

Contingency Plan Quarterly Report on Ambient Monitoring Results

First Quarter 2024

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 January through March 2024. Previous Contingency Plan reports are available at: <http://www.mwra.state.ma.us/harbor/html/contingency.htm>.

This report includes the results of 2023 late autumn and 2024 winter nuisance algae abundances, and 2023 autumn and annual water column chlorophyll. There is one threshold exceedance in this report. The annual mean water column chlorophyll concentrations exceeded the caution-level threshold.

NUISANCE ALGAE

ALEXANDRIUM – October 2023 and February 2024

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 surveys conducted in October 2023 and February 2024, no *Alexandrium* cells were detected in any samples collected from nearfield stations (stations within 7.5 kilometers from the outfall) and farfield stations (reference stations). Only a sample with 100 or more cells of *Alexandrium* per liter from a nearfield station would constitute an exceedance under the Contingency Plan.

In Figure 1 and Figure 2 below, we compare the results of *Alexandrium* abundance in samples collected from nearfield stations in 2023 and February 2024 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 year².

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

² There were two major modifications to the ambient monitoring plan for the outfall in 2004 and 2010; the numbers of surveys and monitoring stations were reduced through these revisions. More information can be found at: <https://www.mwra.com/harbor/enquad/pdf/2010-04.pdf> and <https://www.mwra.com/harbor/enquad/pdf/2004-ms-92.pdf>

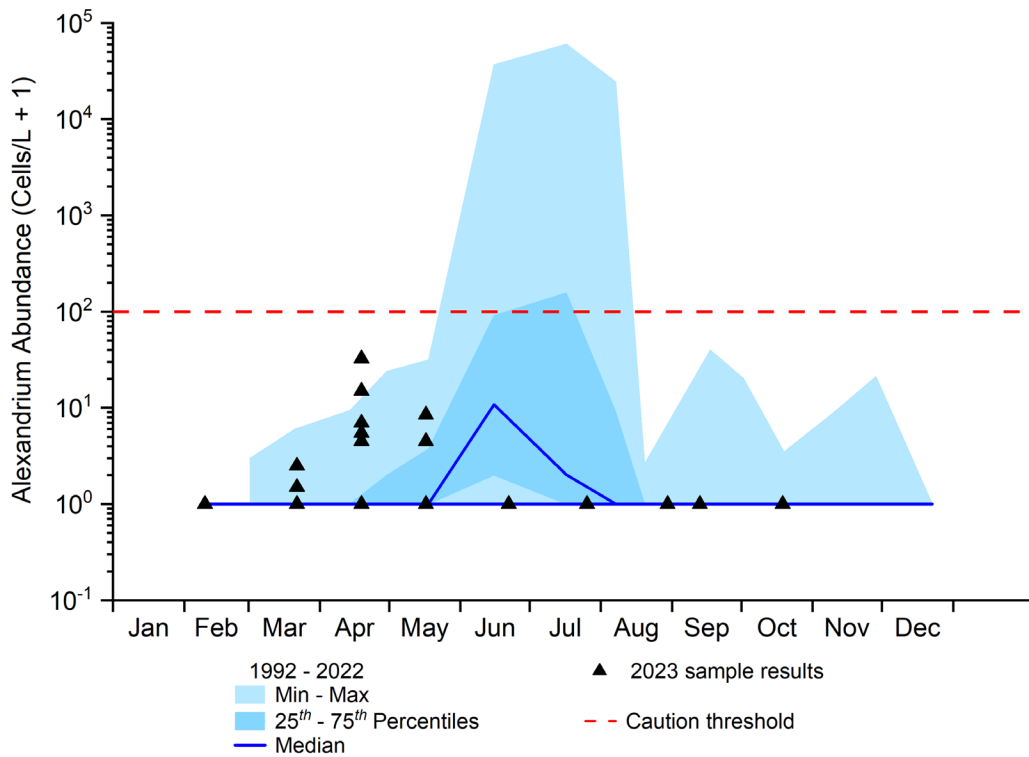


Figure 1. Nearfield *Alexandrium* cell concentrations (1992-2023)

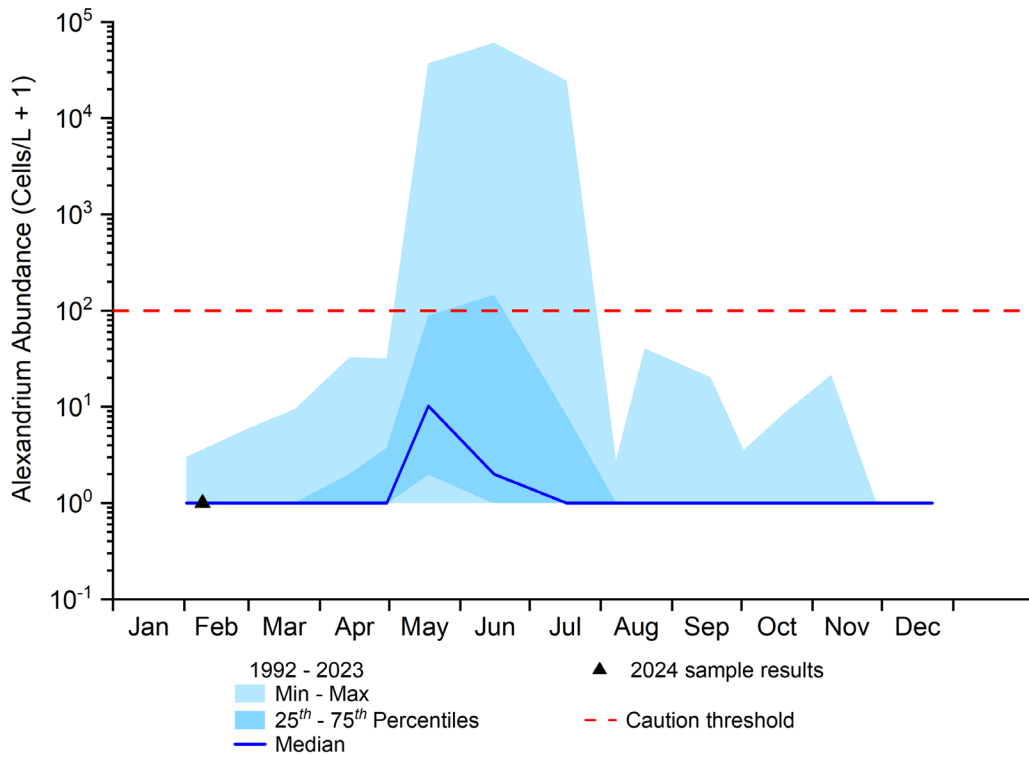


Figure 2. Nearfield *Alexandrium* cell concentrations (1992- February 2024)

PSEUDO-NITZSCHIA – autumn (September – October) 2023

There were no *Pseudo-nitzschia* threshold exceedances for autumn 2023. For *Pseudo-nitzschia* nuisance algae species, the caution level threshold values were derived from the 95th percentile of seasonal baseline means, and seasonal mean abundances at nearfield stations are compared against threshold values.

During autumn 2023, *Pseudo-nitzschia* was observed with low abundance in multiple samples from nearfield stations. The autumn mean abundance of 472 cells per liter was well below the caution level threshold of 27,500 cells per liter.

Figure 3 shows the *Pseudo-nitzschia* caution level threshold for the autumn and the mean abundance data for that season from since the start of the monitoring program in 1992.

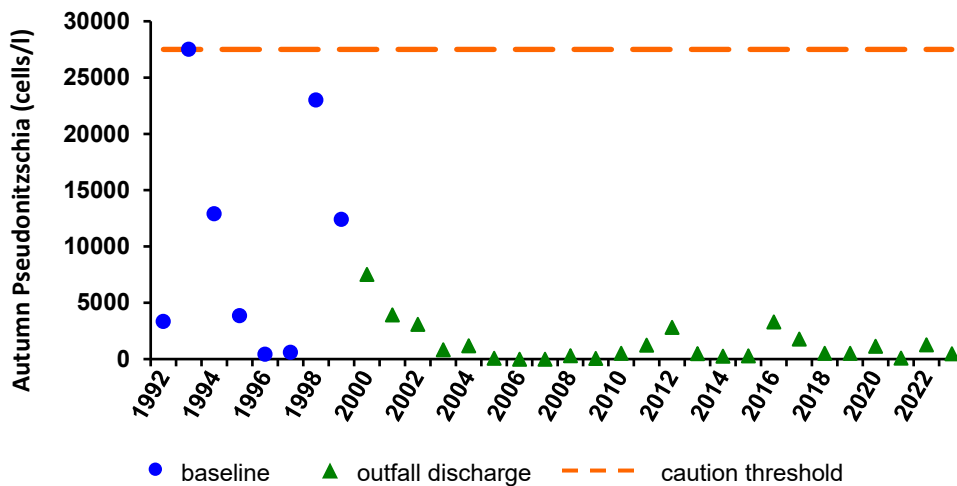


Figure 3. Nearfield *Pseudo-nitzschia* cell concentrations (summer 1992-2023)

PHAEOCYSTIS – October 2023 and February 2024

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 *P. pouchetii* compared to its historical results.

Figure 4 and Figure 5 show the 2023 and February 2024 survey mean results against the results 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 year².

No *P. pouchetii* cells were observed in samples collected during surveys in October 2023 (Figure 4) and February 2024 (Figure 5).

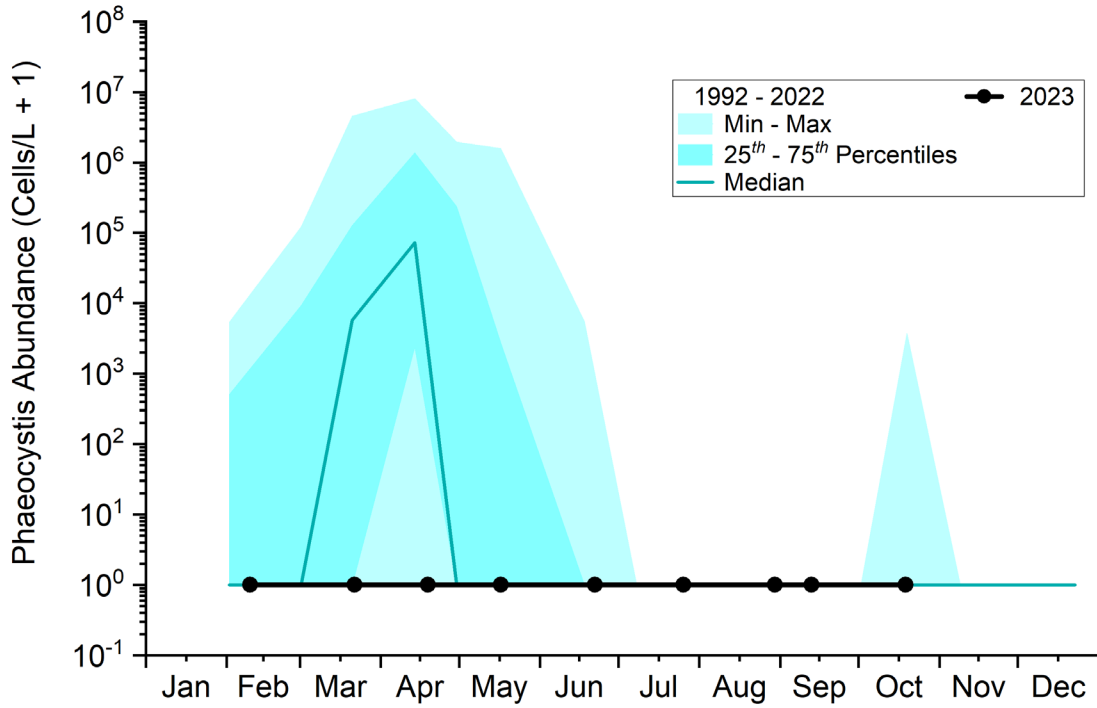


Figure 4. Nearfield Survey Mean abundance of *Phaeocystis* (1992 – 2023)

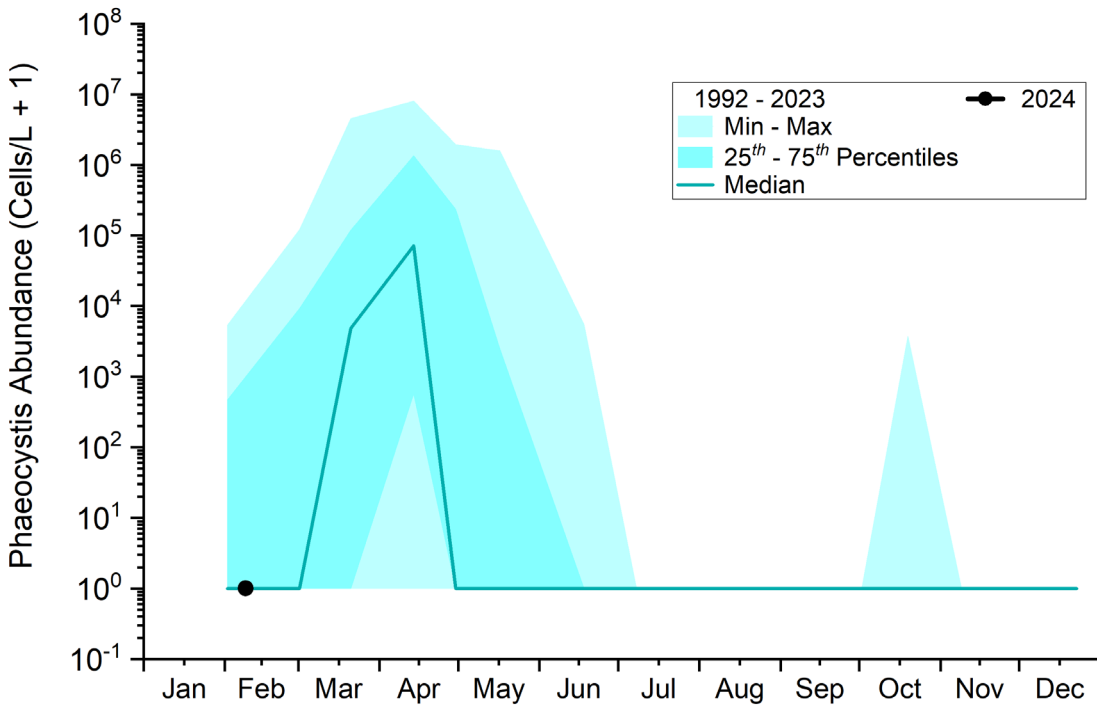


Figure 5. Nearfield Survey Mean abundance of *Phaeocystis* (1992 – February 2024)

CHLOROPHYLL – autumn (September – October) and annual 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 239 mg/m² for the autumn season. The annual caution-level and warning-level thresholds were set as 1.5 times and 2 times of annual baseline means. The annual caution level threshold for chlorophyll is 108 mg/m² and warning level threshold is 144 mg/m².

There was an exceedance of 2023 annual chlorophyll caution-level threshold (Figure 6). The annual nearfield mean areal chlorophyll was 116 mg/m², which was above the annual caution level threshold of 108 mg/m², but below the annual warning level threshold. This exceedance was reported to EPA, DEP, and the public as required under the Contingency Plan³. There is currently no evidence that this exceedance is related to the Deer Island Treatment Plant outfall discharge. A large bloom of the dinoflagellate species *Tripes muelleri* throughout Massachusetts Bay and the wider Gulf of Maine this past summer may have contributed to this threshold exceedance.

There was no exceedance of 2023 autumn chlorophyll caution level threshold. The 2023 autumn nearfield mean areal chlorophyll was 53.9 mg/m², which was well below the autumn caution level threshold (Figure 7).

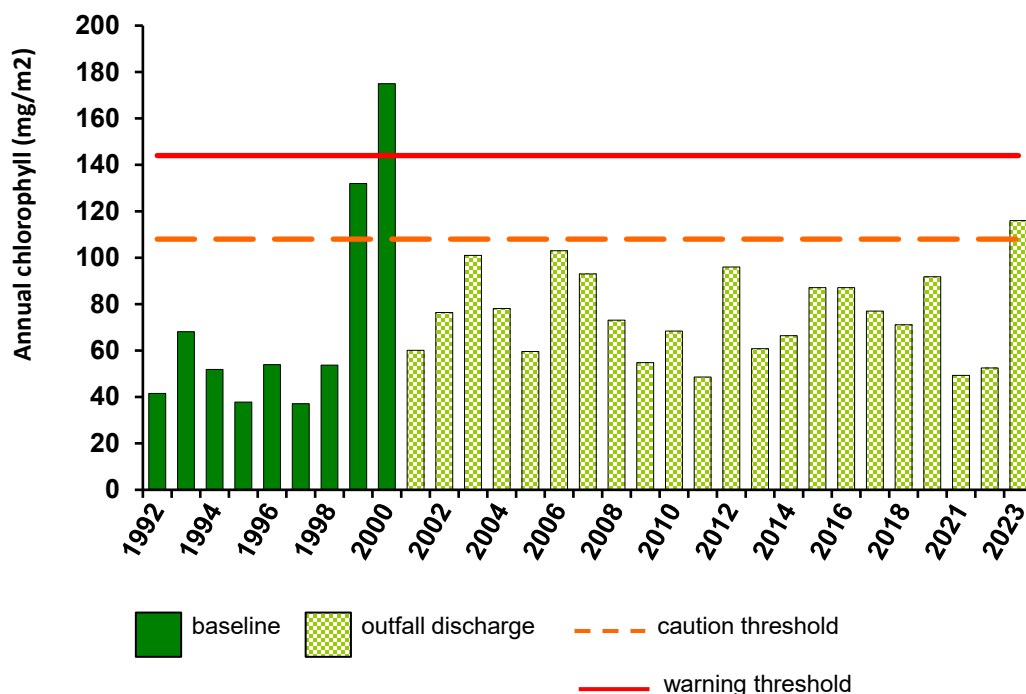


Figure 6. Nearfield annual mean areal chlorophyll-a concentrations (1992-2023)
Note that no annual result is available for 2020 because winter/spring surveys in March and April were dropped due to Coronavirus pandemic related restrictions.

³ https://www.mwra.com/harbor/pdf/20240216_amx.pdf

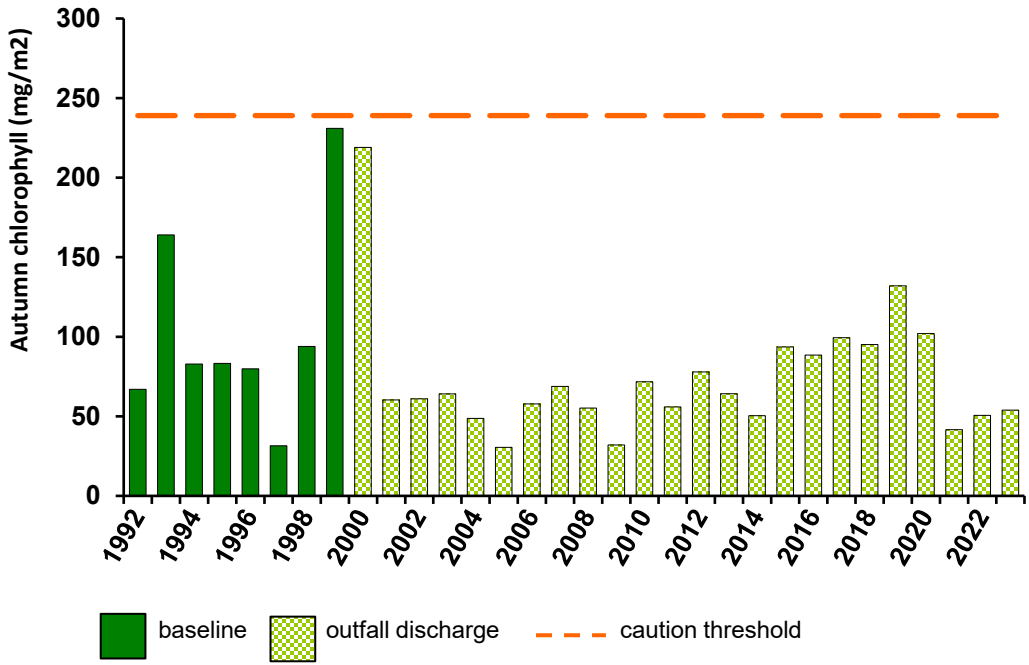


Figure 7. Nearfield autumn mean areal chlorophyll-a concentrations (1992-2023)