

## Mercury in Oregon Waters

### What is mercury and why is mercury in Oregon waters a concern?

Mercury is a naturally occurring element that is found in air, water and soil and exists in several different forms. Methylmercury is the organic form of mercury that most easily enters the body. It can be naturally formed in the soil or water by certain types of bacteria. A number of factors influence the formation of methylmercury. For example, methylmercury is more likely to form in a water body where there is a high amount of organic material or where algal blooms are prone to occur. Methylmercury increases in concentration as it moves up the food chain.

Methylmercury is the form of mercury most toxic to humans. Because methylmercury accumulates in fish, eating fish is the way most people are exposed to mercury in the environment.

Mercury can also cause a range of toxic effects to fish, aquatic life and wildlife. Organisms may be exposed to mercury in the water and sediment where they live or by eating food sources that contain mercury.

### What are the health effects?

Mercury primarily affects the nervous system and is most serious for developing fetuses and young children. Babies born to mothers who have elevated mercury levels may have developmental issues and learning disabilities.

Infants and children are most susceptible to the effects of mercury because their nervous systems continue to develop through adolescence. Mercury can be passed from mother to fetus, resulting in potentially serious effects such as brain damage, mental retardation, blindness, seizures and speech problems. In adults, mercury can lead to irritability, tremors and problems with vision, hearing and memory.

### Does DEQ have water quality standards for mercury?

Yes. DEQ sets water quality standards for mercury to allow people to safely eat fish and shellfish caught in Oregon waters. This standard is based on the concentration of methylmercury found in fish tissue—not the concentration in water. This standard is 0.040 milligrams per kilogram (mg/kg). The fish tissue standard is

unique in that all other water quality standards in Oregon are measured as water concentrations.

Oregon also has mercury standards to protect fish and other aquatic life that live in freshwater and saltwater. These criteria are water concentrations of 0.012 parts per billion ( $\mu\text{g/L}$ ) and 0.025 parts per billion, respectively.



### What are the sources of mercury in Oregon?

In general, mercury comes from a combination of local, regional and global sources. Regional and local contributions include mercury from nearby natural sources (air, water and soil), gold mining activities and combustion. Combustion sources contribute to air deposition of mercury and include such things as incinerators, cement plants and coal fired power plants. Global contributions include mercury added to the earth's atmosphere from natural sources (such as volcanic eruptions and forest fires) and human activities, such as large-scale combustion. Mercury is also found in a number of consumer products, such as fluorescent light bulbs, switches, thermometers and batteries.

### Why does mercury accumulate to high levels in fish?

Once methylmercury enters the food chain, it begins to accumulate in the body of an organism. Mercury levels are then magnified as larger organisms (fish) eat smaller organisms (bacteria,



State of Oregon  
Department of  
Environmental  
Quality

**Water Quality  
Standards and  
Assessment Program**  
811 SW 6<sup>th</sup> Avenue  
Portland, OR 97204  
Phone: (503) 229-5384  
(800) 452-4011  
Fax: (503) 229-6037  
Contact: Andrea Matzke  
[www.oregon.gov/DEQ](http://www.oregon.gov/DEQ)

algae, aquatic insects) in a process called bioaccumulation. Predator species which eat smaller fish tend to have the highest levels, and larger, older fish accumulate more mercury than smaller, younger fish.

High levels of mercury found in fish tissue likely indicate mercury is also present in water and sediment, yet water concentrations may be very low and still be safe for swimming or as a source of drinking water. In some circumstances, levels of mercury in the water may be so low that it can't be detected through current analytical methods. Therefore, measuring mercury concentrations in fish or shellfish provides a more direct link to human risk associated with consumption of contaminated fish.

### **Does DEQ sample fish tissue for mercury? What are the results?**

DEQ in conjunction with its partner agencies collects fish tissue samples from Oregon waters to monitor the level of mercury in fish. Results of these analyses indicate that some resident fish from rivers and lakes throughout the state have levels of mercury in fish tissue higher than the state methylmercury standard of 0.040 mg/kg. Commonly sampled fish, such as northern pikeminnow and bass, are predators or bottom-feeders living their full life in Oregon waters. Therefore, these fish tend to have higher levels of mercury in their tissue.

Non-resident fish such as anadromous salmon and steelhead, which spend most of their life in the ocean, have not been included in DEQ studies because they spend limited time feeding in Oregon rivers or lakes and generally contain lower levels of mercury.

### **What's the difference between DEQ's fish tissue standard and the Oregon Health Authority's fish consumption health advisories?**

DEQ developed the fish tissue standard to protect people who regularly eat fish and shellfish from Oregon waters. The methylmercury fish tissue standard of 0.040 mg/kg protects people who consume up to 175 grams of fish per day (or about 23 fish meals a month). This rate is significantly higher than the national average consumption rate because it takes into consideration populations of Oregonians who eat more fish and shellfish than the average consumer. Consequently, Oregon's standard is more stringent than most other state fish tissue standards for methylmercury.

The standard allows DEQ to evaluate whether the beneficial use of "fishing" (to safely eat fish) is supported, rather than how much fish are safe

to eat based on the amount of mercury already present in fish tissue.

Similar to DEQ, the Oregon Health Authority bases risk to human health on the amount of mercury found in fish and shellfish. OHA's mercury advisories are established to limit the amount of mercury people ingest from eating fish – the more mercury found in fish tissue, the less people should eat. OHA calculates recommended meal limits from fish tissue data they receive from partner agencies like DEQ, U.S. Environmental Protection Agency, or Oregon Department of Fish and Wildlife. Once meal limits are established for a certain water body, OHA posts the advisory to their website.

Fish advisories are also designed to help consumers gain the health benefits of eating fish (for example, omega-3 fatty acids, low in saturated fat) while protecting people from contaminants sometimes found in fish. Therefore, in some cases it may be safe to eat small portions of contaminated fish, while in other circumstances, it is not safe to eat any amount of certain fish. It is important to follow any OHA health advisory recommendation, which will specify how much contaminated fish is safe to eat. The advisories also take into consideration populations that may be more vulnerable to contaminants, such as children and pregnant or nursing women.

For more information about how OHA develops fish advisories and for a list of current advisories and consumption guidelines, see OHA's website: [www.healthoregon.org/fishadv](http://www.healthoregon.org/fishadv).

### **Is my drinking water safe if I get it from waters where there are high levels of mercury in the fish?**

Drinking water is considered safe if it has less than the federal Safe Drinking Water Maximum Contaminant Level of 2 parts per billion of mercury. Mercury is monitored at the point it enters the drinking water distribution system after treatment, rather than at the drinking water source. High mercury levels in fish which reside in drinking water sources have not been linked to exceedances of the drinking water Maximum Contaminant Level for mercury.

Public drinking water suppliers must regularly monitor mercury levels and take action if water exceeds the Maximum Contaminant Level for mercury.

- No active public water suppliers in Oregon have measured mercury levels above this level

- No public water suppliers are treating raw water specifically to remove mercury

More information on drinking water regulations and test results for public water suppliers are available on OHA's Drinking Water Services web page: <http://170.104.63.9/>

**What is DEQ doing about high levels of mercury in fish?**

DEQ identifies waters where fish tissue samples have higher mercury levels than its standard and adds these waters to the state's list of impaired waters needing mercury pollutant load limits (303(d) list). DEQ then collects additional information and conducts analyses to determine the severity and extent of the problem, identifies the sources of mercury, and develops restoration plans to reduce the levels of mercury reaching Oregon's water ways. DEQ develops Total Maximum Daily Loads (pollution load limit plans) to reduce the total amount of mercury that enters the impaired waterbody.

**How long will it take to reduce mercury in our fish?**

DEQ does not have a complete understanding of the sources of mercury in fish, so it is difficult to determine how long mercury will remain at present levels. According to EPA's [Fish Consumption Advisories website](#), many waterbodies across the country, including ocean waters, have fish and shellfish with elevated mercury levels.

**Does DEQ plan to do more fish sampling for mercury?**

Sampling fish for mercury and other toxics is an important part of DEQ's monitoring strategy and it will continue to be part of its long-term toxics monitoring program. For more information about mercury sampling in fish, please contact: Lori Pillsbury, [pillsbury.lori@deq.state.or.us](mailto:pillsbury.lori@deq.state.or.us), 503-693-5735, at DEQ's lab in Hillsboro.

**What can you do to limit mercury in the environment?**

Although mercury may come from natural sources, it is also found in a number of consumer products, such as fluorescent light bulbs, some imported skin-lightening and anti-aging creams, vehicle light switches, certain types of button cell batteries, thermostats and thermometers. You should not dispose of these products down the sink, on the ground, down a storm drain or in your garbage can. For information about disposal of household hazardous waste or collection programs in your area, call **1-800-732-9253**, your local garbage hauler, or your local

government solid waste department. Where possible, use less toxic alternatives such as digital thermostats and thermometers. For more information about mercury and mercury disposal, see DEQ's website at:

<http://www.deq.state.or.us/lq/mercury.htm>.

EPA's website has additional information about mercury in consumer products:

<http://www.epa.gov/hg/consumer.htm>.

**For more information please contact:**

Andrea Matzke, [matzke.andrea@deq.state.or.us](mailto:matzke.andrea@deq.state.or.us), (503) 229-5384.

**Alternative formats**

Alternative formats of this document can be made available. For more information, call 503-229-5696, Portland, or phone toll-free in Oregon at 1-800-452-4011, ext. 5696. Hearing-impaired persons may call 711.



Photo credit: Bureau of Land Management

**Figure 1: Fly fishing on the North Umpqua River**