

# Elevated Lead and PAHs Found in a Few Localized Shellfish Beds

Casco Bay Estuary  
PARTNERSHIP

Periodic monitoring of shellfish tissues indicates that most Casco Bay shellfish are safe for human consumption, with some samples from the most industrialized parts of the Bay showing elevated levels of contaminants.



Dave Roberts

## Historic Sources Account for Some of Toxic Chemicals Found in Bay Shellfish

The presence of toxic chemicals in filter feeders like blue mussels (*Mytilus edulis*) and soft-shell clams (*Mya arenaria*) can indicate contaminants within the larger marine ecosystem, revealing how chemicals released from human sources appear in the food chain—potentially harming fish, wildlife and humans.

The Maine Department of Environmental Protection's SWAT (Surface Water Ambient Toxics) monitoring program collects and analyzes blue mussels and soft-shell clams for toxic chemicals. Maine DEP compares concentrations of mussels collected from Casco Bay with those collected elsewhere in the Gulf of Maine using a standard based on the Gulfwatch program, a joint US/Canada blue mussel monitoring program that has sampled mussels throughout the Gulf. Concentrations are described as elevated when they exceed the 85<sup>th</sup> percentile value based on over two decades of sampling (GOMC 2009).

Shellfish sampled in the last five years from more urban areas of Casco Bay have higher levels of some toxic chemicals compared to less developed areas of Casco Bay. Centuries of pollution from industry and waste dumps, as well as urban runoff from residential and commercial development explain this finding (CBEP 2007).

In 2010 and 2012, for example, mussels collected from Spring Point in South Portland exhibited elevated levels of polycyclic aromatic hydrocarbons (PAHs), toxic compounds released from combustion of fossil fuels and wood and from fuel spills and asphalt. This location, downstream of the Fore River, is near a marina and an oil terminal.

Toxics Elevated<sup>1</sup> in Mussels Collected at Casco Bay Sampling Sites from 2011 to 2014

Year Sampled	Sampling Location	Al	Fe	Cr	Cu	Ni	Pb	Zn	Hg	PCBs <sup>2</sup>	PAHs <sup>3</sup>	Organochlorine Pesticides <sup>4</sup>
2010	Spring Point, South Portland	✓	✓	✓	✓	✓	✓	✓			✓	✓
2011	East End Beach, Portland				✓		✓					✓
	Mill Creek, Falmouth											
2012	Spring Point, South Portland				✓		✓				✓	✓
2013	East End Beach, Portland				✓		✓					Not measured
2014	Mill Creek, Falmouth			N/A <sup>5</sup>		✓						Not measured
	Navy Pier, Harpswell			N/A <sup>5</sup>		✓						Not measured
	Mare Brook, Brunswick		✓	N/A <sup>5</sup>		✓						Not measured

Al: Aluminum Fe: Iron Cr: Chromium Cu: Copper Ni: Nickel Pb: Lead Zn: Zinc Hg: Mercury PCBs: Polychlorinated biphenyls PAHs: Polycyclic aromatic hydrocarbons

<sup>1</sup> Elevated based on Gulf of Maine-wide Gulfwatch 85th percentile value, i.e., 85% of samples fall below the 85th percentile value (GOMC 2009)

<sup>2</sup> Sum of 35 PCB congeners

<sup>3</sup> Sum of 19 PAHs

<sup>4</sup> Sum of organochlorine pesticides

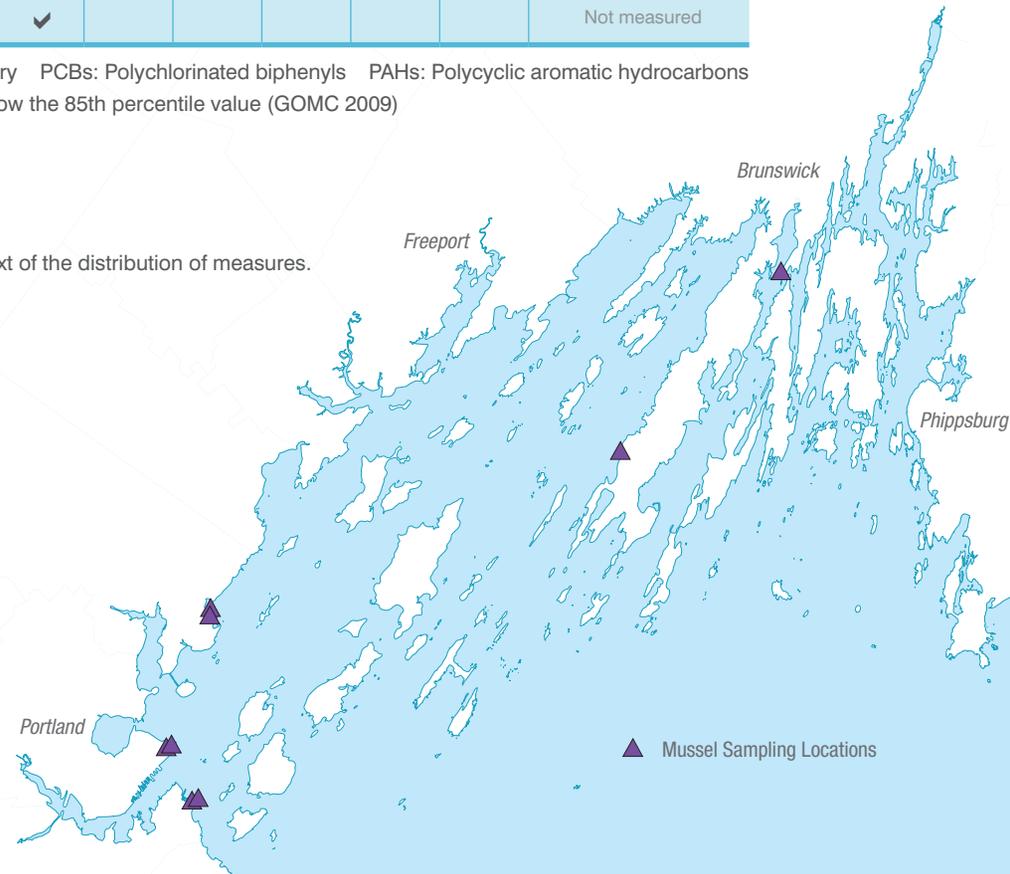
<sup>5</sup> Data not available pending additional data-quality checks.

All data are compared to the Gulfwatch 85th percentile (GOMC 2009) to provide a geographic context of the distribution of measures.

## Most Shellfish Sampled Appear Safe for Human Consumption

The SWAT monitoring program’s recent tests reveal that most of the shellfish sampled from Casco Bay are generally safe for human consumption. This statement is based on levels of mercury and PCBs compared to a risk-based standard for human health (based on shellfish consumption)<sup>†</sup> and not on levels of indicator bacteria, which is governed by the National Shellfish Sanitation Program (NSSP).

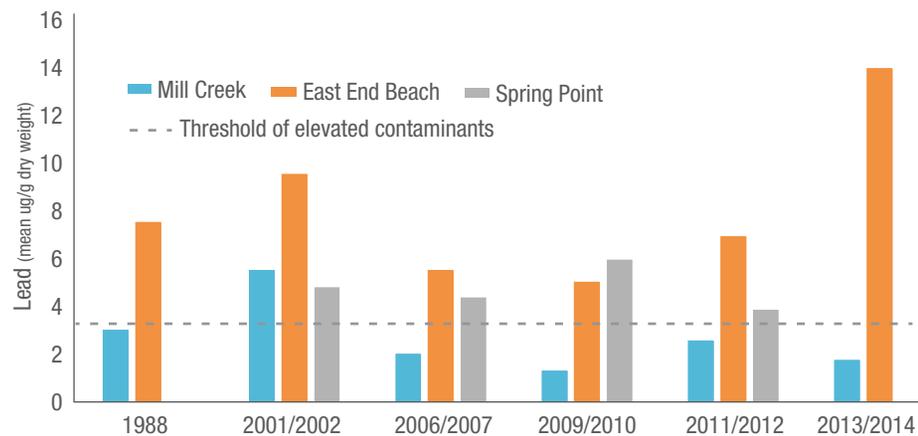
<sup>†</sup> This standard set by the Maine Center for Disease Control and Prevention was recently rescinded. It is used here because the SWAT program continues to use it in reporting (since no alternative standard has been adopted).



## Mussels at Three Sites Reveal Consistently Elevated Lead Concentrations

Contaminant levels of Casco Bay mussels have been tracked for more than two decades at three sites: Mill Creek in Falmouth, East End Beach in Portland, and Spring Point in South Portland.

For lead, values fluctuate but both East End Beach and Spring Point consistently exceed the Gulf of Maine 85th percentile value.



Lead concentration in mussels at three sites in Casco Bay

Concentrations of lead in mussel tissue are also compared to the health-based threshold called the Fish Tissue Advisory Level (FTAL; 0.6 ug/g wet weight) set by the Maine Center for Disease Control and Prevention. Mussels from East End Beach (near both the Portland Wastewater Treatment Facility outfall and the outlets of the Presumpscot River and Back Cove) have consistently exceeded the FTAL (range 0.8 to 2.1 in 2007, 2009, 2011 and 2013); mussels from Spring Point in South Portland equaled or barely exceeded the FTAL (range 0.6 to 0.7 in 2007, 2010 and 2012); and mussels from Mill Creek in Falmouth (a smaller estuary with less surrounding development) have not exceeded the FTAL.

## State Begins Testing for PFCs

In 2013, the Maine Department of Environmental Protection replaced testing for organochlorines with perfluorinated compounds (PFCs), a class of organofluorines that are considered “emerging contaminants of concern.” These compounds, used in industrial and commercial products such as Scotchguard and Teflon, are highly persistent, mobile and distributed worldwide. Some of them are associated with cancer and endocrine disruption in humans and wildlife. At the one site sampled in 2013 (East End Beach), measurements of 11 out of 12 individual PFCs were below detection limits. In 2014, 11 out of 13 individual PFCs were below detection at two of the blue mussel sites sampled. PFCs were not detected in any clam samples in 2013.

For additional references and information, please view the Bibliography of the full *State of the Bay 2015* report at [www.cascobayestuary.org/state-of-the-bay-2015](http://www.cascobayestuary.org/state-of-the-bay-2015).



Duncan Greenhill