

Willamette Basin Toxics Monitoring: Year One Findings



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Environmental
Quality

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Background

The Oregon Toxics Monitoring Program, proposed by Gov. Ted Kulongoski and funded by the Oregon Legislature in 2007, is part of the Oregon Department of Environmental Quality's strategic efforts to identify and reduce toxics in our waters, air and land. The program grew out of public concern about toxic pollutants in Oregon's waters. Many toxics currently aren't regulated, but a better understanding of their sources and where these pollutants are found helps everyone's efforts to reduce their presence in the environment.

While the program will assess toxic pollutants statewide, DEQ is focusing initially on identifying the distribution and magnitude of these pollutants in the Willamette River Basin. It has been nearly 20 years since DEQ conducted a broad survey of the basin, and little information is available for most other basins in Oregon. DEQ plans to expand this effort in future years to other watersheds throughout the state, on a rotating basis.

DEQ is working closely with watershed councils, environmental groups and other natural resource agencies to compile information about toxic pollutants in the Willamette Basin.

Main findings

Much toxics monitoring work remains to be done in the Willamette Basin, but the following are some of the main findings from the program's first year:

- **“Legacy” pesticides** – those no longer in production in the United States, such as DDT and chlordane – **continue to be found in fish tissue**, although at lower levels than earlier studies. (A list describing the main toxic pollutants monitored is on page 2 of this fact sheet.)
- **Industrial and municipal pollutants and waste disposal byproducts such as PCBs, dioxins and furans, and flame retardants are found at elevated levels** in smallmouth bass and pikeminnow. These pollutants bioaccumulate and therefore are found at higher concentrations in fish or other animals that eat fish than the water they live in.
- **Mercury levels in fish remain elevated and a concern.** The levels found in pikeminnow and smallmouth bass (for frequent human consumption) are at the high end of or exceed acceptable levels.
- **Levels of copper and lead** in samples throughout the basin in some locations were found at levels of concern for aquatic life.
- **Herbicides**, chemicals used to inhibit the growth of plants and especially weeds, were frequently detected, but at low levels.
- **Among other organic pollutants, there was widespread (but low-level) presence of “chemicals of emerging concern”** – anti-depressants, sedatives, caffeine, humane hormone/steroid compounds – that aren't regulated but are increasingly found in our waters.

Findings that need more investigation

- **High levels of furans at sample sites in Portland and St. Helens.** This is consistent with findings from other monitoring and cleanup efforts near industrial sites along the lower Willamette River.
- **High levels of PCBs at program's Willamette site at Eugene.** This finding needs to be substantiated by additional samplings of fish.
- **Low-level detection of herbicides throughout the basin.** This information will complement other DEQ monitoring results in the Yamhill, Pudding and Clackamas sub-basins and guide pollution reduction efforts.

Monitoring methodology

DEQ developed a list of toxic pollutants to monitor and monitoring locations after meeting with stakeholders and reviewing historical and more recent data from the lower Willamette and lower Columbia rivers. DEQ also sought and considered public comments on a draft monitoring plan before developing a final plan. DEQ enlisted the aid of recreational fishing groups to help collect fish for toxics sampling.

DEQ selected monitoring locations to get an overall snapshot of the presence and levels of toxic pollutants in the Willamette River. DEQ's analytical tools allow it to detect chemicals at extremely low concentrations (a few nanograms per liter or parts per trillion).

DEQ's laboratory in Hillsboro processes and analyzes all chemical samples, using state-of-the-art equipment purchased especially for this purpose.

Pollutants of concern

In its samplings, DEQ looked for a variety of toxic pollutants in fish tissue and water. Main toxics of concern in fish include:

- **PCBs** (polychlorinated biphenyls). PCBs, no longer produced in the United States, are a mixture of more than 200 chemicals used as coolants and lubricants in transformers, capacitors and other electrical equipment. These pollutants take several decades to decompose and when ingested by people or animals, lodge in fatty tissues before slowly entering the bloodstream. Long-term effects on humans can include liver damage, reproductive problems, severe skin irritation and damage to the nervous system. Certain PCBs are probable carcinogens to humans.
- **PBDEs** (polybrominated diphenyl ethers). PBDEs are compounds used as flame retardants in many consumer products such as mattresses and sofas. In studies on animals, PBDE exposure is associated with brain development problems, alteration of thyroid hormone levels, and reproductive problems. PBDEs' health effects on humans haven't been studied.
- **Dioxins**. Dioxins are petroleum-derived chemical compounds that are byproducts in some manufacturing processes (such as the bleaching of paper and production of herbicides) or the incineration of chlorinated-containing materials, such as PVC. They also occur naturally from forest fires and volcanic eruptions. Dioxins can lodge in the fatty tissue of humans. They are associated with some forms of cancer, and also may affect the human nervous system and immune system.
- **Furans**. Furans are colorless liquid compounds that are a byproduct of chemical manufacturing and metal refining. They are associated with cancer in animals.
- **Mercury**. A naturally occurring element, mercury is a potent toxin that can cause damage to the brain and nervous system, particularly among small children and developing fetuses. Mercury is found in soils throughout the Willamette Basin, as well as in trees and fossil fuels. When released into the atmosphere upon combustion, it can travel great distances and later deposit onto land and water surfaces. Mercury has been used in many products, including fluorescent lights, thermometers, automobile switches and dental fillings.
- **DDT**. Banned for use in the United States since 1972, DDT (dichlorodiphenyltrichloroethane) is an insecticide that persists in the environment and is classified by EPA as a probable human carcinogen. DDT accumulates in the body fat of humans and animals and its concentrations in predators near the top of the food chain are greatly magnified above background levels. It is toxic to a wide range of aquatic organisms and vertebrates.

Waterborne pollutants of interest included current-use pesticides, pharmaceuticals and personal care products as well as other water-soluble pollutants.

Sampling methodology

- DEQ collected water samples twice in 2008 at 20 sites along the main stem of the Willamette and its major tributaries to look for organic pollutants such as industrial chemicals and solvents, pesticides, insect repellents, pharmaceuticals and personal care products (such as fragrances, musk cologne) and polycyclic aromatic hydrocarbons, such as benzene.
- DEQ took water samples five to nine times each at 40 sites to determine the presence of metals such as copper, lead, zinc and cadmium.
- DEQ collected smallmouth bass and northern pikeminnow at 12 sites in the basin and analyzed edible fish tissue to determine the presence of PCBs, flame retardants (PBDEs), dioxins, furans, mercury and legacy (no-longer in-production) pesticides such as DDT.

How DEQ will use these results

DEQ will use information from this Year One work to:

- Document occurrence and distribution of priority persistent pollutants and use this information to guide strategies to decrease the release of these pollutants into the environment (as directed by the Oregon Legislature by Senate Bill 737).
- Improve the quality of pollution control efforts by providing new data to DEQ water quality staff that write pollution discharge permits and work in DEQ's drinking water protection program.
- Incorporate results and share data with other state toxic reduction efforts in land and air as well as water.
- Inform the Oregon Environmental Quality Commission and the public about levels of toxic pollutants in fish, which is especially relevant because of the commission's recent adoption of higher fish consumption rates to better protect consumers of fish. The new consumption rate will help the state update its water quality standards.

Year Two program plans

During the second year of this Willamette Basin toxics monitoring program, DEQ will collect and analyze more fish at its Willamette monitoring location in Eugene and will target a broader variety of fish to confirm initial findings or fill "data gaps" recognized in Year One results.

Monitoring will continue to include water sampling at the same basin sites as in Year One. DEQ will broaden its scope to include recently identified priority persistent pollutants and address other agency priorities.

DEQ may also follow up on Year One results by deploying integrative passive sampling devices that can sample organic pollutants at key streams and river sites over time.

DEQ will continue to work closely with other state, federal and local agencies to gather and share its data and findings.

For more information

A draft report on the Oregon Toxics Monitoring Program's first-year findings in the Willamette Basin is posted on DEQ's Environmental Quality Commission Web page at:

<http://www.deq.state.or.us/about/eqc/agendas/attachments/2009oct/E-AttA-ToxicsMonitoring.pdf>

The final report will later be posted on the DEQ Laboratory's Water Quality Monitoring Web page at:

<http://www.deq.state.or.us/lab/wqm/toxics.htm>.

Alternative formats

Alternative formats (Braille, large type) of this document are available. Contact DEQ's Office of Communications and Outreach, Portland, at (503) 229-5696 or call toll-free in Oregon at 1-800-452-4011, ext. 5696.