

# Contingency Plan Quarterly Report on Ambient Monitoring Results

## Third Quarter 2024

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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 July through September 2024.

Included in the report are the results of 2024 summer and early fall bottom-water dissolved oxygen, flounder liver disease, spring/summer (May through July) nuisance algae abundances, and winter/spring chlorophyll. There were no Contingency Plan threshold exceedances in the data included in this report.

### **Dissolved Oxygen (DO) – June- September 2024**

Dissolved oxygen thresholds are tested on results collected in the bottom water from nearfield (stations within 7.5 kilometers from the outfall) 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. A result is considered an exceedance only if it falls below a caution or warning threshold *and* the background level threshold.

During June to September 2024, four routine water column surveys were conducted. There were no exceedances of bottom dissolved oxygen concentrations or bottom percent saturation in the nearfield or at the Stellwagen Basin.

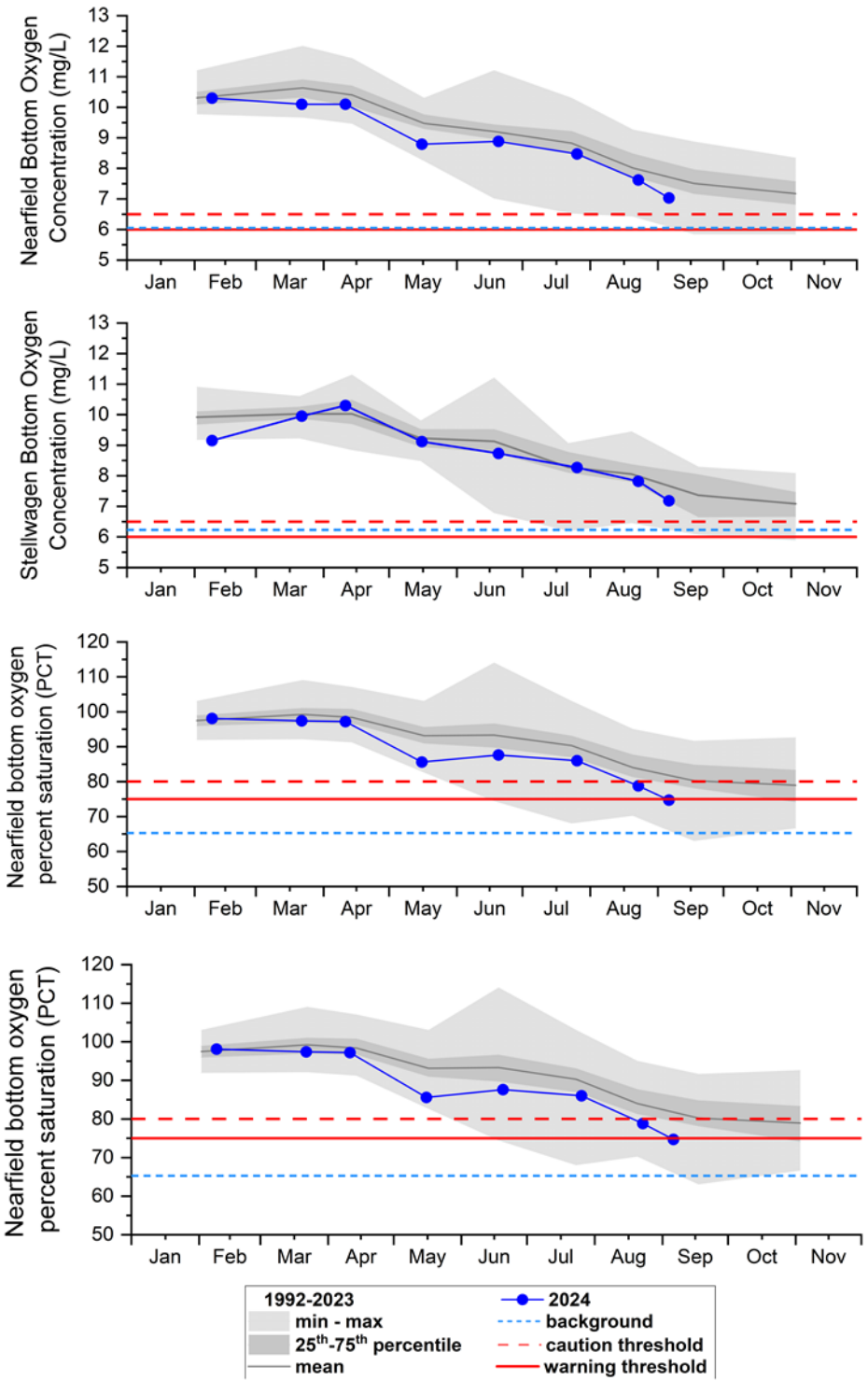


Figure 1: Bottom dissolved oxygen concentration and percent saturation in nearfield and Stellwagen Basin.

## FISH AND SHELLFISH

### Flounder liver disease – April – May 2024

The prevalence in winter flounder (*Pseudopleuronectes americanus*) of centrotubular hydropic vacuolation (CHV), a liver disease associated with contaminant exposure and considered a precursor to liver tumors, is a useful measure of the effects of pollution in the coastal waters. In Boston Harbor, rates of this disease were historically quite high but dropped considerably during the 1990s.

The Caution Level threshold for the prevalence of flounder CHV liver disease is 45%, which is based on measurements collected from Boston Harbor during the baseline period (1991-2000). Since Massachusetts Bay monitoring began in 1991, prevalence of the CHV near the outfall site has been much lower than the threshold. The result for 2024 is 8.82% from the flounder surveys conducted on April 22 and May 29, 2024 (Figure 2).

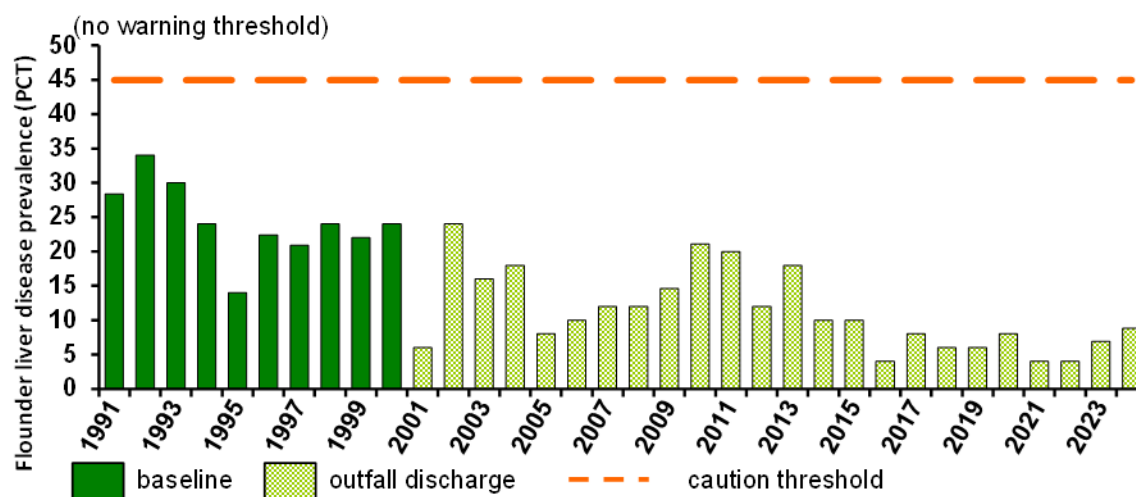


Figure 2: Flounder liver disease prevalence at the outfall site from 1991 through 2024. The red horizontal dashed line shows the Caution Level threshold at  $y = 45\%$ .

## NUISANCE ALGAE

### *Alexandrium* – June - September 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 *A. tamarense*, *A. catenella*, and *A. fundyense*<sup>1</sup>. 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.

Results from February through June 2024, show low levels (2 cells/L or less) of *Alexandrium* cells detected in either the nearfield or farfield reference stations. In July, 96 cells/L were detected at station

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

N01, which is less than the threshold of 100 cells/L. *Alexandrium* levels detected at this station came down the following month in August to 42 cells/L (A depth) and 8 cells/L (C depth). At all other stations in August, and at all stations in September, levels were not observed to be above 1 cells/L. Note that data from July through September are preliminary because they have not yet gone through the complete set of quality assurance checks.

For *Alexandrium*, thresholds are tested using samples collected each month from four nearfield locations at two depths, surface and seasonal pycnocline. Several farfield stations provide information on whether observed trends are bay-wide or limited to the MWRA outfall area. 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 3 below, we compare the 2024 results of *Alexandrium* abundance in samples collected from nearfield stations through September against those from all prior years since 1992. Due to reductions in the number of surveys conducted each year<sup>2</sup>, the historical results encompass more time-points than shown for the current year.

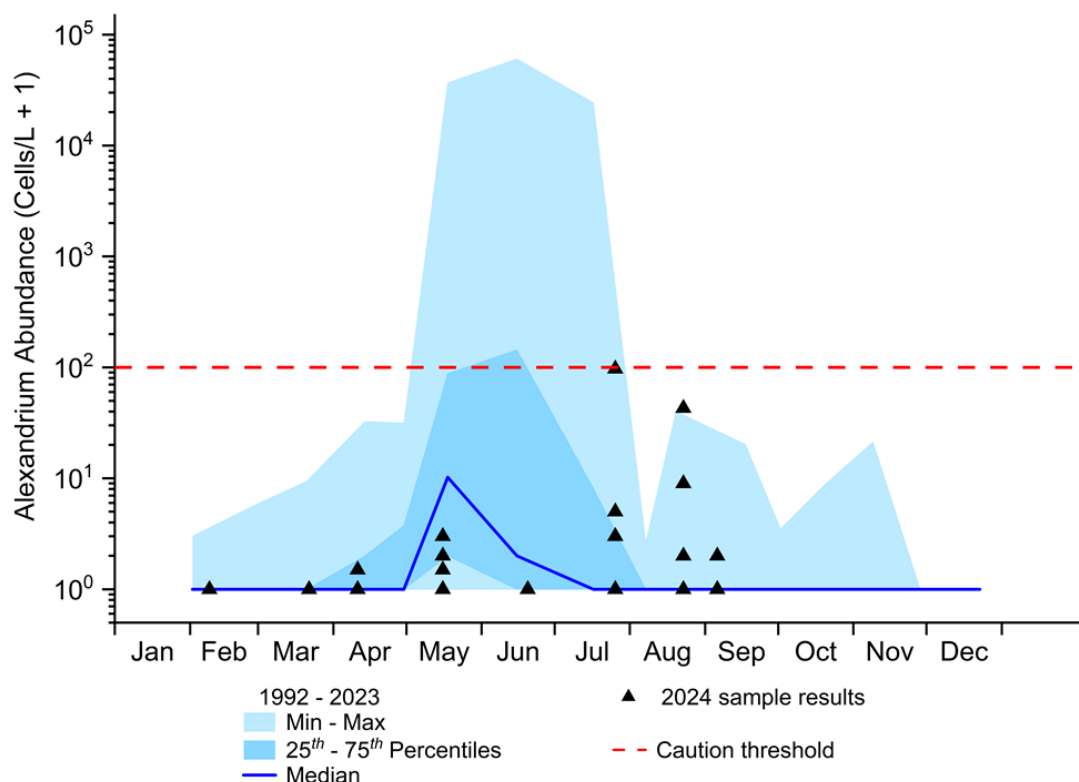


Figure 3: Cell abundance of *Alexandrium* in water samples from nearfield stations during years 1992 – 2024. The red horizontal dashed line is at  $y = 100$  cells/L.

<sup>2</sup> 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.

### Phaeocystis – February - July 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, *P. pouchetii* 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. However, MWRA agreed to continue to report each quarter on nearfield survey mean abundances of *P. pouchetii* compared to its historical seasonal pattern.

Figure 3 shows the 2024 winter/spring and early summer 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<sup>2</sup>, the historical seasonal pattern encompasses more time-points than shown for the current year.

No *P. pouchetii* cells were observed in samples collected during surveys in February to June 2024 (Figure 4).

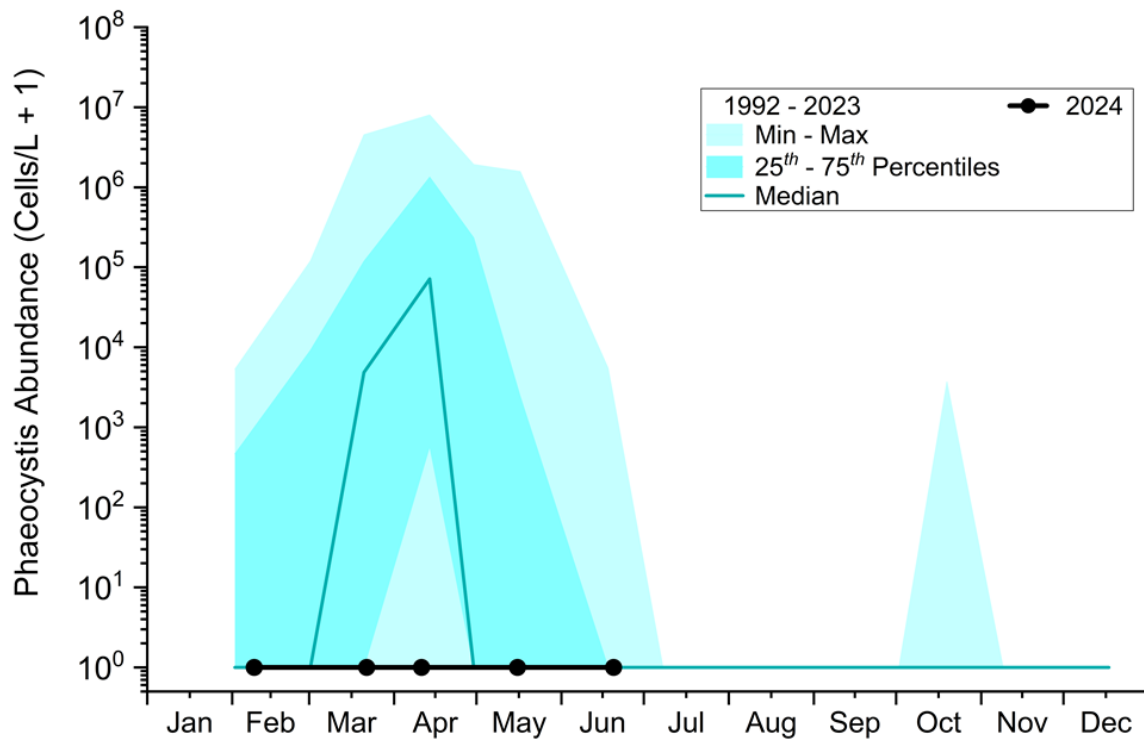


Figure 4: Nearfield Survey Mean abundance of *Phaeocystis* for years 1992 – 2024.

## Chlorophyll - Winter/Spring (February – April) 2024

The chlorophyll seasonal Caution Level threshold values were derived from the 95th percentile of seasonal baseline means. Seasonal mean levels at nearfield stations are compared against threshold values. The Caution Level threshold is 199 mg/m<sup>2</sup> for the winter/spring season.

There were no chlorophyll threshold exceedances for winter/spring 2024 (February through April, Figure 5). The nearfield mean areal average chlorophyll for winter/spring 2024 was 39.8 mg/m<sup>2</sup>, well below the Caution Level threshold of the season and in the range of other years in the baseline (pre-discharge) period.

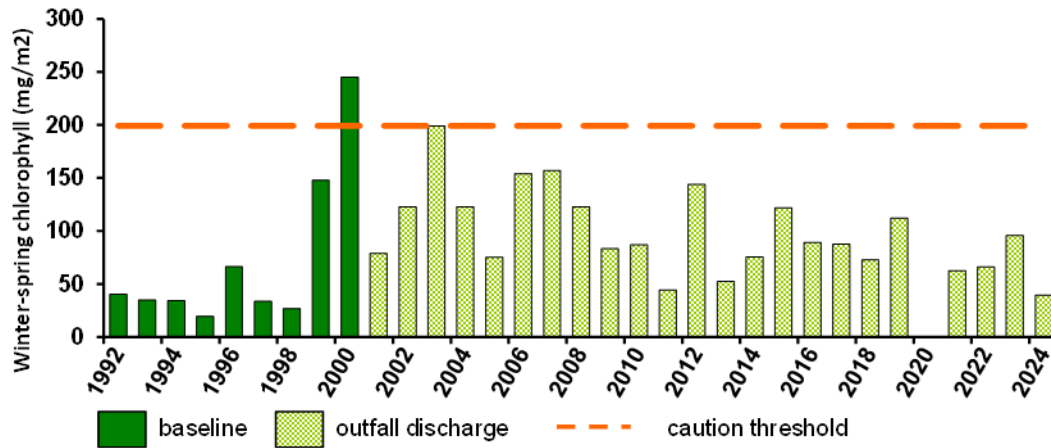


Figure 5: Nearfield mean areal average chlorophyll for winter/spring 2024. The red horizontal line shows the Caution Level threshold at  $y = 199 \text{ mg/m}^2$ . No threshold value was calculated for 2020 due to a reduction in surveys due to COVID.