

Citations for *Take Back Your Meds: Help Fight Environmental Pollution*

- Each year roughly 33 million containers of medicine are left unused in Washington State.

Source: Estimates for unused containers of medicines in Washington state for 2009 were compiled from: Bush, P.J., Sanz, E.J. & Garcia, M. (1996). Section II: Cross cultural reports. Medicines at Home: the Contents of Medicines Cabinets in Eight Countries. In Children, Medicines, and Culture. New York, Pharmaceutical Products Press; Kaiser Family Foundation, State Health Facts. (2009). Total Number of Retail Prescription Drugs Filled at Pharmacies. Available online at:

<http://www.statehealthfacts.org/profileind.jsp?cmprgn=1&cat=5&rgn=49&ind=265&sub=66>; Consumer Healthcare Products Association. (2009). Over-the-counter Retail Sales. Available online at: http://www.chpa-info.org/pressroom/Retail_Sales.aspx; Note: Mail-order prescription sales and over-the-counter drugs sales from Wal-Mart were omitted from this calculation due to the lack of available industry data.

- Drugs also enter wastewater facilities through landfill leachate – or “garbage juice” – the water that seeps through garbage and is pumped out of the most lined landfills in wet areas of our state.

Source: Barnes, K.K., et al. (2004). Pharmaceuticals and Other Organic Waste Water Contaminants within a Leachate Plume Downgradient of a Municipal Landfill. Ground Water Monitoring & Remediation, 24(2), 119;

Source: Behr, R., Stahler, D., Pistell, A. (2010). Preliminary Characterization of the Pharmaceutical Content of Municipal Solid Waste Landfill Leachate from three landfills in Maine. Maine Department of Environmental Protection.

Available online at:

<http://productstewardship.us/associations/6596/files/Landfill%20leachate%20testing%20study%201%202010.pdf>.

- Many drugs pass right through wastewater treatment and are discharged into waterways, others settle out into biosolids that are often applied to land as fertilizer.

Source: Washington State Department of Ecology (2010). Focus on Pharmaceuticals and Personal Care Products. Available online at:

<http://www.ecy.wa.gov/pubs/1003003.pdf>.

- A range of medicines are in the tissues of fish and other aquatic species, which are part of our food chain.

Source: Brooks BW, Chambliss CK, Stanley JK, Ramirez A, Banks KE, Johnson RD, Lewis RJ. (2005). *Determination of select antidepressants in fish from an effluent dominated stream.* Environ. Toxicol. Chem. 24:464-469. Available online at: <http://www.epa.gov/waterscience/ppcp/files/fish-pilot.pdf>.

Source: Woodling, J.D., et al. (2006). Intersex and other reproductive disruption of fish in wastewater effluent dominated Colorado streams. Comparative Biochemistry and Physiology. Part C: Toxicology & Pharmacology: CBP, 144(1), 10-15.

Source: Henry, T.B., & Black, M.C. (2008). Acute and chronic toxicity of fluoxetine (selective serotonin reuptake inhibitor) in western mosquitofish. Archives of Environmental Contamination and Toxicology, 54(2), 325-330.

Source: Perrault, H.A., et al. (2003). Fluoxetine treatment decreases territorial aggression in a coral reef fish. Physiology & Behavior, 79(4-5), 719-724.

Source: King County. (2007). Survey of Endocrine Disruptors in King County Surface Waters. Prepared by Richard Jack and Deb Lester. Water and Land Resources Division. Seattle; WA. Available online at:

<http://your.kingcounty.gov/dnrp/library/2007/kcr1976.pdf>.

Source: Johnson, LL, DP Lomaxa, MS Myers, OP Olsona, SY Sola, S M O'Neill, J West and TK Collier 2008. Xenoestrogen exposure and effects in English sole (*Parophrys vetulus*) from Puget Sound, WA. Aquat. Toxicol. 88:29-38

Source: Washington State Department of Ecology; Nilsen, et al. USGS. (2007). Pharmaceuticals and personal care products detected in streambed sediments of the lower Columbia River and selected tributaries. Available online at:

http://or.water.usgs.gov/proj/Emerging_contaminants/PPCP_Poster2.pdf.

Source: Morace, J.L. (2006). Water-Quality Data, Columbia River Estuary, 2004-05. Data Series. U.S. Department of the Interior, U.S. Geological Survey.

http://pubs.usgs.gov/ds/2006/213/pdf/lcrep_data.pdf.

Source: Lubliner, B., M. Redding, and D. Ragsdale. (2010). Pharmaceuticals and Personal Care Products in Municipal Wastewater and Their Removal by Nutrient Treatment Technologies. Washington State Department of Ecology, Olympia, WA. Publication Number 10-03-004. Available online at:

www.ecy.wa.gov/biblio/1003004.html.

Source: Johnson, A., et al. (2004). Results of a Screening Analysis for Pharmaceuticals in Wastewater Treatment Plant Effluents, Wells and Creeks in the Sequim-Dungeness Area No. 04-03-051.

<http://www.ecy.wa.gov/biblio/0403051.html>.

Source: EPA Pilot Study of PPCPs in Fish Tissue. 2008. Available online at:

<http://www.epa.gov/waterscience/ppcp/files/fish-pilot.pdf>.

- Medicines in the drinking water of 24 major U.S. metropolitan areas, including heart medications, pain relievers, tranquilizers, anti-seizure medicines, and antibiotics.
Source: AP Investigation: *Pharmaceuticals Found in Drinking Water*. (2008) Web site with complete series of articles: Available online at:
http://hosted.ap.org/specials/interactives/pharmawater_site/.
- Medicines in the Columbia River
Source: Morace, J.L. (2006). Water-Quality Data, Columbia River Estuary, 2004-05. Data Series. U.S. Department of the Interior, U.S. Geological Survey Available online at: http://pubs.usgs.gov/ds/2006/213/pdf/lcrep_data.pdf .
Source: Nilsen, E., R. Rosenbauer, E. Furlong, M. Burkhardt, S. Werner, L. Greaser, M. Noriega. USGS. (2007). Pharmaceuticals and personal care products detected in streambed sediments of the lower Columbia River and selected tributaries. Available online at:
http://www.csc.noaa.gov/cz/2007/Coastal_Zone_07_Proceedings/PDFs/Tuesday_Abstracts/0000.Nilsen.pdf and
http://or.water.usgs.gov/proj/Emerging_contaminants/PPCP_Poster2.pdf.
- In the treated wastewater going into local waters of Olympia, Lacey, Puyallup and Tacoma, and in the Sequim-Dungeness region.
Source: Lubliner, B., M. Redding, and D. Ragsdale, 2010. Pharmaceuticals and Personal Care Products in Municipal Wastewater and Their Removal by Nutrient Treatment Technologies. Washington State Department of Ecology, Olympia, WA. Publication Number 10-03-004. Available online at:
www.ecy.wa.gov/biblio/1003004.html.
Source: Johnson, A, B Carey, and S Golding, 2004, *Results of a Screening Analysis for Pharmaceuticals in Wastewater Treatment Plant Effluents, Wells and Creeks in the Sequim-Dungeness Area*. Available online at:
<http://www.ecy.wa.gov/biblio/0403051.html>.
- Synthetic hormones from medicines in lakes and streams in King County.
Source: King County (2007). Survey of Endocrine Disruptors in King County Surface Waters. Prepared by Richard Jack and Deb Lester. Water and Land Resources Division. Seattle; WA. Available online at:
<http://your.kingcounty.gov/dnrp/library/2007/kcr1976.pdf>.

- Medicines coming from septic systems in Liberty Bay near Poulsbo.
Source: Dougherty, J.A., Swarzenski, P.W., Dinicola, R.S., and Reinhard, M. 2010. Occurrence of Herbicides and Pharmaceutical and Personal Care Products in Surface Water and Groundwater around Liberty Bay, Puget Sound, Washington. *J. Environ. Qual.* 39 (4), 1173-1180. Abstract online at: <https://www.agronomy.org/publications/jeq/abstracts/39/4/1173>.
- A medicine take-back system is a simple way to keep waste medicines – estimated to be about one-third of all prescription and over-the-counter drugs sold each year.
Source: Estimates for unused containers of medicines in Washington state for 2009 were compiled from: Bush, P.J., Sanz, E.J. & Garcia, M. (1996). Section II: Cross cultural reports. Medicines at Home: the Contents of Medicines Cabinets in Eight Countries. In *Children, Medicines, and Culture*. New York, Pharmaceutical Products Press; Kaiser Family Foundation, State Health Facts. (2009). Total Number of Retail Prescription Drugs Filled at Pharmacies. Available online at: <http://www.statehealthfacts.org/profileind.jsp?cmprgn=1&cat=5&rgn=49&ind=265&sub=66>; Consumer Healthcare Products Association. (2009). Over-the-counter Retail Sales. Available online at: http://www.chpa-info.org/pressroom/Retail_Sales.aspx; Note: Mail-order prescription sales and over-the-counter drugs sales from Wal-Mart were omitted from this calculation due to the lack of available industry data.