

Contingency Plan Quarterly Report on Ambient Monitoring Results Second Quarter 2020

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 2020. Previous Contingency Plan reports are available at <http://www.mwra.state.ma.us/harbor/html/contingency.htm>.

This report includes nuisance algae abundances and areal chlorophyll results collected during winter/spring (February – April) 2020, and additional May and June monitoring results for *Alexandrium*. Three monthly surveys were planned from February to April for the winter/spring season. Only results from the February survey became available. Due to the COVID-19 pandemic and inclement weather, the March survey was cancelled, and the April survey was postponed to early May. There are no Contingency Plan threshold exceedances in this report.

NUISANCE ALGAE

ALEXANDRIUM – Winter/Spring (February – April) 2020 and additional May & June surveys

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.

No *Alexandrium* cells were observed in the samples collected at the stations near the outfall (“Nearfield”) from the February survey. Preliminary results from two regular surveys in May indicated that *Alexandrium* abundance were low in all stations and well below the threshold value of 100 cells per liter, with highest cell concentration of 45 cells per liter at a nearfield station and of 30 cells per liter at a station away from outfall (“Farfield”).

During regular monitoring survey conducted on June 16, preliminary results showed that there were barely any *Alexandrium* cells detected in the samples collected at nearfield stations. However, a measurement of 127 *Alexandrium* cells per liter in a sample collected off Scituate coast triggered weekly surveys targeting *Alexandrium* under MWRA’s *Alexandrium* Rapid Response Study Survey Plan (“Rapid Response Plan”) <http://www.mwra.state.ma.us/harbor/enquad/pdf/2013-06.pdf>.

The first such survey was conducted on June 25. Preliminary analysis from the survey indicated similar results to those from June 16 survey in nearfield stations, with barely any *Alexandrium* cells found from most nearfield samples and the highest count of 29 cells per liter at one station. However, measurements of 2,123 cells per liter, 134 cells per liter and 107 cells per liter were detected at 10-meter depth from three farfield stations along

the coast of the south shore. The Rapid Response Plan requires that surveys continue until all sample results are below 100 cells/liter, indicating a bloom has ended.

In the figures below, we compare nearfield *Alexandrium* data to the threshold for each sample collected through June 2020. 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 2020 only, including four regular surveys and one special survey through the end of June. Note logarithmic scale for each graph.

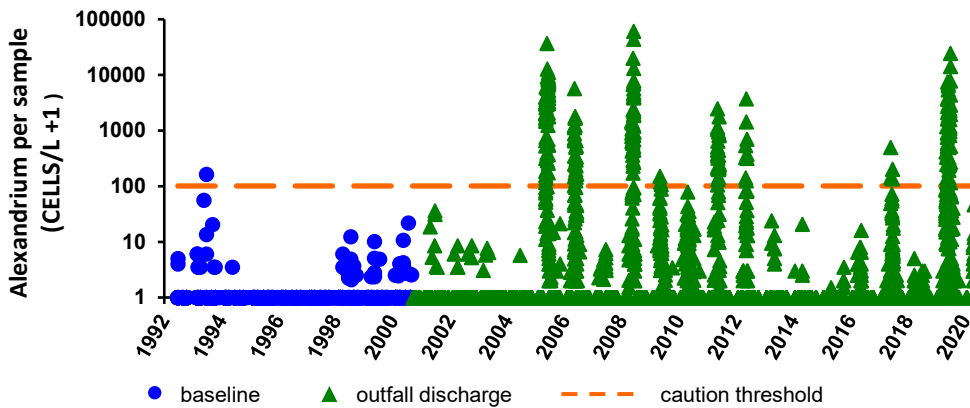
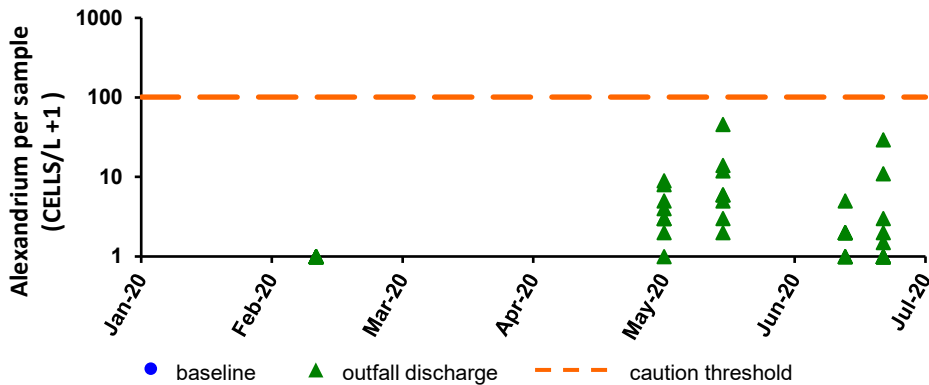


Figure 1. *Alexandrium* cell counts per sample (1992-2020)



Alexandrium per-sample abundance (cells/liter)

Caution threshold	100
February-June 2020	45*
* maximum of all nearfield samples collected February – June 2020	

Figure 2. *Alexandrium* counts per sample (February - June 2020)

PSEUDO-NITZSCHIA – Winter/Spring (February – April) 2020

For nuisance algae *Pseudo-nitzschia* species, the seasonal 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. The Caution Level threshold is 18,000 cells per liter for the winter/spring season.

During winter/spring 2020, *Pseudo-nitzschia* samples were collected from the February survey WN201. Sample results collected from February only are not representative of the seasonal pattern, hence a formal test result against the seasonal Caution Level threshold cannot be calculated.

No *Pseudo-nitzschia* cells were observed in samples collected during the February 2020 survey.

In the table and plot (Figure 3) below, we compare the nearfield mean abundance data from February survey 2020 to the historical range of the early/mid-February surveys from since year 1994, when the earliest early/mid-February survey was available since the start of the monitoring program in 1992.

***Pseudo-nitzschia* nearfield early/mid-February survey mean abundance data (1994 – 2020)**

		<i>Pseudo-nitzschia</i> (cells per liter)					
Survey	Date	2020	Range 1994 -2019				
			Minimum	Maximum	Median	25th percentile	75th percentile
WN201	11-Feb-2020	0	0	15800	48.6	0	351.75

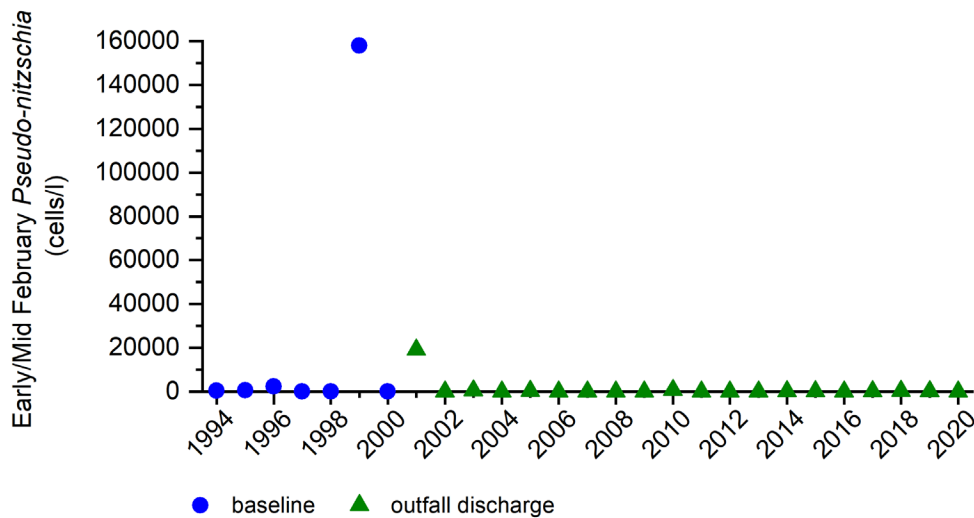


Figure 3. Nearfield early/mid-February survey mean abundance of *Pseudo-nitzschia* (1994 – 2020)

PHAEOCYSTIS – Winter/Spring (February - April) 2020

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 2019 became available.

The figure below shows the 2020 February 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 2020 was within the range of the historical seasonal pattern.

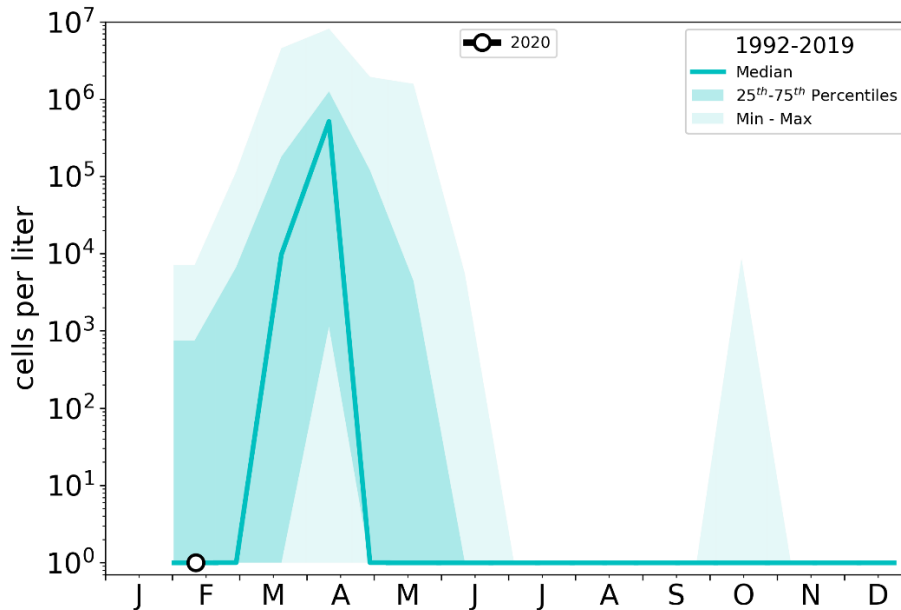


Figure 4. Mean *Phaeocystis* abundance per survey

CHLOROPHYLL - Winter/Spring (February – April) 2020

The chlorophyll seasonal 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. The Caution Level threshold is 199 mg/m² for the winter/spring season.

During winter/spring 2020, chlorophyll samples were collected from the February survey WN201. Sample results collected from February only are not representative of the seasonal pattern, hence a formal test result against the seasonal Caution Level threshold cannot be calculated.

The nearfield mean areal average chlorophyll from February 2020 survey was 20 mg/m², which is at the lower part of the range of other early/mid-February surveys in both baseline (pre-discharge) and post-discharge periods.

The table and figure (Figure 5) below compares nearfield chlorophyll data for February 2020 to the historical range of early/mid-February surveys since 1994, when the earliest early/mid-February survey was available since the start of the outfall monitoring program in 1992.

Chlorophyll nearfield early/mid-February survey mean data (1994 – 2020)

		Chlorophyll (mg/m ²)						
Survey	Date	2020	Range 1994 -2019					
WN201	11-Feb-2020	20	Minimum	Maximum	Mean	Median	25th percentile	75th percentile
			5.9	191.8	68.6	51.5	23.5	108.3

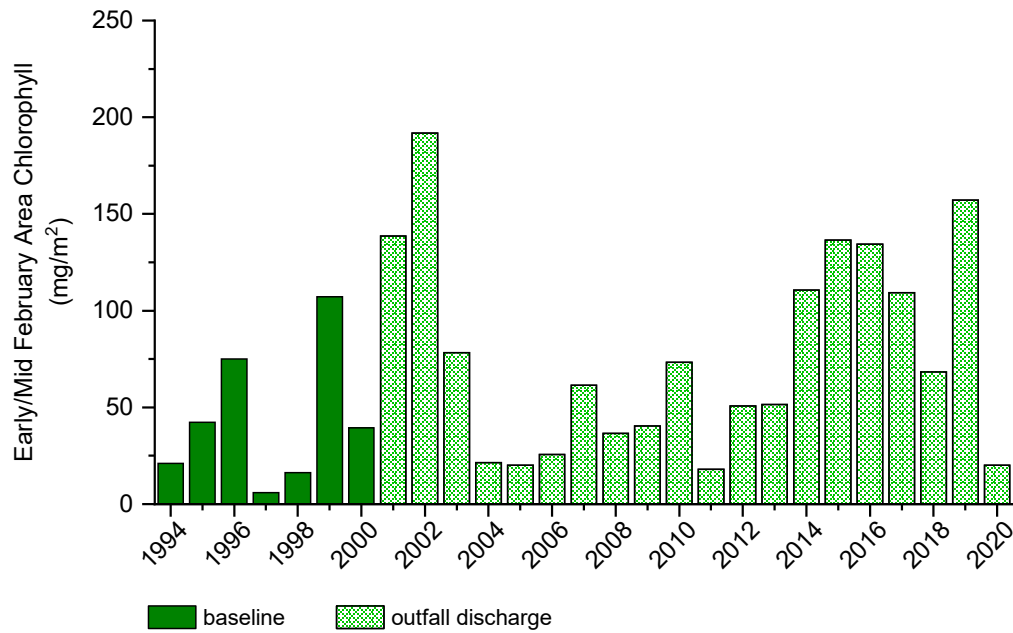


Figure 5. Nearfield early/mid-February survey mean of areal chlorophyll concentration (1994 – 2020)