

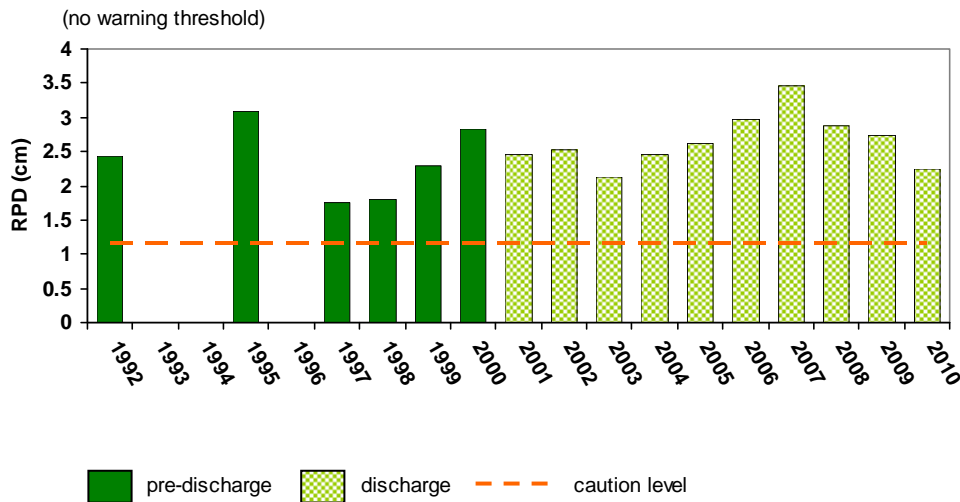
## Contingency Plan Report Fourth Quarter 2010

### Ambient Monitoring

MWRA gathers data from the outfall location in Massachusetts Bay on various thresholds in its Deer Island outfall discharge permit. This report shows relevant ambient monitoring results that became available in the October-December 2010 time period. There are updated data relevant to the nuisance alga *Alexandrium*, for which partial results were reported last quarter. There were no contingency plan threshold exceedances.

#### SEDIMENT ENRICHMENT - 2010

The 2010 annual sediment monitoring showed that the RPD depth was normal at the outfall site and did not exceed the threshold (did not fall below the minimum RPD threshold; see explanation below.)

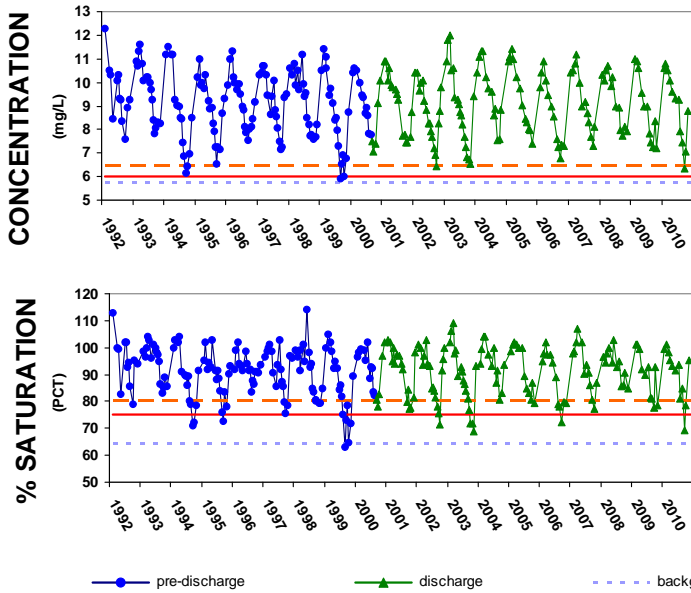


The depth of the oxygenated layer in marine sediment is a measure of ecosystem health. A diverse bottom-dwelling community includes organisms that mix water and oxygen down into the sediment. In an over-enriched environment, organic material deposited on the sediment surface can use up the available 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.)

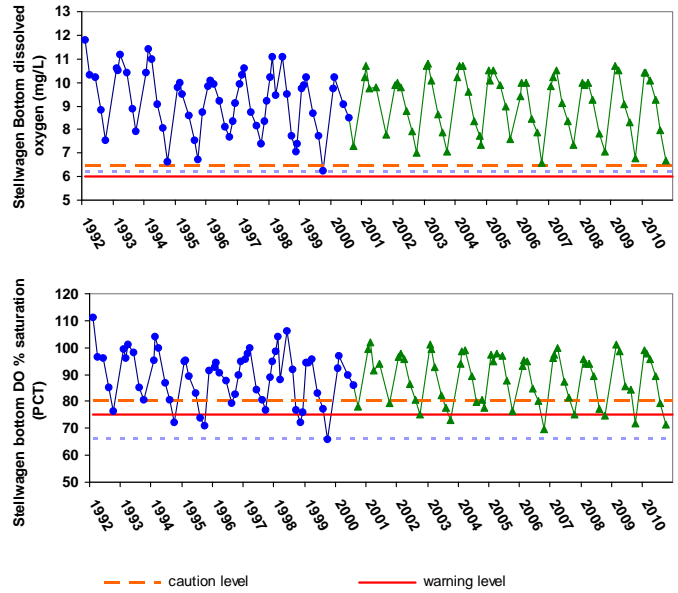
## DISSOLVED OXYGEN (DO) –September-October 2010

Measurements of dissolved oxygen (DO) concentration and percent saturation in fall 2010 did not fall below background levels and thus did not exceed thresholds.

### NEARFIELD DO



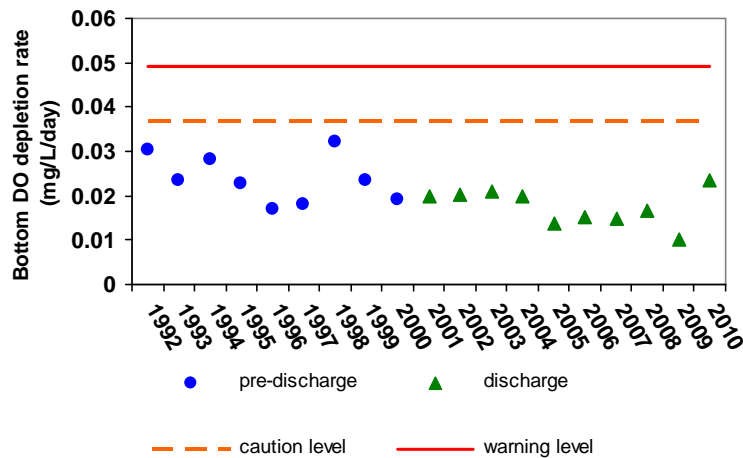
### STELLWAGEN BASIN DO



The current reporting period for [dissolved oxygen thresholds](#) is September-October 2010. During this period there were two nearfield surveys and one farfield survey. Nearfield oxygen levels were somewhat low in late September, but similar to those seen in some baseline years. The graphs above include data since the start of the monitoring program in 1992, and reflect the natural fluctuation of DO and percent saturation, which are typically lowest in early autumn.

### DO Depletion Rate – summer 2010

An additional threshold measure of dissolved oxygen is the rate at which oxygen is depleted during the stratified summer period. The current reporting period for oxygen depletion rate is summer 2010, defined as June - October. The DO depletion rate for the summer of 2010 was higher than other post-discharge years, but typical of pre-discharge summers and well below the threshold.



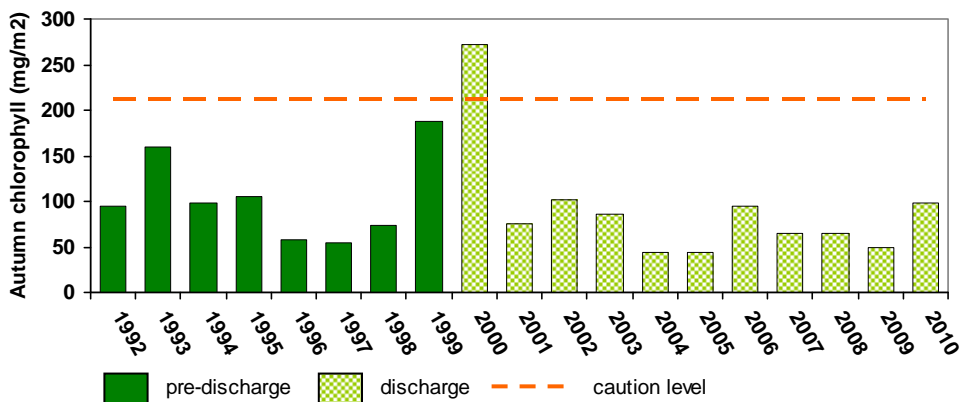
Even if dissolved oxygen concentrations remain healthy, an excessively rapid rate of decrease could signal a future problem. A low rate indicates DO dropped only slowly. The threshold for DO depletion rate is based on a change from the baseline rate; the caution threshold is a rate faster than 1.5 times the baseline mean rate, while the warning threshold is twice the baseline mean rate.

## CHLOROPHYLL – September-November 2010 and Annual 2010

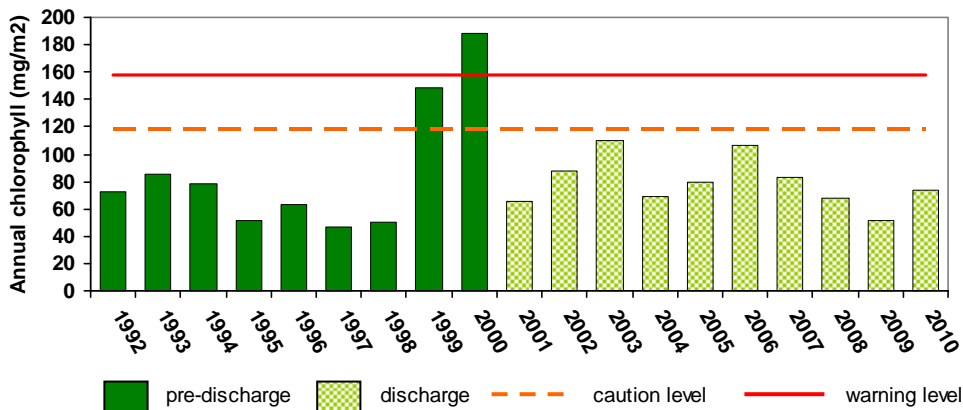
There were no [chlorophyll threshold](#) exceedances for either fall 2010 or for the entire year. The nearfield mean areal average chlorophyll in autumn 2010 was 99 mg/m<sup>2</sup>, well below the caution level threshold for autumn of 212 mg/m<sup>2</sup>. The 2010 annual average was 74 mg/m<sup>2</sup>, below the caution and warning thresholds for annual average chlorophyll of 118 and 158 mg/m<sup>2</sup>, respectively. Both autumn and annual results were similar to other moderate-chlorophyll years in the pre-diversion and post-diversion periods.

The figures below compare chlorophyll data for autumn 2010 (September-November), which included three surveys<sup>1</sup>, and data for all of 2010, to the corresponding thresholds. The graph includes data since the start of the monitoring program in 1992.

### Autumn



### Annual



<sup>1</sup> Note that the survey that usually takes place in very early September, took place at the end of August this year and thus was included in the summer time period.

## NUISANCE ALGAE – SUMMER 2010

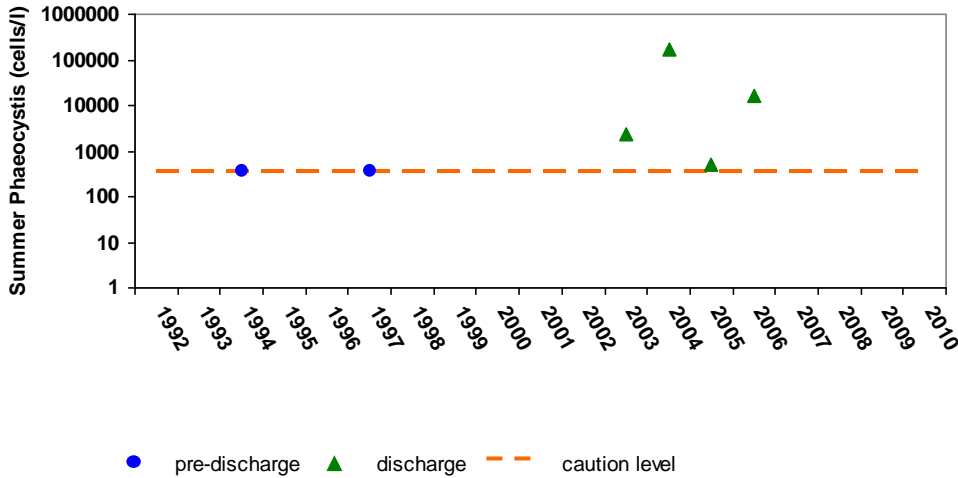
In the figures below, we compare *Phaeocystis* and *Pseudonitzschia* data to the [nuisance algae thresholds](#) for summer 2010 (May through August), which included five surveys<sup>2</sup>. We also compare *Alexandrium* data to the threshold for each sample in July through August 2010.

There were no threshold exceedances for *Phaeocystis*, *Pseudonitzschia*, or *Alexandrium*.

### PHAEOCYSTIS and PSEUDONITZSCHIA

*Phaeocystis pouchetii* was not observed in the nearfield in summer 2010. *Pseudonitzschia* was observed only at very low levels.

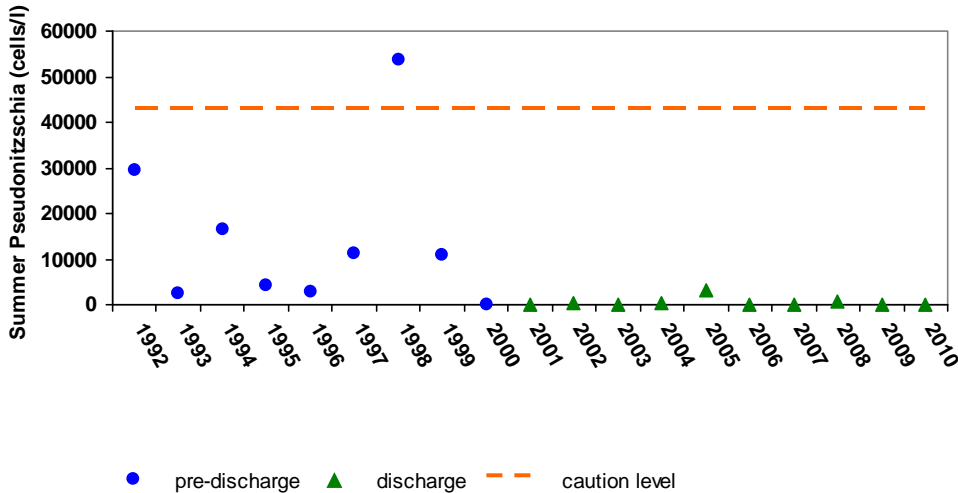
#### PHAEOCYSTIS, Summer



Summer <i>Phaeocystis</i> mean abundance (cells/liter)	
Caution threshold	357
Summer 2010	0

Note logarithmic scale. Years with no data point had zero summer average *Phaeocystis*.

#### PSEUDONITZSCHIA, Summer



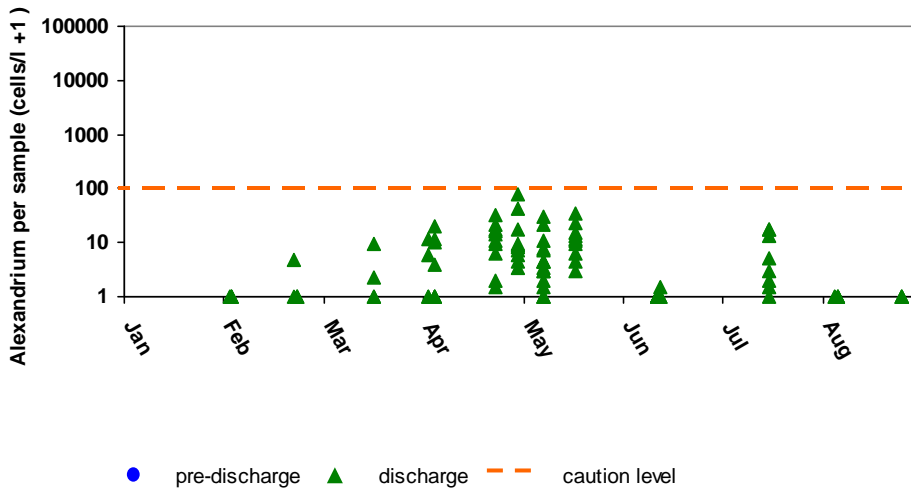
Summer <i>Pseudonitzschia</i> mean abundance (cells/liter)	
Caution threshold	43,100
Summer 2010	54

<sup>2</sup> Note that the survey that usually takes place in very early September, took place at the end of August this year and thus is included in the summer time period.

**ALEXANDRIUM**

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

In 2010 there was an *Alexandrium* bloom along the coast of Maine, New Hampshire, and Massachusetts. However, unlike many recent years, the single sample abundance of *Alexandrium* in the outfall nearfield did not exceed the Caution Level threshold of 100 cells/L. By early July 2010, the bloom had subsided in Massachusetts Bay. Rapid analysis results through July 2010 were reported in previous quarterly reports; this report includes additional results for late summer. The figure below includes results for each 2010 sample available through December 2010. (Note logarithmic scale for graph.)



<b>July-August <i>Alexandrium</i> per-sample abundance (cells/liter)</b>	
Caution threshold	100
Summer 2010	16*
* maximum of all samples collected between July 1, 2010 and August 31, 2010	