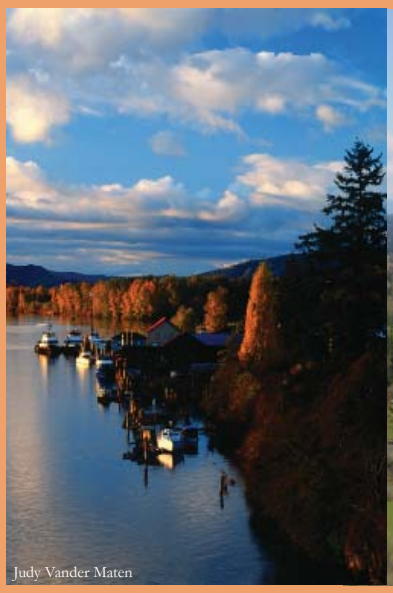
Lower Columbia River Estuary Partnership

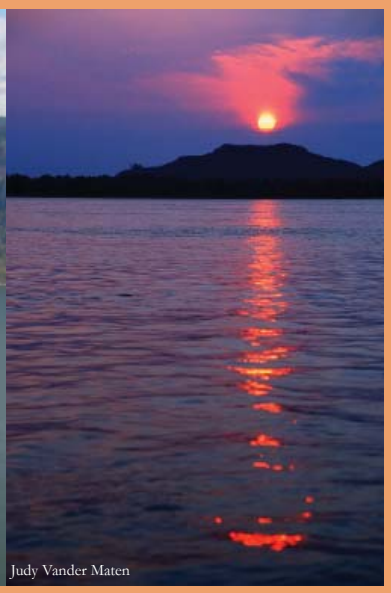
and **U.S. Geological Survey**

Final Report and Next Steps

June 2007

Science to Policy: Many Perspectives, One River


Judy Vander Maten


Judy Vander Maten

Lower Columbia River Estuary Partnership

USGS science for a changing world

From the Directors

May 7-9, 2007, the Estuary Partnership and US Geological Survey hosted a forum followed by two days of technical presentations about conditions in the lower 146 miles of the Columbia River. It was a robust and informative three days thanks to the exceptional discussions. We thank those of you who participated for taking time out of very busy schedules to attend. The dialogue is helping the Estuary Partnership advance its monitoring program and set specific actions to help reduce and eliminate contaminants.

Bringing community leaders together – scientists, elected and appointed government officials, businesspersons, conservationists and educators – gave the Estuary Partnership a sort of constituent check. Two key messages emerged from the discussions and the technical papers: 1) When we talk about toxics and other pollutants and data, we need to do a better job of talking about the implications of what the information means. We need to put the data into context, define the problem and the risks to human health, offer options and the costs, including the cost of doing nothing. 2) We know enough to take toxic reduction actions now and we need to make the investment in long term, comprehensive monitoring to look at more issues in more depth. That will allow us to assess trends over time to determine if we are achieving the results we need and to adapt our investments so they align with current problems.

The Estuary Partnership has a $2.3 million request in to Congress to expand monitoring for toxic contaminants in water, sediment, fish and wildlife of the lower Columbia River and estuary and institute toxic reduction projects. This complements investments made by Bonneville Power Administration for the past four years, expands the number of monitoring sites and the focus to more species and institutes reduction actions in the lower river. It would begin to fund the Columbia River as the other six Great Water Bodies are being funded.

Previous studies, notably the Bi-State Water Quality Program completed in 1995, concluded toxics were prevalent throughout the lower river impairing water, sediment and fish tissue. Levels were causing reproductive abnormalities in mink and river otters and nesting eagles. Concentrations detected in osprey eggs were increasing as sampling sites moved downstream in the Columbia. Beneficial uses were impaired (fishing, shellfishing, wildlife and water sports). Despite that vast undertaking and the foundation of data it provided, no sustained toxics monitoring is occurring and there are no aggressive reduction activities. Since completion of that work, only intermittent studies have been completed by a variety of agencies, and with little coordination. While subsequent work supports results of the Bi-State program, there is minimal investment in the lower river and estuary. The Estuary Partnership request to Congress will institute critical aspects of previous one-time work to provide information on the extent and distribution of toxics including pesticides, metals, PCBs, PAHs, PBDEs, dioxins/furans, estrogenic compounds, pharmaceuticals and personal care products in water, sediment, and fish and wildlife. It will establish both comprehensive ecosystem monitoring and sustained, repeated monitoring to assess trends impacting public and ecosystem health. It will also expand understanding of current conditions, fill existing data gaps, identify areas where toxics may be accumulating, assess the sources of these contaminants, and evaluate effectiveness of toxics reduction projects over time. Finally, it will immediately fund on-the-ground toxics reduction and pollution prevention projects, implemented with our partners, including expansion of existing drug "take back" programs and pesticide collection sites and initiate precision pesticide application to remove and reduce toxics now. This project builds on monitoring both states are conducting within state boundaries by adding monitoring on the Columbia.

As new information emerges we have choices ahead of us. We need to expand the commitment to the lower Columbia River to reduce and eliminate risks to public and ecosystem health. Keeping the dialog active will help us in our goals of advancing protection of public and ecosystem health in a way that fosters a thriving economic and cultural community.

Debrah Marriott
Lower Columbia River Estuary Partnership
Executive Director

Greg Fuhrer
Acting Associate Director and Lead Scientist
USGS Oregon Water Science Center

Science to Policy Forum Overview

Over 120 community leaders and scientists reflected on how policy decisions affecting the Columbia River are made, the role science has in answering policy questions, and how both the decisions and science impact implementation practices. This was the first of a continuing dialog for the Estuary Partnership in making sure science continues to inform decisions and decision makers are getting the information they need.

Three key events align this year that offer a unique opportunity for the Estuary Partnership: 2007 marks the 20th anniversary of the National Estuary Program, including the lower Columbia River which was designated an estuary of national significance in 1995; EPA recently designated the Columbia Basin as one of the nation's seven Great Water Bodies; and results of the first monitoring work conducted by the Estuary Partnership are here, making it a good time to reflect on past activities and define next steps.

The Key Note – Setting the Stage

William Reilly, former US EPA Administrator, offered a challenge for participants at the forum - with all the progress that has been made in Oregon and Washington and nationally with environmental improvements, we are 'stalled on water issues'. This past year, 20,000 beaches in the United States were closed, over half the US waters do not meet their prescribed uses, there remains a high dead zone in the Gulf of Mexico with pesticides and nutrients flowing into the Gulf from 16 counties. All of this is exacerbated by climate warming.

He celebrated the Estuary Partnership and the National Estuary Program. The National Estuary Program (NEP) was established in a manner unlike many other environmental programs that required it to be inclusive and non-confrontational. It was set up to engage as many interests as possible to help identify issues that are held in common. Because of this, it cuts through the adversarial nature of issues and through jurisdictions to look at the ecosystem as a whole. It uses a simple principle: Focus on the natural resources people love and then work together to solve environmental problems. The program is highly cost effective; it is a positive, reassuring and engaging program that helps people feel good about the environment and what they can do to help it. Mr. Reilly said after 20 years, the NEP has many examples of successful partnerships that have led to positive changes in the environment and it's important to clarify for the country the level of investment that has been made and to show examples of how this investment has paid off. From his perspective, Social Security and the Estuary Program are two of the most effective programs in our country's history.

He charged us to look again at the comparative risk process as one that can help bridge the gap that often exists between risk posed by environmental problem and perceived risk. It gives voice to both and brings interests together to talk through the differences. The Estuary Partnership used this process to help define actions in its Management Plan. Mr. Reilly instituted the process during his tenure at EPA.

When he was appointed administrator of EPA, he asked for an assessment of the major threats to the nation's environment, health and economy. Using the comparative risk process, he asked scientists and public policy makers to rank a set of environmental risks based on their perspectives. The results were striking. The major threats to human health were pollutants: air, pesticides, and toxics. The major threats to ecology were the loss of wetlands and habitat and the degradation of estuaries. Hazardous waste was not on the list, yet two-thirds of all congressional EPA dollars at that time were allocated to hazardous waste and clean-up. The process proved to be a valuable tool, not only to communicate the differences among perspectives, but to guide all interested parties to a set of solutions and actions. The exercise of comparing risks allows dollars to be invested wisely and gives a process to adapt actions and dollars as new information emerges and problems are addressed. Integrating science and policy also helps ensure that extremes are managed.

Mr. Reilly commended the Estuary Partnership for its leadership with this "Science to Policy" conference as both important and relevant in the political climate today. The NEP has a 20 year record of successful partnerships among scientists, policy makers, industry and the public. It has led to and will continue to lead to great positive changes in our environment.

The Discussion

Conference participants were invited from three main communities: scientists, policy makers and implementers. The scientific community included experts primarily from the federal, state and local government sectors with a few from the private sector. Policy makers and implementers included leaders from non-profit organizations, businesses, elected and appointed officials from governments, tribal governments and academe. A mix of these interests were seated at each table.

The focus was **"How do we advance protection of public and ecosystem health in the lower Columbia River in a way that fosters a thriving economic and cultural community by integrating policy maker needs, scientific needs and implementer needs?"**

The forum participants were asked to address three questions:
- *What information do community leaders need to make policy decisions about the Columbia River's health?*
- *What does the scientific community need to obtain credible data and information?*
- *How could policy decisions and scientific data support effective actions and implementation?*

With twelve groups of ten working for about two hours, the Estuary Partnership received invaluable feedback to help shape its role and actions in the coming years. One key message evolved: when talking about scientific data, discuss the 'so what?' – the implications of the data, what it means to public health and ecosystem health and what some alternative actions are.

There were three central themes among the answers to all three questions:
- Greater understanding of the extent and context of scientific data and policy making objectives;
- Continuing the dialogue and better communication among scientists, community leaders and implementers, within each of those communities, and with the general public so that science can be linked to (but not driven by) policy and the full breath of issues facing policy makers is discussed;
- Broader investment in toxics monitoring to provide more comprehensive and on-going data.

A consistent thread of thought called for scientific data to be presented to policy makers, implementers and the public in an easy to understand and easily accessible way. Participants also called for one location or website where all data about toxics in the Columbia River could be warehoused so that all parties knew where to go for information.

Forum participants called for clear monitoring data defining the state of the river and estuary and options so that business, industry and the public can take specific actions toward ecosystem health in a collaborative non-judgmental way. They also saw a need for consistent monitoring methods and protocols among all agencies and clear priorities for monitoring efforts. Some of the more specific highlights to our three questions are summarized here. The full results cover several pages and will be used by the Estuary Partnership.

Policy Makers Would Like . . .

- To understand the context of the problem
- The broad picture of conditions
- Scientific data in a form that's understandable
- A well defined statement of the problem - what the risks are and where they're coming from
- To understand the cost of doing nothing
- To know the risk to human health
- A warehouse of data that's easily accessible and well organized/formatted
- Options to solve the health issues-what will give the greatest return for the investment
- The "SO WHAT?"

Scientists Would Like . . .

- Support for long range studies
- Advocacy of findings
- Better correlation between science and actions
- Collaborative monitoring efforts
- Increased capacity and capability to effectively communicate findings to policy makers and the public
- More coordination among agencies when asking questions
- To re-tell the stories of 25 years ago that are now showing results
- Long-term strategic goals
- Agencies to be able to access data from other agencies
- Access to current and historical data sets with agreed upon protocols
- Policy makers/community leaders to convene dialogues among the scientific and other communities to enhance collaborative efforts

Implementers Would Like . . .

- An understanding of policy maker objectives and scientific findings
- To take action with the what information we have
- Strategic monitoring and longer-term monitoring to show whether actions are delivering results
- To develop best management practices and offer incentives to follow
- To eliminate redundancies and red tape
- Common sense solutions
- To get on-the-ground successes
- To reach a new larger audience with conservation message on issues everyone cares about. Education for children and the general public about conservation ethic to understand why stewardship is important
- Don't rush in before problem is fully understood
- To give the public options for taking small steps for the environment
- Easy access to information and emerging data presented in a way that encourages opportunities for positive change and joint problem solving

Next Steps for the Estuary Partnership

The completion of three years of monitoring this past year and the results we learned present the Estuary Partnership with an opportunity to assess next steps for monitoring. Our Management Plan calls for us to both monitor the lower river and estuary, comprehensively and with a sustained effort, and to work with our partners to reduce toxic and conventional pollutants. Our predecessor program collected six years of data at over 500 sites. We have collected data from six sites focused on the impact on salmon. Our monitoring strategy calls for much more comprehensive and sustained monitoring.

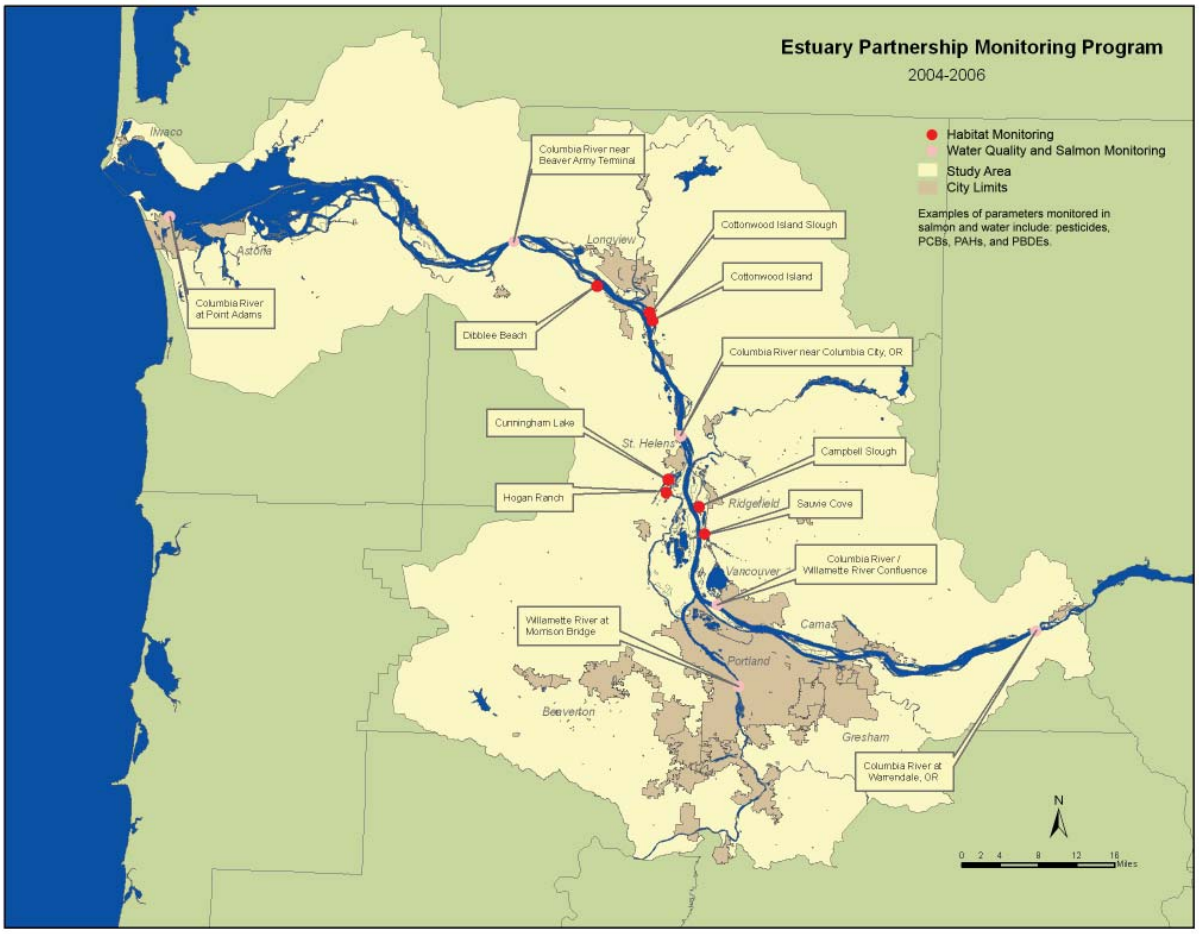
Using the feedback from this forum and board discussions in 2006, the Estuary Partnership is focusing its monitoring work on five major actions:

- Secure additional funding for monitoring, to ensure long term and sustained monitoring to assess trends;
- Initiate some on-the-ground actions as a start, including "take back" programs, and investigate cleanup options for small contaminated sites;
- Disseminate our data, in an integrated way that makes sense to a range of audiences, from school children to scientists, and everyone in between;
- Initiate a Comparative Risk Process to look at current issues in the river and continue the discussion between scientists and policy makers; and
- Provide data in context: develop the "so what?"

Estuary Partnership Monitoring Program

Why Monitor?

The Estuary Partnership monitors water quality, sediment, fish, wildlife, and habitat to better understand current conditions in the river and to fill existing data gaps. Monitoring data, especially when collected over time, allows us to identify areas where toxics may be accumulating or invasive species may be spreading. Also, monitoring allows us to assess the effectiveness of actions over time to determine if environmental targets, such as toxics reduction, containment of invasive species or habitat restoration are being met. This information directs our actions to improve human and ecosystem health.



For all we do know, there is a great deal we do not. There still is no sustained comprehensive monitoring effort on the lower Columbia River. We know that toxics are present in the Columbia River system and estuary, but we do not know the distribution, concentration, and sources of contaminants. We need to better understand how and where fish are being exposed to toxic contamination, the degree of their exposure, and how populations are affected differently. We know that exposure to some contaminants in some species can suppress the immune system, disrupt hormones that affect reproduction, alter homing behavior, and leave species susceptible to infectious diseases and parasites. Other contaminants in the estuary—including PCB, DDT, other chlorinated pesticides—are persistent, meaning that they do not readily break down. They remain relatively unchanged as they move through the environment and accumulate up the food chain. The monitoring data has told us a great deal, but it also raises many more questions.

What Do We Monitor?

The presence of toxic pollutants in the estuary is one of seven priority issues identified in the Estuary Partnership Comprehensive Conservation and Management Plan (Management Plan). One-third of the actions in the Management Plan call for reduction or elimination of toxic and conventional pollutants. Actions address a range of needs, from more sustained long-term monitoring, assessment of trends, and identification of sources of contaminants to specific actions to clean up hazardous waste sites, reduce PAHs, eliminate toxics generated during manufacturing, and require marinas to have spill prevention and cleanup plans in place.

Action 28 calls for the Estuary Partnership to develop and implement sustained long term monitoring in the lower river. The Estuary Partnership and US Geological Survey (USGS) completed the Aquatic Ecosystem Monitoring Strategy (Monitoring Strategy) in 1999 using a collaborative partnership. The Monitoring Strategy defines gaps in previous monitoring efforts and outlines an integrated plan to fill those gaps. It focuses on seven key topics: monitoring oversight; data management; conventional and toxic contaminants; habitat monitoring; exotic species; nutrients; and primary productivity and food web dynamics. The Monitoring Strategy guides all monitoring efforts of the Estuary Partnership and builds on existing work and expands efforts on the Columbia River. Through our Science Work Group, we bring together over 40 public and private partners to coordinate efforts and help define specific actions. Key partners include: the States of Oregon and Washington,

USGS, USFWS, USEPA, NOAA Fisheries, Battelle, University of Washington, Bonneville Power Administration, Northwest Power and Conservation Council, and the Army Corps of Engineers.

Estuary Partnership Monitoring Program

The Estuary Partnership initiated its monitoring program in 2004 with an investment by Bonneville Power Administration. This funding was specifically targeted at assessing the impacts of toxics on salmonid species. We completed toxic and conventional pollutant water quality monitoring and juvenile salmonid sampling at six sites to analyze for PAHs, PCBs, emerging contaminants, such as estrogen compounds and flame retardants, current use pesticides, nutrients, trace elements, chlorophyll *a*, bacteria, and suspended sediment. Our key partners include USGS and NOAA Fisheries.

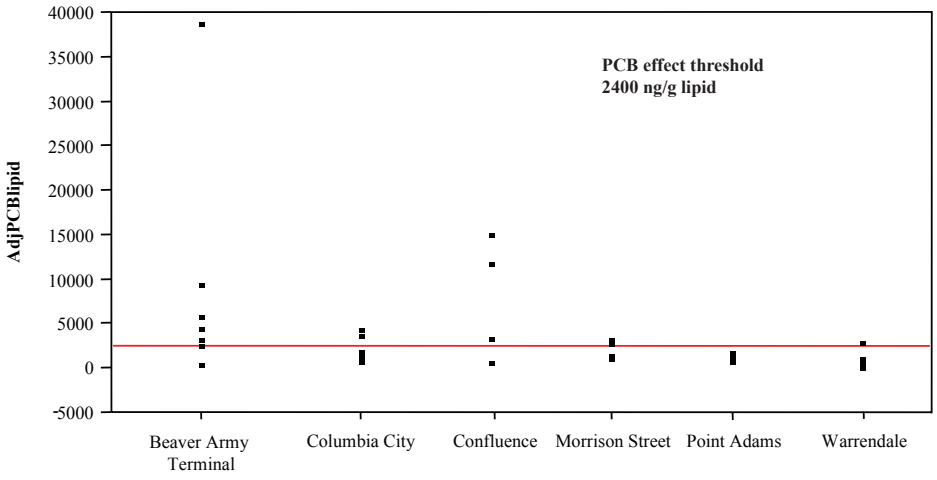
Our monitoring results determined that contaminants banned in the 1970s, referred to as "legacy" contaminants, are still detected in sediment and aquatic biota. These contaminants persist and are accumulating up the food chain. These include pesticides, such as dichlorodiphenyltrichloroethane (DDT), and compounds used as coolants and lubricants, such as polychlorinated biphenyls (PCBs). These break down slowly and remain in the environment a very long time.

We also detected contaminants still in use in sediment and biota, such as mercury and flame retardants (PBDEs), which are accumulating up the food chain. Other in-use and emerging contaminants do not accumulate in fish tissue but are lethal or impact the growth, reproduction and immune systems of aquatic organisms. These include many types of pesticides, petroleum hydrocarbons (PAHs), and pharmaceuticals.

Current Monitoring Results

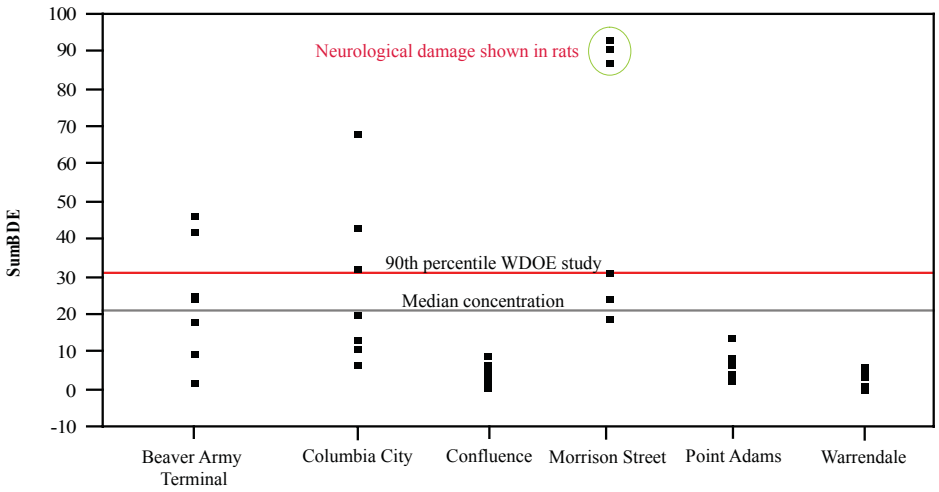
• Contaminants banned in the 1970s are still detected in sediment and fish. These include pesticides, (DDT) and compounds used as coolants and lubricants (PCBs).

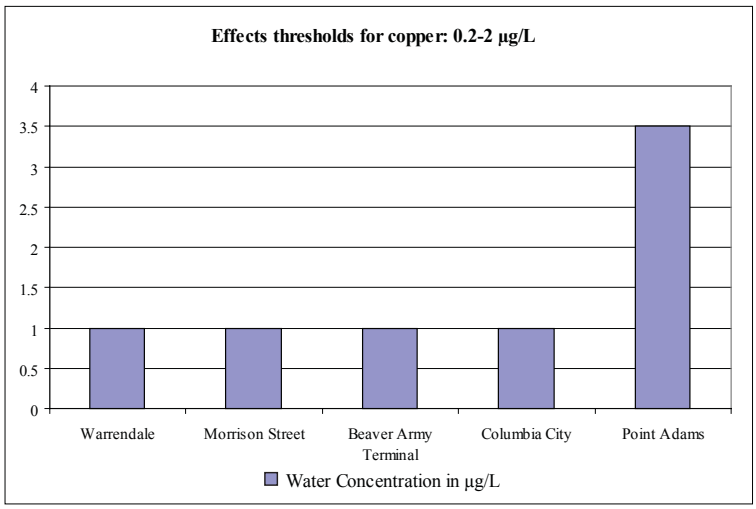
• PCBs in salmon tissue exceed estimated thresholds for delayed mortality, increased disease susceptibility, and reduced growth. PCBs were detected in the bodies and stomach contents of salmon from every sampling site, suggesting that prey are a source of PCB exposure.



Levels were particularly high in the lower Willamette, Confluence, Columbia City, and Beaver Army Terminal sites—those most affected by urban and industrial activities. PCB concentrations were lowest at Warrendale and highest at Beaver.

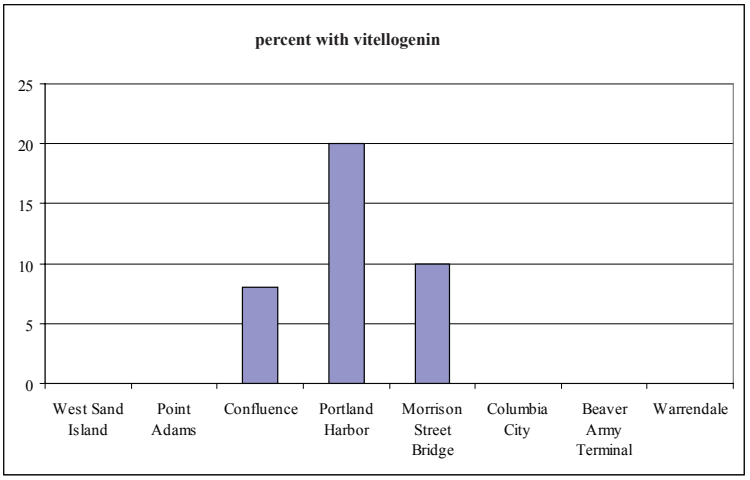
• Exposure to flame retardants (PBDEs) is on the rise throughout the Pacific Northwest, and salmon in the vicinity of Portland have levels within the top 10% of those reported for resident fish in the region. Scientists have linked PBDEs to neurological damage and thyroid issues in rodents and the concentrations reported at the Morrison Street Bridge in Portland are similar to those concentrations. Flame retardants were also found on the suspended sediment with concentrations of two of the most toxic forms, penta-BDE and deca-BDE, the highest.





• Copper was detected in the water at concentrations known to interfere with the normal function of key sensory systems in salmon, such as imprinting, homing, schooling, shoaling, predator detection, predator avoidance, and spawning behavior. Concentrations ranged from 0.7 to 3.8 ug/L and concentrations as low as 1 to 2 ug/L have been shown to inhibit salmon's olfactory senses. Point Adams had the highest water concentration of copper.

• Juvenile salmon from the Portland area exhibit vitellogenin, an estrogen-regulated yolk protein, which is usually only found in adult female fish beginning to develop eggs. Juvenile salmon only manufacture this protein if their bodies are tricked by chemicals, known as endocrine disrupters, which interfere with a salmon's natural ability to regulate hormones throughout its endocrine system. Water and sediment samples from this area contained known endocrine disruptors, which may be inducing vitellogenin production. These contaminants impact the growth, reproduction and immune systems of aquatic organisms. Juvenile salmon from other locations outside Portland did not exhibit vitellogenin.



Technical Conference Summary

The Science to Policy technical sessions explored where contaminants are occurring and brought together scientists from state and federal natural resource agencies to focus on issues in the Pacific Northwest and lower Columbia River. Several scientists argued the importance of sampling water, sediment and biota to detect contaminants. For example, DDT was not regularly detected in the water column, but was found in fish. Other scientists explained the importance of examining contaminants such as pesticides, pharmaceuticals, and personal care products. These chemicals may be present as mixtures and their synergistic/additive effects remain unknown.

Contaminants in Fish and Wildlife:

- The Willamette River is a significant source of PCBs, DDTs, PBDEs, and PAHs, including some trace elements, which negatively affect the health of juvenile salmonids in the lower Columbia River.
- Coincident with the increase in flame retardants in resident fish and fish-eating birds, we are finding PBDEs in juvenile salmon in the Portland area that are within the top 10% of those reported for resident fish in the region.

Presenters: Lyndal Johnson, NOAA Fisheries, Northwest Fisheries Science Center, Seattle, WA and Jennifer Morace, USGS, Oregon Water Science Center, Portland, Oregon.

- PBDEs are doubling in Mountain whitefish every two to three years in the Upper Columbia River Basin and in the US levels in humans are doubling every five years. Household dust and to a lesser degree, fish consumption, are routes of exposure for PBDEs in humans. These studies showed that PBDE concentrations in fish in the effluent dominated Spokane River exceed 1,000 ppb compared to the average of 35 ppb.
  Presenters: Denise Laflammme, Washington Department of Health and Dale Norton, Washington Department of Ecology.

- Osprey studies from 1997 – 1998 and 2004 show DDTs, PCBs and Dioxin are decreasing significantly in osprey eggs. DDT concentrations are no longer exceeding thresholds that cause eggshell thinning and nesting failures. However, mercury and PBDEs have increased significantly in osprey eggs. These studies demonstrate the importance of trend analysis because we are able to determine contaminant level changes over time.
  Presenter: Chuck Henny (pictured at right), USGS, Forest & Rangeland Ecosystem Science Center, Corvallis, Oregon.

- Asian clams (Corbicula) are important indicators of the bioaccumulation of PCB and PBDEs and their movement up the food chain. PCB levels in Asian clams on the Washington side of the Columbia River near Vancouver caused Washington Department of Health officials to issue a shellfish consumption advisory.
  Presenter: Mark Siipola, US Army Corps of Engineers, Portland District.

- The Biomonitoring of Environmental Status and Trends (BEST) Program linked chemical occurrence and fish health by assessing fish organs, blood and whole bodies. Male resident fish had ovotestes indicating exposure to endocrine disruption. Endocrine disruptors mimic or block natural hormones in the body and disrupt reproduction, growth and metabolism. The BEST Program is an important source for trend analysis unfortunately the program is set to end on September 30, 2007.
  Presenter: Jim Coyle, USGS, Fort Collins Science Center, Fort Collins, Colorado.

• Coastal Environmental Monitoring and Assessment Program (CEMAP) fish, water, and sediment data from 1999–2006 will be available soon and this information will be an important source for trend analysis with the BEST Program. Contaminants measured in fish tissue and sediment include metals, PAHs, PCBs, and DDTs. Participants also emphasized the benefit of timely results.
Presenter: Larry Caton, Oregon Department of Environmental Quality.

• Resident fish species have higher concentrations of toxic contaminants than anadromous fish in the Columbia River Basin. The risk to tribal members is significant as their fish consumption rate is 6-11 times that of the general public.
Presenter: Pat Cirone, formerly USEPA.

Pesticides in Our Water Bodies:

• Pesticides were found most frequently and in highest concentrations in small streams and creeks near the source of application in the Willamette River Basin. High concentrations are coincident with heavy rainfall west of the Cascades and with irrigation activity on the east side.
Presenter: Henry (Hank) Johnson, USGS, Oregon Water Science Center, Portland, Oregon.

• The Pesticide Stewardship Partnership, which studies organophosphate insecticides in Hood River was a strong example of sound science coupled with effective communication at the community level. The study examined the fate of these pesticides in the water, aquatic insects, and fish and used the results to develop best management practices to reduce the likelihood these pesticides will reach our water bodies.
Presenter: Gene Foster, Oregon Department of Environmental Quality.

• Two-thirds of pesticide samples in the Clackamas River contained at least one pesticide and pesticides were detected in 97% of tributaries samples. Herbicides were detected more frequently than insecticides and the herbicide Glyphosate (Roundup), a suspected endocrine disruptor, was detected most often. Salmonids utilize the Clackamas River year-round and although insecticides are detected less frequently than herbicides, insecticides such as azinphos methyl and chlorpyrifos exceed life criteria for aquatic insects; the main food source for salmonids. These insecticides exceeded aquatic life criteria in Hood River before the Pesticide Stewardship Partnership and with this new information, the Clackamas River is well poised for its own Pesticide Stewardship Partnership.
Presenter: Kurt Carpenter, USGS, Oregon Water Science Center, Portland, Oregon.

Pharmaceuticals and Personal Care Products in Water and Sediment:

• Analytical methods are now available to detect pharmaceuticals and personal care products (PPCPs) at low concentrations in water and sediment. Sediment collected near wastewater treatment plant discharges and urban tributaries to the Columbia River show that PPCPs have more detections and higher concentrations nearer the source. Lower Columbia River tributaries have PPCP concentrations up to four times higher than those in the mainstem. Of the twelve endocrine disrupting compounds detected in the tributaries, only four were detected in the Columbia due to sediment dilution and contaminant degradation.
Presenters: Ed Furlong, USGS, National Water Quality Laboratory, Denver, Colorado and Elena Nilsen and Jennifer Morace, USGS, Oregon Water Science Center, Portland, Oregon.

Mercury Formation:

• Streambed sediment is not a major source of methylmercury formation, but air deposition, wetland density, and abandoned mines may be significant sources of methylmercury. In Oregon, point source dischargers will be required to monitor for mercury and methylmercury and erosion control efforts are underway to prevent mercuric soils from entering water bodies.
Presenters: Dennis Wentz, USGS, Oregon Water Science Center, Portland, Oregon and Agnes Lut, Oregon Department of Environmental Quality.

Nutrient Trends and Loads:

- In the Spokane Basin, point sources contribute as much as 60% of the instream total phosphorus load. Although essential for aquatic life, too much nitrogen and phosphorus can result in excessive aquatic plant growth which can choke streams and rob oxygen necessary for healthy fish communities.
- In the Columbia Basin, non-point source loads (agricultural runoff, for example) of total nitrogen have decreased during 1993-2003; decreases were attributed to reductions in the atmospheric deposition of nitrogen. Point source loads (waste water treatment plant discharge, for example) of nitrogen and phosphorus increased over the same period however, especially in areas experiencing population growth.
- In the Columbia River Basin, suspended sediment concentrations, which are a measure of erosion, are decreasing. This is good news because large quantities of sediment erosion can smother streambed gravel where salmon lay their eggs and sediment conveys contaminants such as PCB and DDT to our water bodies.

Presenter: Dan Wise, USGS, Oregon Water Science Center, Portland, Oregon.

- A predictive model using land use and chemical data from Tennessee will be adapted to the Pacific Northwest to assist water managers in prioritizing watersheds for nutrient monitoring and will predict nutrient loads and sources in un-sampled water sheds. In Tennessee, the model identified the contribution of nutrients to sensitive habitats, such as estuaries, from atmospheric deposition, agricultural sources, urban runoff and point source discharges and once the model is adapted to the Pacific Northwest, individual nutrient source contributions can be identified.

Presenter: Anne Hoos, USGS, Nashville, Tennessee.

Ecological Modeling:

- In the western US, streamflow characteristics (high flow magnitude and frequency, variability of daily flow, for example) were important metrics related to the abundance and taxa richness of aquatic insect communities which are essential for healthy fish populations.
- Knowledge of these important metrics along with other aquatic community stressors (chemical contamination and habitat degradation) provides water managers with the necessary information to make informed decisions regarding restoration activities.

Presenter: Chris Konrad, USGS, Washington Water Science Center, Tacoma, Washington.

- Landscape alterations, such as those caused by dams and man-made channels in the western US, relate directly to the health of aquatic insect communities. Several biological metrics including EPT taxa (the abundance of the sensitive mayfly, stonefly, and caddisfly) showed significant declines in aquatic insect populations in relation to increasing habitat modification. These insects are important food sources for healthy fish populations.

Presenter: Jason May, USGS, California Water Science, Sacramento, California.

- USGS scientists are developing a model to predict the relationship between watershed disturbance (urban and agriculture, land cover, streamflow regime, influence of dams and manmade channels) characteristics and the health of aquatic insect communities. Target areas include the Blue Mountain ecoregion, Yakima Valley, and the Southern California urban coastal zone. These models are able to detect population changes and test the effects of Best Management Practices or restoration activities on insect communities.

Presenter: Ian Waite, USGS, Oregon Water Science Center, Portland, Oregon.

Great Water Body

Elin Miller, EPA Region 10 Administrator, on May 7, 2007 formally announced designation of the Columbia River as one of EPA's top regional priorities. The Columbia River Basin is now one of seven of the nation's Great Water Bodies, joining Chesapeake Bay, the Great Lakes, the Gulf of Mexico, the South Florida Ecosystem, Long Island Sound, and Puget Sound. This designation, she said, will "help energize our commitment at EPA". The Columbia River also was designated a National Priority in EPA's 2006-2011 Strategic Plan. The national plan includes specific targets for toxics reduction, restoring habitat and wetlands, cleaning up contaminated sediments and reducing fish and water contamination. "Recently, we've started putting our words into action through our Columbia River Toxic Reduction Strategy," said Administrator Miller. She acknowledged the leadership of the Estuary Partnership; "With EPA's commitment, the Estuary Partnership's expertise and focus, and by working together, we can all realize the dream of a cleaner, healthier Columbia." She confirmed that the findings in today's report underscore the need for stronger partnerships and collaboration to help the Columbia River get cleaner and healthier. To achieve success, she asked EPA partners to join in taking Columbia River restoration "to the next level".

The elevation to "Great Water Body" provides important focus on the Columbia River and comes in part as a response to still struggling endangered species that rely on the river. EPA must demonstrate a ten percent reduction in mean concentration of contaminants of concern found in water and fish tissue. To achieve this, EPA launched its toxics reduction strategy in close cooperation with the Estuary Partnership, state and tribal partners, local governments, and others. Among other things, the strategy will help expand fish, water, and sediment monitoring; develop pesticide stewardship partnerships, establish targeted pesticide/toxic collection events; facilitate precision agricultural pesticide use; and conduct other related activities. The Estuary Partnership will play a major role in the strategy, taking the lead for the area below Bonneville Dam, while EPA focuses on the stretch between Grand Coulee and Bonneville dams.

The Lower Columbia River Estuary Partnership

The lower Columbia River and estuary was designated an "Estuary of National Significance" in 1995, one of only 28 in the nation to receive the distinction. The National Estuary Program was authorized in the 1987 amendments to the Clean Water Act and is administered by the US Environmental Protection Agency. Its purpose is to protect nationally significant estuaries that have been degraded by human activity.

Using a watershed approach, the Estuary Partnership works across political boundaries with 28 cities, nine counties, 38 school districts and the states of Oregon and Washington over an area that stretches 146 miles from Bonneville Dam to the Pacific Ocean. The Lower Columbia River Estuary Partnership is a public-private 501(C)(3) non-profit corporation with a Board of Directors representing the diverse interests and geography of the lower river. The Estuary Partnership is the leading two state entity working with the private sector and local, state, federal, and tribal governments to address issues in the lower Columbia River.

The Estuary Partnership Goals Are:

- **Protect the ecosystem and species**-restoring 16,000 acres of wetlands and habitat by 2010 and promoting improvements in stormwater management.
- **Reduce toxic and conventional pollution**-conducting long term monitoring and advocating to eliminate persistent bioaccumulative toxics, bringing water bodies up to water quality standards, reduce hydrocarbon and heavy metal discharges and reduce bacterial contamination.
- **Provide information about the river to a range of audiences**-compiling and evaluating data, offering education programs for children and building public and private partners.

US EPA, the States of Oregon and Washington, NOAA, USGS, Bonneville Power Administration, over 55 corporations and foundations, as well as hundreds of individual citizens, are key participants and provide support to the Estuary Partnership.

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