

BEST PRACTICES



Atmospheric Deposition & the Pollution Globetrotters

Yikes! Did you know that toxic industrial pollution surfs air currents? Once picked up by the wind, it travels up, down, over and throughout the globe until it is deposited into our rivers, lakes, streams and oceans—eventually accumulating within food webs. This is called atmospheric deposition.

What is biomagnification?

Industrial pollutants are persistent, meaning they do not go away. Instead, they steadily increase in concentration in plants and animals as they eat or absorb it. These contaminants are then passed along the food chain. Beginning at the bottom of a food chain, these pollutants build up exponentially into more toxic concentrations travelling upwards from aquatic insects to larger fish and mammals—a situation commonly referred to as biomagnification. This explains why whale blubber is often observed having some of the highest levels of toxic pollutants of any mammal.



Due to the direction of air currents, industrial air-surfing pollutants have been accumulating in unlikely places...pristine mountain lakes and arctic ice caps to name a few. If the thought of this makes your head spin, you are not alone. Undeveloped and isolated locations are some of the last places most of us would consider vulnerable to industrial pollution.

Results from a 2008 study of 20 national parks in the western U.S. and Alaska measured the highest concentrations of mercury in fish from Olympic National Park—despite the parks remote location on the northwestern coast of Washington state. For more information visit: www.nps.gov/articles/understanding-mercury-concentrations-in-mountain-lake-fish.htm.

Over the last decade, a growing amount of data has been collected by a group called the Dragonfly Mercury Project—a citizen scientist led effort with over 4,000 volunteers collecting samples of dragonfly larvae from more than 100 national parks. Collected data is lab analyzed and reported to the U.S. Geological Survey, the University of Maine, and Dartmouth College.

Why test dragonflies?

A juvenile dragonfly can live up to 9 years underwater eating insects and small fish, accumulating significant amounts of mercury in their systems as they grow. They exist in greater numbers than fish and are also easier to capture. According to Rebecca Lofgren, Aquatic Ecologist at Mount Rainier National Park, since “fish eat insects, the levels of mercury found in dragonfly larvae have proven to be a strong indicator for mercury levels in fish and the entire food web in the area.” For more information or to get involved in the Dragonfly Mercury Project, visit: www.nps.gov/articles/dragonfly-mercury-project.htm.

The four main air-surfing industrially generated pollutants are:

- **Methyl mercury:** mostly generated in coal-burning power plants in Asian countries and gold mining operations in South America and Africa
- **Polychlorinated biphenols or PCBs:** banned toxic chemicals originating in pre-banned construction materials, paints, transformers and fluorescent light fixtures
- **Polybrominated diphenyl ethers or PBDEs:** a banned group of toxic chemicals historically used as flame retardants in indoor household items like couches and children’s pajamas
- **Polycyclic aromatic hydrocarbons or PAHs:** a main component in the wood preservative creosote

Of these, mercury is by far the “ultimate globetrotter” due to its unique ability to travel extremely long distances on air currents.

How does this affect the Pacific Northwest?

Industrial toxic compounds are known to accumulate in “plumes” above cities. What is less known is that this pollution is then whisked away in any direction as the wind blows. It may shower down 100 miles later directly into waterways or thousands of miles later upon urbanized areas, farms or our forests. When industrial pollution is hitching a ride on air currents, there is essentially no limit to its global spread.

Did you know that Western North America produces roughly 20% of the continent’s mercury emissions and yet receives some of the highest rates of mercury deposition in the entire world? This is largely connected to pollution crossing over the Pacific Ocean on air currents and showering down in the famously heavy rains of the Pacific Northwest.

Many of these compounds end up in stormwater pollution, although it’s hard to say definitively how much stormwater pollution FIRST travelled through the air.

Atmospheric deposition reminds us how interconnected our actions are on a global scale and also cautions us that environmental relationships defy country borders.

What can you do to limit atmospheric pollution?

- Drive less and invest in an electric vehicle decreasing your fossil fuel combustion.
- Use untreated wood and wood alternatives for building, and if burning wood, choose a wood stove rated to burn more efficiently creating a cleaner combustion.
- Create less waste and recycle limiting waste to landfills and lowering your contribution to waste incineration.
- Properly dispose of household items keeping toxics like mercury (from thermometers and fluorescent lightbulbs) out of landfills.

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