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September 2012

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ABSTRACT

Under the Project ENVVEST Final Project Agreement, the Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS&IMF), Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and local stakeholders have worked collaboratively to improve the environmental quality of Sinclair and Dyes Inlets. A regional mussel monitoring program began in 2010 to assess the status and trend of ecological resources, assess the effectiveness of cleanup and pollution control measures, and determine if discharges from all sources are protective of beneficial uses including aquatic life. The program collected indigenous mussels to represent a time-integrated measure of bioavailable metals and organic chemicals present in the water column. This document supplements the 2010 indigenous mussel data with 2012 data to provide two years of data on the chemical residue of mussels present in the inter-tidal regions of Sinclair Inlet, Dyes Inlet, Port Orchard Passage, Rich Passage, Agate Passage, Liberty Bay, and Keyport Lagoon. The 2012 data set added one station at PSNS&IMF and one market samples from Penn Cove. Indigenous mussels were collected from a small boat and/or from along the shoreline, measured, composited, and analyzed for percent lipids, percent moisture, stable isotopes of carbon and nitrogen, and a suite of trace metals and organic contaminants. The trace metals included silver (Ag), arsenic (As), cadmium (Cd), copper (Cu), mercury (Hg), lead (Pb), and zinc (Zn). The organic contaminants included the list of NOAA Status and Trends 20 polychlorinated biphenyls (PCB) congeners and suite of parent and methylated polycyclic aromatic hydrocarbons (PAHs). The average mussel lengths between the 2010 and 2012 data were generally less than 30% relative percent difference (RPD). Generally, the metals concentrations were lower in 2012 than 2010 with some notable exceptions in Sinclair Inlet and Rich Passage where increases in Ag, Hg, Pb, Cu, and Zn exceeded an RPD of 50% between years. However, they did not exceed the bioaccumulation critical values or the critical body residues corresponding to the no observed effect level (NOEL) and the lowest observed effect level (LOEL) with one exception. The Cd concentrations exceeded the NOEL and LOEL for the Manchester Lab Pier and the Pike Place Market samples. For the PAHs and PCB, the 2012 data were generally lower than 2010 and some cases significantly lower for PAHs and none of the available invertebrate benchmarks were exceeded.

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Introduction

Sinclair Inlet and Dyes Inlet were listed on the State of Washington's 1998 Section 303(d) list of impaired waters because of fecal coliform contamination in marine waters and tributary streams, heavy metals and toxic organics in the bottom sediments, and polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyl (PCBs), aldrin, dieldrin, mercury (Hg), and arsenic (As) in the tissues of marine organisms. The Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS&IMF) and Naval Base Kitsap-Bremerton (referred to as Shipyard for brevity) located in Bremerton, WA are committed to a culture of continuous process improvement for all aspects of Shipyard operations. Process improvements include reductions in the releases of hazardous materials and waste in discharges (e.g. stormwater and sewage system leaks, etc.) from the Shipyard. A cooperative project titled ENVVEST consisted of a final project agreement among PSNS&IMF, the Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology), and local stakeholders (US Navy, EPA and Ecology 2002) that collaboratively targets the improve of the environmental quality of the Sinclair and Dyes Inlet Watershed (ENVVEST 2006). An ambient monitoring program for sediment, water, and indigenous mussels began in 2009 to assess the status and trend of ecological resources, assess the effectiveness of cleanup and pollution control measures, and determine if discharges from all sources are protective of beneficial uses including aquatic life.

The ENVVEST project established a network of mussel watch stations in Sinclair and Dyes Inlets and the adjoining passages as part of the west coast mussel watch monitoring program (Johnston et al. 2010). The procedures followed the protocol documented by the National Oceanic and Atmospheric Administration's (NOAA's) Status and Trends Program. The NOAA program has been using mussel watch stations to track coastal pollution in U.S. waters for over 20 years (NOAA 2009). The ENVVEST network was established in coordination with Washington Department of Fish and Wildlife (WDFW) and other local stakeholders. The objectives of this monitoring are to evaluate the tissue concentrations to determine the spatial distribution of contamination, evaluate temporal trends, assess whether exposure levels exceed screening benchmarks, and identify locations where corrective actions may be warranted. The data also provide a baseline for assessing continuous process improvement.

The mussel watch stations established in Sinclair and Dyes Inlet were composed of indigenous mussels sampled in intertidal areas. Synchronized with the national mussel watch program, the stations are being sampled during the winter of even years (January-February 2010 and 2012) to assess the status of contaminant concentrations in nearshore areas of the Inlets. Results from the 2010 monitoring showed that most stations did not exceed screening levels, however gradients of contaminant exposures were present and areas with elevated exposures were identified (Johnston et al. 2011).

This document supplements the 2010 with the 2012 chemical residue data and stable isotopes of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) for the regional mussel watch stations

located in Sinclair Inlet, Dyes Inlet, Port Orchard Passage, Rich Passage, Agate Passage, Liberty Bay, Keyport Lagoon, and market sample originating from Penn Cove. Indigenous bivalves were collected from a small boat and/or from along the shoreline, measured, composited, and analyzed for percent lipids and moisture, a suite of trace metals and organic contaminants. The trace metals included silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb), and zinc (Zn). The organic contaminants included the list of NOAA Status and Trends 20 polychlorinated biphenyls (PCB) congeners and suite of parent and methylated polycyclic aromatic hydrocarbons (PAHs) as noted in Table 1.

For additional project information on biological monitoring see the following documents:

- 2003 Sinclair and Dyes Inlet TMDL Study: Biological Sampling and Analysis for Metals and PCBs (Brandenberger et al. 2003)
- Biological Sampling and Analysis in Sinclair and Dyes Inlets, Washington: Chemical Analyses for 2005 Puget Sound Biota Study (Brandenberger et al. 2006a,b)
- Biological Sampling and Analysis in Sinclair and Dyes Inlets, Washington: Chemical Analyses for 2007 Puget Sound Biota Study (Brandenberger et al. 2008)
- Contaminant Residues in Demersal Fish, Invetebrates, and Deployed Mussels in Selected Areas of The Puget Sound, WA (Johnston et al. 2007).
- Sampling and Analysis Plan for Ambient Monitoring and Toxicity Testing for Sinclair and Dyes Inlets, Puget Sound, Washington (Johnston et al. 2009)
- Monitoring water, sediment, and biota to assess protection of beneficial uses for Sinclair Inlet (Johnston et al. 2011).
- Ambient Monitoring for Sinclair and Dyes Inlets, Puget Sound, Washington: Chemical Analyses for 2010 Regional Mussel Watch (Brandenberger et al. 2010).

Table 1. Organic compounds measured in the mussel samples.

PCBs	Parent PAHs	Methylated (alkylated)
Cl2(8)	Naphthalene	C1-Naphthalenes
Cl3(18)	Biphenyl	C2-Naphthalenes
Cl3(28)	Acenaphthylene	C3-Naphthalenes
Cl4(44)	Acenaphthene	C4-Naphthalenes
Cl4(52)	Fluorene	C1-Fluorenes
Cl4(66)	Anthracene	C2-Fluorenes
Cl4(77)	Phenanthrene	C3-Fluorenes
Cl5(101)	Dibenzothiophene	C1-Phenanthrenes/Anthracenes
Cl5(105)	Fluoranthene	C2-Phenanthrenes/Anthracenes
Cl5(118)	Pyrene	C3-Phenanthrenes/Anthracenes
Cl5(126)	Benzo(a)anthracene	C4-Phenanthrenes/Anthracenes
Cl6(128)	Chrysene	C1-Dibenzothiophenes
Cl6(138)	Benzo(b)fluoranthene	C2-Dibenzothiophenes
Cl6(153)	Benzo(k)fluoranthene	C3-Dibenzothiophenes
Cl7(170)	Benzo(e)pyrene	C4-Dibenzothiophenes
Cl7(180)	Benzo(a)pyrene	C1-Fluoranthenes/Pyrenes
Cl7(187)	Perylene	C2-Fluoranthenes/Pyrenes
Cl8(195)	Indeno(1,2,3-cd)pyrene	C3-Fluoranthenes/Pyrenes
Cl8(200)	Dibenz(a,h)anthracene	C1-Chrysenes
Cl9(206)	Benzo(g,h,i)perylene	C2-Chrysenes
Cl10(209)		C3-Chrysenes
		C4-Chrysenes

Sample Collection

Twenty-four regional indigenous bivalve monitoring stations were established and sampled following procedures recommended by the NOAA Mussel Watch Program (NOAA 2009; SCMRC 2009) and documented in the ENVVEST ambient monitoring sampling and analysis plan (Johnston et al. 2009; 2010). In 2012, two additional stations were added: Pier 7 and Penn Cove. The Pier 7 station is located within the PSNS&IMF and was selected due to sediment remediation projects actively occurring at this location to target both PCB and Hg contamination. In the NOAA protocol each station consists of three sampling locations that are then composited to represent the station. The three locations from Pier 7 were analyzed as individual samples to evaluate small spatial gradients. The Penn Cove sample was actually collected from Pike Place market and consisted of commercially grown mussels.

The target species for collection were blue mussels, *Mytilus* spp. (*Mytilus trossulus*, *M. californianus*, or *M. galloprovincialis*). Table 2 provides the station identification, site code for the database, and the coordinates for the location. A site description was also provided including, at a minimum, substrate type, habitat characteristics, presence or

absence of creosote pilings, visible sheen of oil, and any other important factors associated with the collection. At each sampling location about 30-50 live specimens (> 1.5 inches) were collected at one to three replicate locations within a 150 ft radius of the station location. The mussels were collected by cutting their byssus threads, brushing off as much sediment, barnacles, or other debris as possible, and placing the mussels into labeled bags along with water proof labels (station #, bag #, and collectors). Each station composite included from 36 to 403 specimens. The specimens were kept on ice until they were transferred to the Pacific Northwest National Laboratory/Marine Science Laboratory (PNNL/MSL) for processing.

Table 2. 2012 indigenous mussel station locations and descriptions.

Site Name	Site Code	Latitude	Longitude	Station Description	Substrate	Creosote
Manchester Lab Pier	MLPIER	47.5736500	-122.5450900	Clam Bay at Manchester Lab pier on floating dock	Creosite piling	Yes
Sinclair Inlet Waterman Point	SIWP	47.5844700	-122.5704400	On rocks seaward of nav light, small mussels	rocks	No
Sinclair Inlet Ross Point	SIRP	47.5399200	-122.6619000	Just east of point, rocky, cobble, & sand. Mussels embedded in beach face and on rocks	rocky cobble and sand	No
PSNS NAVSTA Mid (CP)	PS04	47.5544920	-122.6472150	East side of Charlie Pier on line hanging in water	nylon line	Yes
PSNS NAVSTA West (DP)	PS03	47.5559300	-122.6513720	On steel cable at SW end of small boat dock under stairs; Both samples from same location.	steel cable	Yes
PSNS CIA West (6)	PS06	47.5529760	-122.6426140	SE end of mole pier of DD6 near Pier B construction.	steel cable	Yes
PSNS CIA MidE (5)	PS08	47.5580000	-122.6385000	On barge near DD5 off mooring on steel cable	steel cable	Yes
PSNS CIA MidW (4)	PS09	47.5601000	-122.6363000	Off cement quay wall on steel cable haning in water ~15ft.	steel cable	No
PSNS CIA East (3)	PS11	47.5605000	-122.6299000	Sampled from log and cable attached to quay wall	log, steel cable	No
Sinclair Inlet Sinclair Marina	SISIM	47.5408000	-122.6420500	Public pier east of marina on floating dock from tires	rubber tire	No
Sinclair Inlet Port Orchard Marina	SIPOM	47.5431000	-122.6355000	On foot ferry dock near passage to loading platform	dock	No
Port Orchard Passage Illahee State Park	POPISP	47.5996000	-122.5942700	On pier off floating dock and beach S. of pier on woody debris (large log).	woody debris	No
Port Orchard Passage Illahee Port Dock	POPIPD	47.6126550	-122.5953650	Illahee Port floating dock and under pier on wooden crossbar	wood pier	No

Table 2. 2012 indigenous mussel station locations and descriptions.

Site Name	Site Code	Latitude	Longitude	Station Description	Substrate	Creosote
Port Washington Narrows Lions Park	PWNLP	47.5841610	-122.6438430	On Northern edge of large extensive mussel bed	sand and cobbles on intertidal mud flat	No
Dyes Inlet Old Town Silverdale	DYOTS	47.6432000	-122.6950000	Old Town Silverdale pier on pilings under pier and floating dock	concrete piling	No
PSNS Inactive Fleet Callow Ave OF	PS01	47.5536960	-122.6574460	West end of Shipyard between carrier and Charleston Beech near Callow Ave OF	electrical cable	No
Sinclair Inlet head at Gorst	SIGST	47.5330000	-122.6800600	Head of Sinclair Inlet on western most permanet mooring	steel mooring	No
Dyes Inlet Ostrich Bay Ammo Pier	DYOBAP	47.5864000	-122.6868900	Dyes Inlet Ostrich Bay on end of abandonded ammo pier at Jackson Park	concrete piling	No
Port Orchard Passage Brownsville	POPBWN	47.6524610	-122.6125100	Brownsville Marina in Port Orchard Passage	cement dock	No
Keyport Lagoon	KPTLAG	47.6967751	-122.6190390	Keyport Lagoon inside lagoon near weir and outside lagoon in shellfish bed and on concrete radio tower base	muddy beach; shellfish bed, cement tower	No
Keyport NUWC Pier	KPTPIER	47.7049500	-122.6186800	NUWC Keyport pier on floating dock and steel pilings	steel pilings	No
Liberty Bay Poulsbo Marine Science Center	LBPMSC	47.7323010	-122.6487550	Poulsbo Marina at end of guest dock	cement dock	No
Agate Pass Kiana Lodge	APKIANA	47.7017600	-122.5812100	Suquamish Kiana Lodge at the end of floating dock	dock	Yes
Agate Pass BI Hidden Cove Beach	APHCB	47.6908440	-122.5662080	Bainbridge Island at the W end of Hidden Cove Rd.	rocks and cobbles	No
	PIER7RB30					
	PIER7CB05					
	PIER7FE46					
Penn Cove	PKPLPC			Purchased from Pike Place Market		

Preparation and Analytical Methods

Mussels from 28 sampling locations were collected by the U.S. Navy and hand delivered to MSL. The live mussels were stored at -20°C until they were measured and shucked. The length of each mussel added to the composite sample was recorded along with the total number of specimens in each composite (Table 3). The mussels were rinsed with deionized water, shucked using a ceramic knife, and composites were homogenized to an even color and consistency using a titanium blender. It was discovered after the analyses that the bolts holding the titanium blades had been replaced with stainless steel. Therefore the tissue was randomly contaminated with Cr and Ni and the data were deemed not included in this report. The stations with available unshucked archived samplers are being processed and re-analyzed. The available Cr and Ni data will be provided as an addendum to this report.

The soft tissues from each of the three sampling areas representing a station were composited into each of three pre-cleaned glass 8oz. jars. All jars were composited and ground in a pre-cleaned titanium blender to ensure homogenization. Aliquots were then placed into 1) 4 oz. pre-cleaned polypropylene jar for metals and isotopes, 2) 8oz. pre-cleaned glass jar for organics, and 3) 8 oz. pre-cleaned glass jar for archival. All aliquots were stored at -20°C. The aliquot for metals and stable isotopes was then lypholized and ground using a ball mill shaker system. An approximately 2g aliquot of the dried and ground tissue was removed and sent to Dr. Jay Brandes, Skidaway Institute for Oceanography for $\delta^{13}C$ and $\delta^{15}N$ analyses. Detailed descriptions of the analytical methods and quality control procedures for each parameter are provided in the quality control narrative accompanying each table in this report. In summary, the dried, homogenized tissue was digested using an aqua regia mixture and analyzed for Ag, As, Cd and Pb using inductively coupled plasma mass spectrometry (ICP-MS); Cr, Cu, Ni, and Zn using inductively coupled optical emissions spectroscopy (ICP-OES); and Hg by thermal decomposition, gold amalgamation, and cold vapor atomic absorption spectrometry (TD-CVAAS) based on EPA Method 7473. The quality control samples included in each analytical batch were blanks, blank spikes, matrix spikes, duplicate matrix spikes, standard reference materials, and laboratory duplicates. The quality control samples met the project criteria for accuracy, precision, and representativeness, therefore, no data were qualified. The data are available in the following sections. Average measures of accuracy were ≤ 10% difference from the known value and laboratory precision was ≤ 11% relative percent difference (RPD). The data were expressed in both wet and dry weight concentrations.

The $\delta^{13}C$ and $\delta^{15}N$ analyses were performed on freeze dried, ground samples using a ThermoFinnigan Delta V plus stable isotope mass spectrometer coupled to a Thermo Flash elemental analyzer. Internal laboratory standards composed of marine chitin (Fisher Scientific) and calibrated to NIST standards were employed to correct sample data to international reference scales. Values are normalized to Peedee belemnite (PDB) for C and air for N. This standardization allows for comparison across media and laboratories.

Tissue samples were extracted for PAHs and PCB congeners following MSL standard operating procedures based on the NOAA National Status and Trends (NS&T) methods. Extracts intended for PAH analyses were analyzed using gas chromatography mass spectrometry (GC/MS) and extracts for PCB analyses were analyzed using gas chromatography with electron capture

detection (GC/ECD). Sample data were quantified by the method of internal standards using the surrogate compounds. The quality control samples analyzed with each analytical batch of 20 of fewer samples were blanks, matrix spikes, matrix spike duplicates, and laboratory duplicates. The quality control results are provided in the summaries below. In summary, the only data qualification for PAHs was evaluation of impact from a detectable blank. One of the two acenaphthylene blanks was above the reporting limit (RL) and required data qualifiers. Measures of accuracy and matrix interferences demonstrated an average recovery of 103%. Some exceedences were noted on the naphthalene data indicating naphthalene may be considered an over estimate by about 40-70%. The precision demonstrated by laboratory duplicates where concentrations were greater than the RL averaged 4% RPD. The quality control samples for the PCB analyses demonstrated no data qualifiers were required for the blanks. The measures of accuracy were the matrix spikes with an average recovery of 101%. The laboratory duplicate averaged 20% RPD while the duplicate matrix spikes demonstrated an average precision level of 9% RPD.

Table 3. The total number of mussels in each composite, average length, standard deviation, and percent lipids for both the 2010 and 2012 sampling events.

Station ID	No. Mussels in Composite		Average length (mm)			Standard Deviation of Lengths		% Lipids		
	2010	2012	2010	2012	*RPD*	2010	2012	2010	2012	*RPD*
PS04	194	**174**	45	**40**	*12%*	7.9	**8.2**	6.87	**8.02**	*15%*
PS03	194	**56**	46	**54**	*17%*	6.7	**12**	6.62	**9.37**	*34%*
PS06	329	**77**	47	**46**	*4%*	7.3	**6.4**	6.65	**8.61**	*26%*
PS08	530	**84**	37	**46**	*22%*	7.0	**6.2**	7.47	**8.07**	*8%*
PS09	123	**87**	49	**46**	*5%*	9.3	**6.6**	6.24	**8.09**	*26%*
PS11	333	**134**	41	**45**	*10%*	7.6	**5.5**	6.96	**8.29**	*17%*
SISIM	179	**127**	48	**48**	*0%*	12	**4.9**	6.99	**11.6**	*49%*
POPISP	577	**105**	33	**39**	*16%*	7.5	**6.8**	8.85	**9.24**	*4%*
SIPOM	219	**96**	41	**44**	*8%*	7.3	**6.5**	7.78	**10.1**	*26%*
POPIPD	253	**63**	46	**50**	*9%*	6.3	**6.1**	8.40	**9.37**	*11%*
PWNLP	440	**254**	40	**35**	*13%*	5.5	**3.4**	9.40	**7.55**	*22%*
DYOTS	291	**45**	41	**71**	*54%*	11	**14**	8.61	**8.72**	*1%*
MLPIER	357	**93**	42	**47**	*11%*	8.1	**14**	6.40	**9.03**	*34%*
SIWP	300	**403**	26	**24**	*7%*	5.0	**3.2**	5.43	**7.19**	*28%*
SIRP	177	**81**	32	**44**	*32%*	7.5	**8.2**	5.42	**9.34**	*53%*
POPBWN	338	**205**	40	**38**	*5%*	6.5	**3.4**	8.07	**8.03**	*0%*
KPTPIER	273	**113**	38	**46**	*20%*	9.2	**4.5**	7.92	**8.89**	*12%*
KPTLAG	204	**58**	43	**67**	*44%*	13	**15**	7.55	**8.33**	*10%*
APHCB	342	**330**	26	**24**	*6%*	3.7	**3.0**	5.52	**9.73**	*55%*
APKIANA	248	**42**	44	**54**	*20%*	7.4	**19**	7.57	**10.9**	*36%*
LBPMSC	319	**84**	33	**41**	*21%*	10	**8.5**	7.02	**8.98**	*25%*
DYOBAP	304	**118**	39	**45**	*13%*	9.6	**7.1**	7.97	**9.67**	*19%*
SIGST	281	**36**	41	**66**	*47%*	4.5	**17**	9.08	**9.72**	*7%*
PS01	272	**91**	42	**46**	*9%*	6.5	**7.5**	8.63	**7.49**	*14%*
PIER7RB30	--	**86**	--	**46**	--	--	**4.4**	--	**8.12**	--
PIER7CB05	--	**77**	--	**42**	--	--	**6.4**	--	**7.14**	--
PIER7FE46	--	**98**	--	**40**	--	--	**5.3**	--	**7.97**	--
PKPLPC	--	**78**	--	**57**	--	--	**4.5**	--	**7.95**	--

Results and Discussion

This section provides a brief overview of the results and discussion for the comparison of the 2010 and 2012 indigenous mussel data sets. It is not intended to be comprehensive as an ambient monitoring report compiling the water column and biota monitoring is currently in progress. The discussion points here will be addressed in more detail in the future report.

Twenty-four of the stations were sampled in 2010. With only two years, the data analyses were isolated to RPD values between years, spatial distributions, and a comparison to screening levels. The average lengths between the two years was generally less than 30% RPD with the exception of the mussels collected from DYOTS, SIRP, KPTLAG, and SIGST (Table 3). In these cases, the average mussel length was greater in 2012 than 2010. These stations are located near the terminus of the basins for Dyes Inlet (DYOTS), Gorst Creek in Sinclair Inlet (SIRP and SIGST), and Keyport Lagoon (KPTLAG). Stations with a lipid RPD between years of greater than 30% included PS03, SISIM, MLPIER, SIRP, APHCB, and APKIANA (Table 3). At these stations, the lipids were higher in 2012 than 2010. The longer average lengths seen in 2012 corresponded with higher percent lipids except at three stations: DYOTS, SIGST, and KPTLAG. Stable isotopes of C and N were analyzed on the 2012 data set and added to the existing biota library (Figure 1) to illustrate the position of the indigenous mussels on the trophic level.

Metals

The metals concentrations for the 2010 and 2012 data sets were compiled into Table 4 for relative comparisons between years. The data were reported as dry weight concentrations (µg/g). The wet weight data are available in the field data summary section. The RPD values highlighted in orange indicate those more than 50% higher in 2012 relative to 2010. The green highlights indicate RPD values more than 50% lower in 2012. The stations with concentrations greater than 50% higher in 2012 than 2010 were PS04 (Ag), PS03 (Hg, Ag, Pb), PS06 (Ag, Cu, Pb), MLPIER (Ag, Cu, Pb, Zn), APHCB (Cu), and SIGST (Hg, As, Cd, Pb). The stations with 2012 concentration more than 50% lower in 2012 were PS08 (Ag), PS11 (Ag, Pb), SIPOM (Cu), DYOTS (Ag, Pb), SIWP (Pb), SIRP (Ag, Cu, Pb), POPBWN (Hg), KPTPIER (Hg), KPTLAG (Hg, Ag, Pb, Zn), APKIANA (Hg, Ag, Pb), LBPMSC (Cu), and DYOBAP (Pb).

The station locations are provided in Figure 2. The pattern of higher or lower metals between the years was not isolated to a specific basin, e.g. Sinclair Inlet or Dyes Inlet. Metals with targeted process improvement or remediation activities (e.g. stormwater best management practices, etc.) included Hg, Cu, Pb, and Zn. Overall the regional data from 2012 were lower than 2010. Figure 3 shows the cumulative RPD values for all the metals progressing from the stations in Sinclair Inlet out to Dyes Inlet and then Port Orchard Passage into Agate Passage. The concentrations for Hg in 2012 were lower than 2010 with the exception of five stations in Sinclair Inlet. For Cu, eight of the stations were higher in 2012, but they were not in a single basin. Similar patterns were seen for Pb and Zn. In most cases, the stations with higher 2012 metal concentration the increase was noted for more than one metal (e.g. PS03, PS06, PS11, and MLPIER). The same was true for the decreases noted for specific station.

Ten of the 24 locations sampled were higher for Ag in 2012. The locations of the higher concentrations included Sinclair Inlet, Port Washington Narrows, Rich Passage, and Agate

Passage. Silver may be associated with sewage discharges and considered a tracer in coastal waters (Sanudo-Wilhelmy and Flegal, 1992) while Cd may be associated with ocean processes such as upwelling (Laresa et al. 2002) as well as industrial activities. Thirteen of the stations recorded an increase in Cd in the 2012 data set. The increases were located throughout the region of study.

The concentrations were evaluated against the various benchmark concentrations for invertebrate tissue summarized by Johnston et al. (2007). Bioaccumulation critical values (B_{CV}) in dry weight concentrations were reported for Hg (19.65 µg/g), Cd (186 µg/g), Cu (62 µg/g), Pb (81 µg/g), and Zn (1620 µg/g). The 2012 data did not exceed the B_{CV} for any of the metals or stations. The data were also compared to the tissue screening values (TSV) for Hg (0.06 µg/g), Ag (0.37 µg/g), As (1.58 µg/g), Cd (0.04 µg/g), Cu (3.00 µg/g), Pb (0.06 µg/g), and Zn (20.0 µg/g). All stations exceeded the TSV for As, Cd, Cu, Pb, and Zn. Only two stations were below the TSV for Hg (KPTPIER and APKIANA) and all stations were below the TSV for Ag. The data were also compared to the critical body residues (CBR) corresponding to the no observed effect level (NOEL) and the lowest observed effect level (LOEL) for Cd (4.50 and 6.45 µg/g), Cu (36.0 and 40.5 µg/g), and Pb (20.0 and 102 µg/g) in invertebrate species, respectively. There were only two exceedences of NOEL and LOEL and only for Cd at MLPIER and PKPLPC. The final two benchmarks evaluated were the consumption of invertebrates by black ducks and dolphins. The black duck benchmarks for Hg (5.0 µg/g), Ag (18.4 µg/g), As (57.1 µg/g), Cu (522 µg/g), Pb (12.6 µg/g), and Zn (161 µg/g) were not exceeded with the exception of 17 stations for Zn. The dolphin invertebrate prey consumption benchmarks are only reported for Hg (5.83 µg/g) and Cu (68.3 µg/g) and they were not exceeded.

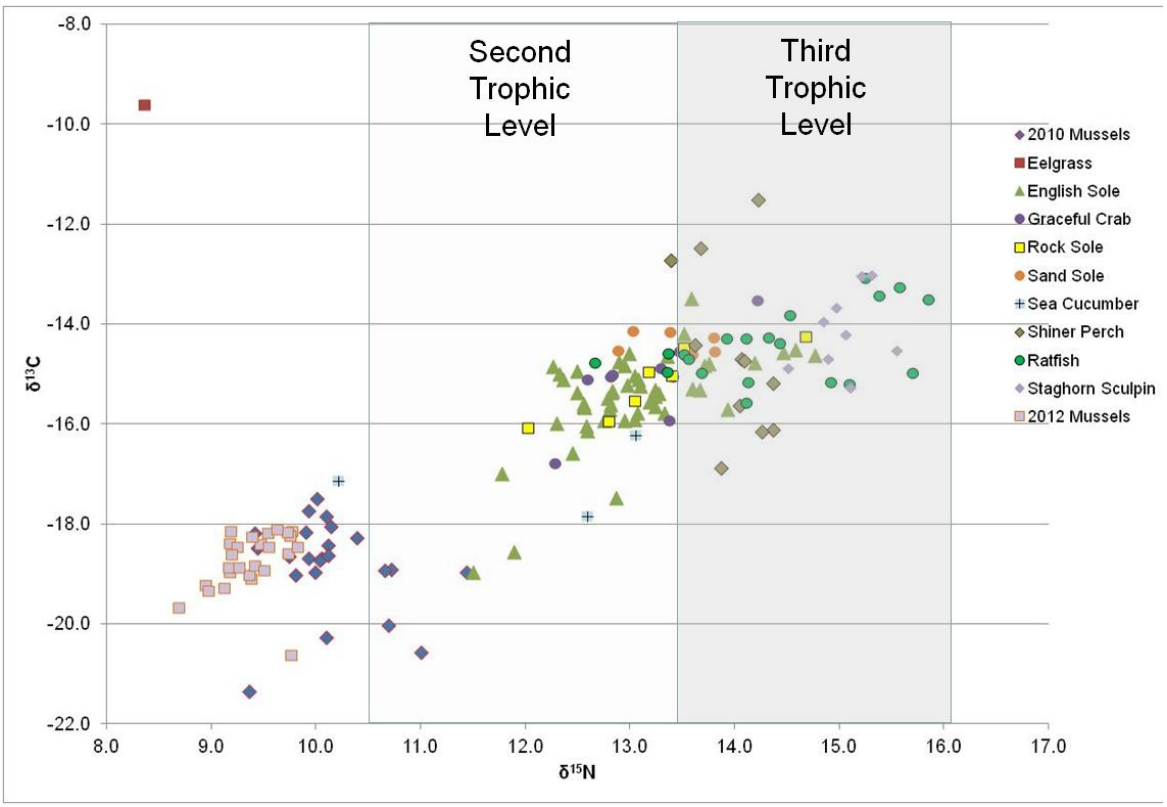

Figure 1. Stable isotopes of carbon and nitrogen on the 2010 and 2012 mussel samples along with the biota survey conducted by ENVVEST and a single eel grass sample.

Table 4. Metal concentrations in mussel tissue collected in 2010 and 2012. Orange highlights show RPD >50% higher in 2012, while green highlights show stations where concentrations were > 50% lower in 2012.

Station ID	Hg (ug/g dry wt)				Cu (ug/g dry wt)				Pb (ug/g dry wt)				Zn (ug/g dry wt)			
	2010	2012	Mean	*RPD*	2010	2012	Mean	*RPD*	2010	2012	Mean	*RPD*	2010	2012	Mean	*RPD*
PS04	0.114	0.125	0.120	9%	10.3	13.8	12.1	29%	1.25	1.38	1.32	10%	210	237	224	12%
PS03	0.395	0.960	0.677	83%	9.78	13.7	11.7	33%	1.99	3.87	2.93	64%	207	210	209	1%
PS06	0.120	0.192	0.156	46%	10.0	35.0	22.5	111%	1.03	1.99	1.51	64%	198	314	256	45%
PS08	0.159	0.124	0.142	-25%	37.3	34.3	35.8	-8%	1.96	1.49	1.73	-27%	270	284	277	5%
PS09	0.140	0.143	0.142	2%	13.3	12.8	13.1	-4%	1.60	1.75	1.68	9%	210	248	229	17%
PS11	0.136	0.106	0.121	-25%	17.7	11.5	14.6	-42%	2.80	1.46	2.13	-63%	299	190	245	-45%
SISIM	0.154	0.151	0.153	-2%	10.3	9.66	10.0	-6%	1.43	1.29	1.36	-10%	202	166	184	-20%
POPISP	0.0893	0.0784	0.0839	-13%	7.32	10.5	8.91	36%	0.902	0.852	0.877	-6%	127	155	141	20%
SIPOM	0.138	0.134	0.136	-3%	13.8	6.48	10.1	-72%	1.03	0.807	0.919	-24%	244	158	201	-43%
POPIPD	0.0842	0.0696	0.077	-19%	6.62	5.78	6.20	-14%	0.766	0.571	0.669	-29%	128	123	126	-4%
PWNLP	0.144	0.142	0.143	-2%	7.71	12.3	10.0	46%	1.61	1.97	1.79	20%	185	180	183	-3%
DYOTS	0.173	0.144	0.159	-18%	7.64	5.29	6.47	-36%	1.22	0.695	0.958	-55%	147	105	126	-33%
MLPIER	0.0935	0.0784	0.0860	-18%	7.12	12.9	10.0	58%	0.637	1.17	0.904	59%	131	234	183	56%
SIWP	0.129	0.114	0.121	-12%	8.57	8.39	8.48	-2%	2.13	1.19	1.66	-57%	196	173	185	-12%
SIRP	0.196	0.163	0.180	-18%	11.0	6.16	8.58	-56%	1.95	1.07	1.51	-58%	221	178	200	-22%
POPBWN	0.127	0.0728	0.0999	-54%	13.9	19.0	16.5	31%	0.801	0.752	0.777	-6%	188	153	171	-21%
KPTPIER	0.102	0.0595	0.0808	-53%	7.17	6.94	7.06	-3%	0.829	0.703	0.766	-16%	156	121	139	-25%
KPTLAG	0.146	0.0778	0.112	-61%	8.34	6.39	7.37	-26%	2.05	0.783	1.42	-89%	215	97.0	156	-76%
APHCB	0.109	0.0782	0.0936	-33%	9.26	22.6	15.9	84%	1.01	1.03	1.02	2%	190	145	168	-27%
APKIANA	0.111	0.0570	0.0840	-64%	8.56	6.35	7.46	-30%	0.644	0.384	0.514	-51%	161	123	142	-27%
LBPMSC	0.140	0.104	0.122	-29%	23.7	12.6	18.2	-61%	1.20	1.21	1.21	1%	239	176	208	-30%
DYOBAP	0.154	0.131	0.142	-16%	7.79	5.34	6.57	-37%	1.51	0.824	1.17	-59%	179	131	155	-31%
SIGST	0.0891	0.278	0.183	103%	11.4	9.29	10.3	-20%	0.857	2.17	1.51	87%	249	192	221	-26%
PS01	0.132	0.129	0.130	-3%	11.6	9.63	10.6	-19%	1.26	1.76	1.51	33%	222	203	213	-9%
PIER7RB30	--	0.102	--	--	--	9.01	--	--	--	1.03	--	--	--	228	--	--
PIER7CB05	--	0.110	--	--	--	9.35	--	--	--	1.11	--	--	--	276	--	--
PIER7FE46	--	0.112	--	--	--	9.51	--	--	--	1.11	--	--	--	263	--	--
PKPLPC	--	0.0743	--	--	--	9.28	--	--	--	0.218	--	--	--	147	--	--

Table 4 Continued.

Station ID	Ag (ug/g dry wt)				As (ug/g dry wt)				Cd (ug/g dry wt)			
	2010	2012	Mean	*RPD*	2010	2012	Mean	*RPD*	2010	2012	Mean	*RPD*
PS04	0.00945	0.0172	0.0133	58%	6.26	6.51	6.39	4%	1.82	2.00	1.91	9%
PS03	0.0130	0.0311	0.0221	82%	6.56	7.53	7.05	14%	2.10	3.21	2.66	42%
PS06	0.0166	0.0541	0.0354	106%	6.34	8.13	7.24	25%	1.98	2.94	2.46	39%
PS08	0.0535	0.0288	0.0412	-60%	7.16	7.08	7.12	-1%	2.25	2.44	2.35	8%
PS09	0.0189	0.0195	0.0192	3%	6.90	7.43	7.17	7%	2.12	2.25	2.19	6%
PS11	0.0260	0.0149	0.0205	-54%	7.70	7.55	7.63	-2%	2.14	2.03	2.09	-5%
SISIM	0.0138	0.0126	0.0132	-9%	6.55	6.40	6.48	-2%	2.44	1.56	2.00	-44%
POPISP	0.0349	0.0330	0.0340	-6%	7.24	7.31	7.28	1%	2.14	2.67	2.41	22%
SIPOM	0.0108	0.0116	0.0112	7%	6.54	6.46	6.50	-1%	2.17	1.75	1.96	-21%
POPIPD	0.0375	0.0275	0.0325	-31%	6.92	6.95	6.94	0%	2.66	3.39	3.03	24%
PWNLP	0.0377	0.0407	0.0392	8%	6.67	6.79	6.73	2%	1.79	2.05	1.92	14%
DYOTS	0.0465	0.0176	0.0321	-90%	7.72	7.70	7.71	0%	2.11	3.15	2.63	40%
MLPIER	0.0267	0.0533	0.0400	67%	8.71	7.60	8.16	-14%	4.20	6.46	5.33	42%
SIWP	0.0336	0.0390	0.0363	15%	8.46	7.00	7.73	-19%	2.34	2.28	2.31	-3%
SIRP	0.0330	0.0179	0.0255	-59%	7.89	7.18	7.54	-9%	2.65	2.67	2.66	1%
POPBWN	0.0201	0.0176	0.0189	-13%	9.57	7.82	8.70	-20%	2.65	2.21	2.43	-18%
KPTPIER	0.0335	0.0310	0.0323	-8%	7.53	6.85	7.19	-9%	2.82	2.22	2.52	-24%
KPTLAG	0.0440	0.0225	0.0333	-65%	9.47	6.63	8.05	-35%	4.65	3.13	3.89	-39%
APHCB	0.0451	0.0490	0.0471	8%	8.88	7.40	8.14	-18%	3.24	2.61	2.93	-22%
APKIANA	0.0414	0.0148	0.0281	-95%	11.5	8.27	9.89	-33%	3.37	3.48	3.43	3%
LBPMSC	0.0193	0.0156	0.0175	-21%	9.51	7.23	8.37	-27%	2.65	1.97	2.31	-29%
DYOBAP	0.0419	0.0412	0.0416	-2%	8.14	7.13	7.64	-13%	3.25	2.89	3.07	-12%
SIGST	0.0192	0.0286	0.0239	39%	5.26	12.0	8.63	78%	1.46	4.15	2.81	96%
PS01	0.0236	0.0193	0.0215	-20%	6.73	7.17	6.95	6%	2.69	2.33	2.51	-14%
PIER7RB30	--	0.0125	--	--	--	7.22	--	--	--	2.35	--	--
PIER7CB05	--	0.0165	--	--	--	7.90	--	--	--	3.39	--	--
PIER7FE46	--	0.0172	--	--	--	8.03	--	--	--	3.21	--	--
PKPLPC	--	0.0291	--	--	--	10.2	--	--	--	11.7	--	--

Figure 2. Top figure shows ENVVEST regional mussel station locations and bottom shows a blow up of the Sinclair Inlet stations including those at the Puget Sound Naval Shipyard.

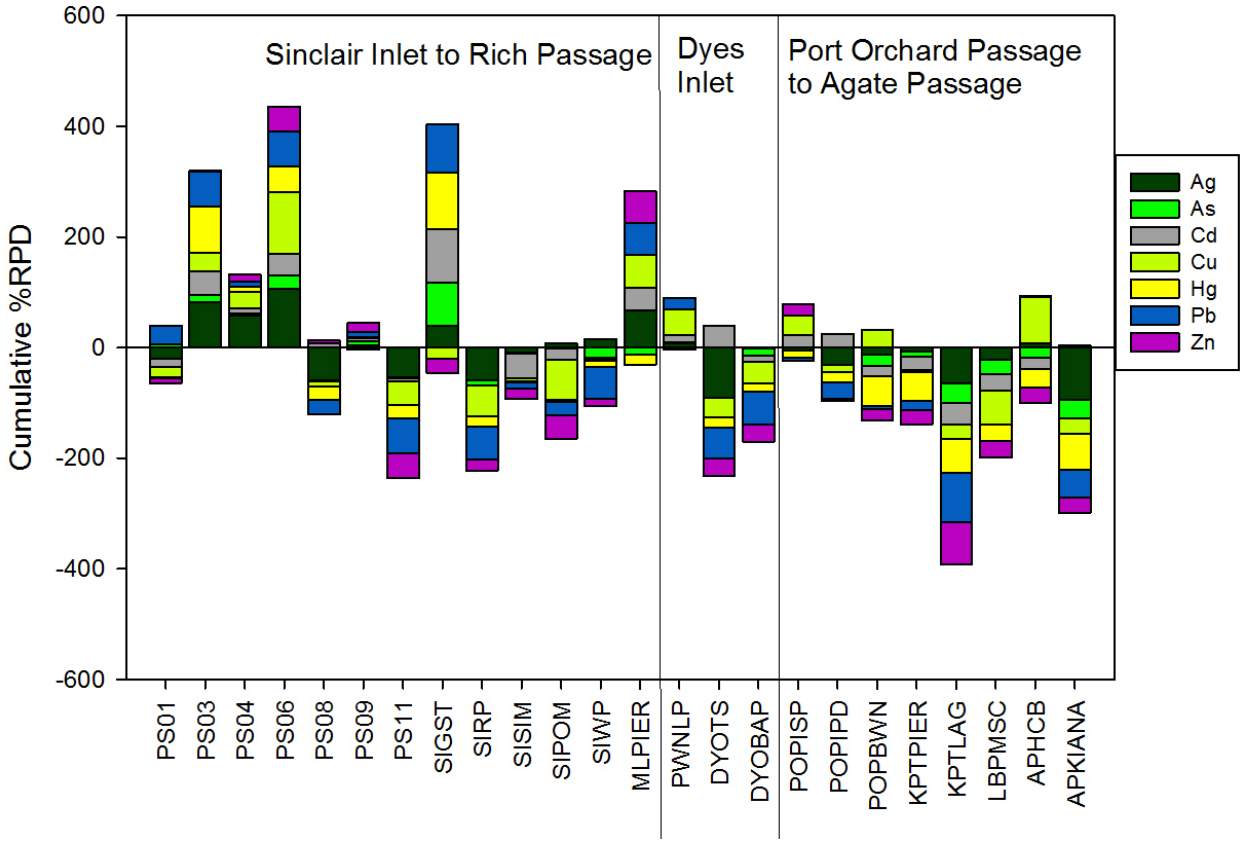

Figure 3. The cumulative relative percent differences (RPD) between 2010 and 2012 for each metal and station progressing from Sinclair Inlet to Dyes Inlet and out to the passages.

Organics

The PAH data from 2010 and 2012 are presented in Table 5. The total PAHs measured are reported as the sum of the individual PAHs including the MDL. The sum includes low molecular weight PAHs (LPAH include naphthalene, acenaphthalene, acanapthene, fluorene, phenanthrene, and anthracene), high molecular weight PAHs (HPAH include fluoranthene, pyrene, benz(a)anthracence, chrysene, benzo(e)perylene, benzo(a)pyrene, perylene, dibenz(a,h)anthracene, indeno(1,2,3,cd)perylene), additional parent PAHs (biphenyl and benzo(e)pyrene), and C1-, C2-, C3-, and C4-alkyl homologs of naphthalene, fluorene, anthracene, phenanthrene, dibenzothiophene, pyrene, and crysene. For the total PAHs, there were three stations with greater than 50% higher concentrations in 2012 (PS04, PS03, and PS08) and 13 were > 50% lower in 2012 (PS09, PS11, POPISP, SIPOM, DYOTS, MLPIER, SIWP, POPBWN, KPTPIER, KPTLAG, APHCB, LBPMSC, and SIGST). The PCB data are presented in Table 6. The sum of the PCBs was calculated following NOAA Status and Trends method of summing congeners (NOAA, 1995; O'Connor, 2002). Overall, the PCB concentrations did not vary significantly between years. Only stations SIRP and LBPMSC were more than 50% higher in 2012 than 2010.

The regional pattern of PAH data shows stations in all basins decreased in total PAH concentrations from 2010 to 2012 (Figure 4). Only four stations in Sinclair Inlet recorded an

increase in total PAHs. The decrease in total PAHs generally corresponded with a slight increase in PCB concentrations although the changes in the PCB concentrations were not significantly different between years. In addition, the PCB concentrations showed no sub-basin pattern. Generally, the slight increases were within the field variability and not significant.

The concentrations were evaluated against the various benchmark concentrations for invertebrate tissue summarized by Johnston et al. (2007). The PAH benchmark were reported in µg/g dry weight, therefore, the 2012 data were converted to dry weight concentrations using the sample specific percent dry weight. The dry weight total PAH concentrations did not exceed the benchmark for the consumption of invertebrates by black ducks (total PAH 546 µg/g dry wt.). Critical values for invertebrate bioaccumulation are available for individual PAH compounds. The invertebrate B_{CV} and the black duck benchmarks for fluorene (9.94 and 11.2 µg/g dry wt.) and phenanthrene (2.53 and 667 µg/g dry wt.), respectively, were not exceeded. The invertebrate B_{CV} was also published for anthracene (3.02 µg/g dry wt.), fluoranthene (42.6 µg/g dry wt.), pyrene (6.21 µg/g dry wt.), chrysene (5.45 µg/g dry wt.), benz(a)anthracene (5.45 µg/g dry wt.), and benzo(a)pryrene (4.08 µg/g dry wt.). The 2012 data do not exceed these thresholds. The benchmarks available for PCBs in invertebrate tissue reported as dry weight include the B_{CV} (0.94 µg/g), TSV (0.44 µg/g), NOEL (3.0 µg/g), LOEL (5.5 µg/g), Blackduck (2.0 µg/g), and Dolphin (0.80 µg/g). These benchmarks were not exceeded in the 2012 data set.

Table 5. PAH concentrations in mussel tissue collected in 2010 and 2012. Orange highlights show RPD >50% higher in 2012, while green highlights show stations where concentrations were > 50% lower in 2012. Concentrations reported as ng/g wet weight.

Station:	PS04				PS03				PS06				PS08				PS09			
Year:	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD
Average %Lipids (dry wt):	6.87	8.02	7.45	15%	6.62	9.37	8.00	34%	6.65	8.61	7.63	26%	7.47	8.07	7.77	8%	6.24	8.09	7.17	26%
Sum of PAHs Measured[1]	**380**	**644**	**512**	**52%**	**495**	**1422**	**958**	**97%**	**299**	**198**	**249**	**-41%**	**726**	**2087**	**1407**	**97%**	**423**	**220**	**321**	**-63%**
Naphthalene	**3.24**	**2.16**	**2.70**	**-40%**	**3.70**	**3.76**	**3.73**	**2%**	**3.31**	**2.25**	**2.78**	**-38%**	**7.03 ***	**2.99**	**5.01**	**-81%**	**5.85**	**1.89**	**3.87**	**-102%**
C1-Naphthalenes	3.17	2.89	3.03	-9%	3.32	6.58	4.95	66%	3.05	6.66	4.86	74%	6.51 *	34.3	20.4	136%	4.81	1.85	3.33	-89%
C2-Naphthalenes	6.98	7.70	7.34	10%	7.24	11.0	9.11	41%	7.01	29.2	18.1	123%	14.6	34.5	24.5	81%	7.88	5.36	6.62	-38%
C3-Naphthalenes	7.74	8.25	7.99	6%	9.40	10.0	9.71	6%	7.61	22.0	14.8	97%	15.8	27.4	21.6	53%	7.48	6.21	6.85	-19%
C4-Naphthalenes	6.84	7.20	7.02	5%	7.77	9.01	8.39	15%	4.92	8.92	6.92	58%	20.9	23.7	22.3	12%	6.95	5.56	6.25	-22%
Biphenyl	**2.86 U**	**2.86 U**	2.86		**2.86 U**	**2.86 U**	**2.86**		**2.86 U**	**2.86 U**	**2.86**		**2.86 U**	**10.3**	**6.59**	**113%**	**2.86 U**	**2.86 U**	**2.86**	
Acenaphthylene	**1.88**	**4.00**	**2.94**	**72%**	**1.68 U**	**4.15 B**	**2.92**	**85%**	**1.68 U**	**2.53**	**2.10**	**40%**	**3.36**	**10.5**	**6.92**	**103%**	**2.15**	**2.76**	**2.46**	**25%**
Acenaphthene	**2.29 U**	**4.07**	3.18	56%	**2.29 U**	**10.9**	**6.62**	**131%**	**2.29 U**	**2.29 U**	**2.29**		**2.32**	**35.2**	**18.7**	**175%**	**2.45**	**2.29 U**	**2.37**	**-7%**
Fluorene	**2.75 U**	**5.72**	4.24	70%	**3.14**	**12.1**	**7.61**	**117%**	**2.75 U**	**2.75 U**	**2.75**		**3.83**	**45.8**	**24.8**	**169%**	**3.21**	**2.75 U**	**2.98**	**-15%**
C1-Fluorenes	13.1	4.69	8.87	-94%	17.1	5.84	11.5	-98%	14.9	3.04	8.96	-132%	20.6	16.6	18.6	-22%	14.7	3.28	8.97	-127%
C2-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	21.4	11.79	163%	2.17 U	2.17 U	2.17		2.17 U	75.1	38.7	189%	2.17 U	2.17 U	2.17	
C3-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	72.6	37.37	188%	2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17	
Anthracene	**5.73**	**11.6**	**8.68**	**68%**	**8.14**	**28.1**	**18.1**	**110%**	**4.31**	**3.40**	**3.86**	**-24%**	**6.75**	**57.7**	**32.2**	**158%**	**5.31**	**3.92**	**4.61**	**-30%**
Phenanthrene	**20.7**	**41.0**	**30.9**	**66%**	**23.2**	**67.5**	**45.4**	**98%**	**14.0**	**5.15**	**9.59**	**-93%**	**32.5**	**231**	**132**	**151%**	**30.9**	**9.11**	**20.0**	**-109%**
C1-Phenanthrenes/Anthracenes	21.8	27.5	24.7	23%	23.3	44.6	34.0	63%	18.9	7.14	13.0	-90%	54.8	123	88.8	77%	22.2	9.71	15.9	-78%
C2-Phenanthrenes/Anthracenes	23.0	26.9	25.0	16%	29.3	42.9	36.1	38%	19.7	10.7	15.2	-59%	64.4	85.8	75.1	28%	23.6	15.86	19.7	-39%
C3-Phenanthrenes/Anthracenes	15.6	21.2	18.4	30%	22.3	35.2	28.8	45%	15.3	9.46	12.4	-47%	68.7	36.6	52.6	-61%	17.6	15.56	16.6	-12%
C4-Phenanthrenes/Anthracenes	0.10 U	31.3	15.68	199%	0.10 U	52.4	26.26	199%	0.10 U	7.38	3.74	195%	0.10 U	47.3	23.7		0.10 U	14.09	7.09	197%
Dibenzothiophene	**0.79 J**	**2.91**	**1.85**	**115%**	**1.04 J**	**4.34**	**2.69**	**123%**	**0.71 J**	**1.29 J**	**1.00**	**58%**	**1.53 J**	**13.5**	**7.50**	**159%**	**1.43 J**	**1.50 J**	**1.47**	**5%**
C1-Dibenzothiophenes	1.35 J	3.30	2.33	84%	1.78 J	3.86	2.82	74%	1.55 J	0.40 U	0.97	-118%	3.86	9.79	6.82	87%	1.72 J	0.40 U	1.06	-125%
C2-Dibenzothiophenes	4.56	0.40 U	2.48	-168%	5.63	7.23	6.43	25%	5.48	0.40 U	2.94	-173%	13.6	15.3	14.4	**12%**	5.82	0.40 U	3.11	-174%
C3-Dibenzothiophenes	6.66	0.40 U	3.53	-177%	9.36	10.5	9.95	12%	5.71	0.40 U	3.06	-174%	12.5	11.4	11.9	**-9%**	8.56	0.40 U	4.48	-182%
C4-Dibenzothiophenes	6.89	4.99	5.94	-32%	12.9	9.49	11.2	-30%	8.23	0.40 U	4.31	-181%	10.6	5.33	7.98	-66%	8.60	0.40 U	4.50	-182%
Fluoranthene	**48.1**	**96.3**	**72.2**	**67%**	**52.7**	**204**	**128**	**118%**	**26.0**	**9.96**	**18.0**	**-89%**	**78.1**	**351**	**214**	**127%**	**46.2**	**15.4**	**30.8**	**-100%**
Pyrene	**26.6**	**59.0**	**42.8**	**76%**	**32.8**	**137**	**84.7**	**122%**	**17.6**	**9.51**	**13.6**	**-60%**	**47.9**	**229**	**138**	**131%**	**28.3**	**11.3**	**19.8**	**-86%**
C1-Fluoranthenes/Pyrenes	22.4	35.9	29.2	47%	28.2	70.6	49.4	86%	14.7	6.75	10.7	-74%	33.0	92.9	62.9	95%	18.6	9.97	14.3	-60%
C2-Fluoranthenes/Pyrenes	9.29	17.5	13.4	61%	15.4	30.3	22.8	65%	7.36	4.92	6.14	-40%	17.7	31.4	24.5	56%	14.5	8.31	11.4	-54%
C3-Fluoranthenes/Pyrenes	0.81 U	9.42	5.12	168%	12.1	17.9	15.0	39%	0.81 U	0.81 U	0.81		10.4	14.9	12.7	**35%**	8.90	0.81 U	4.86	
Benzo(a)anthracene	**19.3**	**33.5**	**26.4**	**54%**	**23.8**	**92.9**	**58.4**	**118%**	**12.1**	**4.94**	**8.51**	**-84%**	**26.8**	**73.9**	**50.4**	**93%**	**20.0**	**7.98**	**14.0**	**-86%**
Chrysene	**29.1**	**49.1**	**39.1**	**51%**	**35.2**	**99.7**	**67.5**	**96%**	**19.6**	**5.72**	**12.7**	**-110%**	**46.3**	**106**	**76.2**	**78%**	**31.3**	**12.7**	**22.0**	**-85%**
C1-Chrysenes	8.96	14.5	11.7	47%	14.4	33.72	24.0	81%	7.14	2.36	4.75	-101%	14.6	27.9	21.2	63%	9.10	6.03	7.57	-41%
C2-Chrysenes	7.64	9.12	8.38	18%	13.3	17.7	15.5	29%	7.19	2.55	4.87	-95%	11.5	13.0	12.3	12%	9.18	6.06	7.62	-41%
C3-Chrysenes	0.87 U	0.87 U	0.87		0.87 U	7.44	4.16	158%	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87	
C4-Chrysenes	0.87 U	0.87 U	0.87		0.87 U	2.27	1.57	89%	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87	
Benzo(b)fluoranthene	**15.7**	**32.4**	**24.0**	**69%**	**25.7**	**88.2**	**57.0**	**110%**	**10.7**	**4.68**	**7.69**	**-78%**	**24.3**	**68.5**	**46.4**	**95%**	**18.3**	**8.82**	**13.5**	**-70%**
Benzo(k)fluoranthene	**7.54**	**14.1**	**10.8**	**61%**	**10.9**	**33.7**	**22.3**	**102%**	**4.96**	**2.25**	**3.60**	**-75%**	**11.0**	**31.6**	**21.3**	**97%**	**7.32**	**3.74**	**5.53**	**-65%**
Benzo(e)pyrene	**9.79**	**17.8**	**13.8**	**58%**	**16.0**	**53.7**	**34.8**	**108%**	**6.71**	**2.59**	**4.65**	**-89%**	**14.4**	**40.5**	**27.5**	**95%**	**10.6**	**4.74**	**7.68**	**-77%**
Benzo(a)pyrene	**4.71**	**9.10**	**6.90**	**63%**	**7.80**	**23.9**	**15.8**	**102%**	**3.53**	**1.63 J**	**2.58**	**-74%**	**5.93**	**17.4**	**11.7**	**98%**	**5.92**	**2.92**	**4.42**	**-68%**
Perylene	**1.82**	**4.49**	**3.15**	**85%**	**2.86**	**9.53**	**6.19**	**108%**	**1.32 J**	**1.99**	**1.66**	**40%**	**2.35**	**9.21**	**5.78**	**119%**	**2.03**	**2.37**	**2.20**	**15%**
Indeno(1,2,3-cd)pyrene	**2.41**	**5.17**	**3.79**	**73%**	**0.87 J**	**9.39**	**5.13**	**166%**	**2.68**	**0.14 U**	**1.41**	**-180%**	**4.25**	**9.76**	**7.00**	**79%**	**1.61 J**	**2.23**	**1.92**	**32%**
Dibenz(a,h)anthracene	**0.06 U**	**3.56**	1.81	194%	**0.06 U**	**4.57**	2.31	195%	**0.06 U**	**0.06 U**	**0.06**		**0.06 U**	**4.94**	**2.50**	**196%**	**0.06 U**	**2.39**	**1.22**	**191%**
Benzo(g,h,i)perylene	**1.93**	**6.07**	**4.00**	**104%**	**0.92 J**	**8.90**	**4.91**	**163%**	**6.00**	**2.55**	**4.28**	**-81%**	**3.99**	**9.69**	**6.84**	**83%**	**0.74 J**	**2.16**	**1.45**	**98%**

Table 5 Continued.

Station:	PS11				SISIM				POPISP				SIPOM				POPIPD			
Year:	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD
Average %Lipids (dry wt):	6.96	8.29	7.63	17%	6.99	11.57	9.28	49%	8.85	9.24	9.05	4%	7.78	10.11	8.95	26%	8.40	9.37	8.89	11%
Sum of PAHs Measured[1]	**2603**	**291**	**1447**	**-160%**	**424**	**384**	**404**	**-10%**	**748**	**154**	**451**	**-132%**	**488**	**274**	**381**	**-56%**	**277**	**180**	**229**	**-42%**
Naphthalene	**41.7**	**2.20**	**22.0**	**-180%**	**4.10 B**	**2.18**	**3.14**	**-61%**	**31.4 B**	**2.22**	**16.8**	**-174%**	**5.00 B**	**2.35**	**3.67**	**-72%**	**5.73 B**	**2.08**	**3.90**	**-93%**
C1-Naphthalenes	30.9	2.58	16.7	-169%	4.22 B	2.18	3.20	-64%	34.5 B	2.08	18.3	-177%	5.44 B	2.35	3.90	-79%	3.71 B	2.00	2.86	-60%
C2-Naphthalenes	36.0	7.79	21.9	-129%	8.81	5.67	7.24	-43%	35.8	4.48	20.2	-156%	11.3	6.78	9.07	-50%	9.19	5.03	7.11	-58%
C3-Naphthalenes	26.8	7.37	17.1	-114%	9.86	8.09	8.97	-20%	23.2	5.58	14.4	-122%	19.4	10.4	14.9	-60%	7.69	5.77	6.73	-29%
C4-Naphthalenes	13.1	7.12	10.1	-59%	7.44	8.01	7.73	7%	9.00	4.50	6.75	-67%	21.6	17.9	19.7	-18%	4.72	4.18	4.45	-12%
Biphenyl	**6.56**	**2.86 U**	**4.71**	**-79%**	**2.86 U**	**2.86 U**	2.86		**9.89**	**2.86 U**	**6.37**	**-110%**	**2.86 U**	**2.86 U**	2.86		**2.86 U**	**2.86 U**	2.86	
Acenaphthylene	**5.71**	**3.27**	**4.49**	**-54%**	**2.45**	**4.81**	**3.63**	**65%**	**4.17**	**2.79**	**3.48**	**-40%**	**1.68 U**	**2.92**	2.30	54%	**1.68 U**	**2.87**	2.27	52%
Acenaphthene	**37.1**	**2.29 U**	**19.7**	**-177%**	**2.29 U**	**2.44**	**2.37**	**6%**	**62.9**	**2.29 U**	**32.6**	**-186%**	**2.29 U**	**2.29 U**	2.29		**3.48**	**2.29 U**	2.88	-41%
Fluorene	**46.5**	**3.06**	**24.8**	**-175%**	**2.75 U**	**3.25**	**3.00**	**17%**	**39.2**	**2.75 U**	**21.0**	**-174%**	**2.75 U**	**2.75 U**	2.75		**3.98**	**3.20**	3.59	-22%
C1-Fluorenes	25.6	3.58	14.6	-151%	11.7	4.15	7.94	-96%	26.6	3.26	14.9	-156%	16.6	5.13	10.9	-106%	16.4	3.37	9.88	-132%
C2-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17	
C3-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17	
Anthracene	**22.8**	**5.34**	**14.1**	**-124%**	**5.47**	**5.80**	**5.64**	**6%**	**12.2**	**3.68**	**7.95**	**-107%**	**3.29**	**3.67**	**3.48**	**11%**	**5.49**	**4.37**	**4.93**	**-23%**
Phenanthrene	**516**	**14.7**	**265**	**-189%**	**21.0**	**13.4**	**17.2**	**-44%**	**55.7**	**8.48**	**32.1**	**-147%**	**18.0**	**7.09**	**12.5**	**-87%**	**17.4**	**12.8**	**15.1**	**-31%**
C1-Phenanthrenes/Anthracenes	185	13.7	99.2	-172%	41.4	15.3	28.4	-92%	83.9	7.65	45.8	-167%	50.5	18.0	34.2	-95%	63.8	9.11	36.4	-150%
C2-Phenanthrenes/Anthracenes	92.5	17.5	55.0	-136%	26.1	22.9	24.5	-13%	20.8	8.99	14.9	-79%	62.4	42.5	52.4	-38%	13.7	10.1	11.9	-30%
C3-Phenanthrenes/Anthracenes	39.3	14.3	26.8	-93%	20.2	22.5	21.4	10%	43.4	6.78	25.1	-146%	39.9	38.6	39.3	-3%	16.0	7.67	11.9	-71%
C4-Phenanthrenes/Anthracenes	0.10 U	14.3	7.22	197%	0.10 U	20.8	10.4	198%	0.10 U	6.65	3.38	194%	33.9	17.1	25.5	-66%	0.10 U	8.23	4.17	195%
Dibenzothiophene	**27.1**	**1.60 J**	**14.4**	**-178%**	**0.88 J**	**1.75 J**	**1.32**	**66%**	**4.18**	**1.47 J**	**2.83**	**-96%**	**1.08 J**	**1.48 J**	**1.28**		**0.68 J**	**1.69 J**	**1.19**	
C1-Dibenzothiophenes	12.1	0.40 U	6.23	-187%	1.56 J	2.62	2.09	51%	2.83	0.40 U	1.62	-151%	3.30	0.40 U	1.85	-157%	1.65 J	0.40 U	1.02	
C2-Dibenzothiophenes	11.1	0.40 U	5.73	-186%	5.30	4.83	5.07	-9%	0.40 U	0.40 U	0.40		9.66	0.40 U	5.03	-184%	3.70	0.40 U	2.05	-161%
C3-Dibenzothiophenes	8.76	0.40 U	4.58	-183%	8.92	0.40 U	4.66	-183%	0.40 U	0.40 U	0.40		10.7	0.40 U	5.54	-186%	0.40 U	0.40 U	0.40	
C4-Dibenzothiophenes	9.16	0.40 U	4.78	-183%	8.25	5.30	6.78	-43%	0.40 U	0.40 U	0.40		8.50	0.40 U	4.45	-182%	3.70	0.40 U	2.05	-161%
Fluoranthene	**497**	**31.9**	**265**	**-176%**	**45.0**	**41.6**	**43.3**	**-8%**	**47.5**	**13.7**	**30.6**	**-110%**	**38.0**	**14.6**	**26.3**	**-89%**	**17.4**	**21.6**	**19.46**	**22%**
Pyrene	**299**	**18.9**	**159**	**-176%**	**29.8**	**24.9**	**27.3**	**-18%**	**25.2**	**8.76**	**17.0**	**-97%**	**24.9**	**11.4**	**18.1**	**-75%**	**8.62**	**12.2**	**10.42**	**35%**
C1-Fluoranthenes/Pyrenes	96.4	13.8	55.1	-150%	22.9	18.2	20.5	-23%	28.7	6.61	17.7	-125%	18.5	9.91	14.2	-61%	11.4	8.29	9.82	-31%
C2-Fluoranthenes/Pyrenes	132	8.62	70.1	-175%	11.0	10.8	10.9	-2%	8.26	5.06	6.66	-48%	9.05	6.74	7.89	-29%	3.23	5.00	4.12	43%
C3-Fluoranthenes/Pyrenes	33.1	0.81 U	17.0	-190%	0.81 U	8.26	4.54	164%	0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81	
Benzo(a)anthracene	**50.3**	**10.9**	**30.6**	**-129%**	**14.9**	**13.9**	**14.4**	**-7%**	**17.8**	**4.21**	**11.0**	**-124%**	**7.10**	**4.16**	**5.63**	**-52%**	**5.93**	**5.70**	**5.82**	**-4%**
Chrysene	**118**	**18.1**	**68.1**	**-147%**	**31.0**	**24.1**	**27.5**	**-25%**	**40.3**	**7.76**	**24.0**	**-135%**	**16.4**	**7.11**	**11.8**	**-79%**	**13.8**	**8.05**	**10.9**	**-53%**
C1-Chrysenes	25.2	6.30	15.8	-120%	10.1	9.36	9.71	-7%	8.38	1.90	5.14	-126%	5.96	2.84	4.40	-71%	3.35	1.87	2.61	-57%
C2-Chrysenes	16.7	6.96	11.8	-83%	9.49	7.13	8.31	-28%	0.87 U	3.09	1.98	112%	6.72	3.84	5.28	-54%	0.87 U	1.77 J	1.32	
C3-Chrysenes	0.87 U	0.87 U	0.87		4.15	0.87 U	2.51	-131%	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87	
C4-Chrysenes	0.87 U	0.87 U	0.87		0.87 U	1.00 J	0.93	13%	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87	
Benzo(b)fluoranthene	**58.0**	**13.4**	**35.7**	**-125%**	**15.6**	**21.5**	**18.6**	**32%**	**22.6**	**5.00**	**13.8**	**-128%**	**8.35**	**6.19**	**7.27**	**-30%**	**6.42**	**5.59**	**6.01**	**-14%**
Benzo(k)fluoranthene	**22.0**	**5.77**	**13.9**	**-117%**	**6.60**	**9.07**	**7.84**	**31%**	**7.76**	**2.41**	**5.08**	**-105%**	**3.39**	**2.83**	**3.11**	**-18%**	**2.85**	**2.70**	**2.78**	**-5%**
Benzo(e)pyrene	**27.5**	**7.42**	**17.5**	**-115%**	**11.1**	**12.5**	**11.8**	**12%**	**12.8**	**2.54**	**7.67**	**-134%**	**6.29**	**3.98**	**5.14**	**-45%**	**3.70**	**2.31**	**3.00**	**-46%**
Benzo(a)pyrene	**14.0**	**3.31**	**8.64**	**-123%**	**2.97**	**4.32**	**3.65**	**37%**	**7.69**	**1.54 J**	**4.61**	**-133%**	**1.64 J**	**1.45 J**	**1.54**		**2.13**	**1.79 J**	**1.96**	**-17%**
Perylene	**3.75**	**2.52**	**3.14**	**-39%**	**1.97**	**3.33**	**2.65**	**51%**	**3.21**	**2.25**	**2.73**	**-35%**	**1.06 J**	**2.24**	**1.65**	**71%**	**1.70 J**	**2.42**	**2.06**	**35%**
Indeno(1,2,3-cd)pyrene	**2.19**	**0.14 U**	**1.17**	**-175%**	**1.90**	**3.38**	**2.64**	**56%**	**3.81**	**0.14 U**	**1.98**	**-185%**	**1.21 J**	**0.14 U**	0.68		**1.64 J**	**1.56 J**	**1.60**	
Dibenz(a,h)anthracene	**3.11**	**0.06 U**	**1.58**	**-193%**	**0.64 J**	**2.77**	**1.71**	**125%**	**1.47 J**	**0.06 U**	**0.76**		**0.06 U**	**0.06 U**	0.06		**0.06 U**	**2.23**	**1.14**	
Benzo(g,h,i)perylene	**4.32**	**10.4**	**7.34**	**82%**	**2.89**	**3.15**	**3.02**	**9%**	**3.60**	**4.27**	**3.94**	**17%**	**1.98**	**4.15**	**3.07**	**71%**	**1.21 J**	**0.90 J**	**1.05**	

Table 5 Continued.

Station:	PWNLP				DYOTS				MLPIER				SIWP				SIRP			
Year:	**2010**	**2012**	**Mean**	**RPD**	**2010**	**2012**	**Mean**	**RPD**	**2010**	**2012**	**Mean**	**RPD**	**2010**	**2012**	**Mean**	**RPD**	**2010**	**2012**	**Mean**	**RPD**
Average %Lipids (dry wt):	9.40	7.55	8.48	-22%	8.61	8.72	8.67	1%	6.40	9.03	7.72	34%	5.43	7.19	6.31	28%	5.42	9.34	7.38	53%
Sum of PAHs Measured[1]	**219**	**139**	**179**	**-45%**	**319**	**128**	**223**	**-86%**	**1409**	**142**	**776**	**-163%**	**203**	**99.5**	**151**	**-68%**	**188**	**133**	**161**	**-34%**
Naphthalene	**14.0 B***	**2.15**	**8.09**	**-147%**	**6.99 B***	**2.18**	**4.58**	**-105%**	**3.62 B**	**1.82 U**	2.72	**-66%**	**7.41 B**	**1.82 U**	**4.61**	**-121%**	**7.38 B***	**2.15**	**4.77**	**-110%**
C1-Naphthalenes	8.16 *	2.10	5.13	-118%	4.61 *	1.96	3.28	-81%	2.72	2.40	2.56	-12%	3.32	1.82 U	2.57	-58%	4.19 *	2.06	3.13	-68%
C2-Naphthalenes	10.9	4.60	7.73	-81%	9.32	4.01	6.66	-80%	5.89	4.20	5.04	-34%	9.21	4.55	6.88	-68%	9.44	5.41	7.43	-54%
C3-Naphthalenes	11.1	7.71	9.39	-36%	10.8	4.56	7.68	-81%	7.81	4.41	6.11	-56%	6.70	5.69	6.20	-16%	9.79	6.57	8.18	-39%
C4-Naphthalenes	7.21	5.01	6.11	-36%	8.44	3.71	6.08	-78%	7.63	3.61 U	5.62	-72%	5.09	4.03	4.56	-23%	4.54	4.17	4.36	-9%
Biphenyl	**2.86 U**	**3.60**	**3.23**	**23%**	**2.86 U**	**2.86 U**	**2.86**		**2.86 U**	**2.86 U**	2.86		**2.86 U**	**2.86 U**	**2.86**		**2.86 U**	**2.86 U**	**2.86**	
Acenaphthylene	**1.68 U**	**2.64**	**2.16**	**44%**	**2.50**	**2.40**	**2.45**	**-4%**	**11.8**	**2.27 B**	**7.04**	**-136%**	**1.68 U**	**2.17**	**1.92**	**25%**	**1.68 U**	**2.66**	**2.17**	**45%**
Acenaphthene	**2.29 U**	**2.29 U**	**2.29**		**2.84**	**2.29 U**	**2.57**	**-22%**	**7.52**	**2.29 U**	**4.91**	**-107%**	**2.29 U**	**2.29 U**	**2.29**		**2.29 U**	**2.29 U**	**2.29**	
Fluorene	**2.75 U**	**2.75 U**	**2.75**		**3.11**	**2.75 U**	**2.93**	**-12%**	**7.71**	**2.75 U**	**5.23**	**-95%**	**2.75 U**	**2.75 U**	**2.75**		**2.75 U**	**2.75 U**	**2.75**	
C1-Fluorenes	28.0	3.89	16.0	-151%	31.9	2.82	17.3	-168%	11.5	2.57	7.03	-127%	16.1	3.15	9.63	-135%	9.15	3.27	6.21	-95%
C2-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17	
C3-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17	
Anthracene	**2.56**	**3.09**	**2.83**	**19%**	**4.90**	**3.02**	**3.96**	**-47%**	**14.9**	**3.12**	**8.99**	**-131%**	**0.99 J**	**2.59**	**1.79**	**90%**	**1.35 J**	**3.39**	**2.37**	**86%**
Phenanthrene	**6.50**	**4.01**	**5.26**	**-47%**	**16.2**	**6.00**	**11.1**	**-92%**	**62.2**	**7.76**	**35.0**	**-156%**	**5.49**	**3.38**	**4.44**	**-48%**	**7.16**	**5.03**	**6.10**	**-35%**
C1-Phenanthrenes/Anthracenes	9.14	6.67	7.90	-31%	18.1	6.15	12.1	-98%	46.8	5.58	26.2	-157%	5.15	4.95	5.05	-4%	5.14	6.73	5.94	27%
C2-Phenanthrenes/Anthracenes	11.8	9.62	10.7	-20%	17.3	8.85	13.1	-65%	57.0	5.96	31.5	-162%	13.3	7.31	10.3	-58%	11.2	10.1	10.7	-10%
C3-Phenanthrenes/Anthracenes	12.9	6.78	9.83	-62%	23.1	6.39	14.8	-113%	84.3	5.39	44.8	-176%	81.9	0.10 U	41.0	-200%	53.6	6.77	30.2	-155%
C4-Phenanthrenes/Anthracenes	0.10 U	8.19	4.14	195%	0.10 U	6.07	3.09	194%	0.10 U	7.08	3.59	194%	0.10 U	4.65	2.4	192%	0.10 U	6.22	3.16	194%
Dibenzothiophene	**0.40 U**	**1.37 J**	**0.88**		**0.61 J**	**1.30 J**	**0.96**	**72%**	**3.53**	**1.16 J**	**2.34**	**-101%**	**0.40 U**	**1.23 J**	**0.82**		**0.63 J**	**1.42 J**	**1.03**	
C1-Dibenzothiophenes	1.24 J	0.40 U	0.82		1.43 J	0.40 U	0.92		4.12	0.40 U	2.26	-165%	0.40 U	0.40 U			0.40 U	0.40 U	0.40	
C2-Dibenzothiophenes	4.27	3.26	3.76	-27%	5.69	0.40 U	3.04	-174%	12.6	0.40 U	6.51	-188%	0.40 U	0.40 U			0.40 U	0.40 U	0.40	
C3-Dibenzothiophenes	5.60	0.40 U	3.00	-173%	5.21	0.40 U	2.81	-171%	11.2	0.40 U	5.80	-186%	0.40 U	0.40 U			0.40 U	0.40 U	0.40	
C4-Dibenzothiophenes	4.42	0.40 U	2.41	-167%	7.10	0.40 U	3.75	-179%	6.52	0.40 U	3.46	-177%	0.40 U	0.40 U			0.40 U	0.40 U	0.40	
Fluoranthene	**8.66**	**7.50**	**8.08**	**-14%**	**26.2**	**9.06**	**17.6**	**-97%**	**384**	**13.3**	**199**	**-187%**	**5.98**	**5.10**	**5.54**	**-16%**	**7.84**	**8.29**	**8.06**	**6%**
Pyrene	**5.87**	**5.61**	**5.74**	**-5%**	**17.0**	**8.02**	**12.5**	**-72%**	**174**	**7.23**	**90.9**	**-184%**	**3.27**	**4.03**	**3.65**	**21%**	**4.63**	**7.22**	**5.92**	**44%**
C1-Fluoranthenes/Pyrenes	6.61	5.40	6.00	-20%	13.4	5.74	9.56	-80%	76.9	6.38	41.7	-169%	3.42	4.16	3.79	19%	4.53	5.76	5.14	24%
C2-Fluoranthenes/Pyrenes	3.90	4.26	4.08	9%	5.68	4.12	4.90	-32%	42.3	4.38	23.3	-163%	0.81 U	3.53	2.17	125%	0.81 U	4.31	2.56	137%
C3-Fluoranthenes/Pyrenes	0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81		14.3	0.81 U	7.6	-179%	0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81	
Benzo(a)anthracene	**3.49**	**2.90**	**3.20**	**-18%**	**9.66**	**3.20**	**6.43**	**-100%**	**41.9**	**5.29**	**23.6**	**-155%**	**2.19**	**2.06**	**2.12**	**-6%**	**3.18**	**3.03**	**3.10**	**-5%**
Chrysene	**7.85**	**4.22**	**6.03**	**-60%**	**15.6**	**4.59**	**10.1**	**-109%**	**105**	**8.09**	**56.8**	**-172%**	**4.91**	**2.65**	**3.78**	**-60%**	**6.51**	**3.93**	**5.22**	**-50%**
C1-Chrysenes	3.88	1.77 J	2.82	-75%	6.02	1.40 J	3.71	-125%	21.9	1.95	11.9	-167%	0.87 U	0.87 J	0.87		4.93	1.35 J	3.14	-114%
C2-Chrysenes	6.61	3.93	5.27	-51%	7.79	1.38 J	4.59	-140%	10.6	1.59 J	6.11	-148%	0.87 U	1.12 J	1.00		2.97	1.49 J	2.23	-66%
C3-Chrysenes	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		5.00	0.87 U	2.94	-141%	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87	
C4-Chrysenes	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87	
Benzo(b)fluoranthene	**5.12**	**3.95**	**4.54**	**-26%**	**9.26**	**3.54**	**6.40**	**-89%**	**59.6**	**6.48**	**33.1**	**-161%**	**2.18**	**2.14**	**2.16**	**-2%**	**3.30**	**3.56**	**3.43**	**8%**
Benzo(k)fluoranthene	**2.04**	**2.02**	**2.03**	**-1%**	**3.59**	**1.59 J**	**2.59**	**-77%**	**22.5**	**3.12**	**12.8**	**-151%**	**0.86 J**	**1.34 J**	**1.10**		**1.32 J**	**1.89**	**1.60**	**36%**
Benzo(e)pyrene	**3.42**	**2.09**	**2.76**	**-48%**	**7.06**	**2.31**	**4.69**	**-101%**	**27.6**	**2.26**	**14.9**	**-170%**	**1.43 J**	**0.97 J**	**1.20**		**2.78**	**2.16**	**2.47**	**-25%**
Benzo(a)pyrene	**1.60 J**	**1.53 J**	**1.57**		**2.18**	**1.12 J**	**1.65**	**-64%**	**19.4**	**1.88**	**10.6**	**-165%**	**0.71 J**	**0.91 J**	**0.81**		**1.07 J**	**1.12 J**	**1.09**	**5%**
Perylene	**1.31 J**	**2.26**	**1.79**	**53%**	**1.96**	**2.05**	**2.01**	**4%**	**4.78**	**1.88**	**3.33**	**-87%**	**0.69 J**	**1.95**	**1.32**	**95%**	**0.83 J**	**2.29**	**1.56**	**93%**
Indeno(1,2,3-cd)pyrene	**1.78 J**	**0.14 U**	**0.96**		**1.33 J**	**1.14 J**	**1.24**		**9.83**	**1.41 J**	**5.62**	**-150%**	**0.52 J**	**1.09 J**	**0.80**		**0.77 J**	**1.23 J**	**1.00**	**47%**
Dibenz(a,h)anthracene	**0.06 U**	**0.06 U**	**0.06**		**0.06 U**	**1.84**	**0.95**	**188%**	**2.89**	**1.83**	**2.36**	**-45%**	**0.06 U**	**1.91**	**0.98**	**189%**	**0.06 U**	**2.10**	**1.08**	**190%**
Benzo(g,h,i)perylene	**2.27**	**3.78**	**3.03**	**50%**	**2.04**	**0.90 J**	**1.47**	**-77%**	**8.33**	**1.12 J**	**4.73**	**-152%**	**0.74 J**	**1.81 J**	**1.27**		**1.18 J**	**1.05 J**	**1.12**	**-12%**

Table 5 Continued.

Station:	POPBWN				KPTPIER				KPTLAG				APHCB				APKIANA			
Year:	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD
Average %Lipids (dry wt):	8.07	8.03	8.05	0%	7.92	8.89	8.41	12%	7.55	8.33	7.94	10%	5.52	9.73	7.63	55%	7.57	10.88	9.23	36%
Sum of PAHs Measured[1]	**464**	**168**	**316**	**-94%**	**325**	**139**	**232**	**-80%**	**177**	**101**	**139**	**-55%**	**1205**	**313**	**759**	**-117%**	**165**	**133**	**149**	**-22%**
Naphthalene	**3.85 B***	**2.22**	**3.04**	**-54%**	**3.86 B**	**2.12**	**2.99**	**-58%**	**4.33 B**	**1.82 U**	3.08	**-82%**	**17.2 B**	**2.74**	**9.98**	**-145%**	**2.77 B**	**2.01**	**2.39**	**-32%**
C1-Naphthalenes	5.06 *	1.82 U	3.44	-94%	3.68	1.83	2.75	-67%	3.11	2.38	2.75	-26%	18.4	2.48	10.5	-153%	1.86	1.94	1.90	4%
C2-Naphthalenes	18.1	3.57 U	10.8	-134%	21.0	4.50	12.7	-129%	12.4	6.20	9.28	-66%	50.9	5.45	28.2	-161%	10.7	4.85	7.79	-76%
C3-Naphthalenes	34.2	5.39	19.8	-146%	11.6	5.57	8.59	-70%	4.65	4.08	4.37	-13%	33.4	7.10	20.2	-130%	9.92	5.11	7.52	-64%
C4-Naphthalenes	25.3	4.35	14.8	-141%	18.2	4.80	11.5	-117%	3.61 U	3.61 U	3.61		12.3	5.02	8.67	-84%	5.66	4.23	4.94	-29%
Biphenyl	**2.86 U**	**2.86 U**	**2.86**		**2.86 U**	**3.12**	**2.99**	9%	**2.86 U**	**2.86 U**	2.86		**5.51**	**2.86 U**	**4.18**	**-63%**	**2.86 U**	**2.86 U**	**2.86**	
Acenaphthylene	**1.68 U**	**2.95**	**2.31**	**55%**	**1.97**	**2.81**	**2.39**	**35%**	**1.68 U**	**1.99 B**	1.83	**17%**	**4.06**	**3.40**	**3.73**	**-18%**	**1.68 U**	**2.37**	**2.02**	**34%**
Acenaphthene	**2.29 U**	**2.29 U**	**2.29**		**2.29 U**	**2.29 U**	**2.29**		**2.29 U**	**2.29 U**	2.29		**69.0**	**3.80**	**36.4**	**-179%**	**2.29 U**	**2.29 U**	**2.29**	
Fluorene	**2.75 U**	**2.75 U**	**2.75**		**2.75 U**	**2.75 U**	**2.75**		**2.75 U**	**2.75 U**	2.75		**63.4**	**4.86**	**34.1**	**-172%**	**2.75 U**	**2.75 U**	**2.75**	
C1-Fluorenes	10.7	3.57	7.14	-100%	14.1	3.63	8.88	-118%	7.73	2.43	5.08	-104%	24.3	4.82	14.5	-134%	9.33	2.79	6.06	-108%
C2-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17	
C3-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17	
Anthracene	**2.81**	**3.58**	**3.20**	**24%**	**3.24**	**3.41**	**3.32**	**5%**	**2.18**	**2.40**	**2.29**	**10%**	**45.1**	**5.73**	**25.4**	**-155%**	**1.77 J**	**3.31**	**2.54**	**61%**
Phenanthrene	**13.9**	**7.22**	**10.6**	**-63%**	**8.70**	**6.19**	**7.44**	**-34%**	**8.87**	**3.65**	**6.26**	**-83%**	**142**	**18.5**	**80.1**	**-154%**	**6.96**	**6.77**	**6.87**	**-3%**
C1-Phenanthrenes/Anthracenes	28.3	7.89	18.1	-113%	16.5	7.40	11.9	-76%	8.75	4.65	6.70	-61%	59.7	16.5	38.1	-114%	9.89	6.54	8.21	-41%
C2-Phenanthrenes/Anthracenes	43.9	10.71	27.3	-121%	31.4	9.36	20.4	-108%	8.10	4.95	6.53	-48%	27.2	15.2	21.2	-56%	8.77	7.93	8.35	-10%
C3-Phenanthrenes/Anthracenes	45.6	10.26	27.9	-127%	35.4	6.84	21.1	-135%	14.5	4.29	9.42	-109%	13.4	8.03	10.7	-50%	13.4	6.35	9.86	-71%
C4-Phenanthrenes/Anthracenes	30.4	8.25	19.3		0.10 U	6.15	3.12	194%	0.10 U	3.90	2.00	190%	0.10 U	11.8	6.0	197%	0.10 U	5.66	2.88	
Dibenzothiophene	**0.40 U**	**1.54 J**	0.97		**0.40 U**	**1.47 J**	**0.94**	**114%**	**0.40 U**	**1.11 J**	0.75		**9.00**	**2.19**	**5.59**	**-122%**	**0.40 U**	**1.37 J**	0.89	
C1-Dibenzothiophenes	1.83	2.03	1.93	11%	4.76	0.40 U	2.58	-169%	0.85 J	0.40 U	0.62		4.35	0.40 U	2.38	-166%	0.87 J	0.40 U	0.64	
C2-Dibenzothiophenes	7.30	2.84	5.07	-88%	20.4	0.40 U	10.4	-192%	3.57	0.40 U	1.98		5.49	0.40 U	2.94	-173%	0.40 U	0.40 U	0.40	
C3-Dibenzothiophenes	12.3	3.41	7.86	-113%	21.1	0.40 U	10.8	-193%	2.94	0.40 U	1.67		3.85	0.40 U	2.13	-162%	2.59	0.40 U	1.49	-146%
C4-Dibenzothiophenes	12.2	0.40 U	6.32	-187%	14.7	0.40 U	7.56	-189%	0.40 U	0.40 U	0.40	0%	0.40 U	0.40 U	0.40		2.86	0.40 U	1.63	-151%
Fluoranthene	**33.8**	**14.13**	**23.9**	**-82%**	**17.2**	**9.90**	**13.5**	**-54%**	**14.4**	**5.92**	**10.2**	**-83%**	**131**	**41.1**	**86.2**	**-105%**	**11.7**	**9.64**	**10.66**	**-19%**
Pyrene	**22.7**	**10.20**	**16.5**	**-76%**	**10.4**	**6.95**	**8.68**	**-40%**	**10.3**	**5.43**	**7.86**	**-62%**	**81.5**	**22.8**	**52.2**	**-113%**	**5.74**	**7.01**	**6.37**	**20%**
C1-Fluoranthenes/Pyrenes	17.8	7.28	12.5	-84%	9.11	5.98	7.54	-41%	8.13	4.13	6.13	-65%	73.1	17.1	45.1	-124%	6.59	5.72	6.15	-14%
C2-Fluoranthenes/Pyrenes	8.73	4.68	6.70	-61%	4.86	4.27	4.57	-13%	3.85	3.46	3.66	-11%	15.5	8.31	11.9	-61%	2.67	3.94	3.30	39%
C3-Fluoranthenes/Pyrenes	0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81	
Benzo(a)anthracene	**8.47**	**3.19**	**5.83**	**-91%**	**4.12**	**2.63**	**3.38**	**-44%**	**6.59**	**2.01**	**4.30**	**-106%**	**64.1**	**15.6**	**39.8**	**-122%**	**4.79**	**3.34**	**4.06**	**-36%**
Chrysene	**18.8**	**6.76**	**12.8**	**-94%**	**7.79**	**4.33**	**6.06**	**-57%**	**8.67**	**3.09**	**5.88**	**-95%**	**118**	**21.7**	**70.0**	**-138%**	**8.63**	**5.46**	**7.04**	**-45%**
C1-Chrysenes	7.14	2.21	4.67	-105%	4.12	1.52 J	2.82	-92%	3.34	0.81 U	2.08	-122%	16.3	5.75	11.0	-96%	3.16	1.43 J	2.30	-75%
C2-Chrysenes	5.43	1.68 J	3.55	-106%	5.40	2.29	3.84	-81%	4.71	0.87 J	2.79	-138%	6.76	3.49	5.12	-64%	3.83	2.90	3.36	-28%
C3-Chrysenes	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87	
C4-Chrysenes	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87	
Benzo(b)fluoranthene	**9.76**	**5.87**	**7.81**	**-50%**	**4.92**	**5.16**	**5.04**	**5%**	**4.59**	**2.51**	**3.55**	**-58%**	**27.3**	**17.1**	**22.2**	**-46%**	**4.26**	**4.23**	**4.24**	**-1%**
Benzo(k)fluoranthene	**4.03**	**3.10**	**3.57**	**-26%**	**1.87**	**2.49**	**2.18**	**29%**	**1.39 J**	**1.17 J**	**1.28**		**11.0**	**6.90**	**8.94**	**-46%**	**1.68 J**	**1.84**	**1.76**	**9%**
Benzo(e)pyrene	**6.42**	**2.87**	**4.65**	**-77%**	**3.96**	**2.02**	**2.99**	**-65%**	**2.94**	**1.59 J**	**2.27**	**-60%**	**12.9**	**8.28**	**10.6**	**-44%**	**3.11**	**2.32**	**2.72**	**-29%**
Benzo(a)pyrene	**2.57**	**1.48 J**	**2.03**	**-54%**	**1.52 J**	**1.19 J**	**1.35**		**2.15**	**0.78 J**	**1.47**	**-93%**	**14.7**	**5.79**	**10.3**	**-87%**	**1.99**	**1.05 J**	**1.52**	**-61%**
Perylene	**1.84**	**2.65**	**2.25**	**36%**	**1.16 J**	**2.13**	**1.64**	**59%**	**1.17 J**	**1.78 J**	**1.48**		**4.24**	**3.65**	**3.94**	**-15%**	**0.88 J**	**0.25 U**	**0.56**	
Indeno(1,2,3-cd)pyrene	**1.57 J**	**1.66 J**	**1.61**		**1.01 J**	**1.81 J**	**1.41**		**0.85 J**	**1.03 J**	**0.94**		**5.97**	**3.71**	**4.84**	**-47%**	**0.72 J**	**0.14 U**	**0.43**	
Dibenz(a,h)anthracene	**0.06 U**	**2.25**	**1.15**	**190%**	**0.06 U**	**2.19**			**0.06 U**	**1.64 J**	**0.85**		**2.12**	**3.11**	**2.62**	**38%**	**0.06 U**	**0.06 U**	**0.06**	
Benzo(g,h,i)perylene	**1.97**	**1.21 J**	**1.59**	**-48%**	**1.07 J**	**1.21 J**	**1.14**		**0.92 J**	**0.55 J**	**0.74**		**4.47**	**0.00 U**	2.23	**-200%**	**0.82 J**	**5.79**	**3.30**	**151%**

Table 5 Continued.

Station:	LBPMSC				DYOBAP				SIGST				PS01			
Year:	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD
Average %Lipids (dry wt):	7.02	8.98	8.00	25%	7.97	9.67	8.82	19%	9.08	9.72	9.40	7%	8.63	7.49	8.06	-14%
Sum of PAHs Measured[1]	**728**	**361**	**544**	**-67%**	**140**	**87.4**	**114**	**-46%**	**292**	**131**	**212**	**-76%**	**242**	**261**	**251**	**8%**
Naphthalene	**3.52 B**	**5.66**	**4.59**	**46%**	**2.23 B**	**1.82 U**	**2.03**	**-20%**	**3.80 B**	**2.50**	**3.15**	**-41%**	**3.17 B**	**2.54**	**2.86**	**-22%**
C1-Naphthalenes	5.48	5.59	5.54	2%	1.98	2.48	2.23	23%	2.66	2.06	2.36	-25%	2.47	2.63	2.55	6%
C2-Naphthalenes	14.0	9.69	11.8	-36%	8.87	4.63	6.75	-63%	17.8	4.57	11.2	-118%	14.2	6.33	10.3	-77%
C3-Naphthalenes	22.5	10.7	16.6	-71%	9.91	4.64	7.27	-72%	14.7	5.93	10.3	-85%	10.6	8.51	9.56	-22%
C4-Naphthalenes	29.7	11.2	20.5	-91%	3.75	3.61 U	3.68	-4%	8.21	4.55	6.38	-57%	6.33	8.70	7.51	32%
Biphenyl	**2.86 U**	**2.86 U**	**2.86**		**2.86 U**	**2.86 U**	**2.86**		**2.86 U**	**2.86 U**	**2.86**		**2.86 U**	**2.86 U**	**2.86**	
Acenaphthylene	**2.34**	**3.79**	**3.06**	**47%**	**1.68 U**	**1.95 B**	**1.82**	**15%**	**1.80 J**	**2.62**	**2.21**	**37%**	**1.68 U**	**2.48**	**2.08**	**38%**
Acenaphthene	**2.29 U**	**2.96**	**2.62**	**25%**	**2.29 U**	**2.29 U**	**2.29**		**2.29 U**	**2.29 U**	**2.29**		**2.29 U**	**2.29 U**	**2.29**	
Fluorene	**2.75 U**	**4.46**	**3.60**	**48%**	**2.75 U**	**2.75 U**	**2.75**		**2.75 U**	**2.75 U**	**2.75**		**2.75 U**	**2.75 U**	**2.75**	
C1-Fluorenes	12.1	4.94	8.52	-84%	11.6	2.42	7.03	-131%	14.1	3.14	8.61	-127%	9.91	3.67	6.79	-92%
C2-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17	
C3-Fluorenes	2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17		2.17 U	2.17 U	2.17	
Anthracene	**4.98**	**5.13**	**5.05**	**3%**	**1.60 J**	**2.37**	**1.99**	**39%**	**2.65**	**3.09**	**2.87**	**15%**	**2.41**	**3.06**	**2.74**	**24%**
Phenanthrene	**27.4**	**19.2**	**23.3**	**-35%**	**4.28**	**2.93**	**3.60**	**-37%**	**6.47**	**3.57**	**5.02**	**-58%**	**6.07**	**6.50**	**6.29**	**7%**
C1-Phenanthrenes/Anthracenes	45.4	17.5	31.5	-89%	10.2	4.14	7.16	-84%	17.8	6.30	12.1	-96%	13.7	12.7	13.2	-8%
C2-Phenanthrenes/Anthracenes	61.9	18.4	40.1	-108%	7.58	4.95	6.26	-42%	14.4	9.91	12.2	-37%	14.0	25.1	19.6	57%
C3-Phenanthrenes/Anthracenes	51.9	13.4	32.6	-118%	14.6	3.85	9.21	-116%	95.3	8.47	51.9	-167%	27.7	25.6	26.6	-8%
C4-Phenanthrenes/Anthracenes	46.0	15.8	30.9		0.10 U	3.58	1.84	189%	0.10 U	7.66	3.88	195%	0.10 U	17.3	8.70	
Dibenzothiophene	**1.79 J**	**2.08**	**1.93**	**15%**	**0.40 U**	**0.40 U**	**0.40**		**0.40 U**	**1.38 J**	**0.89**		**0.40 U**	**1.40 J**	**0.90**	
C1-Dibenzothiophenes	8.49	0.40 U	4.45	-182%	0.40 U	0.40 U	0.40		0.40 U	0.40 U	0.40		0.98 J	2.30	1.64	80%
C2-Dibenzothiophenes	25.9	0.40 U	13.2	-194%	0.40 U	0.40 U	0.40		7.57	0.40 U	3.99	-180%	6.09	5.11	5.60	-17%
C3-Dibenzothiophenes	22.7	0.40 U	11.6	-193%	2.53	0.40 U	1.46	-145%	7.78	0.40 U	4.09	-180%	8.28	8.57	8.42	3%
C4-Dibenzothiophenes	14.8	0.40 U	7.62	-190%	0.40 U	0.40 U	0.40		0.40 U	0.40 U	0.40		10.8	7.63	9.21	-34%
Fluoranthene	**84.0**	**43.8**	**63.9**	**-63%**	**6.47**	**4.35**	**5.41**	**-39%**	**10.8**	**7.68**	**9.23**	**-33%**	**12.3**	**11.6**	**12.0**	**-6%**
Pyrene	**47.9**	**24.9**	**36.4**	**-63%**	**4.06**	**3.66**	**3.86**	**-10%**	**6.48**	**6.33**	**6.41**	**-2%**	**8.72**	**11.3**	**10.0**	**26%**
C1-Fluoranthenes/Pyrenes	33.7	16.7	25.2	-67%	4.98	3.33	4.15	-40%	10.9	5.75	8.33	-62%	9.43	9.31	9.37	-1%
C2-Fluoranthenes/Pyrenes	16.2	9.05	12.6	-57%	2.44	2.83	2.63	15%	0.81 U	4.87	2.84	143%	5.68	9.24	7.46	48%
C3-Fluoranthenes/Pyrenes	0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81		0.81 U	0.81 U	0.81		0.81 U	8.39	4.60	165%
Benzo(a)anthracene	**22.7**	**13.3**	**18.0**	**-52%**	**2.68**	**1.31 J**	**2.00**	**-68%**	**4.52**	**2.85**	**3.68**	**-45%**	**6.00**	**3.46**	**4.73**	**-54%**
Chrysene	**42.2**	**22.8**	**32.5**	**-60%**	**4.50**	**1.40 J**	**2.95**	**-105%**	**5.64**	**3.39**	**4.52**	**-50%**	**9.84**	**7.45**	**8.64**	**-28%**
C1-Chrysenes	11.9	6.85	9.36	-54%	3.67	0.53 U	2.10	-150%	7.21	1.46 J	4.34	-133%	6.98	6.50	6.74	-7%
C2-Chrysenes	7.68	5.38	6.53	-35%	3.93	0.87 U	2.40	-128%	5.02	1.77 J	3.40	-96%	8.27	7.80	8.04	-6%
C3-Chrysenes	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		3.42	0.87 U	2.15	-119%
C4-Chrysenes	0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87		0.87 U	0.87 U	0.87	
Benzo(b)fluoranthene	**17.4**	**19.2**	**18.3**	**10%**	**3.25**	**1.74 J**	**2.49**	**-61%**	**3.01**	**2.78**	**2.89**	**-8%**	**6.02**	**4.87**	**5.44**	**-21%**
Benzo(k)fluoranthene	**6.09**	**7.92**	**7.01**	**26%**	**1.19 J**	**1.10 J**	**1.15**		**1.20 J**	**1.51 J**	**1.35**	**23%**	**2.15**	**2.16**	**2.16**	**0%**
Benzo(e)pyrene	**12.5**	**12.5**	**12.5**	**0%**	**1.92**	**0.85 J**	**1.38**	**-77%**	**2.46**	**2.42**	**2.44**	**-2%**	**4.58**	**3.83**	**4.20**	**-18%**
Benzo(a)pyrene	**3.29**	**3.62**	**3.46**	**9%**	**1.09 J**	**0.68 J**	**0.89**		**0.99 J**	**1.13 J**	**1.06**	**14%**	**1.81 J**	**1.68 J**	**1.74**	
Perylene	**2.24**	**3.16**	**2.70**	**34%**	**0.71 J**	**1.57 J**	**1.14**		**0.82 J**	**2.39**	**1.60**	**98%**	**1.13 J**	**2.08**	**1.60**	**60%**
Indeno(1,2,3-cd)pyrene	**2.01**	**3.23**	**2.62**	**46%**	**0.91 J**	**0.88 J**	**0.90**		**0.44 J**	**1.20 J**	**0.82**	**93%**	**1.10 J**	**1.96**	**1.53**	**56%**
Dibenz(a,h)anthracene	**0.06 U**	**2.82**	**1.44**	**192%**	**0.06 U**	**1.64 J**	**0.85**		**0.06 U**	**2.15**	**1.11**	**190%**	**0.06 U**	**2.26**	**1.16**	**190%**
Benzo(g,h,i)perylene	**2.32**	**3.67**	**2.99**	**45%**	**1.18 J**	**0.52 J**	**0.85**		**0.64 J**	**1.06 J**	**0.85**	**49%**	**1.66 J**	**3.09**	**2.38**	**60%**

Table 5 Continued.

Station:	PIER7RB30		PIER7CB05		PIER7FE46		PKPLPC	
Year:	2012		2012		2012		2012	
Average %Lipids (dry wt):	8.12		7.14		7.97		7.95	
Sum of PAHs Measured[1]	**202**		**120**		**137**		**94.8**	
Naphthalene	**2.09**		**2.09**		**2.38**		**2.68**	
C1-Naphthalenes	3.51		1.86		2.17		2.45	
C2-Naphthalenes	6.32		4.23		4.67		4.67	
C3-Naphthalenes	6.63		5.40		6.01		6.10	
C4-Naphthalenes	5.06		3.61	U	4.09		3.61	U
Biphenyl	**2.86**	**U**	**2.86**	**U**	**2.86**	**U**	**2.86**	**U**
Acenaphthylene	**2.44**	**B**	**2.29**		**2.70**		**2.30**	
Acenaphthene	**2.29**	**U**	**2.29**	**U**	**2.29**	**U**	**2.29**	**U**
Fluorene	**2.75**	**U**	**2.75**	**U**	**2.75**	**U**	**2.75**	**U**
C1-Fluorenes	3.07		2.75		3.22		2.85	
C2-Fluorenes	2.17	U	2.17	U	2.17	U	2.17	U
C3-Fluorenes	2.17	U	2.17	U	2.17	U	2.17	U
Anthracene	**4.00**		**3.05**		**3.45**		**2.63**	
Phenanthrene	**11.4**		**5.27**		**6.34**		**2.95**	
C1-Phenanthrenes/Anthracenes	9.96		5.84		7.13		5.06	
C2-Phenanthrenes/Anthracenes	11.3		7.12		8.71		6.05	
C3-Phenanthrenes/Anthracenes	10.5		5.70		6.55		4.42	
C4-Phenanthrenes/Anthracenes	10.9		5.63		6.53		4.34	
Dibenzothiophene	**1.32**	**J**	**1.28**	**J**	**1.46**	**J**	**1.31**	**J**
C1-Dibenzothiophenes	0.40	U	0.40	U	0.40	U	0.40	U
C2-Dibenzothiophenes	0.40	U	0.40	U	0.40	U	0.40	U
C3-Dibenzothiophenes	0.40	U	0.40	U	0.40	U	0.40	U
C4-Dibenzothiophenes	0.40	U	0.40	U	0.40	U	0.40	U
Fluoranthene	**19.5**		**8.38**		**10.7**		**3.97**	
Pyrene	**11.9**		**5.67**		**7.46**		**3.57**	
C1-Fluoranthenes/Pyrenes	9.44		5.31		6.28		3.83	
C2-Fluoranthenes/Pyrenes	5.58		3.94		4.52		3.56	
C3-Fluoranthenes/Pyrenes	0.81	U	0.81	U	0.81	U	0.81	U
Benzo(a)anthracene	**8.19**		**3.80**		**4.34**		**1.62**	**J**
Chrysene	**11.7**		**4.68**		**5.45**		**1.98**	
C1-Chrysenes	3.96		1.41	J	1.64	J	0.55	U
C2-Chrysenes	2.67		1.27	J	2.77		2.54	
C3-Chrysenes	0.87	U	0.87	U	0.87	U	0.87	U
C4-Chrysenes	0.87	U	0.87	U	0.87	U	0.87	U
Benzo(b)fluoranthene	**7.83**		**3.18**		**3.84**		**2.31**	
Benzo(k)fluoranthene	**3.78**		**1.85**		**2.11**		**1.26**	**J**
Benzo(e)pyrene	**3.81**		**1.34**	**J**	**1.87**		**0.90**	**J**
Benzo(a)pyrene	**2.07**		**1.16**	**J**	**1.37**	**J**	**0.23**	**U**
Perylene	**2.04**		**1.84**		**2.11**		**0.25**	**U**
Indeno(1,2,3-cd)pyrene	**1.51**	**J**	**1.06**	**J**	**0.14**	**U**	**0.14**	**U**
Dibenz(a,h)anthracene	**1.85**		**1.96**		**0.06**	**U**	**0.06**	**U**
Benzo(g,h,i)perylene	**1.36**	**J**	**1.01**	**J**	**0.50**	**J**	**0.22**	**U**

Table 6. PCB concentrations in mussel tissue collected in 2010 and 2012. Orange highlights show RPD >50% higher in 2012, while green highlights show stations where concentrations were > 50% lower in 2012. Concentrations reported as ng/g wet weight.

Station:	PS04				PS03				PS06				PS08				PS09			
Year:	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD
%Lipids	6.87	8.02	7.45	15%	6.62	9.37	8.00	34%	6.65	8.61	7.63	26%	7.47	8.07	7.77	8%	6.24	8.09	7.17	26%
Sum PCB[1]	**37.9**	**40.2**	**39.1**	**6%**	**45.4**	**62.5**	**53.9**	**32%**	**43.6**	**38.3**	**40.9**	**-13%**	**42.6**	**43.3**	**43.0**	**1%**	**91.5**	**82.4**	**86.9**	**-11%**
Cl2(8)	0.32	0.29	0.30	-10%	0.31	0.35	0.33	12%	0.29	0.43	0.36	40%	0.34	0.16 U	0.25	-71%	0.46	0.23	0.35	-68%
Cl3(18)	0.31	0.15 U	0.23	-67%	0.31	0.20	0.26	-41%	0.28	0.19 J	0.23	-38%	0.28	0.15 U	0.22	-60%	0.45	0.16 J	0.31	-97%
Cl3(28)	0.21	0.16 J	0.19	-23%	0.26	0.02 U	0.14	-169%	0.21	0.06 J	0.14	-107%	0.20	0.06 J	0.13	-107%	0.23	0.09 J	0.16	-89%
Cl4(44)	0.31	0.30	0.30	-6%	0.37	0.26	0.31	-34%	0.32	0.41	0.37	24%	0.30	0.25	0.27	-21%	0.49	0.42	0.46	-15%
Cl4(52)	0.77	0.65	0.71	-17%	0.84	0.85	0.85	1%	0.80	0.82	0.81	2%	0.67	1.03	0.85	43%	1.07	0.84	0.95	-25%
Cl4(66)	0.53	0.46	0.50	-14%	0.60	0.32	0.46	-61%	0.63	0.39	0.51	-47%	0.48	0.33	0.40	-38%	0.80	0.34	0.57	-81%
Cl4(77)	0.87	0.84	0.86	-3%	1.01	1.13	1.07	11%	1.05	1.65	1.35	45%	1.06	2.54	1.80	82%	1.89	1.14	1.51	-50%
Cl5(101)	2.41	2.29	2.35	-5%	2.62	2.93	2.77	11%	2.60	1.99	2.29	-27%	2.37	2.49	2.43	5%	5.11	4.08	4.59	-22%
Cl5(105)	0.58	0.62	0.60	6%	0.71	1.02	0.86	36%	0.73	0.58	0.66	-23%	0.80	0.73	0.76	-8%	1.33	1.25	1.29	-6%
Cl5(118)	1.83	1.86	1.85	2%	2.26	3.12	2.69	32%	2.24	1.75	2.00	-24%	2.26	1.84	2.05	-21%	4.10	3.78	3.94	-8%
Cl5(126)	1.27	1.16	1.22	-8%	1.48	1.59	1.53	7%	1.46	1.15	1.30	-24%	1.41	1.00	1.20	-34%	3.04	2.53	2.78	-18%
Cl6(128)	0.47	0.46	0.47	-2%	0.57	0.89	0.73	44%	0.56	0.45	0.50	-22%	0.59	0.48	0.53	-21%	0.97	1.21	1.09	22%
Cl6(138)	2.90	3.32	3.11	14%	3.66	6.66	5.16	58%	3.43	3.13	3.28	-9%	3.52	3.28	3.40	-7%	8.13	9.11	8.62	11%
Cl6(153)	3.44	3.86	3.65	11%	4.33	6.35	5.34	38%	3.97	3.59	3.78	-10%	3.74	3.49	3.62	-7%	10.7	10.1	10.4	-6%
Cl7(170)	0.17 J	0.13 J	0.15		0.19 J	0.18 J	0.18		0.19 J	0.11 J	0.15		0.22	0.14 J	0.18	-43%	0.44	0.23	0.34	-60%
Cl7(180)	0.69	0.67	0.68	-2%	0.86	0.86	0.86	0%	0.84	0.51	0.67	-49%	0.96	0.57	0.77	-50%	2.14	1.69	1.91	-24%
Cl7(187)	1.31	1.33	1.32	1%	1.64	2.47	2.06	40%	1.54	1.33	1.44	-15%	1.47	1.20	1.33	-21%	3.13	3.18	3.15	2%
Cl8(195)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	
Cl8(200)	0.54	1.51	1.02	94%	0.65	2.04	1.35	103%	0.62	0.56	0.59	-9%	0.64	1.88	1.26	99%	1.31	0.84	1.07	-44%
Cl9(206)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	
Cl10(209)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	

Table 6. Continued.

Station:	PS11				SISIM				POPISP				SIPOM				POPIPD			
Year:	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD
%Lipids	6.96	8.29	7.63	17%	6.99	11.57	9.28	49%	8.85	9.24	9.05	4%	7.78	10.11	8.95	26%	8.40	9.37	8.89	11%
Sum PCB[1]	**44.6**	**49.6**	**47.1**	**11%**	**36.8**	**49.1**	**43.0**	**29%**	**25.5**	**24.6**	**25.0**	**-4%**	**29.6**	**44.4**	**37.0**	**40%**	**18.5**	**20.2**	**19.3**	**9%**
Cl2(8)	0.23	0.85	0.54	114%	0.26	0.30	0.28	13%	0.24	0.64	0.44	92%	0.25	1.09	0.67	126%	0.19 J	0.42	0.30	76%
Cl3(18)	0.22	0.78	0.50	113%	0.24	0.15 U	0.20	-44%	0.16 J	0.18 J	0.17		0.21	0.87	0.54	123%	0.15 U	0.15 U	0.15	
Cl3(28)	0.20 J	0.08 J	0.14		0.22	0.11 J	0.17	-65%	0.15 J	0.04 J	0.10		0.20 J	0.02 U	0.11		0.10 J	0.02 U	0.06	
Cl4(44)	0.26	0.44	0.35	52%	0.34	0.43	0.38	25%	0.21	0.38	0.29	59%	0.27	0.02 U	0.14	-169%	0.14 J	0.19 J	0.17	
Cl4(52)	0.65	0.59	0.62	-10%	0.77	0.81	0.79	5%	0.48	0.43	0.45	-10%	0.62	0.50	0.56	-22%	0.32	0.29	0.30	-9%
Cl4(66)	0.49	0.47	0.48	-4%	0.70	0.63	0.67	-9%	0.30	0.41	0.36	30%	0.47	0.54	0.50	14%	0.23	0.17 J	0.20	-30%
Cl4(77)	1.09	2.21	1.65	68%	1.08	1.36	1.22	22%	0.65	0.46	0.56	-34%	0.87	1.85	1.36	72%	0.49	0.15 U	0.32	-106%
Cl5(101)	2.54	3.24	2.89	24%	2.43	3.08	2.76	24%	1.45	1.71	1.58	16%	1.83	3.12	2.47	52%	1.00	1.64	1.32	48%
Cl5(105)	0.75	0.77	0.76	3%	0.70	0.89	0.79	24%	0.32	0.32	0.32	1%	0.56	0.71	0.63	25%	0.24	0.27	0.26	14%
Cl5(118)	2.39	2.01	2.20	-17%	2.30	2.92	2.61	24%	1.12	0.84	0.98	-28%	1.79	1.99	1.89	11%	0.83	0.84	0.84	1%
Cl5(126)	1.52	1.22	1.37	-21%	0.98	1.12	1.05	13%	0.94	0.73	0.84	-26%	0.86	1.03	0.94	17%	0.67	0.59	0.63	-13%
Cl6(128)	0.59	0.50	0.54	-15%	0.48	0.84	0.66	54%	0.36	0.23	0.29	-43%	0.41	0.65	0.53	46%	0.29	0.22	0.26	-27%
Cl6(138)	3.78	3.87	3.82	2%	2.79	4.37	3.58	44%	1.98	1.69	1.84	-16%	2.21	3.39	2.80	42%	1.46	1.52	1.49	5%
Cl6(153)	4.26	4.15	4.21	-3%	3.19	4.41	3.80	32%	2.43	2.16	2.29	-12%	2.55	3.94	3.25	43%	1.79	1.81	1.80	1%
Cl7(170)	0.18 J	0.13 J	0.16		0.11 J	0.13 J	0.12		0.14 J	0.09 J	0.11	-48%	0.09 J	0.11 J	0.10		0.09 J	0.06 J	0.07	
Cl7(180)	0.87	0.89	0.88	2%	0.37	0.57	0.47	44%	0.44	0.39	0.41	-11%	0.35	0.41	0.38	17%	0.25	0.37	0.31	37%
Cl7(187)	1.59	1.45	1.52	-10%	1.02	1.43	1.22	33%	1.00	0.93	0.97	-7%	0.92	1.37	1.14	39%	0.72	0.76	0.74	6%
Cl8(195)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	21%	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	
Cl8(200)	0.65	1.02	0.84	43%	0.40	0.97	0.68	84%	0.37	0.63	0.50	53%	0.35	0.54	0.45	42%	0.26	0.49	0.37	62%
Cl9(206)	0.01 U	0.13 J	0.07		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	21%	0.01 U	0.01 U	0.01		0.01 U	0.12 J	0.06	
Cl10(209)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	21%	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	

Table 6. Continued.

Station:	PWNLP				DYOTS				MLPIER				SIWP				SIRP			
Year:	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD
%Lipids	9.40	7.55	8.48	-22%	8.61	8.72	8.67	1%	6.40	9.03	7.72	34%	5.43	7.19	6.31	28%	5.42	9.34	7.38	53%
Sum PCB[1]	**28.1**	**31.3**	**29.7**	**11%**	**29.5**	**18.2**	**23.8**	**-47%**	**29.9**	**35.2**	**32.6**	**16%**	**16.7**	**19.8**	**18.3**	**17%**	**27.9**	**47.9**	**37.9**	**53%**
Cl2(8)	0.22	0.52	0.37	81%	0.30	0.16 U	0.23	-58%	0.18 J	0.51	0.35	95%	0.17 J	0.49	0.33	97%	0.20	0.89	0.55	125%
Cl3(18)	0.15 U	0.31	0.23	68%	0.21	0.15 U	0.18	-33%	0.18 J	0.15 U	0.17		0.15 U	0.15 U	0.15		0.16 J	0.15 U	0.16	
Cl3(28)	0.11 J	0.15 J	0.13		0.16 J	0.02 U	0.09		0.07 J	0.06 J	0.06		0.08 J	0.06 J	0.07		0.12 J	0.02 U	0.07	
Cl4(44)	0.17 J	0.29	0.23	54%	0.22	0.02 U	0.12	-163%	0.13 J	0.02 U	0.08		0.10 J	0.21	0.16	68%	0.15 J	0.26	0.21	53%
Cl4(52)	0.41	0.58	0.49	36%	0.55	0.30	0.42	-57%	0.31	0.18 J	0.25	-51%	0.25	0.15 J	0.20	-51%	0.41	0.58	0.50	34%
Cl4(66)	0.28	0.08 U	0.18	-110%	0.40	0.08 U	0.24	-132%	0.17 J	0.08 U	0.13		0.14 J	0.08 U	0.11		0.29	0.53	0.41	56%
Cl4(77)	0.73	1.40	1.06	63%	0.82	0.39	0.60	-73%	0.47	0.82	0.64	54%	0.39	1.16	0.77	100%	0.64	1.03	0.83	46%
Cl5(101)	1.50	1.27	1.39	-16%	1.68	1.09	1.39	-42%	1.18	1.45	1.32	21%	0.82	1.04	0.93	24%	1.63	2.80	2.22	53%
Cl5(105)	0.41	0.37	0.39	-9%	0.45	0.28	0.37	-47%	0.19 J	0.25	0.22	26%	0.20 J	0.28	0.24	33%	0.47	0.76	0.61	47%
Cl5(118)	1.41	1.20	1.30	-16%	1.54	0.92	1.23	-50%	0.81	0.81	0.81	0%	0.78	0.62	0.70	-22%	1.46	2.33	1.89	46%
Cl5(126)	1.05	0.90	0.98	-15%	0.99	0.59	0.79	-50%	1.60	1.55	1.57	-3%	0.68	0.58	0.63	-16%	1.04	1.27	1.15	20%
Cl6(128)	0.38	0.40	0.39	5%	0.42	0.28	0.35	-41%	0.31	0.38	0.34	21%	0.24	0.26	0.25	9%	0.38	0.77	0.58	67%
Cl6(138)	2.30	2.56	2.43	10%	2.33	1.62	1.98	-36%	2.48	3.77	3.12	41%	1.33	1.48	1.40	11%	2.23	4.60	3.41	69%
Cl6(153)	2.87	3.15	3.01	10%	2.85	1.81	2.33	-44%	3.46	3.83	3.65	10%	1.70	1.88	1.79	10%	2.73	4.73	3.73	54%
Cl7(170)	0.13 J	0.11 J	0.12		0.09 J	0.05 J	0.07		0.17 J	0.20	0.19	21%	0.11 J	0.07 J	0.09		0.13 J	0.11 J	0.12	
Cl7(180)	0.40	0.39	0.40	-3%	0.28	0.31	0.30	11%	0.88	0.99	0.94	11%	0.26	0.29	0.27	8%	0.42	0.53	0.48	24%
Cl7(187)	1.12	1.33	1.23	18%	1.05	0.70	0.87	-39%	1.62	1.87	1.74	14%	0.71	0.68	0.70	-4%	1.04	1.92	1.48	60%
Cl8(195)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.03 J	0.02		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	
Cl8(200)	0.41	0.59	0.50	37%	0.38	0.27	0.33	-33%	0.73	0.67	0.70	-9%	0.24	0.39	0.32	47%	0.42	0.66	0.54	44%
Cl9(206)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	
Cl10(209)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	

Table 6. Continued.

Station:	POPBWN				KPTPIER				KPTLAG				APHCB				APKIANA			
Year:	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD	2010	2012	Mean	RPD
%Lipids	8.07	8.03	8.05	0%	7.92	8.89	8.41	12%	7.55	8.33	7.94	10%	5.52	9.73	7.63	55%	7.57	10.88	9.23	36%
Sum PCB[1]	**21.1**	**23.6**	**22.3**	**11%**	**23.2**	**22.7**	**22.9**	**-2%**	**17.6**	**15.9**	**16.8**	**-10%**	**15.0**	**19.4**	**17.2**	**26%**	**18.5**	**21.1**	**19.8**	**13%**
Cl2(8)	0.20 J	0.20	0.20	3%	0.25	0.96	0.60	118%	0.21	0.35	0.28	49%	0.17 J	0.61	0.39	114%	0.18 J	1.23	0.71	148%
Cl3(18)	0.17 J	0.15 U	0.16		0.18 J	0.16 J	0.17		0.15 U	0.24	0.20	44%	0.15 U	0.17 J	0.16		0.15 U	0.84	0.50	139%
Cl3(28)	0.17 J	0.16 J	0.17		0.17 J	0.02 U	0.09		0.10 J	0.02 U	0.06		0.08 J	0.08 J	0.08		0.10 J	0.04 J	0.07	
Cl4(44)	0.18 J	0.19 J	0.18		0.18 J	0.44	0.31	83%	0.12 J	0.02 U	0.07		0.12 J	0.40	0.26	109%	0.13 J	0.26	0.20	69%
Cl4(52)	0.41	0.45	0.43	8%	0.48	0.21	0.35	-77%	0.29	0.40	0.35	31%	0.24	0.21	0.23	-12%	0.32	0.42	0.37	26%
Cl4(66)	0.35	0.29	0.32	-20%	0.31	0.12 J	0.22	-89%	0.19 J	0.09 J	0.14		0.12 J	0.22	0.17	54%	0.20 J	0.08 U	0.14	
Cl4(77)	0.54	0.45	0.49	-19%	0.67	0.61	0.64	-11%	0.45	0.96	0.71	71%	0.36	0.57	0.47	47%	0.41	0.61	0.51	40%
Cl5(101)	1.19	1.10	1.14	-8%	1.40	1.46	1.43	4%	1.00	1.38	1.19	32%	0.78	1.21	0.99	43%	1.03	1.14	1.08	10%
Cl5(105)	0.31	0.33	0.32	7%	0.35	0.39	0.37	10%	0.27	0.23	0.25	-16%	0.19 J	0.29	0.24	42%	0.25	0.26	0.26	5%
Cl5(118)	1.07	1.19	1.13	10%	1.20	0.84	1.02	-35%	0.95	0.72	0.83	-28%	0.65	0.70	0.68	8%	0.81	0.62	0.72	-28%
Cl5(126)	0.71	0.83	0.77	16%	0.73	0.64	0.68	-12%	0.58	0.40	0.49	-36%	0.56	0.51	0.53	-11%	0.62	0.57	0.59	-8%
Cl6(128)	0.29	0.35	0.32	20%	0.34	0.42	0.38	21%	0.26	0.21	0.23	-22%	0.21	0.22	0.21	4%	0.29	0.30	0.29	4%
Cl6(138)	1.63	1.97	1.80	19%	1.81	1.77	1.79	-2%	1.45	1.01	1.23	-35%	1.23	1.22	1.22	-1%	1.54	1.34	1.44	-14%
Cl6(153)	2.01	2.43	2.22	19%	2.16	1.84	2.00	-16%	1.74	1.21	1.47	-36%	1.53	1.71	1.62	11%	1.93	1.62	1.78	-17%
Cl7(170)	0.06 J	0.05 J	0.05		0.08 J	0.11 J	0.10		0.06 J	0.06 J	0.06		0.07 J	0.10 J	0.08		0.08 J	0.09 J	0.08	
Cl7(180)	0.23	0.43	0.33	62%	0.20	0.26	0.23	23%	0.15 J	0.14 J	0.14		0.22	0.27	0.24	20%	0.26	0.21	0.24	-20%
Cl7(187)	0.74	0.90	0.82	19%	0.77	0.77	0.77	-1%	0.61	0.32	0.47	-64%	0.60	0.57	0.59	-5%	0.72	0.54	0.63	-28%
Cl8(195)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	
Cl8(200)	0.26	0.31	0.29	19%	0.27	0.30	0.28	10%	0.20 J	0.19 J	0.19		0.19 J	0.64	0.41	107%	0.22	0.32	0.27	37%
Cl9(206)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	
Cl10(209)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01	

Table 6. Continued.

Station:	LBPMSC				DYOBAP				SIGST				PS01				PIER7RB30	PIER7CB05	PIER7FE46	PKPLPC
Year:	**2010**	**2012**	**Mean**	**RPD**	**2010**	**2012**	**Mean**	**RPD**	**2010**	**2012**	**Mean**	**RPD**	**2010**	**2012**	**Mean**	**RPD**	**2012**	**2012**	**2012**	**2012**
%Lipids	7.02	8.98	8.00	25%	7.97	9.67	8.82	19%	9.08	9.72	9.40	7%	8.63	7.49	8.06	-14%	8.12	7.14	7.97	7.95
Sum PCB[1]	**19.2**	**46.9**	**33.1**	**84%**	**21.8**	**19.8**	**20.8**	**-10%**	**55.1**	**52.9**	**54.0**	**-4%**	**46.9**	**31.6**	**39.2**	**-39%**	**32.4**	**18.6**	**24.5**	**10.6**
Cl2(8)	0.19 J	0.72	0.46	114%	0.20	0.82	0.51	121%	0.38	0.16 U	0.27	-78%	0.29	0.42	0.36	35%	0.20	0.34	0.63	0.56
Cl3(18)	0.15 U	0.75	0.45	132%	0.15 U	0.15 U	0.15		0.36	0.15 U	0.26	-81%	0.29	0.15 U	0.22	-63%	0.22	0.17 J	0.15 U	0.27
Cl3(28)	0.16 J	0.97	0.56	143%	0.11 J	0.05 J	0.08		0.43	0.11 J	0.27	-119%	0.28	0.09 J	0.19	-103%	0.08 J	0.02 U	0.16 J	0.02 U
Cl4(44)	0.17 J	8.04	4.10	192%	0.13 J	0.29	0.21	76%	0.51	0.51	0.51	-1%	0.40	0.42	0.41	6%	0.19 J	0.26	0.26	0.29
Cl4(52)	0.40	2.96	1.68	152%	0.37	0.14 J	0.25	-88%	1.33	0.38	0.85	-112%	1.00	0.49	0.74	-69%	0.36	0.20	0.24	0.05 U
Cl4(66)	0.32	0.77	0.54	83%	0.26	0.14 J	0.20	-64%	0.93	0.47	0.70	-65%	0.65	0.26	0.45	-85%	0.30	0.11 J	0.23	0.11 J
Cl4(77)	0.49	0.44	0.47	-11%	0.55	0.94	0.75	53%	1.58	1.61	1.59	2%	1.12	2.38	1.75	72%	0.72	0.91	1.63	1.22
Cl5(101)	1.16	1.11	1.13	-5%	1.23	1.20	1.21	-3%	3.64	3.16	3.40	-14%	2.88	1.80	2.34	-46%	2.25	0.98	1.26	0.79
Cl5(105)	0.35	0.36	0.36	3%	0.31	0.24	0.27	-25%	1.01	0.91	0.96	-10%	0.71	0.45	0.58	-46%	0.53	0.28	0.32	0.14 J
Cl5(118)	1.06	0.79	0.93	-30%	1.10	0.69	0.90	-47%	3.05	2.90	2.97	-5%	2.43	1.33	1.88	-58%	1.71	0.79	0.95	0.34
Cl5(126)	0.53	0.73	0.63	32%	0.81	0.57	0.69	-35%	1.43	1.50	1.47	5%	1.53	0.80	1.17	-62%	0.94	0.59	0.69	0.20 J
Cl6(128)	0.30	0.50	0.40	49%	0.33	0.31	0.32	-8%	0.73	0.86	0.79	16%	0.60	0.42	0.51	-36%	0.52	0.23	0.30	0.19 J
Cl6(138)	1.52	1.84	1.68	19%	1.75	1.34	1.55	-27%	4.35	5.11	4.73	16%	3.68	2.29	2.99	-47%	2.91	1.45	1.83	0.32
Cl6(153)	1.72	1.38	1.55	-22%	2.17	1.67	1.92	-26%	4.75	5.66	5.20	17%	4.46	2.64	3.55	-51%	3.10	1.69	2.06	0.20 J
Cl7(170)	0.05 J	0.07 J	0.06		0.07 J	0.06 J	0.07		0.17 J	0.11 J	0.14		0.14 J	0.13 J	0.13		0.12 J	0.07 J	0.13 J	0.12 J
Cl7(180)	0.15 J	0.24	0.20	46%	0.19 J	0.38	0.29	68%	0.78	0.33	0.55	-83%	0.72	0.38	0.55	-60%	0.46	0.21	0.31	0.09 J
Cl7(187)	0.63	0.71	0.67	11%	0.87	0.57	0.72	-41%	1.53	1.84	1.68	19%	1.61	0.88	1.25	-59%	1.06	0.60	0.76	0.17 J
Cl8(195)	0.01 U	0.01 U	0.01		0.01 U	0.02 J	0.01		0.01 U	0.03 J	0.02		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.20 J	1.09	0.64	138%	0.30	0.29	0.30	-4%	0.58	0.67	0.62	15%	0.63	0.47	0.55	-28%	0.51	0.39	0.33	0.17 J
Cl9(206)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01		0.01 U	0.01 U	0.01 U	0.01 U

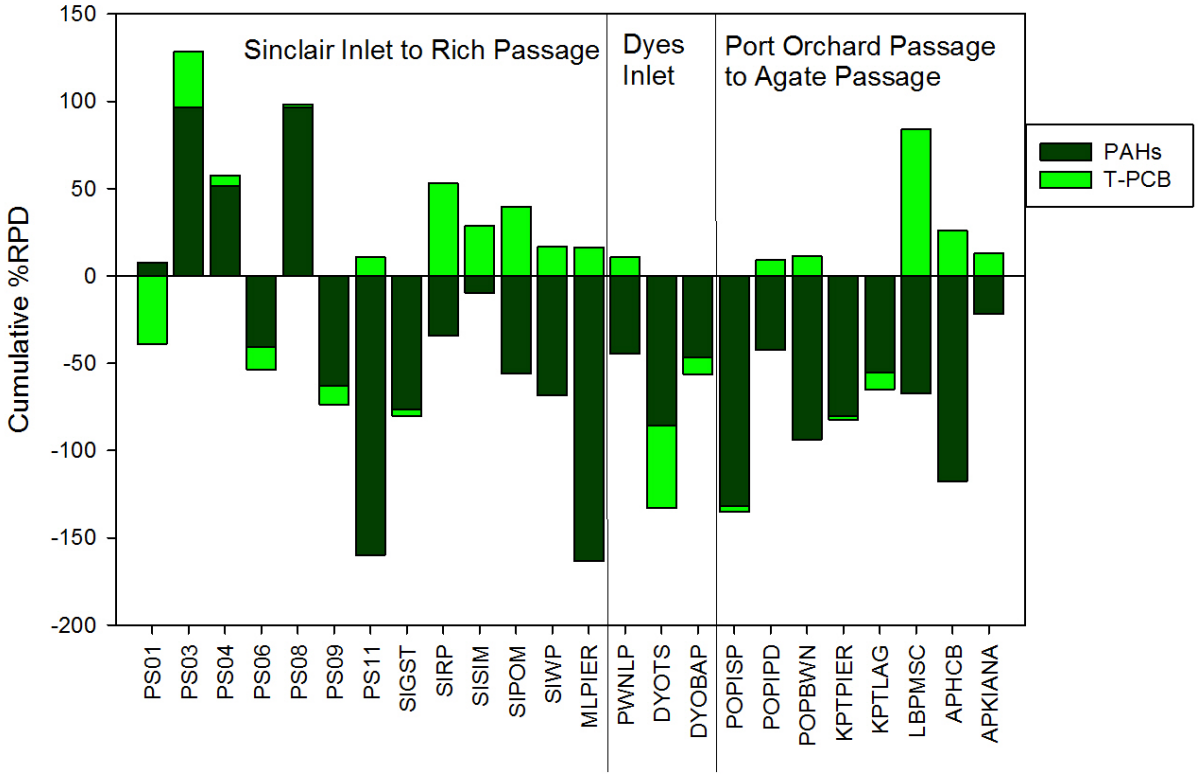

Figure 4. The cumulative relative percent differences (RPD) between 2010 and 2012 for the sum of the PAHs and PCBs progressing from Sinclair Inlet to Dyes Inlet and out to the passages.

Field Data Summary

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1529 West Sequim Bay Road
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PM: Jill Brandenberger 360/681-4564

2012 Regional Mussel Watch
ENVVEST 2012
Metals in Tissue
UNITS: µg/g WET wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Collect Date	# Mussels in Comp	Average length (mm)	Percent Moisture	Ag	As	Cd	Cr	Cu	Hg
				Instrument:					*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-OES*	*ICP-OES*	*DMA*
Laboratory Achieved Method Detection Limits (tissue)								*86.2*	**0.00043**	**0.015**	**0.00040**	**0.0019**	**0.0052**	**0.00027**
Reporting Limit (MDL* 3.18)									**0.0014**	**0.048**	**0.0013**	**0.0061**	**0.017**	**0.00085**
MW2012-001	SIWP	Soft Tissue	Mussel	3106-740	12/05/11	403	24.08	87.5	0.00488	0.875	0.285	0.479	1.05	0.0142
MW2012-002	SIRP	Soft Tissue	Mussel	3106-741	12/05/11	81	43.61	84.5	0.00277	1.11	0.414	0.397	0.955	0.0253
MW2012-003	DYOBAP	Soft Tissue	Mussel	3106-780	12/07/11	118	44.62	84.4	0.00643	1.11	0.451	0.111	0.833	0.0204
MW2012-101	MLPIER	Soft Tissue	Mussel	3106-785	01/17/12	93	46.67	84.1	0.00847	1.21	1.03	0.490	2.05	0.0125
MW2012-102	SIPOM	Soft Tissue	Mussel	3106-786	01/17/12	96	44.29	83.5	0.00191	1.07	0.289	0.160	1.07	0.0221
MW2012-103	SISIM	Soft Tissue	Mussel	3106-787	01/17/12	127	47.80	84.9	0.00190	0.966	0.236	0.350	1.46	0.0229
MW2012-104	POPIPD	Soft Tissue	Mussel	3106-788	01/19/12	63	50.27	84.6	0.00424	1.07	0.522	0.196	0.890	0.0107
MW2012-105	PWNLP	Soft Tissue	Mussel	3106-789	01/19/12	254	35.22	88.7	0.00460	0.767	0.232	2.19	1.39	0.0160
MW2012-106	DYOTS	Soft Tissue	Mussel	3106-790	01/19/12	45	71.43	85.8	0.00250	1.09	0.447	0.142	0.751	0.0205
MW2012-107	POPBWN	Soft Tissue	Mussel	3106-791	01/20/12	205	37.97	86.0	0.00246	1.09	0.309	0.421	2.66	0.0102
MW2012-108	KPTLAG	Soft Tissue	Mussel	3106-792	01/20/12	58	67.38	85.9	0.00317	0.935	0.441	0.192	0.901	0.0110
MW2012-109	KPTPIER	Soft Tissue	Mussel	3106-793	01/20/12	113	46.33	83.1	0.00524	1.16	0.375	0.355	1.17	0.0101
MW2012-110	LBPMSC	Soft Tissue	Mussel	3106-794	01/21/12	84	40.76	87.5	0.00195	0.904	0.246	1.23	1.58	0.0130
MW2012-111	APKIANA	Soft Tissue	Mussel	3106-795	01/21/12	42	53.53	81.6	0.00272	1.52	0.640	0.686	1.17	0.0105
MW2012-112	APHCB	Soft Tissue	Mussel	3106-796	01/21/12	330	24.49	89.9	0.00495	0.747	0.264	12.2	2.28	0.00789
MW2012-113	POPISP	Soft Tissue	Mussel	3106-797	01/22/12	105	38.56	86.6	0.00442	0.980	0.358	3.23	1.41	0.0105
MW2012-201	PS03	Soft Tissue	Mussel	3106-798	01/24/12	56	53.88	86.7	0.00414	1.00	0.427	0.194	1.82	0.128
MW2012-202	PS04	Soft Tissue	Mussel	3106-799	01/24/12	174	40.27	85.3	0.00253	0.957	0.294	0.184	2.03	0.0184
MW2012-203	PS06	Soft Tissue	Mussel	3106-800	01/24/12	77	45.50	87.9	0.00655	0.984	0.356	0.460	4.24	0.0232
MW2012-204	PS08	Soft Tissue	Mussel	3106-801	01/24/12	84	46.23	86.1	0.00400	0.984	0.339	0.186	4.77	0.0173
MW2012-205	PS09	Soft Tissue	Mussel	3106-802	01/24/12	87	46.19	86.8	0.00257	0.981	0.297	0.182	1.69	0.0189
MW2012-206	PS11	Soft Tissue	Mussel	3106-803	01/24/12	134	45.16	85.9	0.00210	1.06	0.286	0.171	1.62	0.0149
MW2012-207	PIER7RB30	Soft Tissue	Mussel	3106-804	01/24/12	86	46.33	85.0	0.00188	1.08	0.353	0.126	1.35	0.0153
MW2012-208	PIER7CB05	Soft Tissue	Mussel	3106-805	01/24/12	77	42.45	89.5	0.00173	0.830	0.356	0.114	0.982	0.0115
MW2012-209	PIER7FE46	Soft Tissue	Mussel	3106-806	01/24/12	98	39.61	88.5	0.00198	0.923	0.369	0.159	1.09	0.0129
MW2012-210	PS01	Soft Tissue	Mussel	3106-807	01/24/12	91	45.73	86.5	0.00261	0.968	0.315	0.211	1.30	0.0174
MW2012-211	SIGST	Soft Tissue	Mussel	3106-808	02/15/12	36	66.45	88.2	0.00337	1.42	0.490	0.371	1.10	0.0328
MW2012-212	PKPLPC	Soft Tissue	Mussel	3106-809	02/18/12	78	57.50	88.7	0.00329	1.15	1.32	1.01	1.05	0.00840

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2012 Regional Mussel Watch
ENVVEST 2012
Metals in Tissue
UNITS: µg/g WET wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	**MSL Code**	**Ni**	**Pb**	**Zn**	DMA Batch ID	ICP-OES Batch ID	ICP-MS Batch ID
				Instrument:	*ICP-OES*	*ICP-MS*	*ICP-OES*			
Laboratory Achieved Method Detection Limits (tissue)					**0.0057**	**0.00047**	**0.0040**			
Reporting Limit (MDL* 3.18)					**0.018**	**0.0015**	**0.013**			
MW2012-001	SIWP	Soft Tissue	Mussel	3106-740	0.516	0.149	21.6	072612DMA	I041712A	042012-6100
MW2012-002	SIRP	Soft Tissue	Mussel	3106-741	0.315	0.166	27.6	072612DMA	I041712A	042012-6100
MW2012-003	DYOBAP	Soft Tissue	Mussel	3106-780	0.119	0.129	20.4	072612DMA	I041712A	042012-6100
MW2012-101	MLPIER	Soft Tissue	Mussel	3106-785	0.452	0.186	37.2	072612DMA	I041712A	042012-6100
MW2012-102	SIPOM	Soft Tissue	Mussel	3106-786	0.135	0.133	26.1	072612DMA	I041712A	042012-6100
MW2012-103	SISIM	Soft Tissue	Mussel	3106-787	0.267	0.195	25.1	072612DMA	I041712A	042012-6100
MW2012-104	POPIPD	Soft Tissue	Mussel	3106-788	0.166	0.0879	18.9	072612DMA	I041712A	042012-6100
MW2012-105	PWNLP	Soft Tissue	Mussel	3106-789	1.57	0.223	20.3	072612DMA	I041712A	042012-6100
MW2012-106	DYOTS	Soft Tissue	Mussel	3106-790	0.110	0.0987	14.9	072612DMA	I041712A	042012-6100
MW2012-107	POPBWN	Soft Tissue	Mussel	3106-791	0.339	0.105	21.4	072612DMA	I041712A	042012-6100
MW2012-108	KPTLAG	Soft Tissue	Mussel	3106-792	0.151	0.110	13.7	072612DMA	I041712A	042012-6100
MW2012-109	KPTPIER	Soft Tissue	Mussel	3106-793	0.279	0.119	20.4	072612DMA	I041712A	042012-6100
MW2012-110	LBPMSC	Soft Tissue	Mussel	3106-794	0.851	0.151	22.0	072612DMA	I041712A	042012-6100
MW2012-111	APKIANA	Soft Tissue	Mussel	3106-795	0.491	0.0707	22.6	072612DMA	I041712A	042012-6100
MW2012-112	APHCB	Soft Tissue	Mussel	3106-796	9.55	0.104	14.6	072612DMA	I041612A	042012-6100
MW2012-113	POPISP	Soft Tissue	Mussel	3106-797	2.39	0.114	20.8	072612DMA	I041612A	042012-6100
MW2012-201	PS03	Soft Tissue	Mussel	3106-798	0.161	0.515	27.9	072612DMA	I041612A	042012-6100
MW2012-202	PS04	Soft Tissue	Mussel	3106-799	0.175	0.203	34.8	072612DMA	I041612A	042012-6100
MW2012-203	PS06	Soft Tissue	Mussel	3106-800	0.425	0.241	38.0	072612DMA	I041612A	042012-6100
MW2012-204	PS08	Soft Tissue	Mussel	3106-801	0.161	0.207	39.5	072612DMA	I041612A	042012-6100
MW2012-205	PS09	Soft Tissue	Mussel	3106-802	0.170	0.231	32.7	072612DMA	I041612A	042012-6100
MW2012-206	PS11	Soft Tissue	Mussel	3106-803	0.161	0.206	26.8	072612DMA	I041612A	042012-6100
MW2012-207	PIER7RB30	Soft Tissue	Mussel	3106-804	0.117	0.155	34.2	072612DMA	I041612A	042012-6100
MW2012-208	PIER7CB05	Soft Tissue	Mussel	3106-805	0.138	0.117	29.0	072612DMA	I041612A	042012-6100
MW2012-209	PIER7FE46	Soft Tissue	Mussel	3106-806	0.179	0.128	30.2	072612DMA	I041612A	042012-6100
MW2012-210	PS01	Soft Tissue	Mussel	3106-807	0.203	0.238	27.4	072612DMA	I041612A	042012-6100
MW2012-211	SIGST	Soft Tissue	Mussel	3106-808	0.303	0.256	22.7	072612DMA	I041612A	042012-6100
MW2012-212	PKPLPC	Soft Tissue	Mussel	3106-809	0.797	0.0246	16.6	072612DMA	I041612A	042012-6100

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2012 Regional Mussel Watch
ENVVEST 2012
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Collect Date	# Mussels in Comp	Average lenth (mm)	Percent Moisture	C wt%	13C	N wt %	15N	Ag	As	Cd	Cr
				Instrument:					*Stable Isotopes*				*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-OES*
Laboratory Achieved Method Detection Limits (tissue)													**0.0031**	**0.11**	**0.0029**	**0.014**
Reporting Limit (MDL* 3.18)													**0.010**	**0.35**	**0.0092**	**0.04**
MW2012-001	SIWP	Soft Tissue	Mussel	3106-740	12/05/11	403	24.08	87.5	43.9	-18.4	10.9	9.2	0.0390	7.00	2.28	3.83
MW2012-002	SIRP	Soft Tissue	Mussel	3106-741	12/05/11	81	43.61	84.5	45.5	-18.1	8.5	9.2	0.0179	7.18	2.67	2.56
MW2012-003	DYOBAP	Soft Tissue	Mussel	3106-780	12/07/11	118	44.62	84.4	44.7	-18.4	8.5	9.5	0.0412	7.13	2.89	0.713
MW2012-101	MLPIER	Soft Tissue	Mussel	3106-785	01/17/12	93	46.67	84.1	44.6	-18.5	10.2	9.2	0.0533	7.60	6.46	3.08
MW2012-102	SIPOM	Soft Tissue	Mussel	3106-786	01/17/12	96	44.29	83.5	45.0	-18.3	9.1	9.4	0.0116	6.46	1.75	0.969
MW2012-103	SISIM	Soft Tissue	Mussel	3106-787	01/17/12	127	47.80	84.9	45.4	-19.3	9.8	9.1	0.0126	6.40	1.56	2.32
MW2012-104	POPIPD	Soft Tissue	Mussel	3106-788	01/19/12	63	50.27	84.6	45.2	-18.6	9.5	9.2	0.0275	6.95	3.39	1.27
MW2012-105	PWNLP	Soft Tissue	Mussel	3106-789	01/19/12	254	35.22	88.7	44.4	-19.1	10.8	9.4	0.0407	6.79	2.05	19.4
MW2012-106	DYOTS	Soft Tissue	Mussel	3106-790	01/19/12	45	71.43	85.8	44.1	-18.5	9.3	9.5	0.0176	7.70	3.15	0.998
MW2012-107	POPBWN	Soft Tissue	Mussel	3106-791	01/20/12	205	37.97	86.0	47.4	-20.6	10.7	9.8	0.0176	7.82	2.21	3.01
MW2012-108	KPTLAG	Soft Tissue	Mussel	3106-792	01/20/12	58	67.38	85.9	44.8	-24.1	10.3	9.1	0.0225	6.63	3.13	1.36
MW2012-109	KPTPIER	Soft Tissue	Mussel	3106-793	01/20/12	113	46.33	83.1	46.7	-19.2	9.9	8.9	0.0310	6.85	2.22	2.10
MW2012-110	LBPMSC	Soft Tissue	Mussel	3106-794	01/21/12	84	40.76	87.5	47.5	-19.7	10.6	8.7	0.0156	7.23	1.97	9.82
MW2012-111	APKIANA	Soft Tissue	Mussel	3106-795	01/21/12	42	53.53	81.6	47.3	-19.0	9.6	9.4	0.0148	8.27	3.48	3.73
MW2012-112	APHCB	Soft Tissue	Mussel	3106-796	01/21/12	330	24.49	89.9	43.6	-19.3	10.4	9.0	0.0490	7.40	2.61	121
MW2012-113	POPISP	Soft Tissue	Mussel	3106-797	01/22/12	105	38.56	86.6	44.2	-19.0	10.1	9.2	0.0330	7.31	2.67	24.1
MW2012-201	PS03	Soft Tissue	Mussel	3106-798	01/24/12	56	53.88	86.7	43.9	-18.8	10.4	9.4	0.0311	7.53	3.21	1.46
MW2012-202	PS04	Soft Tissue	Mussel	3106-799	01/24/12	174	40.27	85.3	42.9	-18.9	9.6	9.2	0.0172	6.51	2.00	1.25
MW2012-203	PS06	Soft Tissue	Mussel	3106-800	01/24/12	77	45.50	87.9	41.9	-18.1	9.0	9.8	0.0541	8.13	2.94	3.80
MW2012-204	PS08	Soft Tissue	Mussel	3106-801	01/24/12	84	46.23	86.1	43.8	-18.6	10.0	9.7	0.0288	7.08	2.44	1.34
MW2012-205	PS09	Soft Tissue	Mussel	3106-802	01/24/12	87	46.19	86.8	43.1	-18.2	10.0	9.5	0.0195	7.43	2.25	1.38
MW2012-206	PS11	Soft Tissue	Mussel	3106-803	01/24/12	134	45.16	85.9	41.1	-18.9	9.3	9.5	0.0149	7.55	2.03	1.21
MW2012-207	PIER7RB30	Soft Tissue	Mussel	3106-804	01/24/12	86	46.33	85.0	44.3	-18.2	9.4	9.8	0.0125	7.22	2.35	0.840
MW2012-208	PIER7CB05	Soft Tissue	Mussel	3106-805	01/24/12	77	42.45	89.5	40.6	-18.2	9.1	9.7	0.0165	7.90	3.39	1.09
MW2012-209	PIER7FE46	Soft Tissue	Mussel	3106-806	01/24/12	98	39.61	88.5	41.7	-18.1	9.3	9.6	0.0172	8.03	3.21	1.38
MW2012-210	PS01	Soft Tissue	Mussel	3106-807	01/24/12	91	45.73	86.5	43.8	-18.9	9.7	9.3	0.0193	7.17	2.33	1.56
MW2012-211	SIGST	Soft Tissue	Mussel	3106-808	02/15/12	36	66.45	88.2	42.6	-18.4	9.6	9.8	0.0286	12.0	4.15	3.14
MW2012-212	PKPLPC	Soft Tissue	Mussel	3106-809	02/18/12	78	57.50	88.7	43.9	-25.3	11.4	8.5	0.0291	10.2	11.7	8.97

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2012 Regional Mussel Watch
ENVVEST 2012
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	**MSL Code**	**Cu**	**Hg**	**Ni**	**Pb**	**Zn**	DMA Batch ID	ICP-OES Batch ID	ICP-MS Batch ID
				Instrument:	*ICP-OES*	*DMA*	*ICP-OES*	*ICP-MS*	*ICP-OES*			
Laboratory Achieved Method Detection Limits (tissue)					**0.038**	**0.0019**	**0.041**	**0.0034**	**0.029**			
Reporting Limit (MDL* 3.18)					**0.12**	**0.0062**	**0.13**	**0.011**	**0.092**			
MW2012-001	SIWP	Soft Tissue	Mussel	3106-740	8.39	0.114	4.13	1.19	173	072612DMA	I041712A	042012-6100
MW2012-002	SIRP	Soft Tissue	Mussel	3106-741	6.16	0.163	2.03	1.07	178	072612DMA	I041712A	042012-6100
MW2012-003	DYOBAP	Soft Tissue	Mussel	3106-780	5.34	0.131	0.766	0.824	131	072612DMA	I041712A	042012-6100
MW2012-101	MLPIER	Soft Tissue	Mussel	3106-785	12.9	0.0784	2.84	1.17	234	072612DMA	I041712A	042012-6100
MW2012-102	SIPOM	Soft Tissue	Mussel	3106-786	6.48	0.134	0.816	0.807	158	072612DMA	I041712A	042012-6100
MW2012-103	SISIM	Soft Tissue	Mussel	3106-787	9.66	0.151	1.77	1.29	166	072612DMA	I041712A	042012-6100
MW2012-104	POPIPD	Soft Tissue	Mussel	3106-788	5.78	0.070	1.08	0.571	123	072612DMA	I041712A	042012-6100
MW2012-105	PWNLP	Soft Tissue	Mussel	3106-789	12.3	0.142	13.9	1.97	180	072612DMA	I041712A	042012-6100
MW2012-106	DYOTS	Soft Tissue	Mussel	3106-790	5.29	0.144	0.773	0.695	105	072612DMA	I041712A	042012-6100
MW2012-107	POPBWN	Soft Tissue	Mussel	3106-791	19.0	0.0728	2.42	0.752	153	072612DMA	I041712A	042012-6100
MW2012-108	KPTLAG	Soft Tissue	Mussel	3106-792	6.39	0.0778	1.07	0.783	97.0	072612DMA	I041712A	042012-6100
MW2012-109	KPTPIER	Soft Tissue	Mussel	3106-793	6.94	0.0595	1.65	0.703	121	072612DMA	I041712A	042012-6100
MW2012-110	LBPMSC	Soft Tissue	Mussel	3106-794	12.6	0.104	6.81	1.21	176	072612DMA	I041712A	042012-6100
MW2012-111	APKIANA	Soft Tissue	Mussel	3106-795	6.35	0.0570	2.67	0.384	123	072612DMA	I041712A	042012-6100
MW2012-112	APHCB	Soft Tissue	Mussel	3106-796	22.6	0.0782	94.6	1.03	145	072612DMA	I041612A	042012-6100
MW2012-113	POPISP	Soft Tissue	Mussel	3106-797	10.5	0.0784	17.8	0.852	155	072612DMA	I041612A	042012-6100
MW2012-201	PS03	Soft Tissue	Mussel	3106-798	13.7	0.960	1.21	3.87	210	072612DMA	I041612A	042012-6100
MW2012-202	PS04	Soft Tissue	Mussel	3106-799	13.8	0.125	1.19	1.38	237	072612DMA	I041612A	042012-6100
MW2012-203	PS06	Soft Tissue	Mussel	3106-800	35.0	0.192	3.51	1.99	314	072612DMA	I041612A	042012-6100
MW2012-204	PS08	Soft Tissue	Mussel	3106-801	34.3	0.124	1.16	1.49	284	072612DMA	I041612A	042012-6100
MW2012-205	PS09	Soft Tissue	Mussel	3106-802	12.8	0.143	1.29	1.75	248	072612DMA	I041612A	042012-6100
MW2012-206	PS11	Soft Tissue	Mussel	3106-803	11.5	0.106	1.14	1.46	190	072612DMA	I041612A	042012-6100
MW2012-207	PIER7RB30	Soft Tissue	Mussel	3106-804	9.01	0.102	0.777	1.03	228	072612DMA	I041612A	042012-6100
MW2012-208	PIER7CB05	Soft Tissue	Mussel	3106-805	9.35	0.110	1.31	1.11	276	072612DMA	I041612A	042012-6100
MW2012-209	PIER7FE46	Soft Tissue	Mussel	3106-806	9.51	0.112	1.56	1.11	263	072612DMA	I041612A	042012-6100
MW2012-210	PS01	Soft Tissue	Mussel	3106-807	9.63	0.129	1.50	1.76	203	072612DMA	I041612A	042012-6100
MW2012-211	SIGST	Soft Tissue	Mussel	3106-808	9.29	0.278	2.57	2.17	192	072612DMA	I041612A	042012-6100
MW2012-212	PKPLPC	Soft Tissue	Mussel	3106-809	9.28	0.0743	7.05	0.218	147	072612DMA	I041612A	042012-6100

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2012 Regional Mussel Watch - AMB09
ENVVEST 2012
PCBs in Indigenous Mussels

Sample Name:	**MDL**	**RL**	**3106-740**	**3106-741**	**3106-780**	**3106-785**
Station:			SIWP	SIRP	DYOBAP	MLPIER
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			40512	40512	32912	32912
Sample Weight (g):			10.63	9.95	11.82	12.33
%Moisture:			87.5	84.5	84.4	84.1
Average %Lipids (n=3; DRY WT):			7.19	9.34	9.67	9.03
Collection Date:			12/05/2011	12/05/2011	12/07/2011	01/17/2012
Extraction Date:			4/5/2012	4/5/2012	3/29/2012	3/29/2012
Analysis Date:			4/13/2012	4/13/2012	4/5/2012	4/5/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.49	0.89	0.82	0.51
Cl3(18)	0.15	0.2	0.15 U	0.15 U	0.15 U	0.15 U
Cl3(28)	0.02	0.2	0.06 J	0.02 U	0.05 J	0.06 J
Cl4(44)	0.02	0.2	0.21	0.26	0.29	0.02 U
Cl4(52)	0.05	0.2	0.15 J	0.58	0.14 J	0.18 J
Cl4(66)	0.08	0.2	0.08 U	0.53	0.14 J	0.08 U
Cl4(77)	0.15	0.2	1.16	1.03	0.94	0.82
Cl5(101)	0.17	0.2	1.04	2.80	1.20	1.45
Cl5(105)	0.03	0.2	0.28	0.76	0.24	0.25
Cl5(118)	0.10	0.2	0.62	2.33	0.69	0.81
Cl5(126)	0.07	0.2	0.58	1.27	0.57	1.55
Cl6(128)	0.04	0.2	0.26	0.77	0.31	0.38
Cl6(138)	0.13	0.2	1.48	4.60	1.34	3.77
Cl6(153)	0.18	0.2	1.88	4.73	1.67	3.83
Cl7(170)	0.02	0.2	0.07 J	0.11 J	0.06 J	0.20
Cl7(180)	0.03	0.2	0.29	0.53	0.38	0.99
Cl7(187)	0.08	0.2	0.68	1.92	0.57	1.87
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.02 J	0.03 J
Cl8(200)	0.08	0.2	0.39	0.66	0.29	0.67
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			19.78	47.95	19.78	35.24
SURROGATE RECOVERIES						
Cl3(30)			97%	109%	99%	99%
Cl4(65)			105%	92%	91%	101%
Cl8(198)			71%	74%	70%	72%

[1] NOAA Status and Trends method of summing congeners (NOAA, 1995; O'Connor, 2002).

NOAA (1995). Magnitude and Extent of Sediment Toxicity in the Hudson-Raritan Estuary. NOAA Tech. Memo. NOS ORCA 88. Sil
O'Connor, T.P. (2002). National distribution of chemical concentrations in mussels and oysters in the USA. Marine Environmental R

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PCBs in Indigenous Mussels

Sample Name:	**MDL**	**RL**	**3106-786**	**3106-787**	**3106-788**	**3106-789**
Station:			SIPOM	SISIM	POPIPD	PWNLP
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			40512	40512	40512	40512
Sample Weight (g):			10.45	10.34	10.09	9.96
%Moisture:			83.5	84.9	84.6	88.7
Average %Lipids (n=3; DRY WT):			10.11	11.57	9.37	7.55
Collection Date:			01/17/2012	01/17/2012	01/19/2012	01/19/2012
Extraction Date:			4/5/2012	4/5/2012	4/5/2012	4/5/2012
Analysis Date:			4/13/2012	4/13/2012	4/13/2012	4/13/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	1.09	0.30	0.42	0.52
Cl3(18)	0.15	0.2	0.87	0.15 U	0.15 U	0.31
Cl3(28)	0.02	0.2	0.02 U	0.11 J	0.02 U	0.15 J
Cl4(44)	0.02	0.2	0.02 U	0.43	0.19 J	0.29
Cl4(52)	0.05	0.2	0.50	0.81	0.29	0.58
Cl4(66)	0.08	0.2	0.54	0.63	0.17 J	0.08 U
Cl4(77)	0.15	0.2	1.85	1.36	0.15 U	1.40
Cl5(101)	0.17	0.2	3.12	3.08	1.64	1.27
Cl5(105)	0.03	0.2	0.71	0.89	0.27	0.37
Cl5(118)	0.10	0.2	1.99	2.92	0.84	1.20
Cl5(126)	0.07	0.2	1.03	1.12	0.59	0.90
Cl6(128)	0.04	0.2	0.65	0.84	0.22	0.40
Cl6(138)	0.13	0.2	3.39	4.37	1.52	2.56
Cl6(153)	0.18	0.2	3.94	4.41	1.81	3.15
Cl7(170)	0.02	0.2	0.11 J	0.13 J	0.06 J	0.11 J
Cl7(180)	0.03	0.2	0.41	0.57	0.37	0.39
Cl7(187)	0.08	0.2	1.37	1.43	0.76	1.33
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.54	0.97	0.49	0.59
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.12 J	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			44.37	49.10	20.20	31.27
SURROGATE RECOVERIES						
Cl3(30)			92%	93%	99%	98%
Cl4(65)			88%	88%	84%	98%
Cl8(198)			69%	67%	67%	69%

[1] NOAA Status and Trends method of summing cc

NOAA (1995). Magnitude and Extent of Sedimentlver Springs, MD. 242pp.
O'Connor, T.P. (2002). National distribution of chesearch 53:117-143.

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Sample Name:	**MDL**	**RL**	**3106-790**	**3106-791**	**3106-792**	**3106-793**	**3106-794**
Station:			DYOTS	POPBWN	KPTLAG	KPTPIER	LBPMSC
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			40512	40512	32912	40512	42412
Sample Weight (g):			11.17	9.18	12.18	9.78	9.79
%Moisture:			85.8	86.0	85.9	83.1	87.5
Average %Lipids (n=3; DRY WT):			8.72	8.03	8.33	8.89	8.98
Collection Date:			01/19/2012	01/20/2012	01/20/2012	01/20/2012	01/21/2012
Extraction Date:			4/5/2012	4/5/2012	3/29/2012	4/5/2012	4/24/2012
Analysis Date:			4/13/2012	4/13/2012	4/5/2012	4/13/2012	5/2/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.16 U	0.20	0.35	0.96	0.72
Cl3(18)	0.15	0.2	0.15 U	0.15 U	0.24	0.16 J	0.75
Cl3(28)	0.02	0.2	0.02 U	0.16 J	0.02 U	0.02 U	0.97
Cl4(44)	0.02	0.2	0.02 U	0.19 J	0.02 U	0.44	8.04
Cl4(52)	0.05	0.2	0.30	0.45	0.40	0.21	2.96
Cl4(66)	0.08	0.2	0.08 U	0.29	0.09 J	0.12 J	0.77
Cl4(77)	0.15	0.2	0.39	0.45	0.96	0.61	0.44
Cl5(101)	0.17	0.2	1.09	1.10	1.38	1.46	1.11
Cl5(105)	0.03	0.2	0.28	0.33	0.23	0.39	0.36
Cl5(118)	0.10	0.2	0.92	1.19	0.72	0.84	0.79
Cl5(126)	0.07	0.2	0.59	0.83	0.40	0.64	0.73
Cl6(128)	0.04	0.2	0.28	0.35	0.21	0.42	0.50
Cl6(138)	0.13	0.2	1.62	1.97	1.01	1.77	1.84
Cl6(153)	0.18	0.2	1.81	2.43	1.21	1.84	1.38
Cl7(170)	0.02	0.2	0.05 J	0.05 J	0.06 J	0.11 J	0.07 J
Cl7(180)	0.03	0.2	0.31	0.43	0.14 J	0.26	0.24
Cl7(187)	0.08	0.2	0.70	0.90	0.32	0.77	0.71
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.27	0.31	0.19 J	0.30	1.09
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			18.17	23.58	15.94	22.67	46.92
SURROGATE RECOVERIES							
Cl3(30)			97%	83%	89%	99%	88%
Cl4(65)			95%	91%	83%	83%	74%
Cl8(198)			72%	74%	72%	64%	63%

[1] NOAA Status and Trends method of summing cc
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Sample Name:	**MDL**	**RL**	**3106-795**	**3106-796**	**3106-797**	**3106-798**	**3106-799**
Station:			APKIANA	APHCB	POPISP	PS03	PS04
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			42412	42412	42412	32912	42412
Sample Weight (g):			11.02	9.37	9.62	13.38	9.99
%Moisture:			81.6	89.9	86.6	86.7	85.3
Average %Lipids (n=3; DRY WT):			10.88	9.73	9.24	9.37	8.02
Collection Date:			01/21/2012	01/21/2012	01/22/2012	01/24/2012	01/24/2012
Extraction Date:			4/24/2012	4/24/2012	4/24/2012	3/29/2012	4/24/2012
Analysis Date:			5/2/2012	5/2/2012	5/2/2012	4/5/2012	5/2/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	1.23	0.61	0.64	0.35	0.29
Cl3(18)	0.15	0.2	0.84	0.17 J	0.18 J	0.20	0.15 U
Cl3(28)	0.02	0.2	0.04 J	0.08 J	0.04 J	0.02 U	0.16 J
Cl4(44)	0.02	0.2	0.26	0.40	0.38	0.26	0.30
Cl4(52)	0.05	0.2	0.42	0.21	0.43	0.85	0.65
Cl4(66)	0.08	0.2	0.08 U	0.22	0.41	0.32	0.46
Cl4(77)	0.15	0.2	0.61	0.57	0.46	1.13	0.84
Cl5(101)	0.17	0.2	1.14	1.21	1.71	2.93	2.29
Cl5(105)	0.03	0.2	0.26	0.29	0.32	1.02	0.62
Cl5(118)	0.10	0.2	0.62	0.70	0.84	3.12	1.86
Cl5(126)	0.07	0.2	0.57	0.51	0.73	1.59	1.16
Cl6(128)	0.04	0.2	0.30	0.22	0.23	0.89	0.46
Cl6(138)	0.13	0.2	1.34	1.22	1.69	6.66	3.32
Cl6(153)	0.18	0.2	1.62	1.71	2.16	6.35	3.86
Cl7(170)	0.02	0.2	0.09 J	0.10 J	0.09 J	0.18 J	0.13 J
Cl7(180)	0.03	0.2	0.21	0.27	0.39	0.86	0.67
Cl7(187)	0.08	0.2	0.54	0.57	0.93	2.47	1.33
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.32	0.64	0.63	2.04	1.51
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			21.05	19.44	24.58	62.52	40.23
SURROGATE RECOVERIES							
Cl3(30)			128% &	105%	131% &	100%	101%
Cl4(65)			95%	96%	111%	89%	83%
Cl8(198)			69%	62%	77%	68%	62%

[1] NOAA Status and Trends method of summing cc
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O'Connor, T.P. (2002). National distribution of ch

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Sample Name:	**MDL**	**RL**	**3106-800**	**3106-801**	**3106-802**	**3106-803**	**3106-804**
Station:			PS06	PS08	PS09	PS11	PIER7RB30
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			42412	42412	42412	42412	32912
Sample Weight (g):			10.83	10.82	10.37	10.69	12.86
%Moisture:			87.9	86.1	86.8	85.9	85.0
Average %Lipids (n=3; DRY WT):			8.61	8.07	8.09	8.29	8.12
Collection Date:			01/24/2012	01/24/2012	01/24/2012	01/24/2012	01/24/2012
Extraction Date:			4/24/2012	4/24/2012	4/24/2012	4/24/2012	3/29/2012
Analysis Date:			5/2/2012	5/2/2012	5/2/2012	5/2/2012	4/5/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.43	0.16 U	0.23	0.85	0.20
Cl3(18)	0.15	0.2	0.19 J	0.15 U	0.16 J	0.78	0.22
Cl3(28)	0.02	0.2	0.06 J	0.06 J	0.09 J	0.08 J	0.08 J
Cl4(44)	0.02	0.2	0.41	0.25	0.42	0.44	0.19 J
Cl4(52)	0.05	0.2	0.82	1.03	0.84	0.59	0.36
Cl4(66)	0.08	0.2	0.39	0.33	0.34	0.47	0.30
Cl4(77)	0.15	0.2	1.65	2.54	1.14	2.21	0.72
Cl5(101)	0.17	0.2	1.99	2.49	4.08	3.24	2.25
Cl5(105)	0.03	0.2	0.58	0.73	1.25	0.77	0.53
Cl5(118)	0.10	0.2	1.75	1.84	3.78	2.01	1.71
Cl5(126)	0.07	0.2	1.15	1.00	2.53	1.22	0.94
Cl6(128)	0.04	0.2	0.45	0.48	1.21	0.50	0.52
Cl6(138)	0.13	0.2	3.13	3.28	9.11	3.87	2.91
Cl6(153)	0.18	0.2	3.59	3.49	10.06	4.15	3.10
Cl7(170)	0.02	0.2	0.11 J	0.14 J	0.23	0.13 J	0.12 J
Cl7(180)	0.03	0.2	0.51	0.57	1.69	0.89	0.46
Cl7(187)	0.08	0.2	1.33	1.20	3.18	1.45	1.06
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.56	1.88	0.84	1.02	0.51
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.13 J	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			38.27	43.28	82.36	49.63	32.40
SURROGATE RECOVERIES							
Cl3(30)			133% &	126% &	95%	122% &	96%
Cl4(65)			122% &	112%	83%	99%	95%
Cl8(198)			78%	79%	64%	72%	71%

[1] NOAA Status and Trends method of summing cc
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PCBs in Indigenous Mussels

Sample Name:	**MDL**	**RL**	**3106-805**	**3106-806**	**3106-807**	**3106-808**	**3106-809**
Station:			PIER7CB05	PIER7FE46	PS01	SIGST	PKPLPC
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			51512	51512	51512	51512	51512
Sample Weight (g):			10.5	9.38	10.32	9.39	9.52
%Moisture:			89.5	88.5	86.5	88.2	88.7
Average %Lipids (n=3; DRY WT):			7.14	7.97	7.49	9.72	7.95
Collection Date:			01/24/2012	01/24/2012	01/24/2012	02/15/2012	02/18/2012
Extraction Date:			5/15/2012	5/15/2012	5/15/2012	5/15/2012	5/15/2012
Analysis Date:			6/16/2012	6/16/2012	6/16/2012	6/16/2012	6/16/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.34	0.63	0.42	0.16 U	0.56
Cl3(18)	0.15	0.2	0.17 J	0.15 U	0.15 U	0.15 U	0.27
Cl3(28)	0.02	0.2	0.02 U	0.16 J	0.09 J	0.11 J	0.02 U
Cl4(44)	0.02	0.2	0.26	0.26	0.42	0.51	0.29
Cl4(52)	0.05	0.2	0.20	0.24	0.49	0.38	0.05 U
Cl4(66)	0.08	0.2	0.11 J	0.23	0.26	0.47	0.11 J
Cl4(77)	0.15	0.2	0.91	1.63	2.38	1.61	1.22
Cl5(101)	0.17	0.2	0.98	1.26	1.80	3.16	0.79
Cl5(105)	0.03	0.2	0.28	0.32	0.45	0.91	0.14 J
Cl5(118)	0.10	0.2	0.79	0.95	1.33	2.90	0.34
Cl5(126)	0.07	0.2	0.59	0.69	0.80	1.50	0.20 J
Cl6(128)	0.04	0.2	0.23	0.30	0.42	0.86	0.19 J
Cl6(138)	0.13	0.2	1.45	1.83	2.29	5.11	0.32
Cl6(153)	0.18	0.2	1.69	2.06	2.64	5.66	0.20 J
Cl7(170)	0.02	0.2	0.07 J	0.13 J	0.13 J	0.11 J	0.12 J
Cl7(180)	0.03	0.2	0.21	0.31	0.38	0.33	0.09 J
Cl7(187)	0.08	0.2	0.60	0.76	0.88	1.84	0.17 J
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.03 J	0.01 U
Cl8(200)	0.08	0.2	0.39	0.33	0.47	0.67	0.17 J
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			18.65	24.51	31.64	52.94	10.56
SURROGATE RECOVERIES							
Cl3(30)			94%	106%	107%	101%	115%
Cl4(65)			93%	96%	94%	94%	95%
Cl8(198)			66%	69%	66%	72%	69%

[1] NOAA Status and Trends method of summing cc
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Sample Name:	**MDL**	**RL**	**3106-740**	**3106-741**	**3106-780**
Station:			SIWP	SIRP	DYOBAP
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE
Batch ID:			40512	40512	32912
Sample Weight (g):			10.63	9.95	11.82
%Moisture:			87.5	84.5	84.4
Average %Lipids (n=3; DRY WT):			7.19	9.34	9.67
Collection Date:			12/05/2011	12/05/2011	12/07/2011
Extraction Date:			4/5/2012	4/5/2012	3/29/2012
Analysis Date:			4/25/2012	4/25/2012	4/24/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]			**99.5**	**133**	**87.4**
Naphthalene	1.82	1.82	1.82 U	2.15	1.82 U
C1-Naphthalenes	1.82	1.82	1.82 U	2.06	2.48
C2-Naphthalenes	3.61	1.82	4.55	5.41	4.63
C3-Naphthalenes	3.61	1.82	5.69	6.57	4.64
C4-Naphthalenes	3.61	1.82	4.03	4.17	3.61 U
Biphenyl	2.86	1.82	2.86 U	2.86 U	2.86 U
Acenaphthylene	1.68	1.82	2.17	2.66	1.95 B
Acenaphthene	2.29	1.82	2.29 U	2.29 U	2.29 U
Fluorene	2.75	1.82	2.75 U	2.75 U	2.75 U
C1-Fluorenes	2.17	1.82	3.15	3.27	2.42
C2-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U
Anthracene	0.42	1.82	2.59	3.39	2.37
Phenanthrene	1.10	1.82	3.38	5.03	2.93
C1-Phenanthrenes/Anthracenes	1.18	1.82	4.95	6.73	4.14
C2-Phenanthrenes/Anthracenes	0.10	1.82	7.31	10.15	4.95
C3-Phenanthrenes/Anthracenes	0.10	1.82	0.10 U	6.77	3.85
C4-Phenanthrenes/Anthracenes	0.10	1.82	4.65	6.22	3.58
Dibenzothiophene	0.40	1.82	1.23 J	1.42 J	0.40 U
C1-Dibenzothiophenes	0.40	1.82	0.40 U	0.40 U	0.40 U
C2-Dibenzothiophenes	0.40	1.82	0.40 U	0.40 U	0.40 U
C3-Dibenzothiophenes	0.40	1.82	0.40 U	0.40 U	0.40 U
C4-Dibenzothiophenes	0.40	1.82	0.40 U	0.40 U	0.40 U
Fluoranthene	0.81	1.82	5.10	8.29	4.35
Pyrene	0.35	1.82	4.03	7.22	3.66
C1-Fluoranthenes/Pyrenes	0.81	1.82	4.16	5.76	3.33
C2-Fluoranthenes/Pyrenes	0.81	1.82	3.53	4.31	2.83
C3-Fluoranthenes/Pyrenes	0.81	1.82	0.81 U	0.81 U	0.81 U
Benzo(a)anthracene	0.54	1.82	2.06	3.03	1.31 J
Chrysene	0.87	1.82	2.65	3.93	1.40 J
C1-Chrysenes	0.87	1.82	0.87 J	1.35 J	0.53 U
C2-Chrysenes	0.87	1.82	1.12 J	1.49 J	0.87 U
C3-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U

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Sample Name:	**MDL**	**RL**	**3106-740**	**3106-741**	**3106-780**
Station:			SIWP	SIRP	DYOBAP
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE
Batch ID:			40512	40512	32912
Sample Weight (g):			10.63	9.95	11.82
%Moisture:			87.5	84.5	84.4
Average %Lipids (n=3; DRY WT):			7.19	9.34	9.67
Collection Date:			12/05/2011	12/05/2011	12/07/2011
Extraction Date:			4/5/2012	4/5/2012	3/29/2012
Analysis Date:			4/25/2012	4/25/2012	4/24/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
C4-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	0.37	1.82	2.14	3.56	1.74 J
Benzo(k)fluoranthene	0.21	1.82	1.34 J	1.89	1.10 J
Benzo(e)pyrene	0.22	1.82	0.97 J	2.16	0.85 J
Benzo(a)pyrene	0.23	1.82	0.91 J	1.12 J	0.68 J
Perylene	0.25	1.82	1.95	2.29	1.57 J
Indeno(1,2,3-cd)pyrene	0.14	1.82	1.09 J	1.23 J	0.88 J
Dibenz(a,h)anthracene	0.06	1.82	1.91	2.10	1.64 J
Benzo(g,h,i)perylene	0.22	1.82	1.81 J	1.05 J	0.52 J
SURROGATE RECOVERIES (%Rec)					
d8-Naphthalene			44%	42%	52%
d10-Acenaphthene			67%	63%	70%
d10-Phenanthrene			88%	81%	86%
d12-Chrysene			73%	68%	79%
d12-Perylene			73%	66%	78%

[1] Sum of PAHs includes the MDL for non-detects

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Sample Name:	**3106-785**	**3106-786**	**3106-787**	**3106-788**
Station:	MLPIER	SIPOM	SISIM	POPIPD
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	32912	40512	40512	40512
Sample Weight (g):	12.33	10.45	10.34	10.09
%Moisture:	84.1	83.5	84.9	84.6
Average %Lipids (n=3; DRY WT):	9.03	10.11	11.57	9.37
Collection Date:	01/17/2012	01/17/2012	01/17/2012	01/19/2012
Extraction Date:	3/29/2012	4/5/2012	4/5/2012	4/5/2012
Analysis Date:	4/24/2012	4/25/2012	4/25/2012	4/25/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]	**142**	**274**	**384**	**180**
Naphthalene	1.82 U	2.35	2.18	2.08
C1-Naphthalenes	2.40	2.35	2.18	2.00
C2-Naphthalenes	4.20	6.78	5.67	5.03
C3-Naphthalenes	4.41	10.40	8.09	5.77
C4-Naphthalenes	3.61 U	17.91	8.01	4.18
Biphenyl	2.86 U	2.86 U	2.86 U	2.86 U
Acenaphthylene	2.27 B	2.92	4.81	2.87
Acenaphthene	2.29 U	2.29 U	2.44	2.29 U
Fluorene	2.75 U	2.75 U	3.25	3.20
C1-Fluorenes	2.57	5.13	4.15	3.37
C2-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	3.12	3.67	5.80	4.37
Phenanthrene	7.76	7.09	13.43	12.77
C1-Phenanthrenes/Anthracenes	5.58	17.96	15.31	9.11
C2-Phenanthrenes/Anthracenes	5.96	42.48	22.91	10.13
C3-Phenanthrenes/Anthracenes	5.39	38.57	22.47	7.67
C4-Phenanthrenes/Anthracenes	7.08	17.05	20.78	8.23
Dibenzothiophene	1.16 J	1.48 J	1.75 J	1.69 J
C1-Dibenzothiophenes	0.40 U	0.40 U	2.62	0.40 U
C2-Dibenzothiophenes	0.40 U	0.40 U	4.83	0.40 U
C3-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U
C4-Dibenzothiophenes	0.40 U	0.40 U	5.30	0.40 U
Fluoranthene	13.26	14.58	41.58	21.56
Pyrene	7.23	11.36	24.88	12.22
C1-Fluoranthenes/Pyrenes	6.38	9.91	18.21	8.29
C2-Fluoranthenes/Pyrenes	4.38	6.74	10.83	5.00
C3-Fluoranthenes/Pyrenes	0.81 U	0.81 U	8.26	0.81 U
Benzo(a)anthracene	5.29	4.16	13.90	5.70
Chrysene	8.09	7.11	24.12	8.05
C1-Chrysenes	1.95	2.84	9.36	1.87
C2-Chrysenes	1.59 J	3.84	7.13	1.77 J
C3-Chrysenes	0.87 U	0.87 U	0.87 U	0.87 U

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Sample Name:	**3106-785**	**3106-786**	**3106-787**	**3106-788**
Station:	MLPIER	SIPOM	SISIM	POPIPD
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	32912	40512	40512	40512
Sample Weight (g):	12.33	10.45	10.34	10.09
%Moisture:	84.1	83.5	84.9	84.6
Average %Lipids (n=3; DRY WT):	9.03	10.11	11.57	9.37
Collection Date:	01/17/2012	01/17/2012	01/17/2012	01/19/2012
Extraction Date:	3/29/2012	4/5/2012	4/5/2012	4/5/2012
Analysis Date:	4/24/2012	4/25/2012	4/25/2012	4/25/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
C4-Chrysenes	0.87 U	0.87 U	1.00 J	0.87 U
Benzo(b)fluoranthene	6.48	6.19	21.51	5.59
Benzo(k)fluoranthene	3.12	2.83	9.07	2.70
Benzo(e)pyrene	2.26	3.98	12.46	2.31
Benzo(a)pyrene	1.88	1.45 J	4.32	1.79 J
Perylene	1.88	2.24	3.33	2.42
Indeno(1,2,3-cd)pyrene	1.41 J	0.14 U	3.38	1.56 J
Dibenz(a,h)anthracene	1.83	0.06 U	2.77	2.23
Benzo(g,h,i)perylene	1.12 J	4.15	3.15	0.90 J
SURROGATE RECOVERIES (%Rec)				
d8-Naphthalene	46%	44%	43%	36% &
d10-Acenaphthene	60%	63%	59%	60%
d10-Phenanthrene	82%	85%	83%	83%
d12-Chrysene	69%	66%	69%	68%
d12-Perylene	72%	69%	69%	69%

[1] Sum of PAHs includes the MDL for non-detect

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Sample Name:	**3106-789**	**3106-790**	**3106-791**	**3106-792**
Station:	PWNLP	DYOTS	POPBWN	KPTLAG
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	40512	40512	40512	32912
Sample Weight (g):	9.96	11.17	9.18	12.18
%Moisture:	88.7	85.8	86.0	85.9
Average %Lipids (n=3; DRY WT):	7.55	8.72	8.03	8.33
Collection Date:	01/19/2012	01/19/2012	01/20/2012	01/20/2012
Extraction Date:	4/5/2012	4/5/2012	4/5/2012	3/29/2012
Analysis Date:	4/25/2012	4/25/2012	4/25/2012	4/24/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]	**139**	**128**	**168**	**101**
Naphthalene	2.15	2.18	2.22	1.82 U
C1-Naphthalenes	2.10	1.96	1.82 U	2.38
C2-Naphthalenes	4.60	4.01	3.57 U	6.20
C3-Naphthalenes	7.71	4.56	5.39	4.08
C4-Naphthalenes	5.01	3.71	4.35	3.61 U
Biphenyl	3.60	2.86 U	2.86 U	2.86 U
Acenaphthylene	2.64	2.40	2.95	1.99 B
Acenaphthene	2.29 U	2.29 U	2.29 U	2.29 U
Fluorene	2.75 U	2.75 U	2.75 U	2.75 U
C1-Fluorenes	3.89	2.82	3.57	2.43
C2-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	3.09	3.02	3.58	2.40
Phenanthrene	4.01	6.00	7.22	3.65
C1-Phenanthrenes/Anthracenes	6.67	6.15	7.89	4.65
C2-Phenanthrenes/Anthracenes	9.62	8.85	10.71	4.95
C3-Phenanthrenes/Anthracenes	6.78	6.39	10.26	4.29
C4-Phenanthrenes/Anthracenes	8.19	6.07	8.25	3.90
Dibenzothiophene	1.37 J	1.30 J	1.54 J	1.11 J
C1-Dibenzothiophenes	0.40 U	0.40 U	2.03	0.40 U
C2-Dibenzothiophenes	3.26	0.40 U	2.84	0.40 U
C3-Dibenzothiophenes	0.40 U	0.40 U	3.41	0.40 U
C4-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U
Fluoranthene	7.50	9.06	14.13	5.92
Pyrene	5.61	8.02	10.20	5.43
C1-Fluoranthenes/Pyrenes	5.40	5.74	7.28	4.13
C2-Fluoranthenes/Pyrenes	4.26	4.12	4.68	3.46
C3-Fluoranthenes/Pyrenes	0.81 U	0.81 U	0.81 U	0.81 U
Benzo(a)anthracene	2.90	3.20	3.19	2.01
Chrysene	4.22	4.59	6.76	3.09
C1-Chrysenes	1.77 J	1.40 J	2.21	0.81 U
C2-Chrysenes	3.93	1.38 J	1.68 J	0.87 J
C3-Chrysenes	0.87 U	0.87 U	0.87 U	0.87 U

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Sample Name:	**3106-789**	**3106-790**	**3106-791**	**3106-792**
Station:	PWNLP	DYOTS	POPBWN	KPTLAG
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	40512	40512	40512	32912
Sample Weight (g):	9.96	11.17	9.18	12.18
%Moisture:	88.7	85.8	86.0	85.9
Average %Lipids (n=3; DRY WT):	7.55	8.72	8.03	8.33
Collection Date:	01/19/2012	01/19/2012	01/20/2012	01/20/2012
Extraction Date:	4/5/2012	4/5/2012	4/5/2012	3/29/2012
Analysis Date:	4/25/2012	4/25/2012	4/25/2012	4/24/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
C4-Chrysenes	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	3.95	3.54	5.87	2.51
Benzo(k)fluoranthene	2.02	1.59 J	3.10	1.17 J
Benzo(e)pyrene	2.09	2.31	2.87	1.59 J
Benzo(a)pyrene	1.53 J	1.12 J	1.48 J	0.78 J
Perylene	2.26	2.05	2.65	1.78 J
Indeno(1,2,3-cd)pyrene	0.14 U	1.14 J	1.66 J	1.03 J
Dibenz(a,h)anthracene	0.06 U	1.84	2.25	1.64 J
Benzo(g,h,i)perylene	3.78	0.90 J	1.21 J	0.55 J
SURROGATE RECOVERIES (%Rec)				
d8-Naphthalene	23% &	38% &	51%	57%
d10-Acenaphthene	49%	62%	62%	76%
d10-Phenanthrene	83%	86%	79%	90%
d12-Chrysene	68%	70%	76%	73%
d12-Perylene	73%	67%	68%	74%

[1] Sum of PAHs includes the MDL for non-detect

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Sample Name:	**3106-793**	**3106-794**	**3106-795**	**3106-796**
Station:	KPTPIER	LBPMSC	APKIANA	APHCB
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	40512	42412	42412	42412
Sample Weight (g):	9.78	9.79	11.02	9.37
%Moisture:	83.1	87.5	81.6	89.9
Average %Lipids (n=3; DRY WT):	8.89	8.98	10.88	9.73
Collection Date:	01/20/2012	01/21/2012	01/21/2012	01/21/2012
Extraction Date:	4/5/2012	4/24/2012	4/24/2012	4/24/2012
Analysis Date:	4/25/2012	4/30/2012	4/30/2012	4/30/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]	**139**	**361**	**133**	**313**
Naphthalene	2.12	5.66	2.01	2.74
C1-Naphthalenes	1.83	5.59	1.94	2.48
C2-Naphthalenes	4.50	9.69	4.85	5.45
C3-Naphthalenes	5.57	10.67	5.11	7.10
C4-Naphthalenes	4.80	11.19	4.23	5.02
Biphenyl	3.12	2.86 U	2.86 U	2.86 U
Acenaphthylene	2.81	3.79	2.37	3.40
Acenaphthene	2.29 U	2.96	2.29 U	3.80
Fluorene	2.75 U	4.46	2.75 U	4.86
C1-Fluorenes	3.63	4.94	2.79	4.82
C2-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	3.41	5.13	3.31	5.73
Phenanthrene	6.19	19.16	6.77	18.47
C1-Phenanthrenes/Anthracenes	7.40	17.53	6.54	16.46
C2-Phenanthrenes/Anthracenes	9.36	18.39	7.93	15.25
C3-Phenanthrenes/Anthracenes	6.84	13.39	6.35	8.03
C4-Phenanthrenes/Anthracenes	6.15	15.79	5.66	11.81
Dibenzothiophene	1.47 J	2.08	1.37 J	2.19
C1-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U
C2-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U
C3-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U
C4-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U
Fluoranthene	9.90	43.81	9.64	41.14
Pyrene	6.95	24.93	7.01	22.78
C1-Fluoranthenes/Pyrenes	5.98	16.71	5.72	17.13
C2-Fluoranthenes/Pyrenes	4.27	9.05	3.94	8.31
C3-Fluoranthenes/Pyrenes	0.81 U	0.81 U	0.81 U	0.81 U
Benzo(a)anthracene	2.63	13.29	3.34	15.55
Chrysene	4.33	22.81	5.46	21.69
C1-Chrysenes	1.52 J	6.85	1.43 J	5.75
C2-Chrysenes	2.29	5.38	2.90	3.49
C3-Chrysenes	0.87 U	0.87 U	0.87 U	0.87 U

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Sample Name:	**3106-793**	**3106-794**	**3106-795**	**3106-796**
Station:	KPTPIER	LBPMSC	APKIANA	APHCB
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	40512	42412	42412	42412
Sample Weight (g):	9.78	9.79	11.02	9.37
%Moisture:	83.1	87.5	81.6	89.9
Average %Lipids (n=3; DRY WT):	8.89	8.98	10.88	9.73
Collection Date:	01/20/2012	01/21/2012	01/21/2012	01/21/2012
Extraction Date:	4/5/2012	4/24/2012	4/24/2012	4/24/2012
Analysis Date:	4/25/2012	4/30/2012	4/30/2012	4/30/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
C4-Chrysenes	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	5.16	19.21	4.23	17.09
Benzo(k)fluoranthene	2.49	7.92	1.84	6.90
Benzo(e)pyrene	2.02	12.51	2.32	8.28
Benzo(a)pyrene	1.19 J	3.62	1.05 J	5.79
Perylene	2.13	3.16	0.25 U	3.65
Indeno(1,2,3-cd)pyrene	1.81 J	3.23	0.14 U	3.71
Dibenz(a,h)anthracene	2.19	2.82	0.06 U	3.11
Benzo(g,h,i)perylene	1.21 J	3.67	5.79	0.00 U
SURROGATE RECOVERIES (%Rec)				
d8-Naphthalene	46%	18% &	50%	47%
d10-Acenaphthene	59%	52%	76%	71%
d10-Phenanthrene	80%	80%	89%	87%
d12-Chrysene	67%	58%	72%	71%
d12-Perylene	65%	68%	77%	72%

[1] Sum of PAHs includes the MDL for non-detect

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Sample Name:	**3106-797**	**3106-798**	**3106-799**	**3106-800**
Station:	POPISP	PS03	PS04	PS06
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	42412	32912	42412	42412
Sample Weight (g):	9.62	13.38	9.99	10.83
%Moisture:	86.6	86.7	85.3	87.9
Average %Lipids (n=3; DRY WT):	9.24	9.37	8.02	8.61
Collection Date:	01/22/2012	01/24/2012	01/24/2012	01/24/2012
Extraction Date:	4/24/2012	3/29/2012	4/24/2012	4/24/2012
Analysis Date:	4/30/2012	4/24/2012	4/30/2012	4/30/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]	**154**	**1422**	**644**	**198**
Naphthalene	2.22	3.76	2.16	2.25
C1-Naphthalenes	2.08	6.58	2.89	6.66
C2-Naphthalenes	4.48	10.98	7.70	29.18
C3-Naphthalenes	5.58	10.01	8.25	22.00
C4-Naphthalenes	4.50	9.01	7.20	8.92
Biphenyl	2.86 U	2.86 U	2.86 U	2.86 U
Acenaphthylene	2.79	4.15 B	4.00	2.53
Acenaphthene	2.29 U	10.94	4.07	2.29 U
Fluorene	2.75 U	12.07	5.72	2.75 U
C1-Fluorenes	3.26	5.84	4.69	3.04
C2-Fluorenes	2.17 U	21.41	2.17 U	2.17 U
C3-Fluorenes	2.17 U	72.56	2.17 U	2.17 U
Anthracene	3.68	28.08	11.63	3.40
Phenanthrene	8.48	67.48	40.98	5.15
C1-Phenanthrenes/Anthracenes	7.65	44.64	27.54	7.14
C2-Phenanthrenes/Anthracenes	8.99	42.93	26.94	10.74
C3-Phenanthrenes/Anthracenes	6.78	35.23	21.18	9.46
C4-Phenanthrenes/Anthracenes	6.65	52.43	31.25	7.38
Dibenzothiophene	1.47 J	4.34	2.91	1.29 J
C1-Dibenzothiophenes	0.40 U	3.86	3.30	0.40 U
C2-Dibenzothiophenes	0.40 U	7.23	0.40 U	0.40 U
C3-Dibenzothiophenes	0.40 U	10.54	0.40 U	0.40 U
C4-Dibenzothiophenes	0.40 U	9.49	4.99	0.40 U
Fluoranthene	13.73	204.20	96.33	9.96
Pyrene	8.76	136.52	59.00	9.51
C1-Fluoranthenes/Pyrenes	6.61	70.56	35.94	6.75
C2-Fluoranthenes/Pyrenes	5.06	30.26	17.53	4.92
C3-Fluoranthenes/Pyrenes	0.81 U	17.94	9.42	0.81 U
Benzo(a)anthracene	4.21	92.91	33.53	4.94
Chrysene	7.76	99.71	49.11	5.72
C1-Chrysenes	1.90	33.72	14.51	2.36
C2-Chrysenes	3.09	17.71	9.12	2.55
C3-Chrysenes	0.87 U	7.44	0.87 U	0.87 U

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2012 Regional Mussel Watch
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PAHs in Indigenous Mussels

Sample Name:	**3106-797**	**3106-798**	**3106-799**	**3106-800**
Station:	POPISP	PS03	PS04	PS06
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	42412	32912	42412	42412
Sample Weight (g):	9.62	13.38	9.99	10.83
%Moisture:	86.6	86.7	85.3	87.9
Average %Lipids (n=3; DRY WT):	9.24	9.37	8.02	8.61
Collection Date:	01/22/2012	01/24/2012	01/24/2012	01/24/2012
Extraction Date:	4/24/2012	3/29/2012	4/24/2012	4/24/2012
Analysis Date:	4/30/2012	4/24/2012	4/30/2012	4/30/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
C4-Chrysenes	0.87 U	2.27	0.87 U	0.87 U
Benzo(b)fluoranthene	5.00	88.23	32.36	4.68
Benzo(k)fluoranthene	2.41	33.74	14.10	2.25
Benzo(e)pyrene	2.54	53.73	17.84	2.59
Benzo(a)pyrene	1.54 J	23.90	9.10	1.63 J
Perylene	2.25	9.53	4.49	1.99
Indeno(1,2,3-cd)pyrene	0.14 U	9.39	5.17	0.14 U
Dibenz(a,h)anthracene	0.06 U	4.57	3.56	0.06 U
Benzo(g,h,i)perylene	4.27	8.90	6.07	2.55
SURROGATE RECOVERIES (%Rec)				
d8-Naphthalene	49%	39% &	53%	48%
d10-Acenaphthene	76%	65%	70%	72%
d10-Phenanthrene	97%	85%	88%	87%
d12-Chrysene	71%	69%	79%	73%
d12-Perylene	76%	69%	79%	75%

[1] Sum of PAHs includes the MDL for non-detect

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2012 Regional Mussel Watch
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Sample Name:	**3106-801**	**3106-802**	**3106-803**	**3106-804**	**3106-805**
Station:	PS08	PS09	PS11	PIER7RB30	PIER7CB05
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	42412	42412	42412	32912	51512
Sample Weight (g):	10.82	10.37	10.69	12.86	10.5
%Moisture:	86.1	86.8	85.9	85.0	89.5
Average %Lipids (n=3; DRY WT):	8.07	8.09	8.29	8.12	7.14
Collection Date:	01/24/2012	01/24/2012	01/24/2012	01/24/2012	01/24/2012
Extraction Date:	4/24/2012	4/24/2012	4/24/2012	3/29/2012	5/15/2012
Analysis Date:	4/30/2012	4/30/2012	4/30/2012	4/24/2012	5/22/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]	**2087**	**220**	**291**	**202**	**120**
Naphthalene	2.99	1.89	2.20	2.09	2.09
C1-Naphthalenes	34.29	1.85	2.58	3.51	1.86
C2-Naphthalenes	34.46	5.36	7.79	6.32	4.23
C3-Naphthalenes	27.40	6.21	7.37	6.63	5.40
C4-Naphthalenes	23.68	5.56	7.12	5.06	3.61 U
Biphenyl	10.33	2.86 U	2.86 U	2.86 U	2.86 U
Acenaphthylene	10.49	2.76	3.27	2.44 B	2.29
Acenaphthene	35.17	2.29 U	2.29 U	2.29 U	2.29 U
Fluorene	45.84	2.75 U	3.06	2.75 U	2.75 U
C1-Fluorenes	16.59	3.28	3.58	3.07	2.75
C2-Fluorenes	75.14	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	57.65	3.92	5.34	4.00	3.05
Phenanthrene	230.55	9.11	14.74	11.41	5.27
C1-Phenanthrenes/Anthracenes	122.77	9.71	13.73	9.96	5.84
C2-Phenanthrenes/Anthracenes	85.75	15.86	17.55	11.29	7.12
C3-Phenanthrenes/Anthracenes	36.57	15.56	14.29	10.52	5.70
C4-Phenanthrenes/Anthracenes	47.32	14.09	14.34	10.94	5.63
Dibenzothiophene	13.48	1.50 J	1.60 J	1.32 J	1.28 J
C1-Dibenzothiophenes	9.79	0.40 U	0.40 U	0.40 U	0.40 U
C2-Dibenzothiophenes	15.26	0.40 U	0.40 U	0.40 U	0.40 U
C3-Dibenzothiophenes	11.40	0.40 U	0.40 U	0.40 U	0.40 U
C4-Dibenzothiophenes	5.33	0.40 U	0.40 U	0.40 U	0.40 U
Fluoranthene	350.80	15.39	31.88	19.45	8.38
Pyrene	228.77	11.25	18.90	11.88	5.67
C1-Fluoranthenes/Pyrenes	92.86	9.97	13.82	9.44	5.31
C2-Fluoranthenes/Pyrenes	31.38	8.31	8.62	5.58	3.94
C3-Fluoranthenes/Pyrenes	14.90	0.81 U	0.81 U	0.81 U	0.81 U
Benzo(a)anthracene	73.92	7.98	10.91	8.19	3.80
Chrysene	106.08	12.66	18.13	11.67	4.68
C1-Chrysenes	27.92	6.03	6.30	3.96	1.41 J
C2-Chrysenes	13.00	6.06	6.96	2.67	1.27 J
C3-Chrysenes	0.87 U	0.87 U	0.87 U	0.87 U	0.87 U

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2012 Regional Mussel Watch
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PAHs in Indigenous Mussels

Sample Name:	**3106-801**	**3106-802**	**3106-803**	**3106-804**	**3106-805**
Station:	PS08	PS09	PS11	PIER7RB30	PIER7CB05
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	42412	42412	42412	32912	51512
Sample Weight (g):	10.82	10.37	10.69	12.86	10.5
%Moisture:	86.1	86.8	85.9	85.0	89.5
Average %Lipids (n=3; DRY WT):	8.07	8.09	8.29	8.12	7.14
Collection Date:	01/24/2012	01/24/2012	01/24/2012	01/24/2012	01/24/2012
Extraction Date:	4/24/2012	4/24/2012	4/24/2012	3/29/2012	5/15/2012
Analysis Date:	4/30/2012	4/30/2012	4/30/2012	4/24/2012	5/22/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
C4-Chrysenes	0.87 U	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	68.48	8.82	13.38	7.83	3.18
Benzo(k)fluoranthene	31.61	3.74	5.77	3.78	1.85
Benzo(e)pyrene	40.52	4.74	7.42	3.81	1.34 J
Benzo(a)pyrene	17.43	2.92	3.31	2.07	1.16 J
Perylene	9.21	2.37	2.52	2.04	1.84
Indeno(1,2,3-cd)pyrene	9.76	2.23	0.14 U	1.51 J	1.06 J
Dibenz(a,h)anthracene	4.94	2.39	0.06 U	1.85	1.96
Benzo(g,h,i)perylene	9.69	2.16	10.36	1.36 J	1.01 J
SURROGATE RECOVERIES (%Rec)					
d8-Naphthalene	49%	50%	49%	46%	40%
d10-Acenaphthene	73%	61%	67%	66%	63%
d10-Phenanthrene	90%	81%	87%	88%	88%
d12-Chrysene	75%	74%	71%	76%	79%
d12-Perylene	75%	72%	74%	77%	77%

[1] Sum of PAHs includes the MDL for non-detect

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2012 Regional Mussel Watch
ENVVEST 2012
PAHs in Indigenous Mussels

Sample Name:	**3106-806**	**3106-807**	**3106-808**	**3106-809**
Station:	PIER7FE46	PS01	SIGST	PKPLPC
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	51512	51512	51512	51512
Sample Weight (g):	9.38	10.32	9.39	9.52
%Moisture:	88.5	86.5	88.2	88.7
Average %Lipids (n=3; DRY WT):	7.97	7.49	9.72	7.95
Collection Date:	01/24/2012	01/24/2012	02/15/2012	02/18/2012
Extraction Date:	5/15/2012	5/15/2012	5/15/2012	5/15/2012
Analysis Date:	5/22/2012	5/22/2012	5/22/2012	5/22/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]	**137**	**261**	**131**	**94.8**
Naphthalene	2.38	2.54	2.50	2.68
C1-Naphthalenes	2.17	2.63	2.06	2.45
C2-Naphthalenes	4.67	6.33	4.57	4.67
C3-Naphthalenes	6.01	8.51	5.93	6.10
C4-Naphthalenes	4.09	8.70	4.55	3.61 U
Biphenyl	2.86 U	2.86 U	2.86 U	2.86 U
Acenaphthylene	2.70	2.48	2.62	2.30
Acenaphthene	2.29 U	2.29 U	2.29 U	2.29 U
Fluorene	2.75 U	2.75 U	2.75 U	2.75 U
C1-Fluorenes	3.22	3.67	3.14	2.85
C2-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	3.45	3.06	3.09	2.63
Phenanthrene	6.34	6.50	3.57	2.95
C1-Phenanthrenes/Anthracenes	7.13	12.66	6.30	5.06
C2-Phenanthrenes/Anthracenes	8.71	25.14	9.91	6.05
C3-Phenanthrenes/Anthracenes	6.55	25.56	8.47	4.42
C4-Phenanthrenes/Anthracenes	6.53	17.30	7.66	4.34
Dibenzothiophene	1.46 J	1.40 J	1.38 J	1.31 J
C1-Dibenzothiophenes	0.40 U	2.30	0.40 U	0.40 U
C2-Dibenzothiophenes	0.40 U	5.11	0.40 U	0.40 U
C3-Dibenzothiophenes	0.40 U	8.57	0.40 U	0.40 U
C4-Dibenzothiophenes	0.40 U	7.63	0.40 U	0.40 U
Fluoranthene	10.66	11.61	7.68	3.97
Pyrene	7.46	11.29	6.33	3.57
C1-Fluoranthenes/Pyrenes	6.28	9.31	5.75	3.83
C2-Fluoranthenes/Pyrenes	4.52	9.24	4.87	3.56
C3-Fluoranthenes/Pyrenes	0.81 U	8.39	0.81 U	0.81 U
Benzo(a)anthracene	4.34	3.46	2.85	1.62 J
Chrysene	5.45	7.45	3.39	1.98
C1-Chrysenes	1.64 J	6.50	1.46 J	0.55 U
C2-Chrysenes	2.77	7.80	1.77 J	2.54
C3-Chrysenes	0.87 U	0.87 U	0.87 U	0.87 U

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2012 Regional Mussel Watch
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PAHs in Indigenous Mussels

Sample Name:	**3106-806**	**3106-807**	**3106-808**	**3106-809**
Station:	PIER7FE46	PS01	SIGST	PKPLPC
Sample Type:	Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:	TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:	51512	51512	51512	51512
Sample Weight (g):	9.38	10.32	9.39	9.52
%Moisture:	88.5	86.5	88.2	88.7
Average %Lipids (n=3; DRY WT):	7.97	7.49	9.72	7.95
Collection Date:	01/24/2012	01/24/2012	02/15/2012	02/18/2012
Extraction Date:	5/15/2012	5/15/2012	5/15/2012	5/15/2012
Analysis Date:	5/22/2012	5/22/2012	5/22/2012	5/22/2012
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**
C4-Chrysenes	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	3.84	4.87	2.78	2.31
Benzo(k)fluoranthene	2.11	2.16	1.51 J	1.26 J
Benzo(e)pyrene	1.87	3.83	2.42	0.90 J
Benzo(a)pyrene	1.37 J	1.68 J	1.13 J	0.23 U
Perylene	2.11	2.08	2.39	0.25 U
Indeno(1,2,3-cd)pyrene	0.14 U	1.96	1.20 J	0.14 U
Dibenz(a,h)anthracene	0.06 U	2.26	2.15	0.06 U
Benzo(g,h,i)perylene	0.50 J	3.09	1.06 J	0.22 U
SURROGATE RECOVERIES (%Rec)				
d8-Naphthalene	33% &	42%	36% &	26% &
d10-Acenaphthene	60%	67%	58%	55%
d10-Phenanthrene	85%	87%	85%	83%
d12-Chrysene	69%	74%	74%	70%
d12-Perylene	70%	78%	73%	74%

[1] Sum of PAHs includes the MDL for non-detect

QA/QC Sample Results

PNNL Marine Science Lab
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
PM: Jill Brandenberger 360/681-4564

2012 Regional Mussel Watch
ENVVEST 2012
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	MSL Code	Percent Moisture	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
			Instrument:		*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-OES*	*ICP-OES*	*DMA*	*ICP-OES*	*ICP-MS*	*ICP-OES*
Laboratory Achieved Method Detection Limits (tissue)					**0.0031**	**0.11**	**0.0029**	**0.014**	**0.038**	**0.0019**	**0.041**	**0.0034**	**0.029**
Reporting Limit (MDL* 3.18)					**0.010**	**0.35**	**0.0092**	**0.04**	**0.12**	**0.0062**	**0.13**	**0.011**	**0.092**
METHOD BLANKS													
MB-1			Blank R1 041312	*86.2*	0.0031 U	0.214 J	0.0029 U	0.0152 J	0.038 U	0.0019 U	0.041 U	0.0034 U	0.0447 J
MB-2			Blank R2 041112	*86.2*	0.0031 U	0.11 U	0.0029 U	0.014 U	0.0430 J	0.0019 U	0.041 U	0.0034 U	0.0953
LABORATORY CONTROL SAMPLES													
MB-1			Blank R1 041312	*86.2*	0.0031 U	0.214 J	0.0029 U	0.0152 J	0.038 U	0.0019 U	0.041 U	0.0034 U	0.0447 J
LCS-1			LCS1 R1 041312	*86.2*	2.02	2.20	2.10	2.07	2.06	1.01	2.03	2.04	2.06
			Spiking Level		2	2	2	2	2	1	2	2	2
			Percent Recovery, LCS		**101%**	**99%**	**105%**	**103%**	**103%**	**101%**	**102%**	**102%**	**101%**
MB-2			Blank R2 041112	*86.2*	0.0031 U	0.11 U	0.0029 U	0.014 U	0.0430 J	0.0019 U	0.041 U	0.0034 U	0.0953
LCS-1			LCS1 R2 041112	*86.2*	2.00	2.06	2.05	2.17	2.14	0.951	2.13	2.02	2.26
			Spiking Level		2	2	2	2	2	1	2	2	2
			Percent Recovery, LCS		**100%**	**103%**	**103%**	**109%**	**105%**	**95%**	**107%**	**101%**	**108%**
MATRIX SPIKE RESULTS													
MW2012-111	APKIANA	Whole body	3106-795	81.6	0.0148	8.27	3.48	3.73	6.35	0.0570	2.67	0.384	123
			3106-795 MS		1.83	30.7	28.3	27.5	31.1	0.261	26.9	2.40	253
			3106-795 MSD		1.89	31.3	28.6	27.8	31.4	0.266	26.8	2.45	254
			Spiking Level, MS		1.99	24.7	24.7	24.7	24.7	0.205	24.7	1.99	124
			Spiking Level, MSD		1.98	24.9	24.9	24.9	24.9	0.225	24.9	1.98	125
			Percent Recovery, MS		**91%**	**91%**	**100%**	**96%**	**100%**	**100%**	**98%**	**101%**	**105%**
			Percent Recovery, MSD		**95%**	**92%**	**101%**	**97%**	**101%**	**93%**	**97%**	**104%**	**105%**
			RPD		**4%**	**1%**	**1%**	**1%**	**1%**	**7%**	**1%**	**3%**	**0%**
MW2012-204	PS08	Whole body	3106-801	86.1	0.0288	7.08	2.44	1.34	34.3	0.124	1.16	1.49	284
			3106-801 MS		1.90	29.0	27.7	3.45	61.9	0.331	3.20	3.62	427
			3106-801 MSD		1.91	32.7	27.9	3.42	61.0	0.325	3.13	3.60	419
			Spiking Level, MS		1.98	25.1	25.1	1.98	25.1	0.195	1.98	1.98	126
			Spiking Level, MSD		2.02	25.3	25.3	2.02	25.3	0.185	2.02	2.02	127
			Percent Recovery, MS		**95%**	**87%**	**101%**	**107%**	**110%**	**106%**	**103%**	**108%**	**113%**
			Percent Recovery, MSD		**93%**	**101%**	**101%**	**103%**	**106%**	**109%**	**98%**	**104%**	**106%**
			RPD		**2%**	**15%**	**0%**	**4%**	**4%**	**2%**	**5%**	**4%**	**6%**

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PM: Jill Brandenberger 360/681-4564

2012 Regional Mussel Watch
ENVVEST 2012
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	MSL Code	Percent Moisture	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
			Instrument:		*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-OES*	*ICP-OES*	*DMA*	*ICP-OES*	*ICP-MS*	*ICP-OES*
REPLICATE PRECISION													
MW2012-001	SIWP	Whole body	3106-740	87.5	0.0390	7.00	2.28	3.83	8.39	0.114	4.13	1.19	173
			3106-740 R2		0.0374	6.92	2.26	3.73	8.39	0.114	4.00	1.17	173
			Mean		**0.0382**	**6.96**	**2.27**	**3.78**	**8.39**	**0.170**	**4.07**	**1.18**	**173**
			RPD		**4%**	**1%**	**1%**	**3%**	**0%**	**0%**	**3%**	**2%**	**0%**
MW2012-201	PS03	Whole body	3106-798	86.7	0.0311	7.53	3.21	1.46	13.7	0.960	1.21	3.87	210
			3106-798 R2		0.0278	7.34	3.11	1.45	13.6	0.939	1.22	3.80	209
			Mean		**0.0295**	**7.44**	**3.16**	**1.46**	**13.7**	**0.882**	**1.22**	**3.84**	**210**
			RPD		**11%**	**3%**	**3%**	**1%**	**1%**	**2%**	**1%**	**2%**	**0%**
MW2012-211	SIGST	Whole body	3106-808	88.2	--	--	--	--	--	0.278	--	--	--
			3106-808 R2		--	--	--	--	--	0.284	--	--	--
			Mean		--	--	--	--	--	**0.170**	--	--	--
			RPD		--	--	--	--	--	**2%**	--	--	--
MW2012-212	PKPLPC	Whole body	3106-809	88.7	--	--	--	--	--	0.0743	--	--	--
			3106-809 R2		--	--	--	--	--	0.0666	--	--	--
			Mean		--	--	--	--	--	**0.882**	--	--	--
			RPD		--	--	--	--	--	**11%**	--	--	--
STANDARD REFERENCE MATERIAL													
SRM-1			1566b-2 R1 041312	0.0	0.603	7.03	2.44	0.508	68.6	--	1.00	0.293	1418
SRM-2			1566b-2 R2 041112	0.0	0.601	7.13	2.49	0.481	71.8	--	0.984	0.303	1504
			Certified Value		**0.666**	**7.65**	**2.48**	**NC**	**71.6**	--	**1.04**	**0.308**	**1424**
			Percent Difference		**9%**	**8%**	**2%**		**4%**	--	**4%**	**5%**	**0%**
			Percent Difference		**10%**	**7%**	**0%**		**0%**	--	**5%**	**2%**	**6%**
SRM-3			DORM-3 R1	0.0	--	--	--	--	--	0.384	--	--	--
SRM-4			DORM-3 R2	0.0	--	--	--	--	--	0.367	--	--	--
			Certified Value		--	--	--	--	--	**0.382**	--	--	--
			Percent Difference		--	--	--	--	--	**0%**	--	--	--
			Percent Difference		--	--	--	--	--	**4%**	--	--	--

PNNL Marine Science Lab
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
PM: Jill Brandenberger 360/681-4564

2012 Regional Mussel Watch
ENVVEST 2012
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	**MSL Code**	DMA Batch ID	ICP-OES Batch ID	ICP-MS Batch ID
			Instrument:			
Laboratory Achieved Method Detection Limits (tissue)						
Reporting Limit (MDL* 3.18)						
METHOD BLANKS						
MB-1			Blank R1 041312	072612DMA	I041712A	042012-6100
MB-2			Blank R2 041112	072612DMA	I041612A	042012-6100
LABORATORY CONTROL SAMPLES						
MB-1			Blank R1 041312	072612DMA	I041712A	042012-6100
LCS-1			LCS1 R1 041312	072612DMA	I041712A	042012-6100
			Spiking Level			
			Percent Recovery, LCS			
MB-2			Blank R2 041112	072612DMA	I041612A	042012-6100
LCS-1			LCS1 R2 041112	072612DMA	I041612A	042012-6100
			Spiking Level			
			Percent Recovery, LCS			
MATRIX SPIKE RESULTS						
MW2012-111	APKIANA	Whole body	3106-795	072612DMA	I041712A	042012-6100
			3106-795 MS	072612DMA	I041712A	042012-6100
			3106-795 MSD	072612DMA	I041712A	042012-6100
			Spiking Level, MS			
			Spiking Level, MSD			
			Percent Recovery, MS			
			Percent Recovery, MSD			
			RPD			
MW2012-204	PS08	Whole body	3106-801	072612DMA	I041612A	042012-6100
			3106-801 MS	072612DMA	I041612A	042012-6100
			3106-801 MSD	072612DMA	I041612A	042012-6100
			Spiking Level, MS			
			Spiking Level, MSD			
			Percent Recovery, MS			
			Percent Recovery, MSD			
			RPD			

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2012 Regional Mussel Watch
ENVVEST 2012
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	**MSL Code**	DMA Batch ID	ICP-OES Batch ID	ICP-MS Batch ID
			Instrument:			
REPLICATE PRECISION						
MW2012-001	SIWP	Whole body	3106-740	072612DMA	I041712A	042012-6100
			3106-740 R2	072612DMA	I041712A	042012-6100
			Mean			
			RPD			
MW2012-201	PS03	Whole body	3106-798	072612DMA	I041612A	042012-6100
			3106-798 R2	072612DMA	I041612A	042012-6100
			Mean			
			RPD			
MW2012-211	SIGST	Whole body	3106-808	072612DMA		
			3106-808 R2	072612DMA		
			Mean			
			RPD			
MW2012-212	PKPLPC	Whole body	3106-809	072612DMA		
			3106-809 R2	072612DMA		
			Mean			
			RPD			
STANDARD REFERENCE MATERIAL						
SRM-1			1566b-2 R1 041312		I041712A	042012-6100
SRM-2			1566b-2 R2 041112		I041612A	042012-6100
			Certified Value			
			Percent Difference			
			Percent Difference			
				072612DMA		
SRM-3			DORM-3 R1	072612DMA		
SRM-4			DORM-3 R2			
			Certified Value			
			Percent Difference			
			Percent Difference			

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2012 Regional Mussel Watch
ENVVEST 2012

DATA QUALIFIERS:

c	Exceeds DQO but meets contingency criteria of either:
1	SRM certified <10x MDL
2	Insufficient spiking level relative to native sample concentrations
3	Sample concentration <10x MDL
U	Analyte not detected at or above the MDL, MDL reported
J	Analyte detected above the MDL, but less than the RL
--	Not analyzed
NA	Not applicable/available
N	Spiked sample recovery outside QC criterion of 70-130%
NC	Not Certified
&	Accuracy result outside QC criterion of ≤20% PD
*	Precision result outside QC criterion of <30%
NS	Sample not spiked for this analyte
B	Analyte detected in the method blank > RL
	and sample concentration < 10 times detected blank value
b	Data are blank corrected using the batch specific procedural blank

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2012 Regional Mussel Watch - AMB09
ENVVEST 2012
PCBs in Indigenous Mussels
QC Summary

Sample Name:	**MDL**	**RL**	Procedural Blank	Procedural Blank
Sample Type;			MB	MB
Matrix:			Diatomaceous earth & Sodium Sulfate	Diatomaceous earth & Sodium Sulfate
Batch ID:			32912	51512
Sample Weight (g):			devided by 10 g	devided by 10 g
Extraction Date:			3/29/2012	5/15/2012
Analysis Date:			4/5/2012	6/16/2012
Units (wet wt):	**ng/g**	**ng/g**	ng/g	ng/g
Cl2(8)	0.16	0.2	0.16 U	0.16 U
Cl3(18)	0.15	0.2	0.15 U	0.15 U
Cl3(28)	0.02	0.2	0.09 J	0.02 U
Cl4(44)	0.02	0.2	0.02 U	0.02 U
Cl4(52)	0.05	0.2	0.05 U	0.05 U
Cl4(66)	0.08	0.2	0.08 U	0.08 U
Cl4(77)	0.15	0.2	0.15 U	0.15 U
Cl5(101)	0.17	0.2	0.17 U	0.17 U
Cl5(105)	0.03	0.2	0.03 J	0.03 U
Cl5(118)	0.10	0.2	0.10 U	0.10 U
Cl5(126)	0.07	0.2	0.07 U	0.07 U
Cl6(128)	0.04	0.2	0.04 U	0.04 U
Cl6(138)	0.13	0.2	0.13 U	0.13 U
Cl6(153)	0.18	0.2	0.18 U	0.18 U
Cl7(170)	0.02	0.2	0.02 U	0.02 U
Cl7(180)	0.03	0.2	0.03 U	0.03 U
Cl7(187)	0.08	0.2	0.08 U	0.08 U
Cl8(195)	0.01	0.2	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.08 U	0.08 U
Cl9(206)	0.01	0.2	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U
SURROGATE RECOVERIES (%Rec)				
Cl3(30)			63%	79%
Cl4(65)			72%	83%
Cl8(198)			70%	80%

NL Marine Science Lab
29 West Sequim Bay Roa
quim, Washington 9838
0/681-4564

2012 Regional Mussel Watch - AMB09
ENVVEST 2012
PCBs in Indigenous Mussels
QC Summary

Sample Name:	DYOBAP 3106-780	DYOBAP 3106-780 SPK1	DYOBAP 3106-780 SPK2		KPTLAG 3106-792	KPTLAG 3106-792 SPK1	KPTLAG 3106-792 SPK2
Sample Type;	Reg_Sample	MS	MSD		Reg_Sample	MS	MSD
Matrix:	TISSUE	TISSUE	TISSUE		TISSUE	TISSUE	TISSUE
Batch ID:	32912	32912	32912		32912	51512	51512
Sample Weight (g):	11.82	12.44	11.82		12.18	10.41	10.63
Extraction Date:	3/29/2012	3/29/2012	3/29/2012		3/29/2012	5/15/2012	5/15/2012
Analysis Date:	4/5/2012	4/5/2012	4/5/2012		4/5/2012	6/16/2012	6/16/2012
Units (wet wt):	ng/g	PCT_REC	PCT_REC	RPD	ng/g	PCT_REC	PCT_REC
Cl2(8)	0.82	114%	127% &	11%	0.35	97%	103%
Cl3(18)	0.15 U	111%	127% &	13%	0.24	95%	84%
Cl3(28)	0.05 J	73%	81%	11%	0.02 U	71%	54%
Cl4(44)	0.29	69%	81%	16%	0.02 U	92%	64%
Cl4(52)	0.14 J	90%	90%	1%	0.40	101%	108%
Cl4(66)	0.14 J	109%	123% &	12%	0.09 J	121% &	115%
Cl4(77)	0.94	100%	154% &	43%	0.96	82%	65%
Cl5(101)	1.20	130%	135% &	4%	1.38	103%	85%
Cl5(105)	0.24	109%	113%	4%	0.23	107%	108%
Cl5(118)	0.69	112%	120%	7%	0.72	102%	97%
Cl5(126)	0.57	90%	89%	1%	0.40	82%	73%
Cl6(128)	0.31	124% &	129% &	4%	0.21	119%	117%
Cl6(138)	1.34	134% &	139% &	4%	1.01	118%	122% &
Cl6(153)	1.67	117%	112%	4%	1.21	100%	100%
Cl7(170)	0.06 J	78%	83%	7%	0.06 J	81%	83%
Cl7(180)	0.38	107%	105%	1%	0.14 J	93%	79%
Cl7(187)	0.57	120%	138% &	14%	0.32	123% &	123% &
Cl8(195)	0.02 J	102%	96%	6%	0.01 U	101%	97%
Cl8(200)	0.29	88%	88%	0%	0.19 J	98%	83%
Cl9(206)	0.01 U	97%	96%	1%	0.01 U	83%	94%
Cl10(209)	0.01 U	92%	95%	2%	0.01 U	92%	91%
SURROGATE RECOV							
Cl3(30)	99%	99%	118%		89%	96%	100%
Cl4(65)	91%	96%	93%		83%	86%	86%
Cl8(198)	70%	74%	73%		72%	71%	68%

NNL Marine Science Lab
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0/681-4564

2012 Regional Mussel Watch - AMB09
ENVVEST 2012
PCBs in Indigenous Mussels
QC Summary

		MLPIER	MLPIER 3106-785		PS03	PS03 3106-798	
Sample Name:		MLPIER 3106-785	DUP		PS03 3106-798	DUP	
Sample Type;		Reg_Sample	Duplicate		Reg_Sample	Duplicate	
Matrix:		TISSUE	TISSUE		TISSUE	TISSUE	
Batch ID:		32912	32912		51512	51512	
Sample Weight (g):		12.3	12.6		13.38	10.39	
Extraction Date:		3/29/2012	3/29/2012		3/29/2012	5/15/2012	
Analysis Date:		4/5/2012	4/5/2012		4/5/2012	6/16/2012	
Units (wet wt):	RPD	ng/g	ng/g	RPD	ng/g	ng/g	RPD
Cl2(8)	6%	0.51	0.76	39% &	0.35	0.23	41% &
Cl3(18)	12%	0.15 U	0.00 U		0.20	0.19 J	
Cl3(28)	27%	0.06 J	0.08 J		0.02 U	0.06 J	
Cl4(44)	36%	0.02 U	0.00 U		0.26	0.40	41% &
Cl4(52)	7%	0.18 J	0.37		0.85	0.73	15%
Cl4(66)	5%	0.08 U	0.14 J		0.32	0.22	34% &
Cl4(77)	24%	0.82	0.93	13%	1.13	0.86	27%
Cl5(101)	19%	1.45	1.83	23%	2.93	2.89	1%
Cl5(105)	1%	0.25	0.22	14%	1.02	0.76	29%
Cl5(118)	5%	0.81	0.80	1%	3.12	2.37	27%
Cl5(126)	11%	1.55	1.60	3%	1.59	1.50	6%
Cl6(128)	2%	0.38	0.43	12%	0.89	0.66	30%
Cl6(138)	3%	3.77	3.95	5%	6.66	4.70	34% &
Cl6(153)	1%	3.83	3.75	2%	6.35	4.95	25%
Cl7(170)	3%	0.20	0.21	1%	0.18 J	0.23	25%
Cl7(180)	16%	0.99	1.10	11%	0.86	0.72	18%
Cl7(187)	0%	1.87	1.81	3%	2.47	1.65	40% &
Cl8(195)	5%	0.03 J	0.07 J		0.01 U	0.00 U	
Cl8(200)	17%	0.67	0.67	1%	2.04	1.16	55% &
Cl9(206)	12%	0.01 U	0.00 U		0.01 U	0.00 U	
Cl10(209)	1%	0.01 U	0.00 U		0.01 U	0.00 U	
SURROGATE RECOV							
Cl3(30)		99%	117%		100%	99%	
Cl4(65)		101%	98%		89%	87%	
Cl8(198)		72%	70%		68%	67%	

PNNL Marine Science Lab
1529 West Sequim Bay Road
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2012 Regional Mussel Watch
ENVVEST 2012
PAHs in Tissue
QC Summary

Sample Name:	MDL	RL	Procedural Blank	Procedural Blank
Sample Type;			MB	MB
Matrix:			Diatomaceous earth & Sodium Sulfate	Diatomaceous earth & Sodium Sulfate
Batch ID:			32912	51512
Sample Weight (g):			devided by 10 g	devided by 10 g
Extraction Date:			3/29/2012	5/15/2012
Analysis Date:			4/24/2012	5/22/2012
Units (wet wt):			ng/g	ng/g
Naphthalene	1.82	1.82	1.82 U	1.82 U
C1-Naphthalenes	1.82	1.82	1.82 U	1.82 U
C2-Naphthalenes	3.61	1.82	3.61 U	3.61 U
C3-Naphthalenes	3.61	1.82	3.61 U	3.61 U
C4-Naphthalenes	3.61	1.82	3.61 U	3.61 U
Biphenyl	2.86	1.82	1.66 U	2.86 U
Acenaphthylene	1.68	1.82	2.06	1.68 U
Acenaphthene	2.29	1.82	2.29 U	2.29 U
Fluorene	2.75	1.82	2.75 U	2.75 U
C1-Fluorenes	2.17	1.82	2.17 U	2.17 U
C2-Fluorenes	2.17	1.82	2.17 U	2.17 U
C3-Fluorenes	2.17	1.82	2.17 U	2.17 U
Anthracene	0.42	1.82	0.42 U	0.42 U
Phenanthrene	1.10	1.82	1.23 J	1.20 J
C1-Phenanthrenes/Anthracenes	1.18	1.82	1.18 U	1.18 U
C2-Phenanthrenes/Anthracenes	0.10	1.82	0.10 U	0.10 U
C3-Phenanthrenes/Anthracenes	0.10	1.82	0.10 U	0.10 U
C4-Phenanthrenes/Anthracenes	0.10	1.82	0.10 U	0.10 U
Dibenzothiophene	0.40	1.82	1.22 J	0.40 U
C1-Dibenzothiophenes	0.40	1.82	0.40 U	0.40 U
C2-Dibenzothiophenes	0.40	1.82	0.40 U	0.40 U
C3-Dibenzothiophenes	0.40	1.82	0.40 U	0.40 U
C4-Dibenzothiophenes	0.40	1.82	0.40 U	0.40 U
Fluoranthene	0.81	1.82	0.81 U	0.81 U
Pyrene	0.35	1.82	0.35 U	0.35 U
C1-Fluoranthenes/Pyrenes	0.81	1.82	0.81 U	0.81 U
C2-Fluoranthenes/Pyrenes	0.81	1.82	0.81 U	0.81 U
C3-Fluoranthenes/Pyrenes	0.81	1.82	0.81 U	0.81 U
Benzo(a)anthracene	0.54	1.82	0.54 U	0.54 U
Chrysene	0.87	1.82	0.87 U	0.87 U
C1-Chrysenes	0.87	1.82	0.87 U	0.87 U
C2-Chrysenes	0.87	1.82	0.87 U	0.87 U
C3-Chrysenes	0.87	1.82	0.87 U	0.87 U

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2012 Regional Mussel Watch
ENVVEST 2012
PAHs in Tissue
QC Summary

Sample Name:	MDL	RL	Procedural Blank	Procedural Blank
Sample Type;			MB	MB
Matrix:			Diatomaceous earth & Sodium Sulfate	Diatomaceous earth & Sodium Sulfate
Batch ID:			32912	51512
Sample Weight (g):			devided by 10 g	devided by 10 g
Extraction Date:			3/29/2012	5/15/2012
Analysis Date:			4/24/2012	5/22/2012
Units (wet wt):			ng/g	ng/g
C4-Chrysenes	0.87	1.82	0.87 U	0.87 U
Benzo(b)fluoranthene	0.37	1.82	0.37 U	0.37 U
Benzo(k)fluoranthene	0.21	1.82	0.21 U	0.21 U
Benzo(e)pyrene	0.22	1.82	0.22 U	0.22 U
Benzo(a)pyrene	0.23	1.82	0.23 U	0.23 U
Perylene	0.25	1.82	0.25 U	0.25 U
Indeno(1,2,3-cd)pyrene	0.14	1.82	0.14 U	0.14 U
Dibenz(a,h)anthracene	0.06	1.82	0.06 U	0.06 U
Benzo(g,h,i)perylene	0.22	1.82	0.22 U	0.22 U
SURROGATE RECOVERIES (%Rec)				
d8-Naphthalene			54%	38% &
d10-Acenaphthene			56%	53%
d10-Phenanthrene			63%	75%
d12-Chrysene			74%	127%
d12-Perylene			65%	52%

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2012 Regional Mussel Watch
ENVVEST 2012
PAHs in Tissue
QC Summary

	3106-780	3106-780	3106-780
Sample Name:	DYOBAP	SPK1	SPK2
Sample Type;	Reg_Sample	MS	MSD
Matrix:	TISSUE	TISSUE	TISSUE
Batch ID:	32912	32912	32912
Sample Weight (g):	11.82	12.44	11.82
Extraction Date:	3/29/2012	3/29/2012	3/29/2012
Analysis Date:	4/24/2012	4/24/2012	4/24/2012
Units (wet wt):	ng/g	REC	REC
Naphthalene	1.82 U	143% &	136% &
C1-Naphthalenes	2.48		
C2-Naphthalenes	4.63		
C3-Naphthalenes	4.64		
C4-Naphthalenes	3.61 U		
Biphenyl	2.86 U	107%	100%
Acenaphthylene	1.95 B	113%	111%
Acenaphthene	2.29 U	108%	106%
Fluorene	2.75 U	116%	119%
C1-Fluorenes	2.42		
C2-Fluorenes	2.17 U		
C3-Fluorenes	2.17 U		
Anthracene	2.37	84%	81%
Phenanthrene	2.93	91%	88%
C1-Phenanthrenes/Anthracenes	4.14		
C2-Phenanthrenes/Anthracenes	4.95		
C3-Phenanthrenes/Anthracenes	3.85		
C4-Phenanthrenes/Anthracenes	3.58		
Dibenzothiophene	0.40 U	98%	95%
C1-Dibenzothiophenes	0.40 U		
C2-Dibenzothiophenes	0.40 U		
C3-Dibenzothiophenes	0.40 U		
C4-Dibenzothiophenes	0.40 U		
Fluoranthene	4.35	97%	93%
Pyrene	3.66	93%	88%
C1-Fluoranthenes/Pyrenes	3.33		
C2-Fluoranthenes/Pyrenes	2.83		
C3-Fluoranthenes/Pyrenes	0.81 U		
Benzo(a)anthracene	1.31 J	121% &	119%
Chrysene	1.40 J	103%	100%
C1-Chrysenes	0.53 U		
C2-Chrysenes	0.87 U		
C3-Chrysenes	0.87 U		

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2012 Regional Mussel Watch
ENVVEST 2012
PAHs in Tissue
QC Summary

	3106-780	3106-780	3106-780
Sample Name:	DYOBAP	SPK1	SPK2
Sample Type;	Reg_Sample	MS	MSD
Matrix:	TISSUE	TISSUE	TISSUE
Batch ID:	32912	32912	32912
Sample Weight (g):	11.82	12.44	11.82
Extraction Date:	3/29/2012	3/29/2012	3/29/2012
Analysis Date:	4/24/2012	4/24/2012	4/24/2012
Units (wet wt):	ng/g	REC	REC
C4-Chrysenes	0.87 U		
Benzo(b)fluoranthene	1.74 J	115%	113%
Benzo(k)fluoranthene	1.10 J	101%	101%
Benzo(e)pyrene	0.85 J	112%	108%
Benzo(a)pyrene	0.68 J	95%	93%
Perylene	1.57 J	80%	80%
Indeno(1,2,3-cd)pyrene	0.88 J	100%	103%
Dibenz(a,h)anthracene	1.64 J	89%	94%
Benzo(g,h,i)perylene	0.52 J	97%	98%
SURROGATE RECOVERIES (%Rec	52%		
d8-Naphthalene	70%	43%	40%
d10-Acenaphthene	86%	67%	66%
d10-Phenanthrene	79%	88%	89%
d12-Chrysene	78%	75%	75%
d12-Perylene		77%	76%

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PAHs in Tissue
QC Summary

	3106-792	3106-792	3106-792
Sample Name:	POPBWN	SPK1	SPK2
Sample Type;	Reg_Sample	MS	MSD
Matrix:	TISSUE	TISSUE	TISSUE
Batch ID:	32912	51512	51512
Sample Weight (g):	12.18	10.41	10.63
Extraction Date:	3/29/2012	5/15/2012	5/15/2012
Analysis Date:	4/24/2012	5/22/2012	5/22/2012
Units (wet wt):	ng/g	REC	REC
Naphthalene	1.82 U	213% &	192% &
C1-Naphthalenes	2.38		
C2-Naphthalenes	6.20		
C3-Naphthalenes	4.08		
C4-Naphthalenes	3.61 U		
Biphenyl	2.86 U	116%	115%
Acenaphthylene	1.99 B	118%	114%
Acenaphthene	2.29 U	117%	114%
Fluorene	2.75 U	135% &	129% &
C1-Fluorenes	2.43		
C2-Fluorenes	2.17 U		
C3-Fluorenes	2.17 U		
Anthracene	2.40	76%	72%
Phenanthrene	3.65	85%	87%
C1-Phenanthrenes/Anthracenes	4.65		
C2-Phenanthrenes/Anthracenes	4.95		
C3-Phenanthrenes/Anthracenes	4.29		
C4-Phenanthrenes/Anthracenes	3.90		
Dibenzothiophene	1.11 J	75%	76%
C1-Dibenzothiophenes	0.40 U		
C2-Dibenzothiophenes	0.40 U		
C3-Dibenzothiophenes	0.40 U		
C4-Dibenzothiophenes	0.40 U		
Fluoranthene	5.92	97%	94%
Pyrene	5.43	95%	95%
C1-Fluoranthenes/Pyrenes	4.13		
C2-Fluoranthenes/Pyrenes	3.46		
C3-Fluoranthenes/Pyrenes	0.81 U		
Benzo(a)anthracene	2.01	106%	112%
Chrysene	3.09	85%	94%
C1-Chrysenes	0.81 U		
C2-Chrysenes	0.87 J		
C3-Chrysenes	0.87 U		

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QC Summary

	3106-792	3106-792	3106-792
Sample Name:	POPBWN	SPK1	SPK2
Sample Type;	Reg_Sample	MS	MSD
Matrix:	TISSUE	TISSUE	TISSUE
Batch ID:	32912	51512	51512
Sample Weight (g):	12.18	10.41	10.63
Extraction Date:	3/29/2012	5/15/2012	5/15/2012
Analysis Date:	4/24/2012	5/22/2012	5/22/2012
Units (wet wt):	ng/g	REC	REC
C4-Chrysenes	0.87 U		
Benzo(b)fluoranthene	2.51	94%	105%
Benzo(k)fluoranthene	1.17 J	86%	95%
Benzo(e)pyrene	1.59 J	94%	104%
Benzo(a)pyrene	0.78 J	79%	86%
Perylene	1.78 J	77%	81%
Indeno(1,2,3-cd)pyrene	1.03 J	112%	129% &
Dibenz(a,h)anthracene	1.64 J	86%	116%
Benzo(g,h,i)perylene	0.55 J	101%	123% &
SURROGATE RECOVERIES (%Rec	57%		
d8-Naphthalene	76%	27% &	30% &
d10-Acenaphthene	90%	53%	56%
d10-Phenanthrene	73%	87%	84%
d12-Chrysene	74%	79%	70%
d12-Perylene		75%	72%

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QC Summary

Sample Name:	MLPIER 3106-785	MLPIER 3106-785 DUP		PS03 3106-798	PS03 3106-798 DUP	
Sample Type;	Reg_Sample	Duplicate		Reg_Sample	Duplicate	
Matrix:	TISSUE	TISSUE		TISSUE	TISSUE	
Batch ID:	32912	32912		51512	51512	
Sample Weight (g):	12.6	12.6		10.39	10.39	
Extraction Date:	3/29/2012	3/29/2012		########	5/14/2008	
Analysis Date:	4/24/2012	4/24/2012		########	5/21/2008	
Units (wet wt):	ng/g	ng/g	RPD	ng/g	ng/g	RPD
Naphthalene	1.82 U	1.85	8% [1]	3.76	4.07	8%
C1-Naphthalenes	2.48	2.69		6.58	5.46	
C2-Naphthalenes	4.63	5.09		10.98	9.21	
C3-Naphthalenes	4.64	4.63		10.01	10.98	
C4-Naphthalenes	3.61 U	3.87		9.01	9.41	
Biphenyl	2.86 U	2.86 U	0% [1]	2.86 U	2.86 U	
Acenaphthylene	1.95 B	2.16	5%	4.15 B	4.74	13%
Acenaphthene	2.29 U	2.29 U	1% [1]	10.94	10.85	1%
Fluorene	2.75 U	2.75 U	3% [1]	12.07	12.38	3%
C1-Fluorenes	2.42	2.60		5.84	6.37	
C2-Fluorenes	2.17 U	2.17 U		21.41	35.99	
C3-Fluorenes	2.17 U	2.17 U		72.56	2.17 U	
Anthracene	2.37	3.11	0%	28.08	26.87	4%
Phenanthrene	2.93	7.36	5%	67.48	65.83	2%
C1-Phenanthrenes/Anthracenes	4.14	5.50		44.64	44.85	
C2-Phenanthrenes/Anthracenes	4.95	6.28		42.93	47.65	
C3-Phenanthrenes/Anthracenes	3.85	5.07		35.23	37.53	
C4-Phenanthrenes/Anthracenes	3.58	6.35		52.43	53.09	
Dibenzothiophene	0.40 U	1.17 J	1% [1]	4.34	4.44	2%
C1-Dibenzothiophenes	0.40 U	0.40 U		3.86	4.32	
C2-Dibenzothiophenes	0.40 U	0.40 U		7.23	8.27	
C3-Dibenzothiophenes	0.40 U	0.40 U		10.54	11.99	
C4-Dibenzothiophenes	0.40 U	0.40 U		9.49	9.18	
Fluoranthene	4.35	12.54	6%	204.20	199.87	2%
Pyrene	3.66	6.66	8%	136.52	134.80	1%
C1-Fluoranthenes/Pyrenes	3.33	6.00		70.56	73.80	
C2-Fluoranthenes/Pyrenes	2.83	4.37		30.26	33.07	
C3-Fluoranthenes/Pyrenes	0.81 U	0.00 U		17.94	18.62	
Benzo(a)anthracene	1.31 J	5.08	4%	92.91	90.49	3%
Chrysene	1.40 J	7.91	2%	99.71	94.37	5%
C1-Chrysenes	0.87 U	2.06		33.72	31.33	
C2-Chrysenes	0.87 U	1.82		17.71	16.77	
C3-Chrysenes	0.87 U	0.87 U		7.44	6.42	

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QC Summary

Sample Name:	MLPIER 3106-785	MLPIER 3106-785 DUP		PS03 3106-798	PS03 3106-798 DUP	
Sample Type;	Reg_Sample	Duplicate		Reg_Sample	Duplicate	
Matrix:	TISSUE	TISSUE		TISSUE	TISSUE	
Batch ID:	32912	32912		51512	51512	
Sample Weight (g):	12.6	12.6		10.39	10.39	
Extraction Date:	3/29/2012	3/29/2012		########	5/14/2008	
Analysis Date:	4/24/2012	4/24/2012		########	5/21/2008	
Units (wet wt):	ng/g	ng/g	RPD	ng/g	ng/g	RPD
C4-Chrysenes	0.87 U	0.87 U		2.27	1.62 J	
Benzo(b)fluoranthene	1.74 J	6.42	1%	88.23	82.54	7%
Benzo(k)fluoranthene	1.10 J	3.14	1%	33.74	31.74	6%
Benzo(e)pyrene	0.85 J	2.24	1%	53.73	48.89	9%
Benzo(a)pyrene	0.68 J	1.79 J	5%	23.90	23.21	3%
Perylene	1.57 J	1.82	3%	9.53	8.81	8%
Indeno(1,2,3-cd)pyrene	0.88 J	1.34 J	5%	9.39	9.04	4%
Dibenz(a,h)anthracene	1.64 J	1.78 J	2%	4.57	4.92	7%
Benzo(g,h,i)perylene	0.52 J	0.74 J	42% &	8.90	8.12	9%
SURROGATE RECOVERIES (%Rec						
d8-Naphthalene	52%	41%		39% &	43%	
d10-Acenaphthene	70%	66%		65%	66%	
d10-Phenanthrene	86%	85%		85%	90%	
d12-Chrysene	79%	69%		69%	74%	
d12-Perylene	78%	71%		69%	76%	

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2012 Regional Mussel Watch
ENVVEST 2012
Data Qualifiers for Organics

Data Qualifiers

U	Not detected at or above laboratory achieved detection limit; MDL reported
J	Analyte concentration is less that the RL, but greater than the MDL
B	Analyte detected in the method blank above the RL, sample concentration <10x detected blank value
&	Outside Project DQO for spike recovery (40-120%), replicate analysis (<30%), or SRM PD (<30%)
D	Results determined from dilution
c	Exceeds Project DQO but meets contingency criteria

QA Narratives

QA/QC NARRATIVE

PROJECT: Regional Mussel Watch AMB09 – 2012

PARAMETER: Metals: silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb), and zinc (Zn)

LABORATORY: Pacific Northwest National Marine Sciences Laboratory (MSL), Sequim, Washington. Operated by Battelle

MATRIX: Tissues (*indigenous mussels*)

SAMPLE CUSTODY AND PROCESSING: Mussels from 28 sampling locations were collected by the U.S. Navy following NOAA Mussel watch protocol and hand delivered to MSL on 12/06/11, 12/07/11, 01/23/12, and 02/23/12. The live mussels were stored at -20°C until they were measured and shucked. Some mussels were received frozen and also stored frozen until shucked. The length of each mussel added to the composite sample was recorded along with the total number of specimens in each composite. Each composite included specimens from the locations at each site, with the exception of the mussels from Pier 7 at the Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS) and the bag of mussels from Pike Place Market that were collected from Penn Cove. Three bags were provided for Pier 7, but a composite of each bag was analyzed rather than creating a site composite of all three bags.

The mussels were rinsed with deionized water, shucked using a ceramic knife, and composites were homogenized to an even color and consistency using a titanium blender. The composites were split into two containers: 1) polypropylene pre-cleaned vial, tarred for percent moisture determination and metals analyses and 2) 8 oz. pre-cleaned glass jar for organic compounds and archival.

The following quality control summary addresses the analyses of the 28 composite samples for trace metals. The composite samples were assigned a Battelle Central File (CF) identification number (3106). All project information was entered into Battelle's laboratory information and sample tracking system.

The following lists information on sample receipt and processing activities:

Chemistry Lab ID	**3106*740, 741, 780, 785-809**
Description	*mussels*
Collection dates	See table. Dec. 2011 and Jan.-Feb. 2012
Laboratory arrival date	12/06/11, 12/07/11, 01/23/12, and 02/23/12
Cooler temperatures, on arrival	4±2°C (or frozen)
Digestion (aqua regia)	04/11/12 and 04/13/12
DMA Analysis Date (Hg)	07/26/12
ICP-OES Analysis Date (Cr, Cu, Ni, Zn)	04/16/12 and 04/17/12
ICP-MS Analysis Date (Ag, As, Cd, Pb)	04/02/12

QA/QC NARRATIVE

QA/QC DATA QUALITY OBJECTIVES:

Analyte	Analytical Method	Range of Recovery	SRM Accuracy	Relative Precision	MDL (µg/g dry wt.) [a]	RL (µg/g dry wt.) [b]
Silver	ICP-MS	70-130%	≤20%	≤30%	0.0031	0.010
Arsenic	ICP-MS	70-130%	≤20%	≤30%	0.11	0.35
Cadmium	ICP-MS	70-130%	≤20%	≤30%	0.0029	0.0092
Chromium	ICP-OES	70-130%	≤20%	≤30%	0.014	0.04
Copper	ICP-OES	70-130%	≤20%	≤30%	0.038	0.12
Mercury	DMA	70-130%	≤20%	≤30%	0.0019	0.062
Nickel	ICP-OES	70-130%	≤20%	≤30%	0.041	0.13
Lead	ICP-MS	70-130%	≤20%	≤30%	0.0034	0.011
Zinc	ICP-OES	70-130%	≤20%	≤30%	0.029	0.092

(a) Achieved method detection limits (MDLs) reported from the annual MDL study using seven replicates of a tissue matrix prepared and analyzed as samples.
(b) The reporting limit (RL) was determined as 3.18 times the achieved MDL.

METHODS:

Tissue samples were homogenized at MSL using a titanium blender, aliquoted for metals, and stored at -80±2°C until lyophilization according to MSL-C-003. The samples were analyzed for nine metals including Ag, As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn. Tissue samples were digested according to Battelle SOP MSL-I-024, *Mixed Acid Tissue Digestion.* An approximately 500-mg aliquot of each dried, homogeneous sample was combined with nitric and hydrochloric acids (aqua regia) in a Teflon vessel and heated in an oven at 130ºC (±10ºC) for a minimum of eight hours. After heating and cooling, deionized water was added to the acid-digested tissue to achieve analysis volume and the digestates were submitted for analysis by three methods.

The homogenized tissue was analyzed for total Hg according to SOP MSL-I-034, *Direct Determination of Total Mercury in Tissues and Sediments by Thermal Decomposition, Gold Amalgamation and Cold Vapor Atomic Absorption Spectrometry (DMA), EPA Method 7473m (modified).* An approximately 20-mg aliquot of each dried, homogeneous sample was heating in a controlled decomposition furnace flushed with oxygen to liberate Hg from solid and aqueous samples. The sample was weighed (± 0.001) into a sample boat (nickel or quartz) and mechanically introduced into a quartz decomposition tube, which was heated by two independently programmable ovens. The decomposition and catalyst furnaces maintain a temperature of at least 750˚C. The decomposition products were carried by flowing oxygen to the catalytic section of the furnace. Here oxidation was completed and halogens and nitrogen/sulfur oxides were trapped. The remaining decomposition products were then carried to a gold amalgamator that selectively traps Hg. After the system was flushed with oxygen to remove any remaining gases or decomposition products, the amalgamator was rapidly heated, releasing elemental Hg vapor. Flowing oxygen carried the Hg vapor, sequentially, through two absorbance cells (cuvette) of different path lengths. The cells were maintained at approximately 120˚C to prevent condensation and minimize carry-over effects. The cells were positioned in the light path of a single wavelength atomic absorption spectrophotometer (AAS). The mercury vapor was first carried through a long path length absorbance cell and then a short path length absorbance cell. Absorbance (peak height or peak area) was measured at a wavelength of 253.7 nm. The cell lengths were in a ratio of 10:1. This arrangement allowed the same sample to be quantified twice, using two different sensitivities.

Digested samples were analyzed for Cr, Cu, Ni, and Zn using inductively coupled plasma optical emissions spectroscopy (ICP-OES) according to Battelle SOP MSL-I-

033, *Determination of Elements in Aqueous and Digestate Samples by ICP-OES*. This procedure is based on two methods modified and adapted for analysis of low level samples: EPA Method 6010B and 200.7.

Digested samples were analyzed for Ag, As, Cd, and Pb using inductively coupled plasma-mass spectrometry (ICP-MS) according to Battelle SOP MSL-I-022, *Determination of Elements in Aqueous and Digestate Samples by ICP/MS*. This procedure is based on two methods modified and adapted for analysis of solid sample digestates: EPA Method 1638, *Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma-Mass Spectrometry* and EPA Method 200.8, *Determination of Trace Elements in Water and Wastes by Inductively Coupled Plasma – Mass Spectrometry.*

All results were determined and reported in units of µg/g on a dry-weight basis and converted to µg/g wet-weight. The formula for this conversion is dry-weight concentration * (sample percent dry weight/100).

HOLDING TIMES: The EPA Method 1631 Appendix A provides a holding time for Hg in frozen tissue of one year from collection to analysis. This holding time was achieved for all metals.

DETECTION LIMITS AND DATA QUALIFIERS: The MSL standard operating procedure for the determination of method detection limits (MDLs) is MSL-Q-007-08. This procedure describes the determination of MDLs, instrument detection limits (IDLs), reporting limits (RLs), and quantitation limits (QLs) as described in the Federal Register (40 CFR Part 136, Appendix B). The reporting limit (RL) is defined as 3.18 times the MDL for the matrix of interest and the instrument. The 3.18 value is based on the Student's t value for 7-10 replicates analyzed in our MDL study. The 40 CFR Part 136, Appendix B uses at least 7 replicates of the matrix, digested as independent samples, and then analyzed by the instrument of interest. The standard deviation is then multiplied by the student's t value for n-1 replicates. Sample concentrations were evaluated and flagged to the following criteria:

U Analyte not detected at or above the MDL, MDL reported

J Analyte detected above the MDL, but less than the RL

N Spiked sample recovery outside QC criterion of 70-130%

& Accuracy result outside QC criterion of ≤20% PD

* Precision result outside QC criterion of <30%

B Analyte detected in the method blank > RL and sample concentration < 10 times detected blank value

c Exceeds data quality objective but meets contingency criterion

METHOD BLANKS: Method blanks were analyzed at a minimum frequency of one each per 20 field samples or analytical batch. Two method blanks were analyzed with the samples for all metals. The concentrations were less than RL for all metals except one replicate for Zn. The sample concentrations are three orders of magnitude above the detected blank; therefore, the data were not impacted by the detected blank.

LABORATORY CONTROL SAMPLE/BLANK Blank spikes/laboratory control samples (LCS) were analyzed at a frequency of one each per 20 field samples. The LCS recoveries were within the QC acceptance criterion of 70% to 130% recovery.

QA/QC NARRATIVE

SPIKE ACCURACY:

MATRIX SPIKE ACCURACY: Matrix spikes and matrix spike duplicates were analyzed at a frequency of one each per 20 field samples. Matrix spike recoveries were within the QC acceptance criterion of 70% to130% recovery for all metals.

REPLICATE PRECISION: Analytical precision was evaluated using two methods: 1) laboratory duplicates and 2) duplicate matrix spikes. Replicate analyses were performed at a frequency of one set per 20 field samples. Precision of replicate analyses was expressed as the relative percent difference (RPD) of replicate results. The RPDs for both the laboratory duplicates and duplicate matrix spikes were within the QC limits of ≤30% for all metals.

STANDARD REFERENCE MATERIAL ACCURACY: The SRM accuracy was expressed as the percent difference (PD) between the measured and certified SRM concentrations. Recovery of a particular analyte exceeded QC criteria if the PD exceeded 20% PD. The SRM 1566b Oyster Tissue was analyzed at a frequency of one per 20 field samples. The SRM DORM-3 Dogfish Mussel was analyzed for Hg at a frequency of one per 20 field samples. The recoveries for certified or referenced metals were within the QC acceptance criterion for all metals.

PCB – Tissue QA/QC SUMMARY

PROJECT:	ENVVEST Regional Mussel Watch AMB09 – 2012
PARAMETER:	Polychlorinated Biphenyls (PCBs)
LABORATORY:	Battelle Marine Sciences Laboratory, Sequim, Washington
MATRIX:	Tissues (*indigenous mussels*)
SAMPLE CUSTODY:	Mussels from 28 sampling locations were collected by the U.S. Navy following NOAA Mussel Watch protocol and hand delivered to MSL on 12/06/11, 12/07/11, 01/23/12, and 02/23/12. The live mussels were stored at -20°C until they were measured and shucked. The length of each mussel added to the composite sample was recorded along with the total number of specimens in each composite. The mussels were rinsed with deionized water, shucked using a ceramic knife, and composites were homogenized to an even color and consistency using a titanium blender. The composites were split into three containers: 1) polypropylene pre-cleaned vial, tarred for percent moisture determination and metals analyses, 2) 8 oz. pre-cleaned glass jar for organic compound analyses, and 3) 8 oz. pre-cleaned glass jar for archival. The following quality control summary addresses the analyses of the 28 composite samples for parent and selected Polychlorinated Biphenyls (PCBs). The composite samples were assigned a Battelle Central File (CF) identification number (3106). All project information was entered into Battelle's laboratory information and sample tracking system.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Surrogate Recovery	LCS/MS Recovery	Sample Replicate Relative Precision	Detection Limits (ng/g wet)
PCB	NOAA Status & Trends	<MDL	40-120%	40-120% Recovery[1]	≤30% RPD[2]	~0.01 – 0.18

[1] Target spike must be >5 x native concentration.
[2] Applies to analytes >10x sample specific MDL.

METHOD: Tissue samples were extracted for PCBs following general National Atmospheric and Oceanic Administration (NOAA) National Status and Trends (NS&T) methods. Approximately 10 g of tissue was mixed with anhydrous sodium sulfate, spiked with surrogates and extracted with methylene chloride using accelerated solvent extractor (ASE). The extract was concentrated, and processed through an alumina cleanup column, concentrated, and further cleaned up by gel permeation chromatography (GPC) with methylene chloride as the mobile phase. The extract was finally concentrated via gentle nitrogen stream and fortified with internal standard (IS) before analysis. PCB were analyzed using gas chromatography with electron capture detection (GC/ECD), following Battelle SOP O-016. Sample data were quantified by the method of internal standards using the surrogate compounds.

PCB – Tissue QA/QC SUMMARY

HOLDING TIMES: Tissue samples were stored frozen until sample preparation. Samples were prepared for analyses in four analytical batches and were extracted within the 1-year holding time for sample collection and analyzed within 40 days of extraction.

Batch	Extraction Date	Analysis Date
32912	3/29/2012	4/05/2012
40512	4/5/2012	4/13/2012
42412	4/24/2012	5/02/2012
51512	5/15/2012	6/16/2012

BLANKS: There were two procedural blank (MB) samples. MB were analyzed to ensure the sample extraction and analyses methods were free of contamination.

Exceedances – Two exceedances were found.

Comments – Two analytes (PCB 28 and PCB 105) in one of the two MBs were greater than the MDL; however both were less than the RL and less than 5 tunes the MDL. Results were J-flagged.

MATRIX SPIKES: Two matrix spike (MS) and matrix spike duplicate (MSD) pairs were analyzed. The percent recoveries of PCBs were calculated to estimate analytical accuracy in the presence of a representative matrix.

Exceedances – Thirteen exceedances were found.

Comments – In the MS and MSD samples, the observed recovery exceedances are all slightly higher (mostly 122-135%) than the laboratory control limits (40 – 120%). Results were flagged.

Duplicate Samples: Two duplicate samples (DUP) were analyzed for two selected mussel samples. The relative percent differences (RPD) of PCB were calculated to assess the sample homogeneity and analytical precision in the presence of a representative matrix.

Exceedances – Seven exceedances were found.

Comments – In the two DUP samples, seven exceedances (RPD > 30%) were found for analytes with concentrations greater than the RL. This could be a result of the low concentration (five of the flagged RPDs had sample concentrations less than 10 times the MDL) or potential interference from co-elution. Results were flagged. In addition, RPDs for the MS/MSD pairs are provided in the hard copy data report to demonstrate acceptable reproducibility.

SURROGATES Three surrogate compounds were added prior to extraction, including PCB 30, PCB 65, and PCB 198. The recovery of each surrogate compound was calculated to assess data quality in terms of accuracy (extraction efficiency).

Exceedances – Six exceedances were found.

Comments – Five of the exceedances were for PCB 30 (122-133%) and one was for PCB 65 (122%). Recoveries were slightly higher than laboratory control limits (40 – 120%); results were flagged.

PAH – Tissue QA/QC SUMMARY

PROJECT:	ENVVEST Regional Mussel Watch AMB09 – 2012
PARAMETER:	Polycyclic Aromatic Hydrocarbons (PAHs)
LABORATORY:	Battelle Marine Sciences Laboratory, Sequim, Washington
MATRIX:	Tissues (*indigenous mussels*)
SAMPLE CUSTODY:	Mussels from 28 sampling locations were collected by the U.S. Navy following NOAA Mussel Watch protocol and hand delivered to MSL on 12/06/11, 12/07/11, 01/23/12, and 02/23/12. The live mussels were stored at -20°C until they were measured and shucked. The length of each mussel added to the composite sample was recorded along with the total number of specimens in each composite. The mussels were rinsed with deionized water, shucked using a ceramic knife, and composites were homogenized to an even color and consistency using a titanium blender. The composites were split into three containers: 1) polypropylene pre-cleaned vial, tarred for percent moisture determination and metals analyses, 2) 8 oz. pre-cleaned glass jar for organic compound analyses, and 3) 8 oz. pre-cleaned glass jar for archival. The following quality control summary addresses the analyses of the 28 composite samples for parent and selected alkylated PAHs. The composite samples were assigned a Battelle Central File (CF) identification number (3106). All project information was entered into Battelle's laboratory information and sample tracking system.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Surrogate Recovery	LCS/MS Recovery	Sample Replicate Relative Precision	Detection Limits (ng/g wet)
PAH	NOAA Status & Trends	<MDL	40-120%	40-120% Recovery[1]	≤30% RPD[2]	~0.1 – 3.6

[1] Target spike must be >5 x native concentration.
[2] Applies to analytes >10x sample specific MDL.

METHOD: Tissue samples were extracted for PAHs following general National Atmospheric and Oceanic Administration (NOAA) National Status and Trends (NS&T) methods. Approximately 10 g of tissue was mixed with anhydrous sodium sulfate, spiked with surrogates and extracted with methylene chloride using accelerated solvent extractor (ASE). The extract was concentrated, and processed through an alumina cleanup column, concentrated, and further cleaned up by gel permeation chromatography (GPC) with methylene chloride as the mobile phase. The extract was finally concentrated via gentle nitrogen stream and fortified with internal standard (IS) before analysis. PAH analyses were analyzed using gas chromatography mass spectrometry (GC/MS), following Battelle SOP O-015. Sample data were quantified by the method of internal standards using the surrogate compounds.

PAH – Tissue QA/QC SUMMARY

HOLDING TIMES: Tissue samples were stored frozen until sample preparation. Samples were prepared for analyses in four analytical batches and were extracted within the 1-year holding time for sample collection and analyzed within 40 days of extraction.

Batch ID	Extraction Date	Analysis Date
32912	3/29/2012	4/24/2012
40512	4/5/2012	4/25/2012
42412	4/24/2012	4/30/2012
51512	5/15/2012	5/22/2012

BLANKS: Two procedural blank (MB) samples were analyzed with these data. The MB was analyzed to ensure the sample extraction and analyses methods were free of contamination.
Exceedances – Acenaphthylene in one MB was greater than the reporting limit (RL); "B" qualifiers applied.
Comments – For samples in the same analytical batch with that particular MB, "B" qualifiers were applied to their acenaphthylene concentration. Minimal data impact. No further corrective action taken.

MATRIX SPIKES: Two matrix spike (MS) and matrix spike duplicate (MSD) pairs were analyzed. The percent recoveries of PAHs were calculated to estimate analytical accuracy in the presence of a representative matrix.
Exceedances – Nine recovery exceedances were noted.
Comments – In two MS and two MSD, nine spike recoveries were outside the laboratory control limits (40 – 120%). Among these, four exceedances were naphthalene; two were fluorene; one was benzo(a)anthracene; one was indeno(1,2,3-cd)pyrene; and, one was benzo(g,h,i)perylene. All recoveries were >120%, however, the spiked concentrations of these PAHs were not >10 times the corresponding concentrations in the background materials and therefore were not appropriate for data quality assessment.

Duplicate Samples: Two samples (DUP) were analyzed in duplicate. The relative percent differences (RPD) of parent PAHs were calculated to assess the sample homogeneity and analytical precision in the presence of a representative matrix.
Exceedances – One RPD exceedances was observed (42%).
Comments –One PAH, benzo(g,h,i)perylene RPD was outside the laboratory control limits (≤30%) however the sample concentration was lower than the RL and should be used with caution when evaluating data quality. All other PAHs have relatively narrow RPD (>15%) although it should be noted the flagged (1) recoveries have one or more concentrations below the MDL and should be used as information only.

SURROGATES Five surrogate compounds were added prior to extraction, including naphthalene-d8, acenaphthene-d10, phenanthrene-d10, chrysene-d12, and perylene-d12. The recovery of each surrogate compound was calculated to assess data quality in terms of accuracy (extraction efficiency).
Exceedances – Eleven exceedances noted.
Comments – All exceedances are Naphthalene-d8. The recoveries (26%-39%) are slightly lower than laboratory control limits (40 – 120%).

Sample Custody Records

- Field Collection Worksheets
- Composites
- Sample Login

SAMPLE CHAIN OF CUSTODY FORM

Date: 12/5/11

Page: 1 of 1

COC Number:

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.: 54220

Project Name: 2012 Mussel Watch

Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT: AMBOA MW Collection

Testing Parameters

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger
Observations, Instructions

Lab. Use only: Lab ID	Sample ID	Sample Lable	Collection Date/Time	Matrix	metals	PAH/PCB	Isotopes							No. of containers	StationID	Comments
310-740	SIWP	MW2012-001	12/5/11 2104	tiss	X	X	X							3	Waterman Pt	clear/no rain
310-741	SI RP	MW2012-002	12/5/11 2157	tiss	X	X	X							3	Ross Pt.	

Relinquished by: [signature] 12/5/11 2300
Signature Date Time
Jill Brandenberger MW
Printed Name Company

Received by: [signature] 12/6/11
Signature
C. Bush 1800
Printed Name

Total # of Containers
Shipment Method:
Shipment Method: Hand carry
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE LOGIN

Project Manager: Brandenberger
Date Received: 12/6/2011
Batch: 17
Login Designee: Suslick

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Ambient Monitoring, Mussel Watch 2012 (AMB09)**

Sponsor ID	Sample Lable	Site	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
MW2012-001	SIWP	Waterman Pt	3106-740	Tissue	Walkin Freezer	Metals, Organics, Isotopes	12/05/11
MW2012-002	SIRP	Ross Pt	3106-741	Tissue	Walkin Freezer	Metals, Organics, Isotopes	12/05/11

SOP#: MSL-A-001

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 3106 Sample No(s): 740-741 Batch: 18

Project Name: AMB09 - Musselwatch 2012 Project Manager: JMB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: Tissues WP#

Yes	No	
☐	☐	Navy-type Project (requires high-level sample tracking procedures)
☐	☐	USDA Samples (see Compliance Agreement Checklist)

PM Verification:

☐	☐	Filter Samples: *Amount:* Entire sample Half of sample
☐	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)
☐	☐	Special instructions:

Sample Preservation Instructions:

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
☐	☐	☑	Custody seal present Seal intact? YES NO
☑	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) (if multiple coolers, note temp. of each) — Hand delivered from field Collection: 4±2 °C; °C
☐	☐	☑	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc) Comment/Remedy:
☑	☐	☐	Were all chain of custody forms signed and dated?
☐	☐	☑	Were samples filtered at MSL?

Sample condition(s): (Acceptable) Other (explain):

Container type: Teflon Poly Glass Cap. Vial Other: baggies

Notes:

Completed By: Date/Time: 12/6/11 1800

SAMPLE PRESERVATION

☐	Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)
☐	Random pH checked for ~10% of samples (use dip paper) Sample IDs:
☐	Complete pH check required for project (use pH meter and record on pH Record form)
☐	Sample(s) were preserved at MSL

Type: ☐	0.2% HNO3	Notes:	Lot#
☐	0.5% HCl (Hg samples)	Notes:	Lot#
☑	Refrigerate/(Freeze)	Notes:	Walk in freezer
☐	Other	Notes:	

Completed By: Date/Time: 12/6/11 1850

Storage Shelf:

SAMPLE CHAIN OF CUSTODY FORM

Date: 12/7/11

Page: 1 of 2

COC Number:

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.:

Project Name:

Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT: AmB09-Day2

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road, Sequim, WA 98382

Attention: Jill Brandenberger

Testing Parameters

Observations, Instructions

Start w/ AmB09-026/100 GS 3/11/13

3106-

Lab. Use only: Lab ID	Sample ID (JMB 12/7/11)	Sample Lable	Collection Date/Time (12/7/11)	Matrix	TIME/DATE	NUT/TOC	TSS/OSAL	DOC	MUSSELS	Metals	ORGANICS (PAH/PCBS)	ISOTOPES	No. of containers	StationID	TOTAL/TSS Comments	DISS
	AmB09-~~026~~100	M5	0926	M	X	X	X	X						M5	742	743
	-101	M8	1021	M										M8	744	745
	-102	M-7	1041	M									3	M7	746	747
MUSSEL	mw2212.005	DYOBAP	0945 TISS ~~MS~~							X	X	X	3	DYOBAP	~~778~~ 780	~~779~~
	-103	DYOTS	1054	M										~~WF~~DYOTS	748	749
	-104	WP	1140	M										WP	750	751
	-105	M2	1200	M										M2	752	753
	-106	M2 Deep	1155	M										M2 Deep	6.5 meters	754/755
	-107	CLMBAY	1218	M										CLMBAY	756	757
	-108	ICSP	1250	M										ICSP	758	759
	-109	M1 1304	~~1400~~	M										M1	760	761
	-110	M1 Deep	1309	M										M1 Deep	9.5 meters 762	763
	-111	SNO3	1344	M										SNO3	764	765
	-112	SNO5	1354	M										SNO5	766	767
	-113 Dup	SNO5 Dup	1355	M										SNO5 Dup	768	769

Relinquished by: _____ 12/7/11 1700
Signature Date Time
J. Brandenberger
Printed Name Company

Received by: _____ 1700
Signature
C. Sussman 12/7/11
Printed Name

Total # of Containers

Shipment Method:

Shipment Method: Hand Delivery

Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE LOGIN

Project Manager: Brandenberger
Date Received: 12/7/2011
Batch: 19
Login Designee: Suslick

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Ambient Monitoring, Mussel Watch 2012 (AMB09)**

Sponsor ID	Sample Lable	Site	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
MW2012-003	DYOBAP	DYOBAP	3106-780	Tissue	Walkin Freezer	Metals, Organics, Isotopes	12/07/11

SOP#: MSL-A-001

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 3106 Sample No(s): 780 Batch: 19820

Project Name: ENVVEST AMBOY MUSSEL WATCH Project Manager: JMB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: TISS WP#

Yes	No	
☐	☐	Navy-type Project (requires high-level sample tracking procedures)
☐	☐	USDA Samples (see Compliance Agreement Checklist)

PM Verification:

☐	☐	Filter Samples: Amount: Entire sample Half of sample
☐	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)
☐	☐	Special instructions:

Sample Preservation Instructions:

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Hand delivered

Yes	No	N/A	Indicate in Appropriate Box
☐	☑	☐	Custody seal present Seal intact? YES NO
☑	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) 4±2 °C
			(if multiple coolers, note temp. of each) °C
☐	☐	☑	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc)
			Comment/Remedy:
☑	☐	☐	Were all chain of custody forms signed and dated?
☐	☐	☑	Were samples filtered at MSL?

Sample condition(s): (Acceptable) Other (explain):

Container type: Teflon Poly Glass Cap. Vial Other: baggie

Notes:

Completed By: Date/Time: 12/7/11 1730

SAMPLE PRESERVATION

☐ Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)

☐ Random pH checked for ~10% of samples (use dip paper) Sample IDs:

☐ Complete pH check required for project (use pH meter and record on pH Record form)

☐ Sample(s) were preserved at MSL

Type:			
☐	0.2% HNO3	Notes:	Lot#
☐	0.5% HCl (Hg samples)	Notes:	Lot#
☑	Refrigerate/Freeze	Notes:	Walk-in Freezer
☐	Other	Notes:	

Completed By: Date/Time: 12/7/11 1735

Storage Shelf: 8

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/22/2012

Page: _____ of _____

COC Number: _____

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.: MW2012

Project Name: ENVVEST

Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT: Mussel water Sampling Sinclair, Dyes, Port Orchard Passage, & Liberty Bay

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road Sequim, WA 98382

Attention: Jill Brandenberger

Testing Parameters

Observations, Instructions

3 gallon-sized zip lock keeper station

Individual Bags homogenized into 1 analytical sample

Archive Remaining

Lab. Use only: Lab ID	Sample ID	Sample Lable	Collection Date/Time	Matrix (Live Cindy eggars) Mussels	METALS	PAHs	PCB Homo/Long.	LIPIDS	Stable Isotopes	Size & weight					No. of containers	StationID	Comments
31pl-785	MW2012-101	MLPIER	1/17/2012 1430	Mussel	X	X	X	X	X	X					3	MLPIER	Manchester Lab Pier
786	MW2012-102	SIPOM	1/17/2012 1645												3	SIPOM	Sinclair Inlet Port Orchard Marina
787	-103	SISM	1/17/2012 1710												3	SISM	Sinclair Inlet Sinclair Marina
788	-104	POPILPD	1/19/2012 1745												3	POPILPD	Port Orchard Pass. Illahee Port Dock
789	-105	PWNLP	1/19/2012 1915												3	PWNLP	Port Wash. Narrows Lions Park
790	-106	DYOTS	1/19/2012 2030												3	DYOTS	Dyes Inlet Old Town Silverdale
791	-107	POPBWN	1/20/2012 1655												3	POPBWN	Port Orchard Pass. Brownsville Marina
792	-108	KEYLAG	1/20/2012 1810												3	KEYLAG	Keyport Lagoon NUWC
793	-109	KEYPIER	1/20/2012 1930												3	KEYPIER	Keyport Pier NUWC
794	-110	LBPMSC	1/21/2012 1825												3	LBPMSC	Liberty Bay Poulsbo Marine Sci. Cen
795	-111	APKIANA	1/21/2012 1955												3	APKIANA	Agate Pass Kiana Lodge
796	-112	APHCB	1/21/2012 2115												3	APBIHCB	Agate Pass Bainbridge Is Hidden Cove Beach
3106-797	-113	POPISP	1/22/2012 2020												3	POPILSP	Port Orchard Pass. Illahee State Park

Relinquished by: _____ 1/23/2012 0450
Signature Date Time

_____
Printed Name Company

Received by: _____ 1/23/12 0950
Signature

Jim Brandenberger
Printed Name

Total # of Containers

Shipment Method:

Shipment Method:

Relinquished by:
Signature Date Time

Printed Name Company

Received by:
Signature

Printed Name

Sample Disposition:

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 1/23/2012
Batch: 22
Login Designee: Brandenberger

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST - MW2012 (AMB09)**

Sponsor ID	Site Description		Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
MW2012-101	MLPIER	Manchester Lab Pier	3106-785	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/17/12
MW2012-102	SIPOM	Sinclair Inlet Port Orchard Marina	3106-786	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/17/12
MW2012-103	SISM	Sinclair Inlet Sinclair Marina	3106-787	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/17/12
MW2012-104	POPILPD	Port Orchard Pass. Illahee Port Dock	3106-788	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/19/12
MW2012-105	PWNLP	Port Wash. Narrows Lions Park	3106-789	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/19/12
MW2012-106	DYOTS	Dyes Inlet Old Town Silverdale	3106-790	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/19/12
MW2012-107	POPBWN	Port Orchard Pass. Brownsville Marina	3106-791	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/20/12
MW2012-108	KEYLAG	Keyport Lagoon NUWC	3106-792	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/20/12
MW2012-109	KEYPIER	Keyport Pier NUWC	3106-793	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/20/12
MW2012-110	LBPMSC	Liberty Bay Poulsbo Marine Sci Cen	3106-794	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/21/12
MW2012-111	APKIANA	Agate Pass Kiana Lodge	3106-795	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/21/12
MW2012-112	APHCB	Agate Pass Bainbridge Is Hidden Cove Beach	3106-796	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/21/12
MW2012-113	POPISP	Port Orchard Pass. Illahee State Park	3106-797	Tissue	walkin freezer	Metals, Organics, Lipids, stable isotopes, size/weights	01/22/12

SOP#: MSL-A-001

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 3106 Sample No(s): 785 - 797 Batch: 22

Project Name: ENVVEST MW 2012 Project Manager: JMB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: tissue WP#

Yes	No	
☐	☑	Navy-type Project (requires high-level sample tracking procedures)
☐	☑	USDA Samples (see Compliance Agreement Checklist)

PM Verification:

☐	☑	Filter Samples:	Amount: Entire sample Half of sample
☑	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)	
☑	☐	Special instructions:	schuck, split

Sample Preservation Instructions: freeze

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
☐	☐	☑	Custody seal present Seal intact? YES NO
☑	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) (if multiple coolers, note temp. of each) 4.6, 3.8, 3.2 °C ____ °C
☐	☐	☑	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc) Comment/Remedy:
☑	☐	☐	Were all chain of custody forms signed and dated?
☐	☑	☐	Were samples filtered at MSL?

Sample condition(s): (Acceptable) Other (explain):

Container type: Teflon Poly Glass Cap. Vial Other: bags of whole mussels

Notes: coolers stored in walk-in freezer until splitting

Completed By: [signature] Date/Time: 1/23/12 1750

SAMPLE PRESERVATION

☐		Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)	
☐		Random pH checked for ~10% of samples (use dip paper)	Sample IDs:
☐		Complete pH check required for project (use pH meter and record on pH Record form)	
☐		Sample(s) were preserved at MSL	
Type:	☐	0.2% HNO3	Notes: Lot#
	☐	0.5% HCl (Hg samples)	Notes: Lot#
	☑	Refrigerate/(Freeze)	Notes: Walk-in
	☐	Other	Notes:

Completed By: See above note [signature] Date/Time: 1/23/12 1800

Storage Shelf:

SAMPLE CHAIN OF CUSTODY FORM
Date: 2/1/2012
Page: _____ of _____
COC Number: _____

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.: MW2012
Project Name: ENVVEST Ambient Monitoring
Mussel Watch Stations
Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT: mussel watch sampling & FC monitoring at PSNS + NBK
FC20120124

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger

Testing Parameters

Observations, Instructions

Lab. Use only: Lab ID	Sample ID	Sample Lable	Collection Date/Time	Matrix	Metals	PAHs	PCBs, Homo/cong	Cl pids	Stable Isotopes	Size & weight				No. of containers	StationID	Comments
	MW2012-		1/24/2012	Clive indigenous Mussel												3- 1 gallon zip lock bags per station Except PIER 7 → 1 gallon zip lock bag for each sample
3106-798	-201	PS03	0910	Mussel										3	PS03	Between D & E near PSNS015 NBK
799	-202	PS04	0945											3	PS04	C Pier NBK
800	-203	PS06	1013											3	PS06	DD6 Pier 9 CIA OF19
801	-204	PS08	1054											3	PS08	DD5 Dive Barge CIA
802	-205	PS09	1126											3	PS09	DD4 near OF18 CIA
803	-206	PS11	1204											3	PS11	DD1 Base of Pier 7 CIA
804	-207	PIER7RB30	1226											1	PIER7RB30	W side of Pier 7 piling RB30
805	-208	PIER7CB05	1235											1	PIER7CB05	SW corner P7 piling CB05
806	-209	PIER7FE46	1242											1	PIER7FE46	E side P7 piling FE46
807	-210	PS01	1315											3	PS01	Base of Mooring G NBK
808	-211	SIGST	2/15/2012 1535											3	SIGST	North Shore Sinclair Inlet Gorst
3106-809	-212	PKPLPC	2/18/2012 1600											1	PKPLPC	Pike Place (Penn Cove)

Relinquished by: [signature] 2/23/2012 1730
Signature Date Time
Printed Name Company

Received by: [signature] 2/23/12 1730
Signature
Printed Name

Total # of Containers
Shipment Method:
Shipment Method: Hand delivered

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 2/23/2012
Batch: 23
Login Designee: Brandenberger

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST - 2012 Musselwatch (AMB09)**

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
MW2012-201	PS03	3106-798	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-202	PS04	3106-799	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-203	PS06	3106-800	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-204	PS08	3106-801	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-205	PS09	3106-802	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-206	PS11	3106-803	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-207	PIER7RB30	3106-804	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-208	PIER7CB05	3106-805	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-209	PIER7FE46	3106-806	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-210	PS01	3106-807	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	01/24/12
MW2012-211	SIGST	3106-808	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	02/15/12
MW2012-212	PKPLPC	3106-809	TISS	walkin freezer	Metals, PAH, PCBs, lipids, stable isotopes, size/weight	02/18/12

SOP#: MSL-A-001

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 31096 Sample No(s): 798-809 Batch: 23

Project Name: ENVVEST Regional mw Project Manager: JMB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: tissue / unchecked WP# _____

Yes	No	
☐	☑	Navy-type Project (requires high-level sample tracking procedures)
☐	☑	USDA Samples (see Compliance Agreement Checklist)

PM Verification:

☐	☑	Filter Samples:	Amount: Entire sample Half of sample
☑	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)	
☑	☐	Special instructions:	shuck & homogenize

Sample Preservation Instructions: Freeze

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
☐	☐	☑	Custody seal present Seal intact? YES NO
☑	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) (if multiple coolers, note temp. of each) 1, 0.1 °C; 2 °C
☐	☐	☑	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc) Comment/Remedy:
☑	☐	☐	Were all chain of custody forms signed and dated?
☐	☐	☑	Were samples filtered at MSL?

Sample condition(s): (Acceptable) Other (explain):

Container type: Teflon Poly Glass Cap. Vial (Other): Bags of mussels

Notes: _____

Completed By: [signature] Date/Time: 2/23/12 2000

SAMPLE PRESERVATION

☐ Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)

☐ Random pH checked for ~10% of samples (use dip paper) Sample IDs: _____

☐ Complete pH check required for project (use pH meter and record on pH Record form)

☐ Sample(s) were preserved at MSL

Type:			
☐	0.2% HNO3	Notes:	Lot#
☐	0.5% HCl (Hg samples)	Notes:	Lot#
☑	Refrigerate/Freeze	Notes:	Outside freezer in coolers
☐	Other	Notes:	

Completed By: [signature] Date/Time: 2/23/12 2000

Storage Shelf: _____

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