

## Contingency Plan Quarterly Report on Ambient Monitoring Results Fourth Quarter 2018

MWRA gathers data near the outfall discharge location in Massachusetts Bay on various thresholds in the [Contingency Plan](#) required by its Deer Island Treatment Plant (DITP) NPDES discharge permit. This report shows ambient monitoring results for Contingency Plan thresholds that became available in October through December 2018. None of these new results exceed Contingency Plan thresholds. Included in this report are results for flounder tissue chemistry, nuisance algae (July – October *Alexandrium* and summer and autumn *Pseudo-nitzschia*), chlorophyll (summer, autumn and annual), October bottom water dissolved oxygen and seasonal decline.

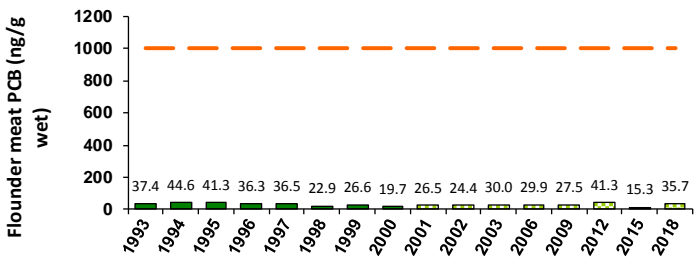
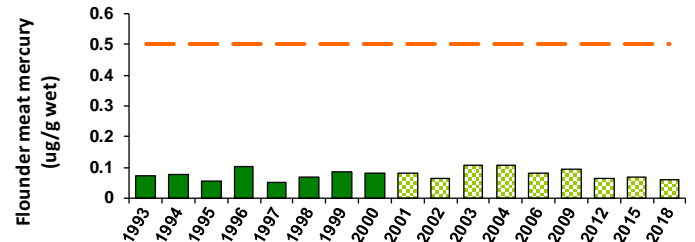
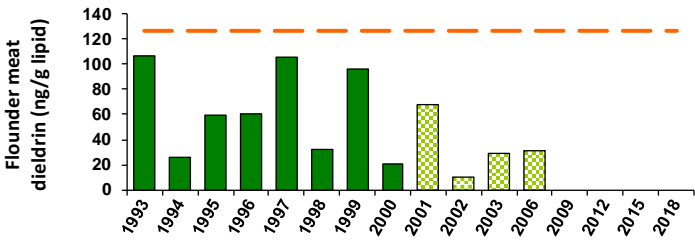
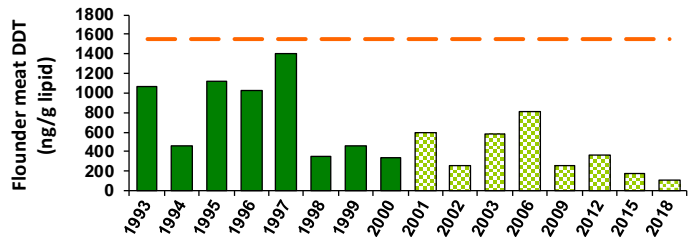
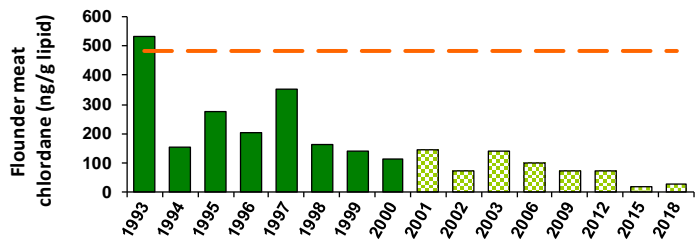
Previous Contingency Plan reports are available at:  
<http://www.mwra.state.ma.us/harbor/html/archive.htm#cpq>.

### FISH AND SHELLFISH TISSUE CHEMISTRY

Contaminants are measured in three species of seafood: flounder, lobster, and mussels. The fish tissue contamination thresholds are designed to identify unexpected effects on marine life. For mercury and PCBs in flounder, lobster, and mussels, caution and warning thresholds are set at 50% and 80% of the FDA action limits. The threshold for lead in mussels is based on EPA risk assessment of lead in drinking water. Other fish/shellfish tissue contamination thresholds are based on change from baseline conditions at the outfall site.

Data available this quarter include tissue contamination in winter flounder from the outfall site. Tissue chemistry results for lobster and mussel samples will be available by the end of next quarter.

Flounder were sampled at the outfall site late April and early May 2018. Flounder fillet mercury and PCB contamination remained low and similar to other years. DDTs were lower in 2018 than measured in all previous years. Chlordane was lower than all years except for 2015. Dieldrin was not detected again in 2018 as was the case for the last three years in which flounder tissue chemistry was analyzed (2009, 2012 and 2015). There were no exceedances of flounder tissue contamination thresholds in 2018.



■ baseline    ▨ outfall discharge    - - - caution threshold

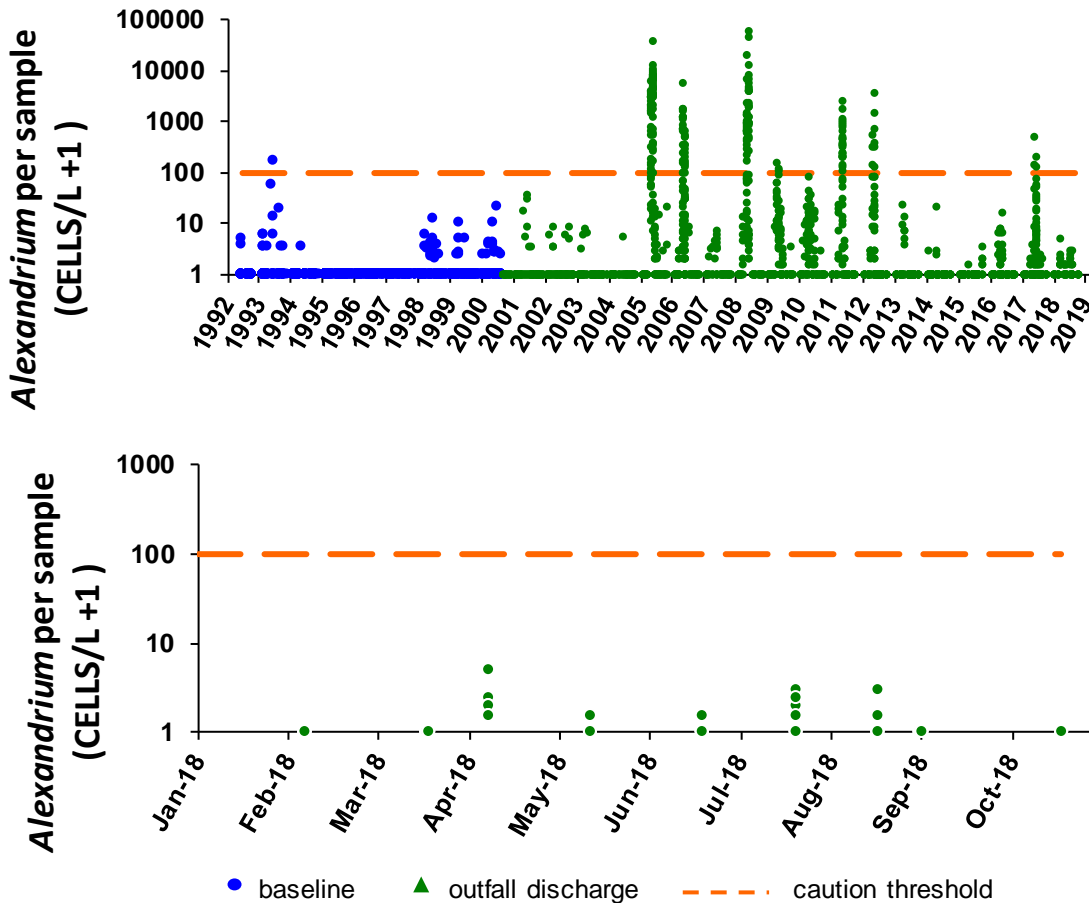
### NUISANCE ALGAE

Secondary treatment increases the proportion of effluent nitrogen that can be readily taken up by marine algae. The Contingency Plan monitoring addresses blooms of nuisance algal species that have the potential to affect human health or aesthetics.

#### Alexandrium – August-October 2018

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

*Alexandrium* abundances remained low and below threshold values during August through October 2018. No *Alexandrium* cells were detected in any samples from the October survey. August through September results are unchanged from those reported as preliminary in the Q3 report.

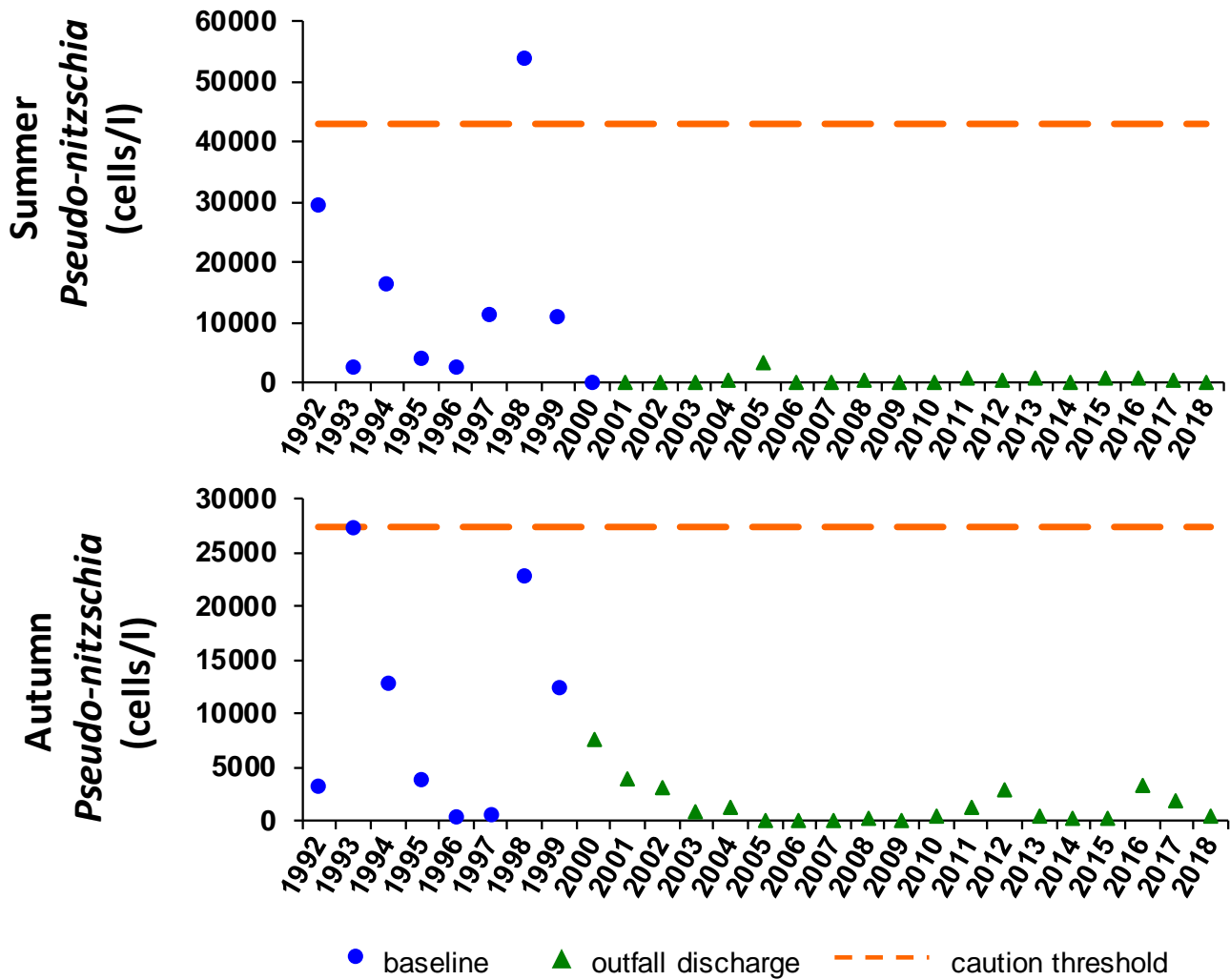


**Pseudo-nitzschia – summer and autumn 2018**

For *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 summer (May-August) and autumn (September-October) 2018 seasonal means against seasonal threshold values.

During summer and autumn 2018, *Pseudo-nitzschia* was observed at low abundances that were well below the Caution Level thresholds of 43,100 and 27,500, respectively.

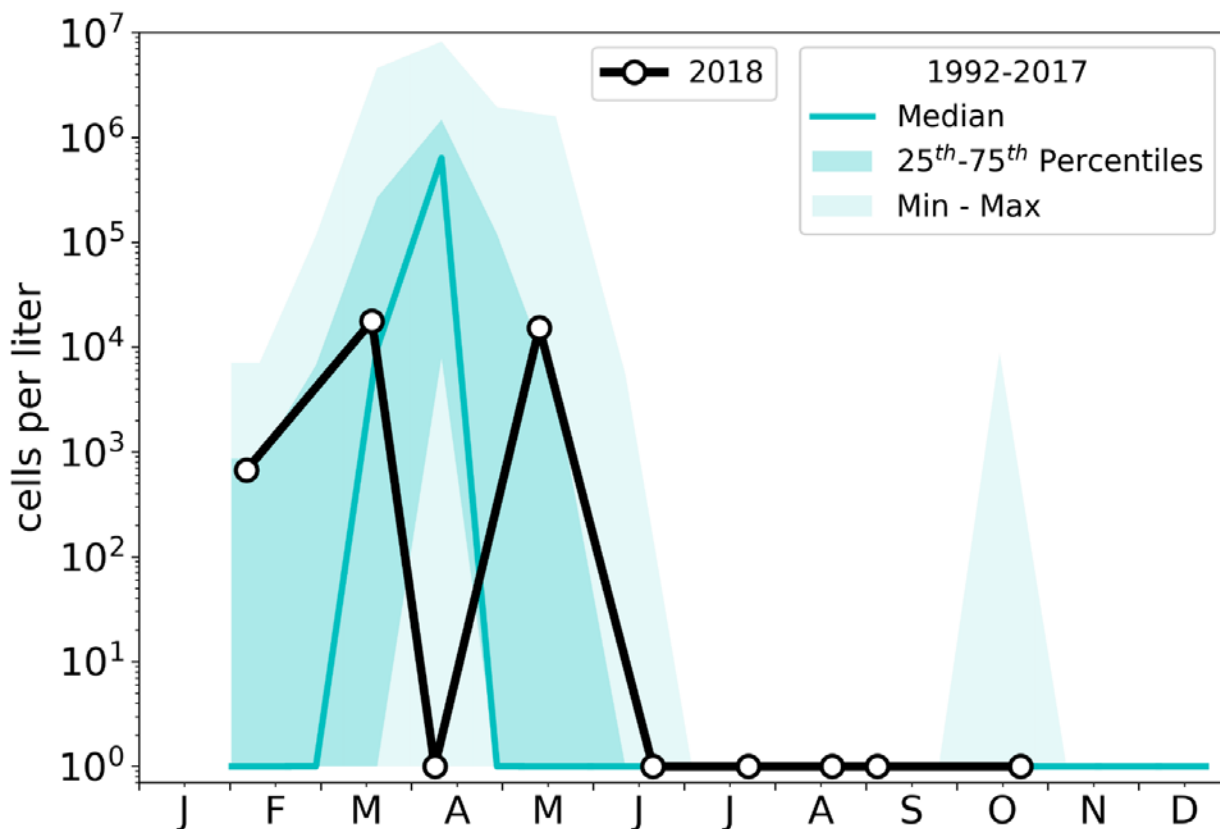
In the figure below, we compare *Pseudo-nitzschia* data to the nuisance algae thresholds for summer and autumn seasonal Caution Level thresholds. The graphs include data since the start of the monitoring program in 1992.



**Phaeocystis – Late Summer through Autumn (August - October) 2018**

In February 2017, EPA approved changes in the Contingency Plan to remove the threshold for the seasonal abundance of the nuisance alga *Phaeocystis pouchetii* in the nearfield water column. During bloom conditions, *Phaeocystis* can form large, gelatinous colonies, which may accumulate as foam as they disintegrate on beaches. Evaluations of prior threshold exceedances for this species have indicated that they resulted from natural fluctuations in Massachusetts Bay, do not represent degradation, did not result from MWRA’s discharge, and have not occurred in concentrations that would pose problems for recreation. MWRA agreed to continue to report each quarter on nearfield survey mean abundances of *Phaeocystis pouchetii* compared to its historical seasonal pattern. This quarter, results for August through October 2018 became available.

The figures below shows the 2018 survey mean *Phaeocystis* results against the seasonal background for all prior years since 1992. Due to reductions in the number of surveys conducted each year, the historical seasonal pattern encompasses more time-points than shown for the current year. Both the timing and magnitude of survey mean *Phaeocystis* abundance for August through October 2018 was within the range of the historical seasonal pattern.



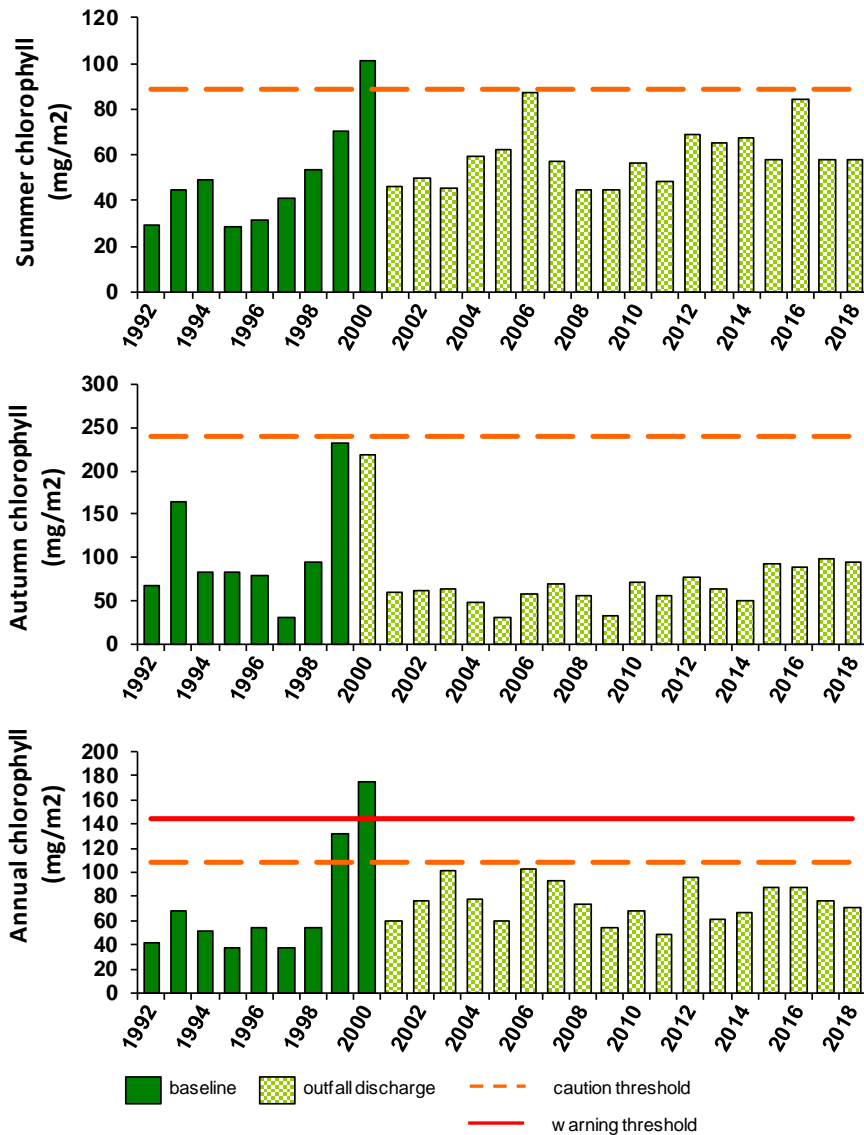
## CHLOROPHYLL

Chlorophyll, a photosynthetic chemical in all green plants, is the most common measure of algal biomass, the total amount of algae present in the water. Since algal blooms are sudden increases in algal biomass, chlorophyll is a good measure of algal blooms and thus eutrophication.

### **Chlorophyll Biomass Summer, Autumn and Annual 2018**

There were no [chlorophyll threshold](#) exceedances of summer, autumn or annual thresholds in 2018. The nearfield mean areal average chlorophyll for each of these time periods in 2018 were all well below their respective caution and warning thresholds. Each of these means were within the range of previous years, both in the baseline (pre-discharge) and discharge years.

The figure below compares chlorophyll data for winter/spring 2018 (February through April), which included three surveys. The graphs include data since the start of the monitoring program in 1992.



**DISSOLVED OXYGEN (DO) – October 2018 concentration and June-October Depletion Rate**

Dissolved oxygen (DO) thresholds are tested on near-bottom water measurements from June-October when lower solubility due to warmer temperatures has the potential to reduce oxygen concentration. We compare survey mean dissolved oxygen concentration, percent saturation, and the seasonal rate of oxygen decline against threshold values. There were no threshold exceedances for these thresholds for the period covered by this report.

The current reporting period for [dissolved oxygen thresholds](#) is June-October. Last quarter, we reported oxygen concentration through September. There was one regular water column survey in October, which is the final survey included in the 2018 seasonal oxygen decline measurements.

The first set of 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. Bottom-water oxygen concentration in both the nearfield and Stellwagen Basin remained above caution levels and well above background levels. October percent saturation levels were near, but above warning thresholds and well above background levels, thus there were no exceedances for either dissolved concentration or percent saturation during this period.

The second graph reports the slope of the June-October decline in nearfield, bottom-water dissolved oxygen concentrations computed from survey means. In 2018, the slope of the bottom water decline was consistent with prior, post-discharge years, and was below both caution and warning levels. Thus, there was no exceedance of the threshold for seasonal, bottom-water decline.



