



Puget Sound Georgia Basin Ecosystem Indicator Report

Executive Summary



Photo: Peter Ross

Toxics in Harbor Seals

Conditions Worsening

The Puget Sound Georgia Basin Ecosystem Indicators give a glimpse into the health of our ecosystem, which includes the interactions among seven million people, their health, local economies and a complex system of water, land, plants, animals and microorganisms. This indicator describes the presence and effect of persistent bioaccumulative toxics (PBTs) in harbor seals and in the fish they eat. PBTs are chemicals that dissolve easily in animal fat and do not break down readily, causing them to build up, or bioaccumulate, in the food web.

This indicator emphasizes the following trends in the Puget Sound Georgia Basin: the flame retardant polybrominated diphenyl ether (PBDE) and its presence in harbor seals from 1984 to 2003, and the level and distribution of PBDEs and polychlorinated biphenyls (PCBs) in Pacific herring, a key food of harbor seals.

PBDEs are used in commercial and consumer electronics, fabrics, upholstery, mattresses, and paints and cable insulation, among other products.

What Is Happening?

Harbor Seals: Between 1984 and 2003, harbor seals were tested in four locations (see figure at top right). Seals from Gertrude Island (Strait of Juan de Fuca), Puget Sound, were approximately twice as contaminated as their counterparts in the Georgia Basin, indicating that they are exposed to higher levels of PBDEs in their diet. A study of Puget Sound and Strait of Georgia harbor seal prey showed that the Puget Sound harbor seal food basket is seven times more contaminated with PCBs (2.90 mg/kg lipid) than the Strait of Georgia food basket (0.41 mg/kg lipid). Further, PBDE concentrations were almost five times higher in the Puget Sound seal food basket. Differences in prey consumed did not explain the differences in contamination between the two harbor seal populations, but was rather attributed to an effect of local contamination within Puget Sound (Cullon et al., 2005, http://www.epa.gov/region10/psgb/indicators/harbor_seals/references.htm).

Pacific Herring: Herring is a food source for many animals that are higher in the food web. Herring are eaten by seals, diving birds and many marine fish species including Chinook and Coho salmon. Accordingly, the health of these predators depends on the health of the herring as one of their food sources. Between 1999 and 2003, 1,055 three-year-old male herrings were sampled in six of 14 major Puget Sound Georgia Basin stocks. Total PCBs in whole bodies of herring from Port Orchard and Squaxin (central and southern Puget Sound, respectively) were

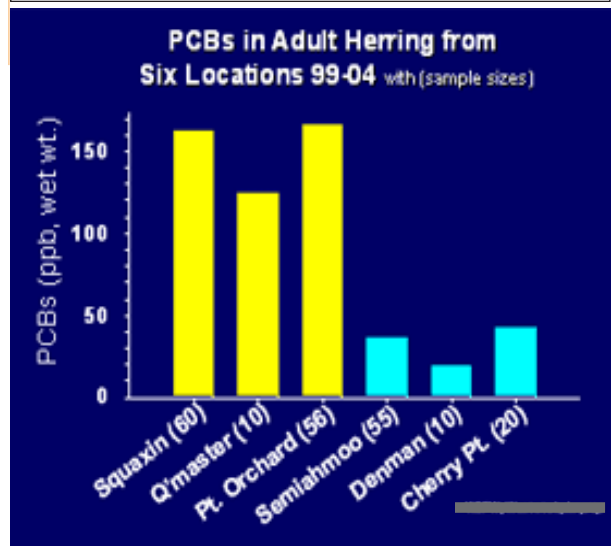
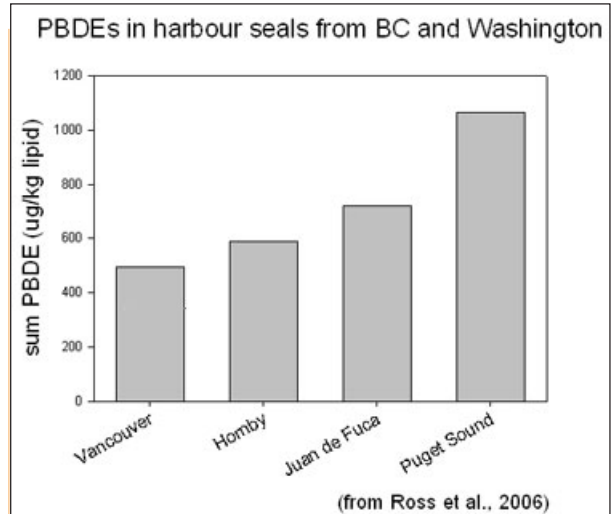


Chart: Washington State Dept. Fish & Wildlife, West et al.

four to nine times higher than those from the Georgia Basin (Denman Island). The elevated levels of PCBs in Puget Sound herring are similar to levels measured in herring from the Baltic Sea, one of the more highly contaminated marine ecosystems in the world.

continued

What Is Happening? *continued*

Salmon, Orcas and Humans: PCB and PBDE concentrations in Puget Sound herring and Strait of Georgia herring also reflect contaminant patterns in their predators: Chinook salmon; Coho salmon; harbor seals; and in resident killer whales that feed predominantly on salmon in the summer months. A 2004 report indicated PBDEs in the breast milk of healthy Pacific Northwest mothers at levels 20 to 40 times higher than their Japanese and Swedish counterparts (Sightline Institute www.sightline.org/research/pollution/res_pubs; Toxics in Harbor Seals | References www.epa.gov/region10/psgb/indicators/harbor_seals/references.htm)

Why Is It Happening?

Nearly 67,400 metric tons of PBDEs are sold worldwide each year. The U.S. is the world's leading manufacturer at 33,100 metric tons. Wildlife and humans are exposed: when PBTs/PBDEs migrate out of the products they are found in as the products wear out or degrade; through food, as soils or food webs become contaminated; through household dust, where PBDEs and other pollutants are found in high concentrations; and during burning or incineration, where dioxins and furans are created and spread throughout the atmosphere.

PBDEs and PCBs, like all other persistent bioaccumulative toxics, bind to fatty tissue in humans and wildlife, including plankton (the base of the marine food web), fish, animals and sediment. The legacy of PCBs, banned nearly 30 years ago, is still with us as we spend hundreds of millions of dollars cleaning up sediments in the region.

How Does This Affect me?

Using laboratory studies and established models of chemical structure, we know that PBDEs, similar to PCBs, affect the neurological, immune, endocrine and reproductive systems of harbor seals. PCBs, which resemble PBDEs in structure, are also known to affect memory and learning in humans. Given the widespread occurrence of PBT contaminants in humans, and the health risks that have been identified using a variety of methods, there exists reason for concern about the increasing levels of PBDEs in humans and in the environment.

What Are We Doing About It?

Responses include a Washington State Chemical Action Plan (www.ecy.wa.gov/pubs/0507048.pdf), legislation under consideration to phase out PBDEs, and recommendations from the Washington Departments of Ecology and Health (www.ecy.wa.gov/programs/eap/pbt/pbde/). In 2005, a bill was introduced in Washington that would phase in bans on certain types of PBDEs, including those found in televisions, computers and residential upholstered furniture and mattresses. Canada proposed that PBDEs be considered toxic under the Canadian Environmental Protection Act and added to the Virtual Elimination List. A wide range of electronics companies, corporations such as Ikea and Volvo, and major medical and non-profit organizations are supporting a ban on PBDEs.

What Can I Do?

Your Tool Box

- Clean often and carefully, paying attention to cleaning fabrics
- Keep electronics away from direct light
- Businesses: adopt environmentally preferable purchasing strategies and ask your suppliers to stop using PBDEs and other PBTs (see *Corporate Environmental Strategy: International Journal for Sustainable Business*. Vol. 12, Issue 1, 2005. www.cesjournal.com). For examples of how to establish an environmentally preferable purchasing program, visit the Pacific Northwest Pollution Prevention Resource Center (PPRC) at www.pprc.org or call them at (206) 352-2050.
- Continue to breast feed children and check fish consumption advisories. See Health Canada | PBDE Flame Retardants and Human Health www.hc-sc.gc.ca/iyh-vsv/environ/pbde_e.html. Visit Health Canada | PBDEs in Fish www.hc-sc.gc.ca/fn-an/securit/chem-chim/pbde-edpb/pbde_fish-edpb_poisson_e.html. Check out Washington State Department of Health | PBDEs www.doh.wa.gov/ehp/oehas/pbde/pbde.htm.

Learn more http://www.epa.gov/region10/psgb/indicators/harbor_seals/
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The Puget Sound Georgia Basin Ecosystem Indicators Report is a collaborative effort brought to you by Federal, State, Provincial and Local partners from the United States and Canada.