3-31-2017

Casco Bay Sediment Assessment 1991 – 2011

Casco Bay Estuary Partnership

Ramboll Environ

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Casco Bay, Maine

March 31, 2017

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Special thanks to Friends of Casco Bay, Maine Department of Environmental Protection, and National Coastal Condition Assessment. This project was funded by the United States Environmental Protection Agency under Cooperative Agreements #CE 961605010, #CE 96173101, and #CE 96185501.

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ACRONYMS AND ABBREVIATIONS

µg/g	microgram(s) per gram
ANOVA	Analysis of Variance
ATSDR	Agency for Toxic Substances and Disease Registry
CAS	Chemical Abstract Service
CBEP	Casco Bay Estuary Partnership
CSO	combined sewer overflow
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
ERL	effects range low
ERM	effects range medium
HMWPAH	high molecular weight polycyclic aromatic hydrocarbon
IDW	inverse-distance weighting
LMWPAH	low molecular weight polycyclic aromatic hydrocarbon
NCCA	National Coastal Condition Assessment
ng/g	nanogram(s) per gram
PAH	polycyclic aromatic hydrocarbon
PBDE	polybrominated diethyl ether
PCB	polychlorinated biphenyl
PCDD/PCDF	polychlorinated dibenzo-p-dioxin and dibenzofuran
Ramboll Environ	Ramboll Environ US Corporation
TOC	total organic carbon
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

The Casco Bay Estuary Partnership (CBEP) has funded three comprehensive sediment quality assessments throughout Casco Bay since 1991, at roughly ten-year intervals. Chemicals analyzed include metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organochlorine pesticides, dioxins and furans, and organotins. This report summarizes the results from the most recent sediment sampling program conducted in 2010-2011 and describes how concentrations of chemicals in sediment have changed over the 20-year period since samples were originally collected.

The existing sediment data indicate some notable trends, although there is some uncertainty in the ability to conclusively identify trends in sediment concentrations over time due to differences in analytical methods, spatial variability, and sediment resuspension. Concentrations of most chemicals in the sediments of Casco Bay have either decreased or showed little to no change over time and concentrations for nearly all chemicals were consistently below effects-based screening values that are protective of marine life. Concentrations of most analytes (metals, PAHs, dioxins and furans, and organotins) tended to be lower in the 2010–2011 data set compared to the previous sampling efforts. Elevated detection limits for PCBs and pesticides preclude conclusions regarding time trends for concentrations of those analytes. The highest chemical concentrations appear to be associated with adjacent land use and the physical characteristics of sediment (grain size and total organic carbon content). Finally, concentrations of most chemicals in Casco Bay tended to be lower than or similar to concentrations in other coastal locations in the Gulf of Maine.

These trends are generally consistent with expectations as industrial loadings of chemicals to the bay have decreased, several of these chemical groups (e.g., PCBs and some pesticides) have been banned from production and use in the United States, and the economic base within the Casco Bay watershed is transitioning to more service-based sectors. However, the decrease in concentrations of PAHs is somewhat unexpected. A principal source of PAHs to the environment is fossil fuel combustion, and Maine experienced decreases in emissions from power plants and transportation from 2005 to 2012. Emissions have since begun to increase again. It is possible that the observed decline in PAH concentrations in Casco Bay sediments in 2010–2011 is a short-term trend associated with the observed decrease in atmospheric emissions around the same time period.

While the overall trend of recovery is apparent, there are deviations in that trend for some metals. Concentrations of several metals appeared to increase slightly in the West Bay and East Bay. Selenium, in particular, showed significant increases in the 2010-2011 data. However, there are uncertainties associated with these results related to analytical methods and additional sampling may be necessary to confirm these trends. Future sediment sampling programs in Casco Bay also may be helpful for determining 1) whether PAH concentrations have rebounded with the more recent increase in local carbon emissions; 2) whether dioxins and furans have continued to decline in the East Bay; and 3) to confirm that PCBs and pesticides have, indeed, declined since 2000-2002. Finally, this report concludes by considering whether CBEP should consider adding emerging chemicals of potential concern in future sediment sampling programs in Casco Bay.

1. INTRODUCTION

On behalf of the Casco Bay Estuary Partnership (CBEP), Ramboll Environ US Corporation (Ramboll Environ) mapped, statistically analyzed, and evaluated surface sediment[1] chemistry data collected from Casco Bay between 1991 and 2011. As requested by CBEP, the objectives of this assessment are to:

- document the current status of chemical concentrations in Casco Bay sediments;
- determine whether concentrations of key chemicals (e.g., metals, persistent organic[2] pollutants such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and organotins) exceed sediment quality guidelines;
- determine whether there are spatial or temporal trends in the three-decade history of sediment sampling in Casco Bay and whether those trends, or lack thereof, indicate anything about past and ongoing sources to the bay;
- evaluate how sediment concentrations in Casco Bay compare to concentrations in sediments from other coastal areas in the Gulf of Maine; and
- identify what further studies related to sediment quality or chemical sources would be useful for CBEP to advance its mission of protecting and restoring the ecological integrity of Casco Bay, if any.

The rest of this introduction describes the setting of Casco Bay, including the physical features that may influence sediment quality and the five regions of the bay that are used to evaluate spatial trends in sediment concentrations. It also describes the history of sediment sampling in the bay. Section 2 describes the sediment sampling design, the data management process for creating a unified database of all Casco Bay sediment quality data, and the analytical methods used to address the objectives described above. Section 3 summarizes the results of the most recent sediment sampling program (2010–2011), compares them to the historical data, and evaluates how Casco Bay sediment concentrations compare to those from coastal areas elsewhere in the Gulf of Maine. In Section 4, we describe our conclusions regarding each of the report's objectives, and Section 5 presents a bibliography of references cited in this report. Maps, tables, and figures are included throughout the report and in Appendix A.

1.1 Casco Bay Setting

Casco Bay is located along the coast of southern Maine. The bay covers approximately 200 square miles of water with 575 miles of shoreline along the mainland and its 785 islands. The bay is bounded by Cape Elizabeth to the south and Cape Small (Phippsburg) to the north.

In 1990, Casco Bay was declared an Estuary of National Significance as part of the United States Protection Agency's (USEPA's) National Estuary Program due to its unique ecological, economic, and cultural importance. The many islands throughout the bay provide shelter from storms that hit the Gulf of Maine, making the bay a prime habitat for marine life and an ideal location for harbors that have thrived as successful fisheries and shipping ports. The bay and surrounding towns have faced the pressures of residential and industrial development since the early 19th century.

The Fore, Presumpscot, Cousins, and Royal Rivers drain into Casco Bay (Figure 1). This 986-square-mile drainage area encompasses 42 communities, including two of the biggest cities in Maine—Portland and South Portland (CBEP 2010). For the purposes of this and previous sediment assessments (Kennicutt et al. 1994, Wade et al. 2008), the bay has been divided into five regions

[1] Sediment is the material at the bottom of the bay that is comprised of minerals, water, organic matter (i.e., decaying plants and animals), and invertebrates (e.g., clams and worms).
[2] In this context, "organic" refers to chemical compounds where the element carbon is the basis of the structure.

summarized below (Figure 2). The regions were identified based on the general understanding of sources and circulation patterns within the Bay prior to the 1991 sampling event. While our understanding of circulation patterns within the Bay has improved and potential sources to the Bay continue to change, there is currently no overall conceptual site model for chemical sources and fate and transport within Casco Bay. Therefore, the five regions identified in previous sampling events were retained for this analysis.

- Inner Bay: The Inner Bay includes the western most part of Casco Bay, encompassing the Fore River and Presumpscot River estuaries. The cities of Portland and South Portland and the towns of Falmouth and Yarmouth are located within its drainage.
- Outer Bay: The Outer Bay includes the large open water area to the south of the other regions. It represents the area that connects Casco Bay to the rest of the Gulf of Maine.
- West Bay: West Bay extends from Yarmouth on the west to Orrs and Bailey Islands on the east. It includes Maquoit and Middle Bays, Harpswell Sound, and the communities of Freeport, Harpswell, and parts of southern Brunswick. The Royal and Harraseeket Rivers discharge into West Bay.
- East Bay: East Bay includes the inland portions of Casco Bay bordered by Orrs and Bailey Islands on the west and Phippsburg on the east. It includes Quahog Bay and the New Meadows River in southern Brunswick and Phippsburg.
- Cape Small: Cape Small is the eastern most region of the bay. It includes the southern end of the Phippsburg peninsula to Small Point. The mouth of the Lower Kennebec River flows into the Gulf of Maine to the east of Phippsburg. While it is not part of Casco Bay, coastal circulation patterns indicate that the discharge from the Lower Kennebec (which includes flows from the Kennebec and Androscoggin Rivers) is entrained into the bay in the Cape Small area (Janzen et al. 2005).

Industrial and urban activities within the watershed have contributed chemicals to water and sediment within the bay. The rivers and ports have attracted industry dating back to the mid-1800s, including mills, foundries, canneries, and locomotive and ship building companies (CBEP 1994). Following the Clean Water Act and other environmental laws in the 1970s, chemical loadings decreased significantly. More recently, several of the communities along Casco Bay have worked to minimize their combined sewer overflows (CSOs) into the bay. CSOs release storm water, untreated sewage, and associated chemical loadings to surface water during large rainfall events. Between 1990 and 2009, abatement efforts reduced the number of CSO outfalls to the Casco Bay watershed from 80 to 45 (CBEP 2010). However, several sources of chemicals persist such as the remaining active CSO outfalls, wastewater treatment plants, storm water drainage, combustion sources from vehicle exhaust, power plants, and potential sources from shipping vessels (CBEP 1994, CBEP 2007, CBEP 2010). These sources are related to urbanization as the residential and commercial areas surrounding Casco Bay continue to grow. According to the Maine State Planning Office, the total population in Cumberland County grew 6% between 2000 and 2010. Growth rates within the region have been low in urban areas but high in former farm and forest lands within the watershed (CBEP 2010). Finally, mercury and some other chemicals have ongoing sources outside of the Casco Bay watershed, in that they are released to the atmosphere from the burning of fossil fuels (e.g., coal) and transported great distances before getting deposited in precipitation in the watershed or directly in the Bay (CBEP 2007).

1.2 Historical Sediment Data for Casco Bay

Over the past two decades, CBEP has developed a comprehensive inventory of chemicals within the surficial sediments of Casco Bay based on the collection and analysis of hundreds of sediment samples between 1991 and 2011. The types and locations of data collected during each sampling

event (1991/1994, 2000–2002, and 2010–2011) are generally comparable. Each successive sediment sampling program was designed with the central goal of capturing spatial and temporal trends in sediment chemistry by collecting sediment samples from the same approximate locations and analyzing for a similar list of chemicals during each sampling event. Therefore, the sampling design of the 1991/1994 sampling event provided the basis for the subsequent sampling events. This section summarizes results and trends interpreted from the data and presented in previous reports. In this discussion, the historical data is divided into two groups: data collected in 1991/1994 as summarized by Kennicutt et al. (1994) and data collected in 2000–2002 as summarized by Wade and Sweet (2005) and Wade et al. (2008).

Kennicutt et al. (1994) evaluated the results from CBEP's first sediment sampling program conducted in 1991 and 1994. Surface sediment samples were analyzed for a variety of chemicals described in greater detail in Section 2.1. The authors compared surface sediment chemical concentrations to a series of benchmark values protective of benthic invertebrates (Long and Morgan 1990, Washington State Sediment Quality Guidelines). Kennicutt et al. (1994) used benchmark values that represent multiple levels of protection, including the effects range low (ERL) and effects range median (ERM) concentrations. To understand the implications of concentrations that exceed these benchmark values, it is important to first describe the basis for the benchmarks, as follows.

To help evaluate sediment chemistry data collected in the National Status and Trends Program, Long and Morgan (1990) assembled a national sediment database that included effects and no-effects field and laboratory toxicity test data for freshwater, estuarine, and marine organisms. Long et al. (1990) derived an ERL and ERM for each chemical by ranking chemical concentrations (dry-weight normalized) observed or predicted by these methods to be associated with biological effects using percentiles. The ERL corresponds to the lower 10th percentile of concentrations where effects rarely would be observed. The ERM corresponds to the 50th percentile concentration, above which effects are frequently observed. At the time of the Kennicutt et al. (1994) assessment, benchmark values were available for several metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), individual and total PAHs, several pesticides (dichlorodiphenyltrichloroethane [DDT], dichlorodiphenyldichloroethane [DDD], dichlorodiphenyldichloroethylene [DDE], total DDT, chlordane, dieldrin, and endrin), and total PCBs.

Kennicutt et al. (1994) reports that concentrations of some metals (lead, cadmium, and mercury), pesticides, and PCBs exceeded ERLs, and concentrations of total PAHs exceeded the ERL and ERM in urbanized and industrialized areas, such as Portland Harbor. In general, the authors concluded that the potential for a biological impact from chemicals in sediment was observed to be higher in the industrialized and urbanized areas than in the majority of Casco Bay. The lowest potential for biological impact was observed in the Cape Small and West Bay regions. Through the results of a Principal Components Analysis, Kennicutt et al. (1994) concluded that high concentrations were associated with areas of fine-grained sediment accumulation, which may be driving regional trends in concentrations.

Wade and Sweet (2005) reported regional trends in the concentrations of chemicals in sediment samples collected in 2000 through 2002 and compared those data to the previous sampling data (i.e., 1991/1994). Again, in some areas, PAHs, PCBs, pesticides, and some metals were frequently detected at high concentrations relative to sediment quality guidelines developed for the National Status and Trends Program (Long and Morgan 1990, Long et al. 1995, Long et al. 1998, and Field et al. 1999). Wade and Sweet (2005) also reported that toxicity tests indicated that sediments collected from the bay had no adverse effect on benthic organisms. Similar to Kennicutt et al. (1994), Wade and Sweet (2005) found that the highest chemical concentrations were associated with fine sediment near urban and industrialized areas. Overall, Wade and Sweet (2005) report that concentrations of chemicals had decreased or not changed at most locations and that the only increases in some trace

metals (silver, zinc, lead, and others) and PAHs were observed in shallow water sites in the Inner Bay.

2. SEDIMENT ASSESSMENT METHODOLOGY

This section describes the Casco Bay sediment sampling program as it has evolved since the first samples were collected in 1991. It also describes how the data from the three different sampling events (i.e., 1991/1994, 2000–2002, and 2010–2011) were combined into a single unified dataset and what decisions were required to standardize the data across the three time periods. Finally, this section describes the analyses we conducted to evaluate the spatial and temporal trends in sediment concentrations in Casco Bay since 1991.

2.1 Casco Bay Field Sampling

Hundreds of sediment samples from Casco Bay were collected and analyzed between 1991 and 2011. This section provides a description of the sampling and analytical procedures and also describes the locations sampled and groups of chemicals analyzed from each sampling event. Samples were collected from surface sediment (defined as approximately the top two inches of sediment) using either a Smith McIntyre grab sampler, Van Veen sampler, a ponar grab sampler, or were collected by hand (Table 1). Field sampling methods are described in detail in project Quality Assurance Project Plans available from CBEP. In this discussion, counts of chemicals analyzed do not include parameters that are calculated as summations of multiple analytes such as total PAHs, high molecular weight PAHs (HMWPAHs), and low molecular weight PAHs (LMWPAHs). Table 2 shows the sample counts and chemicals analyzed by sampling event.

In 1991, samples of surface sediment were collected from 65 locations throughout Casco Bay. Locations were chosen to provide spatial coverage across each of the five regions and temporal coverage across sediments of different ages, as well as to represent a range of benthic communities. Therefore, the sampling locations were selected represent conditions throughout the Bay and were not assigned to identify specific source areas. The results provide estimates of overall concentrations in the bay and within the five regions but are not intended to delineate specific areas with elevated concentrations. Kennicutt et al. (1994) provide a detailed discussion of which chemicals were analyzed in the sediment samples. They included 11 metals, 25 PAHs, 79 PCBs[3], 29 pesticides, and grain size. Sediment samples from 63 of those locations were also analyzed for total organic carbon (TOC). In 1994, a subset of 27 of the original 65 locations and 5 new locations (for a total of 32 locations) were sampled and analyzed for 4 organotins. Sediment samples from 30 of those 32 locations were analyzed for 20 additional compounds including dioxins and furans (polychlorinated dibenzo-p-dioxins and dibenzofurans [PCDD/PCDFs]), and dioxin-like PCB compounds (Table 2).

In 2000, CBEP partnered with the USEPA's National Coastal Assessment program to revisit the 70 locations previously sampled in 1991 and 1994 and to identify an additional 13 locations to sample as part of an updated sediment sampling program. Wade and Sweet (2005) and Wade et al. (2008) describe the sediment sampling program and analytes of the second sediment sampling program. Overall, sediment samples were collected from 83 locations during the summers of 2000, 2001, and 2002 and were analyzed for a list of chemicals similar to those evaluated in the first sampling program. The analytes included 15 metals, chlorinated pesticides, and PCBs in all samples with a subset of samples analyzed for additional metals, PAHs, chlorinated pesticides, PCBs, PCDD/PCDFs (and dioxin-like PCBs), TOC, grain size, Uranium-238, and organotins (Table 2).

[3] PCB results were reported for individual congeners. However, several congeners were reported in combination with other congeners (or coelutors). Therefore, the 79 PCB congener results correspond to results for 80 out of the 209 possible PCB congeners, 3 classes of unidentified congeners, and 2 Aroclors.

In 2010 and 2011, CBEP collaborated with the USEPA National Coastal Condition Assessment (NCCA) to collect samples from the historical sampling locations[4]. The sampling locations are shown in Figure 3. The analytical methods and method detection limits[5] for chemical analyses conducted in 2010 and 2011 are shown in Table 3. Sediment samples were collected from 70 of those 83 historical locations (plus 5 field duplicates). The Cadmus Group, Inc. subcontracted out the analyses to certified analytical laboratories such as Columbia Analytical Services, Institute for Integrated Research in Materials, Environment & Society (IIRMES), and Alpha Analytical. Seventy-five samples were analyzed for 23 metals, 25 PAHs, 54 PCB congeners, 29 pesticides, 5 organotins, TOC, and grain size. Additionally, Columbia Analytical Services analyzed 17 samples for 17 PCDD/PCDFs. Sediment samples were also collected from 7 locations in Casco Bay as part of the USEPA NCCA for Maine in 2010. The 7 sediment samples were analyzed for 15 metals, 25 PAHs, 21 PCB congeners, 19 pesticides, TOC, and grain size.

2.2 Casco Bay Sediment Data Management

Ramboll Environ combined Casco Bay sediment chemistry data from multiple sources into a single database to aid in efficient data analysis over all sampling events. The data sources included a Microsoft Access™ database of the 1991–2002 data provided by CBEP; the results of the 2010 and 2011 sample analyses from Alpha Analytical, Columbia Analytical Services, Inc., Katahdin Analytical Services, and the Institute for Integrated Research in Materials, Environments, and Society; and data collected from the Gulf of Maine in 2010 as part of the NCCA. Prior to the incorporation of the 2010-2011 sediment data into the project database, CBEP conducted a data quality review of all historical data to confirm that they accurately represent the historic data available in their archives.

For the 2010-2011 dataset, Ramboll Environ converted each data file into a common format and merged them in Microsoft Access™. The results of quality control samples—such as field duplicates, blank samples, and spiked samples—were merged into the database. Field duplicates were retained as quality control samples and were not averaged with parent sample results or included in statistical or visual analyses as individual samples. We standardized chemical names and added Chemical Abstract Service (CAS) numbers. We also converted concentrations to the same units for each chemical group.

The content of iron or aluminum detected in each sample can indicate the potential source of other trace elements detected in a sample. Wade and Sweet (2005) evaluated concentrations of each trace element by normalizing those concentration based on the iron content within each sample to account for the natural abundance of each trace element. We performed the same normalization but the trends were the same as those observed in the concentrations of trace elements prior to normalization. Because the normalization did not provide additional insights as to the trends in sediment concentrations in Casco Bay, the rest of this report addresses non-normalized sediment concentrations.

Once all data were entered and reviewed, the remaining data management steps included calculations to represent grouped analytes (Section 2.2.1), evaluating scenarios for handling nondetected results (Section 2.2.2), and review of Quality Control results (Section 2.2.3).

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[4] Due to changes in GPS technology, coordinates from sample locations from the 1991/1994 sampling event lack the precision that current measurements provide and may be off by more than 100 feet.

[5] Table 3 shows method detection limits and reporting detection limits. Method detection limits are the minimum chemical concentrations that can be measured and reported with 99 percent confidence that the concentration is greater than zero. The method reporting limit is the lowest concentration of a chemical that can be quantitatively determined with acceptable precision and accuracy. Typically, the method reporting limits are approximately three times the method detection limits.

2.2.1 Grouped Analytes

Parameters that represent grouped chemicals include HMWPAHs, LMWPAHs, total PAHs, total PCBs, total chlordane, the sum of all DDT-related compounds (or DDx), total butyltins, and total PCDD/PCDFs. Table 4 identifies which chemicals were summed into groups, as further described below.

A subset of all PAHs reported were combined to calculate total PAHs and divided into two groups depending on their molecular weight as either LMWPAHs or HMWPAHs. HMWPAHs were calculated as the sum of benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, flouranthene, and pyrene. LMWPAHs were calculated as the sum of 2-methylnapthalene, acenapthene, acenapthylene, anthracene, flourene, naphthalene, and phenanthrene. Total PAHs were calculated as the sum of HMWPAHs and LMWPAHs. This summation scheme is consistent with the approach used to derive sediment quality benchmarks presented by Long et al. (1995) and is also consistent with the approach used in USEPA's NCCA (USEPA 2016). Phenanthrene, one of the compounds included with LMWPAHs, was not analyzed in the 2000-2002 sampling event.

Total PCBs were calculated as the sum of all PCB congeners analyzed, despite variations in numbers of PCB congeners analyzed for each sampling event.[6] Total chlordane was calculated as the sum of alpha-chlordane, gamma-chlordane, and oxychlordane. DDx was calculated as the sum of DDT and it's metabolites—2,4'-DDD, 2,4,'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. Total PCDD/PCDF were calculated by summing the detected concentrations for the 17 individual congeners analyzed. Total butyltins were calculated as the sum of dibutyltin, monobutyltin, and tributyltin.

2.2.2 Treatment of Nondetects

To provide consistency with the comparison to historical concentrations, concentrations below the detection limit (nondetects) were not included in totals because detection and reporting limits are not consistently available for the sediment chemistry data collected in the early investigations. For the same reason, we did not include nondetects in the statistical tests. We estimated the effect of treating nondetect concentrations as 0 in the summation of constituents by comparing totals calculated from the 2010 and 2011 data using two different approaches. We calculated total PCDD/PCDF, HMWPAHs, LMWPAHs, and total PAHs using a value of 0 for nondetects and also using half the detection limit for nondetects. We compared the results using box plots (Appendix A, Figure A1). While the lower end of the concentrations are higher when half the detection limits were applied, the overall distribution of the total concentrations remain similar between the two treatments. Therefore, we concluded that our decision to apply a value of 0 for nondetects was unlikely to substantially alter the trends or overall conclusions in this report.

2.2.3 Quality Control Samples

As indicated above, the field sampling program included collection of multiple types of quality control samples. Sample duplicates (i.e., split samples) were collected and analyzed by the laboratory. Those samples informed the analytical quality assurance analyses conducted by the laboratories to confirm that the data were useable for their intended purpose. In addition, in the 2010-2011 sampling program, field replicates were collected from 5 locations. For those samples, the sediment sampling station was located in the field using the previously identified global positioning system coordinates and the initial sample was collected. Following initial sample collection, the field sampling team left the sampling station and then navigated back to the same coordinates for the collection of the field replicate. The field replicates were analyzed as separate samples and are included as such in the project database. They were collected to provide estimates of spatial heterogeneity that could be used to parameterize geospatial interpolation models of sediment concentrations (Section 2.3.3).

[6] 1991: 74 congeners; 2000–2002: 20 congeners; 2010–2011: 53 congeners

2.3 Casco Bay Sediment Data Analysis

The analysis of Casco Bay sediment data was designed to answer three main questions:

1. Do Casco Bay sediment concentrations of key chemicals exceed sediment quality guidelines for the protection of aquatic life?
2. Are spatial and temporal trends present in Casco Bay sediment concentrations?
3. How do Casco Bay sediment concentrations compare to concentrations from coastal areas elsewhere in the Gulf of Maine?

We analyzed the sediment chemistry data collected from Casco Bay in 2010 and 2011 for spatial trends to determine the most recent status of chemical concentrations throughout Casco Bay and how those concentrations vary among the five regions of the bay described in Section 1 (Figure 2). We calculated summary statistics and performed an effects-based screening for each analyte to evaluate whether chemical concentrations are likely to cause adverse effects in biota in sediments. We also compared the sediment chemistry data collected from Casco Bay in 2010 and 2011 to the sediment chemistry data collected between 1991 and 2002 on a bay-wide and region basis to determine if there are any temporal trends in the three-decade history of sediment sampling in Casco Bay. The following describes the methods used to perform each aspect of the analysis.

2.3.1 Summary Statistics and Screening

Ramboll Environ calculated the following summary statistics based on the detected concentration of each chemical parameter: the minimum, median, average, and maximum detected concentration. We also calculated the frequency at which each chemical was detected. The summary statistics are calculated over the entire bay and by region to provide an overview of the sediment data.

We compared the chemical concentrations detected in sediment to effects-based screening benchmarks for all chemicals for which benchmarks have been derived (Long et al. 1995).[7] The ERL and ERM represent different degrees of protectiveness for benthic organisms. As described above, adverse biological effects on benthic organisms are rarely observed when concentrations are below the ERL. Occasional effects are associated with concentrations that fall between the ERL and ERM, and frequent toxic effects are associated with concentrations above the ERM.

To facilitate comparison of chemical concentrations to benchmarks, we grouped the concentrations of several analytes, as described in Section 2.2.1. We calculated the frequency at which detected concentrations of each analyte exceed the ERLs and ERMs and mapped where samples exceed either of those benchmarks. Finally, we evaluated the uncertainty in this assessment by determining whether detection limits for analytes exceed either the ERL or the ERM.

2.3.2 Statistical Tests

Ramboll Environ tested for spatial and temporal relationships in the sediment chemistry data by using Analysis of Variance (ANOVA) and Rank ANOVA to answer the following questions:

- Has there been a significant change in the concentrations of chemicals between sampling events within the entire bay?
- Do concentrations of chemicals vary by region such that concentrations of a given chemical are consistently higher or lower in one region than in others?
- Has there been a significant change in the concentrations of chemicals between sampling events within each region?

We grouped the data by sampling period to analyze for changes in concentrations of chemicals between sampling events across Casco Bay. We grouped the data by region to analyze for regional

[7] Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), PCBs, PAHs, and some pesticides. Benchmarks are not available for other metals (e.g., selenium, antimony, strontium), dioxins and furans, organotins, and some pesticides.

differences in concentrations. To analyze for changes in regional concentrations over time, we grouped the data by sampling period and by region.

ANOVA is a parametric test that analyzes for differences in central tendency concentration estimates among groups (i.e., region, sampling event). We used a step-wise process to identify the appropriate statistical test and necessary data transformations for each analyte. First, we removed results from any region with sample counts of two or fewer for any given analyte and sampling event because there was not enough data to provide meaningful statistical results. In most cases, this data omission was necessary for samples collected from the Cape Small region. Next, we plotted the distribution of fitted chemical concentrations versus residuals. If residuals appeared random for each parameter, we performed the ANOVA. If residuals did not appear random, we transformed the data to a logarithmic scale and examined the residuals again. If residuals of the log-transformed data appeared random we performed the ANOVA using the log-transformed data. If the data set was not normally or lognormally distributed and the residuals of the original or log-transformed data did not appear random, we performed rank ANOVA on the nontransformed data (Zar 1984). Rank ANOVA is a nonparametric test that analyzes for differences in the median concentrations in the nontransformed dataset. This is slightly different from ANOVA which compares differences in arithmetic mean concentrations in nontransformed data and geometric mean concentrations in transformed data.

The ANOVAs were run by evaluating year and region as independent factors potentially contributing to variability in surface sediment concentrations. The contribution of both factors to variability were evaluated separately and as an interaction term. ANOVA produces p-values for each factor (year, region, or the interaction of year*region). A p-value of less than 0.05 indicates that there is a statistically significant relationship between the chemical concentration and the factor. If the p-value for year*region was not statistically significant (i.e., >0.05), the ANOVA was then run without the interaction term.

2.3.3 Geospatial Methods

In order to facilitate understanding of the spatial and temporal trends in surface sediment concentrations throughout Casco Bay, we identified a handful of representative chemicals—lead, zinc, mercury, selenium, and total PAHs—for spatial interpolation and mapping. The sample results for each chemical and sampling event were interpolated using inverse-distance weighting (IDW). The IDW method was compared with kriging methods, parameterized using the spatial variability estimates provided by the field replicate samples, but the resulting interpolation maps did not substantially differ. We chose IDW as the interpolation method for its simplicity and lack of assumptions necessary to generate a product. IDW estimates values at unknown locations using the distance to and value of nearby known locations, with the resulting estimates weighted based on each distance.

3. RESULTS

The results from the analyses described above are summarized in this section in the following order. Section 3.1 discusses the 2010–2011 sediment results including the summary statistics, qualitative description of spatial patterns, and comparison to sediment quality benchmarks. In Section 3.2, the 2010–2011 results are compared to historical sediment sampling events in Casco Bay (i.e., 1991/1994 and 2000–2002) and also includes the statistical analysis of temporal and spatial trends using ANOVA and geospatial interpolation of sediment concentrations. Finally, in Section 3.3, sediment concentrations in Casco Bay are compared to concentrations from other coastal areas in the Gulf of Maine that are part of the NCCA. Boxplots and maps depicting the sediment data are provided in Figures 4 to 24 and Appendix A.

3.1 2010–2011 Casco Bay Sediment Results

This section provides a summary of the results of the 2010 and 2011 sediment sampling program in Casco Bay. Tables 5 and 6 provide summary statistics across the bay and by region, respectively. Sediment screening benchmarks and results of the comparison of measured concentrations to sediment screening benchmarks are shown on a bay-wide scale in Table 7 and are broken down by region in Table 8.

3.1.1 Physical Parameters

Physical parameters measured in 2010 and 2011 include grain size (Figure 4) and TOC (Figure A2). Sediment at the Casco Bay sampling locations was dominated by silt and clay (62±30%[8]) and sand (35±28%). Samples rarely included larger grain sizes, such as pebbles and shells (1.4±6%) and gravel (1.2±4%). Inner Bay, West Bay, and East Bay samples had the highest percentages of silt and clay, Outer Bay samples were characterized as a mixture of sand, silt, and clay, and Cape Small samples were predominantly sand. Sediment with smaller grain sizes (e.g., silt and clay) tend to have higher organic carbon content, which is reflected in the TOC results. TOC averaged 3.1±2% throughout Casco Bay, with the highest average concentrations in West Bay (4.3±4%), Inner Bay (3.3±1%), and East Bay (3.3±2%) followed by Outer Bay (2.2±1%) and Cape Small (0.57±0.8%).

3.1.2 Metals

Trace metals in sediments have many potential sources. They all have geological origins and are naturally present, to some degree, in most sediments. Human activities can contribute to higher concentrations of metals in sediments which, in heavily impacted systems, can lead to adverse effects to biota that live in or forage within sediments. Environmental regulations and source control have resulted in decreased contributions of anthropogenic metals to the environment. For example, while environmental lead exposures continue to be an issue in some locations, widespread sources of lead have declined since the elimination of leaded gasoline and removal of lead from paint (ATSDR 2007).

Differences in detected concentrations of metals were observed by region (Figure 5; Figures A3 to A25), which may be attributed to proximity to urban versus less-developed land use in Casco Bay (e.g., mercury and lead) or differences in background mineral composition (e.g., aluminum, iron, and arsenic). In general, average and median detected concentrations of metals were higher in the Inner Bay, West Bay, and East Bay regions than in the Cape Small and Outer Bay regions. Both lead and mercury concentrations were highest in the Inner Bay. Note, however, that there are isolated samples in West Bay and East Bay with relatively high concentrations for some metals (including cadmium, chromium, cobalt, molybdenum, thallium, vanadium, and selenium), but they appear to be associated with elevated concentrations of iron and aluminum which may indicate that the elevated concentrations are associated with natural mineral sources for those metals (Figures A3-A25).

[8] Values presented are the arithmetic mean ± standard deviation.

We compared arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc detected concentrations to ERL and ERM benchmark values (Figure 6). All reported detection limits were below their relevant sediment benchmarks providing additional certainty it is appropriate to focus the screening solely on detected results. All detected metals results were below their respective ERM benchmark values. Zinc and silver did not exceed their ERLs in any samples. Cadmium, lead, and copper exceeded the ERL in less than 5% of samples. Cadmium ERL exceedances were limited to West Bay and East Bay, copper to Inner Bay and East Bay, and lead to Inner Bay. Mercury and chromium exceeded the ERL in approximately 25% of samples. Chromium exceedances were observed throughout all five regions of Casco Bay. Mercury exceedances were limited to Inner Bay and East Bay. Arsenic and nickel exceeded the ERL in approximately 50% of samples, and exceedances were observed in all five regions.

3.1.3 Polycyclic Aromatic Hydrocarbons

PAHs are a common group of chemicals that have both natural and anthropogenic sources. They are formed by burning organic materials (e.g., wood, fossil fuels, and garbage) and are also components of oil, natural gas, and coal. Because they originate from a variety of sources, they can be found throughout the environment. There is a wide variety of PAH compounds; a handful are considered to be toxic to biota at environmentally relevant concentrations and may be carcinogenic in humans (ATSDR 1995). Concentrations of PAHs in the environment are typically correlated with human development. Within Casco Bay, the highest concentrations have been found in the Fore River estuary near Portland and South Portland (Kennicutt et al. 1994, Wade and Sweet 2005). In general, HMWPAHs are associated with pyrogenic sources of PAHs (i.e., combustion of fossil fuels) while LMWPAHs are associated with petrogenic sources of PAHs (i.e., oil and gas spills).

Differences in detected PAH concentrations were observed by region (Figure 7; Figures A26 and A27), which may be attributed to proximity to urban versus less-developed land use in Casco Bay. The highest average detected concentrations were observed in Inner Bay for 20 of 25 individual PAHs, and the highest average concentrations for the remaining 5 individual PAHs were in East Bay (Table 6). The lowest average concentrations were observed in Outer Bay and West Bay. The sums of PAHs were also highest in Inner Bay followed by East Bay. Concentrations of HMWPAHs in all 5 regions were higher than concentrations of LMWPAHs suggesting that fossil fuel combustion is a more important source of PAHs to Casco Bay than petrogenic sources.

We compared detected concentrations of individual PAHs[9] and sums of PAHs (i.e., HMWPAHs, LMWPAHs, and total PAHs) to ERL and ERM benchmark values (Figure 8; Figure A28). All detected concentrations of individual and sums of PAHs were below the ERM. With the exception of one sample from Inner Bay[10], all detected concentrations were also below the ERL. In addition, all reported detection limits for individual PAH compounds were below their respective ERLs and ERMs.

3.1.4 Dioxins and Furans

PCDD/PDCFs are a class of chemicals that have both natural and anthropogenic sources. They are the product of combustion of organic materials but are also generated as industrial byproduct of chlorination processes. Environmental regulations have led to declines in releases of PCDD/PDCFs to the environment. Historically, concentrations in Casco Bay have been highest near Portland and in East Bay, potentially related to discharges from the Lower Kennebec River (Kennicutt et al. 1994, Wade and Sweet 2005).

Only samples from Inner Bay and West Bay were analyzed for PCDD/PDCFs in 2010 (Figure 9; Figure A29). At least 4 of the 17 congeners were detected in each sample, with an average of 8±4

[9] 2-methylnaphthalene, acenapthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene

[10] One sample collected from the most upstream location in the Fore River had concentrations above the ERL for 3 PAHs – acenaphthene, fluorine, and phenanthrene.

congeners detected per sample. The range in total PCDD/PCDF concentrations overlapped between Inner Bay and West Bay, although higher concentrations were generally observed in West Bay. Benchmark comparisons were not possible because no PCDD/PCDF marine sediment quality benchmark values have been established for PCDD/PCDFs.

3.1.5 Polychlorinated Biphenyls

PCBs are synthetic organic chemicals that were widely used in generating and transmitting electricity, as well as numerous other industrial applications from the mid-1900s until they were banned from production in the late 1970s. Although there is no ongoing manufacture or use of PCBs, because they are highly resistant to degradation, they are still frequently detected in environmental samples, and they tend to bioaccumulate within the food chain. PCBs have been associated with toxic effects in wildlife and are classified as probable human carcinogens (ATSDR 2000). They have been historically detected in Casco Bay sediments with the highest concentrations observed in 1991 in the Fore River (Kennicutt et al. 1994).

Total PCBs were only detected in Casco Bay in one West Bay sample in 2010-2011 (Figure A30). The concentration in that sample exceeded the ERL for total PCBs but did not exceed the ERM. In the samples where PCBs were not detected, the reported detection limits for the individual PCB congeners (approximately 5 ng/g) were below both the ERM and the ERL.

3.1.6 Pesticides

Similar to PCBs, DDT and the other pesticides evaluated in this study are synthetic organic chemicals that have no known natural sources. Because they share many of the same characteristics as PCBs (i.e., persistent, bioaccumulative, and toxic), their use has also been discontinued in the United States. They have been detected at low concentrations throughout Casco Bay but tended to be higher near the population center of Portland (Kennicutt et al. 1994, Wade and Sweet 2005).

In 2010-2011, the only pesticide detected in Casco Bay was 4,4′-DDE, and it was detected in only one sample from West Bay (Figure A31). ERL and ERM benchmark values are available for comparison to individual pesticides (i.e., 4,4′-DDD, 4,4′-DDE, 4,4′-DDT, and dieldrin) and the sum of pesticides (i.e., total chlordane and the sum of DDT, DDE, and DDD). The one detected 4,4′-DDE concentration is below both its ERL and ERM benchmark values. However, the reported detection limits for both chlordane and dieldrin (1 ng/g for both) is above the ERL but below the ERM for both pesticides.

3.1.7 Butyltins

Butyltins are organic compounds that contain tin and were primarily used as antifouling agents in marine paints and plastics. They are frequently found in sediments near shipyards and marinas, and have been associated with toxic effects in aquatic organisms (USEPA 2002). Butyltins were widely detected in Casco Bay in 1991/1994 but less so in 2000–2002 (Kennicutt et al. 1994, Wade and Sweet 2005).

Mono-, di-, tri-, and tetrabutyltin were measured in Casco Bay samples in 2010–2011. Most butyltins were not detected in Casco Bay sediments, but tributyltin was detected in six samples (Figures A32 and A33). These samples were located in four of the five Casco Bay regions (all regions except Outer Bay). The highest total butyltin concentration detected was from an Inner Bay sample. Benchmark comparisons were not possible because no ERL or ERM benchmark values have been established for butyltins.

3.2 Temporal Trends in Casco Bay Sediment Conditions

We compared the 2010–2011 sediment conditions to conditions in 1991/1994 and 2000–2002 to assess temporal trends in Casco Bay. Concentrations of most chemicals tended to be lower in the 2010–2011 sediment dataset than in the previous two sampling events. Table 9 provides the results of statistical tests for trends in chemical concentrations over time and over regions. In addition, we

interpolated concentrations of selected chemicals to illustrate the spatial distributions of sediment concentrations throughout the bay for each of the three sampling events.

3.2.1 Physical Parameters

Grain size distribution was consistent in Casco Bay across the three sampling events (Figure 10), although some temporal variability was observed by region (Figure A34). TOC was generally higher in sediment samples collected from Inner Bay, West Bay, and East Bay in 2010–2011 than in the previous sampling events (Figures A35 and A36). Differences in grain size and TOC among sampling events may reflect sediment heterogeneity among sampling locations.

3.2.2 Metals

The ANOVA results indicate that most metals showed significant differences in sediment concentrations among the three sampling events. The only metals that show no significant differences in sediment concentrations among the three events were antimony, arsenic, cobalt, mercury, molybdenum, and vanadium (Table 9). In most of the cases, where a significant difference over time was reported, concentrations appear to be declining (e.g., aluminum, barium, beryllium, chromium, copper, iron, lead, manganese, nickel, strontium, thallium, and zinc) (Figure 11).

In addition to the differences over time, all metals except for vanadium showed significant differences among regions when combining results from the three sampling events (Table 9), and examining the patterns of sediment concentrations over time within each region shows more nuanced patterns (Figures A3 to A25; Figure A37). Although average concentrations of mercury in Casco Bay did not change significantly for the entire bay, they appear to show some decreases in the Inner Bay where concentrations have historically been highest. In addition, concentrations of lead and chromium decreased in all regions except Cape Small.

Some of the metals showing significant changes in sediment concentrations among sampling periods appear to show either inconsistent time trends or possible increases in concentrations over time. Cadmium, selenium, and tin appear to have higher concentrations from the 2010–2011 sediment sampling program than in the previous data (Figure 11). The apparent increases in cadmium are due to higher concentrations in samples collected from West Bay and East Bay where several samples exceed the ERL, but not the ERM. The apparent differences in tin appear to result from higher concentrations in West Bay (Appendix A, Figure A37).

For selenium, the significantly higher concentrations in the 2010–2011 data are due to higher concentrations reported in four of the five regions, but most notably in West Bay and East Bay (Appendix A, Figure A-37). Minimum detected selenium concentrations are similar in all three sampling events, less than 0.08 µg/g in all cases, but the maximum concentration in the 2010-2011 data exceeds those from the previous sampling by a factor of nearly three (e.g., 1.1 µg/g and 1.2 µg/g in 1991/1994 and 2000–2002, respectively, and 2.9 µg/g in 2010–2011)[11]. Although this same trend was not apparent for most metals in this dataset, the apparent increase in selenium concentrations is confounded by differences in analytical methods.[12] Therefore, it is possible that the differences among sampling periods could be due to differences in efficiencies between the different analytical methods used in each round of sampling or they could represent significantly higher concentrations of selenium throughout much of Casco Bay, particularly in the East Bay.

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[11] Sample sizes were similar for each sampling period. There were 65 selenium samples collected in 1991 and 77 samples collected in both the 2000-2002 and 2010-2011 sampling programs.

[12] The Quality Assurance Project Plan for the 2010 NCCA and data reports from the analytical laboratory for the 2010-2011 data (Institute for Integrated Research in Materials, Ecosystems, and Society at California State University in Long Beach) indicate that the 2010-2011 samples were analyzed by USEPA method 6020 (Inductively Coupled Plasma – Mass Spectrometry, or ICP-MS) preceded by microwave extraction (USEPA 2010). The 1991/1994 data were analyzed via graphite furnace - atomic absorption spectroscopy preceded by acid digestion while the 2000-2002 samples were analyzed via ICP-MS preceded by acid digestion (Wade et al. 2008).

Finally, for illustrative purposes, we generated maps for several metals with significant temporal and/or spatial trends using spatial interpolation techniques (Figures 12 through 15). Lead and zinc have well-known anthropogenic sources that are associated with industrial activity and level of development within the watershed. Concentrations of both metals tended to decline from the initial sediment sampling in 1991 to the most recent sampling in 2011 (Figures 12 and 13). While lead concentrations appear to have declined throughout the bay, zinc concentrations in East Bay have remained relatively consistent over time and appear to decrease elsewhere. Mercury concentrations have not changed significantly throughout the bay during the three sampling events. Figure 14 illustrates that mercury concentrations tend to be highest in the Inner Bay and East Bay, and concentrations in the Inner Bay appear lower in 2010–2011 than in previous sampling events. Figure 15 shows the trend towards higher selenium concentrations in some areas of Inner Bay, and most strikingly in East Bay, during the 2010-2011 sampling.

3.2.3 Polycyclic Aromatic Hydrocarbons

PAHs were one of the few analyte groups with higher sediment concentrations in 2000–2002 than in 1991/1994 (Wade and Sweet 2005). That trend reversed in the 2010–2011 data (Figure 16; Figure A27 and A38). Concentrations of PAHs (HMWPAHs, LMWPAHs, and total PAHs) in sediment declined significantly ($p<0.05$) throughout Casco Bay from 2000–2002 to 2010–2011 (Table 9)[13]. The most significant declines appear to have occurred in the Inner Bay, Outer Bay, West Bay, and East Bay (Figures A39 and A40). These changes over time are illustrated in the maps of interpolated total PAH concentrations by sampling period (Figure 17).

Phenanthrene, a PAH included in the summations of LMWPAHs and total PAHs, was not analyzed in the 2000-2002 sampling event. Phenanthrene accounted for an average of 58 percent of LMWPAHs and an average of 12 percent of total PAHs in the 1991/1994 and 2010-2011 sampling periods. Thus, concentrations of LMWPAHs and total PAHs, in all likelihood, would have been higher in 2000-2002 had phenanthrene been included in the analysis. The decline observed throughout Casco Bay from 2000-2002 to 2010-2011 was likely greater than that which is reflected in the results presented in this report.

3.2.4 Other Chemicals

In 2010–2011, PCDD/PCDFs were only analyzed in samples collected from Inner Bay and West Bay. In the earlier datasets, they were also analyzed in samples from other regions. The statistical analyses summarized in Table 9 were conducted using only data from the two regions where PCDD/PCDF results were available for all three sampling events. Butyltins, in contrast, were analyzed for in more samples in 2010-2011 than in previous sampling programs. After accounting for the differences in sampling locations used in the three sampling events, concentrations of PCDD/PCDFs (Figure 18; Figures A29 and A41) and butyltins (Figure 19; Figures A33 and A42) tended to be lower in 2010–2011 than in previous sampling events.[14]

Pesticides were only detected at one location in 2010–2011 compared to 100% detection frequency of total pesticides in previous sampling years (Figure 20; Figures A31 and A43). The detection limits of pesticides in 2010–2011 (1 to 5 nanograms per gram [ng/g]) were higher than the average detected concentration of individual pesticides from 1991 to 2002 (0.7 ng/g). Thus, the decreased frequency of detects in 2010–2011 could reflect higher detection limits rather than declines in sediment concentrations over time. Similarly, PCBs were detected at fewer locations in 2010–2011 than in previous sampling periods (Figure 21; Figures A30 and A44). Again the detection limit for

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[13] The analytical methods for PAHs have been consistent among the three sampling programs (i.e., Soxhlet extraction followed by analysis by gas chromatography, mass spectrometry).

[14] Due to the differences in sample counts and the few detects in the 2010-2011 dataset, a statistical comparison of butyltin concentrations between sampling events was not possible. Therefore, concentrations of butyltins between the different time periods were qualitatively compared.

PCB congeners in 2010–2011 (5 ng/g) was higher than the average detected concentration of PCB congeners from 1991 to 2002 (0.6 ng/g). An analysis of the number of PCB congeners analyzed in each sampling event indicates that the 54 PCBs analyzed in the 1991/1993 sampling period, but not analyzed in the subsequent sampling periods, accounted for an average of 50 percent and as much as 82 percent of total PCB concentrations in the 1991/1993 dataset. Additionally, several PCB congeners that were analyzed in 2000-2001 and 2010-2011 sampling events were not analyzed in 1991/1993. Given the discrepancies in detection limits, detection frequencies, and numbers of PCB congeners reported across the three sampling periods, we cannot temporally compare PCBs or pesticides within Casco Bay.

3.3 Comparisons of Casco Bay to NCCA Gulf of Maine Sediment Results

The NCCA sampling program collected Gulf of Maine sediment data during multiple sampling events between 2000 and 2011. In this section we compare 2010–2011 Casco Bay data to the NCCA Gulf of Maine data to evaluate how sediment conditions in Casco Bay compare to other coastal areas in the Gulf of Maine. The Gulf of Maine data set excludes Casco Bay samples for the purposes of this comparison. Gulf of Maine data are not available for PCDD/PCDFs or butyltins. Table 10 presents a comparison of summary statistics between the 2010–2011 Casco Bay sediment data and the 2010–2011 Gulf of Maine sediment data. Table 11 provides the results of statistical tests for trends in chemical concentrations between Casco Bay and the Gulf of Maine in 2010-2011.

3.3.1 Metals

Average detected metals concentrations were generally higher in Casco Bay than in other coastal areas of the Gulf of Maine in 2010–2011. Although the distributions of sediment concentrations for most metals in Casco Bay and the Gulf of Maine were similar and largely overlap, the following metals appeared to be higher in Casco Bay than in the Gulf of Maine: arsenic, beryllium, cobalt, iron, manganese, nickel, silver, thallium, vanadium, and zinc (Figure 22). Arsenic, nickel, and zinc did not exceed their respective ERM benchmark values in Casco Bay. Zinc did not exceed its ERL benchmark value while arsenic and nickel both exceeded their ERL benchmark values in 56% of Casco Bay sediment samples. The following metals appeared to be indistinguishable between Casco Bay and the Gulf of Maine: aluminum, barium, cadmium, chromium, lead, molybdenum, selenium, strontium, tin, titanium. Antimony and mercury appeared to be higher in the Gulf of Maine than in Casco Bay. Note that although selenium concentrations in Casco Bay appear to be higher in 2010-2011 than in previous sampling events, they are consistent with concentrations throughout the Gulf of Maine (Figure 22).

3.3.2 Polycyclic Aromatic Hydrocarbons

HMWPAHs and LMWPAHs tended to be lower in Casco Bay than in other coastal areas of the Gulf of Maine in 2010-2011 (Figure 23; Figure A45). Figure 24 shows how total PAH concentrations are distributed throughout the Gulf of Maine and Casco Bay during the periods when we have data from both areas. Areas such as Great Bay (on the Maine-New Hampshire border) and in Boston Harbor had higher concentrations of PAHs. Concentrations on the Maine coast north of Casco Bay, between Great Bay and Boston, and along Cape Cod were similar to or lower than those found in Casco Bay. As discussed in Section 3.2.3, Casco Bay PAH concentrations were lower in 2010–2011 than in previous sampling years. We observed a similar temporal trend in the Gulf of Maine when comparing 2010–2011 data to 2005–2006 (Figure 25).

3.3.3 Polychlorinated Biphenyls

PCBs were infrequently detected both in the Gulf of Maine (3 of 44 samples) and Casco Bay (1 of 77 samples) samples in 2010–2011. As discussed in Section 3.2.4, elevated detection limits likely resulted in low detection frequencies in Casco Bay as well as in the Gulf of Maine; therefore, we could not infer trends from the 2010–2011 PCB results.

3.3.4 Pesticides

Pesticides were infrequently detected in Gulf of Maine (4 of 44 samples) and Casco Bay (1 of 77 samples) in 2010–2011. As with PCBs, elevated detection limits likely resulted in low detection frequencies in Casco Bay and Gulf of Maine; therefore, we could not infer trends from the 2010–2011 pesticides results.

4. SUMMARY AND CONCLUSIONS

Concentrations of most chemicals in the sediments of Casco Bay have either decreased or showed little to no change over time as represented by sediment collected in 1991/1994, 2000–2002, and 2010–2011 (Table 12). Organic compounds were not widely detected, and concentrations of most metals tended to be lower in the 2010–2011 data set compared to the previous sampling efforts. Although sediment concentrations of PAHs appeared to increase slightly between 1991 and 2002 (Wade and Sweet 2005), their concentrations were lower throughout the bay in 2010–2011. The highest chemical concentrations appear to be associated with adjacent land use and the physical characteristics of sediment (grain size and total organic carbon content). Finally, concentrations of most chemicals in Casco Bay tended to be lower than or similar to concentrations in other coastal areas of the Gulf of Maine (Table 12).

Declines in concentrations of metals are associated with decreases in sources of chemicals. As environmental laws such as the Clean Water Act were enacted in the 1970s, industrial loadings of chemicals dramatically decreased. In addition, much of the heavy industrial activity that contributed to high concentrations of chemicals has ceased, and the Casco Bay area has transitioned to a more service-based economy. However, the decrease in sources of PAHs is somewhat unexpected. Maine and New England have experienced decreases in emissions from the combustion of fossil fuels from power plants and transportation following the economic downturn of 2008 and 2009. For example, Maine's energy-related greenhouse gas emissions declined between 2005 and 2012, but emissions have since started to increase (USEIA 2015). It is possible that this observed decline in PAH concentrations in Casco Bay sediments in 2010–2011 is a short-term trend associated with the observed decrease in atmospheric emissions around the same time period.

The *Julie N* oil spill in the Fore River occurred in September 1996 – between the first and second monitoring events. Responders recovered more than 75% of the oil released when the tanker struck the Million Dollar Bridge, but nearly 40,000 gallons of oil were never recovered and were released into the Fore River Estuary.[15] However, the oil spilled from the vessel was transported upstream, with the tide, from the spill site rather than out into Casco Bay and was deposited in estuarine salt marshes. Impacts to sediments from this spill would be more localized than this dataset was designed to detect. Trends in concentrations of LMWPAHs – those most associated with petrogenic sources such as oil spills – were similar to those for HMWPAHs – those most associated with pyrogenic sources. Concentrations were relatively similar in the first two monitoring events and declined in the most recent event (Appendix A, Figures A38-A40).

Many chemicals in the sediment, such as metals, PCDD/PCDFs, and PCBs can persist for decades, but changes in loadings from industry likely explain the recent declines in of sediment concentrations. Rivers, wave action, and longshore transport processes also deliver clean sediment to the bay, which buries contaminated sediments. This mechanism, coupled with the decrease in sources, may be effectively reducing concentrations of most chemicals in surface sediment in Casco Bay.

While the overall trend of recovery is apparent, deviations in that trend are apparent for some metals. Concentrations of several metals appeared to increase slightly in the West Bay and East Bay. Maps showing sediment concentrations from each sampling event (in Appendix A) show some isolated, elevated concentrations of cadmium, chromium, cobalt, molybdenum, thallium, vanadium, and selenium in Quahog Bay and Harpswell Sound. Given that these are isolated sediment samples, it is difficult to determine whether these are real increases in metals concentrations over time or the results of spatial heterogeneity. Aluminum and iron concentrations are relatively elevated in some of the same samples which may indicate natural mineral sources for those metals. Concentrations of

[15] https://www.cerc.usgs.gov/orda_docs/CaseDetails?ID=901

selenium showed more consistent increases in the 2010–2011 dataset over previous sampling events, but the cause for the increase in selenium concentrations is also unclear. Selenium is widely used in the manufacture of commercial goods such as photoelectric cells and rectifiers, glass, steels, alloys, and rubber (UNEP 1988). However, analytical methods used to quantify selenium concentrations in sediment differed between sampling events, which could have also contributed to differences in results between sampling events.

Finally, the results described above lead to the following list of Ramboll Environ's recommendations for future investigations within Casco Bay related to sediment quality and toxic chemical sources to the bay:

- Revisions to the existing sediment monitoring program: The existing sediment dataset that includes the 1991/1994, 2000-2002, and 2010-2011 sampling data provides a good baseline of sediment conditions throughout Casco Bay. Ramboll Environ recommends that any future sediment sampling programs could be scaled back to address the key uncertainties and results identified in this report. The potential components of a revised sediment sampling program are described below:
    - Metals: While most metals concentrations continued to decline in Casco Bay in the 2010-2011 dataset, there were a couple of potentially unexpected trends. Most notable is the possible increase in selenium, particularly in West Bay and East Bay. As described in this report, it is possible that the apparent increases in sediment concentrations over time are confounded by analytical issues. Therefore, an additional round of sediment sampling where sediment samples are analyzed for metals would be helpful in addressing these unresolved questions. If possible, ensure that analytical methods are comparable to the existing dataset and consider including split samples to compare the different selenium extraction methods that have been employed in the Casco Bay sediment dataset (microwave extraction per USEPA 2010 and acid digestion per Wade et al. 2008).
    - PAHs: The apparent decline in sediment PAH concentrations in Casco Bay in 2010-2011 is notable and an encouraging sign if it is, in fact, related to the decrease in fossil fuel combustion in the years prior to 2010. The rebound in carbon dioxide emissions in Maine since 2012 indicates that the decline in PAH concentrations in Casco Bay in 2010-2011 may be a short-term trend. However, continued action to control sources (e.g., CSOs) within the bay's watershed may offset growth in those atmospheric sources. Therefore, an additional round of data on sediment concentrations of PAHs would be helpful in tracking the fate of PAHs within bay and understanding how activities within the watershed influence conditions in Casco Bay.
    - PCBs/organochlorine pesticides: While we expect that sediment concentrations of these chemicals are continuing to decline, the 2010–2011 data quality is, unfortunately, insufficient to add any meaningful evidence to this hypothesis. The elevated detection limits prevent any meaningful evaluation of time trends in sediment concentrations since 2000-2002. If CBEP would like to confirm the hypothesis that these legacy, persistent, bioaccumulative pollutants are declining in Casco Bay, another round of sediment data would be beneficial as long as detection limits that are comparable to the 1991/1994 and 2000-2002 sediment sampling programs can be assured.
    - PCDD/PCDFs: The data from the three sediment sampling events clearly show that concentrations of PCDD/PCDFs are declining in the Inner Bay and West Bay. Any additional sediment sampling in those regions could exclude PCDD/PCDF analysis. However, CBEP may consider collecting another round of sediment samples from East Bay for PCDD/PCDF analysis to confirm that sources associated with the Lower Kennebec River are also on the decline.

  - Butyltins: Butyltins were infrequently detected in the 2010-2011 sediment samples and detection limits were consistent with previous sampling events. Ramboll Environ recommends eliminating analysis of butyltins in any future widespread sediment sampling in Casco Bay.
- Conceptual site model: A conceptual site model provides the basis for understanding patterns of chemical concentrations in sediment. While there is a growing literature on chemical concentrations in Casco Bay sediments and biota, we lack a comprehensive conceptual site model that describes the major sources of chemicals to the Bay, their pathways into the Bay, and the transport processes that determine the fate of those chemicals once they reach the Bay. Key factors that contribute to a conceptual site model include:
  - Demographic patterns in the watershed and region
  - Locations and types of major industrial sources including contaminated sites, discharge permit holders, and CSO locations
  - Atmospheric deposition rates
  - Freshwater sources (i.e., river and stream flows)
  - Tidal inputs and inundation patterns
  - Bathymetry within the Bay
  - Sediment deposition rates
  - Circulation patterns and flow rates
  - Habitat quality and availability in the bay to understand where exposure to marine life is most likely to occur
  - Mixing patterns with the rest of the Gulf of Maine
  - Storm intensities and frequency

  Among other things, a conceptual site model would allow CBEP to understand the time periods over which the surface sediment included in each sampling program were deposited and whether the elevated metals concentrations in East Bay and West Bay are likely to be from new sources, natural variability, or scouring of cleaner, more recently deposited sediments.
- Emerging chemicals of potential concern: The historical sediment sampling in Casco Bay has addressed chemicals with legacy sources to the bay. However, emerging chemicals of potential concern with ongoing sources to the bay include currently used pesticides, perflorinated chemicals, pharmaceuticals and personal care products, flame retardants, and microplastics. Although the extent to which these chemicals partition into sediments and persist in the environment is uncertain, CBEP may consider incorporating consideration of these chemical groups in any future sediment monitoring programs to understand sediment quality in Casco Bay.
  - Pyrethroids are widely used pesticides that have been associated with sediment toxicity in numerous waterbodies (Amweg et al. 2006, Kuivila et al. 2012). Although some initial work has been conducted on localized concentrations of some widely used pesticides in Casco Bay, the extent to which these compounds are found within the bay and whether they are adversely impacting marine life is poorly understood.
  - Perflorinated chemicals (PFCs) are industrial chemicals that are commonly included in firefighting foam and multiple consumer products (e.g., Teflon coatings, stain guards, and other cleaners). In 2007 and 2009, CBEP sponsored a study that documented the concentrations of PFCs in osprey eggs collected from 12 nests throughout the Bay. PFCs were detected in all osprey eggs collected, including one location near Phippsburg (East Bay) where the concentration of perfluorooctanesulfonate was the highest concentration ever observed in wildlife in Maine (2.5 mg/kg) (Goodale 2010). These data indicate that PFCs can

be taken up by wildlife but their pathway into biota (e.g., sediment or surface water), persistence in the environment, and toxicity to wildlife is uncertain.

- Pharmaceuticals and personal care products (e.g., antibiotics, steroids, hormones) are well-documented components of municipal wastewater discharges but their long-term persistence and accumulation in sediments as well as their toxicity to marine life is not well characterized (Blair et al. 2013, Long et al. 2013, Gaw et al. 2014).
- Polybrominated diphenyl ethers, or PBDEs, are widely used chemicals, as flame retardants, that have numerous sources within the watershed. They are relatively persistent compounds that have been detected in samples from many environments, including sediments. PBDEs were detected in all 12 osprey eggs collected in Casco Bay in 2007 and 2009 for CBEPs study on emerging chemicals of concern (Goodale 2010). However, the potential toxicity of those environmental exposures is not well characterized. CBEP may consider including PBDEs in future sediment sampling programs as a way to understand their concentrations relative to other water bodies but screening those results to evaluate potential risks remains uncertain.
- Microplastics are an emerging issue related to the ubiquity and persistence of plastics in our society. Microbeads are being phased out from consumer products but sources of microfibers and microplastics are likely to continue to increase within the Casco Bay watershed. The impacts of these substances on marine life is poorly understood and the analytical methods for detecting them are still being developed. While microplastics are an issue relevant to CBEP's mission of ensuring the ecological integrity of Casco Bay, implementation of a widespread monitoring program for microplastics may not be feasible in the short-term, both from an analytical and interpretation perspective.

5. REFERENCES

Amweg, EL, DP Weston, J You, and MJ Lydy. 2006. Pyretroid Insecticides and Sediment Toxicity in Urban Creeks from California and Tennessee. Environmental Science and Technology. 40(5): 1700-1706

ATSDR. 1995. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. Agency for Toxic Substances and Disease Registry. United States Department of Health and Human Services. August.

ATSDR. 2000. Toxicological Profile for Polychlorinated Biphenyls (PCBs). Agency for Toxic Substances and Disease Registry, United States Department of Health and Human Services. November.

ATSDR. 2007. Toxicological Profile for Lead. Agency for Toxic Substances and Disease Registry. United States Department of Health and Human Services. August.

Blair, BD, JP Crago, CJ Hedman, and RD Klaper. 2013. Pharmaceuticals and personal care products found in the Great Lakes above concentrations of environmental concern. Chemosphere 93(9): 2116-2123.

CBEP. 1994. The Dirty History of Portland Harbor. Casco Bay Estuary Partnership. University of Southern Maine Muskie School. Portland, Maine.

CBEP. 2007. Toxic Pollution in Casco Bay, Sources and Impacts. Casco Bay Estuary Partnership. University of Southern Maine Muskie School. Portland, Maine.

CBEP. 2010. State of the Bay 2010. Casco Bay Estuary Partnership. University of Southern Maine Muskie School. Portland, Maine.

Field, J.L., D.D. MacDonald, S.B. Norton, C.G. Severn, and C.G. Ingersoll. 1999. Evaluating sediment chemistry and toxicity data using regression modeling. Environmental Toxicology and Chemistry. 18:1311-1322.

Gaw, S. K.V. Thomas, and T. Hutchinson. 2014. Sources, impacts and trends of pharmaceuticals in the marine and coastal environment. Philosophical Transactions of the Royal Society B. Biological Science 369(1656):20130572.

Goodale, W. 2010. Contaminant screening of osprey eggs in Casco Bay, Maine: 2009 Field Season. BRI report number 2010-09. BioDiversity Research Institute, Gorham, Maine.

Janzen, CD, JH Churchill, and NR Pettigrew. 2005. Observations of exchange between eastern Casco Bay and the western Gulf of Maine. Deep Sea Research Part II: Topical Studies in Oceanography. 52 (19-21): 2411-2429.

Kennicutt, M.C., T.L. Wade, B.J. Presley, A.G. Requejo, J.M. Brooks, G.J. Denoux. 1994. Sediment contaminants in Casco Bay, Maine: inventories, sources, and potential for biological impact. Environmental Science and Technology. 28(1):1-5.

Kuivila, KM, ML Hladik, CG Ingersoll, NE Kemble, PW Moran, DL Calhoun, LH Nowell, and RJ Gilliom. 2012. Occurance and Potential Sources of Pyrethroid Insecticides in Stream Sediments from Seven U.S. Metropolitan Area. Environmental Science and Technology. 46: 4297-4303.

Long, E., L. Morgan. 1990. The potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program; NOAA technical Memorandum NOS OMA 52. NOAA Office of Oceanography and Marine Assessment. Ocean Assessments Division. Seattle, Washington.

Long, E.R. D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments. Environmental Management. 19(1): 81-97.

Long, E.R. L.J. Field, and D.D. Macdonald. 1998. Predicting toxicity in marine sediments with numerical sediment quality guidelines. Environmental Toxicology and Chemistry. 17: 714-727.

Long, E.R., M. Dutch, S. Weakland, B. Chandramouli, and J.P. Benskin. 2013. Quantification of Pharmaceuticals, Personal Care Products, and Perfluoroalkyl Substances in the Marine Sediments of Puget Sound, Washingtin, USA. Environmental Toxicology and Chemistry 32(8):1701-1710.

UNEP. 1988. Arsenic, mercury and selenium in the marine environment. The Joint Group of Experts in the Scientific Aspects of marine Pollution. GESAMP Reports and Studies No. 28.

USEIA. 2015. Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2013. United States Energy Information Administration. U.S. Department of Energy. Washington, DC. October. http://www.eia.gov/environment/emissions/state/analysis/pdf/stateanalysis.pdf

USEPA. 2000. Coastal 2000. Northeast Component. United States Environmental Protection Agency. Office of Research and Development. EPA/620/R-00/002. Washington, DC.

USEPA. 2001. National Coastal Condition Assessment Field Operations Manual. United States Environmental Protection Agency. EPA-620/R-01/003. Washington, DC.

USEPA. 2002. Notice of Ambient Water Quality Criteria Document for Tributyltin (TBT) – Draft. United States Environmental Protection Agency. EPA-822-F-02-003. Washington, DC.

USEPA. 2010. National Coastal Condition Assessment Quality Assurance Project Plan. United States Environmental Protection Agency. EPA-841-R-09-004. Washington, DC. July.

USEPA. 2016. NCCA 2010 Technical Report. National Coastal Condition Assessment 2010. United States Environmental Protection Agency. January. https://www.epa.gov/sites/production/files/2016-01/documents/ncca_2010_technical_report_20160127.pdf

Wade, T., S. Sweet. 2005. Assessment of Sediment Contamination in Casco Bay. A Report Submitted to the Casco Bay Estuary Project. University of Southern Maine.

Wade, T., S. Sweet, A. Klein. 2008. Assessment of sediment contamination in Casco Bay, Maine, USA. Environmental Pollution. 152:505-521.

Zar, J.H. 1984. Biostatistical Analysis (Second Edition). Prentice-Hall, Inc: Englewood Cliffs, NJ.

TABLES

Table 1. Sediment Sample Collection Summary
Casco Bay Estuary Partnership, Portland, Maine

Event	Number of Locations	Sampling Device	Depth (cm)
1991/1994	65	Smith McIntyre grab sampler, ponar grab sampler, or by hand	2
2000-2004	83	Van Veen grab sampler or ponar sampler	2 to 3
2010-2011	77	Van Veen grab sampler or ponar sampler	2 to 3

cm: centimeter(s)

Table 2. Number of Samples Analyzed by Analyte
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Sampling Event		
		1991-1994	2000-2002	2010-2011
CDDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran	30	32	17
CDDF	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	30	32	17
CDDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran	30	32	17
CDDF	1,2,3,4,7,8-Hexachlorodibenzofuran	30	32	17
CDDF	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	30	32	17
CDDF	1,2,3,6,7,8-Hexachlorodibenzofuran	30	32	17
CDDF	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	30	32	17
CDDF	1,2,3,7,8,9-Hexachlorodibenzofuran	30	32	17
CDDF	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	30	32	17
CDDF	1,2,3,7,8-Pentachlorodibenzofuran	30	32	17
CDDF	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	30	32	17
CDDF	2,3,4,6,7,8-Hexachlorodibenzofuran	30	32	17
CDDF	2,3,4,7,8-Pentachlorodibenzofuran	30	32	17
CDDF	2,3,7,8-Tetrachlorodibenzofuran	30	32	17
CDDF	2,3,7,8-Tetrachlorodibenzo-p-dioxin	30	32	17
CDDF	HpCDD (total)	0	0	17
CDDF	HpCDF (total)	0	0	17
CDDF	HxCDD (total)	0	0	17
CDDF	HxCDF (total)	0	0	17
CDDF	Octachlorodibenzofuran	30	32	17
CDDF	Octachlorodibenzo-p-dioxin	30	32	17
CDDF	PCB-077 (3,3',4,4'-TeCB) (dioxin-like)	30	32	0
CDDF	PCB-126 (3,3',4,4',5-PeCB) (dioxin-like)	30	32	0
CDDF	PCB-169 (3,3',4,4',5,5'-HxCB) (dioxin-like)	30	32	0
CDDF	PeCDD (total)	0	0	17
CDDF	PeCDF (total)	0	0	17
CDDF	TCDD (total)	0	0	17
CDDF	TCDF (total)	30	32	17
CDDF	PCDD/PCDF TEQ	0	0	17
Inorganic	Aluminum	0	83	82
Inorganic	Antimony	0	83	82
Inorganic	Arsenic	65	83	82
Inorganic	Barium	0	38	75
Inorganic	Beryllium	0	38	75
Inorganic	Bismuth	0	38	0
Inorganic	Cadmium	65	83	82
Inorganic	Calcium	0	38	0
Inorganic	Chromium (total)	65	83	82
Inorganic	Cobalt	0	38	75
Inorganic	Copper	65	83	82
Inorganic	Iron	65	83	82
Inorganic	Lead	65	83	82
Inorganic	Lithium	0	38	0
Inorganic	Magnesium	0	38	0
Inorganic	Manganese	0	83	82
Inorganic	Mercury	65	83	82
Inorganic	Molybdenum	0	38	75
Inorganic	Nickel	65	83	82
Inorganic	Potassium	0	38	0
Inorganic	Ruthenium	0	38	0
Inorganic	Selenium	65	83	82
Inorganic	Silver	65	83	82
Inorganic	Sodium	0	38	0
Inorganic	Strontium	0	38	75

Table 2. Number of Samples Analyzed by Analyte
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Sampling Event		
		1991-1994	2000-2002	2010-2011
Inorganic	Tellurium	0	38	0
Inorganic	Thallium	0	38	75
Inorganic	Tin	0	83	82
Inorganic	Titanium	0	0	75
Inorganic	Vanadium	0	38	75
Inorganic	Zinc	65	83	82
Organotin	Butyltin (mono+di+tri)	32	32	0
Organotin	Dibutyltin	32	32	59
Organotin	Monobutyltin	32	32	59
Organotin	Tetrabutyltin	0	0	59
Organotin	Tributyltin	32	32	59
PAH	1,1-Biphenyl	65	78	82
PAH	1-Methylnaphthalene	65	78	82
PAH	1-Methylphenanthrene	65	78	82
PAH	2,3,5-Trimethylnaphthalene	65	78	82
PAH	2,6-Dimethylnaphthalene	65	78	82
PAH	2-Methylnaphthalene	65	78	82
PAH	Acenaphthene	65	78	82
PAH	Acenaphthylene	65	78	82
PAH	Anthracene	65	78	82
PAH	Benzo(a)anthracene	65	78	82
PAH	Benzo(a)pyrene	65	78	82
PAH	Benzo(b)fluoranthene	65	78	82
PAH	Benzo(e)pyrene	65	0	82
PAH	Benzo(g,h,i)perylene	65	78	82
PAH	Benzo(k)fluoranthene	65	78	82
PAH	Chrysene	65	78	82
PAH	Dibenz(a,h)anthracene	65	78	82
PAH	Dibenzothiophene	65	78	82
PAH	Fluoranthene	65	78	82
PAH	Fluorene	65	78	82
PAH	Indeno(1,2,3-cd)pyrene	65	78	82
PAH	Naphthalene	65	78	82
PAH	PAHs (High MW 13)	65	78	0
PAH	PAHs (Low MW 9)	65	78	0
PAH	PAHs (total 22)	65	78	0
PAH	Perylene	65	0	82
PAH	Phenanthrene	65	0	82
PAH	Pyrene	65	78	82
PCB	Aroclor-1254	65	0	0
PCB	Aroclor-1260	65	0	0
PCB	PCB-003 (4-CB)	0	0	75
PCB	PCB-007 (2,4-DiCB)	65	0	0
PCB	PCB-008 (2,4'-DiCB)	65	76	82
PCB	PCB-015 (4,4'-DiCB)	65	0	0
PCB	PCB-016+032	65	0	0
PCB	PCB-018 (2,2',5-TrCB)	65	76	82
PCB	PCB-022 (2,3,4'-TrCB)	65	0	0
PCB	PCB-024 (2,3,6-TrCB)	65	0	0
PCB	PCB-025 (2,3',4-TrCB)	65	0	0
PCB	PCB-026 (2,3',5-TrCB)	65	0	0
PCB	PCB-028 (2,4,4'-TrCB)	65	76	82
PCB	PCB-028+031	65	0	0
PCB	PCB-029 (2,4,5-TrCB)	65	0	0

Table 2. Number of Samples Analyzed by Analyte
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Sampling Event		
		1991-1994	2000-2002	2010-2011
PCB	PCB-031 (2,4',5-TrCB)	0	0	75
PCB	PCB-033 (2,3',4'-TrCB)	65	0	75
PCB	PCB-037 (3,4,4'-TrCB)	0	0	75
PCB	PCB-037+042	65	0	0
PCB	PCB-040 (2,2',3,3'-TeCB)	65	0	0
PCB	PCB-041+064	65	0	0
PCB	PCB-044 (2,2',3,5'-TeCB)	65	76	82
PCB	PCB-045 (2,2',3,6-TeCB)	65	0	0
PCB	PCB-046 (2,2',3,6'-TeCB)	65	0	0
PCB	PCB-047+048	65	0	0
PCB	PCB-049 (2,2',4,5'-TeCB)	65	0	75
PCB	PCB-050 (2,2',4,6-TeCB)	65	0	0
PCB	PCB-052 (2,2',5,5'-TeCB)	65	76	82
PCB	PCB-056+060	65	0	75
PCB	PCB-066 (2,3',4,4'-TeCB)	65	76	82
PCB	PCB-070 (2,3',4',5-TeCB)	65	0	75
PCB	PCB-074 (2,4,4',5-TeCB)	65	0	75
PCB	PCB-077 (3,3',4,4'-TeCB)	65	76	82
PCB	PCB-081 (3,4,4',5-TeCB)	0	0	75
PCB	PCB-082 (2,2',3,3',4-PeCB)	65	0	0
PCB	PCB-083 (2,2',3,3',5-PeCB)	65	0	0
PCB	PCB-084 (2,2',3,3',6-PeCB)	65	0	0
PCB	PCB-085 (2,2',3,4,4'-PeCB)	65	0	0
PCB	PCB-087 (2,2',3,4,5'-PeCB)	65	0	75
PCB	PCB-088 (2,2',3,4,6-PeCB)	65	0	0
PCB	PCB-092 (2,2',3,5,5'-PeCB)	65	0	0
PCB	PCB-095 (2,2',3,5',6-PeCB)	0	0	75
PCB	PCB-097 (2,2',3,4',5'-PeCB)	65	0	75
PCB	PCB-099 (2,2',4,4',5-PeCB)	65	0	75
PCB	PCB-100 (2,2',4,4',6-PeCB)	65	0	0
PCB	PCB-101 (2,2',4,5,5'-PeCB)	65	76	82
PCB	PCB-105 (2,3,3',4,4'-PeCB)	65	76	82
PCB	PCB-110 (2,3,3',4',6-PeCB)	0	0	82
PCB	PCB-114 (2,3,4,4',5-PeCB)	0	0	75
PCB	PCB-118 (2,3',4,4',5-PeCB)	65	76	82
PCB	PCB-119 (2,3',4,4',6-PeCB)	0	0	75
PCB	PCB-123 (2,3',4,4',5'-PeCB)	0	0	75
PCB	PCB-126 (3,3',4,4',5-PeCB)	65	76	82
PCB	PCB-128 (2,2',3,3',4,4'-HxCB)	65	76	82
PCB	PCB-129 (2,2',3,3',4,5-HxCB)	65	0	0
PCB	PCB-132+168	0	0	75
PCB	PCB-136 (2,2',3,3',6,6'-HxCB)	65	0	0
PCB	PCB-137 (2,2',3,4,4',5-HxCB)	65	0	0
PCB	PCB-138 (2,2',3,4,4',5'-HxCB)	65	76	82
PCB	PCB-141 (2,2',3,4,5,5'-HxCB)	65	0	75
PCB	PCB-146 (2,2',3,4',5,5'-HxCB)	65	0	0
PCB	PCB-149 (2,2',3,4',5',6-HxCB)	65	0	75
PCB	PCB-151 (2,2',3,5,5',6-HxCB)	65	0	75
PCB	PCB-153 (2,2',4,4',5,5'-HxCB)	65	76	82
PCB	PCB-156 (2,3,3',4,4',5-HxCB)	0	0	75
PCB	PCB-157 (2,3,3',4,4',5'-HxCB)	0	0	75
PCB	PCB-158 (2,3,3',4,4',6-HxCB)	65	0	75
PCB	PCB-167 (2,3',4,4',5,5'-HxCB)	65	0	75
PCB	PCB-169 (3,3',4,4',5,5'-HxCB)	0	0	75

Table 2. Number of Samples Analyzed by Analyte
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Sampling Event		
		1991-1994	2000-2002	2010-2011
PCB	PCB-170 (2,2',3,3',4,4',5-HpCB)	65	76	82
PCB	PCB-172 (2,2',3,3',4,5,5'-HpCB)	65	0	0
PCB	PCB-174 (2,2',3,3',4,5,6'-HpCB)	65	0	75
PCB	PCB-177 (2,2',3,3',4,5',6'-HpCB)	65	0	75
PCB	PCB-178 (2,2',3,3',5,5',6-HpCB)	65	0	0
PCB	PCB-180 (2,2',3,4,4',5,5'-HpCB)	65	76	82
PCB	PCB-183 (2,2',3,4,4',5',6-HpCB)	65	0	75
PCB	PCB-185 (2,2',3,4,5,5',6-HpCB)	65	0	0
PCB	PCB-187 (2,2',3,4',5,5',6-HpCB)	65	76	82
PCB	PCB-188 (2,2',3,4',5,6,6'-HpCB)	65	0	0
PCB	PCB-189 (2,3,3',4,4',5,5'-HpCB)	65	0	75
PCB	PCB-191 (2,3,3',4,4',5',6-HpCB)	65	0	0
PCB	PCB-194 (2,2',3,3',4,4',5,5'-OcCB)	65	0	75
PCB	PCB-195 (2,2',3,3',4,4',5,6-OcCB)	65	76	82
PCB	PCB-196 (2,2',3,3',4,4',5,6'-OcCB)	65	0	0
PCB	PCB-199+200	0	0	33
PCB	PCB-200 (2,2',3,3',4,5,6,6'-OcCB)	65	0	42
PCB	PCB-201 (2,2',3,3',4,5',6,6'-OcCB)	65	0	75
PCB	PCB-205 (2,3,3',4,4',5,5',6-OcCB)	65	0	0
PCB	PCB-206 (2,2',3,3',4,4',5,5',6-NoCB)	65	76	82
PCB	PCB-209 (DeCB)	65	76	82
PCB	PCBCL6 (unidentified PCBs)	65	0	0
PCB	PCBs (total)	65	76	0
PCB	PCBTRI2 (unidentified PCBs)	65	0	0
PCB	PCBTRI4 (unidentified PCBs)	65	0	0
Pesticide	1,1-Dichloro-2,2-bis(4-ethylphenyl) ethane	0	0	75
Pesticide	2,4'-DDD	65	76	82
Pesticide	2,4'-DDE	65	76	82
Pesticide	2,4'-DDT	65	76	82
Pesticide	4,4'-DDD	65	76	82
Pesticide	4,4'-DDE	65	76	82
Pesticide	4,4'-DDT	65	76	82
Pesticide	Aldrin	65	76	82
Pesticide	alpha-BHC	65	0	75
Pesticide	alpha-Chlordane	65	76	82
Pesticide	beta-BHC	65	0	75
Pesticide	cis-Nonachlor	65	0	75
Pesticide	delta-BHC	65	0	75
Pesticide	Dieldrin	65	76	82
Pesticide	Endosulfan I	65	76	82
Pesticide	Endosulfan II	65	76	82
Pesticide	Endosulfan sulfate	65	76	82
Pesticide	Endrin	65	76	82
Pesticide	Endrin aldehyde	65	0	75
Pesticide	Endrin ketone	0	0	75
Pesticide	gamma-BHC	65	76	82
Pesticide	gamma-Chlordane	65	0	75
Pesticide	Heptachlor	65	76	82
Pesticide	Heptachlor epoxide	65	76	82
Pesticide	Hexachlorobenzene	65	76	82
Pesticide	Methoxychlor	0	0	75
Pesticide	Mirex	65	76	82
Pesticide	Oxychlordane	65	0	75
Pesticide	Pesticides (total)	65	76	0

Table 2. Number of Samples Analyzed by Analyte
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Sampling Event		
		1991-1994	2000-2002	2010-2011
Pesticide	Toxaphene	65	76	0
Pesticide	trans-Nonachlor	65	76	82
Physical	Organic Carbon (total)	63	65	157
Physical	Percent Clay	65	43	75
Physical	Percent Coarse Sand	0	0	75
Physical	Percent Fine Sand	0	0	75
Physical	Percent Gravel	0	45	73
Physical	Percent Medium Sand	0	0	75
Physical	Percent Pebbles and Shells	0	0	75
Physical	Percent Sand	65	67	82
Physical	Percent Silt	65	43	75
Physical	Percent Silt and Clay	65	67	82
Physical	Percent Total Grain Size	0	0	75
Physical	Percent Very Coarse Sand	0	0	72
Physical	Percent Very Fine Sand	0	0	72
Physical	Solids (total)	0	0	75
Radio	Uranium-238	0	38	0

CDDF: chlorinated dibenzodioxins and furans
PAH: polycyclic aromatic hydrocarbons
PCB: polychlorinated biphenyl
TEQ: toxic equivalents

Table 3. Methods and Detection Limits, 2010–2011 Data
Casco Bay Estuary Partnership, Portland, Maine

Group	Method	Units	Method Detection Limit		Reporting Detection Limit	
			Minimum	Maximum	Minimum	Maximum
CDDF	8290	ng/kg dry	0.0152	2.01	1.19	37.7
Metal	EPA 245.7m	µg/g dry	0.01	0.01	0.02	0.02
Metal	EPA 6020m	µg/g dry	0.025	1	0.05	5
Organotin	Krone et al., 1989	ng/g dry	1	1	3	3
PAH	EPA 8270Cm	ng/g dry	1	1	5	5
PCB	EPA 8270Cm	ng/g dry	1	1	5	5
Pesticide	EPA 8270Cm	ng/g dry	1	5	5	10

Note that detection and reporting limits presented here represent ranges for the different metals and congeners that are reportable under each method.
µg/g dry: microgram(s) per gram, dry weight basis
CDDF: chlorinated dibenzodioxins and furans
ng/g dry: nanogram(s) per gram, dry weight basis
ng/kg dry: nanogram(s) per kilogram, dry weight basis
PAH: polycyclic aromatic hydrocarbon
PCB: polychlorinated biphenyl

Table 4. Definitions of Summed Constituents
Casco Bay Estuary Partnership, Portland, Maine

Group	Note
HMWPAH	Sum of benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, flouranthene, and pyrene
LMWPAH	Sum of 2-methylnapthalene, acenapthene, acenapthylene, anthracene, flourene, naphthalene, and phenanthrene[a]
PAH (total)	Sum of Low MW PAHs and High MW PAHs (PAHs used in ERM/ERL derivation; NCCA 2016)
Total PCBs	Sum of all congeners analyzed (variable among sampling events)
Total Chlordane	Sum of alpha-chlordane, gamma-chlordane, and oxychlordane
DDx	Sum of 2,4′-DDD, 2,4,′-DDE, 2,4′-DDT, 4,4′-DDD, 4,4′-DDE, and 4,4′-DDT
Total PCDD/PCDFs	Sum of 17 dioxins and furans
PCDD/PCDF TEQ	Sum of 17 dioxins and furans normalized to the toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin, or toxic equivalents
Total butyltins	Sum of dibutyltin, monobutyltin, and tributyltin

All sums include detected concentrations only
Assumed all zero results reported in NCCA data are not detected concentrations
a. Phenanthrene could not be included in the summation of LMWPAHs or PAHSs (total) because it was not analyzed in the 2000-2002 sampling period. The potential effects are discussed in Section 3.2.3.
b. The inconsistency in the number of PCB concegner analyzed in each sampling event is disccused in Section 3.2.4.
DDD: dichlorodiphenyldichloroethane
DDE: dichlorodiphenyldichloroethylene
DDT: dichlorodiphenyltrichloroethane
ERL: effects range low
ERM: effects range medium
HMWPAH: high molecular weight polycyclic aromatic hydrocarbons
LMWPAH: low molecular weight polycyclic aromatic hydrocarbons
NCCA: national coastal condition assessment
PAH: polycyclic aromatic hydrocarbon
PCB: polychlorinated biphenyl
PCDD/PCDFs: polychlorinated dibenzodioxins and furans
TEQ: toxic equivalents

Table 5. Bay-Wide Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
CDDF	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg dry	16 / 16	1.2	8.9	18	130	32
CDDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg dry	16 / 16	0.11	2.7	3.2	9.1	2.8
CDDF	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg dry	4 / 16	0.12	0.26	0.27	0.44	0.14
CDDF	1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg dry	12 / 16	0.039	0.43	0.44	0.85	0.26
CDDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg dry	2 / 16	0.52	0.79	0.79	1.1	0.39
CDDF	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg dry	14 / 16	0.074	0.56	0.96	5.4	1.4
CDDF	1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg dry	4 / 16	0.18	0.32	0.31	0.43	0.11
CDDF	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg dry	3 / 16	0.15	0.16	0.23	0.37	0.12
CDDF	1,2,3,7,8-Pentachlorodibenzofuran	ng/kg dry	2 / 16	0.26	0.36	0.36	0.46	0.14
CDDF	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg dry	10 / 16	0.07	0.58	0.65	1.3	0.43
CDDF	1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg dry	0 / 16	ND	ND	ND	ND	ND
CDDF	2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg dry	5 / 16	0.096	0.32	0.35	0.62	0.22
CDDF	2,3,4,7,8-Pentachlorodibenzofuran	ng/kg dry	3 / 16	0.14	0.3	0.25	0.31	0.096
CDDF	2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg dry	3 / 16	0.071	0.18	0.17	0.26	0.093
CDDF	2,3,7,8-Tetrachlorodibenzofuran	ng/kg dry	7 / 16	0.58	0.81	1.1	2.8	0.78
CDDF	Total PCDD/PCDFs	ng/kg dry	16 / 16	19	110	170	1000	250
CDDF	PCDD/PCDF TEQ	ng/kg dry	16 / 16	0.039	0.26	0.58	2.9	0.78
CDDF	HpCDD (total)	ng/kg dry	16 / 16	3.6	22	38	200	49
CDDF	HpCDF (total)	ng/kg dry	13 / 16	1.7	7.2	11	38	11
CDDF	HxCDD (total)	ng/kg dry	16 / 16	0.77	4.8	5.1	14	4.3
CDDF	HxCDF (total)	ng/kg dry	15 / 16	0.2	2.1	3.6	20	4.8
CDDF	Octachlorodibenzo-p-dioxin	ng/kg dry	16 / 16	17	95	140	860	200
CDDF	Octachlorodibenzofuran	ng/kg dry	16 / 16	0.3	5.1	7.6	38	9.6
CDDF	PeCDD (total)	ng/kg dry	5 / 16	0.16	0.3	0.33	0.63	0.18
CDDF	PeCDF (total)	ng/kg dry	13 / 16	0.15	1.6	2.2	7.5	2
CDDF	TCDD (total)	ng/kg dry	2 / 16	0.29	0.66	0.66	1	0.52
CDDF	TCDF (total)	ng/kg dry	10 / 16	0.36	1.2	1.8	6.2	1.9
Metal	Aluminum	µg/g dry	77 / 77	6700	47000	50000	90000	19000
Metal	Antimony	µg/g dry	77 / 77	0.1	0.3	0.33	0.8	0.15
Metal	Arsenic	µg/g dry	77 / 77	2.4	9.4	9.5	20	4.4
Metal	Barium	µg/g dry	70 / 70	140	260	280	560	100
Metal	Beryllium	µg/g dry	70 / 70	1	2	2	3.6	0.48
Metal	Cadmium	µg/g dry	74 / 77	0.089	0.31	0.46	2.3	0.41
Metal	Chromium (total)	µg/g dry	77 / 77	14	65	66	130	24
Metal	Cobalt	µg/g dry	70 / 70	2.7	8.7	8.6	16	2.8
Metal	Copper	µg/g dry	77 / 77	2.1	15	15	36	7.4

Table 5. Bay-Wide Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
Metal	Iron	µg/g dry	77 / 77	8800	30000	28000	45000	9200
Metal	Lead	µg/g dry	77 / 77	7.9	24	26	50	7.9
Metal	Manganese	µg/g dry	77 / 77	130	490	560	2100	290
Metal	Mercury	µg/g dry	71 / 77	0.01	0.1	0.11	0.3	0.074
Metal	Molybdenum	µg/g dry	70 / 70	0.3	1.5	1.6	4.9	0.91
Metal	Nickel	µg/g dry	77 / 77	5.5	23	23	48	8.6
Metal	Selenium	µg/g dry	56 / 77	0.08	0.9	0.97	2.9	0.7
Metal	Silver	µg/g dry	68 77	0.06	0.2	0.28	0.9	0.18
Metal	Strontium	µg/g dry	70 / 70	74	140	160	800	110
Metal	Thallium	µg/g dry	70 / 70	0.3	0.6	0.64	1.1	0.21
Metal	Tin	µg/g dry	77 / 77	1.1	4.1	4.8	11	2.3
Metal	Titanium	µg/g dry	70 / 70	1400	3200	3100	4500	710
Metal	Vanadium	µg/g dry	70 / 70	28	87	85	140	27
Metal	Zinc	µg/g dry	77 / 77	18	69	68	130	26
Organotin	Butyltin (mono+di+tri)	ng/g dry	6 / 55	0.7	4.5	6.8	16	7
Organotin	Dibutyltin	ng/g dry	0 / 55	ND	ND	ND	ND	ND
Organotin	Monobutyltin	ng/g dry	0 / 55	ND	ND	ND	ND	ND
Organotin	Tetrabutyltin	ng/g dry	0 / 55	ND	ND	ND	ND	ND
Organotin	Tributyltin	ng/g dry	6 / 55	0.7	4.5	6.8	16	7
Organotin	Tripentyltin	ng/g dry	55 / 55	20	43	41	60	10
PAH	1-Methylnaphthalene	ng/g dry	35 / 77	1	1.7	1.9	7.1	1.1
PAH	1-Methylphenanthrene	ng/g dry	51 / 77	1	2.4	3.2	26	3.9
PAH	1,1-Biphenyl	ng/g dry	25 / 77	0.8	1.2	1.3	2.9	0.45
PAH	2-Methylnaphthalene	ng/g dry	45 / 77	1	2.1	2.4	12	1.7
PAH	2,3,5-Trimethylnaphthalene	ng/g dry	10 / 77	0.7	1.4	1.9	4.7	1.1
PAH	2,6-Dimethylnaphthalene	ng/g dry	20 / 77	1	1.8	2	6	1.1
PAH	Acenaphthene	ng/g dry	17 / 77	1.1	2	3.9	28	6.5
PAH	Acenaphthylene	ng/g dry	41 / 77	1	2.4	3.1	16	2.7
PAH	Anthracene	ng/g dry	49 / 77	1.2	2.8	7.5	76	14
PAH	Benzo(a)anthracene	ng/g dry	74 / 77	1.1	6.6	16	210	31
PAH	Benzo(a)pyrene	ng/g dry	70 / 77	1.8	7.3	18	210	33
PAH	Benzo(b)fluoranthene	ng/g dry	70 / 77	1.7	5.8	13	130	23
PAH	Benzo(e)pyrene	ng/g dry	70 / 77	1.8	5.9	13	120	20
PAH	Benzo(g,h,i)perylene	ng/g dry	70 / 77	1.4	5.8	11	94	16
PAH	Benzo(k)fluoranthene	ng/g dry	70 / 77	1.4	5.4	13	140	21
PAH	Chrysene	ng/g dry	75 / 77	1.1	9.2	20	230	35

Table 5. Bay-Wide Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
PAH	Dibenz(a,h)anthracene	ng/g dry	22 / 77	1.2	3.2	5.3	24	5.6
PAH	Dibenzothiophene	ng/g dry	45 / 77	1	1.9	2.4	13	2
PAH	Fluoranthene	ng/g dry	76 / 77	1.2	14	32	360	57
PAH	Fluorene	ng/g dry	44 / 77	1	1.9	3	32	5.1
PAH	Indeno(1,2,3-cd)pyrene	ng/g dry	66 / 77	1.1	5	11	95	16
PAH	Naphthalene	ng/g dry	50 / 77	0.7	4.1	4.8	14	2.8
PAH	HMWPAH	ng/g dry	77 / 77	2.3	48	110	1200	200
PAH	LMWPAH	ng/g dry	75 / 77	1.1	16	31	420	57
PAH	PAHs (total)	ng/g dry	77 / 77	2.3	62	140	1500	260
PAH	Perylene	ng/g dry	58 / 77	1	3.3	6	41	7.8
PAH	Phenanthrene	ng/g dry	73 / 77	2.1	9	17	260	35
PAH	Pyrene	ng/g dry	76 / 77	1.4	13	28	300	49
PCB	PCB-003 (4-CB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-008 (2,4'-DiCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-018 (2,2',5-TrCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-028 (2,4,4'-TrCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-031 (2,4',5-TrCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-033 (2,3',4'-TrCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-037 (3,4,4'-TrCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-044 (2,2',3,5'-TeCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-049 (2,2',4,5'-TeCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-052 (2,2',5,5'-TeCB)	ng/g dry	1 / 77	1.4	1.4	1.4	1.4	ND
PCB	PCB-056+060	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-066 (2,3',4,4'-TeCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-070 (2,3',4',5-TeCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-074 (2,4,4',5-TeCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-077 (3,3',4,4'-TeCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-081 (3,4,4',5-TeCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-087 (2,2',3,4,5'-PeCB)	ng/g dry	1 / 70	1.1	1.1	1.1	1.1	ND
PCB	PCB-095 (2,2',3,5',6-PeCB)	ng/g dry	1 / 70	1.2	1.2	1.2	1.2	ND
PCB	PCB-097 (2,2',3,4',5'-PeCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-099 (2,2',4,4',5-PeCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-101 (2,2',4,5,5'-PeCB)	ng/g dry	1 / 77	3.1	3.1	3.1	3.1	ND
PCB	PCB-105 (2,3,3',4,4'-PeCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-110 (2,3,3',4',6-PeCB)	ng/g dry	1 / 77	1.6	1.6	1.6	1.6	ND
PCB	PCB-114 (2,3,4,4',5-PeCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND

Table 5. Bay-Wide Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
PCB	PCB-118 (2,3',4,4',5-PeCB)	ng/g dry	1 / 77	1	1	1	1	ND
PCB	PCB-119 (2,3',4,4',6-PeCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-123 (2,3',4,4',5'-PeCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-126 (3,3',4,4',5-PeCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-128 (2,2',3,3',4,4'-HxCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-132+168	ng/g dry	1 / 70	1.5	1.5	1.5	1.5	ND
PCB	PCB-138 (2,2',3,4,4',5'-HxCB)	ng/g dry	1 / 77	6.6	6.6	6.6	6.6	ND
PCB	PCB-141 (2,2',3,4,5,5'-HxCB)	ng/g dry	1 / 70	1.6	1.6	1.6	1.6	ND
PCB	PCB-149 (2,2',3,4',5',6-HxCB)	ng/g dry	1 / 70	5.8	5.8	5.8	5.8	ND
PCB	PCB-151 (2,2',3,5,5',6-HxCB)	ng/g dry	1 / 70	2.6	2.6	2.6	2.6	ND
PCB	PCB-153 (2,2',4,4',5,5'-HxCB)	ng/g dry	1 / 77	6.2	6.2	6.2	6.2	ND
PCB	PCB-156 (2,3,3',4,4',5-HxCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-157 (2,3,3',4,4',5'-HxCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-158 (2,3,3',4,4',6-HxCB)	ng/g dry	1 / 70	1	1	1	1	ND
PCB	PCB-167 (2,3',4,4',5,5'-HxCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-169 (3,3',4,4',5,5'-HxCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-170 (2,2',3,3',4,4',5-HpCB)	ng/g dry	1 / 77	1.9	1.9	1.9	1.9	ND
PCB	PCB-174 (2,2',3,3',4,5,6'-HpCB)	ng/g dry	1 / 70	3.6	3.6	3.6	3.6	ND
PCB	PCB-177 (2,2',3,3',4,5',6'-HpCB)	ng/g dry	1 / 70	2.7	2.7	2.7	2.7	ND
PCB	PCB-180 (2,2',3,4,4',5,5'-HpCB)	ng/g dry	1 / 77	5.3	5.3	5.3	5.3	ND
PCB	PCB-183 (2,2',3,4,4',5',6-HpCB)	ng/g dry	1 / 70	2.1	2.1	2.1	2.1	ND
PCB	PCB-187 (2,2',3,4',5,5',6-HpCB)	ng/g dry	1 / 77	4.2	4.2	4.2	4.2	ND
PCB	PCB-189 (2,3,3',4,4',5,5'-HpCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-194 (2,2',3,3',4,4',5,5'-OcCB)	ng/g dry	0 / 70	ND	ND	ND	ND	ND
PCB	PCB-195 (2,2',3,3',4,4',5,6-OcCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-199+200	ng/g dry	0 / 31	ND	ND	ND	ND	ND
PCB	PCB-200 (2,2',3,3',4,5,6,6'-OcCB)	ng/g dry	0 / 39	ND	ND	ND	ND	ND
PCB	PCB-201 (2,2',3,3',4,5',6,6'-OcCB)	ng/g dry	1 / 70	1.4	1.4	1.4	1.4	ND
PCB	PCB-206 (2,2',3,3',4,4',5,5',6-NoCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCB-209 (DeCB)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
PCB	PCBs (total)	ng/g dry	1 / 77	56	56	56	56	ND
Pesticide	1,1-Dichloro-2,2-bis(4-ethylphenyl) ethane	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	2,4'-DDD	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	2,4'-DDE	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	2,4'-DDT	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	4,4'-DDD	ng/g dry	0 / 77	ND	ND	ND	ND	ND

Table 5. Bay-Wide Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
Pesticide	4,4'-DDE	ng/g dry	1 / 77	1.1	1.1	1.1	1.1	ND
Pesticide	4,4'-DDT	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Aldrin	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	alpha-BHC	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	alpha-Chlordane	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	beta-BHC	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	Chlordane (total)	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	cis-Nonachlor	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	1 / 77	1.1	1.1	1.1	1.1	ND
Pesticide	delta-BHC	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	Dieldrin	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Endosulfan I	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Endosulfan II	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Endosulfan sulfate	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Endrin	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Endrin aldehyde	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	Endrin ketone	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	gamma-BHC	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	gamma-Chlordane	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	Heptachlor	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Heptachlor epoxide	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Hexachlorobenzene	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Methoxychlor	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	Mirex	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Pesticide	Oxychlordane	ng/g dry	0 / 70	ND	ND	ND	ND	ND
Pesticide	Pesticides (total)	ng/g dry	1 / 77	1.1	1.1	1.1	1.1	ND
Pesticide	trans-Nonachlor	ng/g dry	0 / 77	ND	ND	ND	ND	ND
Physical	Organic Carbon (total)	%	77 / 77	0.042	3.1	3.1	14	2.3
Physical	Organic Carbon (total)	µg/g dry	70 / 70	420	33000	33000	140000	24000
Physical	Percent Clay	%	70 / 70	0	14	16	43	11
Physical	Percent Coarse Sand	%	70 / 70	0	1	3.8	51	8.6
Physical	Percent Fine Sand	%	70 / 70	0	4.7	11	70	15
Physical	Percent Gravel	%	68 / 68	0	0	1.2	22	3.7
Physical	Percent Medium Sand	%	70 / 70	0.11	2.1	6.1	42	9.5
Physical	Percent Pebbles and Shells	%	70 / 70	0	0	1.4	28	5.6
Physical	Percent Sand	%	77 / 77	1.7	28	35	99	28

Table 5. Bay-Wide Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
Physical	Percent Silt	%	70 / 70	0.7	54	48	75	21
Physical	Percent Silt and Clay	%	77 / 77	0.8	72	62	98	30
Physical	Percent Total Grain Size	%	70 / 70	96	100	100	100	0.61
Physical	Percent Very Coarse Sand	%	67 / 67	0	0.2	1.7	20	3.8
Physical	Percent Very Fine Sand	%	67 / 67	0.9	8.5	12	43	10
Physical	Solids (total)	%	70 / 70	23	43	46	83	16

%: percent
µg/g dry: microgram(s) per gram, dry weight basis
CDDF: chlorinated dibenzodioxins and furans
HMWPAH: high molecular weight polycyclic aromatic hydrocarbons
LMWPAH: low molecular weight polycyclic aromatic hydrocarbons
ND: not detected
ng/g dry: nanogram(s) per gram, dry weight basis
ng/kg dry: nanogram(s) per kilogram, dry weight basis
PAH: polycyclic aromatic hydrocarbon
PCB: polychlorinated biphenyl
PCDD/PCDFs: polychlorinated dibenzodioxins and furans
TEQ: toxic equivalents

Table 6. Regional Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
CDDF	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg dry	Inner Bay	13 / 13	1.8	9	11	33	9
CDDF	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	ng/kg dry	West Bay	3 / 3	1.2	8.8	48	130	74
CDDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg dry	Inner Bay	13 / 13	0.11	2.6	2.9	8.5	2.4
CDDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg dry	West Bay	3 / 3	0.33	3.2	4.2	9.1	4.4
CDDF	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg dry	Inner Bay	3 / 13	0.12	0.21	0.26	0.44	0.17
CDDF	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg dry	West Bay	1 / 3	0.3	0.3	0.3	0.3	ND
CDDF	1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg dry	Inner Bay	9 / 13	0.15	0.35	0.45	0.85	0.25
CDDF	1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg dry	West Bay	3 / 3	0.039	0.62	0.43	0.64	0.34
CDDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg dry	Inner Bay	1 / 13	0.52	0.52	0.52	0.52	ND
CDDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg dry	West Bay	1 / 3	1.1	1.1	1.1	1.1	ND
CDDF	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg dry	Inner Bay	11 / 13	0.2	0.61	0.68	1.6	0.44
CDDF	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	ng/kg dry	West Bay	3 / 3	0.074	0.5	2	5.4	3
CDDF	1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg dry	Inner Bay	2 / 13	0.18	0.28	0.28	0.38	0.14
CDDF	1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg dry	West Bay	2 / 3	0.27	0.35	0.35	0.43	0.12
CDDF	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg dry	Inner Bay	2 / 13	0.15	0.26	0.26	0.37	0.15
CDDF	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	ng/kg dry	West Bay	1 / 3	0.16	0.16	0.16	0.16	ND
CDDF	1,2,3,7,8-Pentachlorodibenzofuran	ng/kg dry	Inner Bay	1 / 13	0.46	0.46	0.46	0.46	ND
CDDF	1,2,3,7,8-Pentachlorodibenzofuran	ng/kg dry	West Bay	1 / 3	0.26	0.26	0.26	0.26	ND
CDDF	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg dry	Inner Bay	8 / 13	0.21	0.58	0.65	1.3	0.39
CDDF	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	ng/kg dry	West Bay	2 / 3	0.07	0.63	0.63	1.2	0.78
CDDF	1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg dry	Inner Bay	0 / 13	ND	ND	ND	ND	ND
CDDF	1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg dry	West Bay	0 / 3	ND	ND	ND	ND	ND
CDDF	2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg dry	Inner Bay	3 / 13	0.096	0.2	0.27	0.51	0.22
CDDF	2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg dry	West Bay	2 / 3	0.32	0.47	0.47	0.62	0.21
CDDF	2,3,4,7,8-Pentachlorodibenzofuran	ng/kg dry	Inner Bay	2 / 13	0.14	0.22	0.22	0.31	0.12
CDDF	2,3,4,7,8-Pentachlorodibenzofuran	ng/kg dry	West Bay	1 / 3	0.3	0.3	0.3	0.3	ND
CDDF	2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg dry	Inner Bay	3 / 13	0.071	0.18	0.17	0.26	0.093
CDDF	2,3,7,8-Tetrachlorodibenzo-p-dioxin	ng/kg dry	West Bay	0 / 3	ND	ND	ND	ND	ND
CDDF	2,3,7,8-Tetrachlorodibenzofuran	ng/kg dry	Inner Bay	6 / 13	0.58	0.87	1.1	2.8	0.83
CDDF	2,3,7,8-Tetrachlorodibenzofuran	ng/kg dry	West Bay	1 / 3	0.64	0.64	0.64	0.64	ND
CDDF	Total PCDD/PCDFs	ng/kg dry	Inner Bay	13 / 13	39	110	120	310	84
CDDF	Total PCDD/PCDFs	ng/kg dry	West Bay	3 / 3	19	110	390	1000	570
CDDF	PCDD/PCDF TEQ	ng/kg dry	Inner Bay	13 / 13	0.05	0.25	0.46	2	0.52
CDDF	PCDD/PCDF TEQ	ng/kg dry	West Bay	3 / 3	0.039	0.32	1.1	2.9	1.6
CDDF	HpCDD (total)	ng/kg dry	Inner Bay	13 / 13	5.6	22	29	81	23
CDDF	HpCDD (total)	ng/kg dry	West Bay	3 / 3	3.6	22	76	200	110
CDDF	HpCDF (total)	ng/kg dry	Inner Bay	11 / 13	1.7	7.2	8.9	27	7.7
CDDF	HpCDF (total)	ng/kg dry	West Bay	2 / 3	3.2	21	21	38	25
CDDF	HxCDD (total)	ng/kg dry	Inner Bay	13 / 13	0.77	5.2	4.8	14	3.8
CDDF	HxCDD (total)	ng/kg dry	West Bay	3 / 3	0.78	4.4	6.5	14	7
CDDF	HxCDF (total)	ng/kg dry	Inner Bay	12 / 13	0.6	1.9	2.5	7.8	2.1
CDDF	HxCDF (total)	ng/kg dry	West Bay	3 / 3	0.2	3.5	7.8	20	10
CDDF	Octachlorodibenzo-p-dioxin	ng/kg dry	Inner Bay	13 / 13	32	99	100	240	66
CDDF	Octachlorodibenzo-p-dioxin	ng/kg dry	West Bay	3 / 3	17	90	320	860	470
CDDF	Octachlorodibenzofuran	ng/kg dry	Inner Bay	13 / 13	0.3	4.9	6	20	5.4
CDDF	Octachlorodibenzofuran	ng/kg dry	West Bay	3 / 3	0.62	5.4	15	38	20
CDDF	PeCDD (total)	ng/kg dry	Inner Bay	4 / 13	0.21	0.33	0.37	0.63	0.18
CDDF	PeCDD (total)	ng/kg dry	West Bay	1 / 3	0.16	0.16	0.16	0.16	ND
CDDF	PeCDF (total)	ng/kg dry	Inner Bay	10 / 13	0.55	1.7	2.2	7.5	2
CDDF	PeCDF (total)	ng/kg dry	West Bay	3 / 3	0.15	1.6	2.3	5.1	2.5
CDDF	TCDD (total)	ng/kg dry	Inner Bay	2 / 13	0.29	0.66	0.66	1	0.52
CDDF	TCDD (total)	ng/kg dry	West Bay	0 / 3	ND	ND	ND	ND	ND
CDDF	TCDF (total)	ng/kg dry	Inner Bay	8 / 13	0.52	1.3	2.1	6.2	2
CDDF	TCDF (total)	ng/kg dry	West Bay	2 / 3	0.36	0.81	0.81	1.3	0.65
CDDF	TEQ CDD/CDF	ng/kg dry	Inner Bay	13 / 13	0.05	0.25	0.46	2	0.52
CDDF	TEQ CDD/CDF	ng/kg dry	West Bay	3 / 3	0.039	0.32	1.1	2.9	1.6
Metal	Aluminum	µg/g dry	Inner Bay	21 / 21	24000	58000	53000	90000	17000
Metal	Aluminum	µg/g dry	Outer Bay	17 / 17	6700	47000	43000	70000	18000
Metal	Aluminum	µg/g dry	West Bay	19 / 19	34000	53000	58000	87000	18000

Table 6. Regional Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
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Metal	Aluminum	µg/g dry	East Bay	14 / 14	25000	44000	50000	84000	21000
Metal	Aluminum	µg/g dry	Cape Small	6 / 6	25000	26000	28000	41000	6200
Metal	Antimony	µg/g dry	Inner Bay	21 / 21	0.15	0.4	0.35	0.73	0.13
Metal	Antimony	µg/g dry	Outer Bay	17 / 17	0.1	0.4	0.38	0.8	0.18
Metal	Antimony	µg/g dry	West Bay	19 / 19	0.1	0.3	0.27	0.5	0.13
Metal	Antimony	µg/g dry	East Bay	14 / 14	0.1	0.35	0.34	0.6	0.15
Metal	Antimony	µg/g dry	Cape Small	6 / 6	0.2	0.2	0.25	0.4	0.084
Metal	Arsenic	µg/g dry	Inner Bay	21 / 21	4.1	11	9.6	15	3.8
Metal	Arsenic	µg/g dry	Outer Bay	17 / 17	2.6	7.9	8.2	14	3.6
Metal	Arsenic	µg/g dry	West Bay	19 / 19	2.8	11	10	20	4.6
Metal	Arsenic	µg/g dry	East Bay	14 / 14	2.5	9.4	11	18	5.4
Metal	Arsenic	µg/g dry	Cape Small	6 / 6	2.4	6.2	7.7	16	4.9
Metal	Barium	µg/g dry	Inner Bay	20 / 20	140	250	270	530	100
Metal	Barium	µg/g dry	Outer Bay	14 / 14	170	280	290	450	85
Metal	Barium	µg/g dry	West Bay	18 / 18	210	340	350	560	94
Metal	Barium	µg/g dry	East Bay	12 / 12	140	220	250	410	87
Metal	Barium	µg/g dry	Cape Small	6 / 6	140	160	170	240	39
Metal	Beryllium	µg/g dry	Inner Bay	20 / 20	1.4	2.2	2.2	3.6	0.47
Metal	Beryllium	µg/g dry	Outer Bay	14 / 14	1	1.6	1.7	2.6	0.45
Metal	Beryllium	µg/g dry	West Bay	18 / 18	1.6	2.2	2.2	3.2	0.45
Metal	Beryllium	µg/g dry	East Bay	12 / 12	1.3	1.7	1.8	2.2	0.28
Metal	Beryllium	µg/g dry	Cape Small	6 / 6	1.7	1.9	1.9	2.3	0.24
Metal	Cadmium	µg/g dry	Inner Bay	21 / 21	0.2	0.5	0.44	0.8	0.17
Metal	Cadmium	µg/g dry	Outer Bay	17 / 17	0.089	0.2	0.25	0.8	0.21
Metal	Cadmium	µg/g dry	West Bay	19 / 19	0.1	0.5	0.53	1.3	0.34
Metal	Cadmium	µg/g dry	East Bay	14 / 14	0.1	0.4	0.71	2.3	0.71
Metal	Cadmium	µg/g dry	Cape Small	3 / 6	0.1	0.1	0.13	0.2	0.058
Metal	Chromium (total)	µg/g dry	Inner Bay	21 / 21	30	59	61	87	19
Metal	Chromium (total)	µg/g dry	Outer Bay	17 / 17	14	59	60	90	19
Metal	Chromium (total)	µg/g dry	West Bay	19 / 19	23	73	75	130	30
Metal	Chromium (total)	µg/g dry	East Bay	14 / 14	22	78	72	120	25
Metal	Chromium (total)	µg/g dry	Cape Small	6 / 6	35	44	52	84	18
Metal	Cobalt	µg/g dry	Inner Bay	20 / 20	4.1	6.9	7.5	11	2.5
Metal	Cobalt	µg/g dry	Outer Bay	14 / 14	3.3	8.1	8.1	12	2.5
Metal	Cobalt	µg/g dry	West Bay	18 / 18	2.7	9.3	9.4	16	3.5
Metal	Cobalt	µg/g dry	East Bay	12 / 12	7.3	10	10	14	2
Metal	Cobalt	µg/g dry	Cape Small	6 / 6	5.3	6.9	7.7	12	2.3
Metal	Copper	µg/g dry	Inner Bay	21 / 21	7.3	18	17	36	6.5
Metal	Copper	µg/g dry	Outer Bay	17 / 17	2.1	11	11	19	5.3
Metal	Copper	µg/g dry	West Bay	19 / 19	5.1	17	17	31	7.4
Metal	Copper	µg/g dry	East Bay	14 / 14	3.1	16	16	35	7.9
Metal	Copper	µg/g dry	Cape Small	6 / 6	3.4	4	7	17	5.5
Metal	Iron	µg/g dry	Inner Bay	21 / 21	13000	28000	28000	42000	9600
Metal	Iron	µg/g dry	Outer Bay	17 / 17	8800	26000	26000	36000	7600
Metal	Iron	µg/g dry	West Bay	19 / 19	11000	35000	32000	44000	9500
Metal	Iron	µg/g dry	East Bay	14 / 14	12000	30000	29000	45000	9900
Metal	Iron	µg/g dry	Cape Small	6 / 6	19000	20000	21000	27000	3200
Metal	Lead	µg/g dry	Inner Bay	21 / 21	21	33	34	50	8.1
Metal	Lead	µg/g dry	Outer Bay	17 / 17	7.9	22	22	31	6.9
Metal	Lead	µg/g dry	West Bay	19 / 19	16	23	24	33	4.5
Metal	Lead	µg/g dry	East Bay	14 / 14	13	24	24	31	4.8
Metal	Lead	µg/g dry	Cape Small	6 / 6	15	20	20	24	3.7
Metal	Manganese	µg/g dry	Inner Bay	21 / 21	340	470	460	620	77
Metal	Manganese	µg/g dry	Outer Bay	17 / 17	350	620	770	2100	450
Metal	Manganese	µg/g dry	West Bay	19 / 19	310	470	540	1600	270
Metal	Manganese	µg/g dry	East Bay	14 / 14	130	460	480	950	210
Metal	Manganese	µg/g dry	Cape Small	6 / 6	490	670	640	750	130
Metal	Mercury	µg/g dry	Inner Bay	21 / 21	0.03	0.17	0.18	0.3	0.082
Metal	Mercury	µg/g dry	Outer Bay	14 / 17	0.02	0.085	0.081	0.13	0.038

Table 6. Regional Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

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Metal	Mercury	µg/g dry	West Bay	19 / 19	0.01	0.06	0.071	0.15	0.042
Metal	Mercury	µg/g dry	East Bay	14 / 14	0.02	0.11	0.11	0.2	0.057
Metal	Mercury	µg/g dry	Cape Small	3 / 6	0.01	0.05	0.047	0.08	0.035
Metal	Molybdenum	µg/g dry	Inner Bay	20 / 20	0.8	1.6	1.9	3.4	0.8
Metal	Molybdenum	µg/g dry	Outer Bay	14 / 14	0.4	1.1	1.1	1.9	0.51
Metal	Molybdenum	µg/g dry	West Bay	18 / 18	0.6	1.7	1.9	4.9	1.2
Metal	Molybdenum	µg/g dry	East Bay	12 / 12	0.7	1.5	1.5	2.9	0.69
Metal	Molybdenum	µg/g dry	Cape Small	6 / 6	0.3	0.55	0.55	0.9	0.21
Metal	Nickel	µg/g dry	Inner Bay	21 / 21	11	22	23	35	8
Metal	Nickel	µg/g dry	Outer Bay	17 / 17	5.5	19	21	34	8
Metal	Nickel	µg/g dry	West Bay	19 / 19	10	27	26	48	9.6
Metal	Nickel	µg/g dry	East Bay	14 / 14	6.7	26	25	40	8.7
Metal	Nickel	µg/g dry	Cape Small	6 / 6	11	15	18	30	7
Metal	Selenium	µg/g dry	Inner Bay	17 / 21	0.16	0.5	0.81	2.5	0.66
Metal	Selenium	µg/g dry	Outer Bay	12 / 17	0.08	0.85	0.86	2.2	0.56
Metal	Selenium	µg/g dry	West Bay	11 / 19	0.1	1	1	2.5	0.64
Metal	Selenium	µg/g dry	East Bay	11 / 14	0.2	1.5	1.5	2.9	0.81
Metal	Selenium	µg/g dry	Cape Small	5 / 6	0.2	0.4	0.56	1.6	0.59
Metal	Silver	µg/g dry	Inner Bay	20 / 21	0.1	0.33	0.36	0.71	0.19
Metal	Silver	µg/g dry	Outer Bay	14 / 17	0.1	0.15	0.17	0.46	0.099
Metal	Silver	µg/g dry	West Bay	19 / 19	0.06	0.3	0.27	0.57	0.14
Metal	Silver	µg/g dry	East Bay	13 / 14	0.1	0.3	0.29	0.9	0.23
Metal	Silver	µg/g dry	Cape Small	2 / 6	0.1	0.1	0.1	0.1	0
Metal	Strontium	µg/g dry	Inner Bay	20 / 20	74	120	130	200	41
Metal	Strontium	µg/g dry	Outer Bay	14 / 14	100	170	240	800	200
Metal	Strontium	µg/g dry	West Bay	18 / 18	76	150	170	380	70
Metal	Strontium	µg/g dry	East Bay	12 / 12	75	120	120	230	42
Metal	Strontium	µg/g dry	Cape Small	6 / 6	74	86	94	150	27
Metal	Thallium	µg/g dry	Inner Bay	20 / 20	0.5	0.78	0.81	1.1	0.19
Metal	Thallium	µg/g dry	Outer Bay	14 / 14	0.3	0.5	0.47	0.91	0.15
Metal	Thallium	µg/g dry	West Bay	18 / 18	0.4	0.65	0.69	1.1	0.21
Metal	Thallium	µg/g dry	East Bay	12 / 12	0.4	0.55	0.55	0.8	0.11
Metal	Thallium	µg/g dry	Cape Small	6 / 6	0.4	0.45	0.47	0.6	0.082
Metal	Tin	µg/g dry	Inner Bay	21 / 21	3.7	6.9	7.2	11	2.1
Metal	Tin	µg/g dry	Outer Bay	17 / 17	1.1	3.4	3.5	7.9	1.7
Metal	Tin	µg/g dry	West Bay	19 / 19	2.2	4.5	4.9	8.2	1.9
Metal	Tin	µg/g dry	East Bay	14 / 14	1.9	4	3.9	6.9	1.2
Metal	Tin	µg/g dry	Cape Small	6 / 6	1.7	1.9	2.4	4	0.97
Metal	Titanium	µg/g dry	Inner Bay	20 / 20	1600	3000	3000	4000	670
Metal	Titanium	µg/g dry	Outer Bay	14 / 14	1400	3000	3000	4000	790
Metal	Titanium	µg/g dry	West Bay	18 / 18	1500	3500	3300	4300	680
Metal	Titanium	µg/g dry	East Bay	12 / 12	1600	3700	3400	4500	770
Metal	Titanium	µg/g dry	Cape Small	6 / 6	2100	3300	3200	3600	550
Metal	Vanadium	µg/g dry	Inner Bay	20 / 20	32	74	76	120	27
Metal	Vanadium	µg/g dry	Outer Bay	14 / 14	43	78	80	120	22
Metal	Vanadium	µg/g dry	West Bay	18 / 18	28	99	93	140	34
Metal	Vanadium	µg/g dry	East Bay	12 / 12	57	97	95	130	20
Metal	Vanadium	µg/g dry	Cape Small	6 / 6	58	81	83	110	19
Metal	Zinc	µg/g dry	Inner Bay	21 / 21	39	77	74	120	22
Metal	Zinc	µg/g dry	Outer Bay	17 / 17	18	54	57	93	21
Metal	Zinc	µg/g dry	West Bay	19 / 19	20	76	73	130	28
Metal	Zinc	µg/g dry	East Bay	14 / 14	21	76	78	120	28
Metal	Zinc	µg/g dry	Cape Small	6 / 6	29	36	45	83	21
Organotin	Butyltin (mono+di+tri)	ng/g dry	Inner Bay	1 / 16	16	16	16	16	ND
Organotin	Butyltin (mono+di+tri)	ng/g dry	Outer Bay	0 / 9	ND	ND	ND	ND	ND
Organotin	Butyltin (mono+di+tri)	ng/g dry	West Bay	3 / 12	0.7	7.7	7.4	14	6.6
Organotin	Butyltin (mono+di+tri)	ng/g dry	East Bay	1 / 12	0.81	0.81	0.81	0.81	ND
Organotin	Butyltin (mono+di+tri)	ng/g dry	Cape Small	1 / 6	1.2	1.2	1.2	1.2	ND
Organotin	Dibutyltin	ng/g dry	Inner Bay	0 / 16	ND	ND	ND	ND	ND

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Casco Bay Estuary Partnership, Portland, Maine

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Organotin	Dibutyltin	ng/g dry	Outer Bay	0 / 9	ND	ND	ND	ND	ND
Organotin	Dibutyltin	ng/g dry	West Bay	0 / 12	ND	ND	ND	ND	ND
Organotin	Dibutyltin	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Organotin	Dibutyltin	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Organotin	Monobutyltin	ng/g dry	Inner Bay	0 / 16	ND	ND	ND	ND	ND
Organotin	Monobutyltin	ng/g dry	Outer Bay	0 / 9	ND	ND	ND	ND	ND
Organotin	Monobutyltin	ng/g dry	West Bay	0 / 12	ND	ND	ND	ND	ND
Organotin	Monobutyltin	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Organotin	Monobutyltin	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Organotin	Tetrabutyltin	ng/g dry	Inner Bay	0 / 16	ND	ND	ND	ND	ND
Organotin	Tetrabutyltin	ng/g dry	Outer Bay	0 / 9	ND	ND	ND	ND	ND
Organotin	Tetrabutyltin	ng/g dry	West Bay	0 / 12	ND	ND	ND	ND	ND
Organotin	Tetrabutyltin	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Organotin	Tetrabutyltin	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Organotin	Tributyltin	ng/g dry	Inner Bay	1 / 16	16	16	16	16	ND
Organotin	Tributyltin	ng/g dry	Outer Bay	0 / 9	ND	ND	ND	ND	ND
Organotin	Tributyltin	ng/g dry	West Bay	3 / 12	0.7	7.7	7.4	14	6.6
Organotin	Tributyltin	ng/g dry	East Bay	1 / 12	0.81	0.81	0.81	0.81	ND
Organotin	Tributyltin	ng/g dry	Cape Small	1 / 6	1.2	1.2	1.2	1.2	ND
Organotin	Tripentyltin	ng/g dry	Inner Bay	16 / 16	21	44	42	57	9
Organotin	Tripentyltin	ng/g dry	Outer Bay	9 / 9	26	38	39	54	9.8
Organotin	Tripentyltin	ng/g dry	West Bay	12 / 12	24	46	44	59	11
Organotin	Tripentyltin	ng/g dry	East Bay	12 / 12	20	45	44	60	11
Organotin	Tripentyltin	ng/g dry	Cape Small	6 / 6	25	33	32	42	6
PAH	1-Methylnaphthalene	ng/g dry	Inner Bay	14 / 21	1.1	1.9	2.2	7.1	1.5
PAH	1-Methylnaphthalene	ng/g dry	Outer Bay	5 / 17	1	1.4	1.4	2	0.36
PAH	1-Methylnaphthalene	ng/g dry	West Bay	4 / 19	1.5	2.2	2.1	2.5	0.42
PAH	1-Methylnaphthalene	ng/g dry	East Bay	8 / 14	1	1.8	1.9	3.1	0.67
PAH	1-Methylnaphthalene	ng/g dry	Cape Small	4 / 6	1	1.4	1.5	2.4	0.62
PAH	1-Methylphenanthrene	ng/g dry	Inner Bay	19 / 21	1	3	3.8	12	2.9
PAH	1-Methylphenanthrene	ng/g dry	Outer Bay	11 / 17	1.1	1.4	1.7	3.4	0.82
PAH	1-Methylphenanthrene	ng/g dry	West Bay	9 / 19	1.1	1.4	1.8	3.5	0.83
PAH	1-Methylphenanthrene	ng/g dry	East Bay	10 / 14	1.6	2.6	5.1	26	7.6
PAH	1-Methylphenanthrene	ng/g dry	Cape Small	2 / 6	2.9	3.3	3.3	3.7	0.57
PAH	1,1-Biphenyl	ng/g dry	Inner Bay	11 / 21	1	1.2	1.4	2.9	0.58
PAH	1,1-Biphenyl	ng/g dry	Outer Bay	3 / 17	0.8	1.1	1.1	1.4	0.25
PAH	1,1-Biphenyl	ng/g dry	West Bay	4 / 19	1.2	1.4	1.4	1.6	0.17
PAH	1,1-Biphenyl	ng/g dry	East Bay	6 / 14	0.8	1.4	1.4	2.1	0.44
PAH	1,1-Biphenyl	ng/g dry	Cape Small	1 / 6	1.1	1.1	1.1	1.1	ND
PAH	2-Methylnaphthalene	ng/g dry	Inner Bay	15 / 21	1.2	2.6	3.2	12	2.6
PAH	2-Methylnaphthalene	ng/g dry	Outer Bay	9 / 17	1	1.5	1.6	2.5	0.62
PAH	2-Methylnaphthalene	ng/g dry	West Bay	6 / 19	1.5	1.9	2	2.7	0.43
PAH	2-Methylnaphthalene	ng/g dry	East Bay	11 / 14	1.7	2.1	2.4	4	0.63
PAH	2-Methylnaphthalene	ng/g dry	Cape Small	4 / 6	1.5	1.9	2.1	3.1	0.71
PAH	2,3,5-Trimethylnaphthalene	ng/g dry	Inner Bay	9 / 21	0.7	1.3	1.6	2.7	0.69
PAH	2,3,5-Trimethylnaphthalene	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PAH	2,3,5-Trimethylnaphthalene	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PAH	2,3,5-Trimethylnaphthalene	ng/g dry	East Bay	1 / 14	4.7	4.7	4.7	4.7	ND
PAH	2,3,5-Trimethylnaphthalene	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PAH	2,6-Dimethylnaphthalene	ng/g dry	Inner Bay	12 / 21	1	1.9	2.3	6	1.3
PAH	2,6-Dimethylnaphthalene	ng/g dry	Outer Bay	2 / 17	1	1.3	1.3	1.6	0.42
PAH	2,6-Dimethylnaphthalene	ng/g dry	West Bay	2 / 19	1.7	1.9	1.9	2.1	0.28
PAH	2,6-Dimethylnaphthalene	ng/g dry	East Bay	3 / 14	1.5	1.5	1.9	2.8	0.75
PAH	2,6-Dimethylnaphthalene	ng/g dry	Cape Small	1 / 6	1.1	1.1	1.1	1.1	ND
PAH	Acenaphthene	ng/g dry	Inner Bay	12 / 21	1.2	2.1	4.4	28	7.6
PAH	Acenaphthene	ng/g dry	Outer Bay	1 / 17	1.3	1.3	1.3	1.3	ND
PAH	Acenaphthene	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PAH	Acenaphthene	ng/g dry	East Bay	3 / 14	1.1	1.5	3.2	7.1	3.4
PAH	Acenaphthene	ng/g dry	Cape Small	1 / 6	2.7	2.7	2.7	2.7	ND

Table 6. Regional Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
PAH	Acenaphthylene	ng/g dry	Inner Bay	16 / 21	1.1	3.3	3.8	8.5	2.3
PAH	Acenaphthylene	ng/g dry	Outer Bay	8 / 17	1	1.7	1.9	3.3	0.78
PAH	Acenaphthylene	ng/g dry	West Bay	6 / 19	1	1.2	1.4	2.4	0.53
PAH	Acenaphthylene	ng/g dry	East Bay	9 / 14	1.2	2.5	4.1	16	4.6
PAH	Acenaphthylene	ng/g dry	Cape Small	2 / 6	2.5	2.9	2.9	3.2	0.49
PAH	Anthracene	ng/g dry	Inner Bay	18 / 21	1.3	7.1	11	70	16
PAH	Anthracene	ng/g dry	Outer Bay	11 / 17	1.2	2.4	2.7	6.2	1.5
PAH	Anthracene	ng/g dry	West Bay	8 / 19	1.4	2	2.1	2.8	0.52
PAH	Anthracene	ng/g dry	East Bay	10 / 14	2.3	3.4	11	76	23
PAH	Anthracene	ng/g dry	Cape Small	2 / 6	3.8	6.4	6.4	9	3.7
PAH	Benzo(a)anthracene	ng/g dry	Inner Bay	21 / 21	1.8	14	28	150	34
PAH	Benzo(a)anthracene	ng/g dry	Outer Bay	16 / 17	1.5	4.9	6	15	3.6
PAH	Benzo(a)anthracene	ng/g dry	West Bay	18 / 19	1.1	4.8	5.5	21	4.5
PAH	Benzo(a)anthracene	ng/g dry	East Bay	14 / 14	2.3	9.8	25	210	54
PAH	Benzo(a)anthracene	ng/g dry	Cape Small	5 / 6	2.1	3.7	12	37	15
PAH	Benzo(a)pyrene	ng/g dry	Inner Bay	20 / 21	1.8	20	33	160	38
PAH	Benzo(a)pyrene	ng/g dry	Outer Bay	15 / 17	2	4.9	6	16	3.9
PAH	Benzo(a)pyrene	ng/g dry	West Bay	16 / 19	1.8	4.7	6.2	21	4.8
PAH	Benzo(a)pyrene	ng/g dry	East Bay	14 / 14	3.2	11	27	210	54
PAH	Benzo(a)pyrene	ng/g dry	Cape Small	5 / 6	1.8	4.1	12	31	13
PAH	Benzo(b)fluoranthene	ng/g dry	Inner Bay	20 / 21	3.1	13	24	130	30
PAH	Benzo(b)fluoranthene	ng/g dry	Outer Bay	15 / 17	1.7	3.8	4.3	9.6	2.3
PAH	Benzo(b)fluoranthene	ng/g dry	West Bay	16 / 19	2	3.9	4.9	12	2.9
PAH	Benzo(b)fluoranthene	ng/g dry	East Bay	14 / 14	3	7.7	18	130	32
PAH	Benzo(b)fluoranthene	ng/g dry	Cape Small	5 / 6	2	3.6	9.5	25	9.8
PAH	Benzo(e)pyrene	ng/g dry	Inner Bay	20 / 21	1.8	16	24	110	24
PAH	Benzo(e)pyrene	ng/g dry	Outer Bay	15 / 17	2	4.2	4.6	10	2.4
PAH	Benzo(e)pyrene	ng/g dry	West Bay	16 / 19	1.9	3.8	5.1	14	3.6
PAH	Benzo(e)pyrene	ng/g dry	East Bay	14 / 14	2.4	8	17	120	30
PAH	Benzo(e)pyrene	ng/g dry	Cape Small	5 / 6	1.8	3.2	8.5	21	8.5
PAH	Benzo(g,h,i)perylene	ng/g dry	Inner Bay	21 / 21	1.9	13	19	89	20
PAH	Benzo(g,h,i)perylene	ng/g dry	Outer Bay	15 / 17	1.5	4.7	5.5	12	3.1
PAH	Benzo(g,h,i)perylene	ng/g dry	West Bay	16 / 19	1.4	3.9	4.5	11	2.9
PAH	Benzo(g,h,i)perylene	ng/g dry	East Bay	13 / 14	3.1	8.1	15	94	24
PAH	Benzo(g,h,i)perylene	ng/g dry	Cape Small	5 / 6	1.8	3.7	6.7	16	6
PAH	Benzo(k)fluoranthene	ng/g dry	Inner Bay	20 / 21	1.8	12	20	94	22
PAH	Benzo(k)fluoranthene	ng/g dry	Outer Bay	15 / 17	2	4.4	4.7	11	2.5
PAH	Benzo(k)fluoranthene	ng/g dry	West Bay	16 / 19	1.7	3.7	5.5	21	5.1
PAH	Benzo(k)fluoranthene	ng/g dry	East Bay	14 / 14	2.9	9.2	20	140	37
PAH	Benzo(k)fluoranthene	ng/g dry	Cape Small	5 / 6	1.4	4.6	10	27	10
PAH	Chrysene	ng/g dry	Inner Bay	21 / 21	1.7	20	35	160	39
PAH	Chrysene	ng/g dry	Outer Bay	16 / 17	2.6	6.5	8.4	20	4.8
PAH	Chrysene	ng/g dry	West Bay	19 / 19	1.1	5.2	6.5	18	4.6
PAH	Chrysene	ng/g dry	East Bay	14 / 14	3.6	12	29	230	59
PAH	Chrysene	ng/g dry	Cape Small	5 / 6	2.1	4.1	14	40	16
PAH	Dibenz(a,h)anthracene	ng/g dry	Inner Bay	12 / 21	1.4	3.2	5.4	18	4.9
PAH	Dibenz(a,h)anthracene	ng/g dry	Outer Bay	1 / 17	2.4	2.4	2.4	2.4	ND
PAH	Dibenz(a,h)anthracene	ng/g dry	West Bay	3 / 19	1.2	2.5	2.3	3.1	0.97
PAH	Dibenz(a,h)anthracene	ng/g dry	East Bay	5 / 14	2.6	3.7	7.6	24	9.1
PAH	Dibenz(a,h)anthracene	ng/g dry	Cape Small	1 / 6	3.6	3.6	3.6	3.6	ND
PAH	Dibenzothiophene	ng/g dry	Inner Bay	15 / 21	1.3	2.3	3.1	13	2.8
PAH	Dibenzothiophene	ng/g dry	Outer Bay	6 / 17	1	1.5	1.4	1.7	0.25
PAH	Dibenzothiophene	ng/g dry	West Bay	10 / 19	1	1.6	1.7	2.5	0.49
PAH	Dibenzothiophene	ng/g dry	East Bay	12 / 14	1.4	2	2.5	9.2	2.1
PAH	Dibenzothiophene	ng/g dry	Cape Small	2 / 6	1.8	2.1	2.1	2.4	0.42
PAH	Fluoranthene	ng/g dry	Inner Bay	20 / 21	6.3	36	68	360	85
PAH	Fluoranthene	ng/g dry	Outer Bay	17 / 17	1.2	11	13	34	8.8
PAH	Fluoranthene	ng/g dry	West Bay	19 / 19	1.2	9.2	12	35	9.1
PAH	Fluoranthene	ng/g dry	East Bay	14 / 14	6	18	37	270	67

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PAH	Fluoranthene	ng/g dry	Cape Small	6 / 6	1.3	6.3	15	50	19
PAH	Fluorene	ng/g dry	Inner Bay	17 / 21	1.3	2.6	4.4	32	7.1
PAH	Fluorene	ng/g dry	Outer Bay	9 / 17	1	1.3	1.4	2.2	0.42
PAH	Fluorene	ng/g dry	West Bay	8 / 19	1	1.3	1.5	2.8	0.6
PAH	Fluorene	ng/g dry	East Bay	9 / 14	1.1	1.6	3.4	17	5.3
PAH	Fluorene	ng/g dry	Cape Small	1 / 6	2.4	2.4	2.4	2.4	ND
PAH	Indeno(1,2,3-cd)pyrene	ng/g dry	Inner Bay	20 / 21	2.2	13	19	95	21
PAH	Indeno(1,2,3-cd)pyrene	ng/g dry	Outer Bay	14 / 17	1.1	3.6	3.9	9.1	2
PAH	Indeno(1,2,3-cd)pyrene	ng/g dry	West Bay	14 / 19	1.3	2.7	3.8	11	2.8
PAH	Indeno(1,2,3-cd)pyrene	ng/g dry	East Bay	13 / 14	2.3	6.8	13	78	20
PAH	Indeno(1,2,3-cd)pyrene	ng/g dry	Cape Small	5 / 6	1.8	3.1	6.4	15	5.6
PAH	Naphthalene	ng/g dry	Inner Bay	17 / 21	1.4	5.1	6.2	14	3.6
PAH	Naphthalene	ng/g dry	Outer Bay	12 / 17	1.4	3.5	3.5	6.3	1.5
PAH	Naphthalene	ng/g dry	West Bay	7 / 19	1.4	4.1	4.3	7.7	2.2
PAH	Naphthalene	ng/g dry	East Bay	11 / 14	0.7	4.6	4.3	8.7	2.3
PAH	Naphthalene	ng/g dry	Cape Small	3 / 6	3.3	5.3	4.9	6	1.4
PAH	HMWPAH	ng/g dry	Inner Bay	21 / 21	10	120	210	1100	260
PAH	HMWPAH	ng/g dry	Outer Bay	17 / 17	2.6	35	45	100	28
PAH	HMWPAH	ng/g dry	West Bay	19 / 19	2.3	34	40	130	32
PAH	HMWPAH	ng/g dry	East Bay	14 / 14	22	69	160	1200	320
PAH	HMWPAH	ng/g dry	Cape Small	6 / 6	2.8	25	62	210	80
PAH	LMWPAH	ng/g dry	Inner Bay	21 / 21	2.9	42	60	420	88
PAH	LMWPAH	ng/g dry	Outer Bay	17 / 17	1.1	15	14	37	10
PAH	LMWPAH	ng/g dry	West Bay	18 / 19	2.1	10	11	31	7.3
PAH	LMWPAH	ng/g dry	East Bay	14 / 14	4.7	23	38	260	65
PAH	LMWPAH	ng/g dry	Cape Small	5 / 6	1.5	9	19	52	21
PAH	PAHs (total)	ng/g dry	Inner Bay	21 / 21	13	150	270	1500	340
PAH	PAHs (total)	ng/g dry	Outer Bay	17 / 17	3.7	50	59	120	37
PAH	PAHs (total)	ng/g dry	West Bay	19 / 19	2.3	44	50	150	39
PAH	PAHs (total)	ng/g dry	East Bay	14 / 14	35	92	200	1500	380
PAH	PAHs (total)	ng/g dry	Cape Small	6 / 6	2.8	30	78	260	100
PAH	Perylene	ng/g dry	Inner Bay	19 / 21	1.2	5.5	7.7	33	7.6
PAH	Perylene	ng/g dry	Outer Bay	11 / 17	1.8	2.6	2.9	4.7	1
PAH	Perylene	ng/g dry	West Bay	12 / 19	1	2.2	5.5	34	9.2
PAH	Perylene	ng/g dry	East Bay	12 / 14	1.4	4.5	7.6	41	11
PAH	Perylene	ng/g dry	Cape Small	4 / 6	1.4	2.6	3.4	7.1	2.6
PAH	Phenanthrene	ng/g dry	Inner Bay	21 / 21	2.9	20	34	260	55
PAH	Phenanthrene	ng/g dry	Outer Bay	16 / 17	2.2	6.9	7.9	20	4.8
PAH	Phenanthrene	ng/g dry	West Bay	18 / 19	2.1	5.6	6.3	14	3.2
PAH	Phenanthrene	ng/g dry	East Bay	14 / 14	4.7	11	20	140	35
PAH	Phenanthrene	ng/g dry	Cape Small	4 / 6	2.6	8.5	12	27	11
PAH	Pyrene	ng/g dry	Inner Bay	21 / 21	2.6	32	51	260	62
PAH	Pyrene	ng/g dry	Outer Bay	17 / 17	1.4	10	13	30	8
PAH	Pyrene	ng/g dry	West Bay	18 / 19	2.1	9.6	12	37	9
PAH	Pyrene	ng/g dry	East Bay	14 / 14	6.8	19	40	300	76
PAH	Pyrene	ng/g dry	Cape Small	6 / 6	1.5	6.7	15	47	18
PCB	PCB-003 (4-CB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-003 (4-CB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-003 (4-CB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-003 (4-CB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-003 (4-CB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-008 (2,4'-DiCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-008 (2,4'-DiCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-008 (2,4'-DiCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-008 (2,4'-DiCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-008 (2,4'-DiCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-018 (2,2',5-TrCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-018 (2,2',5-TrCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-018 (2,2',5-TrCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND

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PCB	PCB-018 (2,2',5-TrCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-018 (2,2',5-TrCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-028 (2,4,4'-TrCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-028 (2,4,4'-TrCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-028 (2,4,4'-TrCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-028 (2,4,4'-TrCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-028 (2,4,4'-TrCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-031 (2,4',5-TrCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-031 (2,4',5-TrCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-031 (2,4',5-TrCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-031 (2,4',5-TrCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-031 (2,4',5-TrCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-033 (2,3',4'-TrCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-033 (2,3',4'-TrCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-033 (2,3',4'-TrCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-033 (2,3',4'-TrCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-033 (2,3',4'-TrCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-037 (3,4,4'-TrCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-037 (3,4,4'-TrCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-037 (3,4,4'-TrCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-037 (3,4,4'-TrCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-037 (3,4,4'-TrCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-044 (2,2',3,5'-TeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-044 (2,2',3,5'-TeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-044 (2,2',3,5'-TeCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-044 (2,2',3,5'-TeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-044 (2,2',3,5'-TeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-049 (2,2',4,5'-TeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-049 (2,2',4,5'-TeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-049 (2,2',4,5'-TeCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-049 (2,2',4,5'-TeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-049 (2,2',4,5'-TeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-052 (2,2',5,5'-TeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-052 (2,2',5,5'-TeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-052 (2,2',5,5'-TeCB)	ng/g dry	West Bay	1 / 19	1.4	1.4	1.4	1.4	ND
PCB	PCB-052 (2,2',5,5'-TeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-052 (2,2',5,5'-TeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-056+060	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-056+060	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-056+060	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-056+060	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-056+060	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-066 (2,3',4,4'-TeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-066 (2,3',4,4'-TeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-066 (2,3',4,4'-TeCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-066 (2,3',4,4'-TeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-066 (2,3',4,4'-TeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-070 (2,3',4',5-TeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-070 (2,3',4',5-TeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-070 (2,3',4',5-TeCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-070 (2,3',4',5-TeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-070 (2,3',4',5-TeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-074 (2,4,4',5-TeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-074 (2,4,4',5-TeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-074 (2,4,4',5-TeCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-074 (2,4,4',5-TeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-074 (2,4,4',5-TeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-077 (3,3',4,4'-TeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-077 (3,3',4,4'-TeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND

Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
PCB	PCB-077 (3,3',4,4'-TeCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-077 (3,3',4,4'-TeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-077 (3,3',4,4'-TeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-081 (3,4,4',5-TeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-081 (3,4,4',5-TeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-081 (3,4,4',5-TeCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-081 (3,4,4',5-TeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-081 (3,4,4',5-TeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-087 (2,2',3,4,5'-PeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-087 (2,2',3,4,5'-PeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-087 (2,2',3,4,5'-PeCB)	ng/g dry	West Bay	1 / 18	1.1	1.1	1.1	1.1	ND
PCB	PCB-087 (2,2',3,4,5'-PeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-087 (2,2',3,4,5'-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-095 (2,2',3,5',6-PeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-095 (2,2',3,5',6-PeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-095 (2,2',3,5',6-PeCB)	ng/g dry	West Bay	1 / 18	1.2	1.2	1.2	1.2	ND
PCB	PCB-095 (2,2',3,5',6-PeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-095 (2,2',3,5',6-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-097 (2,2',3,4',5'-PeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-097 (2,2',3,4',5'-PeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-097 (2,2',3,4',5'-PeCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-097 (2,2',3,4',5'-PeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-097 (2,2',3,4',5'-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-099 (2,2',4,4',5-PeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-099 (2,2',4,4',5-PeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-099 (2,2',4,4',5-PeCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-099 (2,2',4,4',5-PeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-099 (2,2',4,4',5-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-101 (2,2',4,5,5'-PeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-101 (2,2',4,5,5'-PeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-101 (2,2',4,5,5'-PeCB)	ng/g dry	West Bay	1 / 19	3.1	3.1	3.1	3.1	ND
PCB	PCB-101 (2,2',4,5,5'-PeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-101 (2,2',4,5,5'-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-105 (2,3,3',4,4'-PeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-105 (2,3,3',4,4'-PeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-105 (2,3,3',4,4'-PeCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-105 (2,3,3',4,4'-PeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-105 (2,3,3',4,4'-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-110 (2,3,3',4',6-PeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-110 (2,3,3',4',6-PeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-110 (2,3,3',4',6-PeCB)	ng/g dry	West Bay	1 / 19	1.6	1.6	1.6	1.6	ND
PCB	PCB-110 (2,3,3',4',6-PeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-110 (2,3,3',4',6-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-114 (2,3,4,4',5-PeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-114 (2,3,4,4',5-PeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-114 (2,3,4,4',5-PeCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-114 (2,3,4,4',5-PeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-114 (2,3,4,4',5-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-118 (2,3',4,4',5-PeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-118 (2,3',4,4',5-PeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-118 (2,3',4,4',5-PeCB)	ng/g dry	West Bay	1 / 19	1	1	1	1	ND
PCB	PCB-118 (2,3',4,4',5-PeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-118 (2,3',4,4',5-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-119 (2,3',4,4',6-PeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-119 (2,3',4,4',6-PeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-119 (2,3',4,4',6-PeCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-119 (2,3',4,4',6-PeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-119 (2,3',4,4',6-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-123 (2,3',4,4',5'-PeCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND

Table 6. Regional Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
PCB	PCB-123 (2,3',4,4',5'-PeCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-123 (2,3',4,4',5'-PeCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-123 (2,3',4,4',5'-PeCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-123 (2,3',4,4',5'-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-126 (3,3',4,4',5-PeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-126 (3,3',4,4',5-PeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-126 (3,3',4,4',5-PeCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-126 (3,3',4,4',5-PeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-126 (3,3',4,4',5-PeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-128 (2,2',3,3',4,4'-HxCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-128 (2,2',3,3',4,4'-HxCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-128 (2,2',3,3',4,4'-HxCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-128 (2,2',3,3',4,4'-HxCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-128 (2,2',3,3',4,4'-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-132+168	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-132+168	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-132+168	ng/g dry	West Bay	1 / 18	1.5	1.5	1.5	1.5	ND
PCB	PCB-132+168	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-132+168	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-138 (2,2',3,4,4',5'-HxCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-138 (2,2',3,4,4',5'-HxCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-138 (2,2',3,4,4',5'-HxCB)	ng/g dry	West Bay	1 / 19	6.6	6.6	6.6	6.6	ND
PCB	PCB-138 (2,2',3,4,4',5'-HxCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-138 (2,2',3,4,4',5'-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-141 (2,2',3,4,5,5'-HxCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-141 (2,2',3,4,5,5'-HxCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-141 (2,2',3,4,5,5'-HxCB)	ng/g dry	West Bay	1 / 18	1.6	1.6	1.6	1.6	ND
PCB	PCB-141 (2,2',3,4,5,5'-HxCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-141 (2,2',3,4,5,5'-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-149 (2,2',3,4',5',6-HxCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-149 (2,2',3,4',5',6-HxCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-149 (2,2',3,4',5',6-HxCB)	ng/g dry	West Bay	1 / 18	5.8	5.8	5.8	5.8	ND
PCB	PCB-149 (2,2',3,4',5',6-HxCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-149 (2,2',3,4',5',6-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-151 (2,2',3,5,5',6-HxCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-151 (2,2',3,5,5',6-HxCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-151 (2,2',3,5,5',6-HxCB)	ng/g dry	West Bay	1 / 18	2.6	2.6	2.6	2.6	ND
PCB	PCB-151 (2,2',3,5,5',6-HxCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-151 (2,2',3,5,5',6-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-153 (2,2',4,4',5,5'-HxCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-153 (2,2',4,4',5,5'-HxCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-153 (2,2',4,4',5,5'-HxCB)	ng/g dry	West Bay	1 / 19	6.2	6.2	6.2	6.2	ND
PCB	PCB-153 (2,2',4,4',5,5'-HxCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-153 (2,2',4,4',5,5'-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-156 (2,3,3',4,4',5-HxCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-156 (2,3,3',4,4',5-HxCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-156 (2,3,3',4,4',5-HxCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-156 (2,3,3',4,4',5-HxCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-156 (2,3,3',4,4',5-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-157 (2,3,3',4,4',5'-HxCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-157 (2,3,3',4,4',5'-HxCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-157 (2,3,3',4,4',5'-HxCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-157 (2,3,3',4,4',5'-HxCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-157 (2,3,3',4,4',5'-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-158 (2,3,3',4,4',6-HxCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-158 (2,3,3',4,4',6-HxCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-158 (2,3,3',4,4',6-HxCB)	ng/g dry	West Bay	1 / 18	1	1	1	1	ND
PCB	PCB-158 (2,3,3',4,4',6-HxCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-158 (2,3,3',4,4',6-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND

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Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
PCB	PCB-167 (2,3',4,4',5,5'-HxCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-167 (2,3',4,4',5,5'-HxCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-167 (2,3',4,4',5,5'-HxCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-167 (2,3',4,4',5,5'-HxCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-167 (2,3',4,4',5,5'-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-169 (3,3',4,4',5,5'-HxCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-169 (3,3',4,4',5,5'-HxCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-169 (3,3',4,4',5,5'-HxCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-169 (3,3',4,4',5,5'-HxCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-169 (3,3',4,4',5,5'-HxCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-170 (2,2',3,3',4,4',5-HpCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-170 (2,2',3,3',4,4',5-HpCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-170 (2,2',3,3',4,4',5-HpCB)	ng/g dry	West Bay	1 / 19	1.9	1.9	1.9	1.9	ND
PCB	PCB-170 (2,2',3,3',4,4',5-HpCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-170 (2,2',3,3',4,4',5-HpCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-174 (2,2',3,3',4,5,6'-HpCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-174 (2,2',3,3',4,5,6'-HpCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-174 (2,2',3,3',4,5,6'-HpCB)	ng/g dry	West Bay	1 / 18	3.6	3.6	3.6	3.6	ND
PCB	PCB-174 (2,2',3,3',4,5,6'-HpCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-174 (2,2',3,3',4,5,6'-HpCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-177 (2,2',3,3',4,5',6'-HpCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-177 (2,2',3,3',4,5',6'-HpCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-177 (2,2',3,3',4,5',6'-HpCB)	ng/g dry	West Bay	1 / 18	2.7	2.7	2.7	2.7	ND
PCB	PCB-177 (2,2',3,3',4,5',6'-HpCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-177 (2,2',3,3',4,5',6'-HpCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-180 (2,2',3,4,4',5,5'-HpCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-180 (2,2',3,4,4',5,5'-HpCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-180 (2,2',3,4,4',5,5'-HpCB)	ng/g dry	West Bay	1 / 19	5.3	5.3	5.3	5.3	ND
PCB	PCB-180 (2,2',3,4,4',5,5'-HpCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-180 (2,2',3,4,4',5,5'-HpCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-183 (2,2',3,4,4',5',6-HpCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-183 (2,2',3,4,4',5',6-HpCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-183 (2,2',3,4,4',5',6-HpCB)	ng/g dry	West Bay	1 / 18	2.1	2.1	2.1	2.1	ND
PCB	PCB-183 (2,2',3,4,4',5',6-HpCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-183 (2,2',3,4,4',5',6-HpCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-187 (2,2',3,4',5,5',6-HpCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-187 (2,2',3,4',5,5',6-HpCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-187 (2,2',3,4',5,5',6-HpCB)	ng/g dry	West Bay	1 / 19	4.2	4.2	4.2	4.2	ND
PCB	PCB-187 (2,2',3,4',5,5',6-HpCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-187 (2,2',3,4',5,5',6-HpCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-189 (2,3,3',4,4',5,5'-HpCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-189 (2,3,3',4,4',5,5'-HpCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-189 (2,3,3',4,4',5,5'-HpCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-189 (2,3,3',4,4',5,5'-HpCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-189 (2,3,3',4,4',5,5'-HpCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-194 (2,2',3,3',4,4',5,5'-OcCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-194 (2,2',3,3',4,4',5,5'-OcCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-194 (2,2',3,3',4,4',5,5'-OcCB)	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
PCB	PCB-194 (2,2',3,3',4,4',5,5'-OcCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-194 (2,2',3,3',4,4',5,5'-OcCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-195 (2,2',3,3',4,4',5,6-OcCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-195 (2,2',3,3',4,4',5,6-OcCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-195 (2,2',3,3',4,4',5,6-OcCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-195 (2,2',3,3',4,4',5,6-OcCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-195 (2,2',3,3',4,4',5,6-OcCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-199+200	ng/g dry	Inner Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-199+200	ng/g dry	Outer Bay	0 / 5	ND	ND	ND	ND	ND
PCB	PCB-199+200	ng/g dry	West Bay	0 / 9	ND	ND	ND	ND	ND
PCB	PCB-200 (2,2',3,3',4,5,6,6'-OcCB)	ng/g dry	Inner Bay	0 / 3	ND	ND	ND	ND	ND

Table 6. Regional Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
PCB	PCB-200 (2,2',3,3',4,5,6,6'-OcCB)	ng/g dry	Outer Bay	0 / 9	ND	ND	ND	ND	ND
PCB	PCB-200 (2,2',3,3',4,5,6,6'-OcCB)	ng/g dry	West Bay	0 / 9	ND	ND	ND	ND	ND
PCB	PCB-200 (2,2',3,3',4,5,6,6'-OcCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-200 (2,2',3,3',4,5,6,6'-OcCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-201 (2,2',3,3',4,5',6,6'-OcCB)	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
PCB	PCB-201 (2,2',3,3',4,5',6,6'-OcCB)	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-201 (2,2',3,3',4,5',6,6'-OcCB)	ng/g dry	West Bay	1 / 18	1.4	1.4	1.4	1.4	ND
PCB	PCB-201 (2,2',3,3',4,5',6,6'-OcCB)	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
PCB	PCB-201 (2,2',3,3',4,5',6,6'-OcCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-206 (2,2',3,3',4,4',5,5',6-NoCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-206 (2,2',3,3',4,4',5,5',6-NoCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-206 (2,2',3,3',4,4',5,5',6-NoCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-206 (2,2',3,3',4,4',5,5',6-NoCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-206 (2,2',3,3',4,4',5,5',6-NoCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCB-209 (DeCB)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCB-209 (DeCB)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCB-209 (DeCB)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
PCB	PCB-209 (DeCB)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCB-209 (DeCB)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
PCB	PCBs (total)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
PCB	PCBs (total)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
PCB	PCBs (total)	ng/g dry	West Bay	1 / 19	56	56	56	56	ND
PCB	PCBs (total)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
PCB	PCBs (total)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	1,1-Dichloro-2,2-bis(4-ethylphenyl) ethane	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	1,1-Dichloro-2,2-bis(4-ethylphenyl) ethane	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	1,1-Dichloro-2,2-bis(4-ethylphenyl) ethane	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	1,1-Dichloro-2,2-bis(4-ethylphenyl) ethane	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	1,1-Dichloro-2,2-bis(4-ethylphenyl) ethane	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	2,4'-DDD	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	2,4'-DDD	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	2,4'-DDD	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	2,4'-DDD	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	2,4'-DDD	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	2,4'-DDE	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	2,4'-DDE	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	2,4'-DDE	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	2,4'-DDE	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	2,4'-DDE	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	2,4'-DDT	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	2,4'-DDT	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	2,4'-DDT	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	2,4'-DDT	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	2,4'-DDT	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	4,4'-DDD	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	4,4'-DDD	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	4,4'-DDD	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	4,4'-DDD	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	4,4'-DDD	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	4,4'-DDE	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	4,4'-DDE	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	4,4'-DDE	ng/g dry	West Bay	1 / 19	1.1	1.1	1.1	1.1	ND
Pesticide	4,4'-DDE	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	4,4'-DDE	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	4,4'-DDT	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	4,4'-DDT	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	4,4'-DDT	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	4,4'-DDT	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	4,4'-DDT	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND

Table 6. Regional Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
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Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
Pesticide	Aldrin	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Aldrin	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Aldrin	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Aldrin	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Aldrin	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	alpha-BHC	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	alpha-BHC	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	alpha-BHC	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	alpha-BHC	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	alpha-BHC	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	alpha-Chlordane	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	alpha-Chlordane	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	alpha-Chlordane	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	alpha-Chlordane	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	alpha-Chlordane	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	beta-BHC	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	beta-BHC	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	beta-BHC	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	beta-BHC	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	beta-BHC	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Chlordane (total)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Chlordane (total)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Chlordane (total)	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Chlordane (total)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Chlordane (total)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	cis-Nonachlor	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	cis-Nonachlor	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	cis-Nonachlor	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	cis-Nonachlor	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	cis-Nonachlor	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	West Bay	1 / 19	1.1	1.1	1.1	1.1	ND
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	delta-BHC	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	delta-BHC	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	delta-BHC	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	delta-BHC	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	delta-BHC	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Dieldrin	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Dieldrin	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Dieldrin	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Dieldrin	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Dieldrin	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Endosulfan I	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Endosulfan I	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Endosulfan I	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Endosulfan I	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Endosulfan I	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Endosulfan II	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Endosulfan II	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Endosulfan II	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Endosulfan II	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Endosulfan II	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Endosulfan sulfate	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Endosulfan sulfate	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Endosulfan sulfate	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Endosulfan sulfate	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND

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Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
Pesticide	Endosulfan sulfate	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Endrin	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Endrin	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Endrin	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Endrin	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Endrin	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Endrin aldehyde	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	Endrin aldehyde	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Endrin aldehyde	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	Endrin aldehyde	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	Endrin aldehyde	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Endrin ketone	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	Endrin ketone	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Endrin ketone	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	Endrin ketone	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	Endrin ketone	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	gamma-BHC	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	gamma-BHC	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	gamma-BHC	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	gamma-BHC	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	gamma-BHC	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	gamma-Chlordane	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	gamma-Chlordane	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	gamma-Chlordane	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	gamma-Chlordane	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	gamma-Chlordane	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Heptachlor	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Heptachlor	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Heptachlor	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Heptachlor	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Heptachlor	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Heptachlor epoxide	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Heptachlor epoxide	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Heptachlor epoxide	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Heptachlor epoxide	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Heptachlor epoxide	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Hexachlorobenzene	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Hexachlorobenzene	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Hexachlorobenzene	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Hexachlorobenzene	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Hexachlorobenzene	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Methoxychlor	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	Methoxychlor	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Methoxychlor	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	Methoxychlor	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	Methoxychlor	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Mirex	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Mirex	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Mirex	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	Mirex	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Mirex	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Oxychlordane	ng/g dry	Inner Bay	0 / 20	ND	ND	ND	ND	ND
Pesticide	Oxychlordane	ng/g dry	Outer Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Oxychlordane	ng/g dry	West Bay	0 / 18	ND	ND	ND	ND	ND
Pesticide	Oxychlordane	ng/g dry	East Bay	0 / 12	ND	ND	ND	ND	ND
Pesticide	Oxychlordane	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	Pesticides (total)	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	Pesticides (total)	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	Pesticides (total)	ng/g dry	West Bay	1 / 19	1.1	1.1	1.1	1.1	ND

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Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
Pesticide	Pesticides (total)	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	Pesticides (total)	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Pesticide	trans-Nonachlor	ng/g dry	Inner Bay	0 / 21	ND	ND	ND	ND	ND
Pesticide	trans-Nonachlor	ng/g dry	Outer Bay	0 / 17	ND	ND	ND	ND	ND
Pesticide	trans-Nonachlor	ng/g dry	West Bay	0 / 19	ND	ND	ND	ND	ND
Pesticide	trans-Nonachlor	ng/g dry	East Bay	0 / 14	ND	ND	ND	ND	ND
Pesticide	trans-Nonachlor	ng/g dry	Cape Small	0 / 6	ND	ND	ND	ND	ND
Physical	Organic Carbon (total)	%	Inner Bay	21 / 21	1.1	3.6	3.3	4.8	0.95
Physical	Organic Carbon (total)	%	Outer Bay	17 / 17	0.13	1.9	2.2	4.2	1.2
Physical	Organic Carbon (total)	%	West Bay	19 / 19	0.55	3.4	4.3	14	3.8
Physical	Organic Carbon (total)	%	East Bay	14 / 14	0.4	3.2	3.3	5.6	1.5
Physical	Organic Carbon (total)	%	Cape Small	6 / 6	0.042	0.26	0.57	2.2	0.83
Physical	Organic Carbon (total)	µg/g dry	Inner Bay	20 / 20	11000	37000	34000	48000	9500
Physical	Organic Carbon (total)	µg/g dry	Outer Bay	14 / 14	8000	24000	24000	42000	11000
Physical	Organic Carbon (total)	µg/g dry	West Bay	18 / 18	5500	35000	45000	140000	38000
Physical	Organic Carbon (total)	µg/g dry	East Bay	12 / 12	15000	38000	36000	56000	14000
Physical	Organic Carbon (total)	µg/g dry	Cape Small	6 / 6	420	2600	5700	22000	8300
Physical	Percent Clay	%	Inner Bay	20 / 20	3.1	20	20	43	11
Physical	Percent Clay	%	Outer Bay	14 / 14	0	8.8	9.7	25	7.6
Physical	Percent Clay	%	West Bay	18 / 18	1.4	20	18	33	9.1
Physical	Percent Clay	%	East Bay	12 / 12	0.9	19	19	37	11
Physical	Percent Clay	%	Cape Small	6 / 6	0.1	1.2	3.9	13	5.3
Physical	Percent Coarse Sand	%	Inner Bay	20 / 20	0	0.75	2	13	3.1
Physical	Percent Coarse Sand	%	Outer Bay	14 / 14	0.2	1.4	7.1	51	13
Physical	Percent Coarse Sand	%	West Bay	18 / 18	0	1.9	2.7	7.5	2.5
Physical	Percent Coarse Sand	%	East Bay	12 / 12	0	0.55	1.1	7.9	2.2
Physical	Percent Coarse Sand	%	Cape Small	6 / 6	0.4	2.3	10	49	19
Physical	Percent Fine Sand	%	Inner Bay	20 / 20	1.1	5.7	9.4	24	8.5
Physical	Percent Fine Sand	%	Outer Bay	14 / 14	2	5.8	7.1	17	5
Physical	Percent Fine Sand	%	West Bay	18 / 18	0.4	4.8	14	70	20
Physical	Percent Fine Sand	%	East Bay	12 / 12	0	1.6	5.5	42	12
Physical	Percent Fine Sand	%	Cape Small	6 / 6	2.7	23	26	60	24
Physical	Percent Gravel	%	Inner Bay	20 / 20	0	0	0.21	1.8	0.49
Physical	Percent Gravel	%	Outer Bay	14 / 14	0	0	4.4	22	7.4
Physical	Percent Gravel	%	West Bay	16 / 16	0	0.15	0.58	3.9	1
Physical	Percent Gravel	%	East Bay	12 / 12	0	0	0.36	4	1.1
Physical	Percent Gravel	%	Cape Small	6 / 6	0	0	0.033	0.1	0.052
Physical	Percent Medium Sand	%	Inner Bay	20 / 20	0.6	2.2	4.4	19	5.3
Physical	Percent Medium Sand	%	Outer Bay	14 / 14	0.79	2.5	5.3	20	6.2
Physical	Percent Medium Sand	%	West Bay	18 / 18	0.11	3.3	5.4	25	6.4
Physical	Percent Medium Sand	%	East Bay	12 / 12	0.11	0.7	3.4	30	8.3
Physical	Percent Medium Sand	%	Cape Small	6 / 6	0.8	22	21	42	21
Physical	Percent Pebbles and Shells	%	Inner Bay	20 / 20	0	0	0.033	0.4	0.092
Physical	Percent Pebbles and Shells	%	Outer Bay	14 / 14	0	0	5.8	28	11
Physical	Percent Pebbles and Shells	%	West Bay	18 / 18	0	0	0.9	11	2.5
Physical	Percent Pebbles and Shells	%	East Bay	12 / 12	0	0	0.17	1.7	0.49
Physical	Percent Pebbles and Shells	%	Cape Small	6 / 6	0	0	0.017	0.1	0.041
Physical	Percent Sand	%	Inner Bay	21 / 21	4	21	29	68	21
Physical	Percent Sand	%	Outer Bay	17 / 17	11	39	42	99	25
Physical	Percent Sand	%	West Bay	19 / 19	4	23	30	86	25
Physical	Percent Sand	%	East Bay	14 / 14	1.7	20	27	92	29
Physical	Percent Sand	%	Cape Small	6 / 6	17	92	75	99	34
Physical	Percent Silt	%	Inner Bay	20 / 20	28	54	51	66	13
Physical	Percent Silt	%	Outer Bay	14 / 14	3.4	51	43	75	24
Physical	Percent Silt	%	West Bay	18 / 18	10	51	49	74	20
Physical	Percent Silt	%	East Bay	12 / 12	5.9	62	57	75	18
Physical	Percent Silt	%	Cape Small	6 / 6	0.7	6.3	21	70	28
Physical	Percent Silt and Clay	%	Inner Bay	21 / 21	31	79	71	96	21
Physical	Percent Silt and Clay	%	Outer Bay	17 / 17	1.3	54	50	89	30

Table 6. Regional Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Analyte	Units	Region	Frequency of Detection	Minimum Detected Concentration	Median Detected Concentration	Average Detected Concentration	Maximum Detected Concentration	Standard Deviation of Detected Concentration
Physical	Percent Silt and Clay	%	West Bay	19 / 19	12	77	68	96	27
Physical	Percent Silt and Clay	%	East Bay	14 / 14	6.8	80	72	98	30
Physical	Percent Silt and Clay	%	Cape Small	6 / 6	0.8	7.5	25	83	34
Physical	Percent Total Grain Size	%	Inner Bay	20 / 20	99	100	100	100	0.2
Physical	Percent Total Grain Size	%	Outer Bay	14 / 14	97	100	100	100	0.83
Physical	Percent Total Grain Size	%	West Bay	18 / 18	96	100	100	100	0.92
Physical	Percent Total Grain Size	%	East Bay	12 / 12	100	100	100	100	0.081
Physical	Percent Total Grain Size	%	Cape Small	6 / 6	100	100	100	100	0
Physical	Percent Very Coarse Sand	%	Inner Bay	19 / 19	0	0.1	0.74	5.9	1.4
Physical	Percent Very Coarse Sand	%	Outer Bay	14 / 14	0	0.23	4.9	20	7
Physical	Percent Very Coarse Sand	%	West Bay	16 / 16	0	0.58	1.5	7.1	2
Physical	Percent Very Coarse Sand	%	East Bay	12 / 12	0	0.15	0.3	1.9	0.53
Physical	Percent Very Coarse Sand	%	Cape Small	6 / 6	0	0.1	0.77	4.1	1.6
Physical	Percent Very Fine Sand	%	Inner Bay	19 / 19	2.2	10	13	37	9.5
Physical	Percent Very Fine Sand	%	Outer Bay	14 / 14	0.9	7.7	12	37	10
Physical	Percent Very Fine Sand	%	West Bay	16 / 16	2.4	7.1	8.3	27	6
Physical	Percent Very Fine Sand	%	East Bay	12 / 12	1.2	9.6	13	38	12
Physical	Percent Very Fine Sand	%	Cape Small	6 / 6	1.6	12	17	43	15
Physical	Solids (total)	%	Inner Bay	20 / 20	26	39	41	67	12
Physical	Solids (total)	%	Outer Bay	14 / 14	26	50	51	73	16
Physical	Solids (total)	%	West Bay	18 / 18	25	37	43	76	15
Physical	Solids (total)	%	East Bay	12 / 12	23	39	40	57	13
Physical	Solids (total)	%	Cape Small	6 / 6	43	74	69	83	14

%: percent
µg/g dry: microgram(s) per gram, dry weight basis
CDDF: chlorinated dibenzodioxins and furans
HMWPAH: high molecular weight polycyclic aromatic hydrocarbons
LMWPAH: low molecular weight polycyclic aromatic hydrocarbons
ng/g dry: nanogram(s) per gram, dry weight basis
ng/kg dry: nanogram(s) per kilogram, dry weight basis
PAH: polycyclic aromatic hydrocarbon
PCB: polychlorinated biphenyl
PCDD/PCDFs: polychlorinated dibenzodioxins and furans
TEQ: toxic equivalents

Table 7. Bay-Wide Summary Screening for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Parameter	Units	ERL	ERM	Frequency of Detection	# Exceed ERL	# Exceed ERM	Frequency of Exceedance, ERL	Frequency of Exceedance, ERM
Metal	Arsenic	µg/g dry	8.2	70	77 / 77	43	0	56%	0%
Metal	Cadmium	µg/g dry	1.2	9.6	74 / 77	3	0	4%	0%
Metal	Chromium (total)	µg/g dry	81	370	77 / 77	19	0	25%	0%
Metal	Copper	µg/g dry	34	270	77 / 77	2	0	3%	0%
Metal	Lead	µg/g dry	46.7	218	77 / 77	2	0	3%	0%
Metal	Mercury	µg/g dry	0.15	0.71	71 / 77	18	0	23%	0%
Metal	Nickel	µg/g dry	20.9	51.6	77 / 77	43	0	56%	0%
Metal	Silver	µg/g dry	1	3.7	68 / 77	0	0	0%	0%
Metal	Zinc	µg/g dry	150	410	77 / 77	0	0	0%	0%
PAH	2-Methylnaphthalene	ng/g dry	70	670	45 / 77	0	0	0%	0%
PAH	Acenaphthene	ng/g dry	16	500	17 / 77	1	0	1%	0%
PAH	Acenaphthylene	ng/g dry	44	640	41 / 77	0	0	0%	0%
PAH	Anthracene	ng/g dry	85.3	1100	49 / 77	0	0	0%	0%
PAH	Benzo(a)anthracene	ng/g dry	261	1600	74 / 77	0	0	0%	0%
PAH	Benzo(a)pyrene	ng/g dry	430	1600	70 / 77	0	0	0%	0%
PAH	Chrysene	ng/g dry	384	2800	75 / 77	0	0	0%	0%
PAH	Dibenz(a,h)anthracene	ng/g dry	63.4	260	22 / 77	0	0	0%	0%
PAH	Fluoranthene	ng/g dry	600	5100	76 / 77	0	0	0%	0%
PAH	Fluorene	ng/g dry	19	540	44 / 77	1	0	1%	0%
PAH	Naphthalene	ng/g dry	160	2100	50 / 77	0	0	0%	0%
PAH	HMWPAH	ng/g dry	1700	9600	77 / 77	0	0	0%	0%
PAH	LMWPAH	ng/g dry	552	3160	75 / 77	0	0	0%	0%
PAH	PAHs (total)	ng/g dry	4022	44792	77 / 77	0	0	0%	0%
PAH	Phenanthrene	ng/g dry	240	1500	73 / 77	1	0	1%	0%
PAH	Pyrene	ng/g dry	665	2600	76 / 77	0	0	0%	0%
PCB	PCBs (total)	ng/g dry	22.7	180	1 / 77	1	0	1%	0%
Pesticide	4,4'-DDD	ng/g dry	2	20	0 / 77	0	0	0%	0%
Pesticide	4,4'-DDE	ng/g dry	2.2	27	1 / 77	0	0	0%	0%
Pesticide	4,4'-DDT	ng/g dry	1	7	0 / 77	0	0	0%	0%
Pesticide	Chlordane (total)	ng/g dry	0.5	6	0 / 77	0	0	0%	0%
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	1.58	46.1	1 / 77	0	0	0%	0%
Pesticide	Dieldrin	ng/g dry	0.02	8	0 / 77	0	0	0%	0%

Yellow shading indicates exceedances of the screening value
µg/g: microgram(s) per gram dry weight
DDD: dichlorodiphenyldichloroethane
DDE: dichlorodiphenyldichloroethylene
DDT: dichlorodiphenyltrichloroethane
ERL: effects range low
ERM: effects range median
HMWPAH: high molecular weight polycyclic aromatic hydrocarbons
LMWPAH: low molecular weight polycyclic aromatic hydrocarbons
ng/g: nanogram(s) per gram dry weight
PAH: polycyclic aromatic hydrocarbon
PCB: polychlorinated biphenyl

Table 8. Regional Screening for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Parameter	Units	ERL	ERM	Region	Frequency of Detection	# Exceed ERL	# Exceed ERM	Frequency of Exceedance, ERL	Frequency of Exceedance, ERM
Metal	Arsenic	µg/g dry	8.2	70	Inner Bay	21 / 21	12	0	57%	0%
Metal	Arsenic	µg/g dry	8.2	70	Outer Bay	17 / 17	8	0	47%	0%
Metal	Arsenic	µg/g dry	8.2	70	West Bay	19 / 19	13	0	68%	0%
Metal	Arsenic	µg/g dry	8.2	70	East Bay	14 / 14	8	0	57%	0%
Metal	Arsenic	µg/g dry	8.2	70	Cape Small	6 / 6	2	0	33%	0%
Metal	Cadmium	µg/g dry	1.2	9.6	Inner Bay	21 / 21	0	0	0%	0%
Metal	Cadmium	µg/g dry	1.2	9.6	Outer Bay	17 / 17	0	0	0%	0%
Metal	Cadmium	µg/g dry	1.2	9.6	West Bay	19 / 19	1	0	5%	0%
Metal	Cadmium	µg/g dry	1.2	9.6	East Bay	14 / 14	2	0	14%	0%
Metal	Cadmium	µg/g dry	1.2	9.6	Cape Small	3 / 6	0	0	0%	0%
Metal	Chromium (total)	µg/g dry	81	370	Inner Bay	21 / 21	4	0	19%	0%
Metal	Chromium (total)	µg/g dry	81	370	Outer Bay	17 / 17	2	0	12%	0%
Metal	Chromium (total)	µg/g dry	81	370	West Bay	19 / 19	7	0	37%	0%
Metal	Chromium (total)	µg/g dry	81	370	East Bay	14 / 14	5	0	36%	0%
Metal	Chromium (total)	µg/g dry	81	370	Cape Small	6 / 6	1	0	17%	0%
Metal	Copper	µg/g dry	34	270	Inner Bay	21 / 21	1	0	5%	0%
Metal	Copper	µg/g dry	34	270	Outer Bay	17 / 17	0	0	0%	0%
Metal	Copper	µg/g dry	34	270	West Bay	19 / 19	0	0	0%	0%
Metal	Copper	µg/g dry	34	270	East Bay	14 / 14	1	0	7%	0%
Metal	Copper	µg/g dry	34	270	Cape Small	6 / 6	0	0	0%	0%
Metal	Lead	µg/g dry	46.7	218	Inner Bay	21 / 21	2	0	10%	0%
Metal	Lead	µg/g dry	46.7	218	Outer Bay	17 / 17	0	0	0%	0%
Metal	Lead	µg/g dry	46.7	218	West Bay	19 / 19	0	0	0%	0%
Metal	Lead	µg/g dry	46.7	218	East Bay	14 / 14	0	0	0%	0%
Metal	Lead	µg/g dry	46.7	218	Cape Small	6 / 6	0	0	0%	0%
Metal	Mercury	µg/g dry	0.15	0.71	Inner Bay	21 / 21	14	0	67%	0%
Metal	Mercury	µg/g dry	0.15	0.71	Outer Bay	14 / 17	0	0	0%	0%
Metal	Mercury	µg/g dry	0.15	0.71	West Bay	19 / 19	0	0	0%	0%
Metal	Mercury	µg/g dry	0.15	0.71	East Bay	14 / 14	4	0	29%	0%
Metal	Mercury	µg/g dry	0.15	0.71	Cape Small	3 / 6	0	0	0%	0%
Metal	Nickel	µg/g dry	20.9	51.6	Inner Bay	21 / 21	11	0	52%	0%
Metal	Nickel	µg/g dry	20.9	51.6	Outer Bay	17 / 17	7	0	41%	0%
Metal	Nickel	µg/g dry	20.9	51.6	West Bay	19 / 19	14	0	74%	0%
Metal	Nickel	µg/g dry	20.9	51.6	East Bay	14 / 14	10	0	71%	0%
Metal	Nickel	µg/g dry	20.9	51.6	Cape Small	6 / 6	1	0	17%	0%
Metal	Silver	µg/g dry	1	3.7	Inner Bay	20 / 21	0	0	0%	0%
Metal	Silver	µg/g dry	1	3.7	Outer Bay	14 / 17	0	0	0%	0%
Metal	Silver	µg/g dry	1	3.7	West Bay	19 / 19	0	0	0%	0%
Metal	Silver	µg/g dry	1	3.7	East Bay	13 / 14	0	0	0%	0%
Metal	Silver	µg/g dry	1	3.7	Cape Small	2 / 6	0	0	0%	0%
Metal	Zinc	µg/g dry	150	410	Inner Bay	21 / 21	0	0	0%	0%
Metal	Zinc	µg/g dry	150	410	Outer Bay	17 / 17	0	0	0%	0%
Metal	Zinc	µg/g dry	150	410	West Bay	19 / 19	0	0	0%	0%
Metal	Zinc	µg/g dry	150	410	East Bay	14 / 14	0	0	0%	0%
Metal	Zinc	µg/g dry	150	410	Cape Small	6 / 6	0	0	0%	0%
PAH	2-Methylnaphthalene	ng/g dry	70	670	Inner Bay	15 / 21	0	0	0%	0%
PAH	2-Methylnaphthalene	ng/g dry	70	670	Outer Bay	9 / 17	0	0	0%	0%
PAH	2-Methylnaphthalene	ng/g dry	70	670	West Bay	6 / 19	0	0	0%	0%
PAH	2-Methylnaphthalene	ng/g dry	70	670	East Bay	11 / 14	0	0	0%	0%

Table 8. Regional Screening for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Parameter	Units	ERL	ERM	Region	Frequency of Detection	# Exceed ERL	# Exceed ERM	Frequency of Exceedance, ERL	Frequency of Exceedance, ERM
PAH	2-Methylnaphthalene	ng/g dry	70	670	Cape Small	4 / 6	0	0	0%	0%
PAH	Acenaphthene	ng/g dry	16	500	Inner Bay	12 / 21	1	0	5%	0%
PAH	Acenaphthene	ng/g dry	16	500	Outer Bay	1 / 17	0	0	0%	0%
PAH	Acenaphthene	ng/g dry	16	500	West Bay	0 / 19	0	0	0%	0%
PAH	Acenaphthene	ng/g dry	16	500	East Bay	3 / 14	0	0	0%	0%
PAH	Acenaphthene	ng/g dry	16	500	Cape Small	1 / 6	0	0	0%	0%
PAH	Acenaphthylene	ng/g dry	44	640	Inner Bay	16 / 21	0	0	0%	0%
PAH	Acenaphthylene	ng/g dry	44	640	Outer Bay	8 / 17	0	0	0%	0%
PAH	Acenaphthylene	ng/g dry	44	640	West Bay	6 / 19	0	0	0%	0%
PAH	Acenaphthylene	ng/g dry	44	640	East Bay	9 / 14	0	0	0%	0%
PAH	Acenaphthylene	ng/g dry	44	640	Cape Small	2 / 6	0	0	0%	0%
PAH	Anthracene	ng/g dry	85.3	1100	Inner Bay	18 / 21	0	0	0%	0%
PAH	Anthracene	ng/g dry	85.3	1100	Outer Bay	11 / 17	0	0	0%	0%
PAH	Anthracene	ng/g dry	85.3	1100	West Bay	8 / 19	0	0	0%	0%
PAH	Anthracene	ng/g dry	85.3	1100	East Bay	10 / 14	0	0	0%	0%
PAH	Anthracene	ng/g dry	85.3	1100	Cape Small	2 / 6	0	0	0%	0%
PAH	Benzo(a)anthracene	ng/g dry	261	1600	Inner Bay	21 / 21	0	0	0%	0%
PAH	Benzo(a)anthracene	ng/g dry	261	1600	Outer Bay	16 / 17	0	0	0%	0%
PAH	Benzo(a)anthracene	ng/g dry	261	1600	West Bay	18 / 19	0	0	0%	0%
PAH	Benzo(a)anthracene	ng/g dry	261	1600	East Bay	14 / 14	0	0	0%	0%
PAH	Benzo(a)anthracene	ng/g dry	261	1600	Cape Small	5 / 6	0	0	0%	0%
PAH	Benzo(a)pyrene	ng/g dry	430	1600	Inner Bay	20 / 21	0	0	0%	0%
PAH	Benzo(a)pyrene	ng/g dry	430	1600	Outer Bay	15 / 17	0	0	0%	0%
PAH	Benzo(a)pyrene	ng/g dry	430	1600	West Bay	16 / 19	0	0	0%	0%
PAH	Benzo(a)pyrene	ng/g dry	430	1600	East Bay	14 / 14	0	0	0%	0%
PAH	Benzo(a)pyrene	ng/g dry	430	1600	Cape Small	5 / 6	0	0	0%	0%
PAH	Chrysene	ng/g dry	384	2800	Inner Bay	21 / 21	0	0	0%	0%
PAH	Chrysene	ng/g dry	384	2800	Outer Bay	16 / 17	0	0	0%	0%
PAH	Chrysene	ng/g dry	384	2800	West Bay	19 / 19	0	0	0%	0%
PAH	Chrysene	ng/g dry	384	2800	East Bay	14 / 14	0	0	0%	0%
PAH	Chrysene	ng/g dry	384	2800	Cape Small	5 / 6	0	0	0%	0%
PAH	Dibenz(a,h)anthracene	ng/g dry	63.4	260	Inner Bay	12 / 21	0	0	0%	0%
PAH	Dibenz(a,h)anthracene	ng/g dry	63.4	260	Outer Bay	1 / 17	0	0	0%	0%
PAH	Dibenz(a,h)anthracene	ng/g dry	63.4	260	West Bay	3 / 19	0	0	0%	0%
PAH	Dibenz(a,h)anthracene	ng/g dry	63.4	260	East Bay	5 / 14	0	0	0%	0%
PAH	Dibenz(a,h)anthracene	ng/g dry	63.4	260	Cape Small	1 / 6	0	0	0%	0%
PAH	Fluoranthene	ng/g dry	600	5100	Inner Bay	20 / 21	0	0	0%	0%
PAH	Fluoranthene	ng/g dry	600	5100	Outer Bay	17 / 17	0	0	0%	0%
PAH	Fluoranthene	ng/g dry	600	5100	West Bay	19 / 19	0	0	0%	0%
PAH	Fluoranthene	ng/g dry	600	5100	East Bay	14 / 14	0	0	0%	0%
PAH	Fluoranthene	ng/g dry	600	5100	Cape Small	6 / 6	0	0	0%	0%
PAH	Fluorene	ng/g dry	19	540	Inner Bay	17 / 21	1	0	5%	0%
PAH	Fluorene	ng/g dry	19	540	Outer Bay	9 / 17	0	0	0%	0%
PAH	Fluorene	ng/g dry	19	540	West Bay	8 / 19	0	0	0%	0%
PAH	Fluorene	ng/g dry	19	540	East Bay	9 / 14	0	0	0%	0%
PAH	Fluorene	ng/g dry	19	540	Cape Small	1 / 6	0	0	0%	0%
PAH	Naphthalene	ng/g dry	160	2100	Inner Bay	17 / 21	0	0	0%	0%
PAH	Naphthalene	ng/g dry	160	2100	Outer Bay	12 / 17	0	0	0%	0%
PAH	Naphthalene	ng/g dry	160	2100	West Bay	7 / 19	0	0	0%	0%

Table 8. Regional Screening for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Parameter	Units	ERL	ERM	Region	Frequency of Detection	# Exceed ERL	# Exceed ERM	Frequency of Exceedance, ERL	Frequency of Exceedance, ERM
PAH	Naphthalene	ng/g dry	160	2100	East Bay	11 / 14	0	0	0%	0%
PAH	Naphthalene	ng/g dry	160	2100	Cape Small	3 / 6	0	0	0%	0%
PAH	HMWPAH	ng/g dry	1700	9600	Inner Bay	21 / 21	0	0	0%	0%
PAH	HMWPAH	ng/g dry	1700	9600	Outer Bay	17 / 17	0	0	0%	0%
PAH	HMWPAH	ng/g dry	1700	9600	West Bay	19 / 19	0	0	0%	0%
PAH	HMWPAH	ng/g dry	1700	9600	East Bay	14 / 14	0	0	0%	0%
PAH	HMWPAH	ng/g dry	1700	9600	Cape Small	6 / 6	0	0	0%	0%
PAH	LMWPAH	ng/g dry	552	3160	Inner Bay	21 / 21	0	0	0%	0%
PAH	LMWPAH	ng/g dry	552	3160	Outer Bay	17 / 17	0	0	0%	0%
PAH	LMWPAH	ng/g dry	552	3160	West Bay	18 / 19	0	0	0%	0%
PAH	LMWPAH	ng/g dry	552	3160	East Bay	14 / 14	0	0	0%	0%
PAH	LMWPAH	ng/g dry	552	3160	Cape Small	5 / 6	0	0	0%	0%
PAH	PAHs (total)	ng/g dry	4022	44792	Inner Bay	21 / 21	0	0	0%	0%
PAH	PAHs (total)	ng/g dry	4022	44792	Outer Bay	17 / 17	0	0	0%	0%
PAH	PAHs (total)	ng/g dry	4022	44792	West Bay	19 / 19	0	0	0%	0%
PAH	PAHs (total)	ng/g dry	4022	44792	East Bay	14 / 14	0	0	0%	0%
PAH	PAHs (total)	ng/g dry	4022	44792	Cape Small	6 / 6	0	0	0%	0%
PAH	Phenanthrene	ng/g dry	240	1500	Inner Bay	21 / 21	1	0	5%	0%
PAH	Phenanthrene	ng/g dry	240	1500	Outer Bay	16 / 17	0	0	0%	0%
PAH	Phenanthrene	ng/g dry	240	1500	West Bay	18 / 19	0	0	0%	0%
PAH	Phenanthrene	ng/g dry	240	1500	East Bay	14 / 14	0	0	0%	0%
PAH	Phenanthrene	ng/g dry	240	1500	Cape Small	4 / 6	0	0	0%	0%
PAH	Pyrene	ng/g dry	665	2600	Inner Bay	21 / 21	0	0	0%	0%
PAH	Pyrene	ng/g dry	665	2600	Outer Bay	17 / 17	0	0	0%	0%
PAH	Pyrene	ng/g dry	665	2600	West Bay	18 / 19	0	0	0%	0%
PAH	Pyrene	ng/g dry	665	2600	East Bay	14 / 14	0	0	0%	0%
PAH	Pyrene	ng/g dry	665	2600	Cape Small	6 / 6	0	0	0%	0%
PCB	PCBs (total)	ng/g dry	22.7	180	Inner Bay	0 / 21	0	0	0%	0%
PCB	PCBs (total)	ng/g dry	22.7	180	Outer Bay	0 / 17	0	0	0%	0%
PCB	PCBs (total)	ng/g dry	22.7	180	West Bay	1 / 19	1	0	5%	0%
PCB	PCBs (total)	ng/g dry	22.7	180	East Bay	0 / 14	0	0	0%	0%
PCB	PCBs (total)	ng/g dry	22.7	180	Cape Small	0 / 6	0	0	0%	0%
Pesticide	4,4'-DDD	ng/g dry	2	20	Inner Bay	0 / 21	0	0	0%	0%
Pesticide	4,4'-DDD	ng/g dry	2	20	Outer Bay	0 / 17	0	0	0%	0%
Pesticide	4,4'-DDD	ng/g dry	2	20	West Bay	0 / 19	0	0	0%	0%
Pesticide	4,4'-DDD	ng/g dry	2	20	East Bay	0 / 14	0	0	0%	0%
Pesticide	4,4'-DDD	ng/g dry	2	20	Cape Small	0 / 6	0	0	0%	0%
Pesticide	4,4'-DDE	ng/g dry	2.2	27	Inner Bay	0 / 21	0	0	0%	0%
Pesticide	4,4'-DDE	ng/g dry	2.2	27	Outer Bay	0 / 17	0	0	0%	0%
Pesticide	4,4'-DDE	ng/g dry	2.2	27	West Bay	1 / 19	0	0	0%	0%
Pesticide	4,4'-DDE	ng/g dry	2.2	27	East Bay	0 / 14	0	0	0%	0%
Pesticide	4,4'-DDE	ng/g dry	2.2	27	Cape Small	0 / 6	0	0	0%	0%
Pesticide	4,4'-DDT	ng/g dry	1	7	Inner Bay	0 / 21	0	0	0%	0%
Pesticide	4,4'-DDT	ng/g dry	1	7	Outer Bay	0 / 17	0	0	0%	0%
Pesticide	4,4'-DDT	ng/g dry	1	7	West Bay	0 / 19	0	0	0%	0%
Pesticide	4,4'-DDT	ng/g dry	1	7	East Bay	0 / 14	0	0	0%	0%
Pesticide	4,4'-DDT	ng/g dry	1	7	Cape Small	0 / 6	0	0	0%	0%
Pesticide	Chlordane (total)	ng/g dry	0.5	6	Inner Bay	0 / 21	0	0	0%	0%
Pesticide	Chlordane (total)	ng/g dry	0.5	6	Outer Bay	0 / 17	0	0	0%	0%

Table 8. Regional Screening for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Parameter	Units	ERL	ERM	Region	Frequency of Detection	# Exceed ERL	# Exceed ERM	Frequency of Exceedance, ERL	Frequency of Exceedance, ERM
Pesticide	Chlordane (total)	ng/g dry	0.5	6	West Bay	0 / 19	0	0	0%	0%
Pesticide	Chlordane (total)	ng/g dry	0.5	6	East Bay	0 / 14	0	0	0%	0%
Pesticide	Chlordane (total)	ng/g dry	0.5	6	Cape Small	0 / 6	0	0	0%	0%
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	1.58	46.1	Inner Bay	0 / 21	0	0	0%	0%
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	1.58	46.1	Outer Bay	0 / 17	0	0	0%	0%
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	1.58	46.1	West Bay	1 / 19	0	0	0%	0%
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	1.58	46.1	East Bay	0 / 14	0	0	0%	0%
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	1.58	46.1	Cape Small	0 / 6	0	0	0%	0%
Pesticide	Dieldrin	ng/g dry	0.02	8	Inner Bay	0 / 21	0	0	0%	0%
Pesticide	Dieldrin	ng/g dry	0.02	8	Outer Bay	0 / 17	0	0	0%	0%
Pesticide	Dieldrin	ng/g dry	0.02	8	West Bay	0 / 19	0	0	0%	0%
Pesticide	Dieldrin	ng/g dry	0.02	8	East Bay	0 / 14	0	0	0%	0%
Pesticide	Dieldrin	ng/g dry	0.02	8	Cape Small	0 / 6	0	0	0%	0%

Yellow shading indicates exceedance of the screening value.
μg/g dry: microgram(s) per gram dry weight
ERL: effects range low
ERM: effects range median
HMWPAH: high molecular weight polycyclic aromatic hydrocarbons
LMWPAH: low molecular weight polycyclic aromatic hydrocarbons
ng/g dry: nanogram(s) per gram dry weight
PAH: polycyclic aromatic hydrocarbons
PCBs: polychlorinated biphenyls

Table 9. Results of Statistical Tests
Casco Bay Estuary Partnership, Portland, Maine

Group	Parameter	Data Transformation	Residuals	Test	ANOVA p-values[c]		
					Year	Region	Year*Region
CDDF	Total PCDD/PCDFs[b]	--	--	Nonparametric	**<0.05**	**<0.05**	**<0.05**
Metal	Aluminum	--	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Antimony	Lognormal	Random	ANOVA	0.079	**<0.05**	--
Metal	Arsenic	--	Random	ANOVA	0.095	**<0.05**	--
Metal	Barium[a]	--	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Beryllium[a]	--	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Cadmium	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Chromium (total)	--	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Cobalt[a]	--	Random	ANOVA	0.807	**<0.05**	--
Metal	Copper	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Iron	--	--	Nonparametric	**<0.05**	**<0.05**	--
Metal	Lead	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	**<0.05**
Metal	Manganese	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Mercury	Lognormal	Random	ANOVA	0.328	**<0.05**	--
Metal	Molybdenum[a]	Lognormal	Random	ANOVA	0.257	**<0.05**	--
Metal	Nickel	--	--	Nonparametric	**<0.05**	**<0.05**	--
Metal	Selenium	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Silver	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Strontium[a]	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Thallium[a]	--	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Tin	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--
Metal	Vanadium[a]	--	Random	ANOVA	0.387	0.094	--
Metal	Zinc	--	Random	ANOVA	**<0.05**	**<0.05**	--
PAH	HMWPAH	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--
PAH	LMWPAH[d]	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--
PAH	PAHs (total)[d]	Lognormal	Random	ANOVA	**<0.05**	**<0.05**	--

a. Cape Small excluded from statistical analysis due to low sample count prior to 2010–2011 (n=1).
b. Statistical analysis only conducted on West Bay and Inner Bay because the remaining regions were not sampled in 2010–2011.
c. Statistical analyses were first conducted to include the year*region interaction (i.e., chemical concentration ~ year + region + year*region). If the interaction was not statistically significant (p-value<0.05), the analyses was then conducted excluding the year*region interaction (i.e., chemical concentration ~ year + region), and the p-values for year and region are provided from the second analysis).

d. Phenanthrene could not be included in the summation of LMWPAHs or PAHSs (total) because it was not analyzed in the 2000-2002 sampling period. The potential effects are discussed in Section 3.2.3
CDDF: chlorinated dibenzodioxins and furans
HMWPAH: high molecular weight polycyclic aromatic hydrocarbons
LMWPAH: low molecular weight polycyclic aromatic hydrocarbons
PAH: polycyclic aromatic hydrocarbon
PCDD/PCDFs: polychlorinated dibenzodioxins and furans

Table 10. Casco Bay and Gulf of Maine Summary Statistics for Sediment Chemistry Data Collected in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Parameter Group	Parameter	Units	Casco Bay		Gulf of Maine	
			Frequency of Detection	Average of Detected Concentrations ± Standard Deviation	Frequency of Detection	Average of Detected Concentrations ± Standard Deviation
Metal	Aluminum	µg/g dry	77 / 77	50000 ± 20000	45 / 45	45000 ± 20000
Metal	Antimony	µg/g dry	77 / 77	0.33 ± 0.15	45 / 45	0.53 ± 0.5
Metal	Arsenic	µg/g dry	77 / 77	9.5 ± 4.4	45 / 45	7.3 ± 5
Metal	Barium	µg/g dry	70 / 70	280 ± 100	45 / 45	300 ± 100
Metal	Beryllium	µg/g dry	70 / 70	2 ± 0.48	45 / 45	1.7 ± 0.7
Metal	Cadmium	µg/g dry	74 / 77	0.46 ± 0.41	39 / 45	0.6 ± 1
Metal	Chromium (total)	µg/g dry	77 / 77	66 ± 24	45 / 45	60 ± 40
Metal	Cobalt	µg/g dry	70 / 70	8.6 ± 2.8	45 / 45	6.7 ± 4
Metal	Copper	µg/g dry	77 / 77	15 ± 7.4	45 / 45	15 ± 20
Metal	Iron	µg/g dry	77 / 77	28000 ± 9200	45 / 45	22000 ± 10000
Metal	Lead	µg/g dry	77 / 77	26 ± 7.9	45 / 45	30 ± 30
Metal	Manganese	µg/g dry	77 / 77	560 ± 290	45 / 45	390 ± 200
Metal	Mercury	µg/g dry	71 / 77	0.11 ± 0.074	33 / 45	0.2 ± 0.2
Metal	Molybdenum	µg/g dry	70 / 70	1.6 ± 0.91	45 / 45	1.4 ± 0.9
Metal	Nickel	µg/g dry	77 / 77	23 ± 8.6	45 / 45	17 ± 10
Metal	Selenium	µg/g dry	56 / 77	0.97 ± 0.7	23 / 45	0.93 ± 0.6
Metal	Silver	µg/g dry	68 / 77	0.28 ± 0.18	43 / 45	0.46 ± 0.6
Metal	Strontium	µg/g dry	70 / 70	160 ± 110	45 / 45	140 ± 80
Metal	Thallium	µg/g dry	70 / 70	0.64 ± 0.21	45 / 45	0.46 ± 0.2
Metal	Tin	µg/g dry	77 / 77	4.8 ± 2.3	45 / 45	8.5 ± 20
Metal	Titanium	µg/g dry	70 / 70	3100 ± 710	45 / 45	2900 ± 1000
Metal	Vanadium	µg/g dry	70 / 70	85 ± 27	45 / 45	64 ± 30
Metal	Zinc	µg/g dry	77 / 77	68 ± 26	45 / 45	57 ± 40
PAH	1,1-Biphenyl	ng/g dry	25 / 77	1.3 ± 0.45	15 / 45	5 ± 7
PAH	1-Methylnaphthalene	ng/g dry	35 / 77	1.9 ± 1.1	19 / 45	5.9 ± 10
PAH	1-Methylphenanthrene	ng/g dry	51 / 77	3.2 ± 3.9	29 / 45	19 ± 30
PAH	2,3,5-Trimethylnaphthalene	ng/g dry	10 / 77	1.9 ± 1.1	16 / 45	5.8 ± 8
PAH	2,6-Dimethylnaphthalene	ng/g dry	20 / 77	2 ± 1.1	17 / 45	7.3 ± 10
PAH	2-Methylnaphthalene	ng/g dry	45 / 77	2.4 ± 1.7	23 / 45	7.5 ± 10
PAH	Acenaphthene	ng/g dry	17 / 77	3.9 ± 6.5	17 / 45	16 ± 30
PAH	Acenaphthylene	ng/g dry	41 / 77	3.1 ± 2.7	23 / 45	28 ± 80
PAH	Anthracene	ng/g dry	49 / 77	7.5 ± 14	29 / 45	36 ± 80
PAH	Benzo(a)anthracene	ng/g dry	74 / 77	16 ± 31	36 / 45	110 ± 300
PAH	Benzo(a)pyrene	ng/g dry	70 / 77	18 ± 33	37 / 45	87 ± 200
PAH	Benzo(b)fluoranthene	ng/g dry	70 / 77	13 ± 23	36 / 45	77 ± 200
PAH	Benzo(e)pyrene	ng/g dry	70 / 77	13 ± 20	36 / 45	76 ± 200
PAH	Benzo(g,h,i)perylene	ng/g dry	70 / 77	11 ± 16	31 / 45	100 ± 200
PAH	Benzo(k)fluoranthene	ng/g dry	70 / 77	13 ± 21	36 / 45	59 ± 100
PAH	Chrysene	ng/g dry	75 / 77	20 ± 35	38 / 45	94 ± 200
PAH	Dibenz(a,h)anthracene	ng/g dry	22 / 77	5.3 ± 5.6	23 / 45	45 ± 90
PAH	Dibenzothiophene	ng/g dry	45 / 77	2.4 ± 2	22 / 45	12 ± 20
PAH	Fluoranthene	ng/g dry	76 / 77	32 ± 57	41 / 45	180 ± 400
PAH	Fluorene	ng/g dry	44 / 77	3 ± 5.1	24 / 45	13 ± 20
PAH	Indeno(1,2,3-cd)pyrene	ng/g dry	66 / 77	11 ± 16	30 / 45	120 ± 300
PAH	Naphthalene	ng/g dry	50 / 77	4.8 ± 2.8	18 / 45	23 ± 70
PAH	HMWPAH	ng/g dry	77 / 77	110 ± 200	41 / 45	650 ± 2000
PAH	LMWPAH	ng/g dry	75 / 77	31 ± 57	38 / 45	170 ± 400
PAH	PAHs (total)	ng/g dry	77 / 77	140 ± 260	41 / 45	810 ± 2000
PAH	Perylene	ng/g dry	58 / 77	6 ± 7.8	29 / 45	51 ± 100
PAH	Phenanthrene	ng/g dry	73 / 77	17 ± 35	38 / 45	98 ± 200
PAH	Pyrene	ng/g dry	76 / 77	28 ± 49	41 / 45	170 ± 400
PCB	PCBs (total)	ng/g dry	1 / 77	56 ± NA	3 / 45	28 ± 40
Pesticide	DDT+DDE+DDD (sum)	ng/g dry	1 / 77	1.1 ± NA	4 / 45	2.6 ± 3
Pesticide	Pesticides (total)	ng/g dry	1 / 77	1.1 ± NA	4 / 45	3.5 ± 5

µg/g dry: microgram(s) per gram, dry weight basis
HMWPAH: high molecular weight polycyclic aromatic hydrocarbons
LMWPAH: low molecular weight polycyclic aromatic hydrocarbons
NA: not applicable
ng/g dry: nanogram(s) per gram, dry weight basis
PAH: polyaromatic hydrocarbons
PCB: polychlorinated biphenyls

Table 11. Results of Statistical Tests for Sediment Chemistry Data Collected in Casco Bay and Gulf of Maine in 2010 and 2011
Casco Bay Estuary Partnership, Portland, Maine

Group	Parameter	Data Transformation	Residuals	Test	ANOVA p-values[c]
Metal	Aluminum	--	Random	ANOVA	0.155
Metal	Antimony	--	Random	ANOVA	**<0.05**
Metal	Arsenic	--	Random	ANOVA	**<0.05**
Metal	Barium	--	Random	ANOVA	0.530
Metal	Beryllium	--	Random	ANOVA	**<0.05**
Metal	Cadmium	--	Random	ANOVA	0.327
Metal	Chromium (total)	--	Random	ANOVA	0.359
Metal	Cobalt	--	Random	ANOVA	**<0.05**
Metal	Copper	--	Random	ANOVA	0.895
Metal	Iron	--	Random	ANOVA	**<0.05**
Metal	Lead	--	Random	ANOVA	0.255
Metal	Manganese	--	Random	ANOVA	**<0.05**
Metal	Mercury	--	Random	ANOVA	**<0.05**
Metal	Molybdenum	--	Random	ANOVA	0.223
Metal	Nickel	--	Random	ANOVA	**<0.05**
Metal	Selenium	--	Random	ANOVA	0.766
Metal	Silver	Lognormal	Random	ANOVA	0.528
Metal	Strontium	--	Random	ANOVA	0.301
Metal	Thallium	--	Random	ANOVA	**<0.05**
Metal	Tin	--	Random	ANOVA	0.105
Metal	Titanium	--	Random	ANOVA	0.195
Metal	Vanadium	--	Random	ANOVA	**<0.05**
Metal	Zinc	--	Random	ANOVA	0.072
PAH	HMWPAH	Lognormal	Random	ANOVA	**<0.05**
PAH	LMWPAH	Lognormal	Random	ANOVA	**<0.05**
PAH	PAHs (total)	Lognormal	Random	ANOVA	**<0.05**

ANOVA: analysis of variance
HMWPAH: high molecular weight polycyclic aromatic hydrocarbons
LMWPAH: low molecular weight polycyclic aromatic hydrocarbons
PAH: polycyclic aromatic hydrocarbon

Table 12. Summary of the Casco Bay Estuary Partnership's Sediment Monitoring Program Results (1991-2011)
Casco Bay Estuary Partnership, Portland, Maine

Chemical Group	Casco Bay 2010-2011	Casco Bay 1991-2011	Coastal GOM Comparison
Metals	Below screening values[a]	Declining/stable[b]	Consistent with GOM
PAHs	Below screening values	Decline since 2000-2002	Lower than GOM
PCDD/PCDFs	Low concentrations	Decline since 2000-2002	NA
PCBs	Rarely detected (elevated DL)	Expected continued decline	NA
Pesticides	Rarely detected (elevated DL)	Expected continued decline	NA (rarely detected)
Butyltins	Low concentrations, not detected	Declining	NA (rarely detected)

a. Most results are below the screening values below which negative effects have never been reported. No metals exceed the higher screening values above which adverse effects are typically observed.

b. Selenium concentrations were higher in 2010-2011 but could be due to analytical differences between sampling programs.

DL: detection limits

GOM: Gulf of Maine

NA: not applicable, results not reported in Gulf of Maine data.

PAHs: polycyclic aromatic hydrocarbons

PCBs: polychlorinated biphenyls

PCDD/PCDFs: dioxins and furans