

Contingency Plan Report

Fourth Quarter 2009

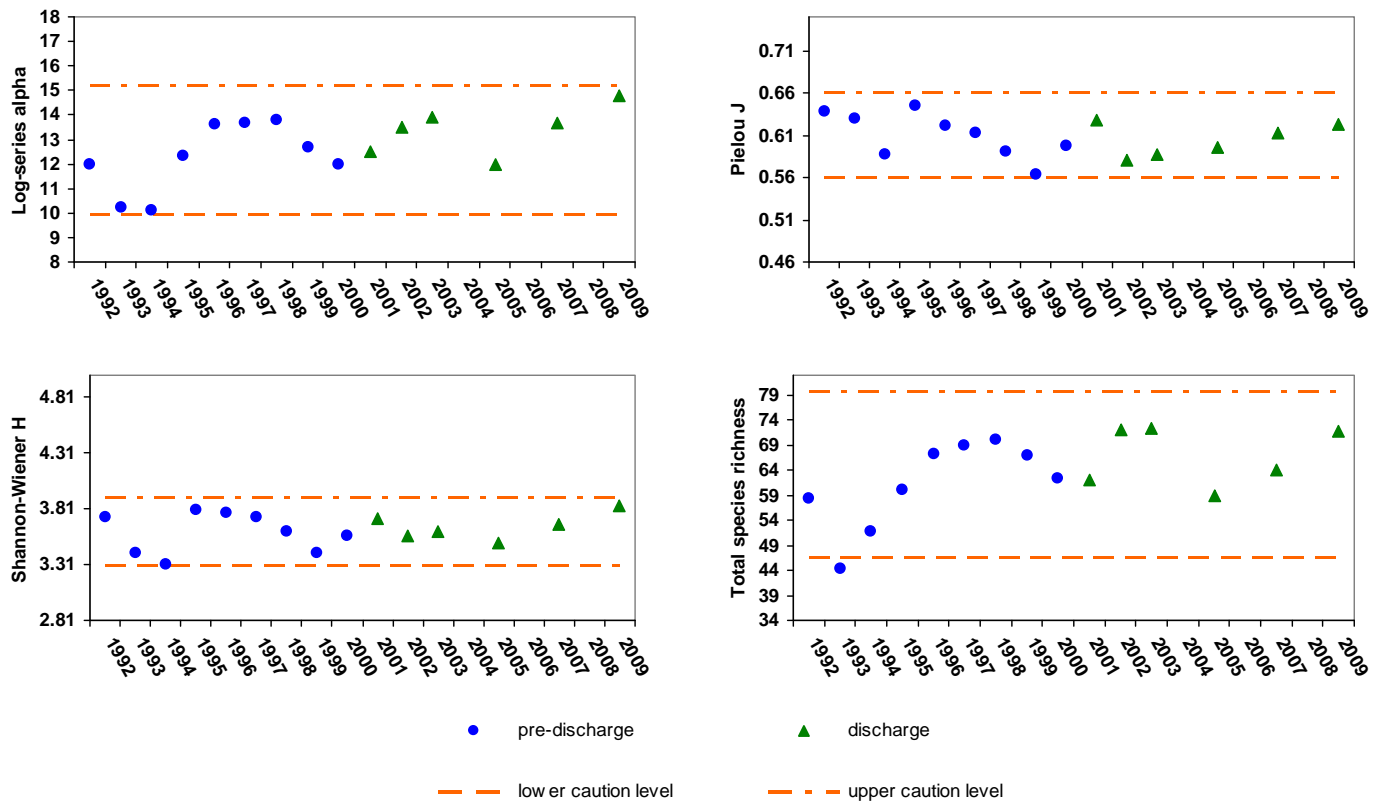
Ambient Monitoring

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 2009 time period. There are updated data relevant to the nuisance alga *Alexandrium*, for which partial results were reported last quarter. There are no new contingency plan threshold exceedances.

SEDIMENT BIODIVERSITY - 2009

DIVERSITY

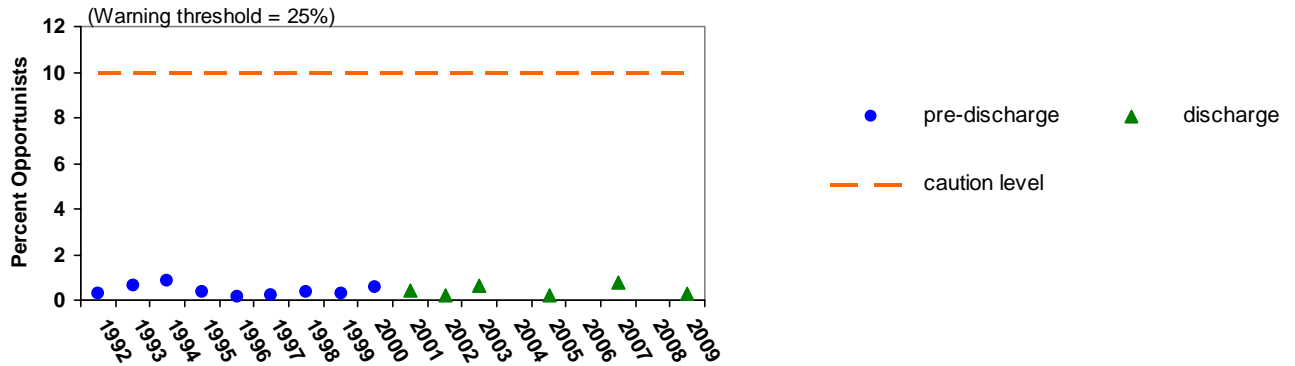
The annual survey of sediment-dwelling communities in 2009 showed that the benthic diversity did not exceed any of the [benthic diversity thresholds](#). Some diversity measures were somewhat high compared to most past years.



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 2006 and 2008 because a different set of stations was sampled in those years.

OPPORTUNISTS

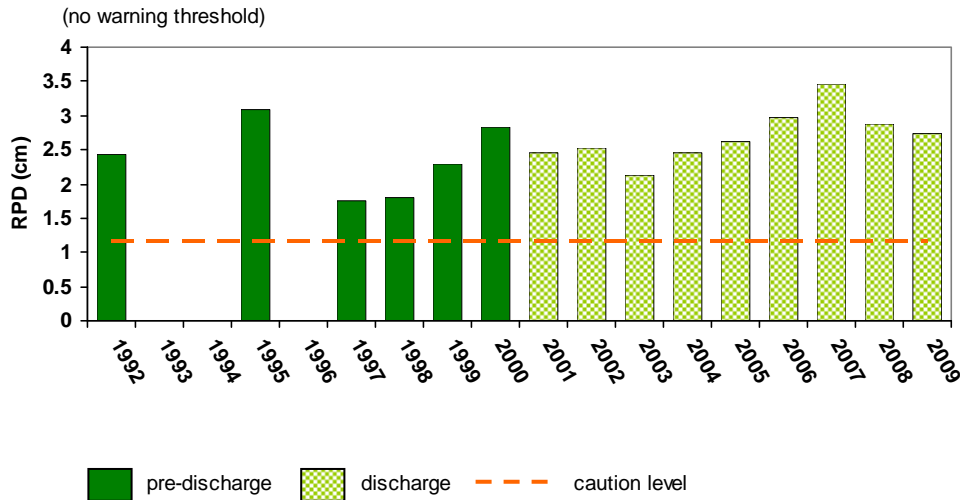
The annual sampling in 2009 showed that the numbers of [opportunistic benthic organisms](#) remain normal at the outfall site and did not exceed the caution threshold of 10% of the total population.



No data are shown for 2006 and 2008 because a different set of stations was sampled in those years.

SEDIMENT ENRICHMENT - 2009

The 2009 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.)

FISH AND SHELLFISH TISSUE CONTAMINATION - FLOUNDER 2009

The fish tissue contamination thresholds are designed to identify unexpected effects on marine life. There were no exceedances of flounder tissue contamination thresholds in 2009.

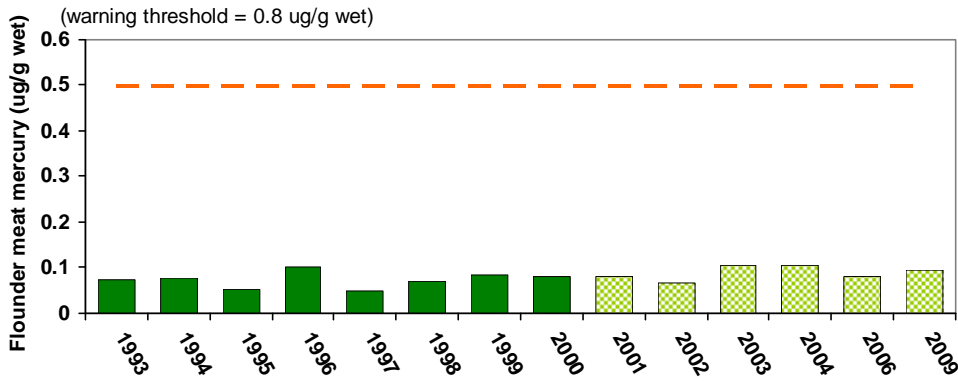
Contaminants are measured in three species of seafood: flounder, lobster, and mussels. For mercury and PCBs in flounder, lobster, and mussels, caution and warning thresholds are set at 50% and 80% of the FDA action limits. The threshold for lead in mussels is based on EPA risk assessment of lead in drinking 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 in winter flounder from the outfall site.

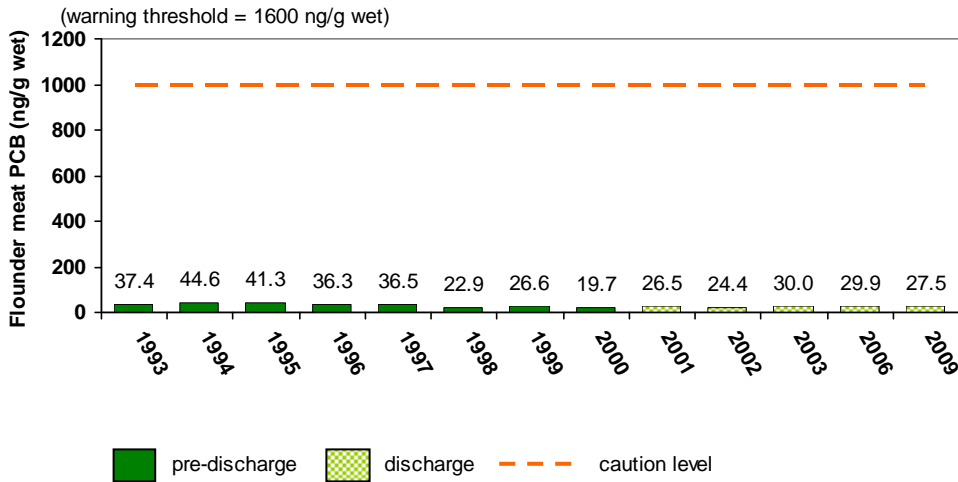
FLOUNDER

Flounder were sampled at the outfall site in April 2009. Flounder meat contamination remained low and similar to other years.

Mercury

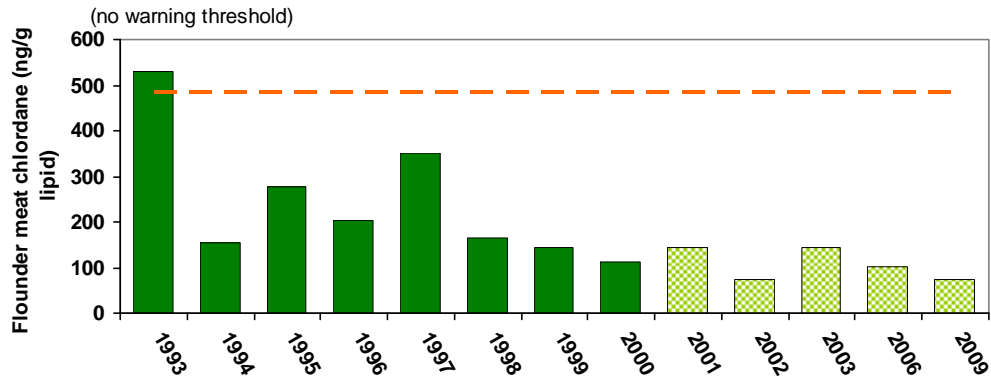


PCBs

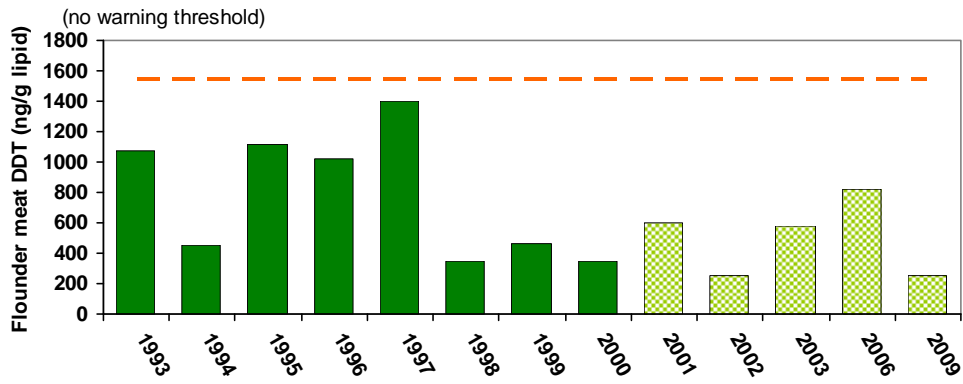


Flounder tissue contaminant levels (continued on next page)

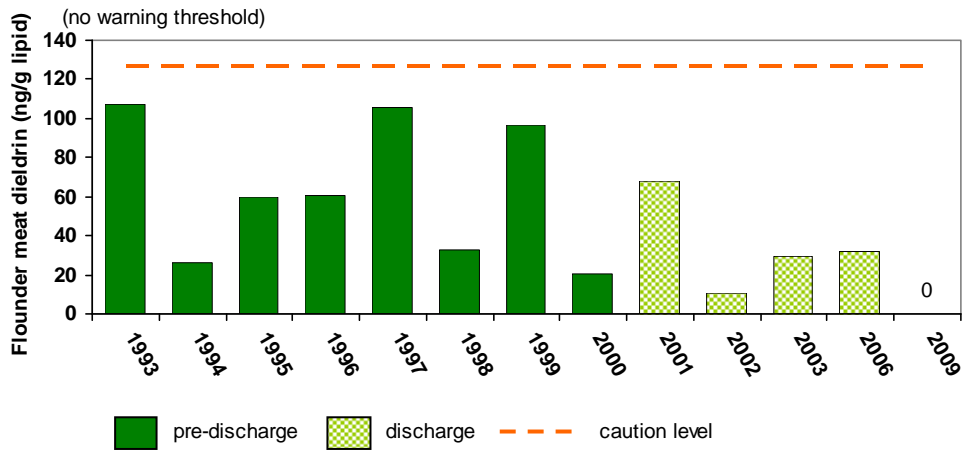
Chlordane



DDT

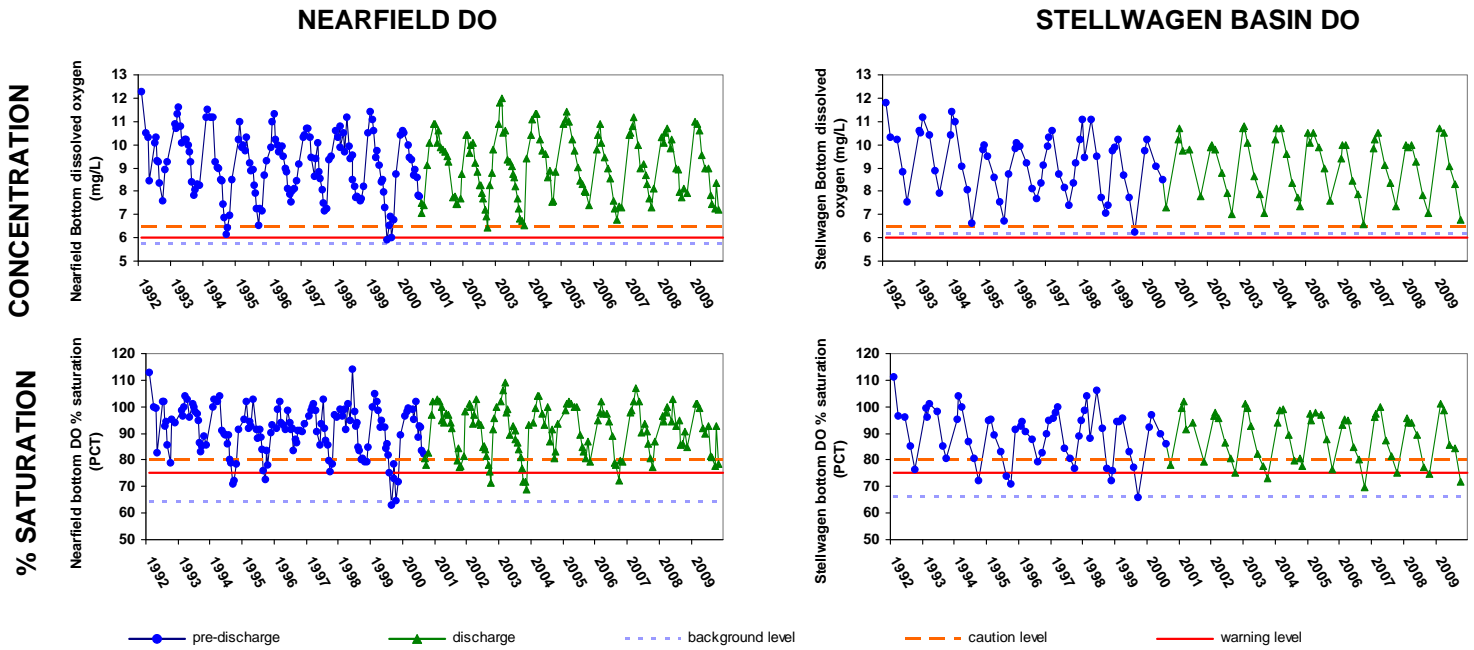


Dieldrin



DISSOLVED OXYGEN (DO) – late September-October 2009

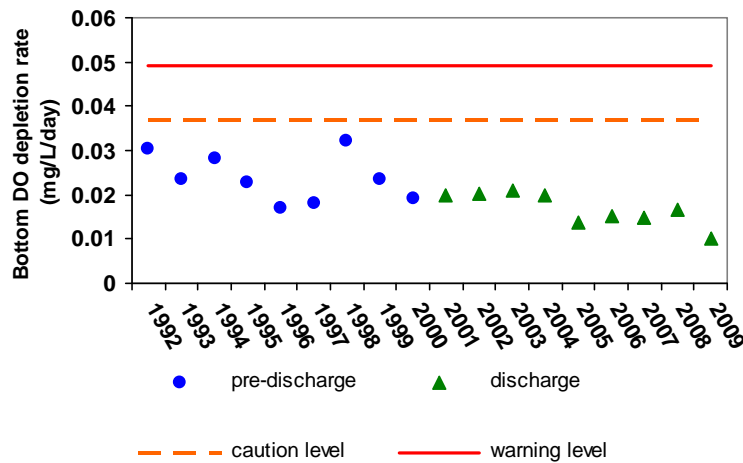
Measurements of dissolved oxygen (DO) concentration and percent saturation in late fall 2009 did not fall below background levels and thus did not exceed thresholds.



The current reporting period for [dissolved oxygen thresholds](#) is late September-October 2009. During this period there were two nearfield surveys and one farfield survey. Oxygen levels were somewhat low, but similar to those seen in several 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 2009

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 2009, defined as June - October. The DO depletion rate for the summer of 2009 was quite low and did not exceed the threshold.



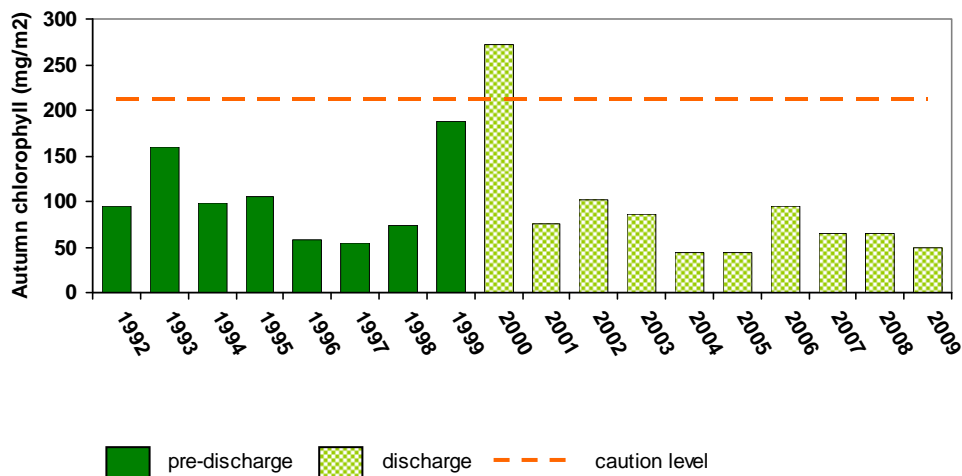
Even if dissolved oxygen concentrations remain healthy, an excessively rapid rate of decrease could signal a future problem. A low rate indicates DO dropped only slowly. The threshold for DO depletion rate is based on a change from the baseline rate; the caution threshold is a rate faster than 1.5 times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

CHLOROPHYLL – September-November 2009 and Annual 2009

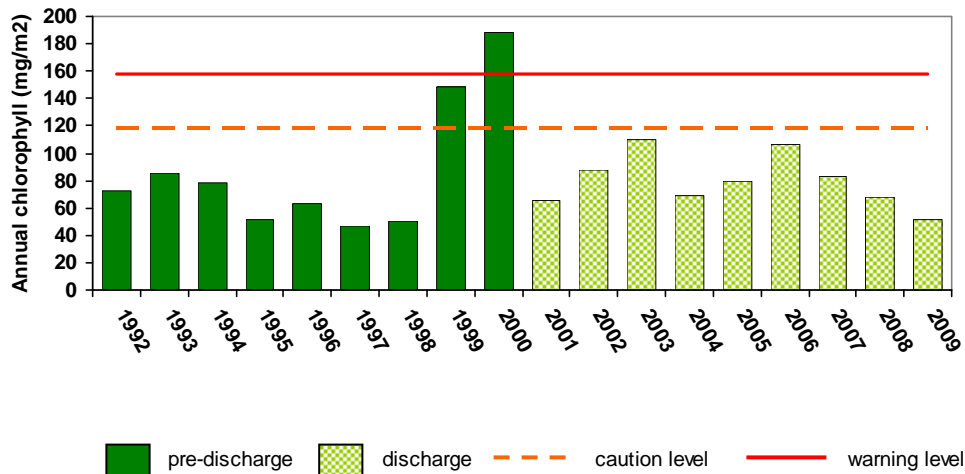
There were no [chlorophyll threshold](#) exceedances for either fall 2009 or for the entire year. The nearfield mean areal average chlorophyll in autumn 2009 was 49 mg/m², well below the caution level threshold for autumn of 212 mg/m². The 2009 annual average was 52 mg/m², well below the caution and warning thresholds for annual average chlorophyll of 118 and 158 mg/m², respectively. Both autumn and annual results were similar to other low-chlorophyll years in the pre-diversion and post-diversion periods.

The figures below compare chlorophyll data for autumn 2009 (September-November), which included four surveys, and data for all of 2009, to the corresponding thresholds. The graph includes data since the start of the monitoring program in 1992.

Autumn



Annual



NUISANCE ALGAE – SUMMER 2009

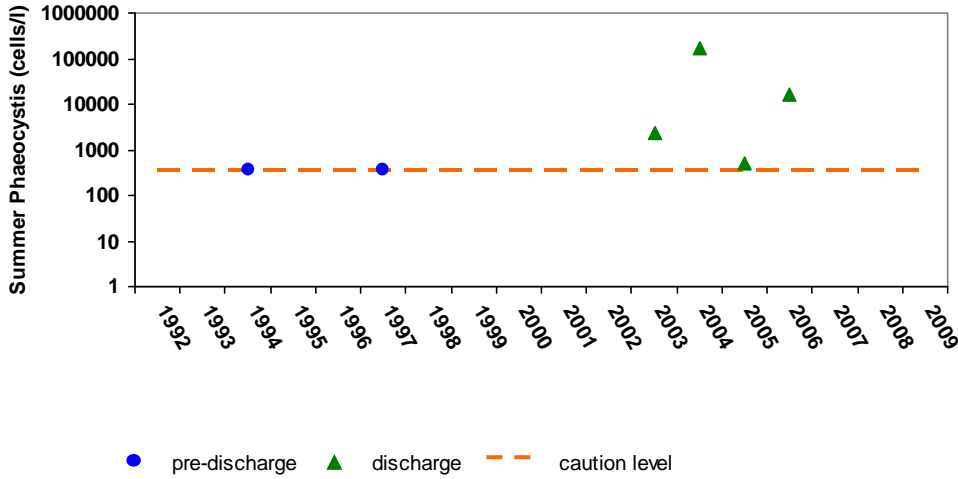
In the figures below, we compare *Phaeocystis* and *Pseudonitzschia* data to the [nuisance algae thresholds](#) for summer 2009 (May through August), which included four surveys. We also compare *Alexandrium* data to the threshold for each sample in July through August 2009.

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

PHAEOCYSTIS and PSEUDONITZSCHIA

Neither *Phaeocystis pouchetii* nor *Pseudonitzschia* were observed in the nearfield in summer 2009.

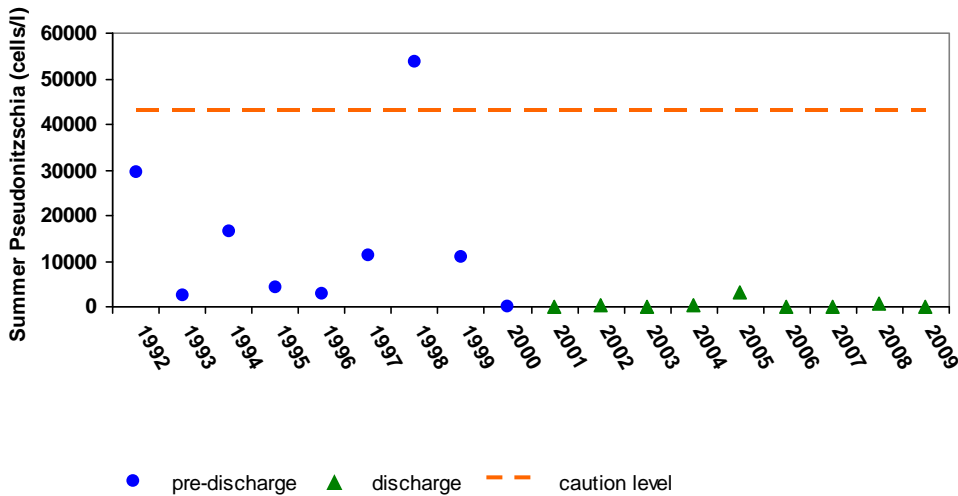
PHAEOCYSTIS, Summer



Summer <i>Phaeocystis</i> mean abundance (cells/liter)	
Caution threshold	357
Summer 2009	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 2009	0

