

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Focus on Fish Consumption in Washington

December 12, 2011, 9:00 am to 4:30 pm

Opening and Welcome

Ted Sturdevant, Director, WA State Dept. of Ecology

Ted Sturdevant thanked everyone for attending the workshop to start on what will be a complex, difficult and important process. The workshop is the start of a discussion about how much fish people eat, and whether the estimates are accurate. The assumptions will drive actions to ensure waters are clean enough to support the diets of Washingtonians. There is a lot of interest in this issue in terms of health of ecosystems, health of people and health of the economy. The stakes are high and Ecology needs full public engagement.

Ecology is undergoing a major transition in how it deals with toxic chemicals. There is little understanding of the effect of toxins on human health, and how they interact with each other and the environment. Ted said the fish consumption policy hasn't been changed since 1976, and that is symptomatic of larger issues with toxic chemicals. Ecology has been building robust cleanup and toxic waste management programs. The Washington State Legislature has shown that things are changing by recently passing regulations controlling flame retardants, mercury lamps, lead wheel weights, copper from brake pads, boat paint, polycyclic aromatic hydrocarbons (PAH) from tar sealant on roads, and soon new reporting on 66 chemicals in children's products. There is a lot more work to do, and changing policy, phasing out chemicals, and reducing discharges will happen over time.

Ted said that some people are worried Ecology will create loopholes with a new fish consumption rate. Others fear that Washington waters will be characterized as scary and will make people feel that fish aren't safe to eat, and yet others worry they will have to make changes that are not implementable. Ted said our shellfish industries are huge economic engines and need to be preserved. Ecology needs to find a balance to make sure that loopholes are not created during this process, and will need help from the public to do that. Ted said most people want three main things: healthy communities, a healthy environment, and a healthy economy. It is important to look for collaborative solutions.

Ecology's plan has three pieces that will be conducted through rulemaking:

1. Revise sediment management standards,
2. Update implementation tools for people to meet water quality standards, and
3. Start revising the surface water quality standards.

Ted said the law says that Ecology must base standards on the uses of waters; and they are not doing that. Ecology needs to get realistic about how much people are using our resources, what people need from our waters, and how to get there. This is about doing the right thing, and hopefully with help from the public, doing it the right way.

Regulatory Context for Fish Consumption Effort
Jim Pendowski, Manager of Toxics Cleanup Program,
Kelly Susewind, Manager of Water Quality Program
WA State Dept. of Ecology

Jim Pendowski said the Toxics Cleanup program uses the Model Toxics Control Act (MTCA) and sediment management standards that are federally approved to complete cleanup work on uplands, and in water. Current sediment standards are narrative and not specific. During cleanup, costs go up because site-by-site cleanup standards have to be developed. Ecology is not prepared for the in-water cleanup work ahead on the Puget Sound and Upper Columbia River. The sediment standards were developed in 1991 along with MTCA. Amendments have been made to MTCA many times since then, but the sediment standards have only been updated once.

The new rules will integrate Ecology's regulatory structures. The Toxics Cleanup Program regulates cleanup, the Water Quality Program regulates water quality; Ecology needs to integrate regulatory authority, and the fish consumption rate is a critical linking piece.

Kelly Susewind outlined the three steps in Ecology's Clean Water Act implementation strategy: developing a fish consumption rate, creating new sediment standards, and complying with federally approved standards. Ecology's goal is to develop a single number for the agency to use for fish consumption, to be protective and consistent, with updated implementation tools to help people to comply with the new standards. Kelly said the water quality solutions are decades long, and current tools don't accommodate decade-long processes. Ecology will balance the new standards with the reality that those standards can't be met in the short term. The implementation step will be kicked off on December 13 with a workshop in Lacey. Kelly said next year Ecology will start updating the water quality standards with the Environmental Protection Agency (EPA).

Summary notes of presentation by:

James E. West, M.Sc
Senior Research Scientist
Puget Sound Assessment and Monitoring Program
WA State Dept. of Fish and Wildlife

What Do We Know About Contaminant Levels in Washington's Fish?

Jim West said he is part of the Puget Sound Assessment and Monitoring Program (PSAMP) that was created in the late 1980s by the Washington State Legislature. Jim explained that PSAMP can't monitor or measure contaminants everywhere due to cost, so they pick species to represent broad coverage. Some species they sample regularly include English sole, rockfish, pacific herring and pacific salmon. They also collect data on plankton, krill, mussels, pacific cod, lingcod, and sharks. When designing studies they look at several key factors including proximity to persistent bioaccumulative toxic chemical sources, migratory patterns/mobility, trophic level/food source, gender, lifespan (duration of exposure), and tissue lipid (fat in body).

Jim said Puget Sound is a unique estuary because of the inland marine conditions that are protected from the effects of the ocean. There are areas in Puget Sound that are highly urban where marine species can complete their lifecycle. If you look at a cross section of Puget Sound from Admiralty Inlet to

the Tacoma Narrows, you see a huge influx of fresh water from rivers into cold dense seawater. The reflux at the sills creates a recirculation pattern that tends to contain contaminants.

Jim reviewed the average concentrations of polychlorinated biphenyls (PCBs) found in different species around Puget Sound:

- In English sole, they found higher concentrations of PCBs in urban areas (Seattle), and lower concentrations of PCBs in less urban areas (Bellingham Bay and Georgia Straits). PCBs in English sole reflect the conditions in the sediments where they live.
- Quillback rockfish showed a difference in PCB accumulation based on sex. Fish reproduce around age eight, and after that age males continue to accumulate PCBs while females get rid of them through reproduction of eggs and larvae.
- Findings on herring were surprising; the average concentrations of PCBs in herring in Puget Sound were higher than herring found in the most contaminated parts of the Baltic Sea.
- In Chinook salmon, they found 3-5 times higher concentrations of PCBs in fish that originate from rivers than from Pacific Coast salmon. A Department of Health report advised based on this information that people only consume one meal per week of Puget Sound salmon.
- Killer whales are highly contaminated with PCBs even now, and are the most contaminated marine mammals on the planet.

Jim said the National Toxics Rule (NTR) PCB standard is 5.3 nanograms per gram (ng/g) in fish tissue, and studies show that:

- 70 percent of fish sampled in fresh water exceed that standard,
- 70 percent of salt water fish sampled exceed the standard,
- 90 percent of Coho salmon sampled exceed standards, and
- All Chinook salmon sampled exceed the standard.

Jim posed the question: Are PCBs going away? He said their findings suggest that if so, not quickly. PCBs tend to recycle in the food chain; recently an old male killer whale died and was declared a hazardous waste due to contamination. Jim said the only place where they are seeing PCBs declining is in areas that have been heavily remediated, like Sinclair Inlet. In Elliott Bay and the Duwamish, they see a PCB high in the 1970s, a slow decline when PCBs were phased out, and then a flattening out since then. In the South Sound, the data show what might be an increase in PCB concentrations in recent years.

Jim summarized PSAMP's main findings:

- Biota in Puget Sound is still substantially exposed to PCBs.
- Levels have declined from the 1970s but have remained stable over the past 20 years.
- 72-100 percent of marine fish and salmon sampled by PSAMP exceeded the NTR PCB criterion.
- 53 percent of fresh water fish sampled by Ecology exceeded the NTR criterion.

Questions/Comments:

- *What other studies are planned?* A lot of studies, but one in particular is to address the gap in understanding of contaminants in the nearshore by looking at blue mussels. PSAMP is also looking at polybrominated diphenyl ethers (PBDE or flame retardants), which mirror PCBs, but were 30 percent lower and now declining.
- *Can you explain the variability in PCB rates from fish in the South Sound to the Central Basin and Elliott Bay?* They found slightly higher concentrations of PCBs in Coho in the South Sound compared to the Central and North Sound. The river of origin seems to make no difference, but they are finding slightly higher concentrations in the South Sound because those fish spend more time in Puget Sound.

- *Why are PBDEs 30 percent lower than PCBs, is this a biological difference?* Jim offered that it seems to be a consistent relationship in dirty areas and clean areas.
- *Is the relationship the same for other things beyond fish?* Jim said he thought so.
- *Has there been any effort to look at safe levels of PCBs in wildlife, or the threshold of health effects in fish?* Jim said for fish we only have lab studies to rely on, and the best study that is used as a guideline was conducted as a literature review. That study came up with 2,600 ng/g for juvenile salmon, which if applied to adult fish, means 20 percent of returning adult Chinook exceed the limit.
- *How accurate are the numbers on percentage of fish returning and the yield of loss at sea after migration?* Jim said PCBs are not the only contaminants out there, and other contaminants have effects on early life stages of fish. Jim said salmon exposed to PAHs may not survive well, so the fish that make it through may be the healthy ones to start out with. Jim said that return rates are something we should consider further.

Summary notes from presentation by:

Elaine M. Faustman, Ph.D. DABT

Professor and Director

Institute for Risk Analysis and Risk Communication

Department of Environmental and Occupational Health Sciences

School of Public Health

University of Washington

What's the Public Health Issue, and Why Is It Important? – Elaine M. Faustman, University of Washington

Elaine outlined the key public health issues:

1. Recognize that fish are an essential component of healthy diets.
2. Ensure that fish are safe to eat.
3. Ensure that we can make these statements based on regional knowledge about how our Pacific Northwest residents eat and prepare fish.
4. Recognize that contaminants are present in our fish and that they have prevented access to fish.
5. Acknowledge that we have been “warning” our residents about fish consumption.

Elaine said if you look at fish consumption as a risk, it is important to look at effects on fish, and also human health, to assess residual risk and combined risk. You can't just look at PCBs, but also bacteria, natural toxins, viruses, persistent bioaccumulative toxins, copper and other agents. Public agencies need to ensure they have the right context, and recognize the complexity as they move forward with risk assessments and risk management.

The dilemma with seafood is whether the health benefits outweigh risk from biological and chemical contaminants and how that is communicated to the public. Women are often told it is healthy to eat fish and the fatty acids are good for neuron growth and development, but those same fish can contain contaminants. Public agencies want to be able to say their recommendation is safe, and they have a responsibility to ensure that seafood is safe. Elaine said that in order to do that, agencies must understand culturally diverse populations' diets and differences in what and how they eat, collect, and prepare food resources.

Elaine said there is variation in different cultures' food by region. There have been a lot of studies on consumption, collection and preparation of seafood and how much seafood people in the Northwest consume. Korean and Japanese populations are in the 95th percentile for fish consumption rates compared to the rest of the U.S. population. These two groups are consuming different types and proportions of seafood: Japanese eat more salmon compared to squid for Koreans. In comparing these diets, studies showed that populations can have deficiencies in omega 3 fatty acids but have high mercury intake.

Elaine said the benefits of fish consumption are important, and intervention approaches in the community must be culturally appropriate and use risk communication tools. Some studies looked at meeting PCB guidelines with crabs by avoiding different parts of the crab to avoid contamination; people also make specific suggestions on how to cook fish and what parts to include. There are a lot of fish advisories in the U.S. that are heavy on warnings about contaminants, and people are getting the message that fish are contaminated and some are suppressing their rates of fish consumption. The message that fish are healthy is getting lost. People are cutting out fish because of these advisories. Studies have shown that a ten percent decrease in servings per month for pregnant women can occur following a fish advisory.

Questions/Comments:

- *How do you communicate such a confusing message to the public?* Washington State has been working hard at that, and does include health benefits on the back of advisories, but some people have turned away from seafood, and benefits need to be better communicated. Messages tend to focus on bioaccumulative impacts, and the public just wants to know if they can eat the fish or not. Elaine said it was important to consider how fish consumption rates have been affected by messages that tell people not to eat fish because likely studies don't capture the amount of fish that people want to eat.
- *There is a sustainability message that is adding confusion but is important as well.* Elaine agreed and said she had heard about a pregnant woman who stopped eating all meat and only ate tuna because of PCB contamination in salmon. Elaine said it is important to remember that people take messages and use them, but sometimes without the whole context.
- *We don't normally think about the availability of fish in discussions about fish consumption, but the recreational shrimp season is only four days long because of overfishing. Consumption rates also have to consider availability.* Elaine agreed and said that clamming is also a good example, where beaches are now opening in the winter when less people are there.
- *Do people tend to eat less fish overall because of advisories? Or do people differentiate messages and eat fish differently?* Elaine said the literature shows that after a certain level of complexity, people gloss over and miss the context. Studies also show that when women cut down, the whole family cuts down. There are new applications being developed for mobile phones that are designed to help people make decisions about what is safe to eat. Elaine thought agencies could do better to help people make good decisions because the studies show that people don't understand so they make cuts in their diet, and overall seafood protein levels drop.
- *People's total diets are complex, but for the general population, most of their direct food comes from supermarkets. The decision is not so much which fish to eat, but what to eat in general. It is important to consider the availability of alternative protein sources.* Elaine agreed. She said people are substituting tilapia for salmon, but tilapia has no omega 3s so they are not getting the benefit by making an alternative selection.
- *Address the issue of the development of allowable fishable concentrations on carcinogenic risk vs. non carcinogenic risk.* Elaine said studies include both cancer and non-cancer risks. For example, the mercury

studies are done on humans and show that every exposure level impacts I.Q. rates. Some recent reports are emphasizing the overall benefits of seafood even when lower levels of methyl mercury are present but this requires species specific information and real knowledge about the amounts and types of seafood individuals eat locally.

Summary notes of presentation by:

Craig McCormack

Toxicologist

Toxics Cleanup Program

WA State Dept. of Ecology

Overview of the Technical Support Document – How Did We Get to These Numbers?

Craig McCormack said the Ecology technical support document on fish consumption was modeled after the recent Oregon report (Human Health Focus Group Report, Oregon Fish and Shellfish Consumption Rate Project, June 2008:

<http://www.deq.state.or.us/wq/standards/docs/toxics/HHFGFinalReportJune2008.pdf>), and relied heavily on the technical talent associated with that report. Craig acknowledged all of the people who contributed to the report. Craig said he wanted to briefly review the important conclusions in the report, provide new information from Colville survey, and continue the dialogue about whether the fish consumption rates in the report are good estimates.

The report did not consider implementation issues, application/consequences or a revised fish consumption rate range or default for sediment and/or surface water cleanup standards, consider risk-based cleanup concentrations compared to background, or consider costs and benefits associated with specific rates. It did however, provide a platform to initiate dialogue, review available Pacific Northwest fish dietary information, estimate fish/shellfish resources, evaluate strengths and weaknesses of fish dietary surveys, and provide fish consumption rate range from which a default may be determined for regulatory purposes.

Craig said fish consumption rates used in current regulations are outdated. The rates used in MTCA are from the 1980s and are based on recreational surveys from Commencement Bay while the rate of 6.5 grams per day, from the National Toxics Rule, was published in the Federal Register in the early 1990s. Ecology's goal is to update and revise the sediment management standards to be consistent with the new fish dietary information and update MTCA when opportunity arises.

Craig reviewed the following elements of the report:

- Available finfish/shellfish resources
- Estimates of Washington State fish-consuming populations
- Regional specific fish dietary information
- How much do people consume, what is reasonable maximum exposure?
- Fish consumption rates used in Washington State regulations and regional specific fish dietary information
- Conclusions from statistical analysis
- Fish consumption dialogues: businesses, tribes, and others including academic
- Fish consumption related issues: salmon, where the salmon body burden is assumed, use of national data, and regional specifics

Summary notes of presentation by:

Whitney J. Fraser

Senior Associate, LEED AP

Environment International Ltd.

New Data from Colville Tribal Study

Whitney Fraser presented her preliminary findings from the “Colville Tribe: Upper Columbia River Resources Survey.” Whitney said for 100 years one of the world’s largest smelters in Canada has been impacting the Columbia River through slag deposits, liquid waste, and smoke stack deposits. The Colville Reservation is 50 miles downriver from the smelter. The contamination is impacting fish and shellfish, and EPA is leading a human health risk assessment. The Colville Tribe worked with EPA to conduct a survey of fish consumption rates.

All reservation residents were included totaling 1,783 dwelling units. Screening and interviewing was completed by tribal representatives and 1,165 people completed all three interviews (about 20 percent of the population). Whitney said survey methods included 24-hour recalls, past year food frequency, and past year non-food frequency. Both in person and paper studies were used to collect data on what people had eaten, and a map was used to determine sources of food.

Whitney shared the preliminary results:

- 83 percent reported eating fish.
- Average fish species consumed was 3, maximum was 13; salmon was most popular.
- 73 percent eat salmon, 15 times per year; 20 percent were eating skin, organs and eggs.
- 61 percent sourced 100 percent of salmon from the reservation; 12 percent sourced salmon locally outside of the reservation.
- Shellfish in eastern Washington:
 - 8 percent ate mussels and crawfish; 13 percent sourced all mussels locally from Columbia River.
 - 81 percent of crawfish sourced locally.

Surveyors asked people if they were avoiding local food resources (suppression) to determine if they would eat more seafood if the area was clean. Many responded yes, and mentioned pollution from the river and fish advisories as reasons for avoiding food resources. Whitney said they will be working with EPA on the final results of the risk assessment.

Questions/Comments:

- *You asked people about 16 species of fish found locally; how do fish from the supermarket factor in?* Whitney said they first asked if a person eats fish at all, and if they said yes but responded no to using local resources, then they knew some was from the store. They had additional follow-up questions that tried to get at how much was coming from which sources.
- *What did you mean by “non food use?”* Whitney said that people use local resources for activities such as basket making and to build sweat lodges.
- *Did you break down the differences in resident fish by tributaries?* Whitney said they used a map and asked people to show where they got their food, which allowed them to attribute the food to tributaries, rivers, or lakes.
- *How did you translate a yes/no response to the questions about suppression into a numerical value?* Whitney said they first asked if a person was avoiding a resource; if they said yes, they

asked further questions to understand why. From there they can look at high fish consumers to see if they are avoiding, or if the person is just a low fish consumer.

- *How are you going to account for suppression rates in the technical document?* Craig said the technical document includes information on suppression but doesn't have a quantitative analysis for suppression. He said the Colville Tribe is leading the way for this information, but the Suquamish Tribe has also noted impacts on shellfish consumption based on location. Ecology will need to continue working with tribes to better understand suppression rates.
- *How do you take the tribal studies into account in the technical document?* Craig said the Colville Tribe is providing new information that they hope to include in future studies. He said Ecology didn't have any information previously on eastern Washington shellfish consumption, so they are working with the tribe to integrate the data into the analysis once the final versions are available, and that will be included in supplemental information for the technical document.
- *Puget Sound surveys show 50 percent of consumers are eating shellfish. There is a big difference from the Puget Sound region to inland areas. Has Ecology talked about how to reconcile that, and has there been thought to creating an east- and westside standard?* Craig said they had considered this and EPA Region 10 has recognized that one system may not fit all. Craig said they will evaluate the Colville data and other recent surveys to see how they can be combined and will consider that carefully in the future.

What Does This Mean for Us? Sharing Perspectives – Panel Discussion

Dave McBride, Washington Department of Health

Dave McBride said the Department of Health (DOH) uses fish consumption rates in different ways. They have a site assessment section with toxicologists and risk assessors, and they use fish consumption rates to identify concerns. They estimate exposures to contaminants to determine dose, and cancer and non-cancer risk. DOH is not wedded to the Ecology fish consumption rates under MTCA or total maximum daily loads (TMDLs), so they can also use site-specific rates or EPA's subsistence rate.

Dave explained that changing the fish consumption rate does not necessarily lead to more fish advisories. Fish advisories are not intended to determine risk; that is done in a risk assessment. They are also not meant to set cleanup or discharge standards. Advisories are meant to provide guidance on how much fish is safe to consume. DOH has to weigh the risks and benefits of consumption, and finding that balance is difficult. Dave said DOH works closely with Elaine on the results of her studies.

Dave said the fish consumption rates used in water quality standards have more of an effect on future contaminants than on legacy contamination. Dave showed a chart that demonstrates that by raising the fish consumption rate, you see a decrease in the allowable PCB concentrations. Dave said that fish consumption rates should be changed to reflect what people are actually eating, but it is important to remember that it might not have an effect on advisories because of legacy contaminants; it will however have an effect on future contamination.

Aja DeCoteau, Columbia River Intertribal Fisheries Commission (CRITFC)

Aja DeCoteau said CRITFC represents the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes of the Yakama Indian Nation. Aja commended Ecology for compiling the report and for meeting with tribes to solicit input and offer help. CRITFC played a role in Oregon's new rate as well.

Aja said the health of fish is important to tribes because it is their major food source and an integral part of their cultural and spiritual wellbeing. Tribes rely on protection and enhancement from water-borne pollutants, and often will take it upon themselves to conduct water quality improvements.

Aja cited some statistics from recent tribal fish consumption studies:

- 389 g/d average for Umatilla Indian Reservation
- 170 g/d average for Warm Springs Reservation
- 97 percent of their tribal members consume fish
- 88 percent comes from Columbia River
- 92 contaminants were found in fish tissue including PCBs, mercury, and dichlorodiphenyl trichloroethane (DDT)

Aja said studies have shown that exposure to contaminants in fresh water affect a salmon's lifecycle. Aja said that there was a question about whether or not to include fresh water salmon in the fish consumption rates, and the tribes want to encourage salmon studies to be included. She said salmon must be included in assessing risk from tribal exposure.

Catherine O'Neill, Seattle University

Catherine O'Neill said she has been involved in environmental justice issues for a long time, and assisted in the development of a fish consumption report which is now a decade old. Catherine said Ecology's current fish consumption rate of 6.5 g/d was based on data collected in the 1970s and fails to protect Washington residents who eat fish. The current figure is based on survey data from all over the U.S., and is not specific to the Northwest. Catherine said the figure has been used now for almost three decades to the detriment to those who do eat fish regularly and those legally entitled to eat more fish.

Catherine shared contemporary levels of fish consumption documented by recent surveys. She said the current consumption levels are off by several orders of magnitude. She recognized that Ecology's technical document's range is a significant increase, but is still just a step to protecting Washingtonians. Contemporary surveys show that 540 g/d reflects the mean consumption. For Asian Pacific Islanders in King County, the rate is 733.5 g/d.

Catherine said Ecology is required to consider highly exposed populations for fish consumption and ought to consider these populations because it's the right thing to do, but also it is required by civil rights laws, environmental justice laws, and by treaties. Failure to consider them will result in increased risk.

Catherine compared risk levels using different consumption rates for local sites:

- The cancer risk along the Columbia River at 7.5 g/d is 1 in 100,000; if the consumption rate is increased to 540 g/d as reported by the tribes, the risk increases to 1 in 100 (the acceptable risk level set by EPA is 1 in 1,000,000).
- The safe mercury threshold along the Columbia River at 17.5 g/d is 0.043 n/kg/day; if the consumption rate is increased to 540 g/d, the exposure rate increases to 1.33 n/kg/day (the safe limit set by EPA is 0.1 n/kg/day).

Catherine said by setting fish consumption levels protective of tribes, Ecology will by default protect the general population as well. Catherine said other presenters brought up the issue of suppression, and added that every contemporary measurement will be low because of suppression. Catherine said a clear baseline for tribal fish consumption is available because only the tribes have legal rights at a certain

level. The causes of suppression have had impacts for a longer time period and to a greater extent for tribes, and current fish consumption rates are artificially low compared to treaty right baselines.

Catherine felt that it was not appropriate for Ecology to increase the fish consumption rate while also modifying acceptable risk levels. Industry is going to have to clean up or increase controls in order to reduce risk. If everyone is equally likely to be exposed this process would be easier, but in Washington the tribes are most likely to be exposed and the standards must take tribes into account to be protective.

Pam Elardo, King County Wastewater Treatment Division

Pam Elardo said the County's mission is to create resources from wastewater: reclaimed water, biosolids, and heat. Pam said if you live in the region, then you pay a bill to the County and that is a big investment, but wastewater is the basis of a healthy economy.

Pam provided some background information on the King County Wastewater Treatment Division:

- 1.5 million customers
- 420 square mile service area
- 3 regional treatment plants
- 2 wet weather treatment plants
- Community treatment plants on Vashon Island and in Carnation
- 330 miles of conveyance pipe
- 42 pump stations
- 19 regulator stations
- 72 dry tons/day of biosolids

Pam agreed that Ecology should consider science and make the fish consumption rate as protective as possible for the most vulnerable populations. Pam added that sometimes technologies available today can't meet the protection standards that people would like to achieve. She is afraid that if the standards are set to a level that is not technically achievable, it will paralyze the agencies in achieving their goals. Long-term goals are good, but there should be incremental steps to help get to those longer term goals. Controls on dischargers might not be the best immediate solution to get them in compliance. King County protects the public and environment, and as a government agency, they also support businesses and the economy. Pam said she doesn't believe that any of those things need to be sacrificed to support the environmental goals.

Margaret Barrette, Pacific Coast Shellfish Growers Association

Margaret Barrette said her organization is made up of farmers from Alaska, Washington, Oregon and Hawaii. She said they grow mussels, clams and geoduck. Most of the shellfish grown in Washington is sent out of Washington. Margaret said the shellfish industry is a big industry in Washington State and provides many local jobs, and a healthy portion of the economy in rural areas. Fish consumption rates are important to the shellfish growers because they are the producers of these resources and clean healthy water is important for their products. Margaret said they also need healthy consumers, so they are interested in their products being safe to eat.

They have looked at the rates being discussed, and want them to be as accurate and realistic as possible, and based on appropriate assumptions of fish that are harvested and consumed locally. Margaret said that while she appreciates the discussion on native populations, she thinks it is important to consider how other people get their shellfish. Eighty percent of fish consumed in Washington are imported; most

fish in the state is consumed at restaurants. Fish advisories will make people stop eating fish all together, and that concerns the shellfish industry.

Lincoln Loehr, Stoel Rives

Lincoln Loehr said he is an oceanographer who has worked on water quality standards in Washington and Oregon for many years. When Ecology looks at fish consumption and water quality and moves toward more protection, Lincoln agreed it is important to look at risks and benefits and keep comparative risks in mind. The fish consumption rate study allows Ecology to examine current criteria and how protective they are in terms of water quality and human health. He said the recommendation is to protect the average consumer and high-end consumers to not greater than a 1 in 10,000. Lincoln acknowledged that people eat different amounts of fish, but believes you can't protect everyone to the same risk level. Lincoln agreed the 6.5 g/d rate is not representative, but said the National Toxics Rule provided guidance that said if you protect average consumers you also protect the outliers. Lincoln does not believe that surface water criteria should be developed based on maximum exposed individuals because that will create a path that can never be achieved.

Linn Gould, Erda Environmental Services

Linn Gould's background is in risk assessment but she also studies risk disparities and does environmental justice analysis. As a consultant to the Duwamish River Cleanup Coalition (DRCC), she can provide perspectives on the Duwamish, and as a technical expert on health disparities she can also provide that perspective.

Linn said more data are needed, but Seattle-King County Public Health has been studying local fish consumption in the Duwamish and has shown that people are ignoring fish advisories because they lack other resources. She has also seen data from the Low Income Housing Institute (LIHI) which did interviews on fish eaten locally. LIHI found immigrants (including pregnant women) were eating fish from the Duwamish every day, and extra fish were caught and being sold or given away. Anecdotal evidence shows much higher fish consumption rates in the Duwamish than what is reported.

Linn said health disparities exist and there are heritable changes that are affected by things in the environment. Many toxins have been studied through epigenetic changes. Linn said there is a balance to needing the nutrition and avoiding the contamination. She said they have also found that overall health and stress causes epigenetic changes. As a risk assessor, Linn said she has to regularly acknowledge to public and private clients that 6.5 g/d is not a good fish consumption factor. Linn said the new data seems well substantiated and may make the rate go up, but she won't know until she sees the data sets.

Panel Questions/Comments:

What is Ecology's response to including salmon in the report?

- Craig said salmon as a species are included in the fish consumption rate because they are the most frequently consumed fish based on the diet data. Craig added that this is an area of controversy because some people have suggested not to include salmon because their body burden is assumed to be received in marine waters. In terms of ambient water quality, salmon are considered a marine species and not included in the Clean Water Act for fresh water species.
- Catherine said that ambient water quality data is considered under guidance from EPA and states and tribes are supposed to use local data to reflect local conditions. Catherine said Jim West described Puget Sound as technically marine, but a unique estuary. This is a circumstance where EPA's guidance leaves it to agencies to reflect local conditions. Catherine said that salmon don't have to be excluded just because the federal government excludes them. Craig responded

that in the context of the technical document they tried to document salmon lifecycles and survival strategies as they relate to the fish consumption rate. He consulted with Jim West on that information and noted that all salmon in Puget Sound are not the same.

- It seems like the Columbia River would follow the same reasoning as Puget Sound because it is unique and is utilized by people far inland.

Is the study of cancer risk relevant given that a lot of the risks to human health are driven by mercury rather than carcinogens?

- Dave McBride said that in Washington State, 70 percent of all fish advisories are based on carcinogens. Dave said mercury advisories exist too, and PCBs have a cancer component, but when looking at cancer and non-cancer together, most states use non-cancer endpoints, even for PCBs. The level of protection is greater when you use non-cancer endpoints
- It would be interesting to see mercury figures similar to PCBs because the background rates might make the ingestion rate narrower. Dave said he has that information and can follow up with it after the meeting. Dave added that mercury levels vary by species.

What is the evidence for the claim that Aja made that the body burden of contaminants comes from fresh water exposure?

- Aja said she was referring to a study that showed a significant burden in juvenile fish comes from fresh water when migrating. She added that there are hundreds of miles of inland tributaries, and the Columbia River is a series of reservoirs because of the dams, so the fish spend a lot of time in tributary areas.

The fish consumption report provides a starting point for ambient water quality criteria, and prescribes a reasonable maximum exposure. Is Ecology constrained by reasonable maximum exposure?

- Cheryl Niemi, of Ecology's Water Quality Program (WQ), said when the sediment management standards are finalized in 2012, WQ will take the final fish consumption number and calculate human health criteria for draft rule making. At that time, WQ will look at new information and will have a formal public comment process. Cheryl said the rate they come up with might not be the same number as the sediment management standards, but it might be. There are differences of scope and scale between the two programs.
- Catherine said if you look at the concept of reasonable maximum exposure, it is only reasonable when it reflects real people. The average American may not live in the same place and eat the same diet their whole lives, but in Washington there are people who do live in the same place and eat the same fish their whole lives. The guidance reflects the importance of looking at people's actual exposure which makes it reasonable.
- A participant disagreed with Catherine's characterization of reasonable maximum exposure. He said he has a background in risk assessment, and he understands "reasonable maximum" to be a policy decision intended to determine what population you intend to protect. The decision is whether to use an average exposure to be representative, or a subset population based on upper bound consumers, and EPA has to balance that based on risk and implementation. For soil exposure, the reasonable maximum doesn't take into account pica children who eat more dirt than average because you don't regulate for outliers. It is important to be clear about who you're protecting.
- Elaine said exposure sciences study how people are exposed, and the methods of using biomarkers and 24-hour recall studies show scientific evidence for reasonable maximum exposure. Elaine said theoretically studies are done to set upper bounds, and risk management can use whatever levels they want. Elaine said it is important to be clear about science-based levels vs. policy levels.

- Fran Wilshusen, Northwest Indian Fisheries Council, said she thought the conversation was interesting about how you do risk assessments and how you determine who is at risk. She agreed it is important to recognize the legal requirements, and the treaty levels that are legally enforceable. Fran said Catherine pointed out that it isn't an abstract understanding that some people might eat more fish; it is known that tribes are eating more fish. It would be unreasonable not to include salmon in the study because of the amount of salmon consumed. Fran also said a number of studies show that fish vary dramatically on how far they travel.

What lessons were learned in the Oregon process that Ecology should keep in mind?

- Dave McBride said one of the biggest concerns in Oregon was around the level of protection and technology for treatment. Oregon has been willing to work on technologies for dischargers, and a timeframe to determine steps to achieve the goals. This makes it tough for dischargers, because new technology is often needed. Oregon has struggled with making the rate protective, while ensuring dischargers can still function. That will be tough for Washington as well.
- Lincoln said Oregon will provide an opportunity for Washington to see what implementation complications come up, since they developed their rate first. Lincoln also said that Puget Sound is dealing with issues of toxic loading and the main source is surface water runoff. Lincoln said it is important for Ecology look at stopping the use of PCBs and other toxins.
- Dave McBride said it is important to remember that most of the data used in establishing fish consumption rates in Oregon came from Washington. Washington State has a wealth of consumption surveys, more than any other state.

Public health is important, but if we can't meet the criteria today, are the lower criteria meaningful or just academic? Are there tools to help address this concern?

- Dave McBride said for cleanup of legacy contaminants, it's not going to make much difference. Fish don't meet cleanup values today, so reducing that value won't have a big effect on PCBs, or other contaminants. It will however have an effect on contaminants that are being used and developed now.
- *Will the list of priority pollutants be expanded?* Ecology staff said they have no current plans to expand the list.

Dealing with suppression is difficult. Are there any ideas for how to address this issue?

- Dave McBride agrees that that suppression is an issue because people are avoiding fish due to contamination. Dave said he is not sure how to address it numerically, but suggested that Ecology look back to historic rates to account for it.
- Catherine suggested that different approaches might be appropriate for different groups. She said one idea for the general population is to start from a nutritional analysis and work backwards. For tribes, Ecology should work on a government-to-government basis to answer the question because there are historical and current data to support a number.
- Regarding the approach of asking people what they eat, people aren't accurate. In risk assessments sometimes people look at grams per day to calculate calories.
- Aja said consumption of fish for tribal members depends on population of fish available. Tribes are working on rebuilding populations, and one could argue there is a greater amount of suppression today because there are more fish than in the 1990s.
- Elaine said she was surprised by the comments made about technology that assume technology is stable and not able to improve. Within the last few years, technology has advanced to detect chlorinated compounds, and the technology was forced by industry. At the West Point wastewater treatment plant they are working on new technologies for contaminants that are

released into the Sound. Elaine said often the challenge is to get it into a cost effective method, but technology can move amazingly fast.

- From a risk communication perspective, to discount salmon would be difficult to communicate to the public. Craig reiterated that salmon are included in the rate in the technical document.
- *How are non-tribal populations being addressed in the study?* Craig said Ecology included context for non-tribal and Asian populations in the technical document where data were available. Craig also said there are some rates you can use to extrapolate to the general population. Craig suggested that if people have resources for other data that could be used, they should submit that to Ecology during the comment period.
- *The Puget Sound toxics studies showed air deposition was one of the highest sources of pollutants; the strategy has to deal with the effects of that. Has Ecology thought about how to broaden this to more than the few programs that are available today?* Dave Bradley said there are multiple Ecology programs that will be engaged in this, from environmental assessment and hazardous waste, to air quality. Dave said there are certain products that Ecology needs to look at eliminating, and this will involve more than the Toxics Cleanup and Water Quality programs.

Summary of Panel Discussions and Implications for Ecology's Policy Decisions Dave Bradley, Toxics Cleanup Program and Melissa Gildersleeve, Water Quality Program, Dept. of Ecology

Dave Bradley thanked everyone for participating, and provided a short summary of what he heard, with next steps.

- Revisions to sediment management standards will need to define a framework for making decisions based on human health risk.
- What is a technically defensible fish consumption rate under MTCA?
- What is the scientific basis, variability across groups, health and cultural importance, current laws, regulatory framework, real world implications and costs?
- The Colville study will be an important new study.
- The document does a good job of characterizing current data; current range is close to what people really eat.
- Where do people get their fish, where do fish swim, etc?
- Issue of suppression. Ecology will look at the Midnight Mine example.
- Integrating results from multiple studies is important, needs technical feedback.
- Importance of fish and shellfish as excellent nutrition source; economics of shellfish industry.
- Consider epigenetics and health disparities: adapting to a changing diet.
- Communications and public health messages are important.
- Regulatory framework: reasonable maximum exposure are key policy decisions for sediment management standards.
- Question of salmon is built into fish consumption rate; need to consider how to make decisions and take that into account.
- Fish are different than soil, and the benefits of eating fish are important.
- Consider relationship to risk levels and other exposure factors.
- Compliance with federal laws and treaties involves EPA guidance documents that must be integrated.
- On fish advisories, the fish rate will have limited impact.
- The rule revision requires a cost benefit analysis; we need to find the sweet spot of health, community, and economics.

- These are both meaningful and academic changes; Ecology is looking at risk, background and analytics.
- Consider how much detail in rule vs. guidance.

Dave outlined the next steps for Ecology in this process: finish the workshop and evaluate comments, review additional scientific analysis, and conduct a cost benefit analysis. In March/April Ecology will face a critical decision point in moving forward with the sediment management standards rule. At that point, the Toxics Cleanup Program will enter the formal rule making process, which is approximately six month long and will include public hearings.

Melissa Gildersleeve said that Ecology Director, Ted Sturdevant, did a nice job of setting the context for the workshop in the morning. If the fish consumption rate goes up, Ecology knows there is concern over how businesses will implement it. Ecology watched what happened in Oregon closely, and thought that Oregon focused on what was the right number, but didn't look at all tools under National Pollutant Discharge Elimination System (NPDES) permits. Toxics and Water Quality will need to work together closely. There are some legal questions for this work, including the tribal legal questions that Catherine and Fran raised.

The Water Quality Program is thinking about how to write and develop water quality permits, because right now there is a ten year window for permits; for cleanup the glide path is longer. Also technologies for monitoring are changing, and that is part of what Ecology wants to address in terms of implementation tools. Fish consumption rates are important to weigh in on now in terms of cleanup and Ecology's regulatory structure. Ecology needs an integrated toxics control strategy that looks at source control through multiple pathways. Melissa said this will be a heavy lift for the agency, and becoming comfortable talking about issues is important to continue the dialogue. Ecology will be asking the public to understand that they don't have a lot of flexibility as a clean water agency. How the programs come together to meet criteria and to be meaningful is going to be an important challenge for Ecology over the long term. Point sources and non-point source pollution will continue to be discussed during cleanup decisions, as well as regulatory controls on the industries that create toxins. Melissa said she hopes people will bring these topics to the discussion and help Ecology think about implementation.

Melissa announced a Water Quality Program meeting happening on December 13, 2011 at 9:00 am at the Lacey at the Community Center. The meeting will kick off the water quality rulemaking process.

Comments from Audience Participation Forms

Anonymous

Questions:

- If we are sincerely interested in human health, have food consumption risks been identified for the majority of foods consumed (fish being a relatively small proportion of the NW citizen's diet) and assessed? Included here should be (non-organic) fruit, vegetables, meats, canned/cured/preserved meats, juices, etc.
- How do we move from research to actual risk management (risk reduction) via source control of the legacy lypophyllic compounds?

Feedback:

- Please realize we do not all live and consume fish in/from Commencement Bay – (I don't recall any shellfish harvests there?) – Fish consumption from PNW sources needs to be delineated

better. Those children/adults listed in Pub # 11-09-050 as eating fish are more likely to be consuming fish sticks and canned tuna. Finfish/shellfish openings are not of sufficient length in WA to allow high multi-seasonal consumption. Please analyze local openings of fish harvest/shellfish days and ability to sustain localized/regional diets on these. Tribal and Pac Islanders shop in stores too!

Don Essig, don.essig@deqidaho.gov

Questions:

- I understand that public health is an important issue and that a lot of people eat more than 6.5 g/day of fish and shellfish, and thus are more exposed to contaminants. What I do not understand is the importance, need, imperative to lower fish tissue criteria for contaminants when most fish sampled (53-100% according to Jim West's data) are not meeting current criteria? Seems we are so far off the mark, have so much cleanup to do just to meet current criteria, that lower criteria are more academic than anything else.

Catherine Gockel, U.S. EPA Region 10, gockel.catherine@epa.gov

Questions:

- What the new fish consumption implementation tools will be. What will that look like?
- What are some of the lessons learned from Oregon DEQ's experience?
- How to account for the variations in fish consumption between the various tribes/Asian and Pacific Islander communities?

Feedback:

- It was difficult to find the right building – a building name and room number would help.
- Very interesting and informative presentations!
- My personal opinion – fish consumption levels should be protective of all Washingtonians and should include the “suppression effect” and account for baseline tribal treaty right levels. Current consumption levels are artificially low.

Anonymous

Questions:

- What workable ideas are out there for integrating pollution prevention/source control solutions into meeting eventually stricter sediment/WQ standards?

Feedback:

- Making sure we focus on full range of chemical of concern – PBTs and heavy metals – not just PCBs.
- Strongly support Ecology Director's point about more investment in pollution prevention as a sustainable solution.
- Let's focus on chemicals of concern that we can actually influence. PCBs are historical remnants. Focus on today's emerging problems – phthalates, pharm, etc. – before they become bigger problems.

Anonymous

Feedback:

- Concern: that fish consumption studies used to set FCR in Washington be examined in a fully transparent fashion and vetted for accuracy and credibility. That to the maximum extent possible only fish consumption studies with rigorous survey and analysis methods are employed.
-

Anonymous:

Questions:

- Craig: can you clarify whether the recommended range of fish consumption rates includes salmon?

Priscilla Tomlinson, Integral Consulting Inc, ptomlinson@integral-corp.com, 425-894-6872

Questions:

- The fish bioconcentration factor (BCF) has significant variability and uncertainties, but it's not being discussed in the context of regulatory updates related to the fish consumption rate. What are the regulatory opportunities for addressing variability and uncertainty surrounding BCF? Can the regulations (SMS, WQS, MTCA) be structured to allow consideration of these issues on a site-specific basis?

Anonymous

Questions:

- Jim West showed figures overlaying the allowable tissue concentration of PCBs resulting from application of the National Toxics Rule with the tissue concentrations of fish analyzed under PSAMP.
- I would like to see the allowable tissue concentrations of PCBs calculated if the range of consumption values in the technical support document was applied instead, and compare those to actual PSAMP data, as well as data from other areas (other West Coast, Alaska).

Tad Deschler, Windward Environmental, tad@windwardenv.com, 206-812-5406

Questions:

- How consumption rates will be incorporated into sediment management standards.

Feedback:

- Ecology should be more explicit about where 90th or 95th percentiles of tribal consumption studies fall within WA residents, both consumers and non-consumers. Without this acknowledgement, presentation of tribal data is biased.

Anonymous

Questions:

- SMS – how will changes affect ongoing cleanups? Sites without AO/CAPs? Sites with AOs/CAPs? Source control – how will enforcement of stormwater, CSOs, be effected? Regional background may be higher than new SMS. Site specific factors – surface sediment vs. sediment deeper than benthic zone and bioavailability of contaminants.

Glenn Hayman, ghayman54@gmail.com, 206-235-0589

Questions:

- Jim West mentioned that there were some large PCB spills in the 1970s. Where were the spills? What has been done to clean them up? What is the methyl mercury concentration and distribution in Puget Sound? Compare with PCBs.

Anonymous

Feedback:

- Burden – What considerations can DOE include about the burden shifting away from warnings and advisories on the general population rather than point source contributors?