

## Contingency Plan Quarterly Report on Ambient Monitoring Results Third Quarter 2018

MWRA gathers data near the outfall discharge location in Massachusetts Bay on various thresholds in the Contingency Plan required by its Deer Island Treatment Plant (DITP) NPDES discharge permit. This report shows ambient monitoring results for Contingency Plan thresholds that became available in July through September 2018. None of these new results exceed Contingency Plan thresholds. Included in this report are results for flounder liver disease, sediment enrichment, nuisance algae and dissolved oxygen.

Previous Contingency Plan reports are available at:

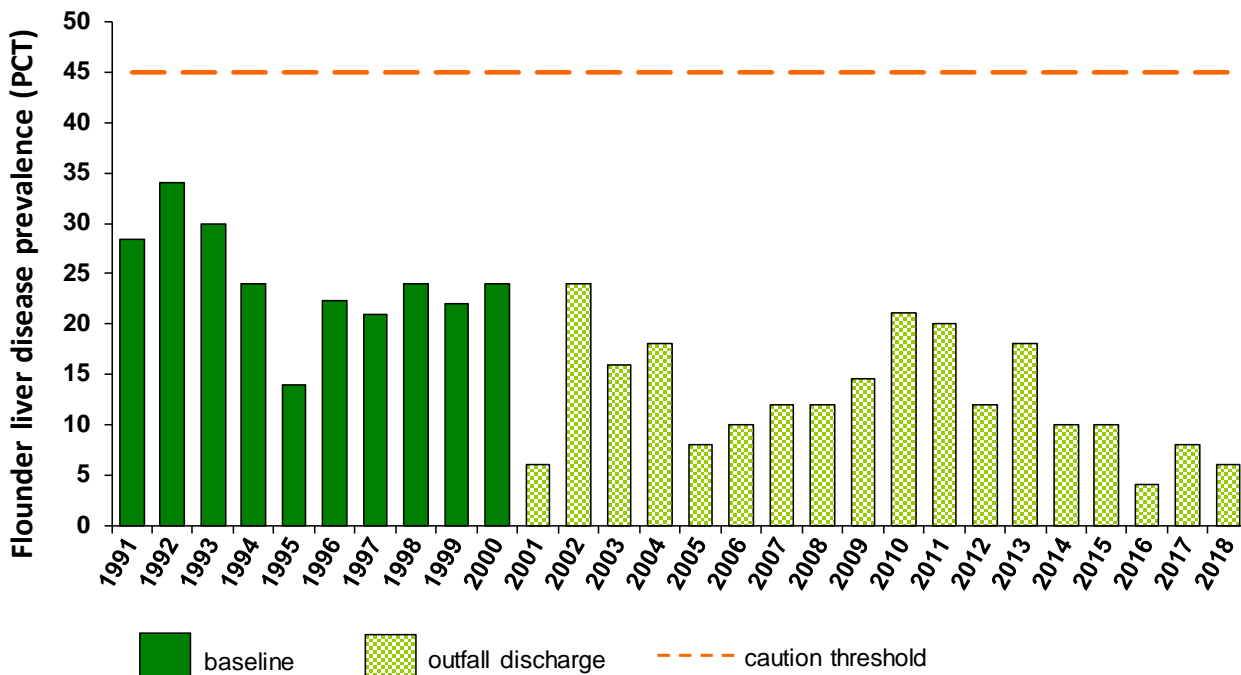
<http://www.mwra.state.ma.us/harbor/html/archive.htm#cpq>.

### FISH AND SHELLFISH

#### Flounder liver disease 2018

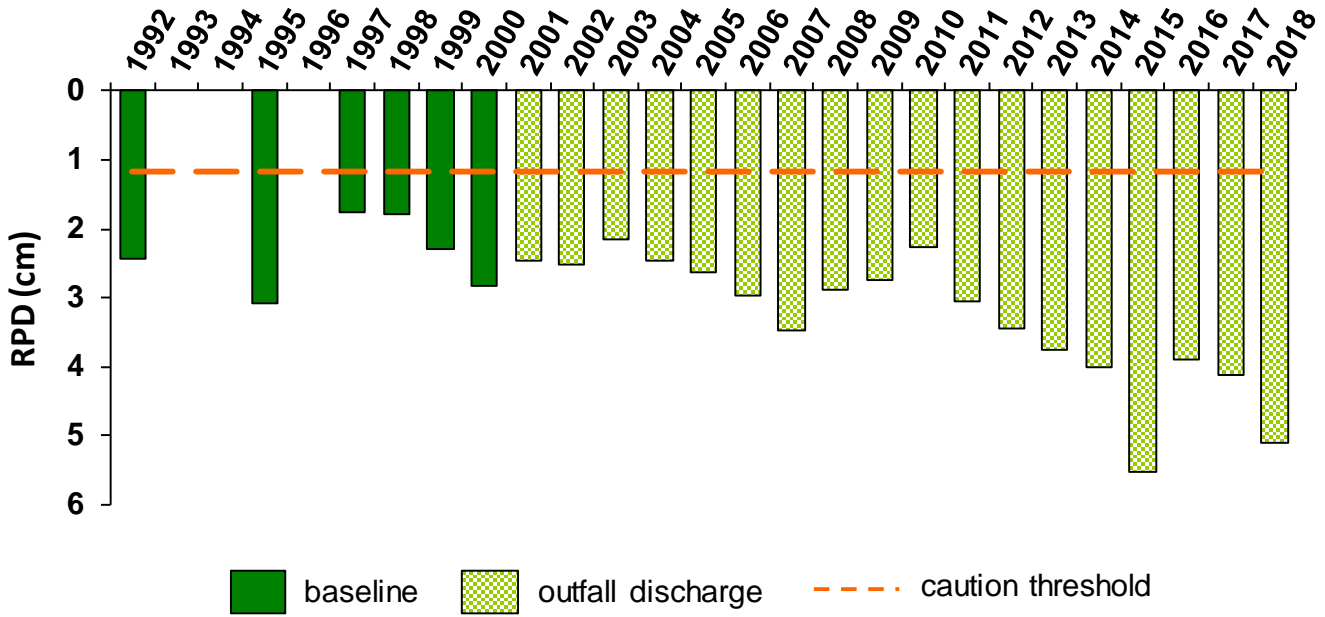
The prevalence of liver disease at the outfall site in 2018 was 6%, which is lower than was observed at the site during the baseline period, and did not exceed the threshold. Flounder are sampled annually in April. This year, sampling extended into the first week of May to acquire enough fish at Deer Island Flats and the outfall site.

The prevalence of centrotubular hydropic vacuolation, a condition considered a precursor to liver tumors caused by exposure to contaminants in winter flounder, is a useful measure of the effects of pollution. The flounder liver disease threshold value (dashed line) is based on data from Boston Harbor during the baseline monitoring period (1991-2000). In the harbor, flounder liver disease rates were historically quite high but dropped considerably during the late 1990s. Since Massachusetts Bay monitoring began, prevalence of early-stage liver disease near the new outfall has been much lower than the threshold.



### SEDIMENT ENRICHMENT - 2018

The 2018 annual sediment monitoring showed that the redox potential discontinuity (RPD) depth was the second deepest yet observed at the outfall site and did not exceed the threshold (did not fall below the minimum RPD threshold; see explanation below).



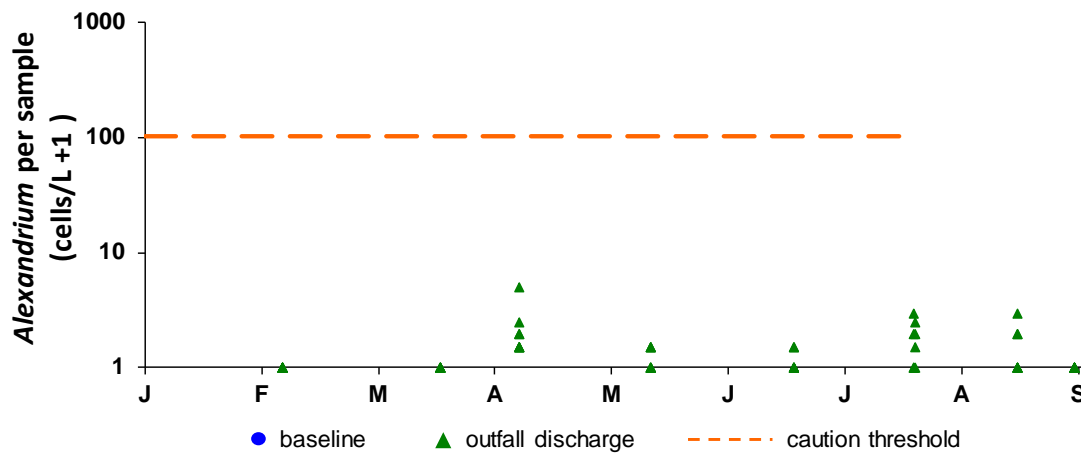
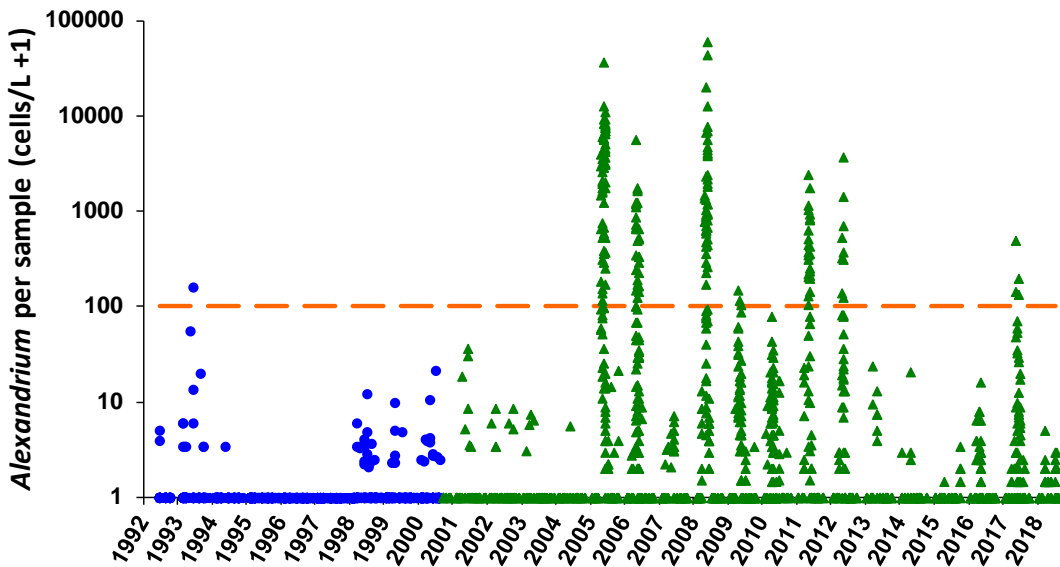
The depth of the oxygenated layer in marine sediment is a measure of ecosystem health. A diverse bottom-dwelling community includes organisms that mix water and oxygen down into the sediment. In an over-enriched environment, organic material deposited on the sediment surface can use up the available oxygen and smother the bottom-dwelling community. Such areas, including some areas of Boston Harbor, have a thin or nonexistent oxygenated layer. The thickness of the oxygenated layer is called the redox potential discontinuity (RPD) depth. In MWRA’s monitoring program, the RPD depth is estimated from sediment-profile images, cross-sections of the upper several centimeters of the sediment taken with a special mud-penetrating prism and camera. The threshold for RPD is half the mean measured in the baseline period (that is, if the thickness of the oxygenated layer fell to less than half the thickness measured pre-discharge, a caution threshold would be exceeded.) Sediment profile imaging for MWRA monitoring is conducted in August.

**NUISANCE ALGAE**

**ALEXANDRIUM – May - September-August 2018**

The [nuisance algae](#) *Alexandrium catenella* (formerly *A. fundyense*) (“*Alexandrium*”) can cause paralytic shellfish poisoning (PSP, “red tide”) in Massachusetts Bay. MWRA measures *Alexandrium* abundance in its monitoring program, and also checks state fisheries agency observations of shellfish PSP toxicity and other regional monitoring programs to keep track of the course of Gulf of Maine *Alexandrium* blooms.

As last quarter, *Alexandrium* abundances remained low and below threshold values through early September 2018. This report includes results from regular surveys in May through July, and preliminary results from the August and September surveys.



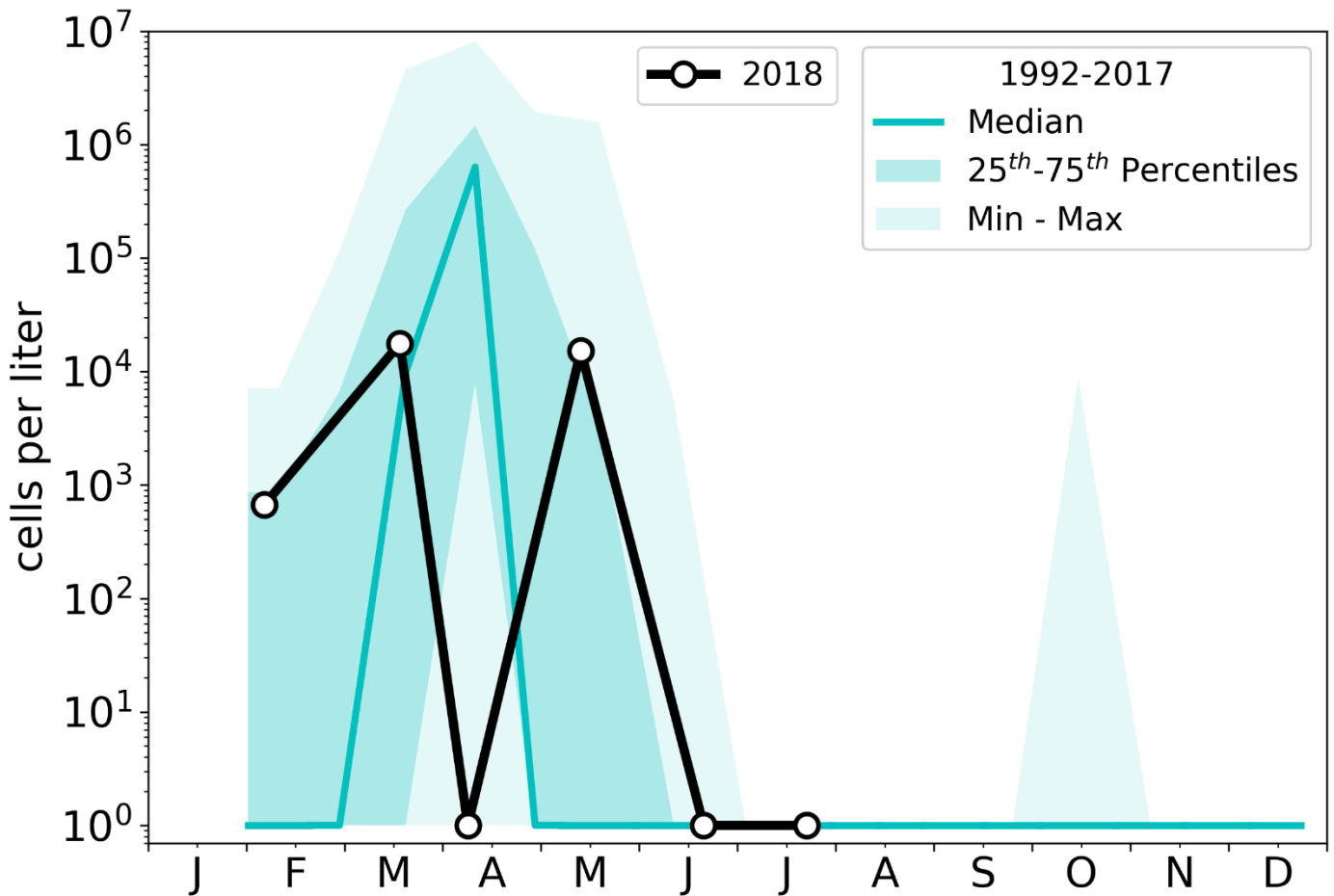
*Alexandrium* per-sample abundance (cells/liter). Data from August and September surveys are preliminary.

Caution threshold	100
May – September 2018	2*
* Maximum of all nearfield samples collected May through September 2018	

### PHAEOCYSTIS – Early Summer (May-June) 2018

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, did not result from 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 for May through July 2018 became available.

The figure below shows the 2018 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 for May through July 2018 was within the range of the historical seasonal pattern.



### **DISSOLVED OXYGEN (DO) – June - September 2018**

Dissolved oxygen (DO) thresholds are tested on results from June-October when lower solubility due to warmer temperatures has the potential to reduce oxygen concentration and saturation. October results are not yet available. There were no threshold exceedances for these thresholds during June through September.

The current reporting period for [dissolved oxygen thresholds](#) is June-September 2018. During this period there were four regular surveys. The graphs below show the natural annual fluctuation of DO and percent saturation, which are typically lowest in early autumn. The 1992-2010 data shown are subsets of all data reflecting the modified design that began in 2011, i.e. nine surveys per year, and one station rather than four in Stellwagen Basin. This enables us to better compare the threshold results across years. Bottom-water oxygen percent saturation and concentration in both the nearfield and Stellwagen Basin remained above caution levels and well above background levels, thus there were no exceedances during this period.

