

Contingency Plan Quarterly Report on Ambient Monitoring Results Second Quarter 2019

MWRA gathers data near the outfall discharge location in Massachusetts Bay on various thresholds in the Contingency Plan related to its Deer Island Treatment Plant (DITP) NPDES discharge permit. This report shows ambient monitoring results for Contingency Plan thresholds that became available in April through June 2019. Previous Contingency Plan reports are available at <http://www.mwra.state.ma.us/harbor/html/contingency.htm>.

Results in this report include winter/spring (February through April) 2019 nuisance algae abundances, additional May and June monitoring results for *Alexandrium*, and winter/spring areal chlorophyll. There is one Contingency Plan threshold exceedance in this report — preliminary results from May and June *Alexandrium* samples triggered a Caution Level exceedance for this toxic algae species.

NUISANCE ALGAE

***ALEXANDRIUM* - Winter/Spring (February – April) 2019 and additional May & June special study**

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

There are no indications the 2019 exceedance is related to the DITP outfall discharge. The results available so far indicate that a portion of the coastal population of *Alexandrium* north of Cape Ann was transported into Massachusetts Bay by winds and currents, leading to the result observed. In early May 2019, there was an *Alexandrium* bloom along the coast of Maine, New Hampshire, and Massachusetts. Preliminary data from a routine MWRA survey on May 16 showed a measurement of 171 *Alexandrium* cells per liter in one sample collected near Cape Ann, triggering weekly surveys targeting *Alexandrium* under MWRA’s *Alexandrium* Rapid Response Study Survey Plan <http://www.mwra.state.ma.us/harbor/enquad/pdf/2013-06.pdf>.

The first such survey was conducted on May 22. One of the twelve samples collected from nearfield stations had an *Alexandrium* abundance of 413 cells per liter (Table 1) at 10 meters deep. This result exceeded the Contingency Plan threshold of 100 cells per liter, requiring notification under the Contingency Plan (see notice <http://www.mwra.com/harbor/pdf/20190531amx.pdf>).

In the figures below, we compare nearfield *Alexandrium* data to the threshold for each sample through June 2019. All data from May onward have passed initial quality control (QC) checks but are considered preliminary until all QC procedures are complete. 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 2019 only, including five routine surveys and five special surveys through the end of June. Note logarithmic scale for each graph.

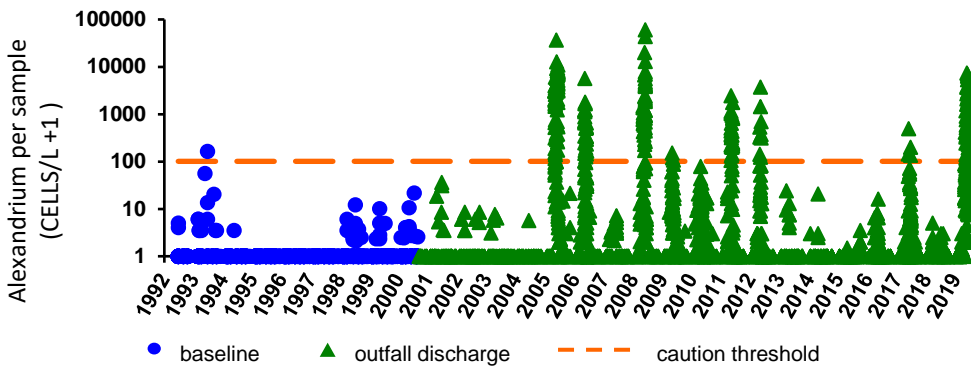


Figure 1. *Alexandrium* counts per sample (1992 - 2019)

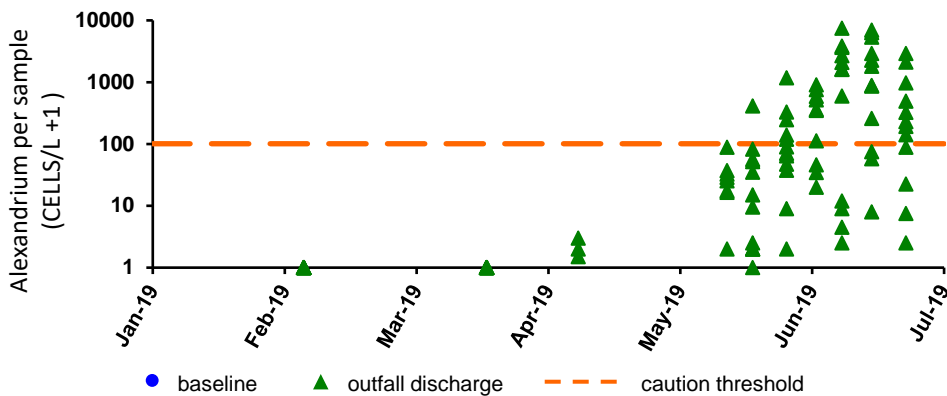


Figure 2. *Alexandrium* counts per sample (February - June 2019)

Alexandrium per-sample abundance (cells/liter)

Caution threshold	100
Winter/spring 2019	7442*
* maximum of all nearfield samples collected February-June, 2019	

Draft data from these weekly special surveys and from MWRA’s regularly scheduled water quality monitoring survey on June 6 document that the bloom has grown in both spatial extent and in intensity since it was identified, and has not abated as of the most recent draft data available (June 27). During the May 16 and 22 surveys, counts higher than 100 cells per liter were observed only at offshore stations. As the bloom has progressed, high counts have been observed from Cape Ann in the north to offshore waters in the Stellwagen Bank National Marine Sanctuary to the east, to the mouth of Boston Harbor to off Plymouth to the south, including at nearfield stations in the vicinity of MWRA’s offshore outfall. Maximum *Alexandrium* counts increased to over 10,000 cells/L in some farfield samples on June 19 and 27.

In response to the *Alexandrium* bloom and the paralytic shellfish poisoning toxicity associated with it, during the week of June 18, Massachusetts Division of Marine Fisheries closed shellfish growing areas North of Cape Ann and in all south shore coastal waters due to the potential for toxicity in these areas. Researchers from National Oceanographic and Atmospheric Administration (NOAA) and Woods Hole Oceanographic Institution (WHOI) predicted a small, spatially limited red tide for the Gulf of Maine in 2019 (<https://coastalscience.noaa.gov/news/2019-gome-red-tide-forecast/>). Results available to date document that the 2019 bloom in Massachusetts Bay is stronger than was projected. Monitoring of the bloom will continue until the measured *Alexandrium* abundance decreases below 100 cells/L.

PSEUDO-NITZSCHIA – Winter/Spring (February – April) 2019

There were no *Pseudo-nitzschia* threshold exceedances for winter/spring 2019. For *Pseudo-nitzschia* nuisance algae species, the Caution Level threshold values were derived from the 95th percentile of seasonal baseline means. Seasonal mean abundances at nearfield stations are compared against threshold values.

During Winter/Spring 2019, *Pseudo-nitzschia* was only observed in one sample from nearfield stations, with abundance of 439 cells per liter. The mean seasonal abundance was well below the Caution Level threshold of 17,900 cells per liter.

In the figure below, we display the *Pseudo-nitzschia* Caution Level threshold for Winter/Spring season and the mean abundance data for the season from since the start of the monitoring program in 1992 to present.

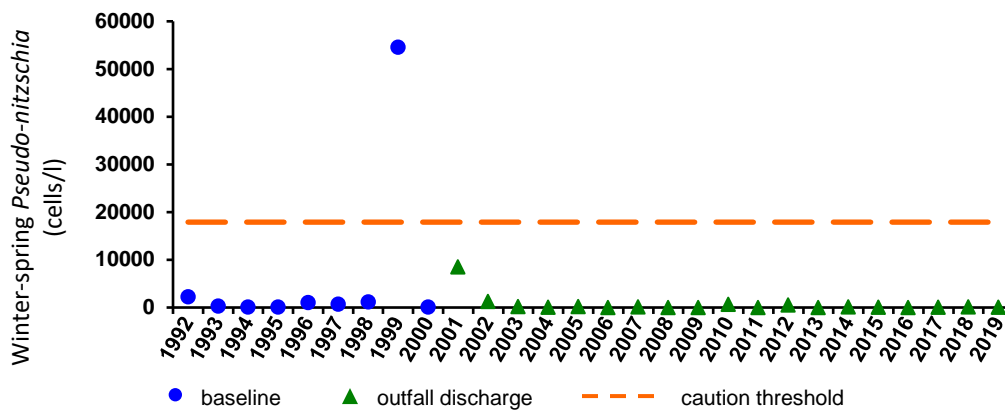


Figure 3. Seasonal mean *Pseudo-nitzschia* abundance for Winter/Spring (1992 - 2019)

PHAEOCYSTIS – Winter/Spring (February - April) 2019

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, were not a result of 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 from February to April 2019 became available.

The figure below shows the 2019 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 from February to April 2019 was within the range of the historical seasonal pattern.

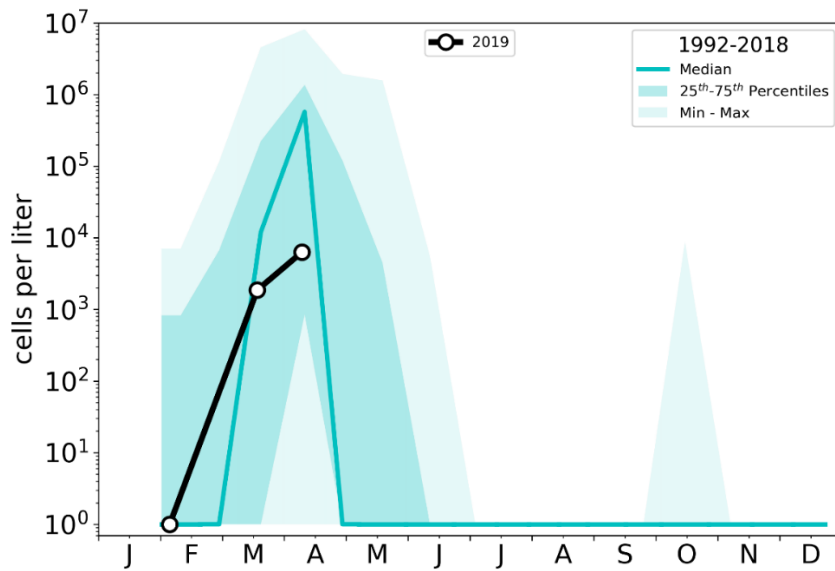


Figure 4. Mean *Phaeocystis* abundance per survey

CHLOROPHYLL - Winter/Spring (February – April) 2019

There were no [chlorophyll threshold](#) exceedances for winter/spring 2019. The nearfield mean areal average chlorophyll in winter/spring 2019 was 112 mg/m², well below the Caution Level threshold for winter/spring of 199 mg/m² and in the range of other years in the baseline (pre-discharge) period.

The figure below compares chlorophyll data for winter/spring 2019 (February through April), which included three surveys. The graph includes data since the start of the monitoring program in 1992.

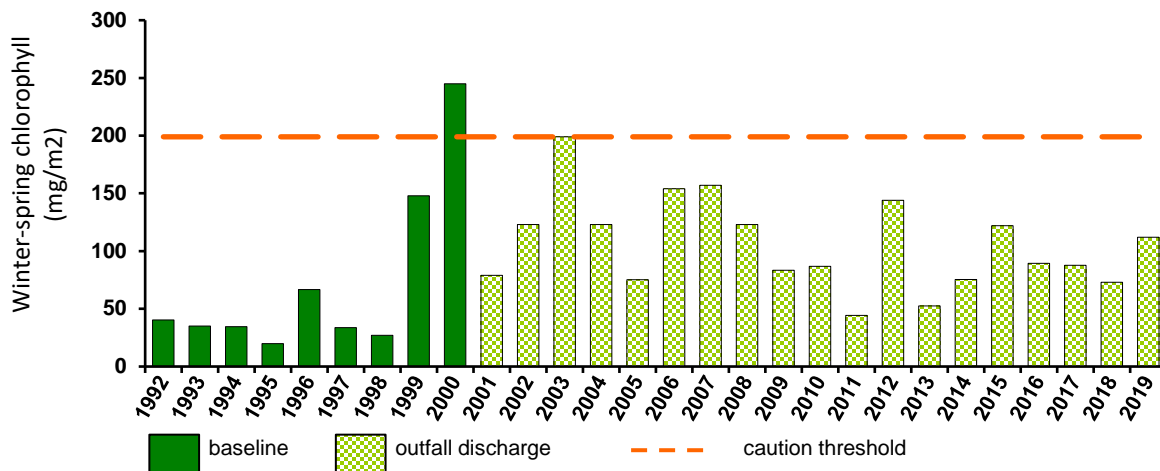


Figure 5. winter/spring mean areal chlorophyll concentrations (1992-2019)