

Reel Trouble

How Washington's Fish-Advisory Program Fails to Protect Consumers from Toxic Fish



ACKNOWLEDGMENTS

The authors wish to thank all of those who provided input, advice, and assistance:

Jeremiah Baumann
Robert Pregulman
Erika Schreder
Brandie Smith
Ken Steffenson
Laurie Valeriano

Department of Ecology and Department of Health staff members who provided information.

We also thank our members, donors, and foundation funders including the Beldon Fund, Bullitt Foundation, Burning Foundation, The Dudley Foundation, Kongsgaard-Goldman Foundation, Education Foundation of America, Mitchell Kapor, Northwest Fund for the Environment, Public Welfare, Russell Family Foundation, Social Venture Partners, and W. Alton Jones.

All photos by Ivy Sager-Rosenthal.

The Washington Public Interest Research Group Foundation is a non-profit, nonpartisan, 501(c)(3) organization working on environmental protection, consumer rights, and good government.

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The Washington Toxics Coalition is a non-profit, nonpartisan, 501(c)(3) organization that works to protect public health and the environment by preventing pollution.

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by
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October 2002



The Duwamish River in Seattle



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Executive Summary

Fish is good food, but not when it's contaminated with heavy metals and other toxic chemicals that can harm the development of children. Unfortunately, this important source of food, recreation, and tourism is increasingly contaminated with toxic chemicals—the most common of which is mercury—that are dumped in our waterways and spewed into the air. For pregnant women and young children, eating mercury-contaminated fish poses a significant risk to the developing child.

Mercury can cause learning disabilities and developmental delays in children who are exposed even to small amounts in the womb or in the early stages of development (NAS 2000).

The primary way mercury winds up in our bodies is when we eat mercury-contaminated fish (CDC 2001). Populations that eat large amounts of fish, including Native Americans, Asians and others, are also at greater risk of dangerous levels of mercury exposure due to fish consumption.

In Washington, mercury pollution is becoming more and more prevalent. In fact, according to the federal Toxics Release Inventory data, between 1987 and 2000, more than 21,000 pounds of mercury and mercury compounds were released directly into Washington's air, land, and water by polluting industries. In addition, the Washington State Department of Ecology estimates that an additional 1,800 pounds of mercury is released each year from dental offices, crematoria, and the landfilling or incineration of mercury-containing products such as thermometers and thermostats (WSDOE 2002-2). This is a staggering amount when you consider that it

takes only .002 pounds of mercury, or just a couple of drops, to contaminate a 25-acre lake to the point where the fish are unsafe to eat (Buschbaum et al. 1999). Currently, 19 waterways in Washington fail to meet water quality standards for mercury, including central Puget Sound, Elliott Bay, the Yakima River, and Bellingham Bay (WSDOE 2000-2). Yet, it is very common to find fish with dangerously high mercury levels even in waterways that do meet water quality standards because fish often have mercury concentrations 1 million to 10 million times greater than the dissolved mercury concentrations of the surrounding water (EPA June 2001).

Nationally, increasing concern over mercury contamination of fish and the potential health

risks for women of childbearing age and children has prompted the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA) to issue nationwide advisories. In April 2001, the Washington State Department of Health

(DOH) strengthened an FDA warning by issuing a statewide advisory warning women of childbearing age and children under six not to eat shark, swordfish, tilefish, king mackerel, and tuna steaks and also to limit their consumption of canned tuna because of high mercury concentrations (DOH 2002-3).

Mercury pollution in Washington also has resulted in health advisories for fish caught in local waterways. For example, in May 2001, DOH issued an advisory for Lake Whatcom near Bellingham warning women of childbearing age and young children to limit their consumption of smallmouth bass and yellow perch to avoid unsafe levels of mercury (DOH 2001-2). In

Between 1987 and 2000, more than 21,000 pounds of mercury and mercury compounds were released directly into Washington's air, land, and water by polluting industries.



addition to the Lake Whatcom advisory, Washington State has three other local fish advisories specifically for mercury (DOH 2002-3). The advisories are for Lake Roosevelt, Sinclair Inlet, and Eagle Harbor. Unfortunately, Washingtonians have no way of knowing whether other areas of the state have mercury-contaminated fish because the state does not have a comprehensive program for monitoring mercury levels in fish, assessing the health risks of contaminated fish, and notifying the public of the risks. The Department of Ecology (Ecology) only recently announced that it would implement a statewide monitoring program to obtain mercury data for freshwater fish in Washington (WSDOE 2002).

While the current advisories and monitoring program show the state is slowly beginning to address the public health problems of mercury, the state is not doing enough to protect women, their unborn children, young children, and other sensitive populations from the toxic effects of mercury exposure. The state lacks a comprehensive fish-advisory program coordinated and implemented by DOH that includes monitoring, issuing fish advisories, and communicating the risks to the public. This lack of an effective fish-advisory program is very troubling given the large amounts of mercury released into Washington's environment every year that can contaminate waterways, river and lakebed sediments, and inevitably fish.

Specifically, we found that the lack of a statewide fish-advisory program results in the following problems:

1. **The lack of a comprehensive strategy for monitoring mercury contamination of fish leaves health officials and consumers without accurate information about the safety of eating fish.** Washington currently does not have a program to consistently and comprehensively monitor mercury levels in fish. Besides the highly publicized case of Lake Whatcom, the most comprehensive tests of
2. **Health officials are slow to react when monitoring uncovers a potential mercury contamination problem, and there is no protocol for coordinating a response among state health and environmental agencies when contaminated fish are identified.** We found several waterbodies where fish-tissue screening tests conducted by Ecology revealed mercury levels that pose a potential health risk, including Black and Ward Lakes in Thurston County and Samish Lake in Whatcom County. None of these waterbodies was ever subjected to further testing or health assessment, the public has not been notified of the possible contamination, and to date no fish advisories have been issued.
3. **Fish advisories that are issued are not protective and are inconsistent.** DOH has not developed a threshold level of mercury contamination in fish that would trigger an advisory and be fully protective of consumers, especially sensitive populations like women, young children, Native Americans, and Asians. DOH's reliance on consumption surveys to determine whether residents are at risk is not an accurate method for assessing the true risk to residents. In addition, current fish-consumption advisories have not been developed using a consistent methodology, resulting in inconsistent advisories.
4. **The public is not adequately notified of the risks of eating mercury-contaminated fish.** Fish advisories found on DOH's website are confusing and in some cases incomplete. Signs are not consistently posted at



waterbodies with fish advisories and DOH and local health departments do not conduct coordinated and comprehensive public education or outreach programs to alert and educate consumers to the risks of eating contaminated fish. Finally, the Washington Department of Fish and Wildlife currently recommends fishing in waterbodies that currently are the subject of a fish advisory.

The lack of a comprehensive approach to testing waterbodies, issuing fish-consumption advisories, and communicating the risks of eating mercury-contaminated fish continues to put the health of residents, especially pregnant women, children, and other sensitive populations, unnecessarily at risk.

For a strong and effective fish-advisory program **the Department of Health must take a leadership role**. As lead agency, DOH should conduct or coordinate the testing for contaminants, issue health advisories, ensure adequate public outreach and education, and notify the public of advisories. To fully protect the residents of Washington, DOH should:

1. Be designated and funded by the Legislature to develop and implement a fish-advisory program.
2. Conduct a fish-monitoring program, coordinate fish-tissue testing with Ecology and other monitoring agencies, and require that all testing results be forwarded to DOH for assessment and inclusion in a database of mercury and other contaminants in fish.
3. Allow the public to request that the state test fish in a particular waterbody and give the public the opportunity to provide information on waterbodies they see as most critically in need of testing.
4. Establish a threshold level of mercury contamination in fish that requires DOH to alert the public to a possible health risk, conduct additional testing, and, if testing

shows one is necessary, issue a consumption advisory that is fully protective of consumers, especially sensitive populations like women, young children, Native Americans, and Asians.

5. Improve communication of risks to the public by developing and coordinating a statewide public-education program to alert and educate consumers about the risks of eating mercury-contaminated fish.

Adopting and implementing the above policies would greatly improve Washington's fish-advisory program and reduce the mercury exposure of residents, especially pregnant women and children and other sensitive populations. Yet, to fully ensure that residents are not exposed to mercury pollution, Washington must eliminate sources of this pollution. Washington policy-makers must adopt laws, regulations, and guidelines that:

1. Phase out mercury products, such as thermometers and thermostats, in favor of safe, effective and available alternatives.
2. Improve the safety of mercury disposal and require manufacturers of mercury products to pay for safer mercury-disposal systems.
3. Provide the public with the right to know about mercury in products by requiring labeling of mercury products.
4. Phase out mercury emissions from industrial sources, such as coal-fired power plants, gold mines, and incinerators, and clean up toxic sites.
5. Prevent and reduce mercury releases from the use of dental amalgam by requiring dental offices to install filtration units to remove mercury from wastewater.



Fish – An Important Part of the Diet But Becoming Contaminated

Fish provide important nutritional benefits and are an important component of a well-balanced diet. Fish are an excellent source of protein, omega-3 fatty acids, and Vitamin D and are low in saturated fats. Recent studies demonstrate that eating fish high in omega-3 fatty acids may lower the risk of heart attacks and strokes (Brown 2002). All people, especially pregnant women and children, should be able to eat uncontaminated fish as part of a healthy, balanced diet. Unfortunately, eating fish may not always result in a net health gain.

Increasingly, fish are becoming contaminated with toxic chemicals dumped in our waterways and spewed into the air. One of the most prevalent toxic chemicals found in fish is mercury. In a national survey of mercury residues in fish, the U.S. Environmental Protection Agency (EPA) found mercury in fish at 92% of all sites surveyed (EPA 2001-2).

When people ingest mercury-contaminated fish they risk many adverse health effects. For pregnant women and young children, eating mercury-contaminated fish can pose greater health risks.

The Health Effects of Mercury Exposure

Mercury is a potent neurotoxin that builds up in the tissues of animals and people. It belongs to the class of chemicals called persistent bioaccumulative toxics (PBTs or persistent toxic

chemicals). Persistent toxic chemicals break down slowly, or not at all, in the environment, and accumulate in the food chain, building up in our bodies. Exposure to even small amounts can have devastating health effects.

Symptoms of mercury exposure in adults include vision difficulties including blindness, sensory impairments, loss of speech and muscle control, slurred speech, and sometimes death (Baumann et al. 2001). In fact, the phrase “mad as a hatter” originated in the mid-1800s when hat makers used hot solutions of mercuric nitrate to shape felt hats. This chronic exposure to

mercury led to neurological impairments and psychotic symptoms and was the inspiration for Lewis Carroll’s demented Mad Hatter character in *Alice In Wonderland*.

Studies show that children exposed to mercury while in their mother’s womb can experience learning disabilities, blindness, deafness, and other birth defects.

Especially Dangerous For Most-Susceptible Populations

Exposure to mercury is especially dangerous for women of childbearing age, pregnant women, and young children. Mercury easily passes through a mother’s placenta and damages her baby’s brain. Because fetal brains and the brains of young children are still developing, mercury exposure at these crucial times can severely affect brain development (Baumann et al. 2001). Nationwide, one in ten women has blood-mercury levels within one-tenth of dangerous mercury levels. This suggests that for nearly 10% of women, exposure to even a minute amount of mercury could lead to levels of mercury in their blood that pose a danger to the fetus (CDC 2001).

Studies show that children exposed to mercury while in their mother’s womb can experience learning disabilities, blindness,



deafness, and other birth defects (Baumann et al. 2001). The National Academy of Sciences estimates that 60,000 children born each year are at risk of neurological problems because of mercury exposure in the womb (NAS 2000).

Increasing Contamination From Human Sources

Unfortunately, mercury pollution is prevalent in Washington. Mercury pollution comes from a variety of human and natural sources. Natural sources include deposits of ore called cinnabar that can be released over time through volcanic and geothermal activity (Weiss and Wright 2001). More and more, however, the majority of mercury pollution comes from human activities (EPA 1997). Every day, mercury is discharged into our environment from industrial sources, mercury-containing products, landfills, incinerators, health care facilities, crematoria, and dentist's offices. (See Appendix A for a discussion of mercury sources and alternatives.) It is because mercury is so prevalent that the Washington State Department of Ecology (Ecology) has targeted mercury as one of the first chemicals to phase out as part of its ground-breaking policy to phase out persistent toxic pollution (WSDOE 2000-3; WSDOE 2002-2).

According to federal Toxics Release Inventory data, between 1987 and 2000, more than 21,000 pounds of mercury and mercury compounds were released directly into Washington's air, land, and water by polluting industries. In addition, Ecology estimates that an additional 1,800 pounds of mercury is released each year from dental offices, crematoria, and the landfilling or incineration of mercury-containing products such as thermometers and thermostats (WSDOE 2002-2). This is a staggering amount when you consider that it takes only .002 pounds of mercury or just a couple of drops to contaminate a 25-acre lake to the point where the fish are unsafe to eat (Buschbaum et al. 1999).

Information on mercury contamination in

waterways suggests that mercury pollution has led to a water-quality problem in Washington. Currently, 19 waterways fail to meet water-quality standards for mercury (See Table 1).

Table 1. WASHINGTON WATERWAYS FAILING TO MEET MERCURY WATER QUALITY STANDARDS

Affected Waterway

Bear-Evans Creek
 Bellingham Bay and Whatcom Waterway
 Budd Inlet
 Central Puget Sound
 Commencement Bay
 Duwamish Waterway and River
 Dyes Inlet
 Eagle Harbor
 Elliott Bay
 Green River
 Hood Canal
 Lake Roosevelt
 Port Gardner and Inner Everett Harbor
 Possession Sound
 Sinclair Inlet
 Snohomish River
 Springbrook Creek
 White River
 Yakima River

NOTE: A violation of a water quality standard for mercury can occur when mercury levels exceed standards for fish tissue, water column, or sediment.

While 19 waterbodies indicate a water-quality problem, the information does not provide the best guide for assessing the extent of mercury-contaminated fish. The number of waterbodies with mercury-contaminated fish may be much higher. It is very common to find fish with dangerously high mercury levels even in those waters that do meet water quality standards. This is because fish often have mercury



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concentrations 1 million to 10 million times greater than the dissolved mercury concentrations of the surrounding water (EPA 2001-2).

How Mercury Travels In the Environment

Mercury is a naturally occurring element that remains liquid at room temperature. When mercury is released into the environment it cycles through the air, the water, the soil, animals, and people (EPA 1997). Mercury released into the air enters surface waters and lakebed and riverbed sediments when it rains. Because sediments can retain mercury for long periods of time, mercury-contaminated riverbeds and lakebeds can continue to release mercury into the aquatic environment for hundreds of years (EPA 1997).

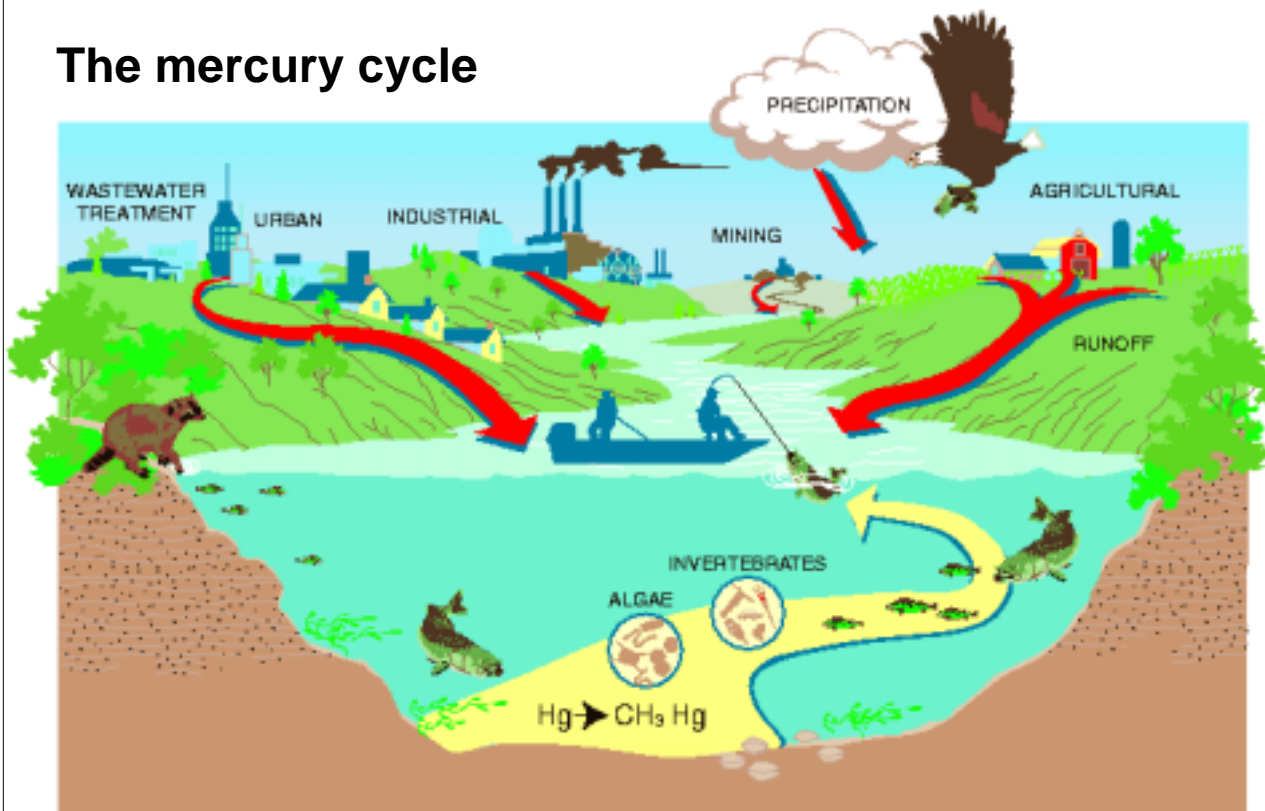
Mercury occurs in several different forms: elemental mercury, inorganic mercury, and organic mercury. Methylmercury is the form of

mercury that is of most concern to humans. Methylmercury forms when other forms of mercury are deposited into water either through direct discharge or as part of the mercury cycle and undergo several complex chemical reactions (EPA 1997). Because methylmercury is easily absorbed and accumulates in animal tissues to a greater extent than other forms of mercury, methylmercury bioaccumulates in the food chain, increasing in concentration in animals at the top of the chain (EPA 1997).

Mercury Accumulation in Fish

The form of mercury most often detected in fish is methylmercury. According to EPA, methylmercury accounts for almost 100% of the mercury that is found in fish tissue (EPA 1997). Fish bioaccumulate methylmercury efficiently (EPA 2001-2). Studies of mercury concentrations in fish species show that predator fish species at the top of the aquatic food chain like

The mercury cycle



(Illustration by Connie J. Dean, U.S. Geological Survey)



bass, swordfish, pike, and tuna typically have the highest mercury concentrations (EPA 2001). Studies conducted in Washington confirm these results. Studies conducted on fish in Lake Roosevelt and Lake Whatcom found mercury concentrations highest in fish at the top of the aquatic food chain, such as smallmouth bass and walleye pike (WSDOE 2001). In this report the term mercury is used in place of methylmercury solely for simplification purposes.

Increasing Fish-Consumption Advisories

The most common way people are exposed to mercury is by eating mercury-contaminated fish (CDC 2001). EPA estimates that up to 1.16 million women of childbearing age eat enough mercury-contaminated fish to pose a risk of harm to their future children (EPA 1997).

To warn people of the risks of eating mercury-contaminated fish, states issue fish-consumption advisories that warn residents to limit their consumption of fish species that have tested high for mercury. As of December 2000, nationwide there were 2,242 fish-consumption advisories in 41 states due to mercury contami-

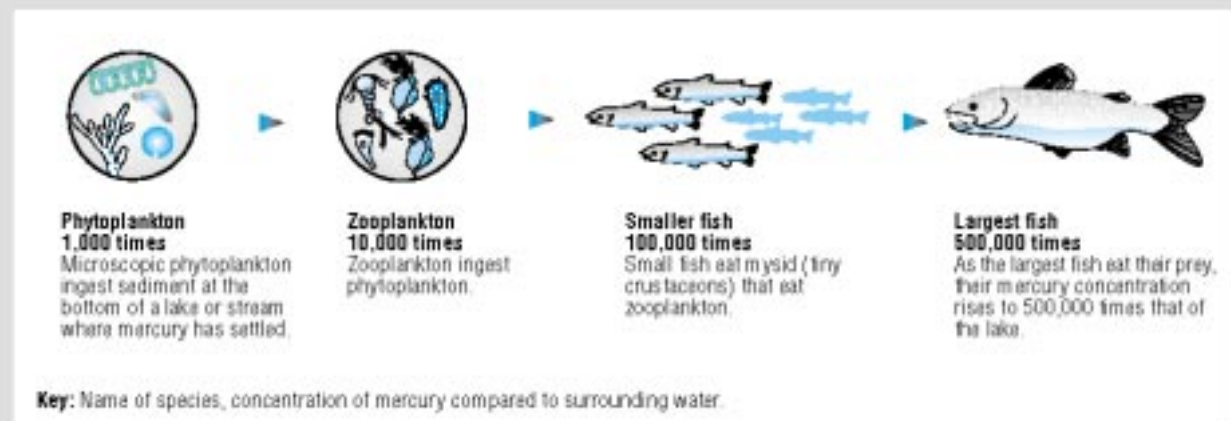
nation (EPA 2001). This represents a 149% increase in the number of mercury fish-consumption advisories since 1993 (EPA 2001).

The increasing levels of mercury in fish have prompted the EPA and the Federal Food and Drug Administration (FDA) to issue nationwide fish-consumption advisories. The EPA currently advises women of childbearing age, pregnant women, and young children to limit consumption of all freshwater fish caught by friends and family in local waters to one meal per week (EPA 2001-3). The FDA advises these sensitive populations to limit consumption of shark, swordfish, king mackerel, and tilefish because of high levels of mercury (FDA 2001). Recent research suggests, however, that FDA's warning is inadequate in protecting the public's health and that the extent of mercury contamination in U.S. seafood is much higher than reported by the FDA (Baumann et al. 2001). For example, in July 2002 an independent science panel recommended that the FDA also warn consumers about the risks of mercury exposure from eating tuna (Neergaard 2002).

Washington currently has 13 waterbody-specific fish-consumption advisories (See Appendix B). Of these advisories, four are specifically

How Mercury Accumulates Up The Food Chain

Mercury is a bioaccumulative toxic, which means it builds up in the tissue of animals and people. Fish like smelt and lake trout can have hundreds of thousands of times more mercury in their system than exists in the surrounding water. People who eat contaminated fish are exposed to even greater levels of mercury.



Source: TH-TAC



Case Study: Lake Whatcom

Nestled in the hills above Bellingham is Lake Whatcom—the only drinking-water source for about 85,000 people in the city and Whatcom County. Many people also live and recreate on Lake Whatcom. Local anglers and residents fish for a variety of species, including smallmouth bass, yellow perch, cutthroat trout, brown bullhead, kokanee, pumpkinseed, and crayfish. What many people may not know about Lake Whatcom is that some of its fish are highly contaminated with mercury.

In 1998, the Department of Ecology (Ecology) found high levels of mercury in one composite sample of Lake Whatcom smallmouth bass. The level found was 0.5 parts per million (ppm), which is high enough to pose a potential health problem for women of childbearing age, infants, and children (DOH 2001-2). This finding prompted the Whatcom Health and Human Services Department (WHHSD) to ask the Washington Department of Health (DOH) to assess the potential health impacts to the people who eat fish from Lake Whatcom. In response DOH worked with WHHSD, Ecology, and the Washington Department of Fish and Wildlife to sample additional fish species for mercury contamination and carry out a fish-consumption survey for Lake Whatcom.

The investigation was conducted from May to June 2000 and revealed high levels of mercury in smallmouth bass and yellow perch (DOH 2001-2). In fact, the average range of mercury found in Lake Whatcom smallmouth bass was much higher than the average range found nationally. A range of .49 to 1.84 ppm was found in Lake Whatcom smallmouth bass, while nationally the range is 0.09 to 0.78 ppm (RE Sources 2001). In addition, at least one sample of brown bullhead was higher than 0.5 ppm.

The consumption survey carried out in July 2000 found that both lake-side residents and anglers do eat the fish that were found to have the highest levels of mercury. In addition, the survey also found that these populations ate tuna, which has been identified as a fish species that contains some of the highest levels of mercury (DOH 2001-2).

The investigation and consumption survey eventually resulted in the issuance of a fish-consumption advisory by the Department of Health in May 2001 (DOH 2001-2). The advisory recommends that women of childbearing age (about 15-45 years of age), infants, and children under six not eat smallmouth bass from Lake Whatcom and limit the amount of yellow perch eaten. The advisory also recommends that the general population follow guidelines based on an individual's body weight for eating other fish species caught in Lake Whatcom.

The sources of the mercury problem continue to be studied for Lake Whatcom. One potential source was the chlorine plant operated by Georgia-Pacific Corporation in downtown Bellingham (RE Sources 2001). This facility made chlorine from a mercury-cell process and according to the federal Toxics Release Inventory reported releasing more than 16,000 pounds of mercury into the air from 1987 to 2000. Other potential local sources of mercury include two solid-waste incinerators that were operated in Ferndale, mining operations, dumpsites, smelting and refining, and the improper disposal of mercury products such as thermometers and thermostats (RE Sources 2001).





due to mercury. In April 2001, DOH issued a statewide advisory warning women of childbearing age and young children not to eat any shark, swordfish, tilefish, king mackerel and fresh caught and frozen tuna steaks (DOH 2002). In addition, DOH also recommends that women of childbearing age and children under the age of six limit the amount of canned tuna they consume because of high mercury concentrations (DOH 2002).

The Role of the Washington State Department of Health and Local Health Departments

According to DOH, the department shares the responsibility for issuing fish and shellfish advisories in Washington with 34 local health departments. DOH provides technical assistance to local health jurisdictions in conducting health assessments and recommending fish advisories while the local health departments are responsible for formal issuance and publicizing the results.

This sharing of responsibility, however, is really in name only. Resource constraints and lack of technical expertise on the part of local health departments render DOH the primary authority for the state's fish-advisory program. Many local health departments depend primarily, if not entirely, upon DOH for monitoring fish and shellfish for mercury contamination, identifying whether a consumption advisory is necessary, and determining the extent of the advisory. Thus, while in theory the responsibility for issuing fish and shellfish advisories is shared among DOH and the local departments, in reality, because of the technical expertise and resources needed to conduct an effective and efficient fish program, DOH is the primary authority in the state for developing and issuing advisories. This makes the gaps in DOH's fish-advisory program even more troubling.

Washington's Current Fish-Advisory Program: Holes in the Fish-Advisory Net

The mercury contamination in Lake Whatcom and Lake Roosevelt indicates that mercury contamination of fish is not just a national problem but a problem in Washington as well. Increasingly, mercury pollution is contaminating the fish that we enjoy catching and eating. Lake Whatcom and Lake Roosevelt should have served as a wake-up call to health officials that Washington needs a comprehensive system to protect its citizens from the health risks of eating fish contaminated with mercury. Unfortunately, health officials have been slow to react.

Our research reveals Washington's fish-advisory system does not protect citizens—especially sensitive populations like pregnant women, their unborn children, young children, Native Americans, and Asians—from exposure to mercury. Because of the lack of monitoring of mercury levels in fish, the true extent of mercury contamination in fish is unclear. In those cases where fish have been monitored and high levels of mercury have been found, our research found that the mercury-contaminated fish were not investigated further and residents were never alerted to the possible mercury contamination. We also found that current advisories are confusing and inconsistent. Finally, Washington fails to adequately notify residents of current advisories and communicate to the public the risks of eating mercury-contaminated fish. The lack of a comprehensive approach to testing waterbodies, issuing fish-consumption advisories, and communicating the risks of eating fish continues to put the health of residents, especially pregnant women, children, and other sensitive populations, unnecessarily at risk.



Lack of Comprehensive and Coordinated Monitoring

The first problem with Washington's fish-advisory program is the lack of a consistent, comprehensive, and coordinated plan to monitor mercury levels in fish. DOH currently does not monitor fish in either fresh or marine waters for mercury or any other toxic contaminants. Responsibility for monitoring mercury pollution rests on Ecology and other environmental and natural resource state agencies like the Puget Sound Ambient Monitoring Program and the Washington Department of Fish and Wildlife (WDFW). As part of their pollution-monitoring efforts these agencies may measure mercury levels in fish, but the testing is not conducted on a routine basis. In addition, the tests may not be conducted in a manner that provides the best data for assessing the human health impacts.

The lack of a monitoring program and resulting deficiencies in data on mercury in fish became evident when we asked DOH for data on mercury levels in fish. It quickly became clear that a severe shortage of information exists on the level of mercury in Washington fish. DOH does not maintain records on mercury levels and referred us to Ecology for the data. We were told by Ecology that mercury data was lacking and was not easily found.

The records supplied by Ecology indicate a shortage of data on mercury levels in fish (Serdar 2002). This is because, until this year, Ecology has not had a consistent monitoring program for toxics, such as mercury, in fish. Besides the recent Lake Whatcom data, the records showed that the small amount of mercury data the agency has is from tests conducted in the 1980s and early 1990s (Serdar 2002). In addition to

Lake Whatcom, Ecology reported 1999 data for clams in Padilla Bay and 1997 data for clams in Jackson Park (WSDOE 2000; WSDOE 1998). For freshwater fish, the most recent information besides the data from Lake Whatcom came from studies on 20 lakes and reservoirs conducted in 1989 and 1992 (Johnson and Norton 1990; Serdar et al. 1994). Thus, decades of mercury pollution in Washington has not been adequately monitored.

Ecology 2002 Monitoring Plan—A Good First Step, but Needs Improvement

Fortunately, Ecology recognizes this failing and, in April 2002, released a plan for monitoring toxic contaminants, including mercury, in freshwater fish (WSDOE 2002). Ecology plans to monitor 8-10 freshwater sites per year and has identified 80-100 potential sites for possible testing in the next five years (WSDOE 2002). Twenty waterbodies are slated for fish testing for mercury in 2002 under Ecology's plan (See Table 2).

Ecology's plan is a good first step in developing a consistent and long-term strategy to monitor mercury and other toxics in fish in Washington. Yet, the way the plan was developed demonstrates the problems of not having a consistent and coordinated approach to monitoring toxics in fish. Because of the lack of a coordinated plan, there is no way to ensure that Ecology's plan will adequately assess human health risks, correctly prioritize waterbodies, and include input from the public.

More Coordination Needed In Developing Monitoring Plan

Although Ecology has experience in conducting the actual monitoring of fish, Ecology's

Until this year, Ecology has not had a consistent monitoring program for toxics, such as mercury, in fish.



Case Study: Duwamish River

Although most people don't know it, the Duwamish River is a real, living river that runs through the heart of Seattle. The river travels past the neighborhoods of South Park, Georgetown and West Seattle, passing finally under the West Seattle Bridge before meeting Elliot Bay. On September 13, 2001, the Environmental Protection Agency listed the lower Duwamish River as a federal Superfund site after determining that it was one of the most toxic contaminated waste sites in the country. One of the chemicals contributing to this toxic mess is mercury. Alarming, at some spots in the river, sediments on the river bottom exceed sediment standards for mercury by up to 400% (King County Department of Natural Resources 1999).

The neighborhoods located along the Duwamish River are the most culturally diverse neighborhoods in Seattle. Living in these communities are thousands of people of Vietnamese, Hmong, Laotian, Samoan, Tongan and Russian descent. For many of these people Duwamish fish are a primary part of their diet.

The Seattle-King County Department of Public Health currently advises people to avoid eating all bottom fish and shellfish caught in the Duwamish, including crab and seaweed. This advisory was issued more than ten years ago. There are a limited number of signs communicating the advisory, which state, "[b]ottomfish, crab and shellfish may be unsafe to eat due to pollution." Although the advisory contains a warning of contamination, it does not provide consumption limits or specific advice on consuming certain species. Outreach efforts by DOH show that people in surrounding communities are unaware of the existing advisory despite the fact that it has been in effect for more than ten years.

The Seattle-King County Department of Public Health has made recent efforts to improve the signage along the Duwamish River. The new signs are now written in seven different languages and have pictures of a bottom fish, clam and scallop with a red line through them indicating that such fish and shellfish should not be consumed. However, this advisory does not reflect new recommendations made by the Department of Health in July 2002 as part of a Superfund health assessment for the Duwamish River.

DOH's health assessment recommends that people consume no more than one meal of bottom fish per month including shiner perch, flounder, English sole, and Rockfish. It also recommends that people not consume shellfish (clam, mussels) and the hepatopancreas of crabs or the livers from bottom fish caught in the Duwamish River (DOH 2002-2). DOH has no plans to post signs along the river until the final public-health assessment is released.



People continue to actively fish in the highly industrialized lower section of the Duwamish River in Seattle.



monitoring plan would benefit from DOH's expertise. As explained previously, DOH is by default the primary agency for issuing fish advisories and relies on Ecology for fish-tissue data. While Ecology may have the staff and knowledge to conduct the actual testing, it does not have the expertise for developing tests to evaluate impacts on human health. Ecology's main purpose for monitoring is to assess water quality and the health of aquatic populations, not the health impacts on humans. DOH, however, does have the necessary expertise and information required to make an accurate health assessment. DOH could also add valuable information from a human health perspective to the determination of the waterways Ecology prioritizes and the fish species chosen for testing.

Public Not Given Opportunity to Provide Input on Plan

Residents have the right to request that a waterbody in which they may fish be tested if they suspect toxic contamination. Ecology developed its priority list without any input from Washington citizens. Many residents depend on Washington fish for food and recreation and residents often possess the best information on the waters that are fished most heavily. Ecology and DOH have a duty to consider these concerns when determining priority waterbodies for testing.

No Advisories or Follow-up When Monitoring Uncovers Potential Problem

Even when monitoring is conducted and reveals potentially high mercury levels in fish, DOH fails to follow up with protective advisories. Ecology and DOH staffs indicate there is no set level of mercury in fish or shellfish that would require Ecology staff to automatically alert DOH and no set level that would require DOH to notify the public of possible risk. DOH does not proactively request or review fish-tissue data

Table 2. WATERBODIES SLATED FOR FISH-TISSUE TESTING BY ECOLOGY IN 2002

(Waterbody, County)

Central Region

Palmer Lake, Okanogan Co.
Fish Lake, Chelan Co.
Bonaparte Lake, Okanogan Co.
Banks Lake, Douglas/Grant Co.
Okanogan River, Okanogan Co.

Eastern Region

Newman Lake, Spokane Co.
Moses Lake, Grant Co.
Deer Lake, Stevens Co.
Upper Long Lake, Spokane Co.
Walla Walla River, Walla Walla Co.

Northwest Region

Lake Whatcom, Whatcom Co.
Fazon Lake, Whatcom Co.
Terrell Lake, Whatcom Co.
Lake Samish, Whatcom Co.
Lake Meridian, King Co.

Southwest Region

Duck Lake, Grays Harbor Co.
Loomis Lake, Pacific Co.
Lake Vancouver, Clark Co.
Black Lake, Thurston Co.
Lake Offutt, Thurston Co.

either. Instead, the agencies conducting the tests, like Ecology, must decide whether the mercury levels are high enough to warrant alerting DOH to a potential fish-contamination problem. The lack of clear guidelines for dangerous levels of mercury and lack of coordination between DOH and the testing agencies may be the reason several waterbodies that registered high fish-



tissue levels of mercury were never further investigated and, therefore, not issued an advisory.

In reviewing data, we found several waterbodies where tests revealed mercury levels in fish that were equal to or greater than the mercury levels that were determined to pose a health risk to residents eating fish from Lake Whatcom. DOH determined that a mercury level of 490 µg/kg in smallmouth bass rendered the fish unsafe for consumption for women of childbearing age and young children and that a mercury level of 200 µg/kg in yellow perch warranted advising the same sensitive populations to limit their consumption of the fish. These levels also prompted DOH to warn the general population to limit their consumption of smallmouth bass and yellow perch according to an individual's body weight.

Several of the lakes where mercury levels tested high are popular fishing spots, including Black and Ward Lakes in Thurston County and Samish Lake in Whatcom County. Several other lakes and rivers also have mercury

levels dangerously close to the levels of mercury that can cause health problems for sensitive populations.

In addition to the tests listed above, mercury in one mountain whitefish found in the Yakima River in 1984 measured 640 µg/kg. To our knowledge, the fish in these waterbodies have never been subjected to further testing and have never been the subject of a health assessment. As a result, there are no fish advisories for these waterways and residents have never been notified of the possible health risks of eating the fish.

It is unclear whether the lack of additional testing, public notification, and fish advisories is the result of the testing agencies' failure to alert DOH to the mercury levels or DOH's failure to closely monitor the test results. What is clear, however, is that the lack of follow-up with fish-tissue tests that indicate serious mercury-contamination problems demonstrates that under the current system DOH cannot accurately assess public-health risks and adequately warn residents.

Table 3. MERCURY CONCENTRATION IN SELECTED FISH FOR WHICH NO ADVISORY WAS ISSUED (LAKE WHATCOM LEVELS IN BOLD FOR COMPARISON).

Waterway	Date Tested	Species of Fish	Mercury Concentration Reported in Composite Samples of Fish
Black Lake (Thurston County)	1989	largemouth bass	540 µg/kg
Duwamish River (King County)*	1984	northern squawfish	530 µg/kg
Lake Whatcom (Whatcom County)	2000	smallmouth bass	490 µg/kg
Ward Lake (Thurston County)	1992	largemouth bass	350 µg/kg
Lake Roosevelt	1995	walleye	340 µg/kg
Lake Samish (Whatcom County)	1989	largemouth bass	270 µg/kg
Lake Whatcom (Whatcom County)	2000	yellow perch	200 µg/kg
American Lake (Pierce County)	1989	rock bass	190 µg/kg
Kahlotus Lake (Franklin County)	1989	largemouth bass	140 µg/kg
Sprague Lake	1989	largemouth bass	110 µg/kg
Lake Sammamish	1992	largemouth bass	90 µg/kg

Sources: WSDOE 1990; WSDOE 1994; DOH 2001-2



Case Study: Lake Roosevelt

Lake Roosevelt is a 130-mile long lake located in the Lake Roosevelt National Recreation Area in eastern Washington. Members of The Confederated Tribes of the Colville Reservation, whose land borders Lake Roosevelt, depend on the lake for food and other cultural activities. More than a million people visit Lake Roosevelt each year to fish, swim, and boat. It is renowned for its excellent walleye fishing. Yet, although people might be able to catch a lot of walleye in Lake Roosevelt, they cannot eat all of the walleye that they catch. That's because walleye in Lake Roosevelt are contaminated with mercury.

Mercury from abandoned gold mines and smelters has contaminated the lake to the point where, at one time, a 30-foot blob of mercury reportedly could be seen floating in the water (McClure 2001). Because of high mercury levels in Lake Roosevelt walleye, DOH currently recommends that an adult consume no more than eight 8-ounce servings of walleye per month, that a pregnant woman consume no more than two 8-ounce meals per month, and that a child under the age of six consume no more than one 4-ounce meal per month (DOH 2002).

Health Officials Are Slow to React To Protect Residents

It is inexcusable that in many cases residents have never been notified of the possible mercury contamination of the fish that have tested high for mercury. This demonstrates, however, another deficiency in the program—a failure to notify residents immediately of possible fish contamination.

Even when high contamination levels are found, DOH does not alert residents to the current investigation and possible health risks of eating the local fish. Instead, health officials begin a lengthy investigation that can take several years to complete or in numerous cases do nothing. Meanwhile, residents are allowed to continue to eat the contaminated fish without any warning that the fish may be harmful.

For example, when testing in 1998 revealed unsafe levels of mercury in several Lake Whatcom fish, the testing and analysis that followed took several years. DOH did not recommend that an advisory be issued until April 2001. During those years in which further

testing was conducted, residents were not told that the fish may be contaminated.

It is DOH's responsibility to protect the health of Washingtonians. At a minimum, residents should be warned immediately that high concentrations of mercury have been found and of the health impacts of eating fish so they can decide whether to continue eating the fish. A better approach, however, is to develop a level of mercury contamination in fish that requires DOH to alert the public to a possible health risk, conduct additional testing, and if the additional testing shows one is necessary, issue a fish advisory to fully protect consumers.

Fish Advisories Issued Are Not Protective

The current method DOH uses to determine whether to issue a fish-consumption advisory results in advisories that do not fully protect all residents who may consume fish, especially women of childbearing age, young children, and other sensitive populations. DOH's reliance on fish-consumption surveys, issuance of inconsistent advisories, and failure to



adequately explain the advisories, puts the health of consumers at risk.

Reliance on Consumption Surveys Does Not Protect All Consumers

DOH's reliance on consumption surveys to develop an advisory does not ensure that all residents will be protected from mercury-contaminated fish. Consumption advisories survey the consumption patterns of those residents researchers are able to contact on a given day or during certain times. These surveys aim to document the average consumption patterns of residents to determine whether fish are being consumed in amounts that pose a health risk to residents. If the surveys find that the average resident consumes enough of a certain type of fish to be harmful, then DOH will issue an advisory. If the survey does not find that the average resident consumes enough fish to pose a health risk, DOH does not issue an advisory.

Consumption surveys cannot document the actual consumption rates of every individual who fishes in a particular waterway. It is impossible for surveys to contact every single individual who consumes fish from the lake. The accuracy of the responses received while conducting a survey is also questionable because of the reluctance of some to provide straightforward answers. Individuals surveyed may be wary of government surveys and thus not always forthcoming when responding, may not speak English or have other problems understanding the survey questions. Yet, because of DOH's reliance on consumption surveys, there is a risk that DOH's current advisories do not adequately protect all local residents from contaminated fish.

In addition, DOH's advisories also do not inform residents that the meal recommendations in the advisories apply only if they are not consuming mercury from other sources. When

DOH calculates the weekly recommended consumption level, DOH does not take into account the mercury that a woman may be exposed to from eating canned tuna or other fish she eats that week. For example, the Lake Whatcom advisory does not make clear that a woman could eat either one meal of yellow perch from Lake Whatcom or one 6-ounce can of tuna, but not both. This is a major failure of the weekly meal-consumption advisories.

Inconsistent Advisories

The effectiveness of Washington's fish-advisory program also is weakened by inconsistent fish advisories. For example, we found that the Lake Whatcom and Lake Roosevelt advisories set meal limits on different timeframes. The Lake Whatcom advisory sets a meal limit on the amount of mercury-contaminated fish a person can eat on a weekly basis and the Lake Roosevelt advisory sets a meal limit on a monthly basis. Setting fish advisories on a weekly meal limit provides more protection for consumers because the health effects from mercury are more closely related to peak exposure from a few closely spaced meals, rather than average exposure over a longer timeframe (DOH 2001-2). Therefore, it is unclear as to why the Lake Roosevelt advisory is based on a monthly meal limit.

According to DOH's website, the Lake Roosevelt advisory is currently under review. This review has already taken more than a year and there is no indication as to when the review will be completed. Meanwhile, pregnant women and children may be eating too much mercury-contaminated fish from Lake Roosevelt, resulting in serious risks to the developing child.

Public Not Adequately Notified of Existing Advisories and Risks

Perhaps worst of all, even when DOH makes a determination that fish are unsafe to eat,



it fails to effectively warn the public.

Washington's fish-advisory program also fails to adequately notify residents of current fish advisories and communicate the risks of eating contaminated fish to the public. There is no coordinated public-outreach effort among the state agencies and local health departments. In our review of the current advisories, we found the advisories confusing, incomplete, and in some instances incorrect. Many local health departments are not willing or able to conduct outreach to residents. We found that the Washington Department of Fish and Wildlife recommends fishing in waterbodies for fish DOH specifically recommends not eating (WDFW 2002).

The lack of public outreach, as well as lack of coordination with WDFW, renders even a comprehensive fish-advisory program ineffective. An advisory is only effective if residents are aware that it exists, and the program's failure to warn residents is unacceptable.

Website Information Incomplete and Confusing

The main method DOH uses for publishing a fish advisory is posting the advisory on its website. Despite the fact that the website states that the fish advisories listed are all of the advisories for Washington due to chemical contamination, we found several advisories in Kitsap County that are not listed by DOH. According to the Bremerton-Kitsap County Health District website, in addition to the advisories for mercury in Sinclair Inlet and other toxics in Dyes Inlet, the department also recommends that shellfish not be consumed from several other bays due to nonpoint pollution such as sewage, oil, and chemicals.

In addition to the missing information on the Bremerton-Kitsap advisory, there is also confusion around the King County advisory. Although we were not able to locate any information on King County's website on fish advisories or signs posted around urban freshwater

lakes and rivers except the Duwamish River, according to King County Health Department staff, King County advises residents to avoid bottom fish from Puget Sound and urban freshwaters in King County. Yet, in the advisory listed on DOH's website, the King County advisory is only for fish and seaweed caught in Puget Sound waters in King County, not freshwaters.

Finally, we found DOH's statewide mercury advisory for women and children very difficult to locate on the website. The only way to access the advisory is through a link buried in the Lake Roosevelt advisory. For individuals not specifically checking advisories for Lake Roosevelt, it would be very difficult to know that a statewide advisory existed.

Because of these incomplete and confusing advisories, residents who fish in Washington have no way of knowing whether they can consume the fish they catch.

No Other Outreach

Besides the website — which does not provide accurate information — DOH does not have a method in place for alerting residents to current advisories. As a result, the examples of DOH's outreach efforts are few. In a few cases, such as Lake Roosevelt, the Yakima River, the Spokane River, and most recently the Duwamish River, DOH has developed a brochure or pamphlet explaining existing fish advisories. In undated pamphlets for the Yakima and Spokane Rivers available on DOH's website, DOH explains to residents the dangers of eating fish contaminated with dioxin. For the Lake Roosevelt mercury advisory, the most recent fact sheet we found was dated August 1997 and was prepared by the United States Geological Survey, not DOH (DOH 2002). It is unclear where, and even if, these pamphlets and fact sheets are still available.



DOH indicates that communicating the advisory is the purview of the local health departments, but lack of funding and staff, and for some a fear of losing tourism dollars, prompts many local health departments not to conduct outreach efforts themselves. Yet, simply posting fish advisories on a website is inadequate. DOH must take definitive

steps to improve outreach to residents. Given budget constraints and lack of staff at local health departments, outreach efforts around fish advisories should at least be a collaborative effort between DOH and the local departments. The efforts should include: outreach to local doctors, fishing groups, ethnic groups that consume locally caught fish, and leaders of particularly sensitive populations; development of multilingual brochures that are readily available in the community; inclusion of advisories in the WDFW's fishing guide; posting multilingual signs at affected waterbodies and where fishing licenses are sold; and television and radio ads during peak fishing season.

Recommended Fishing in Waters with Advisories

We reviewed the WDFW's 2002 *Washington Fishing Prospects: Where to Catch Fish in the Evergreen State*, and found that of the 12 waterbodies with fish advisories, at least half were recommended for fishing. The fishing guide recommends fishing in Lake Whatcom, Lake Roosevelt, Yakima River, and Elliott Bay for fish that are currently the subject of mercury fish advisories (WDFW 2002).

For example, the guide specifically recommends fishing for smallmouth bass in Lake Whatcom and for walleye in Lake Roosevelt despite DOH's fish advisories for Lake Whatcom smallmouth bass and Lake Roosevelt walleye.

The guide also recommends fishing in the Duwamish River even though the lower Duwamish River has been declared a Superfund site and tests show high levels of contaminants, including mercury.

Finally, the guide does not include information on any of the waterbody-specific fish advisories nor does it mention the state-

wide advisory issued by DOH. Washington residents who fish and use the guide have no way of knowing about the advisories.

Recommendations

Washington's current fish-advisory program is plagued by a lack of coordination among agencies, inadequate monitoring, poor and misapplied guidelines, ineffective advisories, and virtually nonexistent public outreach. The lack of coordination severely limits the effectiveness of the program. DOH, Ecology, WDFW and local agencies all perform important and necessary roles in the program, but the effort has never been coordinated.

For a strong and effective fish-advisory program in Washington, DOH must take a leadership role. DOH must coordinate the program and be responsible for ordering, compiling, and tracking fish-tissue testing. DOH as lead agency would be responsible for issuing health advisories and for coordinating the efforts of the local health departments and other agencies in notifying residents of current advisories.

To fully protect the residents of Washington DOH should:

1. **Be designated and funded by the Legislature to develop and implement a fish-advisory program.** DOH must coordinate the pro-



gram and take an active role in ordering, compiling, and tracking fish-tissue testing. DOH as lead agency would be responsible for issuing health advisories and for coordinating the efforts of the local health departments and other agencies.

2. **Conduct a fish-monitoring program, coordinate fish-tissue testing with Ecology and other monitoring agencies, and require that all testing results be forwarded to DOH for assessment and inclusion in a database of mercury and other contaminants in fish.** DOH must become an active player in the monitoring program by overseeing and coordinating fish-tissue testing with Ecology and the other monitoring agencies. DOH must work with these monitoring agencies to properly prioritize the waterways to be tested and to ensure that waters that are popular for fishing and near sources of mercury are monitored. An effective plan would require these agencies to coordinate their testing efforts so that testing is occurring in the areas where the state lacks information. DOH should also receive all fish-tissue testing results and develop a database of mercury and other contaminants in fish.
3. **Allow the public to request that the state test fish in a particular waterbody and give the public the opportunity to provide information on waterbodies they see as most critically in need of testing.** DOH should consult the public to provide citizens with an opportunity to provide input on the waterbodies tested. The fact that even when mercury testing occurs and reveals high levels of mercury, advisories are not issued or follow-up testing or investigation is not conducted demonstrates that the current fish-advisory program does not adequately protect the health of consumers.
4. **Establish a threshold level of mercury**

contamination in fish that requires DOH to alert the public to a possible health risk, conduct additional testing, and if testing shows one is necessary, issue a consumption advisory that is fully protective of consumers, especially sensitive populations like women, young children, Native Americans, and Asians. Residents have a right to know when a potential contamination problem exists. DOH should alert residents immediately when any testing finds high levels of mercury contamination in fish even though a formal advisory has not yet been issued. DOH must investigate fish that test high for mercury immediately, and if necessary issue a fish advisory. DOH should also stop using consumption surveys to issue advisories.

5. **Improve communication of risks to the public by developing and coordinating a statewide public-education program to alert and educate consumers about risks of eating mercury-contaminated fish.** DOH must take definitive steps to improve outreach to residents. Outreach efforts around fish advisories should be a collaborative effort between DOH and local health departments. The efforts should include outreach to local doctors and leaders of particularly sensitive populations, development of brochures that are readily available in the community, and television and radio ads during peak fishing seasons. WDFW must also revise their guide to fishing and include information on the current mercury advisories. DOH should also make mercury levels in fish, no matter how low, available to the public on the Internet so that citizens can make their own decisions about whether to eat the fish.

Adopting the above policies would greatly improve Washington's fish-advisory program and reduce the mercury exposure of residents, especially pregnant women and children. Yet, to fully ensure that residents are not exposed to



mercury pollution Washington must eliminate the sources of this pollution. **Washington policymakers must adopt laws, regulations, and guidelines that:**

1. **Phase out mercury products, such as thermometers and thermostats, in favor of safe, effective, and available alternatives.** Mercury should be phased out for use in products including thermometers, thermostats, automobile switches, and novelties such as toys and clothing. The use of mercury and mercury-containing products should be phased out of schools, health care facilities, and other institutions.
 2. **Improve the safety of mercury disposal and require manufacturers of mercury products to pay for safer mercury disposal systems.** Mercury should be disposed of properly, not incinerated or placed in ordinary landfills where it can leach into groundwater. Manufacturers of mercury products, not local governments or businesses that did not create
- mercury products, should pay for safer mercury disposal systems.
3. **Provide the public with the right to know about mercury in products by requiring labeling of mercury products.** All consumer products that contain mercury should be clearly labeled with their mercury content.
 4. **Phase out mercury emissions from industrial sources, such as coal-fired power plants, gold mines, and incinerators, and clean up toxic sites.** Mercury emissions from incinerators and other industrial sources should be eliminated and mercury from contaminated sites should be cleaned up to levels that are protective of human health and the environment.
 5. **Prevent and reduce mercury releases from the use of dental amalgam by requiring dental offices to install filtration units to remove mercury from wastewater.**



Appendix A

Sources of Mercury

The mercury contaminating our environment comes from a variety of human and natural sources. Natural sources of mercury include naturally occurring deposits of ore called cinnabar. More and more, however, the majority of mercury in our environment is the result of human activities (EPA 1997). Every day, mercury is discharged into our environment from industrial sources, mercury-containing products, landfills, incinerators, health-care facilities, crematoria, and dentist offices. Most of these releases can be prevented.

Industrial Sources

Between 1987 and 2000, more than 21,000 pounds of mercury and mercury compounds were released directly into Washington's air, land, and water by polluting industries (EPA 2002-2). Coal-fired power plants, gold mines, pulp mills, and incinerator are all industrial sources of mercury in Washington (WTC 1999). The specific Washington industries that discharge mercury directly into the environment are listed in Table 5.

The top three industrial mercury polluters in Washington in 2000 were two gold mines located in Northeastern Washington and the Centralia Steam Electric plant located in Centralia. These three sources account for approximately 80% of the mercury emitted by industrial sources in the state. The K2 Mine and the Lamefoot Mine discharged approximately 777 pounds and 655 pounds of mercury respectively (EPA 2002-2). The mercury is emitted from mercury-contaminated mine waste that is deposited on site.

The third highest industrial polluter of mercury in Washington is the Centralia Steam

Electric Plant. The Centralia plant is a coal-burning power plant. Mercury is emitted into the air when coal that contains mercury is burned. In 2000, the Centralia plant discharged 437 pounds of mercury into the environment of which 374 pounds were discharged directly into the air, making the plant the largest source of airborne mercury in the state, but currently there are no limits on mercury emissions from coal plants (Stanfield 2002).

The largest polluter of mercury directly to Washington's waterways is the Kimberly-Clark Paper Plant in Everett. In 2000, this plant discharged 26 pounds of mercury into Possession Sound, accounting for over half of the industrial mercury pollution discharged in Washington's waterways that year (EPA 2002-2). Mercury is a contaminant in the chlorine used for bleaching paper because chlorine is often made from a mercury cell process.

Consumer Products

Many common household items contain mercury. The estimated amounts of mercury these products contribute to Washington's environment are listed in Table 1. Mercury is released when these items are incinerated in solid-waste incinerators, thrown away in landfills, or break during everyday use. Now, recent studies show that in addition to leaching out of landfills, another way mercury is released is as a gas through the landfills' vent systems (Raloff 2001).

Thermometers are perhaps the most obvious mercury-added consumer product. Ecology estimates that thermometers contribute 12 pounds of mercury to Washington's solid waste stream each year (WSDOE 2002-2). Using alternatives to mercury thermometers and properly disposing of mercury thermometers as hazardous waste can help eliminate this pollution.



Table 4. INDUSTRIES REPORTING DIRECT RELEASES OF MERCURY (IN LBS.) IN WASHINGTON STATE IN 2000

Facility	Total Releases to Air	Total Releases to Water	Total Releases to Land	Total Releases to Air, Water, and Land
ECHO BAY INC. K2 MINE	0	0	777	777
LAMEFOOT MINE	0	0	655	655
TRANSALTA CENTRALIA GENERATION / MINING	374	0	62	436
ASH GROVE CEMENT CO.	62	0	0	62
EQUILON PUGET SOUND REFINING CO.	7	2	52	61
TESORO NORTHWEST CO.	4	11	41	56
CITY OF TACOMA STEAM PLANT NO. 2	49	0	0	49
PQ CORP. TACOMA	41	0	0	41
WEYERHAEUSER CO.	38	2	0	40
BP CHERRY POINT REFY.	0	0	38	38
KIMBERLY-CLARK TISSUE CO.	1	26	10	37
GENERAL CHEMICAL	0	0	17	17
GEORGIA-PACIFIC WEST INC.	0	10	0	13
ALLIED TECH. GROUP INC.	0	0	2	2
GRAYMONT WESTERN U.S. INC. TACOMA	1	0	0	1
BIRMINGHAM STEEL CORP. SEATTLE WA. STEEL DIV.	1	0	0	1
REYNOLDS METALS CO. LONGVIEW REDUCTION PLANT	1	0	0	1
Total	579	51	1654	2284

Mercury thermostats also contribute to mercury in the solid waste stream. Ecology estimates that thermostats add 431 pounds of mercury to the solid waste stream each year (WSDOE 2002-2). Even though mercury-free electronic thermostats are more energy efficient and cost effective, mercury-added thermostats remain on the market and continue to be installed in commercial and residential buildings.

Surprisingly, numerous novelty items and toys contain mercury. Until 1995, children's light-up tennis shoes contained mercury. Mercury is used in a variety of necklaces, joy buzzers, and other toys. In fact, the Department of Health warns consumers against purchasing mercury-containing necklaces (DOH 2002-4).

Of all consumer products, compact fluorescent light bulbs (CFLs) contribute the largest source of mercury to the solid waste stream. According to recent Ecology estimates, more than 500 pounds of mercury each year is added to the solid-waste stream when CFLs are improperly disposed of in landfills and incinerators (Ecology 2002-2). One 4-foot CFL contains between 10 and 20 mg of mercury. In 1999, about 13 tons of mercury were sold in CFLs nationwide (NEZMC 2002). Currently, CFLs are the best choice for energy efficiency and should be used in place of standard light bulbs. However, CFLs should be disposed of properly at a local household hazardous waste site or recycled and manufacturers should be required to develop bulbs with little or no mercury in them.



Not only are these mercury products harmful to the environment, they also pose a health risk to humans when they break in a home, school, or health-care facility. The costs of cleaning up such a spill can be in the tens of thousands of dollars.

Automobiles

Mercury is also found in many automobiles. Mercury is often used in vehicle trunk and hood convenience light switches, anti-lock brake systems, active ride systems, air bag sensors, and high-density headlamps.

Mercury convenience light switches contain on average 0.8 grams of mercury and account for approximately 99% of mercury used in vehicles (Griffith et al. 2001). One recent study estimates that more than 150 tons of mercury is currently on the road in the United States just in convenience light switches (NEZMC 2002). When these automobiles are recycled or retired as scrap and crushed, mercury is released into the environment (Griffith et al. 2001). Ecology estimates that auto disposal contributes 219 pounds of mercury to the environment each year in Washington (Ecology 2002-2).

Anti-lock brake systems contain on average 3 grams of mercury and high-density (HID) headlamps contain approximately 5-10 mg of mercury (Ecology Center 2001). Estimates put the amount of mercury on the road nationwide in 2000 in anti-lock brake systems at 5.4 – 7.4 tons and in HID headlamps at 4 pounds (Ecology Center 2001).

Some auto manufacturers have committed to phasing out the use of mercury switches in new cars (Ecology Center 2001). However, very few systems exist to collect and dispose of these switches from older cars. These switches can easily be replaced in cars currently on the road and should be removed from cars before they are scrapped or crushed.

Health Care

Mercury products are commonly used in many health-care facilities. Mercury is found in medical devices including thermometers, blood pressure cuffs, and esophageal dilators. In addition many chemicals and measurement devices used in health-care laboratories contain mercury. The mercury is released when these products are broken, spilled, or disposed of improperly in incinerators, autoclaves, or landfills.

Nationally, medical-waste incinerators contribute 10% of the mercury emissions to the environment (EPA 1997). Although Washington state has only one medical-waste incinerator, which is located in Pullman, medical waste is sent out of the state to be burned. Mercury products that enter autoclaves or other medical waste treatment systems can result in worker health and safety problems as well as environmental problems (HCWH 2001). Washington has one regional autoclave facility in Ferndale and one electrothermal deactivation facility in Morton.

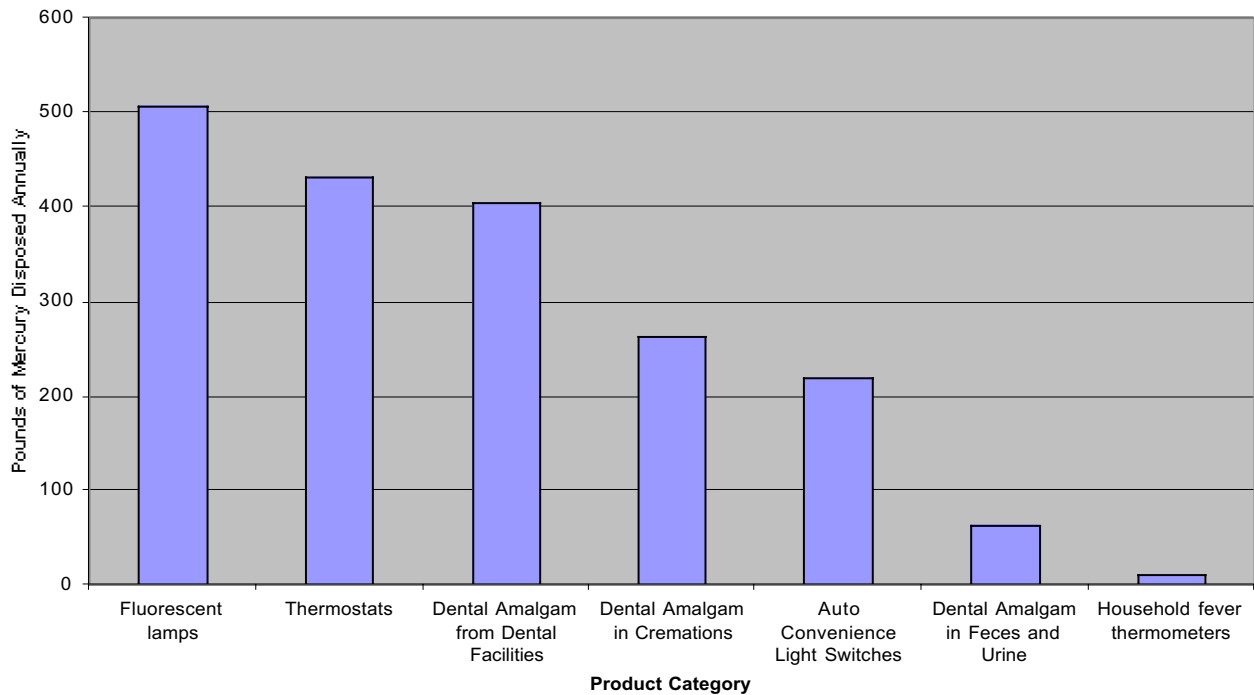
Improper Disposal of Scrap Dental Amalgam

The improper disposal of mercury-containing dental amalgam fillings contributes a significant amount of mercury to Washington's environment. Mercury is combined with silver, tin, copper, and other metals to make the silver fillings (U.S. DOH 1993). Without proper disposal practices, scraps of dental fillings often are washed down the drain into sewer systems, contaminating wastewater that must be treated by cities and counties (Bender 2002).

In King County, improper disposal of scrap dental amalgam accounts for an estimated 14% of the mercury in wastewater (Savina 2001). King County tested dental wastewater for mercury and found a mean concentration of 15 ppm, 75 times the current local discharge limit



Table 5: ESTIMATED POUNDS OF MERCURY DISPOSED FROM PRODUCT CATEGORIES IN WASHINGTON STATE ANNUALLY



of .2 ppm (Savina 2001). King County also found a significant amount of dentists improperly disposing of their mercury amalgam in infectious-waste red bags. The report estimated that every year at least 53 pounds of mercury are going to the Stericycle, Inc.'s electrothermal

deactivation facility in Morton. The King County study noted that mercury wastes entering the Stericycle facility may vaporize if the conditions are suitable, potentially exposing workers in the plant (Savina 2001).



Appendix B

Washington Fish Advisories

Advisory Location: Budd Inlet

Nearest Community: Olympia

Chemicals of Concern: creosote, volatile organic compounds, pentachlorophenol, and dioxins

Species affected: all shellfish

Issued by: Thurston County Health Department

Advisory Method: Signs posted, Ecology fact sheets

Recommendations: The Thurston County Health Department recommends that shellfish not be consumed from the south end of Budd Inlet near Eastbay Marina due to chemical contamination from the hazardous waste site known as Cascade Pole. The Health Department further recommends that shellfish not be consumed from any location in south Budd Inlet due to bacteriological contamination.

Contact: Sue Davis, Thurston County Health Department, 360-754-4111

Advisory Location: Commencement Bay

Nearest Community: Tacoma

Chemicals of Concern: polychlorinated biphenyls (PCBs), diethylphthalates, tetrachloroethylene (TCE), and metals

Species affected: all bottom fish and all shellfish, including crab

Issued by: Tacoma-Pierce County Health Department

Advisory Method: Signs posted

Recommendations: Do not consume fish or shellfish from the waterways at the south end of Commencement Bay.

Contact: Ray Hanowell, Tacoma-Pierce County Health Department, 253-798-2845

Advisory Location: Dyes Inlet

Nearest Community: Bremerton

Chemicals of Concern: Naval ordnance

Species affected: all shellfish, all bottom fish, including crab

Issued by: Bremerton-Kitsap County Health Department

Advisory Method: Signs posted

Recommendations: Do not consume shellfish, fish, or crab from the west side of Ostrich Bay in Dyes Inlet in the vicinity of the Jackson Park naval housing development.

Contact: Shawn Ultican, Bremerton-Kitsap County Health District, 360-692-3611
Water Quality Program

Advisory Location: Eagle Harbor

Nearest Community: Bainbridge Island

Chemicals of Concern: polycyclic aromatic hydrocarbons (PAHs), mercury

Species affected: all shellfish, all bottom fish, and crab

Issued by: Bremerton-Kitsap County Health District

Advisory Method: Signs posted, notice in state fishing guide

Recommendations: Do not consume seafood within Eagle Harbor west of a line drawn between Wing Point south to creosote light #1, then west to the shore of Bainbridge Island.

Contact: Shawn Ultican, Bremerton-Kitsap County Health District, 360-692-3611
Water Quality Program

Advisory Location: Indian Island

Nearest Community: Port Townsend

Chemicals of Concern: pesticides, metals

Species affected: shellfish

Issued by: U.S. Navy, Engineering Field Activities Northwest, Facilities Engineering Command, Poulsbo, Washington

Advisory Method: Signs posted, most of area is off limits to non-military personnel in general



Recommendations: No consumption of shellfish from the north end of Indian Island in and around the Boggy Spit area is permitted by the Navy.

Contact: Bill Kalina,
Kalina.William@bangor.navy.mil,
360-396-5353
Fax 360-396-5366

Advisory Location: King County

Nearest Community: Seattle

Chemicals of Concern: general – historical industrial discharges

Species affected: all bottom fish, all shellfish including crab, and seaweed

Issued by: Seattle-King County Department of Public Health

Advisory Method: Signs posted

Recommendations: Do not collect or consume bottom fish, shellfish, or seaweed from Puget Sound waters in King County, particularly where warning signs are posted.

Contact: Rosemary Burn, Seattle-King County Department of Public Health, Food and Facility Protection Section, Seattle, 206-296-4632

Advisory Location: Lake Roosevelt

Nearest Community: Grand Coulee

Chemicals of Concern: dioxins, mercury

Species affected: walleye, whitefish, sturgeon

Issued by: Washington State Department of Health

Advisory Method: Signs posted, pamphlet (Must use Adobe Reader.), newspaper articles, brochure (U.S. Geological Survey)

Recommendations:

- ❖ Mercury: In April 2001, the Department of Health issued a statewide health advisory containing meal-limit recommendations due to mercury in fish. Mercury data for Lake Roosevelt is currently under review, and this advisory may be updated.
- ❖ Dioxin Levels: Based on dioxin levels

(these do not include mercury) DOH recommends that anglers consume no more than 20 fish meals per month of sport fish caught from Lake Roosevelt.

Contact: Washington State Department of Health, Office of Environmental Health Assessments, 877-485-7316

Advisory Location: Lake Whatcom

Nearest Community: Bellingham

Chemicals of Concern: mercury

Species affected: smallmouth bass, yellow perch

Issued by: Whatcom County Health and Human Services

Advisory Method: Signs posted at boat launches and other sites around the lake.

Recommendations: Women of childbearing age and children under six not eat smallmouth bass and limit consumption of yellow perch to one meal a week.

Contact: Whatcom County Health Human Services, 360-676-6724; Washington State Department of Health, Office of Environmental Health Assessment, 877-485-7316

Advisory Location: Manchester State Park

Nearest Community: Port Orchard

Chemicals of Concern: polychlorinated biphenyls (PCBs) and dioxins

Species affected: all shellfish

Issued by: Bremerton-Kitsap County Health District

Advisory Method: unknown

Recommendations: Shellfish harvesting should not occur from beaches in Clam Bay identified by a line drawn from Middle Point to Orchard Point, which includes a portion of beaches within Manchester State Park.

Contact: Shawn Ultican, Bremerton-Kitsap County Health District, 360-692-3611
Water Quality Program

Advisory Location: Sinclair Inlet

Nearest Community: Bremerton

Chemicals of Concern: mercury, polycyclic



Reel Trouble

aromatic hydrocarbons (PAHs)

Species affected: all shellfish including crab, and all bottom fish including rockfish

Issued by: Bremerton-Kitsap County Health District

Advisory Method: Signs posted

Recommendations: Do not consume seafood within Sinclair Inlet south of a line between the narrows and Gorst.

Contact: Shawn Ultican, Bremerton-Kitsap County Health District, 360-692-3611
Water Quality Program

Advisory Location: Spokane River

Nearest Community: Spokane

Chemicals of Concern: lead, polychlorinated biphenyls (PCBs)

Species affected: rainbow trout, mountain whitefish, large-scale sucker,

Issued by: Spokane Regional Health District, Washington State Department of Health, and Washington State Department of Ecology

Advisory Method: fact sheets, press release

Recommendations: For fish caught above the Upriver Dam to WA/ID state line: Do not consume rainbow trout and mountain whitefish and limit consumption of large scale suckers to one meal per month. For fish caught below the Upriver Dam to Nine Mile Dam: Limit consumption of rainbow trout, mountain whitefish, and large scale suckers to one meal per month.

Contact: Mike LaScuola, Spokane Regional Health District, 509-324-1560

Advisory Location: Yakima River

Nearest Community: Yakima

Chemicals of Concern: DDT, DDE

Species affected: mountain whitefish, common carp and all bottom fish including bridgelip sucker

Issued by: Washington State Department of Health

Advisory Method: Pamphlet in English and

Pamphlet in Spanish

Recommendations: Anglers are recommended to limit their consumption of the above species to one meal per week and eat fish such as trout instead of bottom fish

Contact: Washington State Department of Health, Office of Environmental Health Assessments, 877-485-7316

Advisory Location: Duwamish River

Nearest Community: Seattle

Chemicals of Concern: polychlorinated biphenyls (PCBs), arsenic, mercury, tributyltin, and polycyclic aromatic hydrocarbons (PAHs)

Species affected: shiner perch, flounder, English sole, rockfish from Elliot Bay, shellfish, and crab

Issued by: Washington State Department of Health

Advisory Method: Press Release, Fact Sheets in English / Spanish, Flyers in Laotian / Russian / Vietnamese / Hmong / Cambodian / Spanish

Recommendations: Consume no more than one meal of any of the above mentioned fish per month. Do not eat the hepatopancreas of crabs or the livers from above mentioned fish. Do not eat shellfish (clams, mussels) from the Duwamish River.

Contact: Washington State Department of Health, Office of Environmental Health Assessments, 877-485-7316



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*“The air and water grow heavier with the debris
of our spectacular civilization.”*

*—Lyndon B. Johnson
message to Congress, 30 January 1967*

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