

Contingency Plan Quarterly Report on Ambient Monitoring Results Second Quarter 2021

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 2021. Previous Contingency Plan reports are available at <http://www.mwra.state.ma.us/harbor/html/contingency.htm>.

Included in the report are nuisance algae abundances and areal chlorophyll results collected during winter/spring (February – April) 2021, bottom-water dissolved oxygen from June 2021, and preliminary *Alexandrium* results from May and June 2021. There is one Contingency Plan threshold exceedance in this report — preliminary results from June *Alexandrium* samples triggered a Caution Level exceedance for this toxic algae species. Water column surveys conducted in February through May were under restrictions related to COVID-19 health and safety protocols. As of the June survey these restrictions were eased enough to allow all scheduled data to be collected.

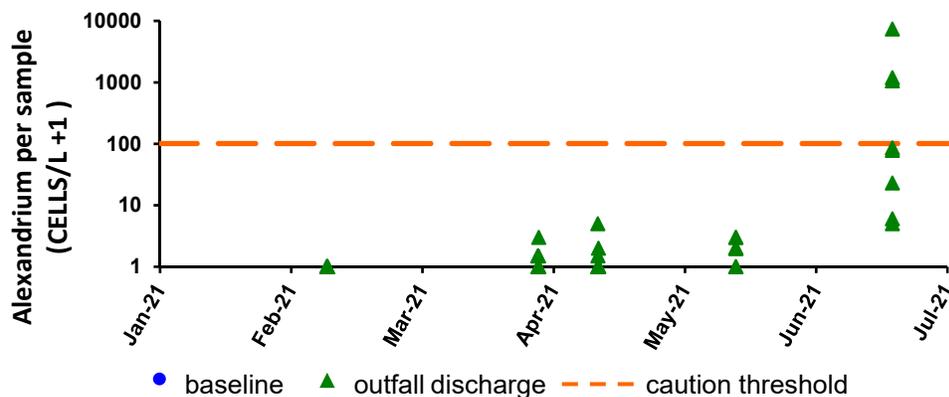
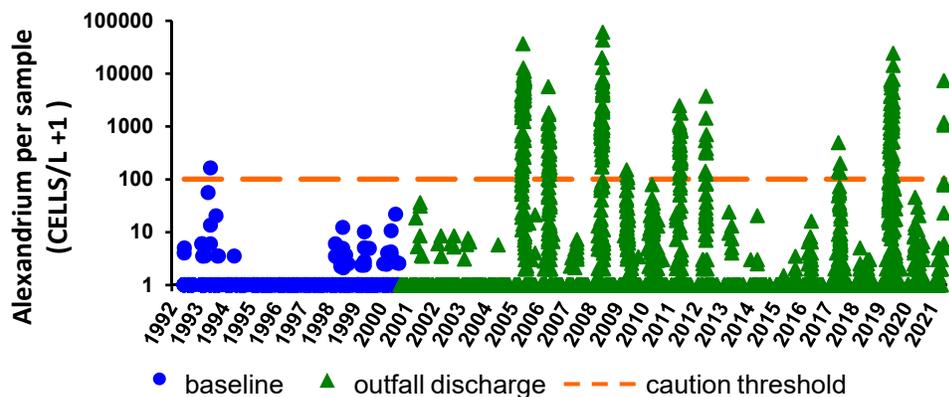
NUISANCE ALGAE

ALEXANDRIUM – February through June 2021

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 agencies and other regional monitoring programs to keep track of the course of Gulf of Maine *Alexandrium* blooms. Data from May and June are preliminary because they have not yet gone through the complete set of quality assurance checks.

During winter through spring 2021, there were very few *Alexandrium* cells detected in the samples collected in either nearfield (stations near the outfall) or farfield (reference stations). The highest abundance of 4 cells per liter was seen at one nearfield station in April and one farfield station in May, which is well below the caution threshold value of 100 cells per liter. However, preliminary results from the June 2021 survey returned values above 1,000 cells per liter at several nearfield and farfield stations. These results have triggered supplementary, rapid-response surveys, which will continue at 1-week intervals until sampling results indicate that the bloom has ended and MA-DMF monitoring shows that PSP toxicity in mussels is below closure levels. The first rapid response survey was performed on July 1.

In the figure below, we compare nearfield *Alexandrium* data to the threshold for each sample collected through April 2021. Figure 1 (top) includes data since the start of the monitoring program in 1992. To better display recent values, Figure 1 (bottom) shows data for 2021 only, including five regular water column surveys. Note logarithmic scale for each graph.



<i>Alexandrium</i> per-sample abundance (cells/liter)	
Caution threshold	100
February-June 2021	7,386*
* maximum of all nearfield samples collected February – June 2021	

Figure 1. *Alexandrium* results for February through June 2021. Top: baseline and post-discharge years. Bottom: 2021 results only.

PSEUDO-NITZSCHIA – Winter/Spring (February – April) 2021

There were no *Pseudo-nitzschia* threshold exceedances for winter/spring 2021. 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 17,900 cells per liter for the winter/spring season.

During Winter/Spring 2021, *Pseudo-nitzschia* was observed with low abundances in multiple samples from nearfield stations, with the highest abundance of 1,058 cells per liter. The mean seasonal abundance was 130 cells per liter, well below the Caution Level threshold for the season.

In Figure 3, 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.

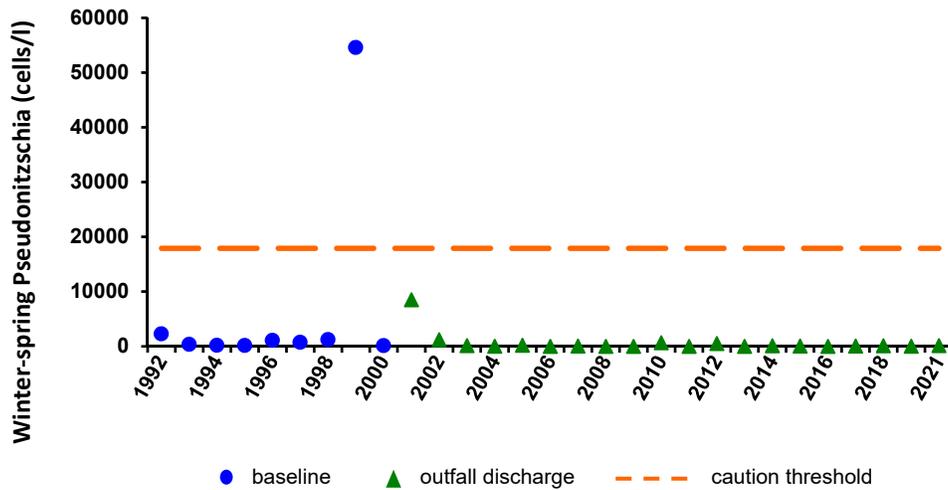


Figure 2. Seasonal mean *Pseudo-nitzschia* abundance for Winter/Spring (1992 - 2021)¹

PHAEOCYSTIS – Winter/Spring (February - April) 2021

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.

Figure 4 shows the 2021 winter/spring 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 2021 was within the range of the historical seasonal pattern.

¹Due to COVID pandemic impact on the logistics of the monitoring program in early 2020, seasonal threshold results from winter/spring 2020 are not available.

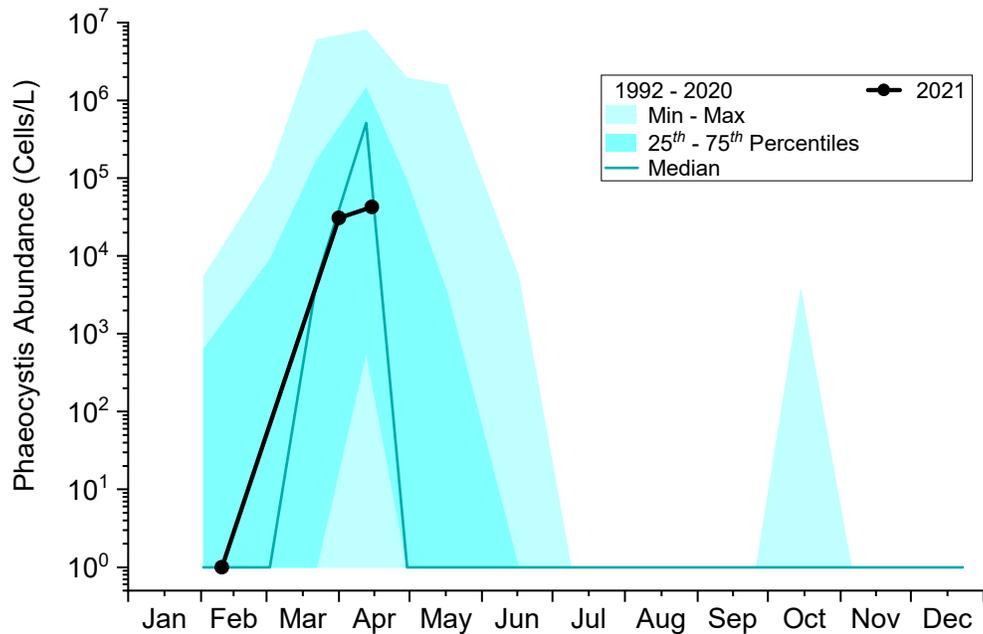


Figure 3. Mean Phaeocystis abundance per survey

CHLOROPHYLL - Winter/Spring (February – April) 2021

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.

There were no [chlorophyll threshold](#) exceedances for winter/spring 2021. The nearfield mean areal average chlorophyll for winter/spring 2021 was 62.4 mg/m², well below the Caution Level threshold of the season and in the range of other years in the baseline (pre-discharge) period.

Figure 5 compares chlorophyll data for winter/spring 2021 (February through April), which included three surveys. The graph also includes data since the start of the monitoring program in 1992.

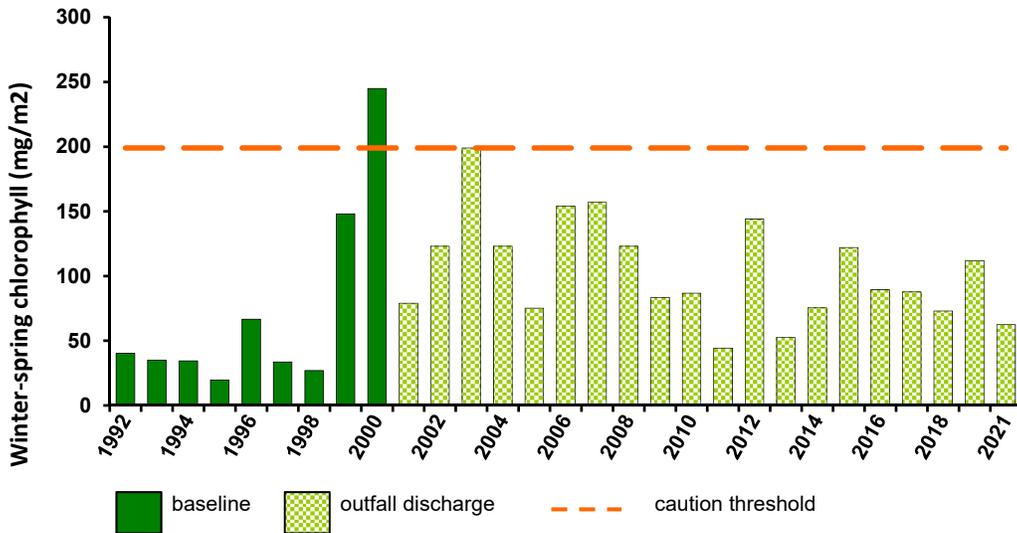


Figure 4. Winter/spring mean areal chlorophyll concentrations (1992-2021)¹

DISSOLVED OXYGEN (DO) – June 2021

The DO thresholds are tested on results collected in the bottom water from nearfield and Stellwagen Basin stations during June through October each year. During this period, warmer temperatures cause lower solubility and water column stratification can further reduce dissolved oxygen concentration and saturation in bottom water. The DO Caution and Warning Level thresholds are based on state water quality standards that were in effect during the baseline monitoring period. To reflect the level of natural fluctuation, background level thresholds were established from measurements collected during the baseline sampling between 1992 and September 2000 from the two areas.

During June 2021, results show that bottom-water oxygen percent saturation and concentration in both the nearfield and in Stellwagen Basin are within the range observed in previous years. June results were well above both background levels (measured in the areas during baseline sampling between 1992 and September 2000) and Contingency Plan threshold caution levels. Thus, there were no threshold exceedances during June (Figure 5).

¹Due to COVID pandemic impact on the logistics of the monitoring program in early 2020, seasonal threshold results from winter/spring 2020 are not available.

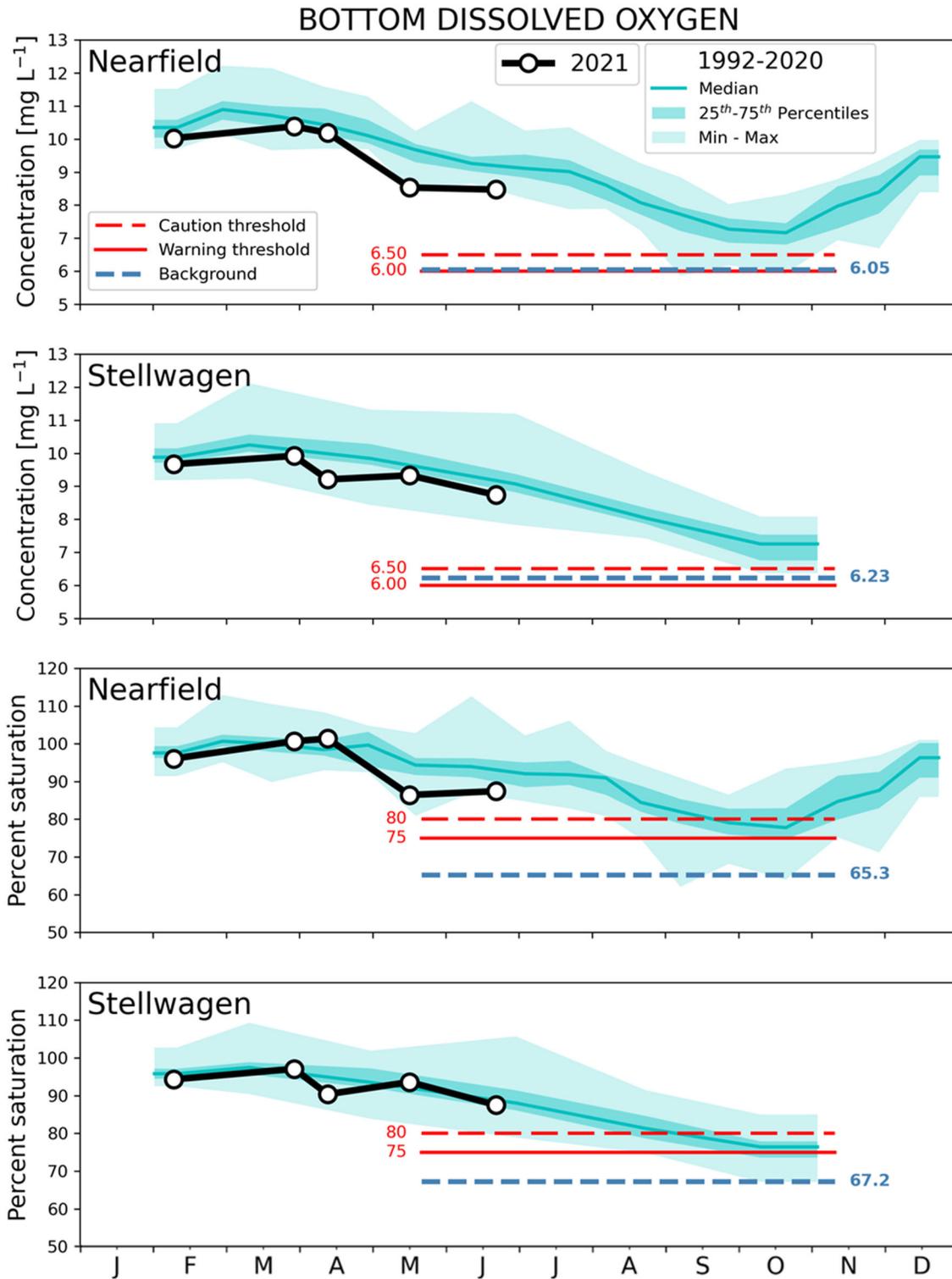


Figure 5. Bottom water dissolved oxygen concentration and percent saturation in nearfield and Stellwagen Bank stations. Horizontal caution, warning, and background lines only shown for months during which oxygen thresholds are in effect.