Persistent Bioaccumulative and Toxic Contaminants in Puget Sound’s Pelagic Food Web

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Simplified pathway for PCBs entering and biomagnifying in the pelagic food web

Source: Seattle Post-Intelligencer “The Zone”
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We added three species/groups......

**Primary producer**
Phytoplankton (POM)

**Primary consumer**
Krill (*Euphausia pacifica*)

**“resident” predators**
Pacific hake (*Merluccius productus*) and Walleye pollock (*Theragra chalcopyrhamma*)
Focus on three basins and one urban embayment.
Sampling for phytoplankton (particular organic matter, POM)
Sampling for krill...

... and hake
Trophic levels of pelagic species in Central Puget Sound

δ15N (‰) vs. Trophic Level (TL)

- TL=2
- TL=3
- TL=4

Species:
- POM
- E. pacifica
- pollock (sm)
- hake (sm)
- herring
- hake (lg)
- resident subadult Chinook
- resident adult Chinook
Central Puget Sound

PCBs (ng/g lipid) vs. $\delta^{15}$N (‰)

- POM
- krill
- small pollock
- small hake
- herring
- large hake

The diagram shows the relationship between PCB concentrations and nitrogen isotope ratios for different fish species from Central Puget Sound.
Central Puget Sound

PCBs (ng/g lipid) vs. $\delta^{15}N \left( ^{\circ}_{\text{o}} \right)$

- krill
- small pollock
- small hake
- herring
- large hake

PCBs in various fish species from Central Puget Sound.
PCBs (ng/g lipid) vs. $\delta^{15}N$ (

Central Puget Sound

krill
small pollock
small hake
large hake

Elliott Bay samples
δ¹⁵N (‰) vs. PCBs (ng/g lipid) for different fish species from Central Puget Sound, Hood Canal, and Whidbey Basin.
δ¹⁵N (‰)

PCBs (ng/g lipid)

- krill
- small pollock
- small hake
- herring
- large hake
- resident subadult Chinook

Central Puget Sound

- resident subadult Chinook
- 9 mo. in salt water
Central Puget Sound

- krill
- small pollock
- small hake
- herring
- large hake
- resident subadult Chinook
- resident adult Chinook

PCBs (ng/g lipid)

- Resident adults 2-3 yrs in salt water
- 9 mo. in salt water
Results

• Basin-specific bioaccumulation and magnification correlations
• Urban influence in low-trophic-level of the pelagic food web
• Three key factors highly correlated w/ PBTs
  – Residency (proximity to source)
  – exposure time
  – trophic level