PCB Concentration Trends Report

for

Seafood Sampled

between

2003 to 2023

from

New Bedford Harbor Superfund Site

by

Massachusetts Department of Environmental Protection

April 2024

TABLE OF CONTENTS

FIGURES

TABLES

1. Introduction

This report documents the trends of the PCBs (polychlorinated biphenyls) measured in edible seafood species caught in New Bedford Harbor and surrounding Buzzards Bay in southeastern Massachusetts from 2003 to 2023. This seafood monitoring program is part of the ongoing PCB cleanup program for the New Bedford Harbor (NBH) Superfund Site, and was a collaborative effort involving the MA Department of Marine Fisheries (DMF), the MA Department of Environmental Protection (MassDEP), and the U.S. Environmental Protection Agency Region I (EPA). The seafood sampling program has been on-going since 2002, the Annual Seafood Monitoring Reports can be found at the EPA's web site at www.epa.gov/new-bedford-harbor under "Technical Documents" **(**MassDEP, 2003-2023**)**. The 2002 data are not included in this trend summary because only a subset (28 vs. 136) of the congeners were analyzed that year.

Due to the identification of high PCB levels in area seafood, the MA Department of Public Health in 1979 promulgated regulations restricting seafood consumption in three closure areas in and around NBH as shown on Figure 1 (MADPH, 1979). NBH was subsequently listed as a Superfund site in 1983. The Remedial Action for the Site resulted in approximately 1 million cubic yards (cy) of PCB-contaminated sediments removed. The annual dredging started in 2003 and ended in March of 2020. The shoreline remediation and restoration will be completed in 2024. This seafood monitoring program will aid in the evaluation of the overall effectiveness of the harbor cleanup, as well as assist in the implementation of institutional controls and seafood restrictions.

2. Seafood Monitoring Program Design

Based on previous investigations and risk assessments performed for the NBH Site, a variety of species were selected for this monitoring program that are considered locally caught seafood; are generally available for field collection; and which bracket potential worse case tissue levels **(**MassDEP, 2003a-2023a**)**. The species collected and the dates the species were collected are shown on Table 1. The goal of this seafood monitoring program is to acquire annual collections of these species in sufficient numbers from all three closure areas to enable statistical comparisons between them, but with the understanding that some species were not necessarily be caught in sufficient numbers every year.

To meet this goal, the monitoring design calls for five composite samples for each species from each of the three closure areas. Based on previous site sampling experience, modifications have been made to the original sampling approach. Each composite sample consists of legally harvestable organisms.

Consistent with CERCLA and the NCP, the selected remedy for the Site (EPA, 1998, Section X) uses a health-based seafood criteria of 0.02 ppm PCBs based on local patterns of seafood consumption which involve more frequent consumption of local PCB-contaminated seafood than that used by the FDA standard of 2 ppm PCBs.

3. Analytical Chemistry

The seafood samples were analyzed for 148 PCB congeners by GC/MS-SIM (gas chromatography/mass spectrometry-selective ion monitoring) based on EPA Methods 680 and 8270D. In previous sampling rounds starting in 2003 to 2016, 136 PCB congeners had been analyzed. The additional twelve PCB congeners did not significantly add to the total concentrations (MassDEP, 2018), thus allowing comparisons with previous site data. The 148 congeners measured included the eighteen NOAA (National Oceanic and Atmospheric Administration) list congeners and the twelve WHO '98 (1998 World Health Organization) list of dioxin-like congeners. Two congeners, BZ #105 and #118, appear on both lists. The NOAA congener list was used by the MA DMF in its analysis of Area III lobsters from 1988 - 1998, while Aroclors had been used previous to this. The NOAA list typically represents approximately 45% of the total PCB in marine tissue (NOAA, 1993).

The congeners quantitated in this effort are listed in the New Bedford Harbor Superfund Site Quality Assurance Project Plan and Revisions **(**MassDEP, 2003b-2023b**).** The WHO '98 congeners were included to enable the evaluation of risks to human health due to the presence of any dioxin-like PCB congeners, if deemed necessary.

Tissue from the collected specimens was filleted, sub-sampled and/or composited as necessary for sample homogenization, extraction and analysis. The first step in the analytical process for the quahog and conch samples was the compositing of the individual samples from each location; these were combined to form one composite sample per location and were homogenized using a tissuemizer. The first step in the analytical process for the other species was to take the tissue for each sample location and homogenize using a tissuemizer. Bluefish, scup and tautog fillets were processed with the skin on. Alewife, black sea bass, and striped bass fillets with the skin off and striped bass stomach contents were processed as individual samples. From each group, approximately five grams of wet sample tissue were collected. This sample tissue was then extracted using EPA method 3570 Microscale Solvent Extraction (MSE) techniques (spin extraction with acetone/methylene chloride in a sealed vessel).

The extracts were concentrated. The lipid portion of the extract was removed and separated from the PCB portion, which was cleaned up prior to analysis. Following sample cleanup, extracts were dried and concentrated using the Kuderna-Danish (K-D) method, brought up to final volume and analyzed. Extract cleanup was performed using Alumina Column Cleanup. Gel Permeation Chromatography (GPC), Sulfuric Acid Cleanup, and/or Silica Gel Cleanup are also employed as appropriate, based on the sample extracts and tissue species.

Sample analysis using GC/MS-SIM allowed identification and quantitation of congeners using selected PCB congeners from BZ1 to BZ209. The identification of the specific congeners was accomplished by comparing their mass spectra with the electron impact spectra of the calibration standards. Congener concentrations were determined using mean relative response factors from a multi-level calibration curve. Response factors for congeners were determined relative to internal standard technique. A multi-point curve was used for the individual congeners to demonstrate the linear range of the instrument. Continuing calibrations assured linearity remained for the duration of the analysis. Laboratory SOPs are available in the Quality Assurance Project Plans and Revisions (MassDEP, 2003b-2023b) should further details on chromatographic conditions, quality control criteria, and other elements of the analysis be

needed. While lipid content was reported, the wet weight PCB concentrations reported herein are not lipid normalized. The data validation summary for the laboratory analysis are presented in Appendix B of the Annual Seafood Monitoring Reports (AMEC/Wood/WSP, 2003-2024).

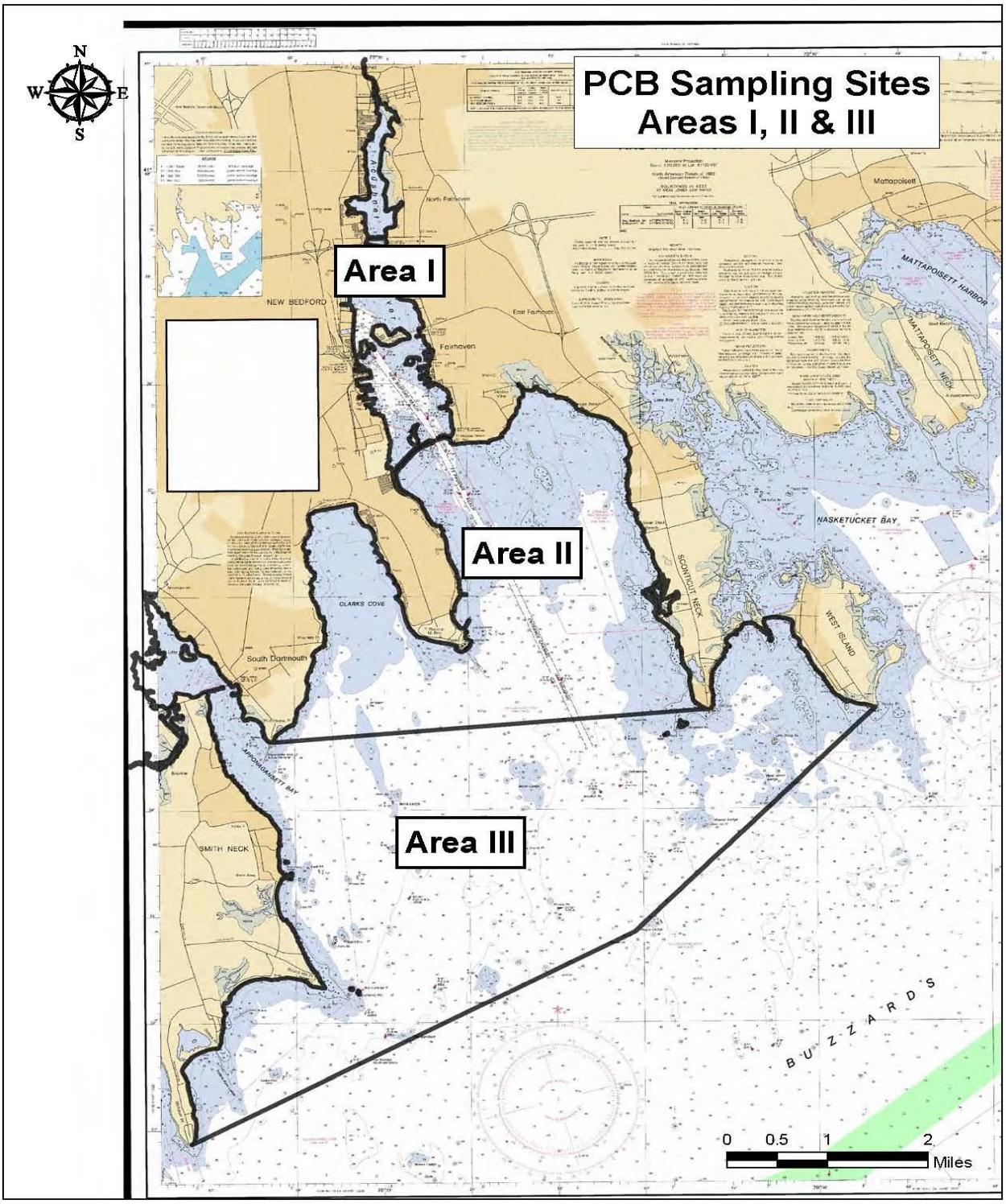


Figure 1 Fish Closure Areas I to III

Table 1: New Bedford Harbor Seafood Species Sampled - 2003 to 2022

Finfish/Shellfish Caught in the New Bedford Harbor Area				
Species	Years	Areas	Locations per Area	Fish per Location
Alewife	2005 - 2014 2019	1	1-2	5
American Eel	2004 - 2007 2012	1 & 2	3-5 for Area 1 1 for Area 2	1 - 3
Black Sea Bass	2003 – 2014 2019	2 & 3	2-5 for Area 2 5 for Area 3	1 - 5
Blue Crabs	2003 – 2007 2012, 2019	1	4	3
Bluefish	2008 – 2013 2019, 2022, 2023	2 & 3	1-2 for Area 2 2 for Area 3	1 - 6
Summer Flounder	2003 - 2004	2 & 3	1	2 - 13
Winter Flounder	2003 - 2006	1 - 3	1-2 for Area 1 1 for Areas 2 & 3	1 - 2
Lobster	2003 - 2007 2012, 2019	1 - 3	1 for Area 1 5 for Areas 2 & 3	1 - 4
Quahogs - pre-spawn	2003 – 2023	1 - 3	5 for Area 1 5-7 for Area 2 4-5 Area 3	12 - 20
Quahogs - post spawn	2003 - 2014	1 - 3	5 for Area 1 5-7 for Area 2 4-5 Area 3	12 - 20
Scup	2003 - 2014 2019	2 & 3	4-5 for Area 2 5 for Area 3	3 - 6
Striped Bass	2010 - 2016 2019, 2022, 2023	1 - 3	1-5	1
Tautog	2012 – 2014, 2019	2 & 3	1-5	1 - 5
Channel Whelk - Conch	2009 - 2014 2016 - 2023	2 & 3	1-5 for Area 2 3-5 for Area 3	4 - 14

4. Results and Discussion

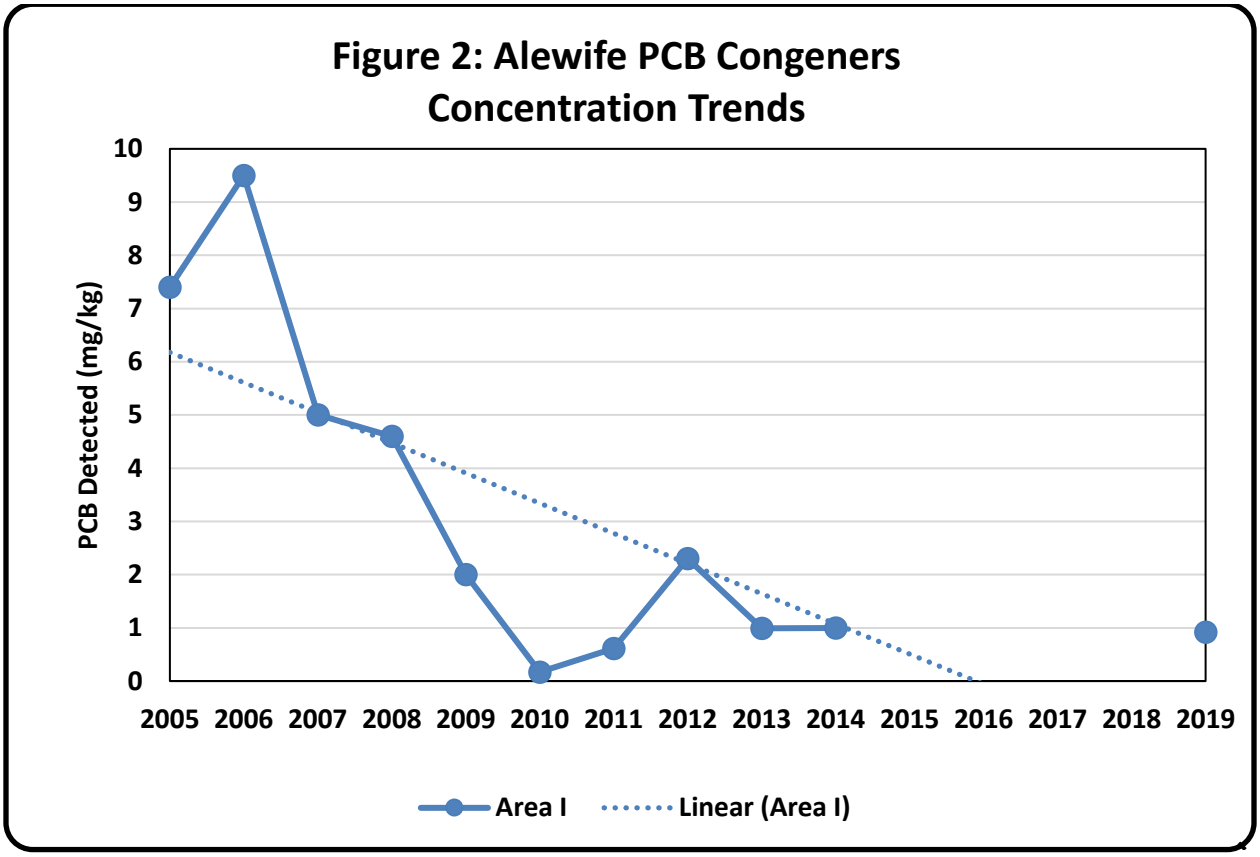
Overall, most of the seafood species indicate a decrease of PCB congener concentration since the start of the dredging in 2003. The following is a summary for each species.

Alewife

The trend for the PCB concentrations in Alewife has been decreasing from 2005 to 2019 as shown in Table 2 and Figure 2. The sample locations for the Alewife are shown on Figures 3 and 4.

Table 2: Alewife PCB Congener Detected Concentrations (mg/kg)

Station\ Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015 to 2018	2019
1A	4.9	11	5.0	4.6	2.0						Not Sampled	
1B	9.9	7.8										
1C						0.17	0.61	2.3	0.99	1.0		0.92
Average	7.4	9.5	5.0	4.6	2.0	0.17	0.61	2.3	0.99	1.0		0.92

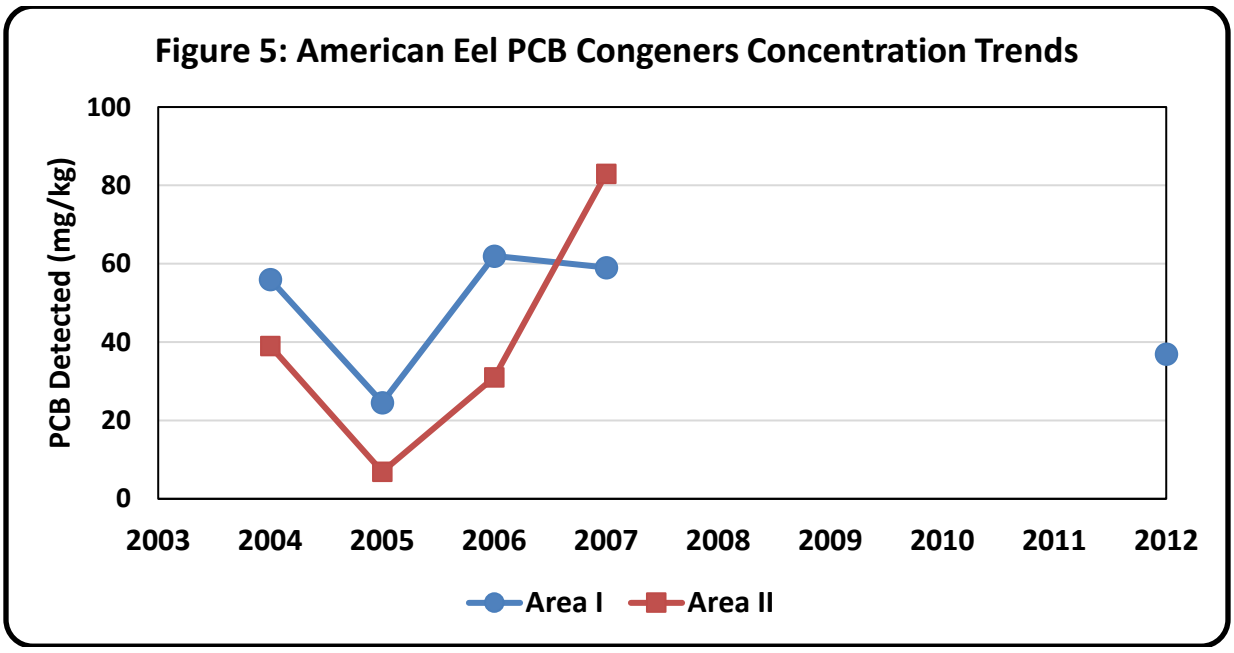


American Eel

The trend for the PCB concentrations in American Eel cannot be determined because of the limited number of samples collected. The data set is shown on Table 3 and Figure 5. The sample locations for the American Eel are shown on Figure 6.

Table 3: American Eel PCB Congener Detected Concentrations (mg/kg)

Area\Year	2004	2005	2006	2007	2008 to 2011	2012
1A	28	16	81	47	Not Sampled	53
1B	31	15	69	22		20
1C	22	29	37	66		
1D	132	35	70	102		37
1E	67	28	55	59		
Average	56	24.6	62	59		37
2C	39	6.9	31	83		



Black Sea Bass

The trend for the PCB concentrations in Black Sea Bass had been decreasing from 2003 to 2019 for Area III, and decreased from 2003 to 2014 in Area II, there has been in an increase in the latest (2019) concentrations in Area II as shown in Table 4 and Figure 7. The sample locations for the Black Sea Bass are shown on Figure 8.

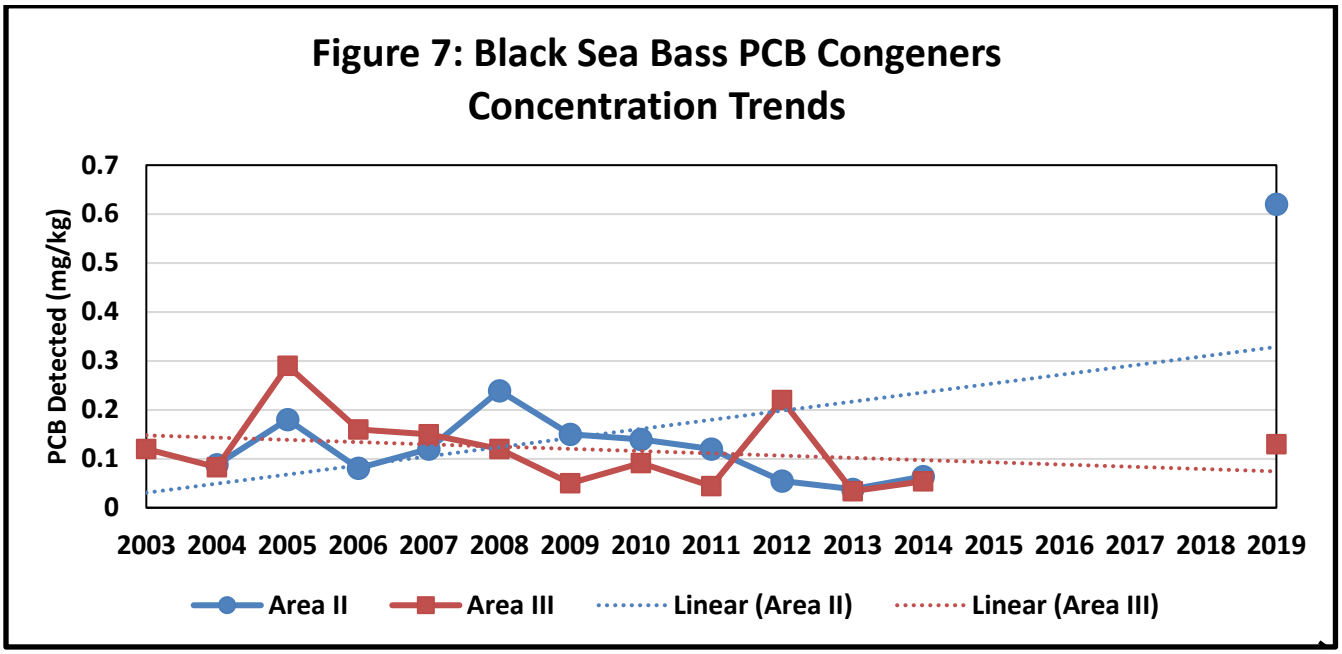


Table 4: Black Sea Bass PCB Congener Detected Concentrations (mg/kg)

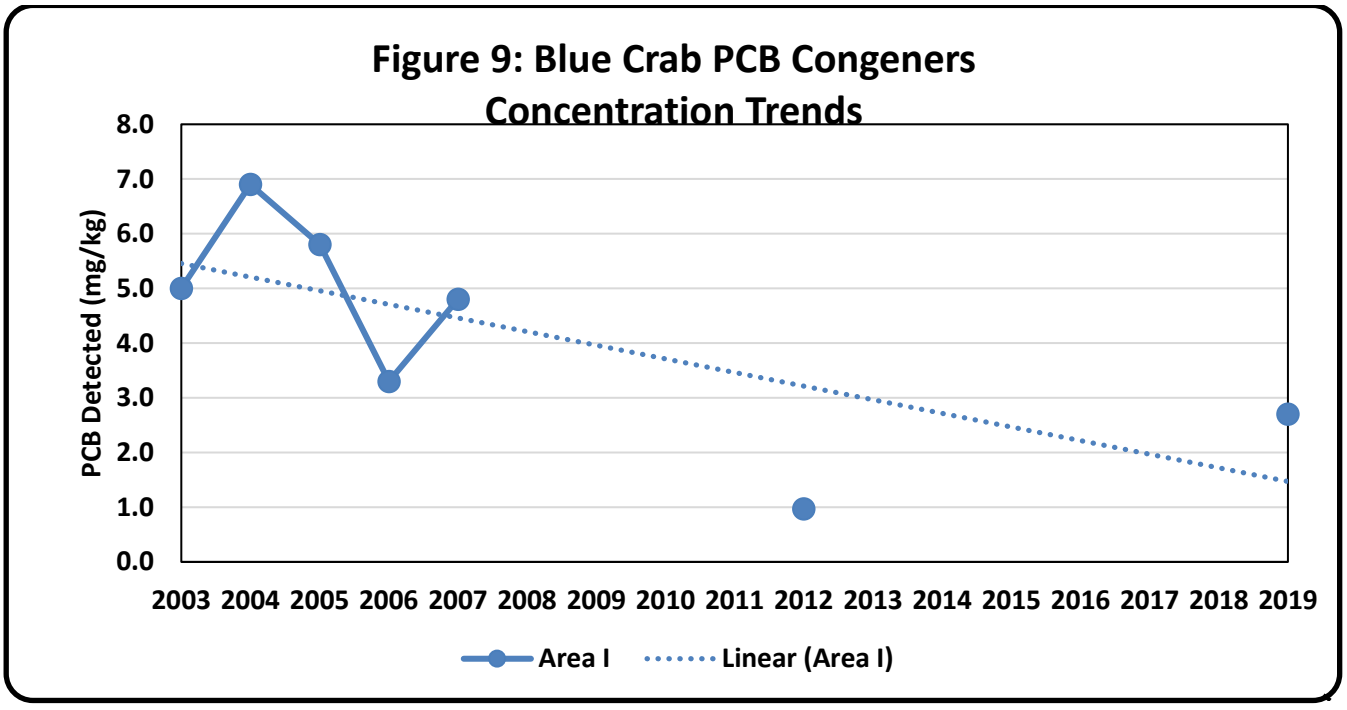
Station\ Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015 to 2018	2019
2A			0.12	0.05	0.27	0.026	0.018	0.34	0.16		0.069	0.027	Not Sampled	0.34
2B		0.077	0.23	0.08	0.023	0.47	0.036	0.18	0.077		0.024	0.038		0.23
2C					0.079	0.18	0.042	0.11	0.29		0.018	0.13		0.57
2D		0.099	0.10	0.07	0.058	0.14	0.63	0.051	0.035	0.06	0.028	0.065		1.8
2E			0.27	0.13	0.15	0.38	0.023	0.036	0.053		0.053	0.057		0.14
Average		0.088	0.18	0.08	0.12	0.24	0.15	0.14	0.12	0.06	0.038	0.064		0.62
3A	0.12	0.075	0.13	0.08	0.10	0.12	0.087	0.052	0.036	0.024	0.016	0.035		0.037
3B		0.056	0.28	0.06	0.23	0.048	0.077	0.029	0.037		0.024	0.044		0.02
3C		0.096	0.42	0.17	0.093	0.25	0.034	0.026	0.083	0.59	0.081	0.037		0.2
3D		0.085	0.29	0.27	0.12	0.030	0.028	0.057	0.052	0.056	0.0086	0.057		0.31
3E		0.10	0.32	0.23	0.19	0.12	0.025	0.29	0.010		0.042	0.096		0.1
Average	0.12	0.083	0.29	0.16	0.15	0.11	0.05	0.091	0.044	0.22	0.034	0.054		0.13

Blue Crab

The trend for the PCB concentrations in Blue Crab has been decreasing from 2003 to 2019 as shown in Table 5 and Figure 9. The sample locations for the Blue Crab are shown on Figure 10.

Table 5: Blue Crab PCB Congener Detected Concentrations (mg/kg)

Station\ Year	2003	2004	2005	2006	2007	2008 to 2011	2012	2013 to 2018	2019
1A	12	14	16	3.8	9.0	Not Sampled	0.64	Not Sampled	4.4
1B	7.8	2.1	3.5	4.7	3.5		1.1		2.1
1C	1.4	5.9	2.7	3.1	2.7		0.90		1.5
1D	0.65	6.0	0.80	1.4	3.9		1.3		
1E	3.0								
Average	5.0	6.9	5.8	3.3	4.8		0.97		2.7



Bluefish

The trend for the PCB concentrations in Bluefish has decreased from 2009 to 2023 in Area I (Area I only has two years of sampling); has decreased from 2008 to 2013 in Area II, there was an increase in the 2019 concentrations in Area II, which has returned to previous levels in 2023; and the trend has been level for Area III from 2008 to 2023 as shown in Table 6 and Figure 11. The sample locations for the Bluefish are shown on Figure 12.

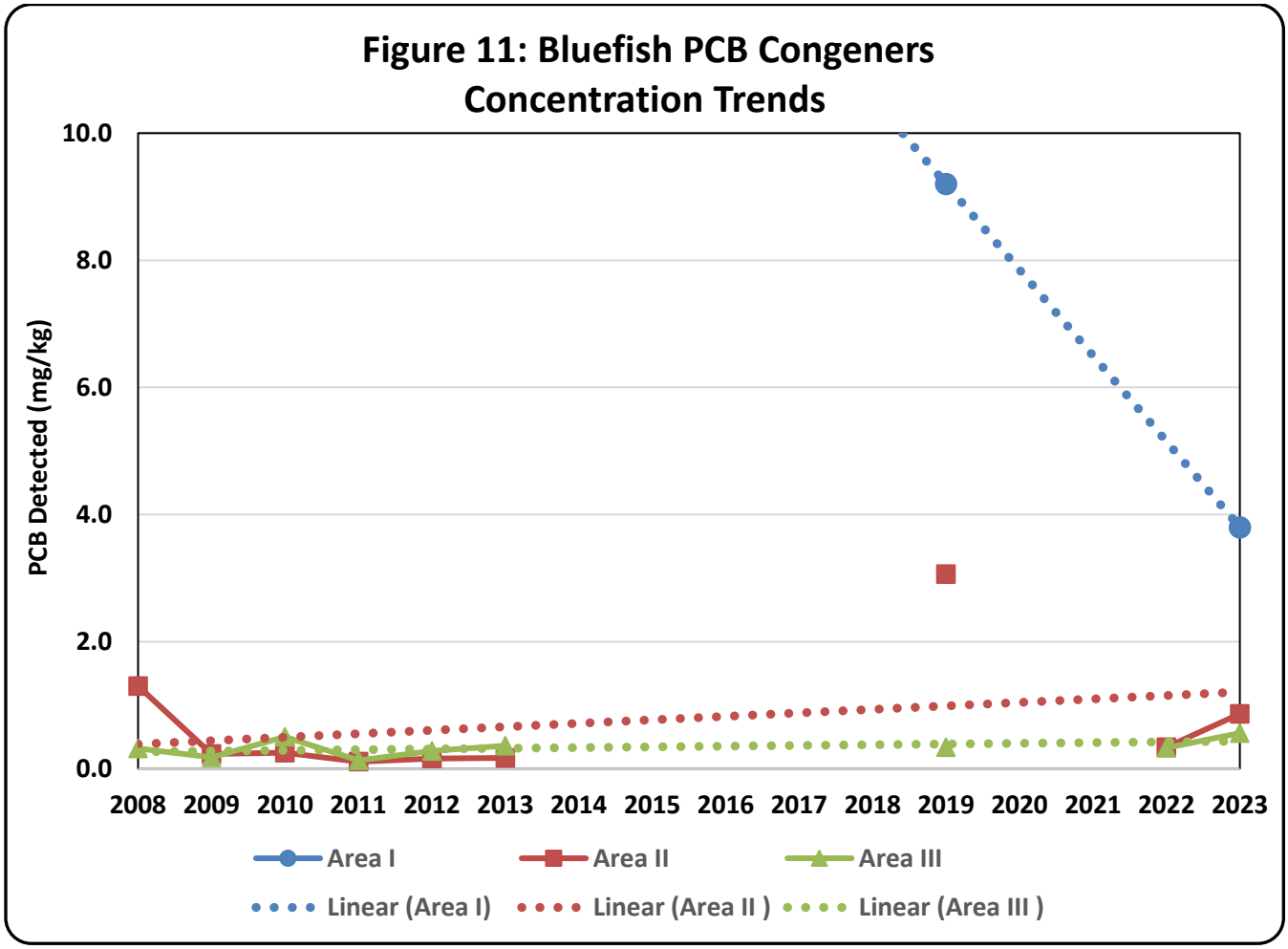


Table 6: Bluefish PCB Congener Detected Concentrations (mg/kg)

Station\Year	2008	2009	2010	2011	2012	2013	2014 to 2018	2019	2022	2023
1A								10.8		5.1
1B								3.2		2.2
1C								5.9		5.0
1D								16.5		2.7
1E								8.8		
Average								9.0		3.8
2A	1.5		0.13	0.12	0.21	0.13		9.4	0.26	2.3
2B	1.1	0.23	0.37	0.10	0.11	0.21		0.57	0.52	0.49
2C								2.1	0.34	0.61
2D								1.8	0.33	0.46
2E								1.4	0.25	0.44
Average	1.3	0.23	0.25	0.11	0.16	0.17		3.1	0.34	0.86
3A	0.39	0.14	0.84	0.15	0.40	0.20		0.25	0.092	0.13
3B	0.24	0.22	0.16	0.11	0.16	0.51		0.12	0.24	0.38
3C								0.22	0.74	1.4
3D								0.94	0.41	0.47
3E								0.18	0.18	0.44
Average	0.32	0.18	0.50	0.13	0.28	0.36		0.34	0.33	0.56

Not Sampled

Note: Samples collected between 2008 and 2013 had composited fish per location. Samples collected in after 2019 had one fish per location. The following station are in the same locations: Stations 1A and 1C; 1D and 1E; 2C, 2D, and 2E in 2019: and 1A, 1B, and 1D in 20023.

Conch

The trend for the PCB concentrations in Conch has been level for Areas II (except for 2016 and 2017) and III as shown in Table 7 and Figure 13. The sample locations for the Conch are shown on Figure 14.

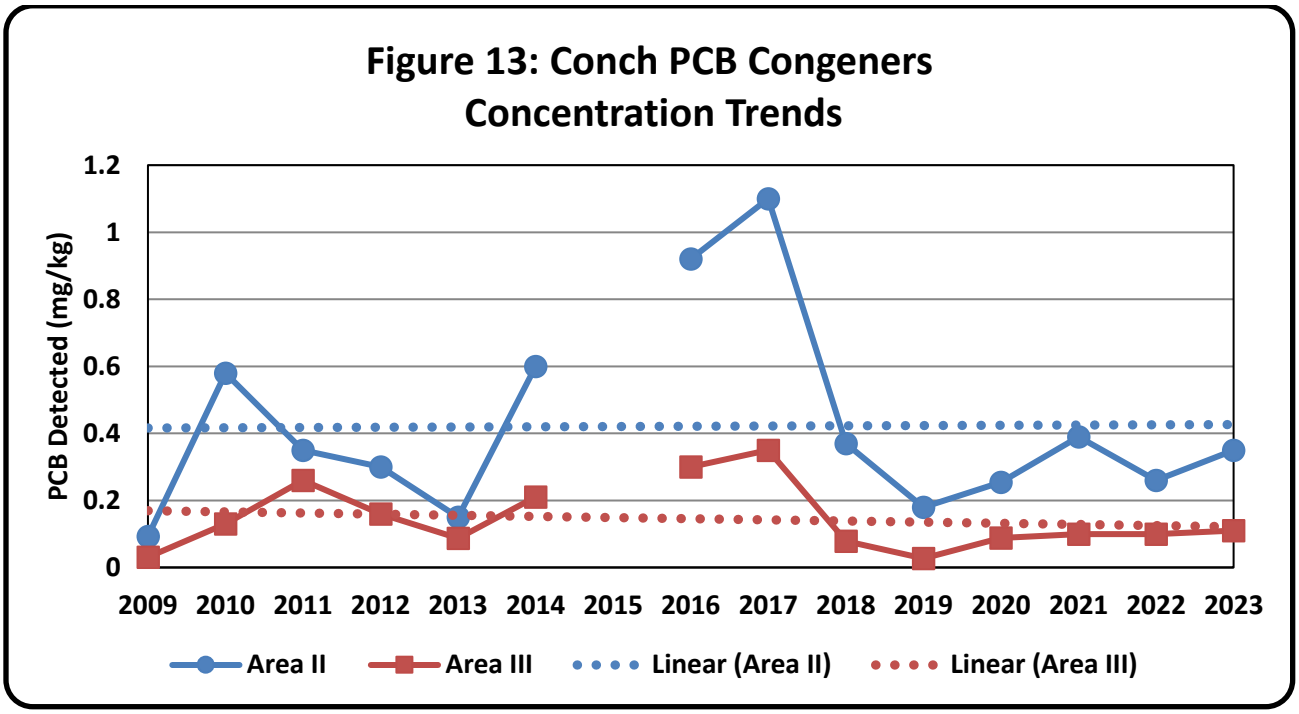


Table 7: Conch PCB Congener Detected Concentrations (mg/kg)

Station\ Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2A	0.068		0.14	0.12	0.028	0.30		0.55	0.36	0.18	0.068	0.15	0.17	0.16	0.15
2B	0.11	0.58	0.22	0.25	0.12	0.88		0.76	1.4	0.26	0.23	0.23	0.35	0.26	0.41
2C	0.16		0.56	0.67	0.40	0.65		1.4	2.3	0.74	0.33	0.41	0.73	0.32	0.53
2D	0.040		0.63	0.23	0.14	0.44		1.5	1.3	0.45	0.17	0.25	0.34	0.40	0.41
2E	0.089		0.21	0.22	0.078	0.72		0.41	0.26	0.20	0.10	0.23	0.34	0.15	0.27
Average	0.093	0.58	0.35	0.30	0.15	0.60		0.92	1.1	0.37	0.18	0.25	0.39	0.26	0.35
							Not Sampled								
3A	0.035	0.13	0.13	0.21	0.066	0.14			0.40	0.058		0.023	0.070	0.092	0.082
3B	0.0093			0.098	0.023	0.043			0.15	0.033	0.021	0.069	0.066	0.10	0.067
3C	0.022	0.091	0.091	0.09	0.078	0.094		0.34	0.80	0.073	0.030	0.20	0.10	0.11	0.12
3D	0.013	0.17	0.72	0.23	0.21	0.43		0.25	0.13	0.079	0.022	0.050	0.081	0.072	0.16
3E	0.074		0.10	0.18	0.059	0.36			0.28	0.15	0.035	0.10	0.19	0.15	0.12
Average	0.031	0.13	0.26	0.16	0.087	0.21		0.3	0.35	0.079	0.027	0.088	0.10	0.10	0.11

Flounder

The trend for the PCB concentrations in Flounder cannot be determined because of the limited number of samples collected. The data set for Winter Flounder is shown on Table 8. The data set for Summer Flounder is shown on Table 9.

Table 8: Winter Flounder PCB Congener Detected Concentrations (mg/kg)

Station\Year	2003	2004	2005	2006
1A	1.8			
1B	3.9			
Average	2.8			
2C			2.0	0.042
3A	0.61			

Table 9: Summer Flounder PCB Congener Detected Concentrations (mg/kg)

Station\Year	2003	2004
2A		0.087
2E		0.81
Average		0.45
3A	0.097	

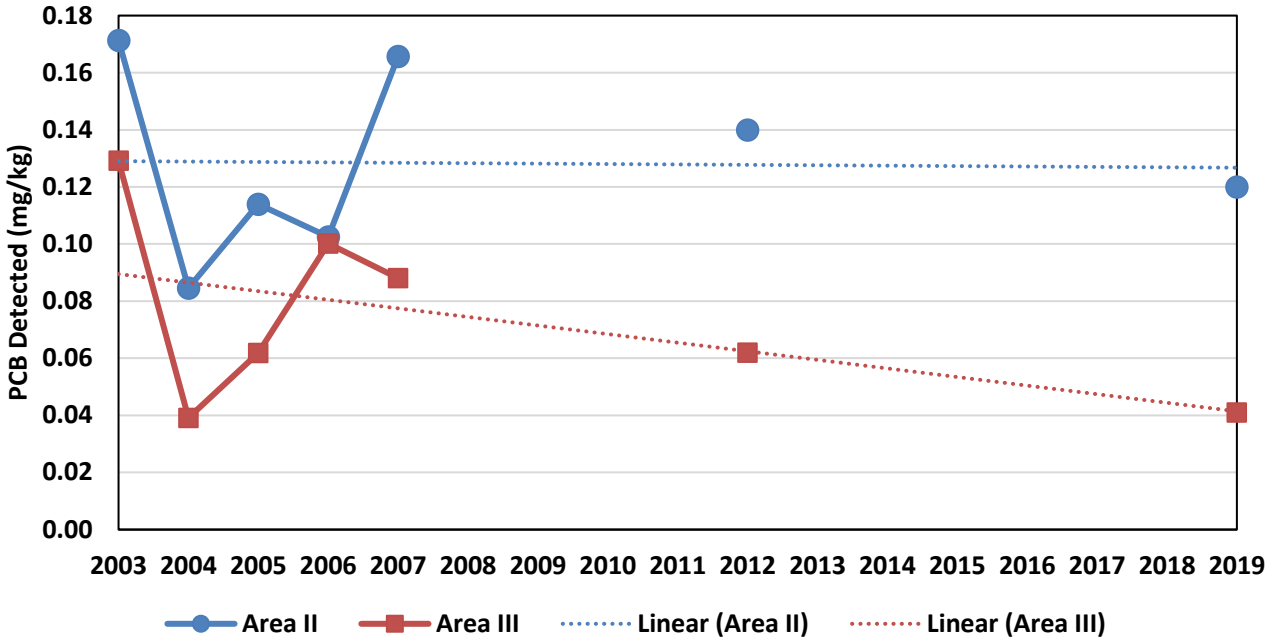
Lobster - Meat

The trend for the PCB concentrations in Lobster meat has been level for Area II and decreasing for Area 3 as shown in Table 10 and Figure 15. The sample locations for the Lobster are shown on Figure 16.

Table 10: Lobster Meat PCB Congener Detected Concentrations (mg/kg)

Station\ Year	2003	2004	2005	2006	2007	2008 to 2011	2012	2013 to 2018	2019
1E		0.098	0.08	0.079	0.16	Not Sampled		Not Sampled	
2A	0.11	0.043	0.13	0.10	0.25		0.23		0.14
2B	0.095	0.058	0.13	0.067	0.094		0.13		0.057
2C	0.31	0.14	0.10	0.12	0.13		0.074		
2D	0.20	0.068	0.090	0.13	0.085		0.11		0.17
2E	0.14	0.11	0.12	0.095	0.27				
Average	0.17	0.085	0.11	0.10	0.17		0.14		0.12
3A	0.092	0.034	0.083	0.14	0.15		0.10		
3B	0.071	0.058	0.10	0.11	0.089		0.081		0.032
3C	0.10	0.025	0.047	0.074	0.083		0.017		0.045
3D	0.073	0.054	0.030	0.084	0.038		0.068		0.03
3E	0.31	0.024	0.049	0.089	0.076		0.045		0.056
Average	0.13	0.039	0.062	0.10	0.088		0.062		0.041

Figure 15: Lobster Meat PCB Congeners Concentration Trends



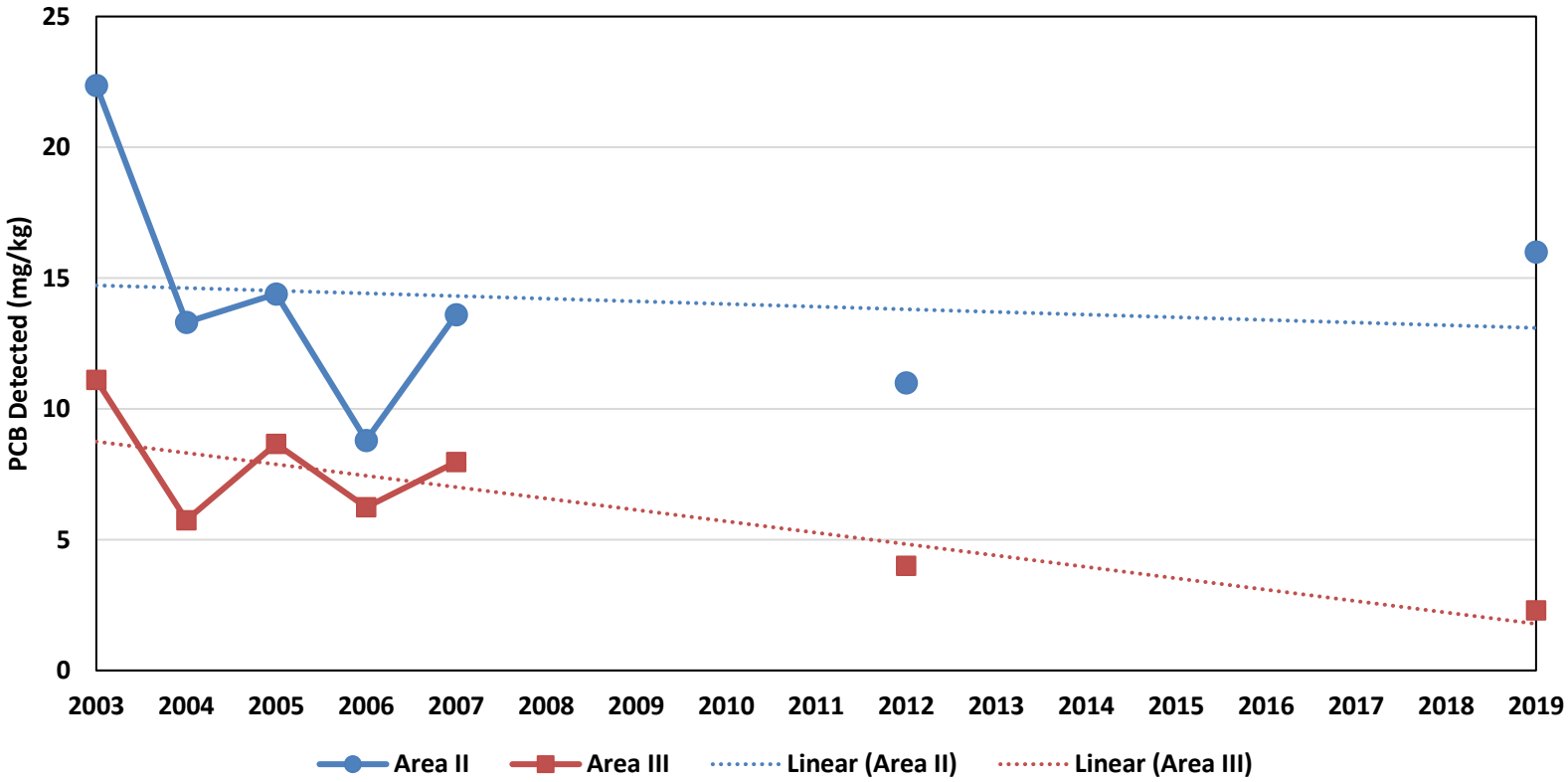
Lobster - Tomalley

The trend for the PCB concentrations in Lobster tomalley decreases from 2003 to 2019 as shown in Table 11 and Figure 17.

Table 11: Lobster Tomalley PCB Congener Trend - Detected Values (mg/kg)

Station\ Year	2003	2004	2005	2006	2007	2008 to 2011	2012	2013 to 2018	2019
1E		31	10	14	14	Not Sampled		Not Sampled	
2A	12	9.4	13	11	19		10		10
2B	9.3	11	10	5.3	7.1		10		9
2C	22	12	14	8.0	6.0		8.5		
2D	25	13	9.0	12	10		13		29
2E	43	21	26	7.5	25				
Average	22	13	14.4	9	14		11		16
3A	10	5.0	5.1	8.0	11		5.9		
3B	6.1	6.1	19	5.9	13		3.5		2.9
3C	4.5	4.9	7.9	3.9	5.1		1.2		5.1
3D	9.2	7.8	6.8	7.5	4.7		6.2		3.4
3E	25	4.9	4.5	5.8	6.4		3.3		2.3
Average	11	5.7	8.7	6.2	8.0		4.0		3.4

Figure 17: Tomalley PCB Congeners Concentration Trends



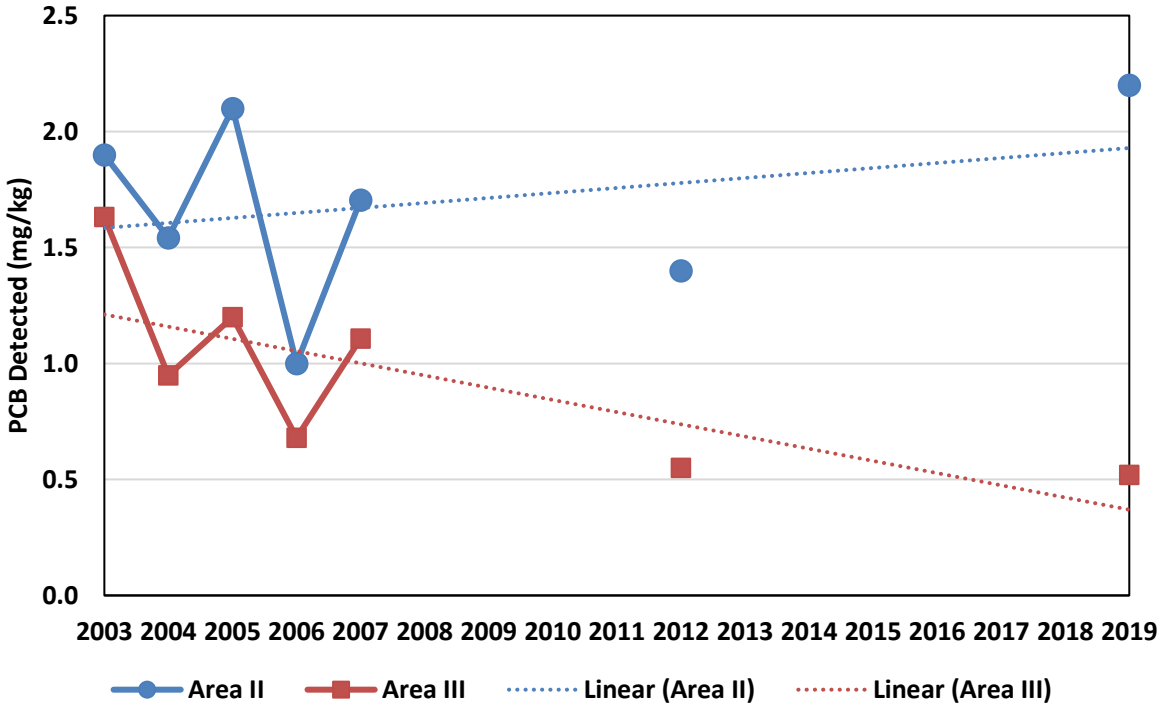
Lobster – Meat and Tomally

The trend for the PCB concentrations in Lobster meat and tomalley decreases from 2003 to 2019 as shown in Table 12 and Figure 18.

Table 12: Lobster Meat and Tomalley PCB Congener Detected Concentrations (mg/kg)

Station\ Year	2003	2004	2005	2006	2007	2008 to 2011	2012	2013 to 2018	2019
1E		4.2	1.4	1.4	1.8	Not Sampled		Not Sampled	
2A	1.4	1.0	1.8	1.2	2.8		1.4		1.4
2B	1.1	1.0	1.4	0.54	1.0		1.3		1.3
2C	1.4	1.2	2.1	0.93	0.78		1.1		
2D	1.7	2.3	1.8	1.4	1.3		1.7		3.8
2E	4.0	2.1	3.6	0.82	2.7				
Average	1.9	1.5	2.1	1.0	1.7		1.4		2.2
3A	1.4	0.67	0.70	0.93	1.4		0.81		
3B	1.1	0.93	2.2	0.56	1.8		0.5		0.45
3C	0.82	0.89	1.2	0.45	0.69		0.17		0.77
3D	1.4	1.4	0.99	0.83	0.69		0.83		0.55
3E	3.4	0.88	0.80	0.65	0.88		0.45		0.31
Average	1.6	0.95	1.2	0.68	1.1		0.55		0.52

Figure 18: Lobster Meat and Tomalley PCB Congeners Concnetration Trends



Quahog - Pre-Spawn

The trend for the PCB concentrations in Pre-Spawn Quahog decreases for all locations, except location 2B is roughly level as shown in Table 13 and Figures 19 to 24. The sample locations for the Quahog are shown on Figures 25 to 27. The sampling generally occurred during or before May. However, there were some years that the sampling was performed in June and July. Locations 2A, 2E, 2O, 3A, 3C, 3E and 3F are not shown on the figures because the sampling at these locations were not sampled after 2007 or have limited number of samples.

Note there is one sample location (3E) collected in September in 2004 that would be considered a Post-Spawn Quahog sample but was left in the Pre-Spawn Quahog data because only one round of sample was collected. The Post-Spawn Quahog sampling events (2007 to 2014) presented in the next section were specifically performed after a round of Pre-Spawn Quahog samples were also collected.

Table 13: Quahog Pre-Spawn PCB Congener Detected Concentrations (mg/kg)

Station\ Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1A	0.73	0.72	0.77	0.60							0.53					1			0.39	0.14	0.16
1B	1.1	0.63	1.2	1.4	1.2				0.40		0.23	0.83	0.45		0.54	1	0.4		0.27	0.17	0.12
1C	1.5	1.65	1.6	1.6					0.50		0.34				0.65				0.36	0.15	0.36
1D	1.7	2.3	1.8	1.8					0.96		0.90	1.1	0.44		1.2	1.8	0.8		0.54		0.24
1E	2.9	6.1	4.0	4.1	6.0				1.3		0.90	2.1	0.79	1.3	1.5	2.7	0.92		0.59		0.36

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2A	0.079	0.086	0.08	0.13																	
2B	0.036	0.053	0.037	0.056	0.075	0.036	0.027	0.037	0.036	0.071	0.029	0.035	0.013	0.030	0.043	0.069	0.033	0.056	0.038	0.037	0.042
2C	0.26	0.28	0.46	0.48	0.72	0.33	0.31	0.39	0.37	0.36	0.24	0.31	0.17	0.22	0.28	0.33	0.22	0.19	0.086	0.14	0.11
2D	0.88	0.17	0.24	0.20	0.15	0.13	0.12	0.28	0.068	0.094	0.056	0.099	0.064	0.057	0.056	0.12	0.073	0.087	0.080	0.040	0.055
2E	0.12	0.77	0.81	0.50					0.050												
2F					0.083	0.053	0.046	0.087	0.050	0.056	0.049	0.046	0.043	0.050	0.049	0.11	0.052	0.043	0.037	0.025	0.035
2G					0.064	0.050	0.040	0.051	0.027	0.067	0.021	0.032	0.016	0.032	0.045	0.077	0.028	0.024	0.030	0.025	0.025
2H					0.29	0.16	0.069	0.15	0.088	0.095	0.12	0.091	0.059	0.080	0.11	0.14	0.071	0.046	0.062	0.086	0.046
2O									0.16												

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
3A	0.028	0.062	0.045	0.19																	
3B	0.034	0.050	0.016	0.19	0.10	0.026	0.014	0.024	0.021	0.054	0.029	0.033	0.033	0.022	0.035	0.035	0.031	0.025	0.039	0.026	0.022
3C	0.028	0.038	0.0002	0.064	0.036																
3D	0.023	0.017	0.14	0.0020	0.029	0.017	0.0067	0.027	0.017	0.022	0.014	0.016	0.0018	0.018	0.024	0.028	0.026	0.020	0.029	0.015	0.017
3E	0.065	0.036	0.001	0.001	0.0004																
3F					0.064																
3I						0.021	0.00058	0.045	0.013	0.028	0.029	0.022	0.013	0.025	0.025	0.041	0.039	0.016	0.013	0.022	0.0082
3J						0.019	0.0034	0.021	0.0034	0.017	0.011	0.007	0.0017	0.0087	0.0056	0.011	0.0062	0.0030	0.0047	0.0084	0.0055

Figure 19: Pre-spawn Quahog PCB Congener Concentration Trends - Locations 1A, 1B, and 1C

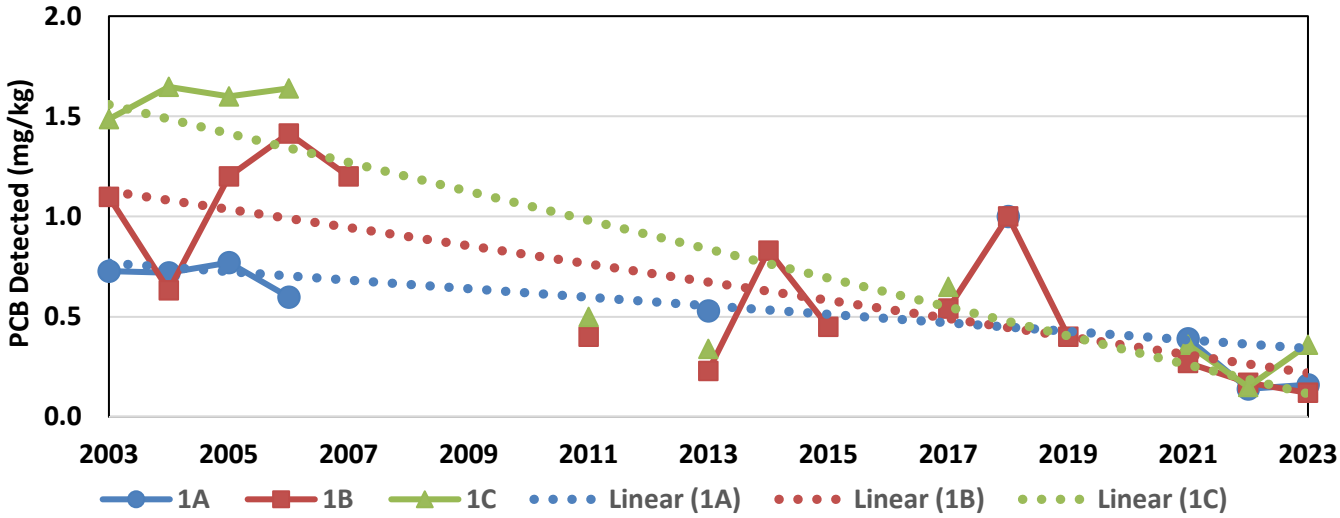


Figure 20: Pre-spawn Quahog PCB Congener Concentration Trends - Locations 1D and 1E

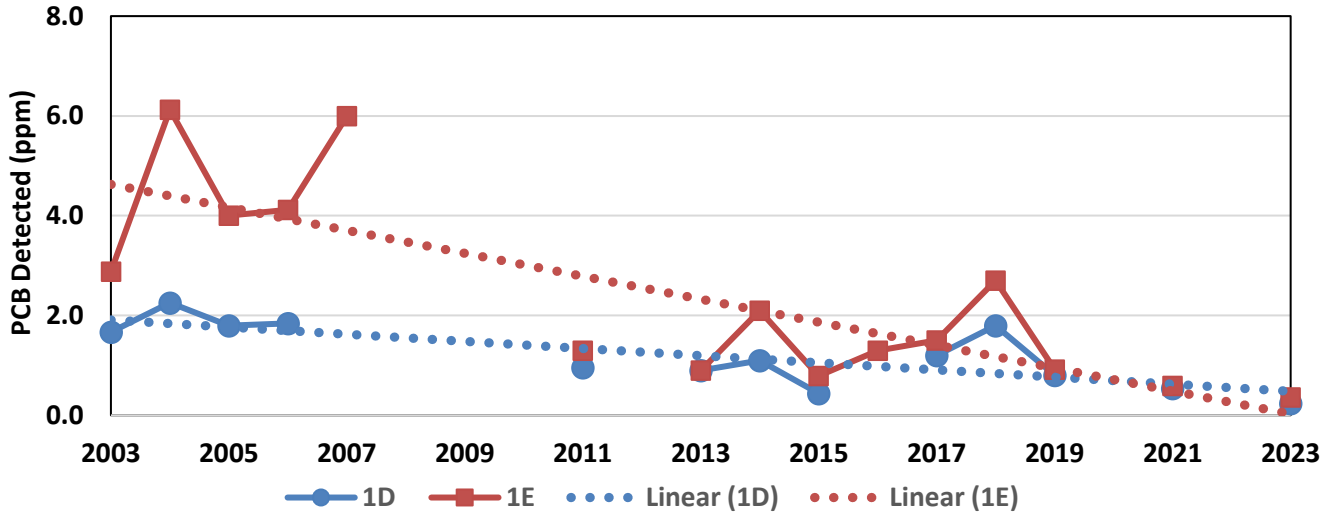


Figure 21: Pre-spawn Quahog PCB Congener Concentration Trends - Locations 2C, 2D, and 2H

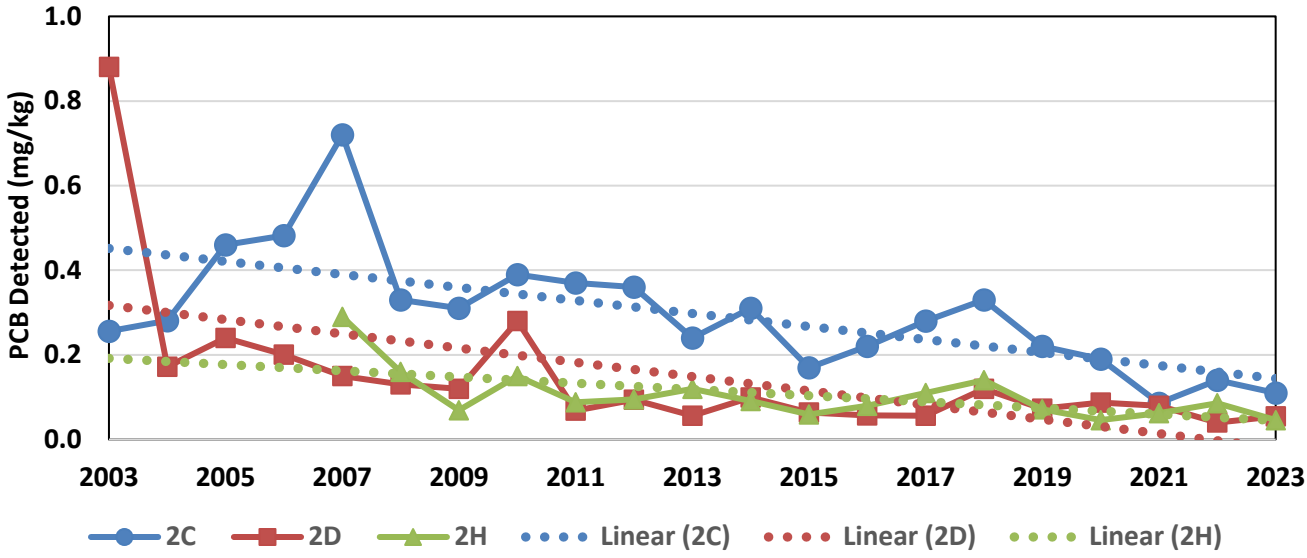


Figure 22: Pre-spawn Quahog PCB Congener Concentration Trends - Locations 2B, 2F, and 2G

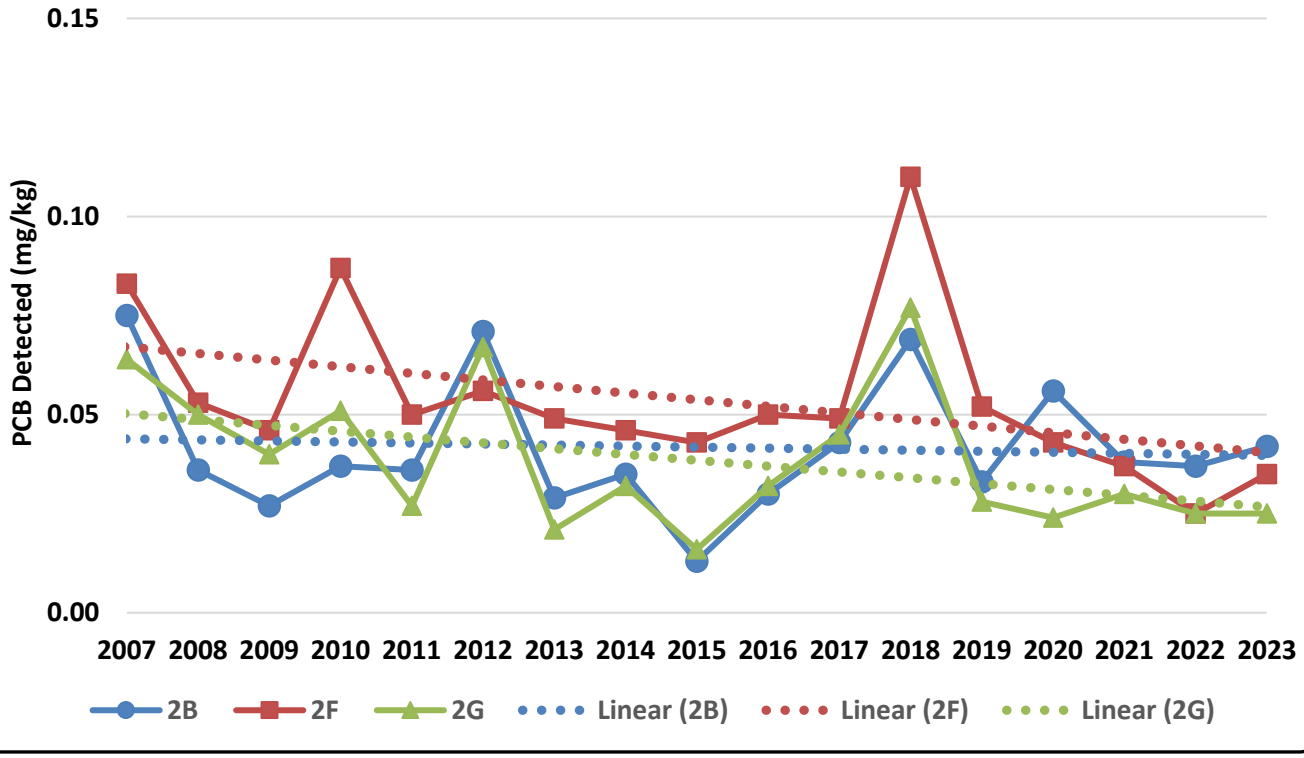


Figure 23: Pre-spawn Quahog PCB Congener Concentration Trends - Locations 3B and 3D

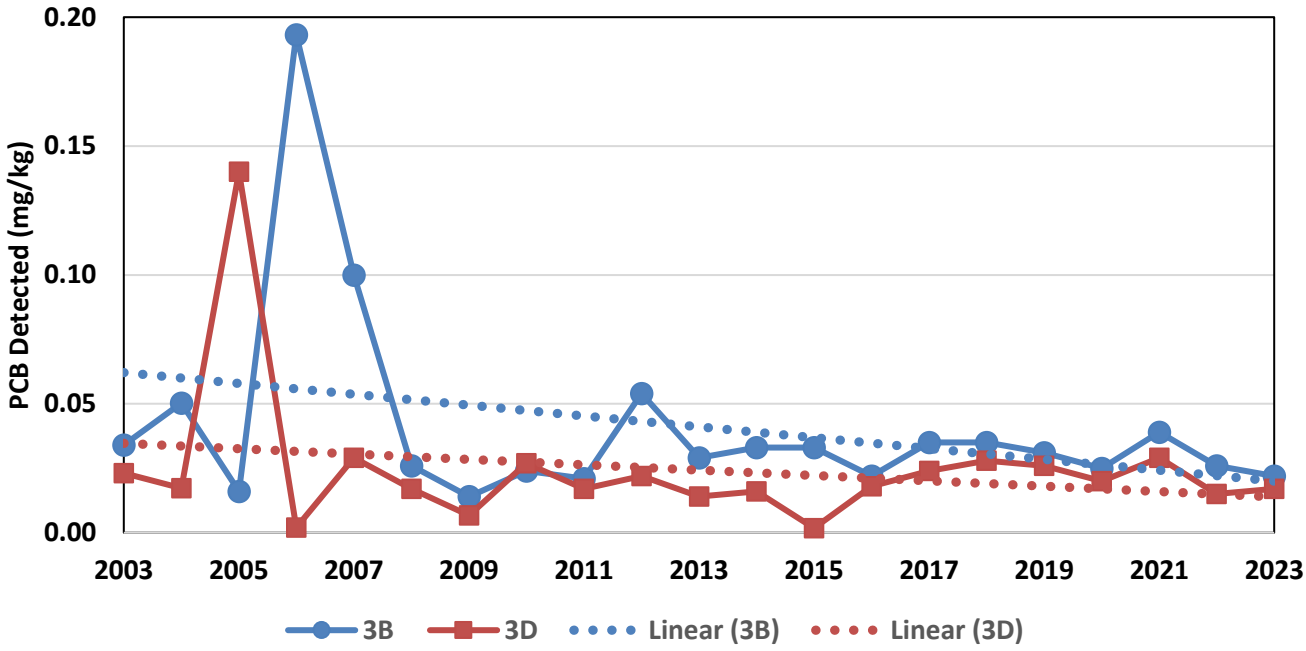
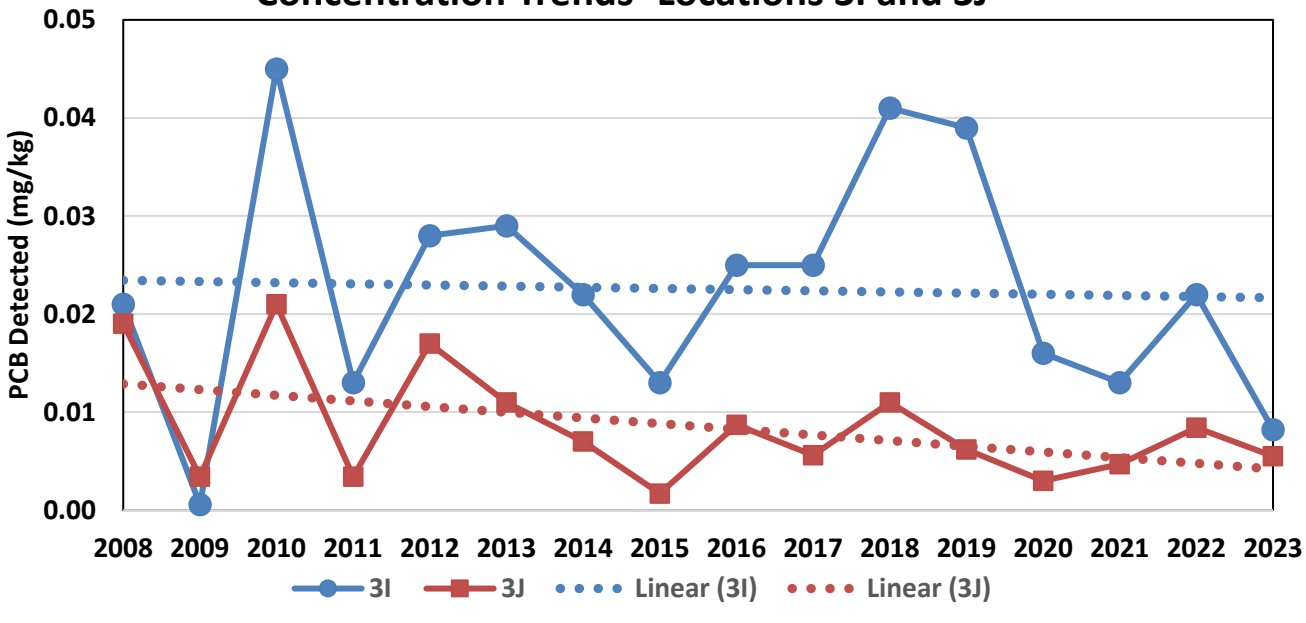


Figure 24: Pre-spawn Quahog PCB Congener Concentration Trends -Locations 3I and 3J



Quahog - Post-spawn

The trend for the PCB concentrations in Post-Spawn Quahog generally decreases for each location from 2007 to 2014 as shown in Table 14 and Figures 28 to 37. The sampling events for the Post Spawn Quahog were generally done during the month of August, except in the year 2009 when the sampling was conducted in October. Two rounds of Post-Spawn Quahog were done during 2010 and 2011 in August and October. Figures 28, 30, 32, 34, and 36 shows the August sampling events and Figures 29, 31, 33, 35, and 37 shows the October sampling events. Trend lines are not shown in the October figures because the limited number of years of data. Note this data represents the years (2007 to 2014) of Post-Spawn Quahog sampling that were specifically performed after a round of Pre-Spawn Quahog samples were also collected. There is one sample location (3E) collected in September in 2004 that would be considered a Post-Spawn Quahog sample but was left in the Pre-Spawn Quahog data because only one round of samples was collected.

Table 14: Quahog Post-Spawn PCB Congener Detected Concentrations (mg/kg)

Station\ Year	2007 Aug	2008 Aug	2009 Oct	2010 Aug	2010 Oct	2011 Aug	2011 Oct	2012 Aug	2013 Aug	2014 Aug
1A									0.39	
1B	0.66								0.38	
1C									0.43	0.50
1D									0.75	0.77
1E	3.8								1.7	1.4
2B	0.044	0.023	0.027	0.074	0.048	0.072	0.059	0.026	0.028	0.025
2C	0.25	0.30	0.57	0.45	0.41	0.50	0.44	0.17	0.19	0.23
2D	0.13	0.13	0.10	0.090	0.025	0.10	0.12	0.069	0.079	0.10
2F	0.11	0.023	0.097	0.080	0.025	0.038	0.052	0.025	0.023	0.031
2G	0.064	0.045	0.062	0.040	0.053	0.051	0.054	0.036	0.030	0.025
2H	0.29	0.18	0.33	0.089	0.097	0.12	0.12	0.059	0.16	0.12
2O										
3B	0.055	0.12	0.037	0.023	0.025	0.080	0.072	0.026	0.038	0.029
3C	0.023									
3D	0.029	0.0082	0.013	0.019	0.019	0.034	0.022	0.019	0.0067	0.015
3E	0.11									
3F	0.046	0.022								
3G										
3I		0.00026	0.031	0.031	0.027	0.039	0.060	0.016	0.014	0.027
3J			0.0061	0.021	0.0041	0.017	0.016	0.0073	0.0045	0.00093

Figure 28: August Post-Spawn Quahog PCB Congener Concentration Trends - Locations 2B and 2G

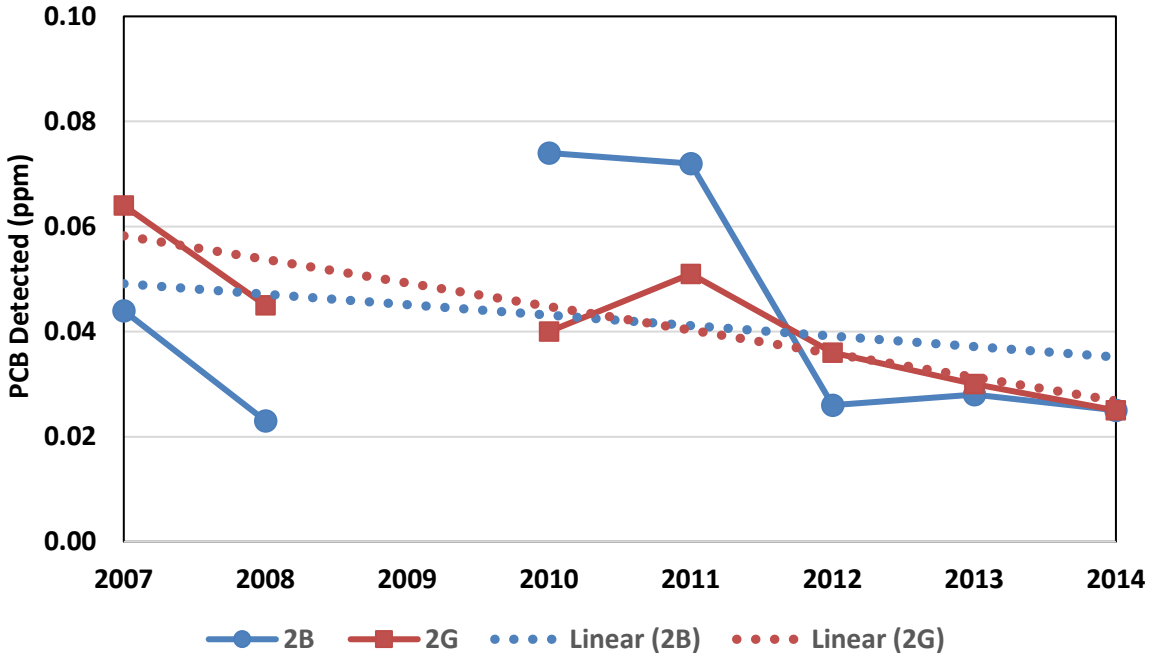


Figure 29: October Post-Spawn Quahog PCB Congener Concentration Trends - Locations 2B and 2G

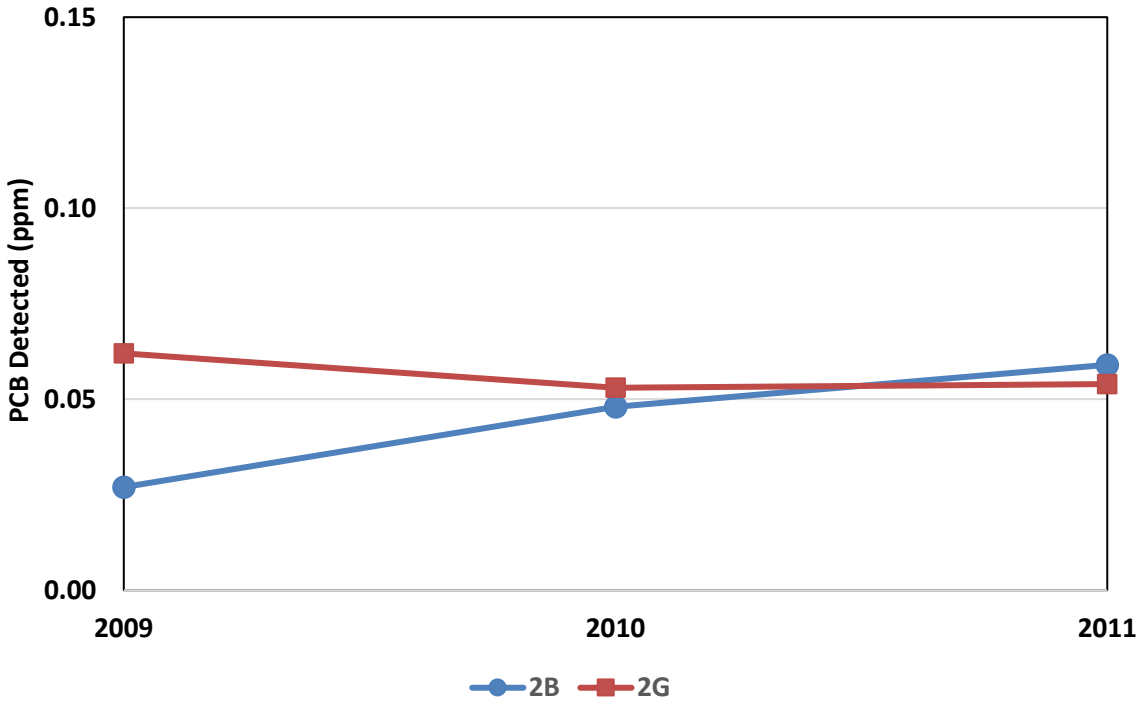


Figure 30: August Post-Spawn Quahog PCB Congener Concentration Trends Locations 2C and 2H

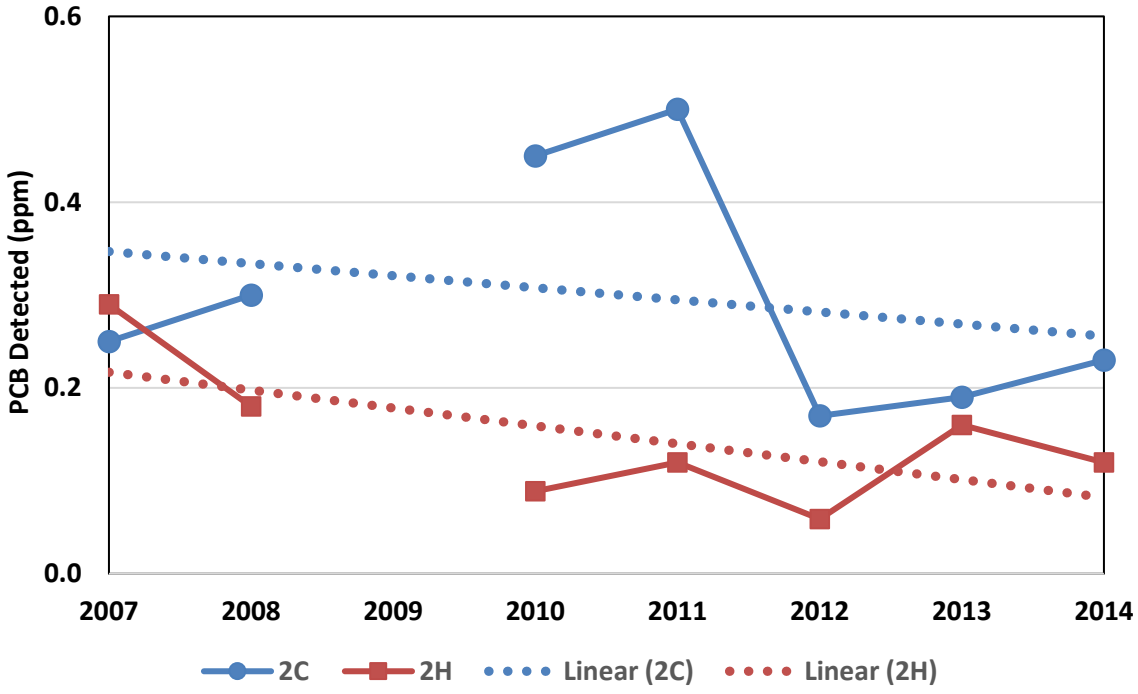


Figure 31: October Post-Spawn Quahog PCB Congener Concentration Trends - Locations 2C and 2H

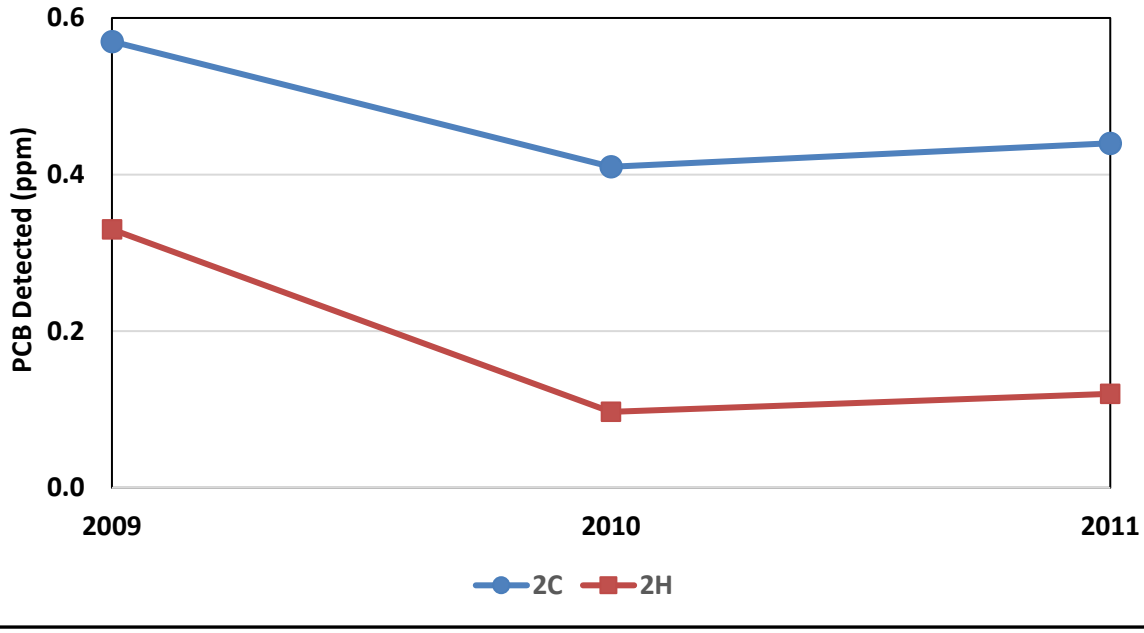


Figure 32: August Post-Spawn Quahog PCB Congener Concentration Trends - Locations 2D and 2F

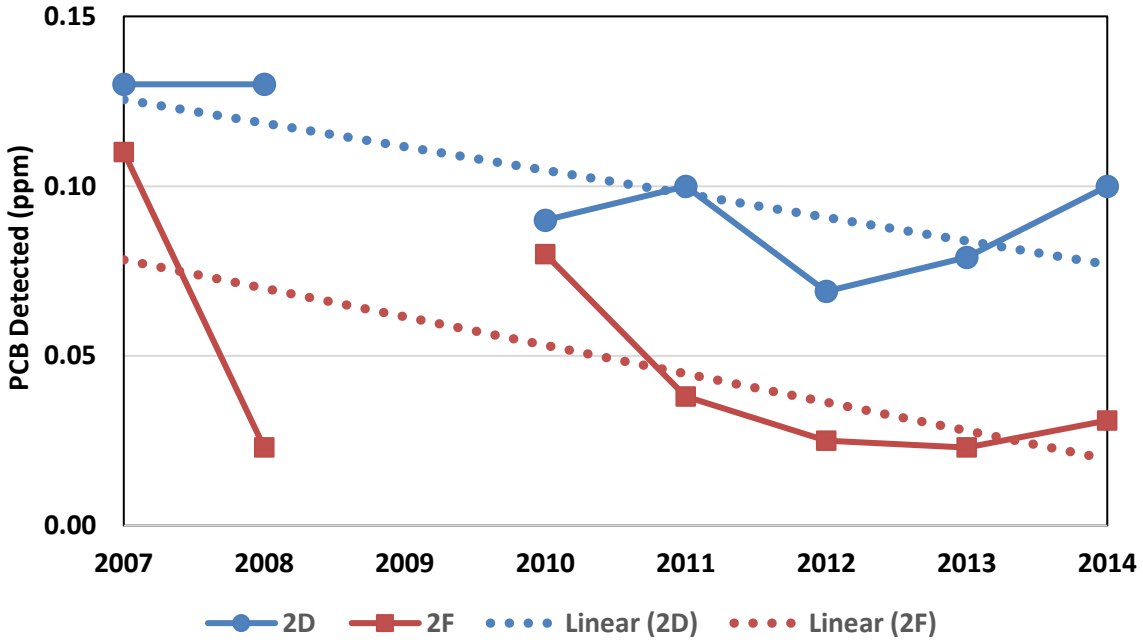


Figure 33: October Post-Spawn Quahog PCB Congener Concentration Trends - Locations 2D and 2F

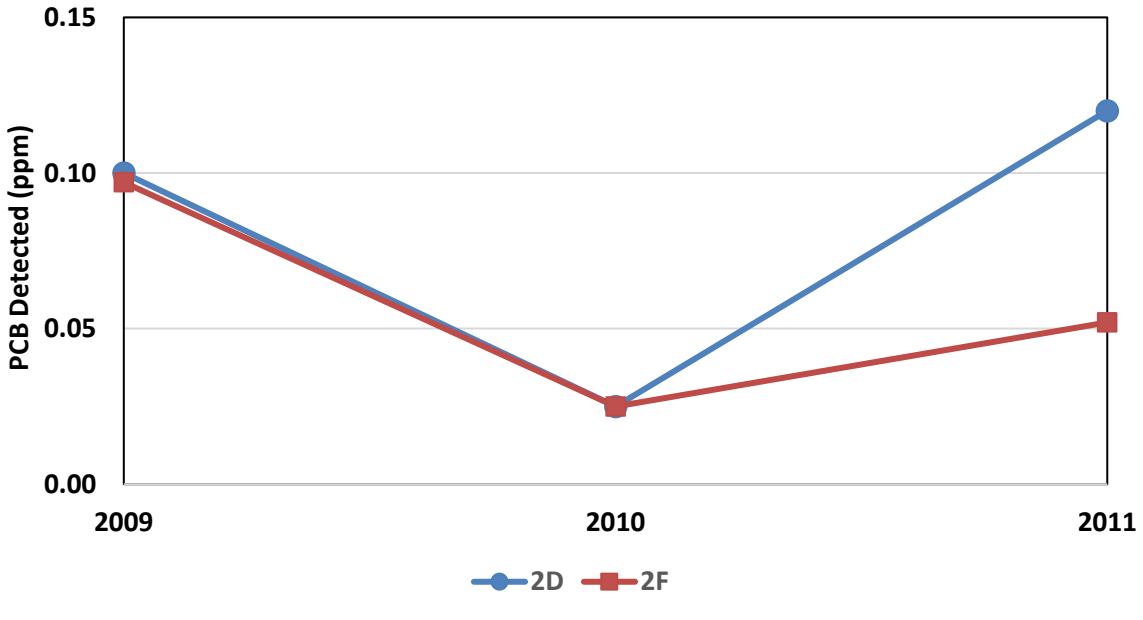


Figure 34: August Post-Spawn Quahog PCB Congener Concentration Trends - Locations 3B and 3D

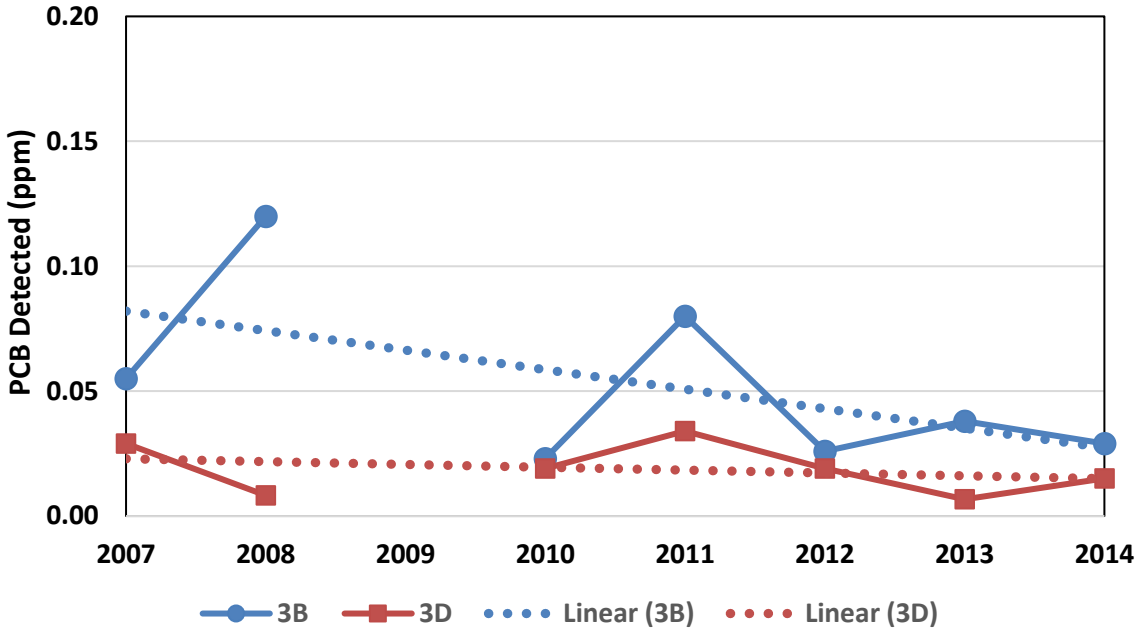


Figure 35: October Post-Spawn Quahog PCB Congener Concentration Trends Locations 3B and 3D

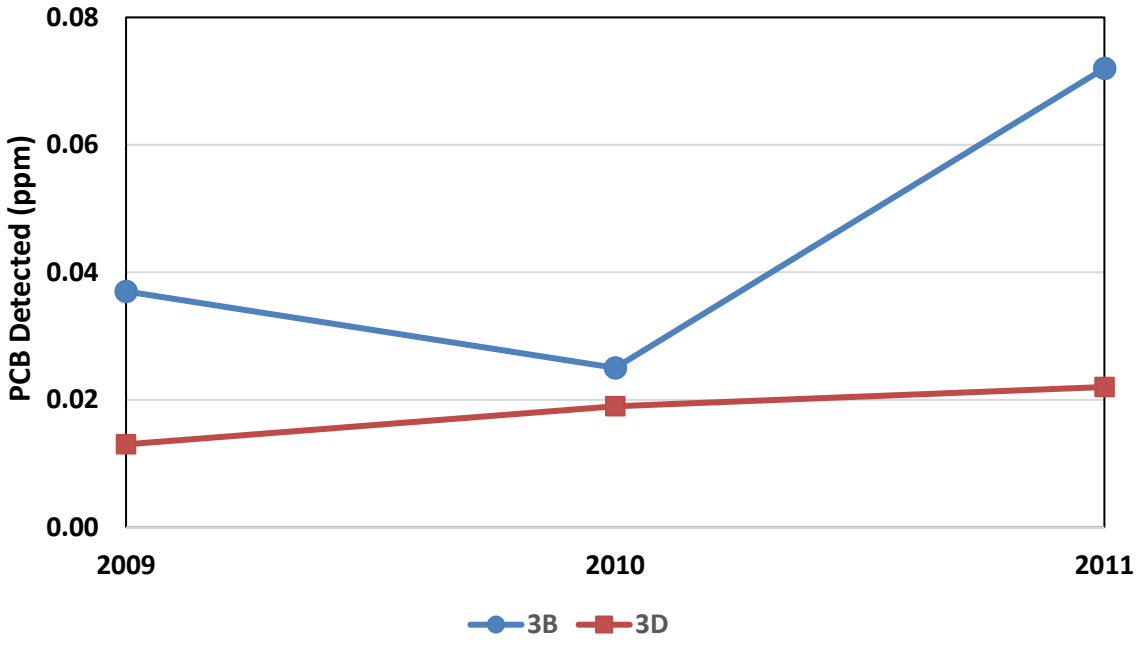


Figure 36: August Post-spawn Quahog PCB Congener Concentration Trends Locations 3I and 3J

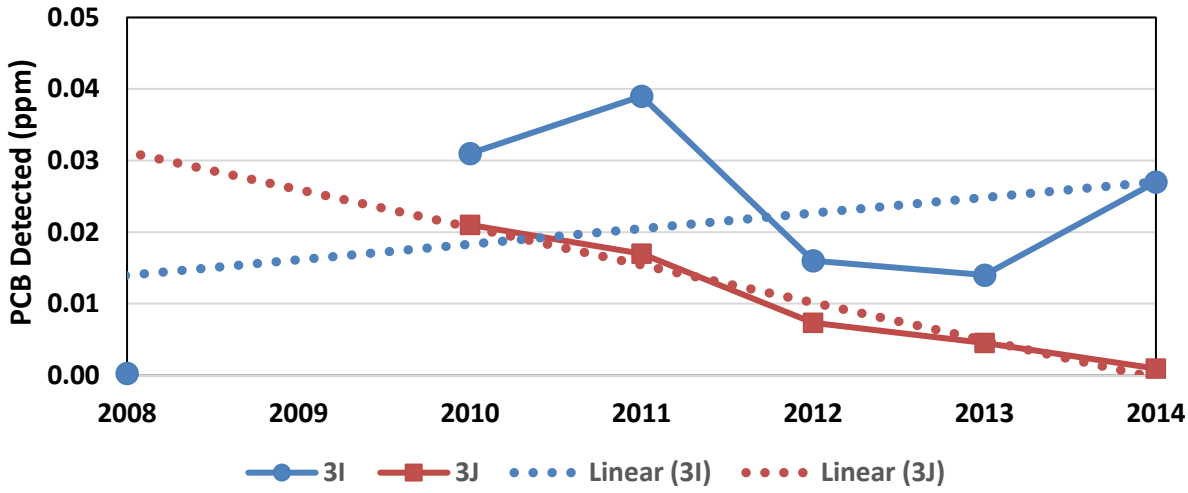
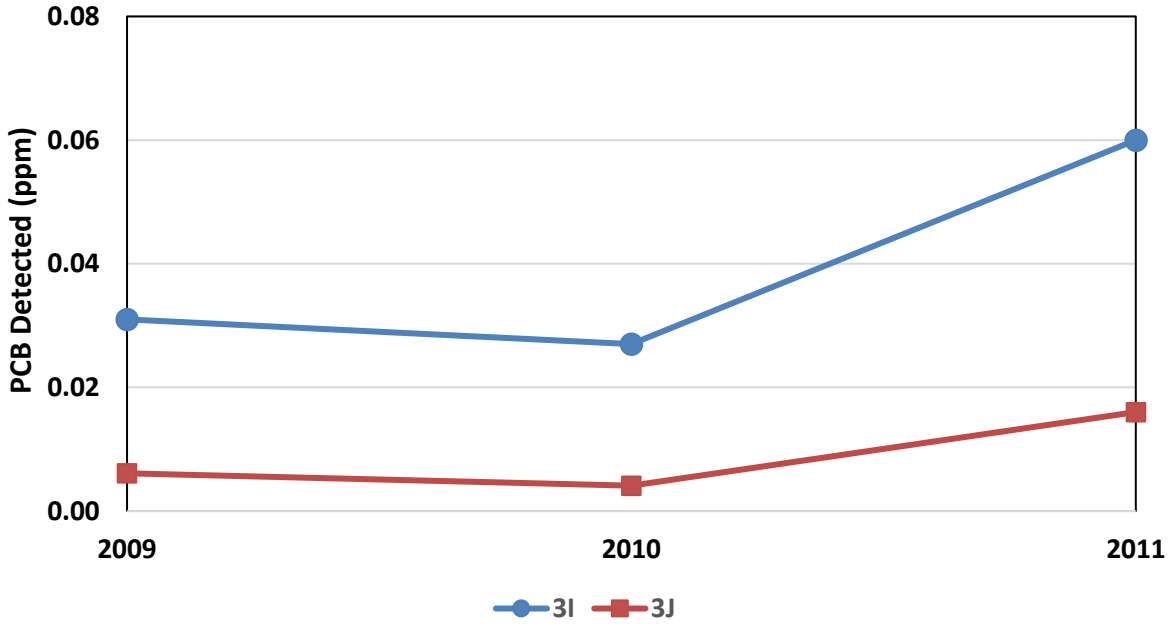


Figure 37: October Post-Spawn Quahog PCB Congener Concentration Trends - Locations 3I and 3J



Scup

The trend for the PCB concentrations in Scup slightly decreased from 2003 to 2019 as shown in Table 15 and Figure 38. The sample locations for the Scup are shown on Figure 39.

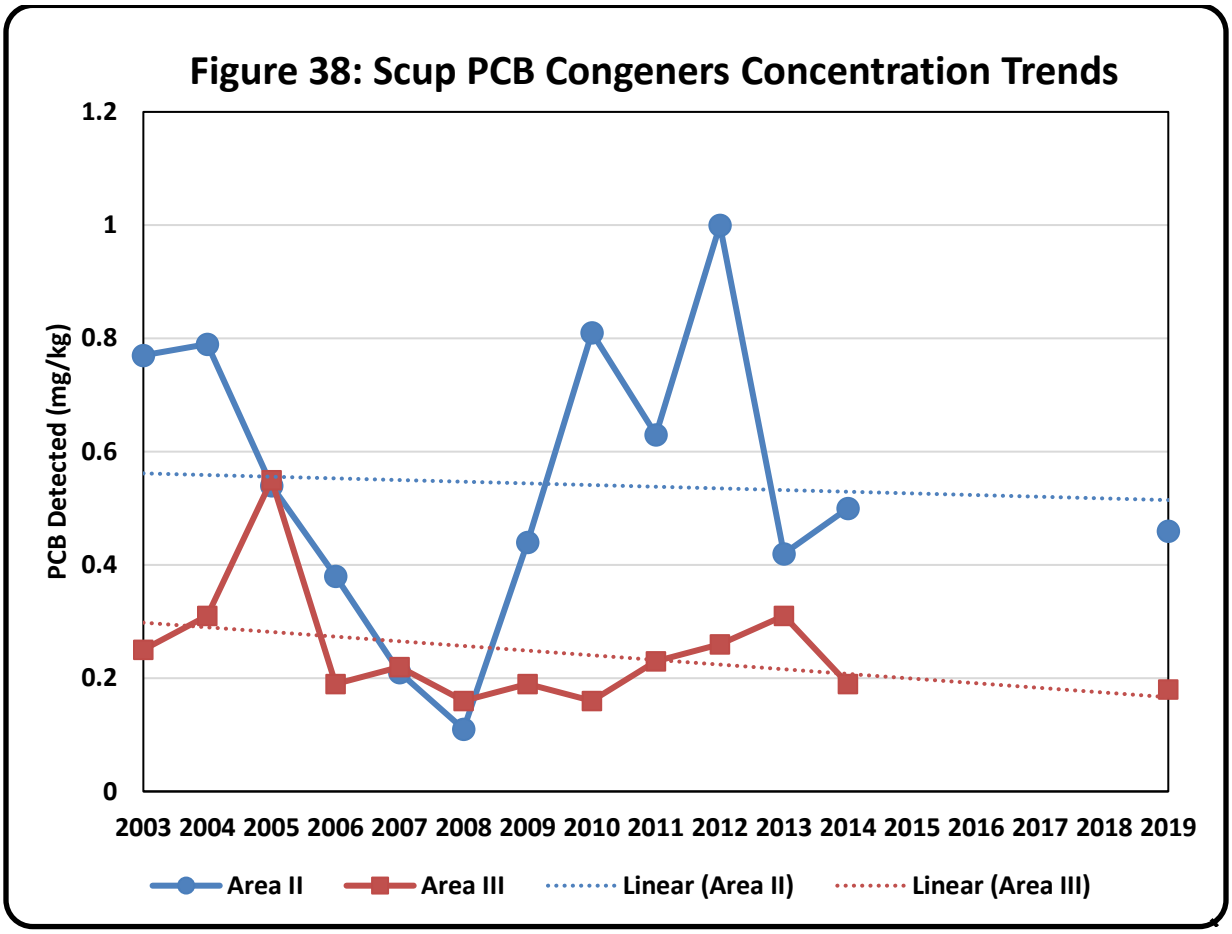


Table 15: Scup PCB Congener Detected Concentrations (mg/kg)

Station\ Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015 to 2018	2019
2A	0.23	0.25	0.34	0.15	0.28	0.33	0.52	0.43	0.30	0.21	0.46	0.56	Not Sampled	0.52
2B	1.1	0.55	0.86	0.53	0.053	0.32	0.78	0.83	0.41	0.83	0.67	0.35		0.26
2C	0.59	0.56	0.89	0.70	0.24	0.75	0.15	1.3	0.84	2.4	0.22	0.28		
2D	1.2	0.94	0.31	0.15	0.34	0.14	0.38	0.91	1.2	1.0	0.095	0.73		0.59
2E	0.72	1.67	0.29	0.38	0.067	0.11	0.39	0.57	0.32	0.80	0.66	0.59		
Average	0.77	0.79	0.54	0.38	0.20	0.33	0.44	0.81	0.61	1.0	0.42	0.50		0.46
3A	0.18	0.28	0.17	0.14	0.13	0.16	0.15	0.15	0.11	0.34	0.062	0.064		
3B	0.14	0.29	0.29	0.22	0.30	0.20	0.29	0.16	0.12	0.45	0.12	0.12		
3C	0.20	0.24	0.65	0.14	0.13	0.17	0.091	0.27	0.32	0.19	0.24	0.25		0.13
3D	0.29	0.38	1.3	0.33	0.084	0.35	0.16	0.12	0.084	0.18	0.082	0.27		0.21
3E	0.41	0.34	0.36	0.14	0.38	0.16	0.24	0.086	0.41	0.16	1.1	0.27		0.20
Average	0.25	0.31	0.55	0.19	0.20	0.208	0.19	0.16	0.21	0.26	0.31	0.19		0.18

Striped Bass

The trend for the PCB concentrations in Striped Bass cannot be determined because of the limited number of samples collected. The data set for Striped Bass is shown on Table 16.

Table 16 Striped Bass PCB Congener Detected Concentrations (mg/kg)

Station\ Year	2010	2011	2012	2013	2014	2015	2016	2017 to 2018	Station\ Year	2019	2022	2023
1B-1							0.31		1A	5.0	1.2	0.26
1B-2							2.8		1B	0.9	0.35	0.29
1C-1							0.73		1C	0.79	1.8	2.5
1C-2							4.6		1D	3.6	1.0	0.65
1C-3							21.0		1E	10.5	0.18	0.46
Average							6.0		Average	4.2	0.91	0.83
2A		2.0	5.3	0.19	1.1				2A		3.6	0.5
2E - 1						0.63	0.17		2B		2.4	0.48
2E - 2						0.63			2C		0.68	2.6
									2D		0.19	2.0
									2E		0.83	
									Average		1.5	1.4
3A	0.24			0.32	0.45				3A	1.2	2.5	0.11
3B	2.5			0.20	0.85				3B	0.41	0.90	0.69
3C	30.0			0.19	0.15				3C	0.2	0.50	0.16
3D				0.26	0.18				3D	0.14	0.17	
3E				0.12	1.8				3E	0.53	0.22	
3F-1						0.18						
3F-2						0.18						
Average	11.0			0.22	0.69				Average	0.5	0.86	0.32

Not Sampled

Note: Samples for 2015 locations (E-2 and F-2) were the composite of two fish each. The following station are in the same locations: Stations 3A, 3B, and 3C in 2010; 1B-1 and 1B-2; 3A, 3B, and 3C in 2014; 1B-1 and 1B-2; 1C-1 and 1C-2 in 2016; all Area 1 Stations in 2019, 2022, and 2023; and 3D and 3E in 2019.

Tautog

The trend for the PCB concentrations in Tautog cannot be determined because of the limited number of years samples were collected. The data set is shown on Table 17 and Figure 40. The sample locations for the Scup are shown on Figure 41.

Station\Year	2012	2013	2014	2015 to 2018	2019
2A		0.41	0.16	Not Sampled	0.14
2B	0.46	0.13	0.14		0.31
2C	1.9	1.2	0.97		0.68
2D		0.19	0.83		0.50
2E		0.87	0.12		0.19
Average	1.19	0.56	0.44		0.36
3A		0.060	0.019		0.0096
3B		0.027			0.028
3C		0.065	0.072		0.021
3D		0.089	0.074		0.056
3E		0.18	0.042		0.10
Average		0.085	0.052		0.043

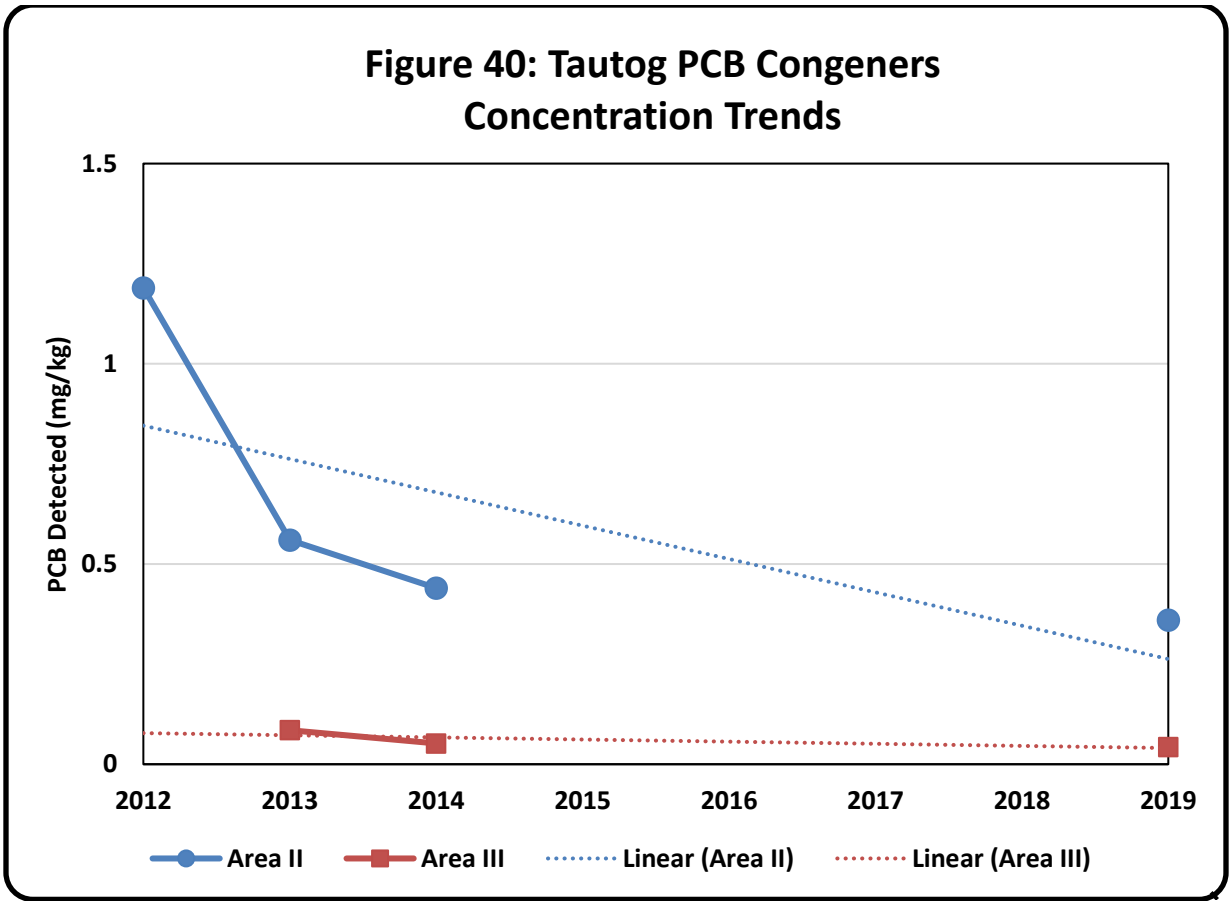


Figure 40: Tautog PCB Congeners Concentration Trends
1.5
1
0.5
0
PCB Detected (mg/kg)
2012
2013
2014
2015
2016
2017
2018
2019
Area II
Area III
Linear (Area II)
Linear (Area III)

5. References

AMEC/Wood/WSP, 2003-2023. Data Validation Summaries, MassDEP, NBH Superfund Site, Seafood Contaminant Survey Monitoring Sampling

EPA, 1998. Record of Decision for the Upper and Lower Harbor Operable Unit, New Bedford Harbor Superfund Site, New Bedford, Massachusetts. U.S. EPA - Region I New England. September 1998.

MADPH, 1979. Massachusetts Department of Public Health Regulations 105 CMR 260.000. 1979

MassDEP, 2003-2023. Monitoring Report for Seafood Harvested from the New Bedford Harbor Superfund Site, Massachusetts Department of Environmental Protection and Massachusetts Division of Marine Fisheries.

MassDEP, 2003a-2023a. Seafood Monitoring and Field Sampling Work Plans, New Bedford Harbor Superfund Site, Massachusetts Department of Environmental Protection.

MassDEP, 2003b-2023b. Quality Assurance Project Plan as revised, New Bedford Harbor Superfund Site, New Bedford, Massachusetts. Massachusetts Department of Environmental Protection.

MassDEP, 2018. PCB Congener Calculations 136 vs 148 for 2017 Memo, May 30, 2018.