oxygen (DO) concentration in July-September 2014 did not fall below background levels and thus did not exceed thresholds.

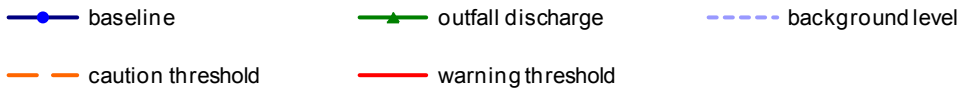
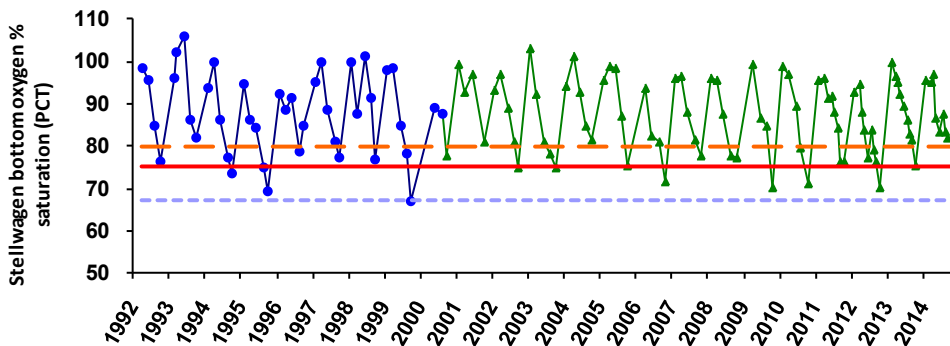
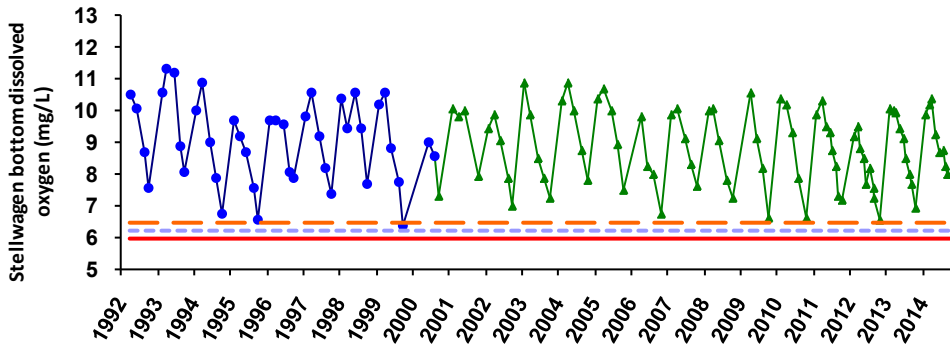
The current reporting period for [dissolved oxygen thresholds](#) is July-September 2014. During this period there were three surveys. Oxygen levels were similar to those seen in most baseline years. The graphs below show the natural annual fluctuation of DO and percent saturation, which is typically lowest in early autumn. The 1992-2010 data are from the reduced set of sampling stations included in the modified study 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. The previous reports are at <http://www.mwra.state.ma.us/harbor/html/archive.htm#cpqamb>.

Nearfield oxygen levels in September 2014 were similar to those seen in several baseline years.

## NEARFIELD



## STELLWAGEN BASIN



## FLOUNDER LIVER DISEASE - 2014

The prevalence of liver disease at the outfall site in 2014 was 10%, lower than any of the baseline years, and did not exceed the threshold. Flounder are sampled annually in April.

The prevalence of in winter flounder is a useful measure of the effects of pollution. The flounder liver disease threshold value (dashed line) is based on data from Boston Harbor during the baseline monitoring period (1991-2000). In the harbor, flounder liver disease rates were historically quite high but dropped considerably during the late 1980s. Since Massachusetts Bay monitoring began, prevalence of early-stage liver disease near the new outfall has been much lower than the threshold.

