

Contingency Plan Quarterly Report on Ambient Monitoring Results

Second Quarter 2023

MWRA gathers data on various Contingency Plan thresholds near the outfall location in Massachusetts Bay. These thresholds are part of the Deer Island Treatment Plant (DITP) NPDES discharge permit. This report presents ambient monitoring results for Contingency Plan thresholds that became available in April through June 2023. 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) 2023, and preliminary *Alexandrium* results from May and June 2023. Thresholds are tested using samples collected each month (February-October) from 4 nearfield locations at 2 depths, surface and seasonal pycnocline, for the nuisance algae, and 5 nearfield locations for continuous measurements of chlorophyll fluorescence through the water column. Several farfield stations provide information on whether observed trends are bay-wide or limited to the MWRA outfall area. There were no Contingency Plan threshold exceedances in this report.

NUISANCE ALGAE

ALEXANDRIUM – February-June 2023

The [nuisance algae](#) *Alexandrium catenella* (“*Alexandrium*”) can cause paralytic shellfish poisoning (PSP, or “red tide”) in Massachusetts Bay. MWRA measures *Alexandrium* abundance using a molecular probe (NA1) thought to be specific to the *Alexandrium* red tide species *tamarense*, *catenella*, and *fundyense*¹.

MWRA also checks observations of shellfish PSP toxicity from state fisheries agencies and other regional monitoring programs to track *Alexandrium* blooms in Massachusetts Bay and the Gulf of Maine region.

During winter through spring 2023, there were very low abundances of *Alexandrium* detected in the samples collected in either nearfield (stations within 7.5 kilometers from the outfall) or farfield (reference stations). The highest abundance of 31.5 cells per liter was seen at one nearfield station in April, and 11 cells per liter at one farfield station in May, which are well below the caution threshold value of 100 cells per liter. No *Alexandrium* cells were observed in any samples from the survey in June. Data from May and June are preliminary because they have not yet gone through the complete set of quality assurance checks.

Only a sample with 100 or more cells of *Alexandrium* per liter from a nearfield station would constitute an exceedance under the Contingency Plan.

¹ <https://doi.org/10.1016/j.dsr2.2005.06.015>

In Figure 1 below, we compare the 2023 results of *Alexandrium* abundance in samples collected from nearfield stations through June against those from all prior years since 1992. Due to reductions in the number of surveys conducted each year, the historical results encompass more time-points than shown for the current year.

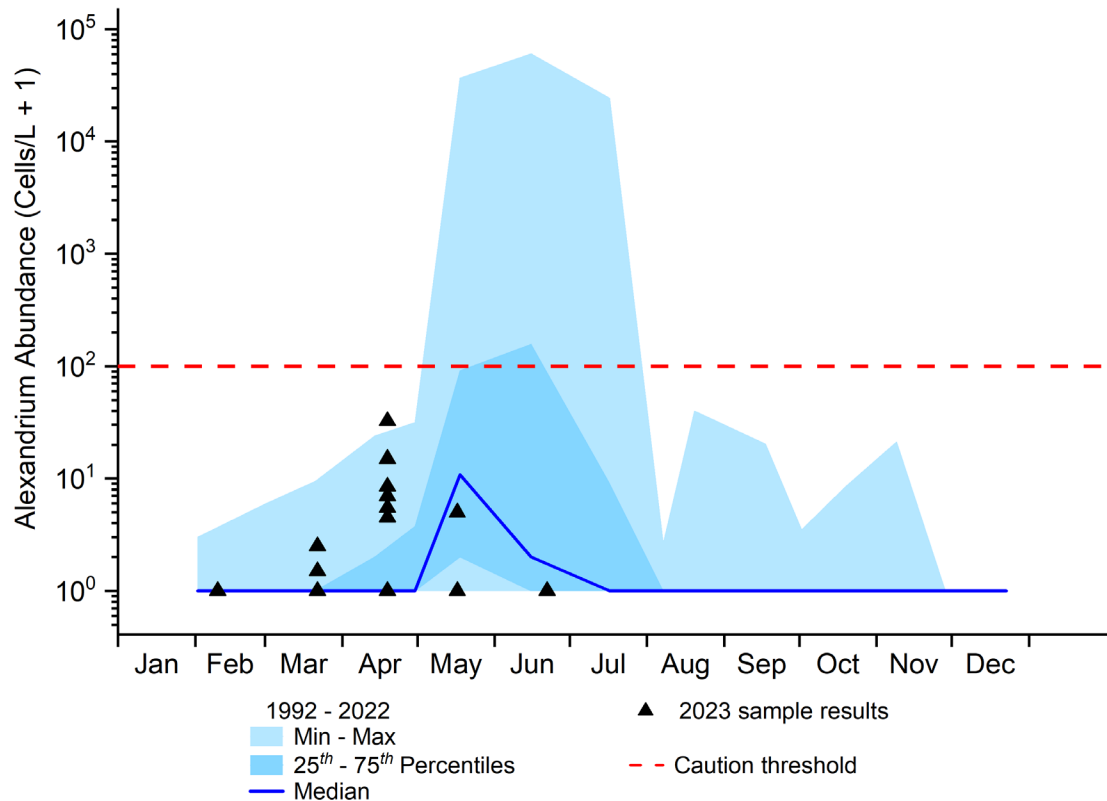


Figure 1. Cell abundance of *Alexandrium* in water samples from nearfield stations (1992 – 2023)

***PSEUDO-NITZSCHIA* – Winter/Spring (February – April) 2023**

There was no *Pseudo-nitzschia* threshold exceedance for winter/spring 2023. 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 2023, *Pseudo-nitzschia* was observed with very low abundance in one sample from a nearfield station, which contained 323 cells per liter. The mean seasonal abundance was 13 cells per liter, well below the Caution Level threshold for the season.

In Figure 2, 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. Note that no result is available for 2020 because winter/spring surveys in March and April were dropped due to Coronavirus pandemic related restrictions.

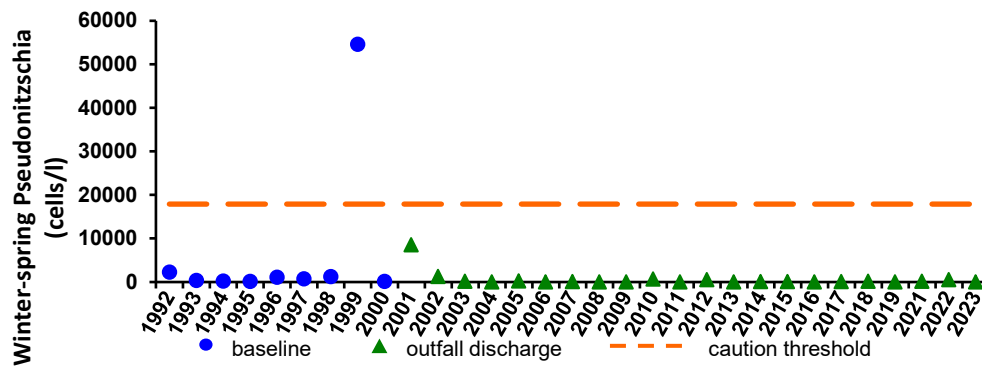


Figure 2. *Pseudo-nitzschia* cell concentrations in Nearfield (Winter/Spring 1992-2023)

PHAEOCYSTIS – Winter/Spring (February - April) 2023

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 3 shows the 2023 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.

No *Phaeocystis* cells were observed in samples collected during surveys in February to April 2023.

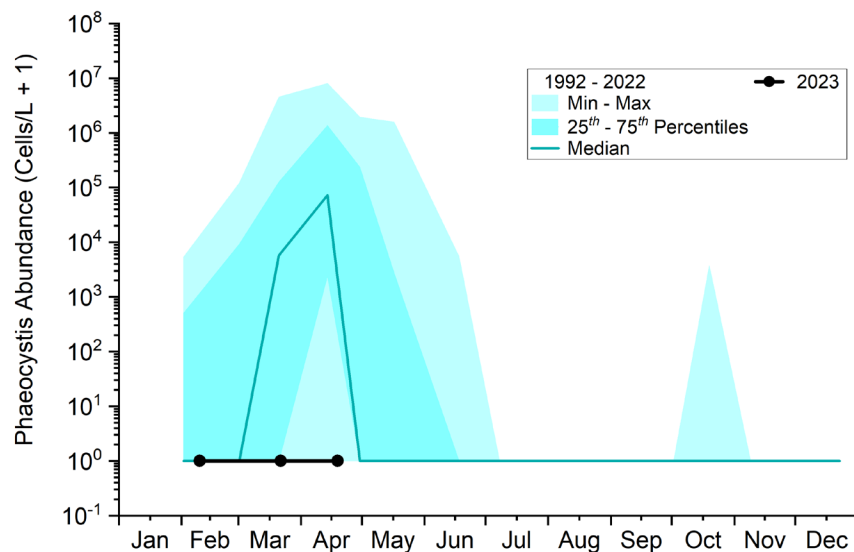


Figure 3. Nearfield Survey Mean abundance of *Phaeocystis* (1992 – 2023)

CHLOROPHYLL - Winter/Spring (February – April) 2023

The chlorophyll seasonal Caution Level threshold value was derived from the 95th percentile of seasonal baseline means. Seasonal mean chlorophyll concentration 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 2023. The nearfield mean areal average chlorophyll for winter/spring 2023 was 95.6 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 4 shows chlorophyll mean area result for winter/spring 2023, and data since the start of the monitoring program in 1992. Note that no result is available for 2020 because winter/spring surveys in March and April were dropped due to Coronavirus pandemic related restrictions.

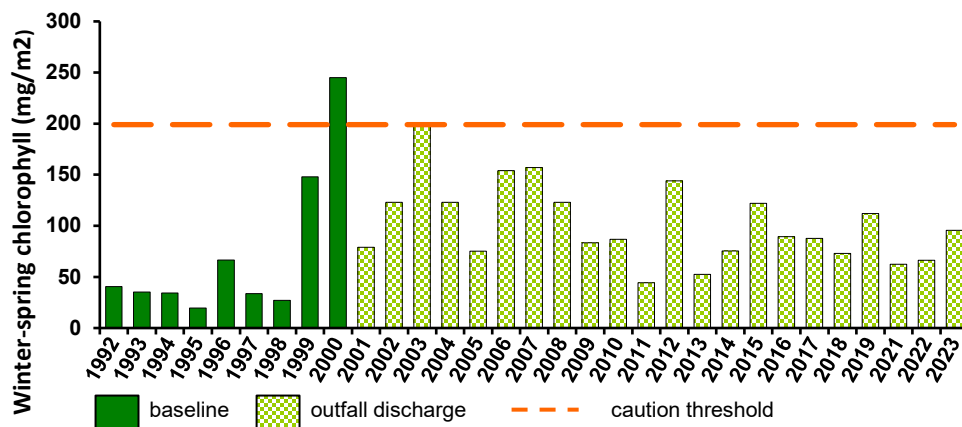


Figure 4. Winter/Spring mean areal chlorophyll concentrations in Nearfield (1992-2023)