Sediment Contamination Study of Casco Bay part 1, Ramboll Environ PowerPoint 2016

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CLEARER THAN MUD
ASSESSMENT OF SEDIMENT IN CASCO BAY (1991-2011)
CASCO BAY ESTUARY PARTNERSHIP
MANAGEMENT COMMITTEE MEETING
AGENDA

• Report objectives
• Overview
  • Why does mud matter?
  • History of sediment sampling
• Methodology
• Results
  • 2010-2011 sediment data review
  • 1991-2011 data trends
  • Regional comparisons
• Summary and conclusions
RESULTS: SNEAK PEEK

Good news for Casco Bay

- Almost without exception, concentrations of chemicals of concern in surface sediments were lower in 2010-2011 than in previous sampling events.
  - Notable exceptions: mercury, selenium
REPORT OBJECTIVES

- Document current status of chemical concentrations in Casco Bay sediments
- Compare to sediment screening values
- Evaluate trends
  - Within areas of Casco Bay
  - Over time
- Regional context (i.e., Gulf of Maine)
- Identify appropriate future studies, if any
WHY DOES MUD MATTER?

- Integrates sources from the entire watershed
  - Ultimate downstream sink
- Historical record
- Pathway into the food chain
  - Ecological exposure
  - Human exposure

Image credit: USEPA
WHY DOES MUD MATTER?

- Integrates sources from the entire watershed
  - Ultimate downstream sink
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- Pathway into the food chain
  - Ecological exposure
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SETTING

• Basin – < 1,000 square miles
• Population - ~250,000 people
• Bay - ~200 square miles
  • Shoreline – 575 linear miles
  • 785 islands
**SETTING**

- Inner Bay: Portland, SoPo, Presumpscot River, Fore River, Back Cove
- Outer Bay: Connection to Gulf of Maine
- West Bay: Yarmouth, Freeport, Harpswell, Royal River, Cousins River, Harraseeket River
- East Bay: Brunswick, New Meadows River, Quahog Bay
- Cape Small: Lower Kennebec River discharge
SOURCES OF CHEMICALS TO CASCO BAY

- Historical
  - Manufactured Gas Plants – PAHs, organics
  - Foundaries – metals
  - Shipyards – organotins, metals
  - Tanneries – metals
  - Rail yards – PAHs, metals, organics
  - Paint factories – metals
  - Various industries – PCBs, mercury, pesticides, dioxins and furans

- Ongoing
  - Wastewater – nutrients, metals, etc.
  - Combustion – PAHs, dioxins and furans
  - Stormwater – metals, PAHs, pesticides...
HISTORY OF SEDIMENT SAMPLING IN CASCO BAY

1991/1994 sediment sampling

- PAHs are most widespread chemicals of concern in Casco Bay
  - Most prevalent near Portland
  - Concentrations exceed screening values
- Concentrations of metals, pesticides, and PCBs are below screening values
HISTORY OF SEDIMENT SAMPLING IN CASCO BAY


- “Regulated chemicals tend to be decreasing” throughout the bay
  - Pesticides, PCBs, some metals
- PAHs and dioxins and furans not changing
  - Nor are select metals
- Concentrations of PAHs and metals increased locally (i.e., Portland)
- Most chemicals below screening values
METHODOLOGY

[Map of Casco Bay with points marked for Inner Bay, Outer Bay, West Bay, East Bay, and Cape Small.]

[Bar chart showing sample count for CDDF, Metal, Organotin, PAH, PCB, Pesticide, and Physical categories.]
DATA ANALYSIS

- Integrate data, calculate sums


benzo(a)anthracene
benzo(a)pyrene
chrysene
dibenz(a,h)anthracene
flouranthene
pyrene
High molecular weight PAHs
DATA ANALYSIS

- Integrate data, calculate sums
- Calculate summary statistics (baywide and by region)
  - Focusing on detects

<table>
<thead>
<tr>
<th>Group</th>
<th>Analyte</th>
<th>Units</th>
<th>Frequency of Detection</th>
<th>Minimum Detected Concentration</th>
<th>Median Detected Concentration</th>
<th>Average Detected Concentration</th>
<th>Maximum Detected Concentration</th>
<th>Standard Deviation of Detected Concentration</th>
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<td>Aluminum</td>
<td>µg/g dry</td>
<td>77 / 77</td>
<td>6700</td>
<td>47000</td>
<td>50000</td>
<td>90000</td>
<td>19000</td>
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