

PBDEs in Farmed Salmon from Maine And Eastern Canada.

Abstract

Recently, we reported on the analysis of polychlorinated biphenyls (PCBs) and chlorinated pesticides in farmed Atlantic salmon (*Salmo salar*) from Maine, eastern Canada, and Norway, and wild Alaskan Chinook salmon (*Oncorhynchus tshawytscha*). In this paper, we extend the analysis to polybrominated diphenyl ethers (PBDEs) in these samples. Total PBDE concentrations in the farmed salmon (0.4 – 1.4 ng/g, wet weight, ww) were not significantly different from those in the wild Alaskan Chinook samples (0.4 – 1.2 ng/g, ww), nor were significant differences found among regions. However, significant intra-regional variations in concentrations of total PBDEs and tetra-BDE 47 were observed in the salmon from the Canadian farms ($p < 0.01$). Congener profiles were dominated by BDE-47, followed by the penta-BDEs 99 and 100. PBDE concentrations in the Canadian samples were lower than those reported two years earlier. Removal of skin resulted in no overall reduction in PBDE concentrations in our farmed salmon, and in some cases, PBDE concentrations were higher in skin-off samples. PBDEs were correlated with lipids only in the skinned samples, suggesting that there is greater accumulation and retention of PBDEs in muscle lipids than in skin-associated fat. In skin-on samples, modest correlations were observed between concentrations of PBDEs and PCBs ($R^2 = 0.47$) and mono-ortho PCBs ($R^2 = 0.50$), whereas PBDEs were not correlated with non-ortho PCBs. Shaw et al. (2008) *Chemosphere* 71: 1422–1431.



Background

This study analyzed PBDEs in farmed and wild salmon marketed to consumers in the northeastern United States. Previously, we analyzed these samples for PCBs, dioxin-like PCBs, PCDD/Fs, and chlorinated pesticides (Shaw et al. *ES&T* **2006**, 40, 5347-5354).

This is the first study of its kind to compare PBDE levels in salmon from several farms within a specific region. It is also the first to specifically examine contaminant levels in salmon fillets with skin on and with skin removed.

Findings

- Our results show that removing the skin from farmed salmon does not significantly reduce lipids or PBDE levels, presumably because contaminants are largely sequestered in muscle lipids. This finding challenges the current paradigm that skin removal may reduce fat and contaminants by as much as 50%.
- Further, we report the lack of a strong PBDE:lipid correlation in these samples, in contrast to that found for PCBs, suggesting that the mechanisms of accumulation of PBDEs in salmon muscle may differ from those of PCBs.
- Our results show that PBDE levels in farmed salmon from eastern Canada may be lower than those reported two years earlier, reflecting industry attempts to lower concentrations in feed.
- Labeling salmon as farmed and by the region of origin has been proposed as a means of helping the consumer minimize exposure to contaminated fish. In this study, we purchased Norwegian samples labeled “organically farmed”, but it was later revealed that these samples were likely conventionally farmed Norwegian salmon that had been exported to the U.S. and falsely labeled.

The results of this study underscore the need for responsible labeling on the part of industry as well as the ongoing quantification of PBDEs and other POPs in farmed salmon and other commercially available fish.

Publications resulting from this research:

Shaw, S.D., Berger, M.L., Brenner, D., Carpenter, D.O., Tao, L., Hong, C-S., Kannan, K. **(2008)**. Polybrominated diphenyl ethers (PBDEs) in farmed and wild salmon marketed in the Northeastern United States. *Chemosphere* 71: 1422–1431.

Shaw, S.D., Bourakovsky, A., Brenner, D., Carpenter, D.O., Tao, L., Kannan, K., Hong, C-S. **(2005)**. Polybrominated diphenyl ethers (PBDEs) in farmed salmon (*Salmo salar*) from Maine and eastern Canada. *Organohalogen Compounds* 67:644-646.

CALL OUT -

Our recent study shows that levels of flame retardants (PBDEs) in harbor seals from the NW Atlantic are higher than the levels in seals from the Baltic Sea and other polluted areas of the world.

[Click here](#) to learn more.. link to [Seals As Sentinels/ BFRs in harbor seals](#)

