prepared by W. Leo, S.Y. Liang, and S. Carroll, MWRA

Contingency Plan Report
Third Quarter 2003

Ambient Monitoring

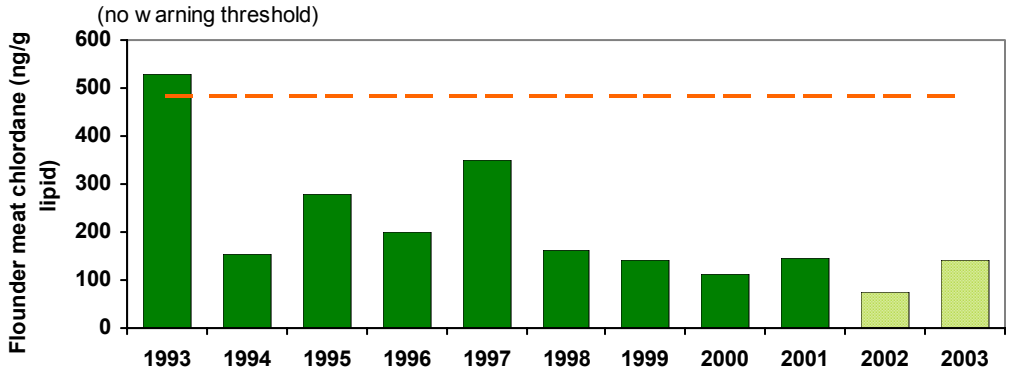
MWRA gathers data from the outfall location in Massachusetts Bay on various thresholds outlined in its Deer Island outfall discharge permit. This report shows relevant ambient monitoring results that became available in July-September 2003.

FISH AND SHELLFISH TISSUE CONTAMINATION

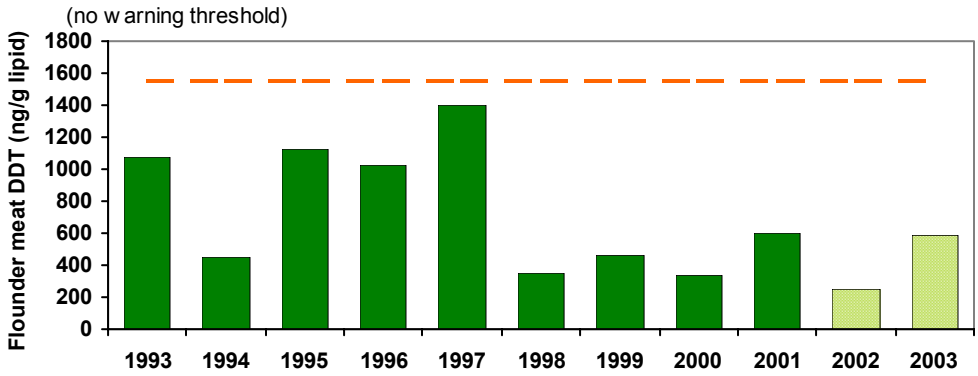
The fish tissue contamination thresholds are designed to identify unexpected effects on marine life. Contaminants are measured in three species of seafood: flounder, lobster, and mussels. FDA Action Limits exist for mercury and PCBs in flounder, lobster, and mussels; for these measurements, caution and warning thresholds are set at 50% and 80% of the FDA limits. The threshold for lead in mussels is based on EPA risk assessment of lead in drinking water. Other fish/shellfish tissue contamination thresholds are based on change from baseline conditions at the outfall site.

Data available this quarter include tissue contamination and liver disease in winter flounder, which were sampled at the outfall site in April 2003. Flounder meat contamination remained low and similar to other years.

CHLORDANE

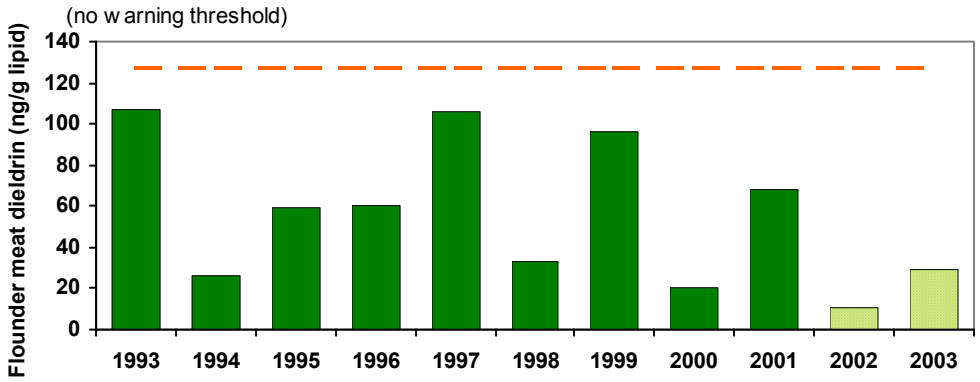


DDT

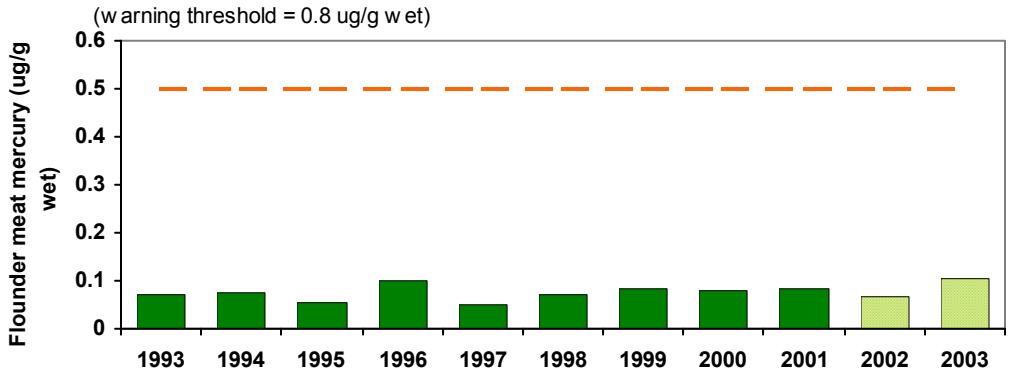


Flounder tissue contaminant levels (continued on next page)

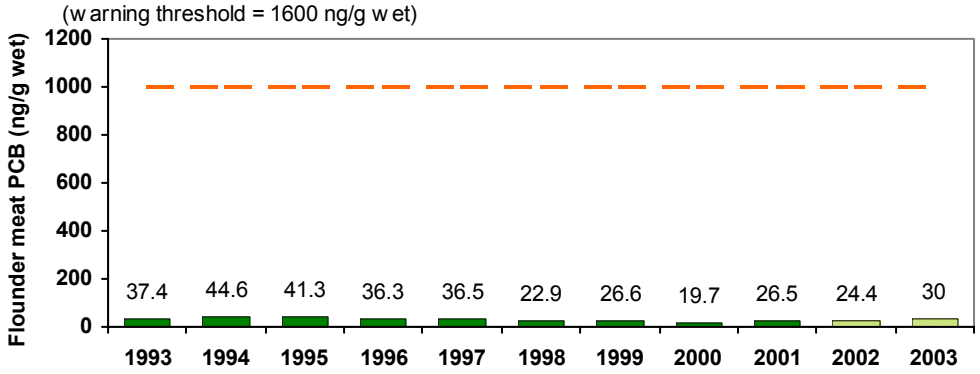
DIELDRIN



MERCURY

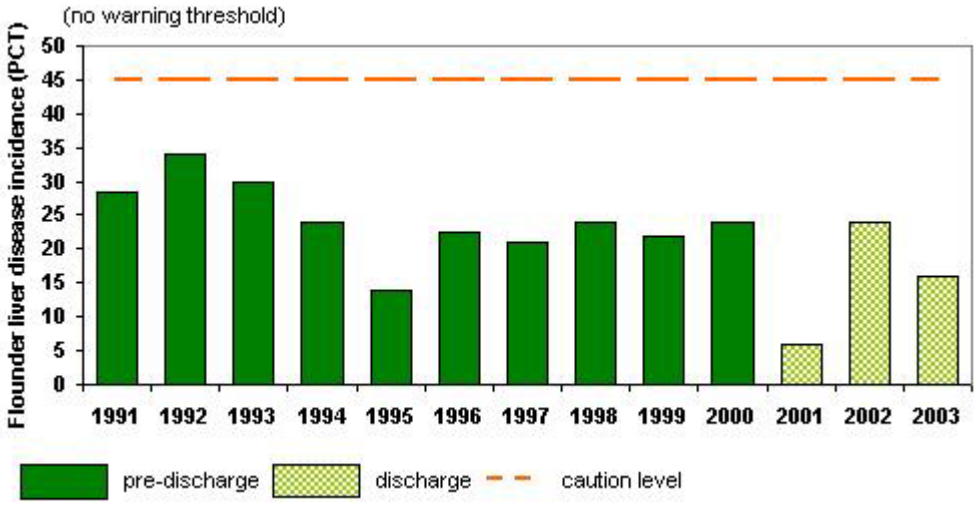


PCBs



FLOUNDER LIVER DISEASE

Another measure of the effects of pollution is the incidence of disease in winter flounder. The flounder liver disease threshold is based on data from Boston Harbor, where flounder liver disease rates were historically quite high but which dropped considerably during the late 1980s. If the prevalence of an early-stage liver disease at the outfall site were to approach the lower levels seen in Boston Harbor during the baseline monitoring period (1991-2000), a caution threshold would be exceeded. In 2003, the prevalence of liver disease at the outfall site was similar to baseline years and did not exceed the threshold.

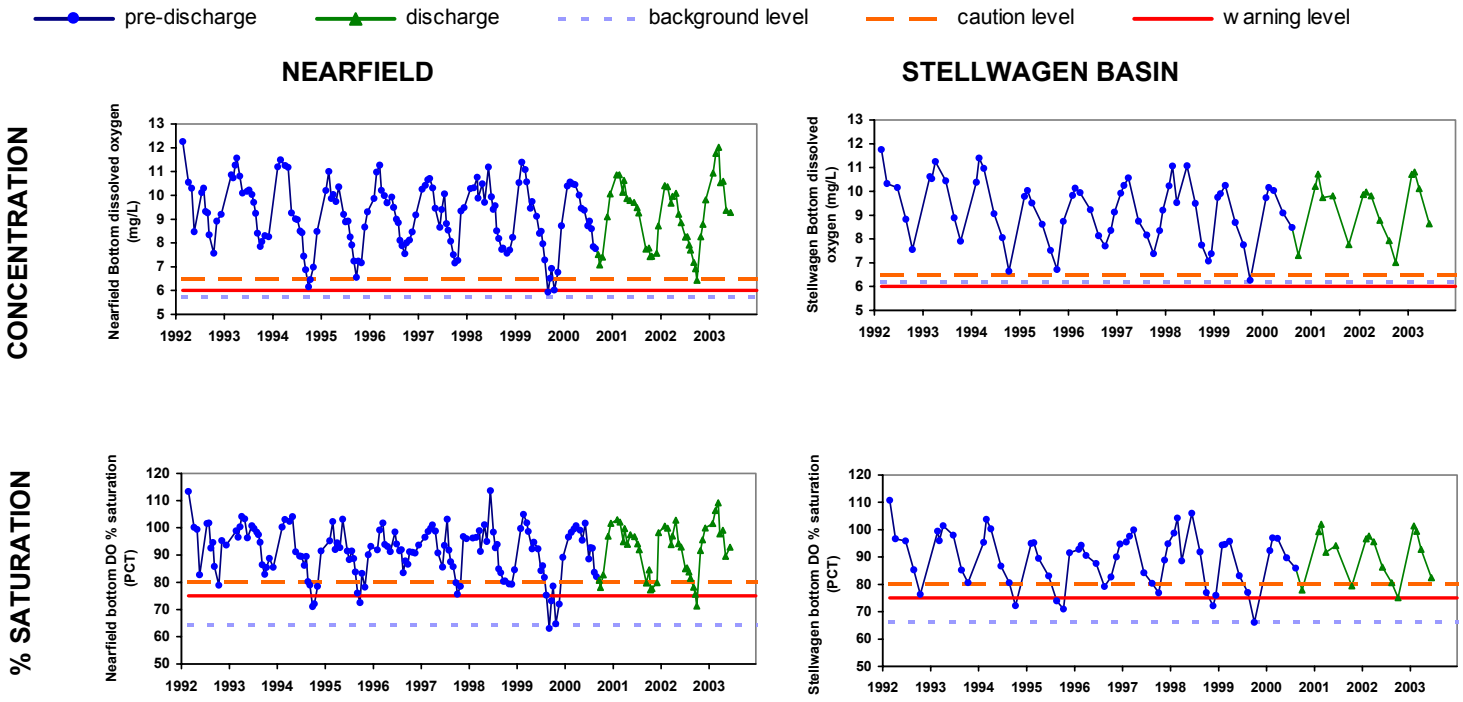


DISSOLVED OXYGEN

The concentration of dissolved oxygen (DO) in the water indicates the balance between production by algae and consumption by aquatic organisms and the decomposition of organic matter. Excessive organic matter may result in oxygen depletion, which may in turn adversely affect the aquatic ecosystem. The amount of oxygen that the water can hold is related to water temperature, salinity, and pressure; thus, the percent saturation of dissolved oxygen is a measure that takes these factors into account. Monitoring locations for which there are DO thresholds include the "nearfield," the group of stations within about three miles from the outfall, and "Stellwagen Basin," a deep area nine miles east of the outfall. Thresholds apply to the part of the year when the water column is stratified, *i.e.* from June - October. The current reporting period for dissolved oxygen thresholds is June 2003. During this period there was one nearfield/farfield survey.

Dissolved oxygen concentration and percent saturation naturally fell below the numerical thresholds on occasion during the baseline period. The state standard, on which the thresholds were based, allows an exception if background conditions are lower, as is the case here; thus, the threshold is not exceeded unless the value falls below the threshold and below background.

Measurements of dissolved oxygen (DO) concentration and percent saturation in early summer did not fall below background levels and thus did not exceed thresholds. Levels in winter and spring 2003 were fairly high, probably due to cold, stormy weather. The graphs below 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.



CHLOROPHYLL

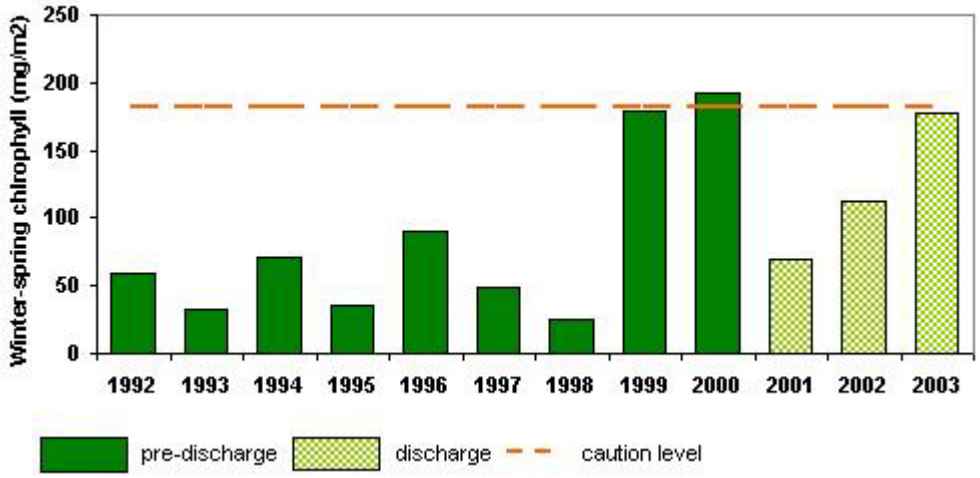
Chlorophyll is a measure of the amount of microscopic plants (phytoplankton or algae) in the water. In Massachusetts Bay, production of algae is the basis of the food web. However, excessive growth of algae can lead to undesirable consequences, such as oxygen depletion at depth due to decomposition of organic matter. Effluent from the outfall is rich in nutrients, and therefore could potentially cause excessive algal growth.

There are annual and seasonal chlorophyll thresholds for the "nearfield," the group of stations within about three miles from the outfall that are most likely to be affected by nutrient-rich effluent. Because the levels of chlorophyll in the water naturally vary over the year, there are separate thresholds for different seasons. In most years, Massachusetts Bay experiences a “spring bloom” characterized by high chlorophyll levels as lengthening days provide enough sunlight for algae to grow quickly. Chlorophyll typically drops in summer, as the nutrients in well-lit surface waters are used up. When the weather cools, the surface and bottom waters mix, which usually gives rise to a “fall bloom” as nutrient-rich bottom waters are mixed up into the well-lit surface layers. As the days become short, chlorophyll levels drop again since there is not enough light for algae to grow.

In this report, we compare post-discharge chlorophyll data to the thresholds for winter/spring 2003 (January through April), which included five surveys. The graphs include data since the start of the monitoring program in 1992.

The caution level threshold for winter/spring is 182 mg/m^2 (areal average of nearfield). The nearfield mean areal average in winter/spring 2003 was 178 mg/m^2, just below the threshold, and similar to the winter/spring of 1999 and 2000.

WINTER/SPRING



NUISANCE ALGAE

Nuisance algal blooms are less predictable than the normal, beneficial algal blooms that produce oxygen and food for marine life; some nuisance blooms did occur during the baseline monitoring period. There is public concern that effluent nutrients could feed a red tide bloom in the vicinity of the new outfall, or otherwise increase the abundance of nuisance algae. Therefore, the Contingency Plan has thresholds for abundance of *Alexandrium*, *Phaeocystis pouchetii*, and *Pseudonitzschia*, which are triggered if the abundance of any of these becomes unusually high.

In this report, we compare post-discharge nuisance algae data to the thresholds for winter/spring 2003 (January through April), which included five surveys. We also compare the per-sample results for *Alexandrium* in the seven January-June surveys to the threshold.

PHAEOCYSTIS

Phaeocystis pouchetii blooms usually occur during February to April but can occur at any time. The species is not toxic, but individual cells can aggregate in gelatinous colonies that may be poor food for zooplankton. *Phaeocystis* was observed in winter/spring 2003 but was below the threshold.

Autumn *Phaeocystis* mean abundance (cells/liter)	
caution threshold	2,020,000
Winter/spring 2003	482,000

PSEUDONITZSCHIA

Pseudonitzschia multiseries blooms can occur during November to March and produce domoic acid, which can cause a condition known as amnesic shellfish poisoning. The group of algae including the toxic species *Pseudonitzschia multiseries*, the closely related *Pseudonitzschia pungens*, and any unidentified *Pseudonitzschia* species was present only at low abundances in the nearfield in winter/spring 2003, well below the threshold.

Autumn *Pseudonitzschia* mean abundance (cells/liter)	
caution threshold	21,000
Winter/spring 2003	232

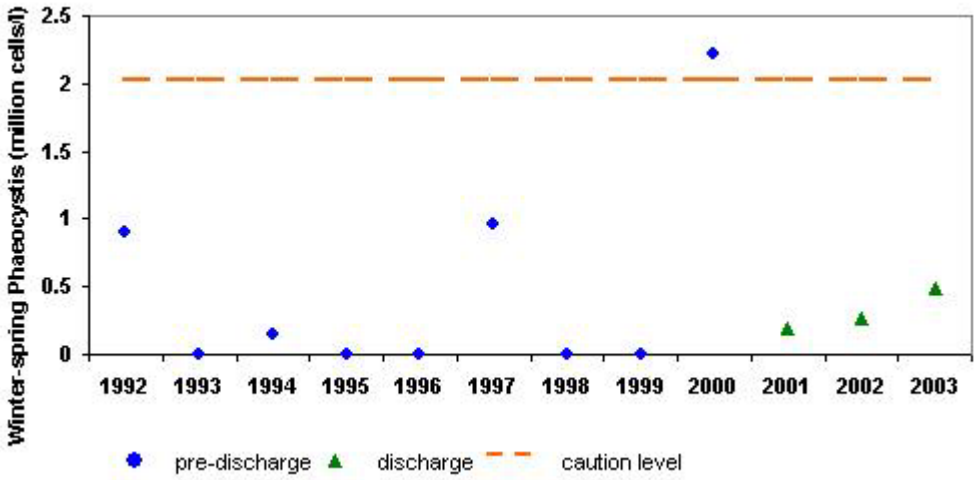
ALEXANDRIUM

No samples exceeded the threshold of 100 cells/liter during the present reporting period (winter and spring 2003.) *Alexandrium tamarense* typically may bloom during April to June and can cause paralytic shellfish poisoning, known as PSP or red tide; it has been periodically found in Massachusetts since the 1970s. Toxicity is generally not found in shellfish until much higher cell counts are seen in the overlying waters. In the winter and spring of 2003 *Alexandrium* cells (*Alexandrium tamarense* plus unidentified *Alexandrium* spp.) were observed in four nearfield samples.

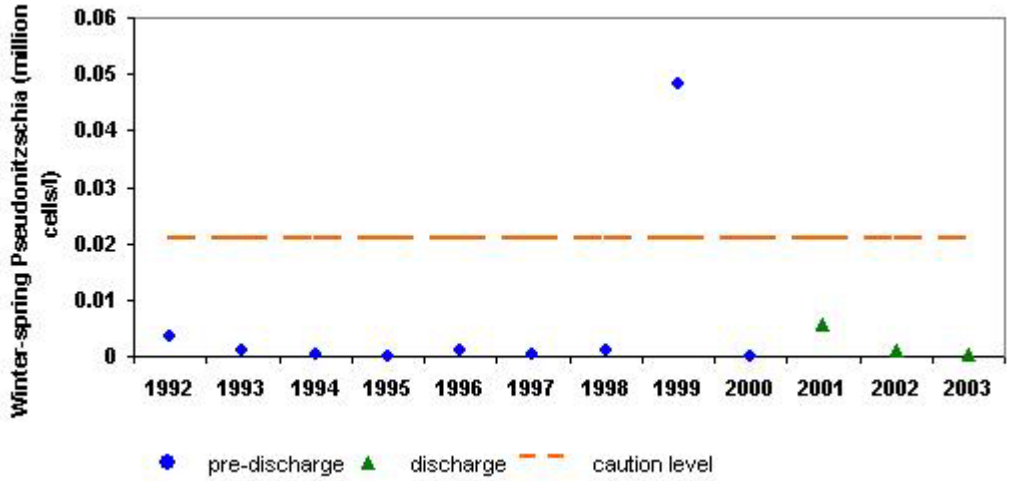
Autumn *Alexandrium* per-sample abundance (cells/liter)	
caution threshold	100
Jan.-June 2003*	7

* maximum of all samples collected between January 1, 2003 and June 30, 2003.

PHAEOCYSTIS



PSEUDONITZSCHIA



ALEXANDRIUM