

Contingency Plan Report
Second Quarter 2011

Ambient Monitoring

MWRA gathers data from the outfall location in Massachusetts Bay on various thresholds in its Deer Island outfall discharge permit. This Contingency Plan quarterly report shows relevant ambient monitoring results that became available in the April-June 2011 time period.

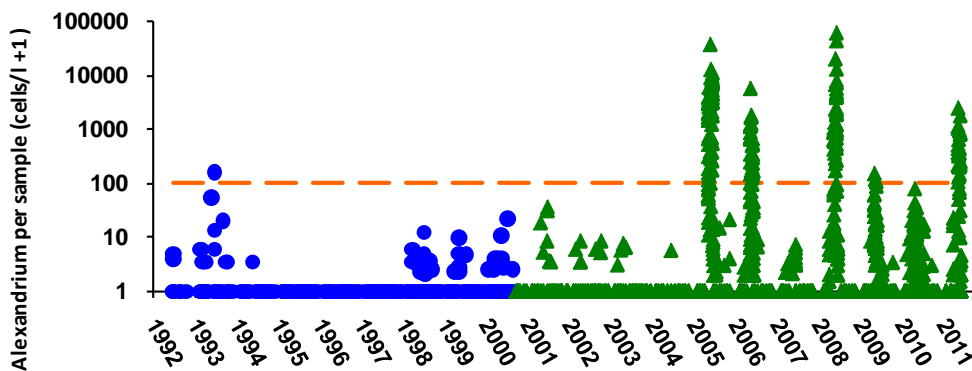
There was one exceedance of a Contingency Plan threshold, for the red tide nuisance alga *Alexandrium*.

NUISANCE ALGAE – February-June 2011

ALEXANDRIUM

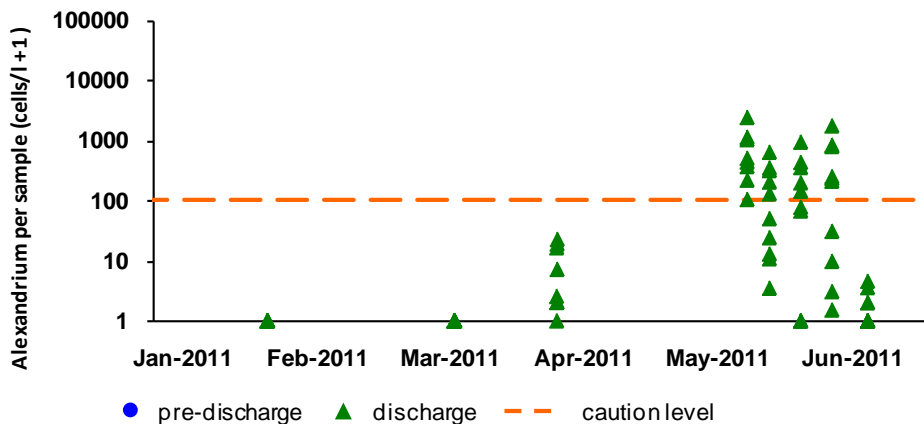
The nuisance algae *Alexandrium* (“red tide”) can cause paralytic shellfish poisoning (PSP) in Massachusetts Bay. MWRA measures *Alexandrium* abundance in its monitoring program, and also checks state fisheries agency observations of shellfish PSP toxicity to keep track of the course of Gulf of Maine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

In 2011 there was an *Alexandrium* bloom along the coast of Maine, New Hampshire, and Massachusetts. Early data, using rapid molecular DNA probe methodologies from a routine survey on May 20, showed that the abundance of *Alexandrium* in the outfall nearfield exceeded the Caution Level threshold of 100 cells/L, triggering notification under the Contingency Plan (see updated notice http://www.mwra.state.ma.us/harbor/pdf/20110610amx_alexandrium.pdf). By the time of preparation of this report (early July 2011), the bloom had subsided in Massachusetts Bay. The bottom figure shows *Alexandrium* results from February through June 2011; there were five routine surveys and three special surveys. (Note logarithmic scale for graph. May and June 2011 data are preliminary.)



January-June results for <i>Alexandrium</i> per-sample abundance (cells/liter)	
Caution threshold	100
Winter-early summer 2011	2,453*

* maximum of DNA probe samples collected in nearfield between January 1, 2011 and June 16, 2011.



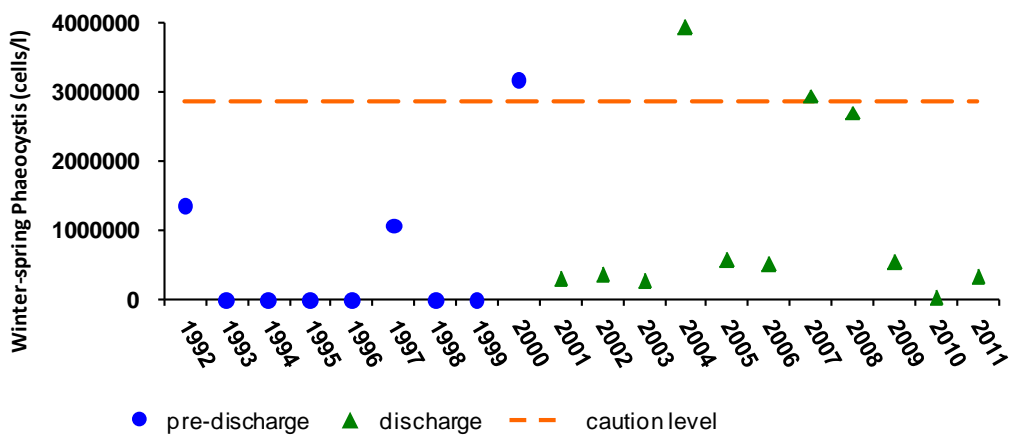
PHAEOCYSTIS and PSEUDONITZSCHIA

In the figures below, we compare *Phaeocystis* and *Pseudonitzschia* data to the [nuisance algae thresholds](#)¹ for winter/spring 2011 (February through April), which included three surveys.

Unlike many recent years, there was no large spring bloom of *Phaeocystis pouchetii* in Massachusetts Bay. Average nearfield abundance was well below the threshold. As in most recent years, *Pseudonitzschia* was not observed in the nearfield in winter/spring 2011.

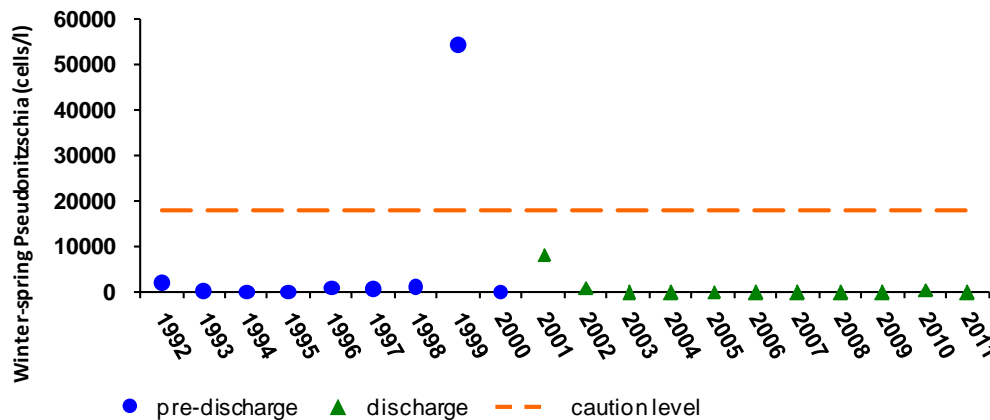
The graphs include data since the start of the monitoring program in 1992; however, the seasonal average values for 1992-2010 are calculated using a subset of all results reflecting the modified design that began in 2011, i.e. three winter/spring surveys. This enables us to better compare the threshold results across years. The previous reports are at <http://www.mwra.state.ma.us/harbor/html/archive.htm>.

PHAEOCYSTIS - Winter/spring



Winter/spring <i>Phaeocystis</i> mean abundance (cells/liter)	
Caution threshold	2,860,000
Winter/spring 2011	338,000

PSEUDONITZSCHIA - Winter/spring



Winter/spring <i>Pseudonitzschia</i> mean abundance (cells/liter)	
Caution threshold	17,900
Winter/spring 2011	0

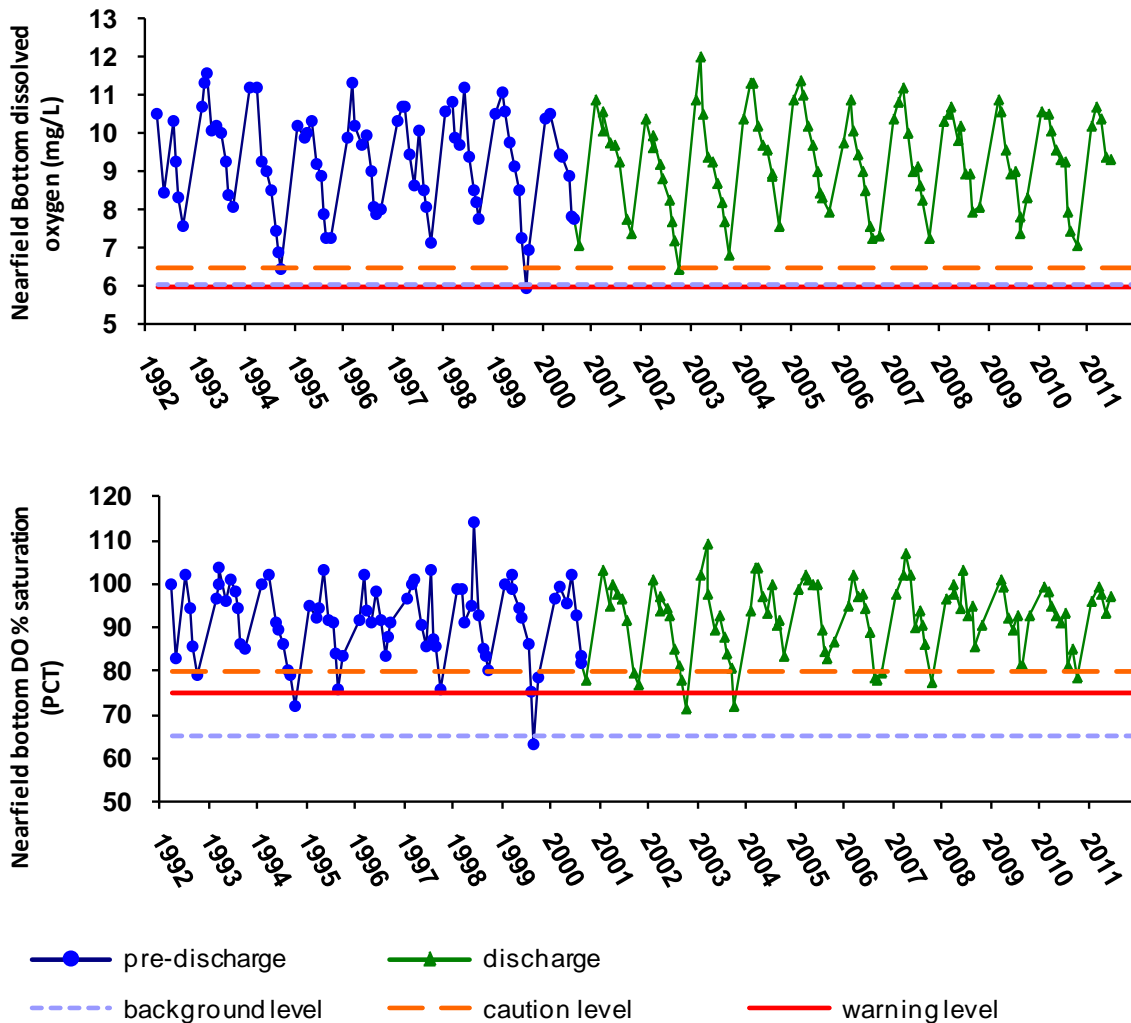
¹ Threshold recalculated for new survey schedule: in 2011, MWRA implemented a new outfall sampling design, which included dropping one survey in the spring. The baseline means and the thresholds (the 95th percentile of the baseline mean) were recalculated by mathematically deleting baseline data corresponding to the dropped survey. The recalculated winter/spring threshold for *Pseudonitzschia* is slightly higher than the old threshold of 2,020,000 cells/l. The recalculated winter/spring *Phaeocystis* threshold is slightly lower than the old threshold of 21,000 cells/l.

DISSOLVED OXYGEN – June 2011

Measurements of dissolved oxygen (DO) concentration and percent saturation in June 2011 did not fall below background levels and thus did not exceed thresholds².

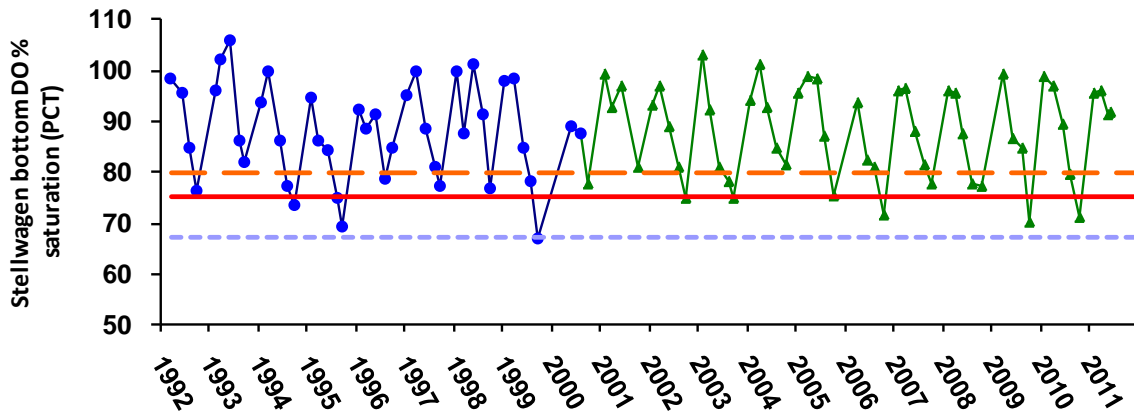
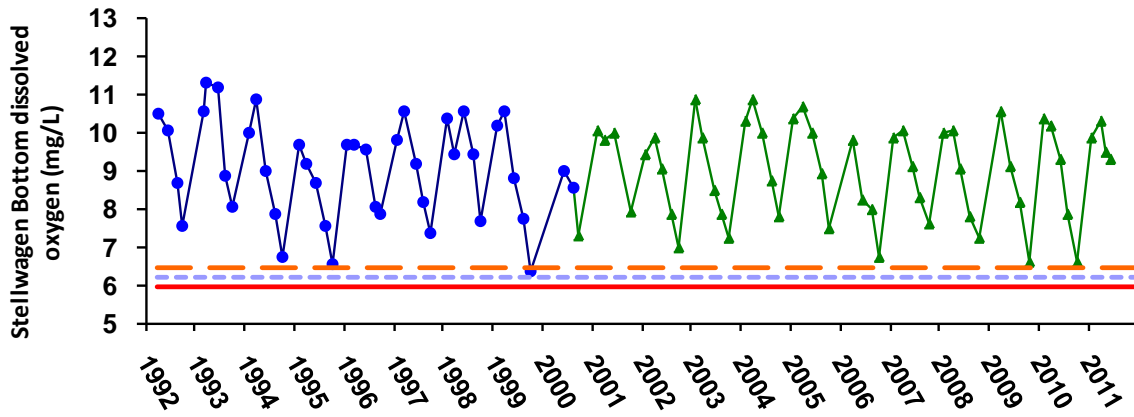
The current reporting period for [dissolved oxygen thresholds](#) is June 2011. During this period there was one survey. Oxygen levels were similar to those seen in most baseline years. The graphs below show the natural annual fluctuation of DO and percent saturation, which is typically lowest in early autumn. The 1992-2010 data shown are a subset 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. The previous reports are at <http://www.mwra.state.ma.us/harbor/html/archive.htm>.

NEARFIELD



² Threshold recalculated for new survey schedule and stations: in 2011, MWRA implemented a new outfall sampling design, which included dropping one (fall) nearfield survey during the period June-October used for threshold testing. The new study design also includes only one station in Stellwagen Basin rather than four, but this farfield station is now sampled nine times per year instead of six. The baseline means and the “background” value (the 5th percentile of the baseline means) were recalculated mathematically deleting baseline data corresponding to the dropped surveys and stations. The recalculated background values are slightly higher than the old background.

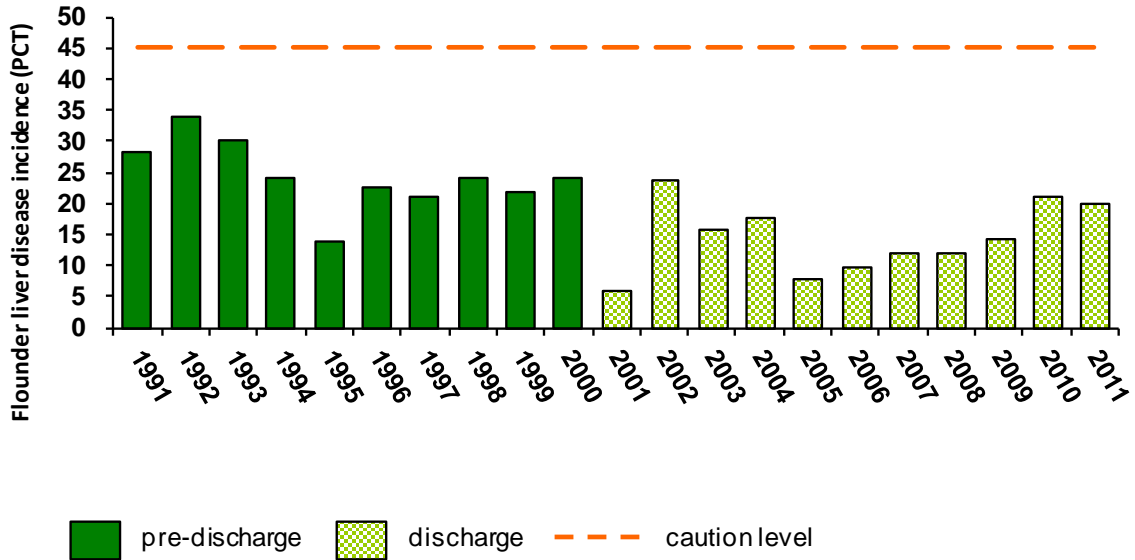
STELLWAGEN BASIN



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

FLOUNDER LIVER DISEASE - 2011

The prevalence of liver disease at the outfall site in 2011 was 20%, within the range of the baseline years, and did not exceed the threshold. Flounder are sampled annually in April.



One measure of the effects of pollution is the prevalence of liver disease in winter flounder. 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 1980s. Since Massachusetts Bay monitoring began, prevalence of an early-stage liver disease near the new outfall has been much lower than the threshold. If the prevalence of liver disease at the outfall site were to approach that seen in Boston Harbor in the 1990's, a caution level threshold would be exceeded.