

# Contingency Plan Report Fourth Quarter 2007

## 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 fourth quarter (October-December) 2007 time period. There were no exceedances of Contingency Plan thresholds.

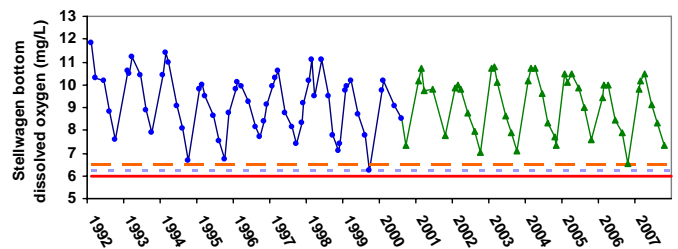
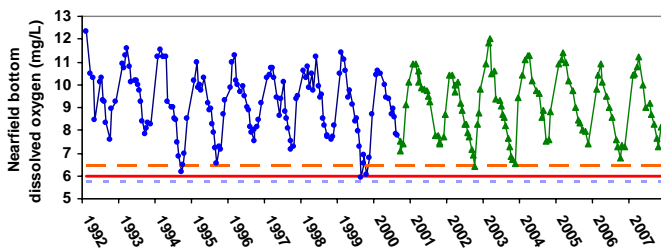
### DISSOLVED OXYGEN (DO) – July-October 2007

Measurements of dissolved oxygen (DO) concentration and percent saturation in summer and early fall 2007 did not fall below background levels and thus did not exceed thresholds.

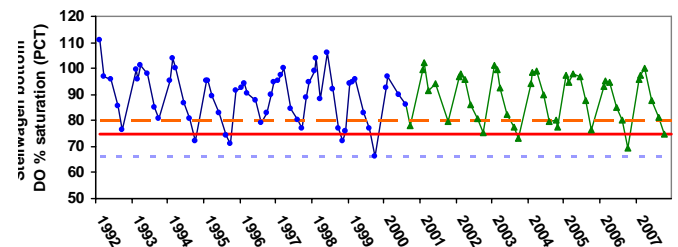
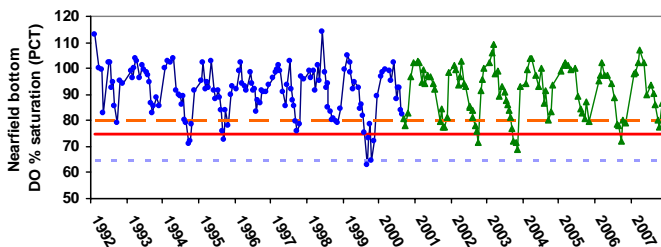
**NEARFIELD DO**

**STELLWAGEN BASIN DO**

CONCENTRATION



% SATURATION

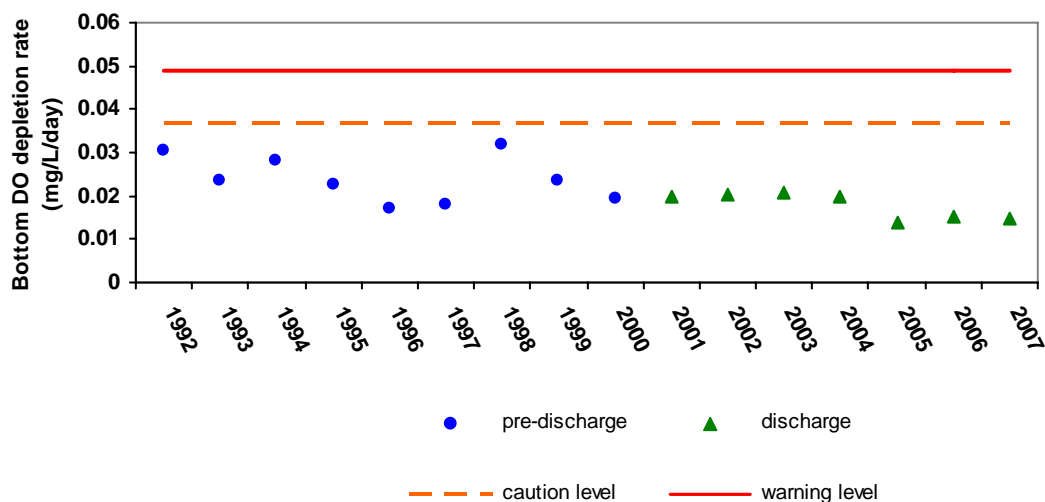


● pre-discharge    
 ▲ discharge    
 - - - background level    
 - - - caution level    
 - - - warning level

The current reporting period for [dissolved oxygen thresholds](#) is July-October 2007. During this period there were four nearfield surveys and two farfield surveys. Oxygen levels were similar to those seen in most 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 is typically lowest in early autumn.

### DO Depletion Rate – summer 2007

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, 2007, defined as June - October. The DO depletion rate for the summer of 2007 was low and did not exceed 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.

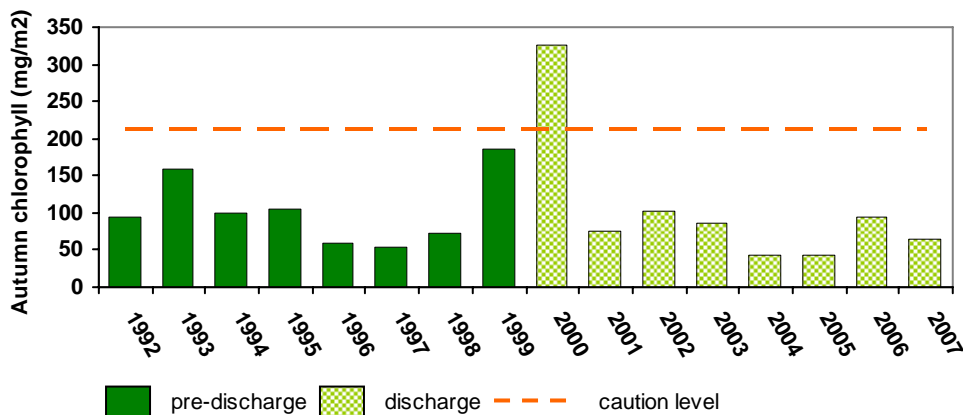
### CHLOROPHYLL – AUTUMN, ANNUAL 2007

There were no exceedances of the fall chlorophyll threshold or of the annual chlorophyll threshold for 2007.

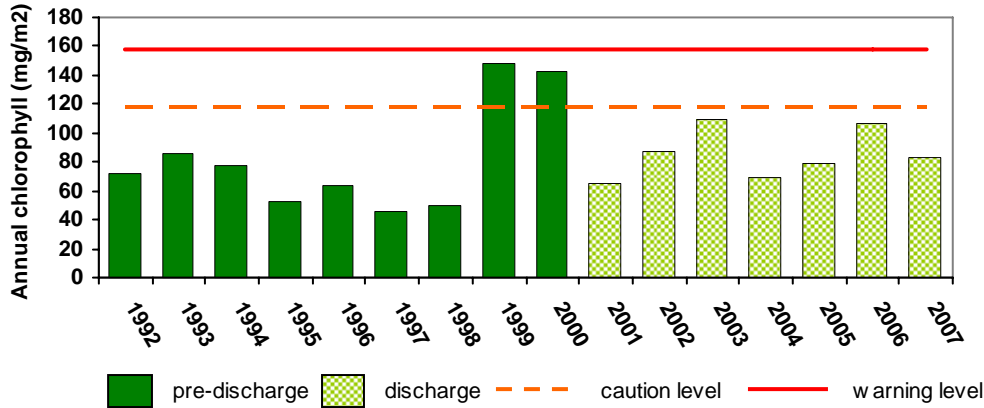
The nearfield mean areal average chlorophyll in autumn 2007 (September-November) was 65 mg/m<sup>2</sup>, well below the caution level threshold for autumn of 212 mg/m<sup>2</sup> and in the range typical of the pre-discharge period. The 2007 annual average was 83 mg/m<sup>2</sup>, similar to most recent years and below the caution and warning thresholds for annual average chlorophyll of 118 and 158 mg/m<sup>2</sup>, respectively.

The figures below compare chlorophyll data for autumn 2007, which included four surveys, and data for all of 2007, to the corresponding thresholds. The graph includes data since the start of the monitoring program in 1992.

#### AUTUMN CHLOROPHYLL



## ANNUAL CHLOROPHYLL



## NUISANCE ALGAE – SUMMER 2007

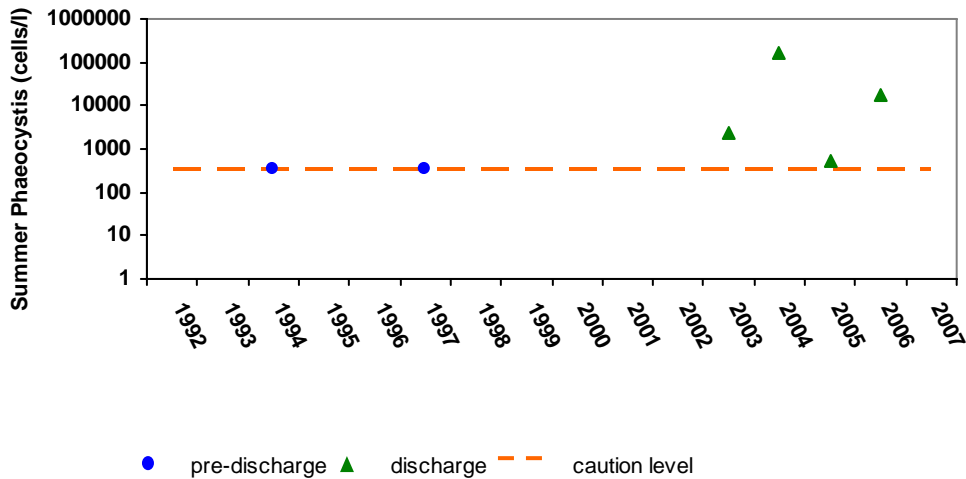
In the figures below, we compare *Phaeocystis* and *Pseudonitzschia* data to the [nuisance algae thresholds](#) for summer 2007 (May through August), which included four surveys. We also compare *Alexandrium* data to the threshold for each sample in May through August 2007.

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

### PHAEOCYSTIS

*Phaeocystis pouchetii* was not observed in the nearfield in summer 2007.

### SUMMER



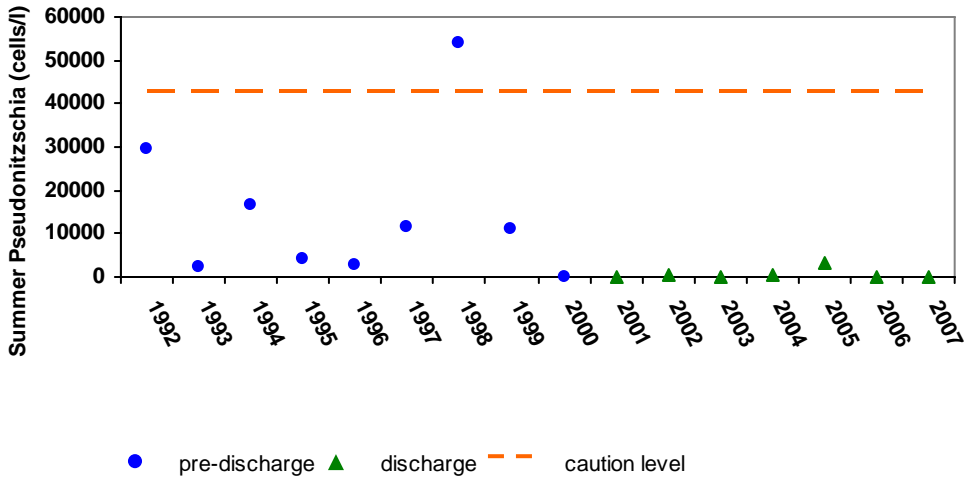
Summer <i>Phaeocystis</i> mean abundance (cells/liter)	
Caution threshold	357
Summer 2007	0

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

## PSEUDONITZSCHIA

*Pseudonitzschia* was not observed in the nearfield in summer 2007.

### SUMMER

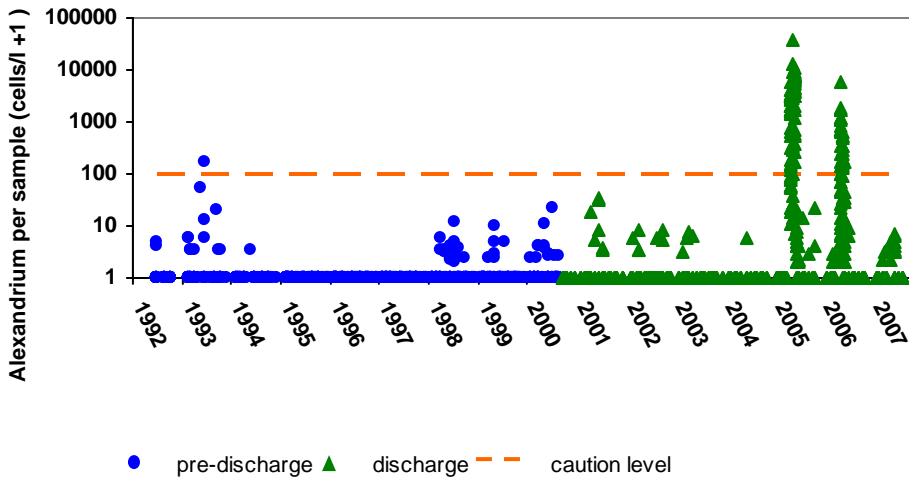


Summer <i>Pseudonitzschia</i> mean abundance (cells/liter)	
Caution threshold	43,100
Summer 2006	0

## 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 development of Gulf of Maine *Alexandrium* blooms.

During the months covered by this quarter's report, (May-August) *Alexandrium* cells (*Alexandrium fundyense*) were observed at very low levels in eleven nearfield samples, but none exceeded the threshold value.



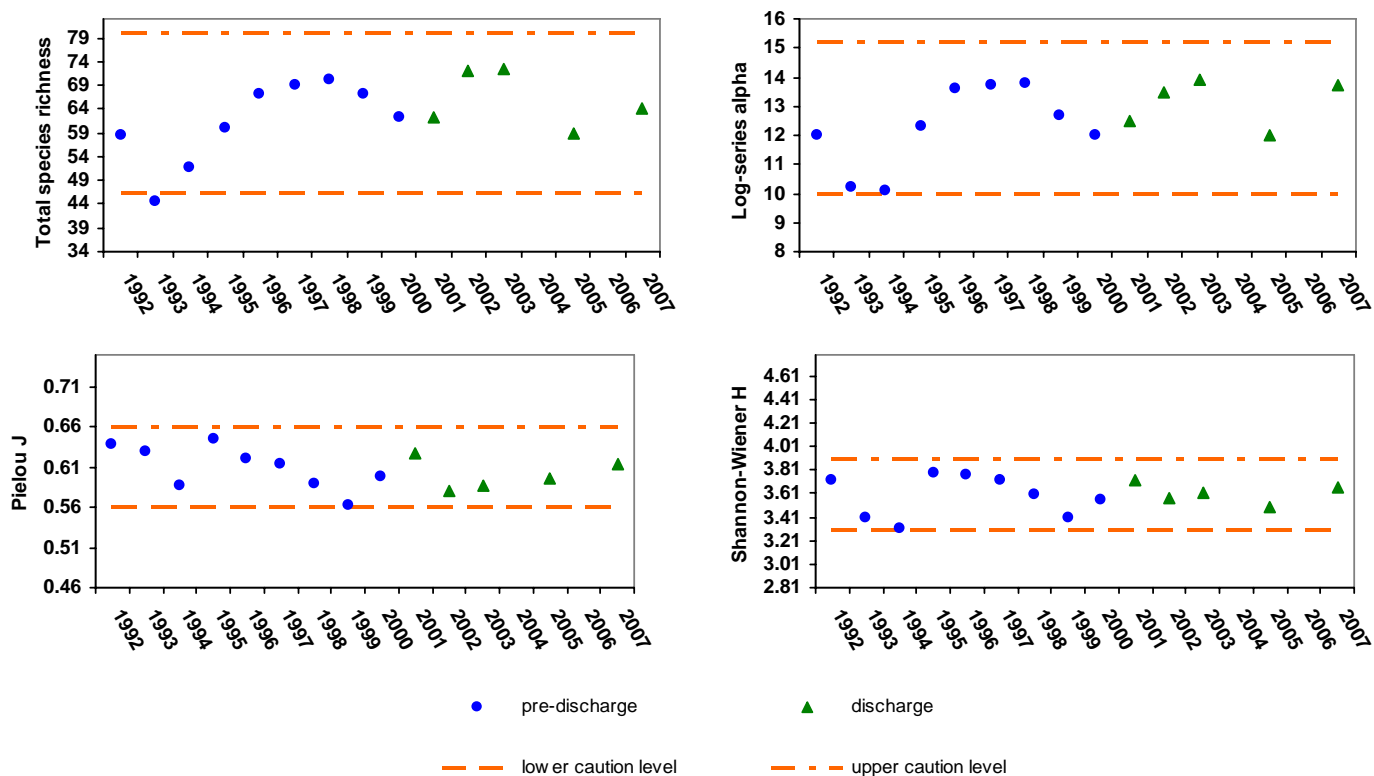
May-August <i>Alexandrium</i> per-sample abundance (cells/liter)	
Caution threshold	100
Summer 2007	6.2*

\* maximum of all samples collected between May 1, 2007 and August 31, 2007

## SEDIMENT BIODIVERSITY - 2007

### DIVERSITY

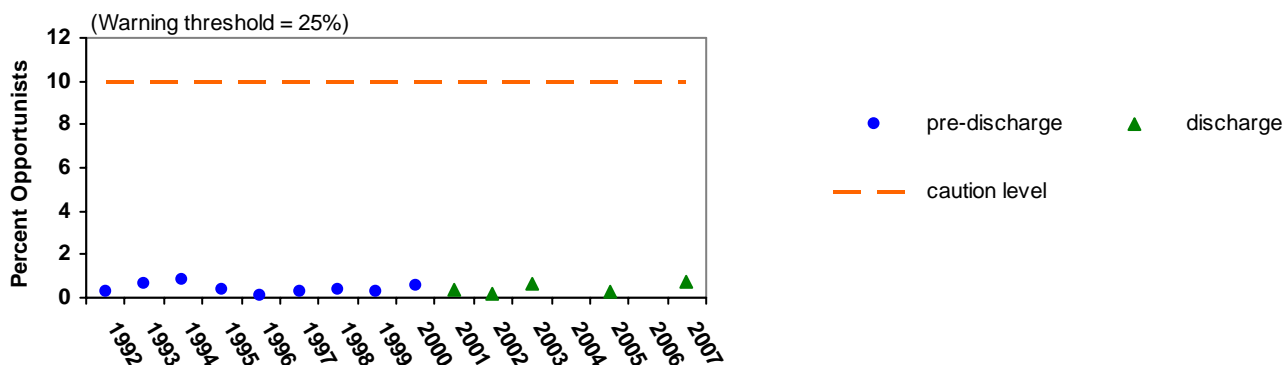
The annual survey of sediment-dwelling communities in 2007 showed that the benthic diversity was normal at the outfall site, and did not exceed any of the [benthic diversity thresholds](#).



For each diversity measure, the graphs show the annual average for sediment samples collected within seven kilometers of the outfall discharge since 1992. No data are shown for 2004 and 2006 because a different set of stations was sampled in those years.

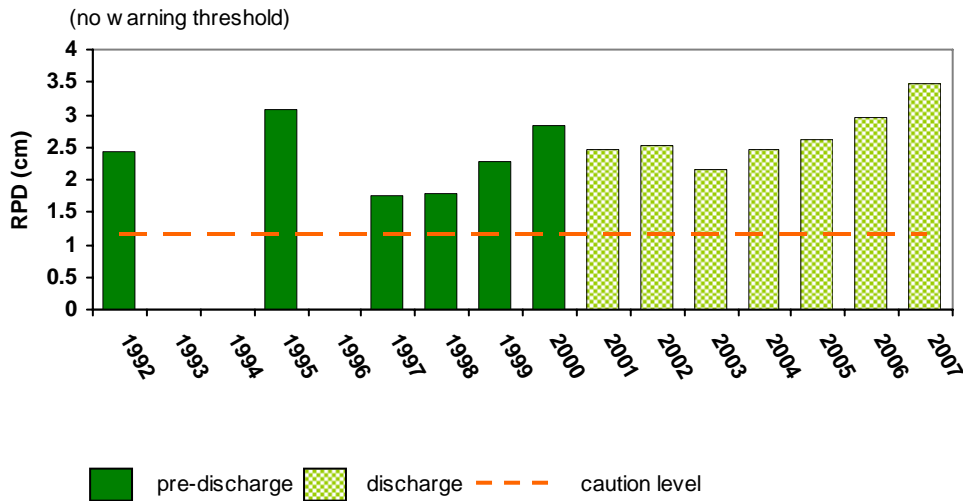
### OPPORTUNISTS

The annual sampling in 2007 showed that the numbers of [opportunistic benthic organisms](#) remain normal at the outfall site and did not exceed the caution threshold of 10% of the total population.



## SEDIMENT ENRICHMENT - 2007

The 2007 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.)