2010

Toxic Chemicals in Mussels (2010 State of the Bay Poster)

Casco Bay Estuary Partnership

Toxic Chemicals in Mussels

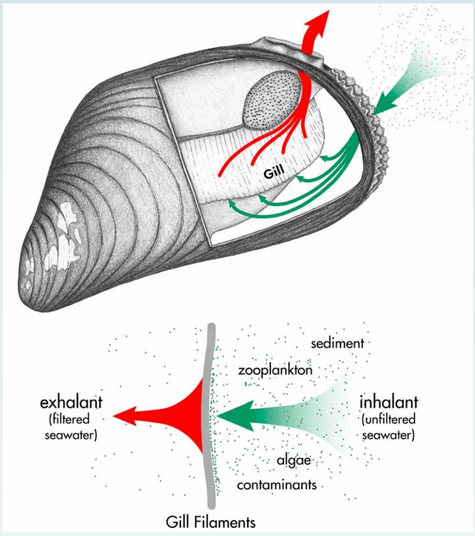


Illustration by Ethan Nedeau

The common blue mussel (*Mytilus edulis*) is an excellent indicator of environmental contamination. As a mussel breathes and feeds, its gill filters out and retains small particles, including biologically available contaminants, which can be ingested and assimilated into its tissues.

The blue mussel is common throughout Gulf of Maine coastal areas, where it is found in densely populated beds in the intertidal zone—the area between low and high tides. Casco Bay is one of the most productive areas in Maine for wild mussels. The blue mussel is thus a useful "sentinel" species for the Bay.

Because many toxic compounds biomagnify (become more concentrated in organisms higher up the food chain), elevated levels of contaminants in the tissues of blue mussels—which are near the base of the food chain—suggest that top-level consumers, including fish and humans, may be at risk from contaminants in the ecosystem.

Changes in Lead Concentration in Mussels from Sites in Casco Bay

- The Maine Department of Environmental Protection (DEP) has monitored pollutants in mussels at several Casco Bay sites.
- As shown in the graph at left, the data suggest that while there was an initial increase in lead levels from 1988 to 2001/2002, **there has been a decline in lead levels** in more recent samples.
- Units are micrograms per gram dry weight.

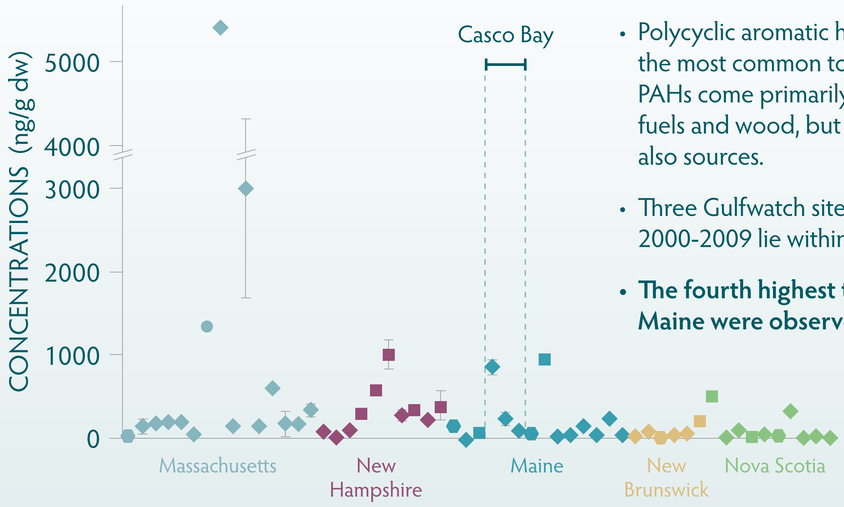
Gulfwatch Data for Metals in Portland Harbor (2000–2008)

Year	Hg	Ag	Cd	Pb	Ni	Zn	Al	Cr	Fe	Cu
2000		0.1	1.78	11.5	2.45	357.5	370	2.3	737.5	12.3
2003	0.30	0.09	1.48	2.33	7.62	107.8	467		668.8	
2005	0.29	0.05	1.89	6.58	1.39	159.5	464	1.8	761.3	8.6
2007	0.2	0.02	1.39	4.34	0.95	146	250	1.7	444	7.6
2008	0.2	0.02	1.48	5.16	1.06	139	483	1.4	606	8.08

Units are µg/g dry weight.

- Gulfwatch is a joint US/Canada blue mussel monitoring program funded through the Gulf of Maine Council on the Marine Environment.
- Three sites sampled from 2000-2009 lie within the Casco Bay watershed.
- As shown in the table, the **concentrations of most metals, including lead, decreased** from 2000 to 2008 at the Gulfwatch site in Portland Harbor.

Concentrations of PAHs at Sampling Sites in the Gulf of Maine



Eight-year (2000-2008) median and median absolute deviations in concentrations in mussel tissues at all Gulfwatch sites, in geographic order (south to north along the x axis from Massachusetts to Nova Scotia).

- Polycyclic aromatic hydrocarbons (PAHs) are the most common toxic contaminants in the Bay. PAHs come primarily from combustion of fossil fuels and wood, but oil, fuel spills, and asphalt are also sources.
- Three Gulfwatch sites sampled for PAHs from 2000-2009 lie within the Casco Bay watershed.
- **The fourth highest total PAHs in the Gulf of Maine were observed at Portland Harbor.**

- Benchmark site (sampled every year)
- Multi-year sites (sampled every 3 years)
- Sampled every 6 years
- Occasionally sampled sites

Casco Bay Estuary Partnership