

Contingency Plan Report
Second Quarter 2016

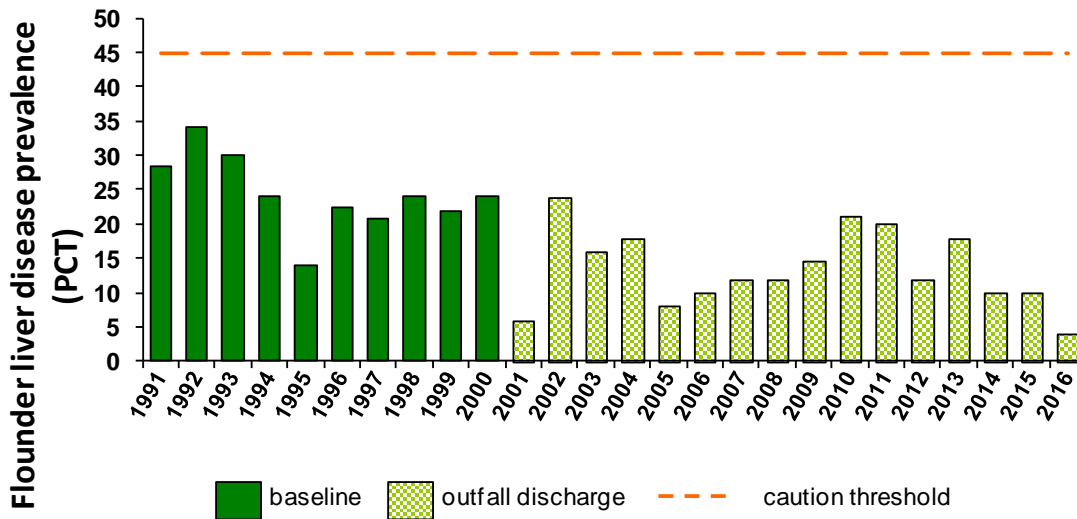
Ambient Monitoring

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** for Contingency Plan thresholds **that became available April through June 2016**. Results in this report include liver disease in flounder, winter/spring nuisance algae abundances, and winter/spring (February through April) areal chlorophyll. 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/contingency.htm>.

FLOUNDER LIVER DISEASE 2016

The prevalence of liver disease at the outfall site in 2016 was 4%, the lowest we have seen in any year, and did not exceed the threshold. Flounder are sampled annually in April.

The prevalence of centro-tubular hydropic vacuolation, a condition considered a precursor to liver tumors caused by exposure to contaminants 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 baseline monitoring. Since Massachusetts Bay monitoring began, prevalence of early-stage liver disease near the new outfall has been much lower than the threshold.



NUISANCE ALGAE – Winter/Spring 2016

PHAEOCYSTIS and PSEUDO-NITZSCHIA

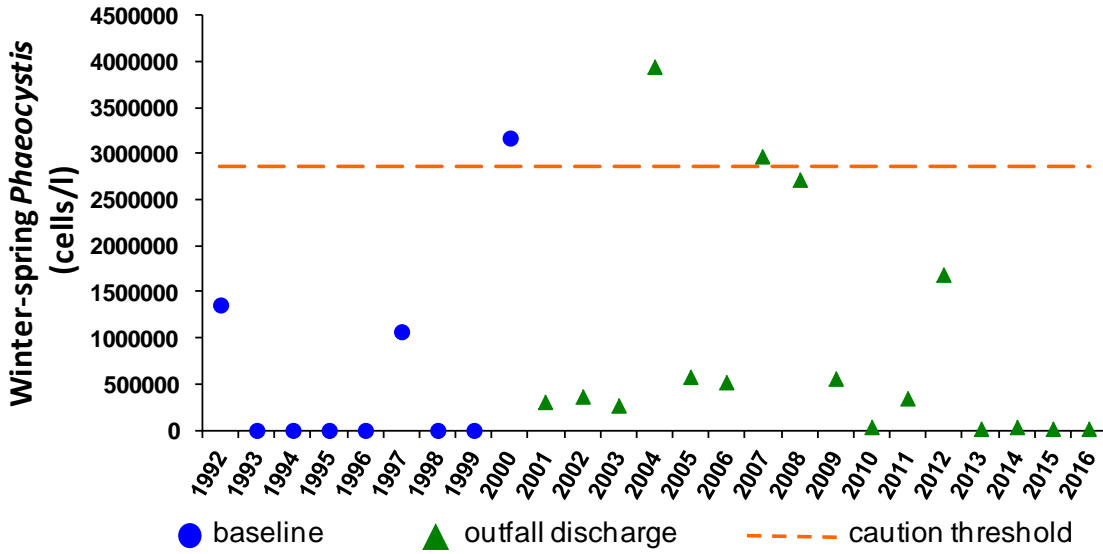
For both *Phaeocystis* and *Pseudo-nitzschia* [nuisance algae](#) species, mean seasonal abundances are compared against threshold values derived from the 95th percentile of seasonal baseline means. This report compares autumn 2016 seasonal means from surveys done in February, March, and April against threshold values.

Mean abundance of the nuisance alga *Phaeocystis* for samples collected in winter/spring 2016 was 6,790 cells per Liter, well below the threshold of over 2 million cells per liter so there was no threshold exceedance for this species. This is the second lowest abundance we have observed since the outfall start-up and is not distinguishable from zero (see plot) relative to the values we have observed in the past winter/spring seasons.

Pseudo-nitzschia was not observed in any samples collected in winter/spring 2016, so the abundance of this species did not exceed the threshold value of 27,500 cells per liter.

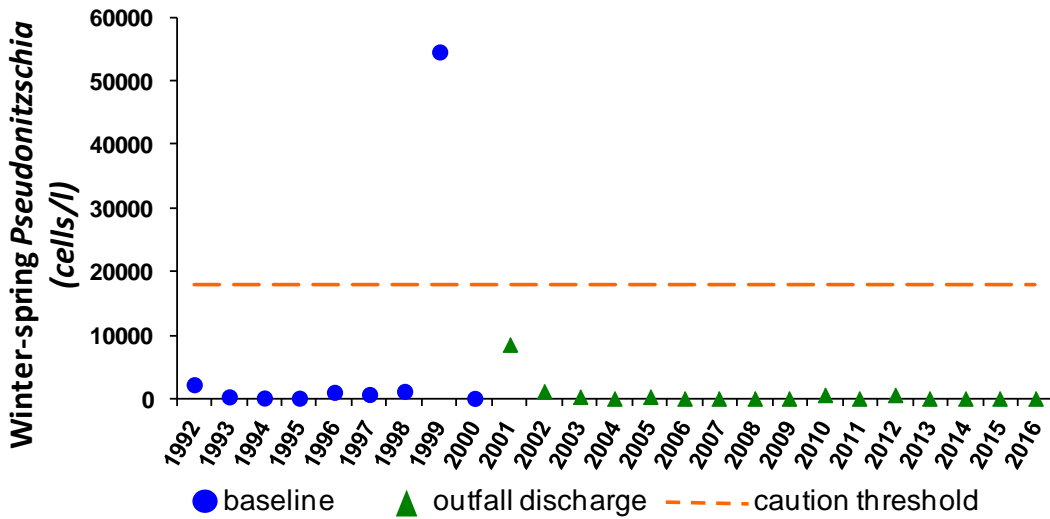
In the following figures, we compare *Phaeocystis* and *Pseudo-nitzschia* data to the nuisance algae thresholds for the winter/spring seasonal threshold. The graphs include data since the start of the monitoring program in 1992; however, the seasonal average values for 1992-2010 are calculated using a subset of all results reflecting the modified design that began in 2011, i.e. three surveys in February through April. This enables us to better compare the threshold results across years.

Phaeocystis – winter/spring 2016



winter/spring <i>Phaeocystis</i> mean abundance (cells/liter)	
Caution threshold	2,860,000
2016 seasonal mean	6,790

Pseudo-nitzschia – winter/spring 2016



winter/spring <i>Pseudo-nitzschia</i> mean abundance (cells/liter)	
Caution threshold	17,900
2016 seasonal mean	0

ALEXANDRIUM

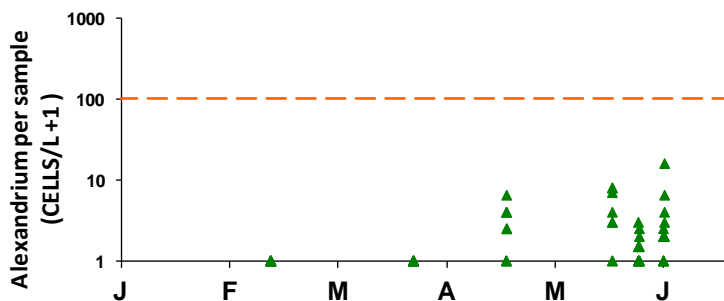
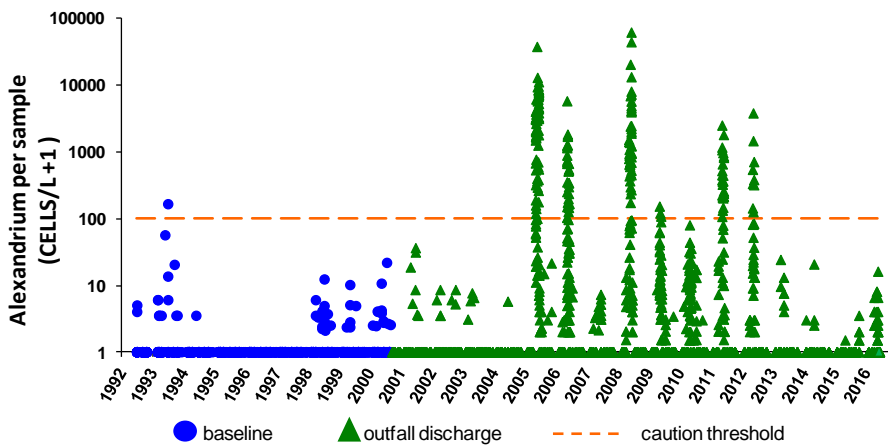
The nuisance algae *Alexandrium fundyense* can cause paralytic shellfish poisoning (“red tide”) in Massachusetts Bay. MWRA measures *Alexandrium* abundance in its monitoring program, and also checks state fisheries agency observations of shellfish PSP toxicity to keep track of the course of Gulf of Maine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

Preliminary data from the regularly scheduled survey conducted on May 18 found 241 cells per liter in northern Massachusetts Bay at far-field station F22. This triggered special weekly surveys of *Alexandrium* on May 25 and June 1, which are done when *Alexandrium* is found in any sample (near-field or far-field) in excess of 100 cells per liter. The special surveys were ended when results showed that abundances of this species dropped to near-zero (maximum of 15 cells per liter at one near-field station) throughout Mass. Bay by June 1. There was no exceedance of the red tide Contingency Plan threshold throughout this period.

Results from Massachusetts state shellfish monitoring were consistent with our *Alexandrium* cell counts. No paralytic shellfish poisoning toxicity has yet been observed from mussels at stations in Massachusetts Bay or Cape Cod Bay.

In the figures below, we compare *Alexandrium* data to the threshold for each sample through June 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. May 18 and June 21 data are preliminary. Draft data from June 21 indicate that *Alexandrium* was absent from Mass. Bay.



<i>Alexandrium</i> per-sample abundance (cells/liter)	
Caution threshold	100
Winter/spring 2016	15*
* maximum of all near-field samples collected February-June , 2016	

WINTER/SPRING 2016 CHLOROPHYLL

There was no [chlorophyll threshold](#) exceedance for winter/spring 2016. The nearfield mean areal average chlorophyll in winter/spring 2016 was 89 mg/m², well below the caution level threshold for winter/spring of 199 mg/m² and in the range of other years in the pre-discharge period.

The figure below compares chlorophyll data for winter/spring 2016 (February through April), which included three surveys. The graph includes data since the start of the monitoring program in 1992; however, the seasonal average values for 1992-2010 are calculated using a subset of all results reflecting the modified design that began in 2011, *i.e.* three winter/spring surveys. This enables us to better compare the threshold results across years.

