Proceedings from the

# Columbia River Basin Tribal Water Quality Conference

November 15-16, 2000
Spokane, Washington

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Sponsored by the Columbia River Inter-Tribal Fish Commission

## Thank You

This conference and the following proceedings were made possible by the efforts of numerous speakers, planners, and staff members who contributed their time and expertise to help us with our goals to improve water quality in the Columbia River Basin. In particular, we thank the US Environmental Protection Agency for their generous contribution to this conference through the cooperative agreement X 980 95 301 0. To everyone who helped to bring this event together, we extend our sincere thanks.

Don Sampson
CRITFC Executive Director

Paul Lumley
CRITFC Watershed Department Manager

Catriona Black
CRITFC Water Quality Coordinator

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# Section I
## Introduction

The Columbia River Basin is currently home to 12 endangered salmonid stocks. Numerous tribal, federal, state, local, and private organizations are working to change this trend. Scientists have for many years recognized that increasing salmon numbers requires an increase in the health of watersheds and streams in which the salmon live. Increasing attention is being paid to improving water quality as a means to improve salmon survival.

The CRITFC sponsored Columbia River Basin Tribal Water Quality Conference was held in Spokane November 15th and 16th 2000. The purpose was to coordinate and exchange information on water quality issues that are important to the Tribes.

CRITFC invited members and water quality staff from the all the Tribes of the Columbia River Basin, as well as other representatives from groups and agencies that work with the Tribes on water quality issues. The event was attended by over eighty registered guests, representing Columbia Basin Tribes from Oregon, Washington, Idaho, Montana, and Canada, and a variety of other organizations involved with the Tribes in water quality protection and restoration efforts.

Topics covered included TMDL development on the Columbia Mainstem and in the tributaries, tribal water quality standards, fund raising strategies, water contamination effects on wildlife and humans, Superfund sites, groundwater quality, the northwest regional temperature criteria guidance project, and various specific water quality studies and projects.

Representatives of the Tribes met in a closed session to discuss tribal viewpoints on water quality issues, participation in regional and federal processes, and possibilities of holding the conference again in another year. There was an expressed interest in repeating the conference and possibly using it as a forum to hold policy level discussions on water quality issues and cooperation among the Tribes. Planning for the next conference will begin in January 2001.

**Background On the Columbia River Inter-Tribal Fish Commission**

The Columbia River Inter-Tribal Fish Commission was formed in 1977 by resolution of 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 and Bands of the Yakama Indian Nation. Under treaties with the United States signed in 1855, the Commission's member Tribes reserved their sovereign rights to hunt and fish in areas ceded to the U.S. and at all usual and accustomed fishing stations. The Tribes are recognized as co-managers of the fish resources in the Columbia River Basin.

The Commission is a technical support and coordinating agency for the fisheries management policies of its member Tribes. The fish and wildlife committees of these Tribes govern the Commission. The Commission employs biologists, hydrologists, other scientists, public information specialists, policy analysts, and administrators who work in fisheries harvest control and coordination, scientific support, public outreach, advocacy and planning. The Commission also operates a fisheries enforcement program for the four Tribes. Inter-tribal police officers protect treaty fishermen from harm and harassment and enforce tribal fishing regulations. For more information about CRITFC and its programs, go to www.critfc.org.

Conference Agenda

**Columbia River Basin Tribal Water Quality Conference 2000**

**Day 1** Wednesday November 15

8:00 - 9:00 a.m. Registration - Coffee, Pastries

9:00 - 9:15 a.m. Welcome and Invocation
Paul Lumley, CRITFC

9:15 - 10:00 a.m. The cultural significance of Salmon and Need for High Water Quality
Warren Seyler, Spokane Tribe, Chair Upper Columbia United Tribes
Marjorie Zarate, Kalispel Natural Resource Department

10:00 – 10:30 a.m. Columbia River Mainstem TMDL Process
Cathy Tortorici NMFS

10:30 - 10:45 a.m. Break

10: 45 - 12:00 p.m. Columbia River Mainstem TMDL Technical Presentations Panel
Facilitator - Rick Eichstaedt, Nez Perce Tribe
Effects of Temperature and Gas on Fish Health: Dale McCullough
Structural Mitigation for TDG - Tom Lorz, CRITFC
Models used for temperature and Gas - John Yearsley, EPA
Snake River Water Quality Lawsuit: Dave Cummings, Nez Perce Tribe

12:00 – 1:00 p.m. Lunch – On Your Own –

Afternoon Concurrent Sessions 1:00-3:30 p.m.

1:00 – 2:15 p.m. **Option A:** Addressing Water Quantity as it Relates to Water Quality
Harold Sheppard, Umatilla Natural Resources Department
**Option B:** Water Quality Jurisdictional Issues
Rick Eichsteadt, Nez Perce Tribe

2:15 – 2:30 p.m. Break

2:30 – 3:45 p.m. **Option A:** Temperature Guidance Criteria
Facilitator - Patti Howard, Nez Perce Tribe
John Palmer, EPA Seattle
**Option B:** Irrigation Project Success Story
James Thomas, Yakama Nation
Richard Mains, BIA

4:00 – 5:30 p.m. Tribal Session for Members and Staff Only
Discussion Facilitator - Paul Lumley

6:00 – 8:30 p.m. Dinner and Grand Prize Raffle Drawings in the Ridpath Ballroom
Hosted by Columbia River Inter-Tribal Fish Commission

Columbia River Basin Tribal Water Quality Conference 2000

**Day 2** Thursday November 16

8:15 – 8:45 a.m. Registration - Coffee, Pastries

8:45 – 9:00 a.m. Good Morning and Announcements

9:00 – 10:45 a.m. Tribal Water Quality Standards Panel
Facilitator - Terry Shepherd, Umatilla Natural Resources Department
Basics of Water Quality - Gayle Killam, The River Network
Federal Core Water Quality Standards - Marcia Largerloef, EPA
401 Certification - Chris Gannon and Ryan Smith, Warm Springs

10:45 – 11:00 a.m. Break

11:00 – 12:00 p.m. Fund Raising Strategies
Private Foundations - E.B. Ferdig, Spirit of the Salmon Fund
Federal EPA Funding - Doug Cole, EPA

12:00 – 1:00 p.m. Lunch – Hosted by Columbia River Inter-Tribal Fish Commission

Afternoon Concurrent Session 1:00 – 4:00 p.m.

1:00 – 2:15 Option A: Contamination Issues Relating to Wildlife, Fish, and Human Health
Facilitator - Catriona Black, CRITFC
Potential Reproductive Effects on Kootenai River White Sturgeon - Gretchen Kruse, M.S. Candidate
Contamination as a Factor in Salmon Recovery - Don Steffeck, US FFWS
Columbia River Basin Fish Tissue Contamination Study – Pat Cirone, EPA
Option B: Columbia Tributary Lakes and Streams TMDL
Facilitator - Jill Ory, CRITFC
Working with the State and Community - Rosenda Shippentower, Umatilla Environmental Planning & Rights Protection
TMDLs Submitted by the Colville Tribe - Chris Fisher, Colville Tribe

2:15 - 2:30 Break

2:30 – 3:30 p.m. Option A: Superfund
Facilitator – Julie Carter, CRITFC
Portland Harbor – Audie Huber, Umatilla
Coeur d'Alene Basin - Howard Funke, Coeur d'Alene Tribe
Option B: Ground Water and Water Quality
Assessing Relative Importance of Hyporegeic Potential in the Umatilla River - Scott O'Daniel, Umatilla Tribe

3:30 – 4:00 p.m. Next Steps Discussion
Facilitated by Paul Lumley

# Speakers Biographies

### Pat Cirone

Patricia Cirone is Chief of the Risk Evaluation Unit in the Seattle Office of the Environmental Protection Agency. Dr. Cirone received her PhD from New York University in 1979. She has been involved with developing risk assessment guidelines and preparing human health and ecological risk assessments with the EPA for past 13 years. She is the author of several publications on ecological risk assessment including, The Middle Snake River Risk Analysis and Integrating human health and ecological concerns in risk assessments. Patricia is also the Project Coordinator for the Columbia River Fish Contaminant Survey.

### Doug Cole

Doug Cole is the Tribal Program Coordinator for EPA R-10, responsible for working with tribal governments in Idaho, E. Washington, and the Bristol Bay Region in Alaska, where he manages more grants than he cares to think about. He was the EPA R-10 staff lead in the development of the Region Tribal Program Strategic Plan, and the Region's tribal consultation procedures.

### Dave Cummings

David Cummings is Deputy Counsel for the Nez Perce Tribal Executive Committee, Office of Legal Counsel in Lapwai, Idaho. He represents the Nez Perce Tribe in the ongoing *US v. Oregon* and *US v. Washington* treaty fishing rights litigation, represents, and advises the Tribe on natural resources, wildlife, and cultural resource issues.

### Rick Eichstaedt

Rick Eichstaedt serves as a Deputy Counsel in the Nez Perce Tribe. Rick works on natural resource issues, including salmon recovery, Dworshak operations, and the implementation of environmental statutes on the Reservation. Previously, he served as Adjudication Coordinator for the Water Resources Division of the Nez Perce Tribe. Rick earned a J.D. and a Certificate in Environmental and Natural Resources Law from the Northwestern School of Law of Lewis & Clark College in 1997 and a B.A. in Anthropology and Political Science from Hamline University.

### Elizabeth "E.B." Ferdig

E.B. Ferdig has a diverse domestic and international background of economic development, fund-raising and cross-cultural relations. E.B. grew up in the Yakima Valley, spent many years working internationally in Africa and Asia, and now has returned to the northwest to work with the Columbia River Basin nations. As development director at the Columbia River Inter-Tribal Fish Commission, E.B. has headed the establishment of the *Spirit of the Salmon Fund* and *the Northwest Native American Philanthropy Awareness Pilot Project.* E.B. received her bachelor's degree in International studies with a focus in Chinese Studies at the University of Washington. Previously, she served as a Peace Corps volunteer, and held a variety of communications, marketing, and coordinating positions.

### Chris Fisher
Chris serves as an anadromous fisheries biologist for the Colville Confederated Tribes where he works to restore or enhance salmon and steelhead populations to a sustainable level to provide harvest opportunities for tribal members. He has previously worked with the U.S. Forest Service, U.S. Fish and Wildlife Service, and the Idaho Department of Fish and Game. Chris received a B.S. degree in Forest Resource with a minor in Fisheries Management from the University of Georgia and a M.S. in Fisheries Sciences from South Dakota State University.

### Howard Funke
Howard Funke is a partner in the law firm of Givens, Funke & Work located in Coeur d'Alene, Idaho, representing the Spokane Tribe of Indians and the Coeur d'Alene Tribe.

### Chris Gannon
Chris is currently a soil scientist with the Warm Springs Tribe in Oregon where he has been employed for the past 9 years. Chris' work with the Tribes has involved water quality standards development, treatment as state, long-range land use planning, timber sale preparation and monitoring, and grant writing. Currently, Chris is assigned to support the Water Control Board of the Tribe in evaluating and processing a 401 application for a FERC hydroelectric project that affects tribal waters. He earned a Bachelors of Science degree in Range Science from New Mexico State University and a Masters of Science in Soil Science. Prior to working with the Tribes, Chris worked with the USDA Forest Service at Mount St. Helens National Volcanic Monument preparing environmental assessments for timber sales.

### Patti Howard
Patti Howard holds a Masters of Science degree in Land Resources from the University of Madison and a BA Anthropology and Biology from Grinnell College in Iowa. Her professional experience includes conducting biochemical, microbial, and molecular analysis of water quality contaminants; and 8 years or work on water quality issues in Utah, Montana, and Idaho as a private consultant and for Yellowstone National Park. Currently she is a Water Planner with the Nez Perce Tribe and works on technical and policy water quality issues. Particularly interested in water quality degradation and impacts to fish and human health.

### Audie Huber
Audie Huber, J.D. 1998, Lewis and Clark College, Northwestern School of Law, works as the Intergovernmental Affairs Manager for the Department of Natural Resources (DNR) of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). His work focuses on the legal aspects of natural resources management and treaty rights protection. Additionally he coordinates some of the CTUIR technical activities with federal and state agencies as well as legislative issues. He interned in the CTUIR DNR Cultural Resources Protection Program during the summers of '95, 96, and '97 and served as the Acting Deputy Director of DNR from '98 to '00.

### Gayle Killam

Gayle Killam is the Coordinator of River Network's Clean Water Program. The goal of the Clean Water Program is to improve watershed health by increasing public involvement in and strengthening the implementation of the Clean Water Act at state and local levels. She co-authored *The Clean Water Act, An Owner's Manual* and has been training citizens across the country about the Clean Water Act. Before joining River Network, Gayle was the Water Program Director for the Oregon Environmental Council. Gayle received her Masters' degree from Duke University's Nicholas School of the Environment where she focused on natural resource economics, especially with respect to managing water resources. Gayle received her Bachelors' degree in economics from Yale University.

### Gretchen Kruse

Gretchen Kruse received her Bachelor of Science in Environmental Studies and Marine Biology from Huxley College at Western Washington University in 1990 and recently completed a M.S. degree in Fisheries Resources at the University of Idaho. Following college, she worked with the Idaho Department of Fish and Game on the Lower Snake River Salmon and Steelhead Compensation Program and with the Snake River and Kootenai River white sturgeon. Subsequently, she began her own consulting business to deal with aquatic habitat and species issues and regularly works with the Kootenai Tribe of Idaho, the US Fish and Wildlife Service, USGS and the Kootenai River Network.

### Marcia Largerloef

Marcia Lagerloef is the Water Quality Standards Coordinator for the U.S. Environmental Protection Agency, Region 10. She has worked for the U.S. EPA for 17 years in a range of environmental programs, primarily in water. Her positions have included Section Chief of Water Permits, Section Chief of Ocean Programs, Branch Chief of Environmental Evaluations, and currently Water Quality Standards Coordinator. She has also served as a loaned employee to the Puget Sound Water Quality Authority, where she developed a research plan for Puget Sound. Other experience includes three years as assistant to the director of the Pacific Marine Environmental Laboratory of the National Oceanic and Atmospheric Administration, two years as Senior Oceanographer in the research office of NOAA Headquarters, Assistant Program Director in Biological Oceanography at the National Science Foundation, and research on Chesapeake Bay. She earned a BS degree in Biology from Bucknell University and an MS in Biological Oceanography from the University of Washington.

### Tom Lorz

Tom Lorz is currently a Hydraulic Engineer for CRITFC where he has worked for four years. He specializes in mainstem passage for juveniles and adults, and also serves as a technical consultant, inter-agency representative, data analyst, and conducts reporting and facility and field inspections. He obtained a Masters Degree from OSU in 1996 in Civil Engineering with a Specialization in Water Resources with a minor in Environmental Engineering.

### Paul Lumley

Paul Lumley is the Manager of the Watershed Department at the Columbia River Inter-Tribal Fish Commission. The Commission is composed of four tribal nations: 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 and Bands of the Yakama Nation. Paul Lumley received his Bachelor of Science degree in Mathematics from Western Washington University in 1986.

Mr. Lumley is an enrolled member of the Yakama Nation and was born and raised on the reservation. Mr. Lumley has fished throughout the Yakama Reservation, including on the Columbia River.

Paul Lumley has worked for the Commission since 1987. The first 12 years were spent working within the U.S. v. Oregon forums in fisheries management. Mr. Lumley has testified in federal court on behalf of the Tribes on numerous issues related to fisheries management and the use of hatcheries as a salmon-rebuilding tool. Beginning in 1999, he expanded his role to include watershed issues, such as habitat protection, habitat restoration and improving water quality for salmon. Mr. Lumley is also very active raising funds for salmon restoration projects that are identified in the Tribes' salmon restoration plan: *WY-KAN-USH-MI WA-KISH-WIT* (Spirit of the Salmon*).*

### Richard Mains

Richard Mains has a BS in Forest Science with an emphasis in Soil Science. Has worked at the Yakama Agency since 1985 and has been a Soil Conservationist for 9.5 years with the last 3.5 years as Supervisory Soil Conservationist for the BIA. He is in charge of management oversight on 120,000 acres of agriculture and grazing land that is leases to the Yakama Nation.

### Dale McCullough

Dr. Dale McCullough is a Senior Fishery Scientist for the Columbia River Inter-Tribal Fish Commission. He has spent the past 15 years working for CRITFC on salmon habitat conservation and water quality issues. He was a member of the water temperature technical committee for Oregon in Oregon DEQ's standards review process and is currently a member of EPA's Regional Temperature Committee in evaluating the science of thermal effects on cold water biota.

### Scott O'Daniel

Scott O'Daniel has utilized GIS and Remote Sensing technology to develop natural resource management plans and conduct research in ecological systems. His professional interests include: incorporating complex ecological rule sets into land management planning scenarios, using remote sensing and GIS to understand the relationships at spatial, temporal and ecological scales, and developing quantitative spatial analysis methods to characterize interactions among geomorphic systems, specifically, rivers and topography.

### John Palmer
John Palmer is a Senior Policy Advisor for Clean Water Act - Endangered Species Act issues for EPA Region 10's Office of Water. He has been with the agency for 15 years in several different positions and programs. Mr. Palmer has a Masters in Public Administration from the University of Washington and a B.S. in Environmental Science from Washington State University.

### Warren Seyler
Warren Seyler is a Councilman for the Spokane Tribal Business Council and Current Chair of Upper Columbia River United Tribes (UCUT).

### Harold Shepherd
Harold Shepherd is the Umatilla Basin Policy Analyst for the Confederated Tribes of the Umatilla in Pendleton, Oregon where he works on water law and policy issues. Most recently, Harold served as the Staff Attorney for the Confederated Tribes of the Siletz Indians located on the Oregon coast. He has also worked as an Attorney for the Confederated Tribes of the Colville Reservation in Washington, the Nez Perce Tribe in Idaho, and as a water quality project coordinator for the Columbia River Inter-Tribal Fish Commission in Oregon. Harold obtained his law degree from the University of Oregon and a Bachelor's degree in Range Management from Colorado State University.

### Rosenda Shippentower
Rosenda Shippentower has been employed by the Umatilla Tribes, Department of Natural Resources, as a Water Quality Policy Analyst in the Environmental Planning and Rights Protection Program for eighteen months. Since that time she has worked with others to submit a "Treatment as a State" application and Water Quality Standards for EPA review under the Clean Water Act. Rosenda holds a Master's degree in Interdisciplinary Studies and a law degree both from the University of Oregon in Eugene.

### Ryan Smith
Ryan Smith works with the Warm Springs Reservation Natural Resources Department as the 401 coordinator and monitoring program manager. He graduated from the University of Oregon with a Bachelor's of Science degree in Environmental Studies in 1997. He is at the tail end of completing his master's degree in natural resources management.

### James Thomas
James Thomas received a B.S. in Environmental Science from Heritage College in Toppenish Washington in 1995, an Associate's Degrees in Fisheries Peninsula College, Port Angeles WA in 1975, and Civil Engineering, Yakima Valley Community College, 1991. He has worked in forestry, agriculture, and fisheries. He has been employed by the Yakama Nation Environmental Program since 1998, addressing water quality impairment, with a focus on irrigated agriculture return flows.

### Cathy Tortorici
Cathy currently serves as a policy analyst at the National Marine Fisheries Service working on Clean Water Act-Endangered Species Act integration for the protection of

anadromous fish. Ms. Tortorici has had over ten years experience with federal, state, and tribal governments, focusing on ecosystem and river management issues.

While at the Environmental Protection Agency (EPA), she served as the Regional Total Maximum Daily Load - TMDL - Coordinator, Wetlands Enforcement Coordinator, Missouri River Basin Coordinator, and as a Senior Reviewer of Environmental Impact Statements. She served on the Scientific Assessment and Strategy Team that helped to develop the "Galloway Report," a Clinton Administration effort to develop a national flood plain management strategy stemming from the Flood of 1993 on the Mississippi and Missouri Rivers.

Cathy holds a M.A. in Biology from the University of Kansas.

### Keith Underwood

Keith Underwood is the Project Leader of the Lake Roosevelt Fisheries Evaluation Program for the Spokane Tribe.

### John Yearsley

John Yearsley holds a BS and MS in Mechanical Engineering, MS in Earth Sciences, PhD in Civil Engineering/Water Resources. He was employed as a Mechanical Engineer for Boeing from 1958-1960, an Arctic Oceanographer for Columbia University from 1963-1966, and as an Environmental Scientist for FWPCA/EPA 1968-Present. His major interest is quantitative analysis of ecosystems primarily those associated with streams, rivers, lakes/reservoirs and estuaries.

# Section II

## Conference Sessions: Speaker Presentations & Session Summaries

Keynote Address: The cultural significance of Salmon and Need for High Water Quality

Warren Seyler, Councilman of the Spokane tribe business council, Chair Upper Columbia United Tribes

*Good morning and welcome. In the words of the Spokane aʔstemʔ spuf: Hello, what's on your heart?* Today and tomorrow, I hope we can come together and really speak, not just what is in our minds, but is what is truly in our hearts. For that is where real solutions that will benefit everyone will come from.

Let me first thank the Columbia River Inter-Tribal Fish Commission, namely Cat Black, for inviting me to speak with you today. And also on behalf of the Upper Columbia United Tribes: the Spokanes, the Coeur d'Alene, the Kalispels, the Kootenais and the Colvilles, we welcome the invitation and the opportunity to speak with you, and to try and find solutions that we've never had before.

Today with everyone's commitment, communication, and courage we can truly unite the 13 Tribes that are found in the Snake and Columbia River Basins. This has never been done before on any issue. To unite and to work on an issue that is important to all of us: water. Water quality, water quantity and the control of the water that brings life to us all. But maybe even more important to all of us, as a native people, is the preservation of a way of life, a way of life that we have witnessed for thousands of years. That life evolved around the salmon that we found in the water. That was a gift from Mother Nature. To continue the relationship with mother earth and grandfather spirit, and to benefit from these mighty salmon, we must come together once again. Water and especially the salmon within it, guided our spirituality and ceremonies and it gave us life.

Our ancestors understood how to interact with Grandmother Earth. Using what she provided and giving back by protecting her in all ways that we could. We also prayed to Grandfather Spirit as he guided our hearts through life, and through ceremonies that were centered on the salmon. But maybe the greatest gift of all was how salmon brought us together. At each of our own fisheries surrounding Tribes would come together, forgetting their differences disagreements and divisions and working side by side helping one another gathering life provisions that would sustain us for the next season.

Today if we allow ourselves, we can again unite in this fashion. Under the same issue as Tribes previously: to benefit all Tribes, all waters, and all life.

When I first received the call to speak here today, I was very hesitant. Like many of your councilmen and other staff, they are in Saint Paul, Minnesota attending the NCAI conference. And here to many important issues are discussed, like here today. Secondly, the reason I hesitated, was that since I was elected in 1990 to the council there's been many attempts to bring the people together, to bring the 13 Tribes, unitedly together to speak on many issues. To have discussions and work out resolutions, this has never happened. Seems we can talk, get together and discuss until that almighty dollar is thrown to us. Then we fight. We divide. We try and out maneuver each other to see who can get the biggest piece. This hurts us all. We need to follow our ancestor's example, and find ways where we can all benefit. Thirdly, the reason I hesitated, was that every year there are hundreds of meetings, covered by many organizations, committees, commissions, boards, councils, on these very same issues. Its very hard to distinguish which ones you can attend. Which ones you can miss, which ones are going to actually accomplish something. But something changed my mind. At one of those meetings, I overheard a staff person from another tribe ask a question "why do those UCUT Tribes want to play a part in recovery? They're not a salmon tribe." This troubled me. My mind first told me to get mad, and to get in

this persons face, and correct his statement. But in my heart I was told that there would be a better time and place for this education. I am hoping that today and tomorrow will be that time.

I realize that part of the problem why we cannot come together even on the important issues such as water quality and quantity that deal with our salmon, is a lack of understanding and a lack of education. Of not just the federal government or the White House or the federal agencies but of ourselves as Tribes. As I stand up here, knowing that I've been to hundreds of meetings over ten years, there are many faces that I see hear today that I've never seen before. Knowing that you've worked on these very same issues, having the very same problems. But how can we move forward if we don't know each other and what's on each other's hearts?

As you know this hotel and this city sits on or near the banks of the Spokane river. Not far from here, is the Spokane falls, that river once held millions of fish, like has been told to you has been seen in your rivers at one time. In the words of one of our elders, "it once ran black with fish." We no longer see that. But we have a vision that one day, we will see that again. That they will return in abundance, to spawn and to provide life, like many of you who fight for the return of salmon to your upper tributaries and to the upper reaches and the old spawning grounds we too feel we can accomplish this. We hope our children will see the same things that our grandfathers did in those waters. This we hope and pray.

Water and life that is brought to us is sacred. We need to work together as we would on any sacred belief. The water that we discuss to improve touches us all. Beginning in the upper reaches of our tributaries, for us it comes from the land of the Flathead, the Salish Kootenai of Montana. Out of the valley, water comes. It passes through the Kootenai Reservation of Idaho from Canada and from the Kalispel lands. It crosses the Colville traditional fishing grounds that they no longer have. The same water collides with that which starts from the land of the Coeur d'Alene and comes down at the confluence of the Spokane and the Columbia right on top of the Spokane reservation, right on top of our lands, continues down to meet up with the water that comes from your traditional sites. That same water is what carries the salmon to the ocean. It's that same water that provides life for all of us. So without protecting any part of that river, for quality isn't in abundance in any portion of that river, nothing will exist. It will hurt us all. This is why we have to come together. If each of us do not protect our portion and our contribution to that system, it hurts us all.

And as we have our discussions, I leave you with one thought: and that is to remember that if we could ever truly unite as 13 Tribes, we would be very powerful.

Thank you.

Keynote Address: The cultural significance of Salmon and Need for High Water Quality

Marjorie Zarate, Kalispel Natural Resource Department, Director of Upper Columbia United Tribes (UCUT)

*Qhest Twe Skwitstm.* Good morning, ladies and gentlemen, member Tribes, staff environmental enthusiasts. We want to extent to you our traditional hospitality and welcome to traditional grounds and territories of the upper the Columbia River Tribes. As Warren stated, as Chairman of the Upper Columbia Tribes, we're representing the great Colville Confederated Tribes, the Spokane Indian Tribe, Kalispel, Koontenis and Coeur d'Alene Tribes. And we say, as these Tribes are great Indian Nations, as all Indian Tribes are, its an honor and privilege to have the opportunity to behold them this morning and extend to you the welcome from the Tribes. My name is Marjorie Zarate, and I am a Coeur d'Alene tribal member and Director of UCUT.

By our tradition, as told by our old people, when we extended our hospitality to you, we are welcoming you to our camp to share some smoked salmon, some smoked elk meat, some huckleberries, to sit with us and join us at our campfire. Or, it could mean that you could stay as long as you want, or even stay all winter. That's the kind of hospitality that our old people had. So today, from our modern economics, and we try to be economically independent, maybe we're thinking of another work when we think of hospitality. But we want to extend that to you, our Indian hospitality, as you come here this morning into the traditional territories and homelands of the Tribes.

My staff and I are new. We just started the first part of October. We've barely been here a month, not even 30 days. And in that month, we've only been able to find office space and find a location, and to begin operations. But we are leasing space here in Spokane, Washington. And it's located at the Freeway Plaza, at 1500 W 4$^{th}$. And we welcome you when you're in town here, to stop by and feel free to visit with us or use our facilities or whatever you would need to do in the area. We're very excited about the opportunity to begin working with the Upper Columbia United Tribes. While we're new, we're not new to Indian Country and UCUT is not new to the area. UCUT was established some ten years ago by the wonderful wisdom of Past Tribal leaders. Who had the thought in mind to unify the respective treaty rights for hunting fishing and gathering of the respective Tribes in the upper Columbia area. Through that vision of protecting and preserving our cultural resources: our salmon, our fish, our wildlife, our berries, we can only come forward and uphold that wonderful vision and mission and attempt to follow it through with modern practices.

Before I continue with my presentation, I want to share a story with you. One day one of or tribal fish and game officers (I think it was on the Spokane reservation, I'm not sure) were out in the forest and came by am man sitting at a self-made campfire. To the horror of the fish and wildlife officer, this man cooked an innocent bald eagle and was eating it for dinner. Well, the tribal workers called the authorities, turned him over. The man was arrested and cited for violating the endangered species act. The tribal fish and game officer went into court to testify about the incident. When the judge asked the man why he did this horrible thing the man responded, "Well, I got lost in the woods, and wandered aimlessly for two weeks, starved almost to death. I spotted an eagle swooping fish out of the river, the Columbia River. The eagle was taking the salmon to the banks of the river and then was eating them. Well I thought if I picked up a rock and I threw it at the eagle it would make him drop the salmon and I could pick it up and eat it. But in my weary and weakened state, I threw the rock, and he died. It killed him. Well, I was taught to never kill anything that I didn't eat, so I had to eat it. And I just decided to take it as a blessing in disguise. And I cooked him and ate him." The Judge said, "Well, due to extreme circumstances, with no ill will on your intent, the court will dismiss the charges." Well as the man was getting ready to walk away from the judge's bench. The judge leaned over and he whispered to the man, "By the way, what did that eagle taste like? I'm kind of wondering." And the man

says, “Well your honor, it’s hard to explain, but I suppose it tastes something like a California condor, or a spotted owl.”

Speaking of endangered species, salmon is of great importance and of great significance to CRITFIC and the upper Columbia Tribes. A call for unity has been addressed by UCUT Chairman, Warren Seyler, and no doubt, has been timelessly addressed. But walking the talk of unity has yet to become a reality for us. In honor and recognition of past leaders who established UCUT and the sovereign countries of the great Indian Nations, we can only stand in awe of their great sacrifices. Our old people, they knew how to stand up to the United States government. By fighting the wars with the United States that resulted in the treaties and executive orders that we now have that sanctions our sovereignty as Indian people and protects our hunting, fishing and gathering rights. As Indian people, we survived the great trauma inflicted upon us with boarding school, the loss of language and culture, and all the social problems that afflicted Indian people.

In many cases, we’re only two or three generations from the hunters and gatherers. In two or three generations, we have evolved into the civilization and educated ourselves to pick up the education of the white man and carry it forward and today use those as the modern tools to fight these wars and stand up to the United States Government.

Our parent’s generation took their turn in standing up. In the pre-Bolt decision they stood up to the United States Government, and the fishing wars that took place in Washington State, and at Franks Landing, and on the Pullyaup River. They stood up to the United States Government and the economic threats that have confronted us. We can’t let these interests throw us a bone, like a dog is thrown a bone, and then tear it apart to get it. Today it’s our turn to continue the battle in our own way, in our own time. We must carry forward the legacy of our ancestors and stand up to the United States Government.

Each tribe has its own management plan. And the Blocked Management Plan is a synthesis of all the respective Tribes unified approach to mitigating the effects of the dams on the Columbia River and its tributaries. The anadromous salmon is extinct in the Columbia River. And attempts to restore through hatchery grown salmon have been minimal in terms of overall impact. Most resident fish mitigation is based on the loss of anadromous fish, this policy is called the resident fish substitution policy.

Good water quality begins at the upper watershed. We are told by the old people that when our babies were born, they were taken by their mothers down to the streams and they were washed in the pristine beauty of these waters that our camps where built upon. Many of us today have even lost our presence along these waterways, but we want to continue to wash our babies with this beautiful, pristine water of our streams.

Again, we want to extend our invitation to you. To come into our camp and stay for some food, some stew, fry bread, smoked salmon, deer meat. Our sacred places in our heart by the waters will always have the salmon. In our coyote stories, we always include in accounts the rivers and streams and waterways. And as the prayers that have been said, the sanction by our Chairman, Warren Seyler, and representation of our culture in this area this morning, our vision and our goal for unity is the return of the salmon in the pristine waterways. Thank you.

Columbia River Mainstem TMDL Process
Cathy Tortorici NMFS

Slide 1:

# Columbia/Snake Rivers Mainstem TMDL

Cathy Tortorici
National Marine Fisheries Service
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Comments:
What's happening on the TMDL being developed for the Columbia and Snake Rivers and a brief introduction as to why we are doing this from the Clean Water Act, Endangered Species Act integration standpoint. Then a discussion on the TMDL itself, the processes and all that's going on. Why is this important for the protection of water quality as well as endangered species.

This topic of ESA/CWA integration really began in the early to mid 1990's when federal agencies were working with state agencies and the public on issues like protection of forestlands. Trying to get a handle on how to get a one stop shopping, where you could get someone coming in from the public and not have to go through this rigorous/painful process of getting permit after permit from federal and state agencies without any talk between those agencies on overlaps in terms of how various statutes might be compatible.

Slide 2:

## The Clean Water Act

Restore and maintain the **chemical, physical,** and **biological integrity** of the Nation's waters; and Where attainable, to achieve water quality that promotes protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water **"Fishable/Swimmable"**

Comments:
When you look at the CWA and the ESA, you can see that there are some clear overlaps. The CWA talks about restoring and maintaining chemical, physical, and *biological* integrity, which is not often emphasized but its there and we need to pay attention to it. And then further on talking about water quality in terms of propagation of fish, shellfish, and wildlife.

Slide 3:

## The Endangered Species Act

Provide a means whereby the ecosystems upon which threatened and endangered species may be conserved.

Comments:
If you look at the ESA it talks about ecosystems and protecting those for threatened and endangered species. So there is a clear relationship between the ESA and CWA. This discussion started in terms of forestlands but it has evolved. At the pinnacle of this integration is what's happening on this mainstem TMDL because of the scope and the scale. EPA even 10 years ago was not as focused on this integration. That really has changed. The thinking has changed on their part and the part of the National Marine Fisheries Service (NMFS). I believe a lot of what's going on here in the Pacific Northwest has pushed that

dialog forward. We are talking now about water quality standards, and TMDLs, storm drains and nonpoint sources run-off, really bringing together the integration of these two statutes in a way that is unprecedented and never been thought about before.

Slide 4:

## Mainstem TMDL: CWA/ESA Integration

- CWA-ESA goals and implementation policies
- Geographic overlap
- Technical overlap in water quality and aquatic health concepts and parameters
- Overlaps in regulatory requirements

Comments:
When we talk about integration what we are really talking about goals and implementation policies of CWA and ESA and brining them together. There's clear geographical overlap in waterbodies that are not meeting water quality standards and habitat for endangered species, there's a virtual 100 % overlap in those things. So from a geographic standpoint its clear that integration works. There is technical overlap in terms of water quality parameters and how we deal with these from a technical aspect. And then of course there are overlaps in regulatory requirements.

Slide 5:

## The Columbia/Snake River and EPA's Role

- All-H Paper - Conceptual Recovery Plan for Columbia Basin Salmon
- Lower Snake River EIS
- 2000 Biological Opinion
  - Federal Water Quality Plan
- Mainstem TMDL

Comments:
And so from the perspective of Columbia and Snake Rivers and EPA's role, there's a lot going on in large part because of the individuals at EPA working to bring these issues together. These are some critical things going on: 1) The all H paper – the hydropower and habitat portions in particular. 2) The lower Snake River EIS – EPA has done an outstanding job in making sure that water quality must be a factor in how we operate these dams. 3) the biological opinion – discussion on reasonable and prudent alternatives focusing on water quality, ESA. Imbedded in the BiOp is the Federal Water Quality Plan (in the BiOp) – how the federal agencies are coming together to talk about water are the obligations and incentives to bring water quality into the discussion about ESA. Tribal involvement in this is important (meeting December 5th). 4) The mainstem TMDL and its relationship to all of these things – making sure that there is synergy in developing mainstem and tributary TMDLs. In the lower Snake River TMDL, recognizing what EPA has said about water quality, make sure its complimentary to the technical and policy aspects raised by EPA. BiOp make sure that the TMDL and the water quality plan are moving together so that water quality plan can be used as part of the implementation plan for the TMDL in terms of structural and operational measures. The TMDL itself: make sure that it has the maximum consideration of how water quality can help the recovery of endangered species. I know you all recognize that good water quality is integral to salmon recovery. There is a lot riding on this mainstem TMDL to make sure that we are doing the kind of integration we need to do.

Slide 6:

# TMDL Defined

- Amount of pollutant a waterbody can receive and still meet water quality standards

Comments:
Briefly described. That's the basic definition we are shooting for when we talk about this mainstem TMDL.

Slide 7:

# TMDL Elements

- Scope
- Applicable Water Quality Standards and Numeric Targets
- Loading Capacity
- Waste Load Allocation (Point Sources)
- Load Allocation (Nonpoint sources)
- Margin of Safety
- Seasonal Variation

Comments:
These elements come not only from the regulations and policy documents, but Region X has put together an excellent document about how to assemble a TMDL (available through EPA Region X). What we are working on right now in developing a mainstem TMDL for total dissolved gas (TDG) and temperature are putting all these pieces together. Scope: EPA is working on problem formulation statement describing the problem, working with the states to understand the numeric target. Loading Capacity: what is the capacity of the mainstem system as we go about setting targets for temperature and TDG. Looking at Point and Non-point sources. The margin of safety: you have to have it in your TMDLs because this is not an exact science. EPA has done a tremendous job with modeling, but science is not perfect. The margin of safety is important taking into account seasonal variation, etc.

Slide 8:

# TMDL Elements

- Monitoring Plan
- Implementation Plan
- Reasonable Assurance
- Public Participation

Comments:
The elements in the last slide were the nuts and bolts. These are more of the procedural nature. Developing a monitoring plan: what does that look like for this mainstem system. An implementation plan: the federal water quality plan will form a major component. Reasonable assurance: so we know the TMDL will be successful and we can meet the targets set. Public Participation: critical for the basin to be commenting on what's going on with the TMDL and providing input. EPA is in the process of working on a communication strategy in conjunction with the states and the Tribes. All of these things are evolving as we speak.

Slide 9:

# Mainstem TMDL:

Scope and Scale

- Large
  - –Upper Columbia
  - –Lower Columbia
- Small
  - –US Border to Grand Coulee
  - –Grand Coulee to BPA
  - –BPA to Mouth
  - –Snake to Columbia

Comments:
We are really working on the scope and the scale. You can imagine that something like this across the Columbia Basin is daunting to say the least. What we are thinking about are a couple different approaches for focusing this TMDL. Scale: how are we going to divide the analysis, large or small scale? One of the issues that has been raised in the process is the situation with Canada and gas that is coming downstream from Canada. There is a trans-boundary gas group, in which EPA, the states, and the Tribes are discussing these issues. Another interest brought up is Lake Roosevelt and how to deal with modeling. We are working on that issue. Scope: whether you talk about large or small there are issues regarding NPDES, irrigation ditches, municipalities, all these smaller point and non-point sources and how you fit this into this broader context. We are working with the states and the Tribes to figure out the best way to bring that information together so that the TMDL, at the end of the day, will be scientifically credible as well as legally defensible and understandable.

Slide 10:

# Mainstem TMDL Development Schedule

- Temperature portion of TMDL expected by December 2001 (EPA)
- Total Dissolved Gas portion of TMDL (Oregon) expected by December 2001
- Total Dissolved Gas portion of TMDL (Washington) expected by December 2002

Comments:
Here is some information on the schedule. We are taking a very assertive approach in a really positive way. EPA is taking the lead on temperature. Oregon and Washington are working on TDG. If there is close coordination by the states, they may work closer to the same time frame.

Slide 11:

# Mainstem TMDL Development Process

- MOA between states (Oregon, Washington, Idaho) and EPA
  - –EPA leads on Temperature portion
  - –States lead on Total Dissolved Gas portion
  - –Idaho DEQ, EPA, and the Nez Perce Tribe will jointly produce a TMDL for the Clearwater River
- EPA leads on overall coordination of process

Comments:
There is an MOA being signed right now that basically lays out the roles, responsibilities, and resources that each of the EPA and states are applying to the development of this TMDL.

Slide 12:

## Mainstem TMDL Development Process

- Tribes engaged and are providing advice, expertise, and technical support
- Federal agencies and other stakeholders (Corps, BPA, BOR, NMFS, FWS, FERC, PUD/Private Dams) encouraged to provide technical expertise and policy support

Comments:
The Tribes are also involved and brought forward in this MOA. We have gotten great response from the Tribes. The Colvilles, Umatilla, Kalispel, Nez Perce, and Yakama have been at the table discussing these issues and have done great work with submitting comments. Next meeting in January. We have a whole host of other federal and private agencies involved and as this all comes together they are going to have to be involved and engaged.

Slide 13:

## Mainstem TMDL: Defining Success

- Provides regulatory compliance with CWA and complementary support of ESA
- Provides biological connection between water quality and habitat recovery for anadromous fish on a basin-wide scale
- Defines water quality targets with technical rigor to determine the "Federal Family Contribution"

Comments:
This project is hard. But this project is important. It's important from a variety of different aspects (three listed above). Providing regulatory compliance with CWA and ESA: this is going to be a test case on the grandest of scales. Providing biological connection between WQ and habitat: really recognizing and embracing the relationship between these two things. NMFS has a matrix that identifies Properly Functioning Condition (for fish), what conditions are required to sustain and recover the fish and also allows for the critical piece of tribal treaty rights. Integral in this process is not only just the biology, just the economics, but also the tribal treaty rights. That's why tribal involvement has been important and will continue to be important. Defining the water quality targets to determine the "federal family contribution": in discussions going on with the regard to the BiOp one thing that comes up from the action agencies in particular is what is their contribution for water quality. Important to define those targets so they are understandable and achievable so that the action agencies, and everyone involved, can understand what they need to do to in terms of meeting those targets. The TMDL is going to be the cornerstone of how we do that.

In closing, this has been a really exciting process. It's going to be continuing for at least the next couple of years. Although we expect to be done in 2002, we recognize that all TMDLs are an iterative, phased process. everyone's involvement is going to be critical to make it a success.

Columbia River Mainstem TMDL Technical Presentations Panel:
Effects of Temperature and Gas on Fish Health: Dale McCullough, CRITFC

I have been involved in water temperature issues for several years, and less involved in total dissolved gas (TDG) issues. Dams that are in place, as they spill water generate supersaturated conditions that have biological impacts on the salmon. These conditions can easily cause mortality and over the years, very high levels of mortality have been documented with high levels of supersaturation. It's been an area that has been researched at CRITFC, determining signs of TDG damage on juvenile salmon. TDG levels up to about 120% have been shown to produce very few signs of gas bubble disease. Over the years 110% has been the level used by EPA and others as the regulatory goal. There have been other studies showing that somewhat higher levels can have minimal effects. One difficulty in interpreting this data is what happens under field conditions: fish behavior can mitigate for saturation levels (by sounding to depth to keep gas in solution). So its not a simple thing, but we should be working toward minimizing levels as much as possible and probably over time going to 110%. One of the reasons for opting for higher levels is there is a trade off. You try to do all things to improve survival of the fish as they go over the dams. You may want have higher levels of spill which increases survival but at the same time causes some of these problems. That's the debate that's going on among scientists.

As far as Temperature goes there are some important things for scientists in the region and for the Tribes that I need to try to communicate here. This diagram is a good one based on modeling results published in about 1985 by Theurer, et al. Similar kinds of modeling have been done on other river systems, for example on the Umatilla in their TMDL by DEQ. They found that by restoring channel vegetation and channel width to depth ratio you could achieve very high levels of restoration of water temperature throughout the entire watershed. This example shows from the headwaters (in a wilderness area) through unrestored areas. The dotted line shows what would be achievable by restoring vegetation and channel width (basically narrowing the channel). An important point here is Theurer took 20 degrees C as a point beyond which you would no longer have Spring Chinook rearing taking place. From the point on river kilometer 40 where the river exceeds this temperature, the river is basically a biological desert. This has been confirmed in the field by snorkeling. Just the mainstem has been restored in this example. If you also modeled restoration on the tributaries, you could have even more dramatic recovery of the temperature profile on the mainstem than what's shown here. Even just restoring the mainstem you can get all of the mainstem under 20 degrees C. So even though this becomes "sub-optimal" for rearing, its still useful habitat. That's an important point that the Tribes need to be aware of: in setting a water temperature standard in the past, the primary scenario has been to adopt a biologically based standard, and one that could be supported by the literature would be somewhere around 15 degrees C. Some people say, "that's unrealistic." With a wilderness in the headwaters, you can't be expected to improve it beyond that temperature level (the temp. of water leaving the wilderness area). But there *is* the potential for degrading that temperature resource. If we opened that up to logging, we all know that this temperature line could take a sharp upward trend there. And you'd say, "so what's the problem with that, you're still going to be under your biological standard." Well, its pretty well recognized by scientists that there is such a thing as cumulative thermal effects on a basin scale. And the only way to achieve the restoration level (the dotted line) would be to control water temperature from the headwaters and working your way downstream. Now if under the current scenario (we have the line showing us above the standard of 15 degrees C) we need to be working to push that line downward. Some will point out that 15 is unrealistic in the lower extremities it probably never was that cold. That is a technical problem and a logical difficulty. How far toward 15 should you push it? In the Oregon standard, they have language there that says *take all feasible steps to try to meet the standard*. If you did that you would do things like leave the riparian area alone to let it recover. Passive restoration is always an

option and its one that is recommended in the CRITC Tribes salmon recovery plan. Probably over time the best we can do for management would be to do everything we can do that we know will have a positive impact which would include things like managing sediment on a basin scale (no excessive amounts of sediment entering streams, filling pools, impacting temperature budget), also total riparian system management on a watershed scale.

This has very significant impacts on salmon production. This graph on the left shows juvenile rearing capacity. The blue represents the restored condition. The tan represents existing conditions. On the right, you see the comparable numbers for adults. So there is a lot at stake here and a lot at stake in bringing about the changes that are needed to move that point at which salmon no longer occur as far downstream as possible (increase the proportion of the stream with water temperatures which support salmon). That previous graph shows you can move that all the way down to the mouth. There is a wide zone of the stream that you can estimate would provide optimal rearing conditions, not just up in the headwaters as they are now, but farther down in the system where you have larger channels, lower gradient and other appropriate habitat features. So that's an important management consideration, to have the proper mixture of all the habitat features available to the salmon, not just having optimal temperatures in one portion of the river system.

This diagram has too much detail to get into at this time. The reason I'm showing it to you know is that it contains some of the factors that need to be taken into consideration in determining whether a stream is providing all the correct biological functions. This May/June/July section corresponds to the adult portion of the life cycle there is a corresponding section that shows you what's going on in the juvenile stages. The summer is a critical point. If you focused only on summer temperatures and brought the summer maximum temperatures down, in most stream systems you would improve conditions for all other seasons. So if you look at what's going on in the summer during the adult stage, you've got things to consider such as adult migration. Operating between temperatures in a certain range here that provide suitable conditions. You've got adult holding going on; spring chinook holding in streams now is a problem, for example in the John Day Salmon are holding in adverse conditions which has an impact on the fecundity for adults. There are major impacts to eggs in the females during holding that then are expressed later in poor survival of the eggs. Diseases effect all life stages, and above 15 degrees disease effects magnify greatly. Spawning: above 16 degrees chinook are not inclined to spawn and if they did survival of the eggs would be low. Migration blockages occur at about 21-22 degrees C for all the salmonids (and that is quite a sharp line, a distinct level at which temperature effects are seen). Another important benchmark is that adult salmon have an upper incipient lethal temperature thresholds that are about 2-3 degrees lower than the juveniles that puts the adult level at about 22 degrees. Adults in the Snake, Okanagon, Yakama and many others are forced to be migrating at temperatures that are just below their incipient lethal threshold and just below the threshold beyond which they couldn't migrate. For juvenile rearing, I show a zone of 10-15 degrees as optimal. At the extremes growth rates go to zero with normal food availability. If food is less available than the optimal growth temperatures go even lower. It's not uncommon in streams for food to be very scarce. You can't be certain that you are going to be providing optimal conditions, you have to take a lot of things into consideration.

This diagram illustrates this point about growth rates. He had an optimum growth rate at full feeding at 18 degrees C. He took 60% of satiation feeding as normal for most streams. Under those conditions the optimum growth rate dropped substantially.

Temperature cycle in a stream daily is usually represented by a standard sine wave graph. The reason I did this is it allows you to integrate the time spent above certain temperatures. If assume

that at any point in the stream behaves like that sine wave, and you have a mean temperature of 27-28, you've got 20% of the day where the temperatures are in this range. That kind of analysis allows you to estimate the total mortality that you could accumulate. Based on lab tests, under constant temperatures we know that as temperatures go higher and higher the impacts become much more severe. So 10 minutes spent at 27 degrees is much more of an impact than from 10 minutes spent at 25. If you integrate the total lethal load accumulated as the day goes through this kind of cycle, you can make estimates of total mortality that you can expect in any stream reach. There are always other factors in the field. There are thermal refuges. A lot of people like to count on cold refuges a lot. Usually those don't occupy too much of a percentage of a stream. And as temperatures become more adverse, fish are congregated in these cold refuges and then feeding reduced competition for food and disease effects make those kind of cold refuges less secure.

This diagram is from the creator of a model used on a widespread basis on the Columbia and has been approved by the Power Council. It's a complex model and has some problems associated with getting the data to run it, but it is a good way to express the biological productivity of the river system. The reason I put this on here is that it shows life history diversity. It shows that salmon (spring chinook in this case) may be using different spawning locations in a basin and using different parts of a basin. Different life history expressions are something that we need to try to restore. Many life history variants in any particular basin have been eliminated overtime. For example, fish that spawned in the lower portion of basins probably can't do that anymore because temperatures are too high. This shows the diversity of life history types that we need to try to restore. As we go through the mainstem and into the ocean, these life histories converge. It may be more complex than that. As they migrate back, they migrate at different times and to different portions of the basin. That life history diversity is something that we want to maintain. That brings into focus parts of the biological performance that need to be considered:

1) Productivity: would involve density independent factors such as temperature that impacts a fish population on a basin scale (lethal and sublethal)
2) Capacity: has to do with the area of habitat that's available. We need to maximize the amount of habitat that is available to the fish.

In doing both of those things, we would bring about conditions that would improve life history diversity.

In dealing with all these issues on a technical basis, it's pretty easy to see the temperatures that provide optimum conditions for the fish. When you move into the policy arena, Its more complicated deciding how much restoration is required by the controlling laws. The major controlling laws are the Clean Water Act, the Endangered Species Act, and Tribal Treaties that are in place. The three of these things together have a major bearing on what degree of restoration needs to take place.

- Clean Water Act: requires trying to fully restore the beneficial use. Fully Restore is a powerful concept that means all areas of a basin, with no tributaries left behind.
- Endangered Species Act: NMFS is looking at restoring a viable population. What "viable" is an unanswered question.
- Treaty Rights: may be the strongest call for restoration of the three. I believe they really call for full restoration of the basin [temperature regimes] to support salmonid populations.

Columbia River Mainstem TMDL Technical Presentations Panel:
Structural Mitigation for TDG - Tom Lorz, CRITFC

Slide 1:

# *Total Dissolved Gas Abatement At A Cross Roads*

***Thomas Lorz***
***CRITFC***

Slide 2:

## Total Dissolved Gas Background:

- ***Definition:*** ***Occurs when water entrains air while plunging. Hydrostatic Pressure due to depth, forces air into solution thus raising total dissolved pressure in the water. Current Standard under CWA is 110% TDG. The Yearly Fish Spill Program receives a waiver for levels of 115% FB / 120% TW***
- ***This process occurs in free flowing rivers - But free flow rivers have mechanism to strip (degas) themselves***

Slide 3:

## Total Dissolved Gas Current Conditions:

- **All Mainstem Projects (except TDA) are equipped with Deflectors**
- **The current system for the 2 years has keep the TDG levels in the mainstem (with the fish passage spill program) with the permit waivers. (~120 - 125%)**
- **There is fish monitoring for signs of TDG** (Juvenile samplers and limited in river)

Slide 4:

**Figure 1 Conventional Spillway Stilling Basin with Deflectors**

Slide 5:

## Gas Abatement Options:

- **Basically Four Options for Future Gas Abatement**
  - ***1) Structural Modifications***
  - ***2) Dam Removal (Natural River Drawdown)***
  - ***3) Status Quo (With Minor Improvements***)
  - ***4) Modification of the Standard/Permanent Variance***

Slide 6:

## Option 1: *Gas Abatement Structural Modifications*

- ***Reduce/eliminate the air being entrained***
- ***Reduce/eliminate the hydrostatic pressure, (i.e. reduce depth of plunge)***
- ***Generate mechanism to strip gas from the water column (i.e. reduce depth or return***

***water particle to surface to allow them to strip gas)***

- ***Different Option or Combination of Options can be used for each Project***

Slides 7-11:
**Figure 2** Raised Tailrace Channel with Deflectors
**Figure 3** Negative Stepped (Raised) Stilling Basin
**Figure 4** Submerged Discharge with Deflected Spill
**Figure 5** Additional Spill Bays with Baffle Blocks
**Figure 6** Side Channel with a Stepped Slope Spillway

Slide 12:

# Option 2: *Dam Removal*

- **Best Option with Regards for Benefits to Water Quality and Fish Survival.**
  - Natural Mechanisms for degassing

- **Political Opposition / Cost - Benefit Concerns?**

Slide 13:

# Option 3: *Status Quo (With Minor Improvements*)

- Current System: Monitoring Program Showed Low Levels of GBT Sign in Juveniles (In 2000, only 1.7% of fish sampled show signs)
- Need to Receive Yearly Waiver for Variance from CWA Standard
- Current Waiver Levels, Limits Spill Volumes thus, Limiting Fish Passage Options

Slide 14:

# Option 4: *Modification of the Standard/Permanent Variance*

- Either Modify Current Standard or Grant a Permanent Variance above the Clean Water Act Standard.

- Increase Levels to a Flat 120% For FB and TW, or Increase TW to 125%, or Some Variation There Of

Slide 15:

## Summary:

- ***1) Structural Modifications***
- ***2) Dam Removal (Natural River Drawdown)***
- ***3) Status Quo (With Minor Improvements***)
- ***4) Modification of the Standard/Permanent Variance***

## Which Will We Choose???

Columbia River Mainstem TMDL Technical Presentations Panel:
Models used for temperature and Gas - John Yearsley, EPA

Slide 1:

## Mathematical Models in the Total Maximum Daily Load Program

Slide 2:

## Total Maximum Daily Loads

- What is a TMDL?
  - Amount of pollutant a waterbody can receive and still meet water quality standards
- Elements of a TMDL
  - Sum of allowable loads to meet standards
  - Waste load allocation - Point Sources
  - Load allocations - Nonpoint Sources
    - Seasonal Variation
    - Margin of Safety

Slide 3:

## Regulatory Process

- Priorities/Schedule for TMDL development
    - Develop list of water quality-limited segments
    - Develop priority ranking based on severity of pollution and water uses
    - Identify pollutant of concern
    - Calculations to establish TMDLs must be subject to public review

Slide 4:

## Columbia/Snake River TMDL Pollutants of Concern

- Water Temperature
- Total Dissolved Gas

Slide 5:

## Mathematical Models: Conceptualization

- Basic Elements
  - Conservation Laws (Mass, Energy, Momentum)
    - Sources/Sinks
    - Hydrodynamics
      - Advection
      - Turbulent Diffusion
- Model Limitations

- Space/Time Resolution
  - Model Error/Uncertainty

Slide 6:

## Mathematical Models of Water Temperature

- Sources/Sinks
  - Solar Radiation
  - Atmospheric Radiation
  - Blackbody Radiation
  - Evaporation/Convection
  - Advected (Point/Nonpoint) Sources
- Hydrodynamics
  - Dependent on Time/Space Scale
    - Function of Water Temperature for vertically stratified systems

Slide 7:

## Mathematical Models of Total Dissolved Gas

- Sources/Sinks
  - Mechanistic Models of Spill
  - Empirical Models of Spill
- Hydrodynamics
  - Dependent on Time/Space Scale

Slide 8:

## Applications:

Columbia/Snake Rivers

Slide 9:

## US Army Corps of Engineers Northwestern Division

- Model Elements
  - WQRRS/HEC5Q
  - One-Dimensional, Time-Dependent
  - Water Temperature, TDG(?), Eutrophication
- Applications
  - Systems Operations Review
  - Dworshak Release Scenarios
  - Dissolved Gas Abatement
- Review Status-Unknown

Slide 10:

## Idaho Power Company

- Model Elements
  - CE-QUAL-W2, Danish Hydraulic Institute
  - Two-Dimensional, Time-Dependent
  - Water Temperature, TDG(?), Eutrophication
- Applications

- FERC Relicensing, TMDL - Middle Snake
- Review Status-Peer Review of CE-QUAL-W2 application

Slide 11:

## Battelle Northwest

- Model Elements
  - MASS1, MASS2
  - One-Dimensional, Two-Dimensional, Time-Dependent
  - Water Temperature, TDG
- Applications
  - Lower Snake, Lower Columbia
- Review Status-Unknown

Slide 12:

## EPA Region 10

- Model Elements
  - RBM10,CE-QUAL-W2
  - One-Dimensional, Two-Dimensional Time-Dependent
  - Water Temperature, TDG in development
- Applications
  - Columbia and Snake rivers in Washington
- Review Status-Peer Review of RBM10

Slide 13:

## Idaho DEQ/IDWR

- Model Elements
  - Danish Hydraulic Institute
  - One-Dimensional, Two-Dimensional, Time-Dependent
  - Water Temperature(?)
- Applications
  - Middle Snake, Clearwater TMDLs (?)
- Review Status-Unknown

Slide 14:

## Simulation Characteristics

- Time Scales
  - > One Hour
- Spatial Scales
  - Longitudinal: ~1000 meters
  - Lateral: ~10 meters
  - Vertical: ~1-2 meters
- Model Error

- Water Temperature: ~1-2 degree C
- TDG: ~2-5%

Slide 15:

## TMDL Modeling Issues

Slide 16:

## Columbia/Snake River TMDL

- Interpretation of Water Quality Standards
- Choice of Design Conditions
- Allowable Loading=Flow*Concentration
- Margin of Safety
- Conflicting Objectives

Columbia River Mainstem TMDL Technical Presentations Panel:
Nez Perce Law Suit-Snake River Water Quality – Rich Eichsteadt, Nez Perce Tribe

Slide 1:

# The Clean Water Act

## Addressing Water Quality Through Cooperation, Enforcement, and Litigation

*Strategies for the Mainstem Columbia and Lower Snake Rivers*

Slide 2:

The objective of …[the Clean Water Act]…is to restore and maintain the chemical, physical, and biological integrity of the nation's waters.

Slide 3:

Graphic showing multiple land uses.

Slide 4:

## Enforcement Mechanisms for Addressing Water Quality Impacts

- NPDES permit
- Section 401 water quality certification
- Section 313 "federal facilities compliance"
- Other state, federal, or tribal enforcement mechanisms
- Non-enforceable cooperative efforts

Slide 5:

## What is a Total Daily Maximum Load?

- A TMDL identifies the pie of water pollution and allocates that pie of water pollution among the sources.
- The development of TMDLs has been court-ordered in Oregon, Washington, and Idaho.

Slide 6:

## What a TMDL is <u>not</u>:

- A TMDL is not an end in and of itself.
- TMDL is a tool, and a means to an end.
- A TMDL is not independently enforceable.

- *Example* - After completing a TMDL (identifying pollution, allocating it to various sources) one may find that there's no enforcement mechanism (all non-federal nonpoint polluted runoff from irrigated agriculture)

Slide 7:

## What does one do in the absence of an enforcement mechanism?

- Attempt to convince state, federal agency or tribe to adopt an enforcement mechanism.
- Attempt to convince polluter of benefits of voluntarily implementing measures to improve water quality.
- Attempt to obtain funding to assist in implementing measures to improve water quality.

Slide 8:

## Eye on the Prize

- Think of the ends (the improvements in water quality) that you are seeking to obtain and analyze the mechanisms available to achieve those ends.
- Devote resources accordingly.

Slide 9:

## National Wildlife Federation v. United States Army Corps of Engineers

- 92 F.Supp.2d 1072 (D.Or. 2000)
- Corps' four lower Snake River dams cause exceedences of temperature and dissolved gas standards.
- On December 9, 1997, EPA, Oregon and Washington urged the Corps to take action to address both the temperature and dissolved gas violations.
- Corps did not take action.

Slide 10:

## National Wildlife Federation v. United States Army Corps of Engineers

EPA modeling concluded that the four Lower Snake River dams cause increases in both the number and extent of the temperature of violations. EPA concluded that the effects of these four dams on temperature violations dwarfed those of other contributing agents such as habitat modifications on tributary streams.

Slide 11:

## Plaintiffs' Legal Claims and Requested Relief

- Corps' operations, resulting in temperature and dissolved gas exceedences, do not comply with section 313 of the Clean Water Act.

- Relief requested: Court order directing Corps to comply with water quality standards.

Slide 12:

## Corps' Defense

- As a "matter of policy", not law, the Corps attempts to comply with water quality standards "to the extent practicable."
- Procedural Defenses.
  - Issue & Claim Preclusion.
  - Standing.
- Section 313 does not authorize a claim for violation of water quality standards
- Judicial review is not available under the Administrative Procedure Act.

Slide 13:

## Economic Issues

- Economic analysis: Multiple agencies compiled estimates of Clean Water Act compliance at the four Lower Snake River dams, indicating substantial costs associated with leaving the dams in place.
- Corps ignored costs of CWA compliance in DEIS on breaching the four Lower Snake River dams.
- Decision-makers' and the public's ability to fairly evaluate breaching and non-breaching options are distorted without assessing <u>all</u> economic costs.

Slide 14:

## Federal Facilities Compliance (Section 313)

"Each department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government (1) having jurisdiction over any property or facility, or (2) engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants . . . shall be subject to, and comply with, all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution in the same manner, and to the same extent as any nongovernmental entity."

Slide 15:

## Ninth Circuit Case Law Precedent

- Section 313 means what it says.
- Courts may review federal agencies' compliance with Section 313 of the Clean Water Act pursuant to the Administrative Procedure Act.

–Pursuant to the APA, the courts will review the agency's action to determine whether the agency has acted in a manner that is "arbitrary, capricious, or otherwise not in accordance with law."

Slide 16:

# Federal Facilities Compliance

## Legislative History

- "The Committee, after hearing of numerous examples of flagrant violation of pollution controls is determined that the Federal facilities shall be a model for the Nation and that unless exempted by the President, they shall be required to meet all requirements as if they were private citizens."

Slide 17:

# Court's initial ruling in NWF v. COE

- Clean Water Act is a separate and independent legal obligation (separate from ESA and Treaty and Trust Responsibility).
- Under the Clean Water Act, the Corps must comply with federally approved water quality standards.
- The Plaintiffs are entitled to challenge alleged violations of these water quality standards pursuant to the Administrative Procedure Act.
- Corps has an additional opportunity to provide anything in administrative record to demonstrate that it is complying or justifying its failure to comply.

Slide 18:

# Current status of *NWF v. COE*

The current question before the Court:

- Is the Corps, through its actions and inactions, violating the CWA by causing water quality exceedences from its operation of the four lower Snake River dams?

Slide 19:

# "Mainstem TMDL" Outcomes

- EPA report already establishes Corps is primarily responsible for water quality exceedences in the lower Snake River.
- A "Mainstem TMDL" is not enforceable.
  –Corps has not committed to implementing measures to improve water quality.
  –Corps will claim water quality standards are "goals" to achieve "to the extent practicable."

Slide 20:

# Draft BiOp's "Water Quality Plan" Outcomes

- "Plan" is not a plan to comply with water quality standards.
- "Plan" is a plan to develop a plan to "address" the "long term water quality goals" at some unspecified time in the future through some indeterminate means.

Slide 21:

# *NWF v. COE* Litigation Outcomes

- Court order directing Corps to implement measures to comply with water quality standards.
- Court order creating judicially enforceable schedule for compliance.

# COLUMBIA RIVER TRIBAL WATER QUALITY CONFERENCE
# WATER QUANTITY AS IT RELATES TO WATER QUALITY
# THE UMAATILLA BASIN PROJECT

HAROLD SHEPHERD
CONFEDERATED TRIBES OF THE UMATILLA RESERVATION

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I. Umatilla Basin Project – Peaceful Resolution to Contentious Problem
  a)Tribes working with irrigators and BOR to restore fish flows in UB and maintain irrigation economy rather than resorting to litigation.
  b) Reclamation Act of 1902, and BOR projects to benefit water users in Umatilla Basin.
    1) By early 1920 Umatilla River began running dry for 6 months each year
      · Extinction of spring chinook, fall chinook, and coho salmon and almost eliminated steelhead runs in the Umatilla Basin for 70 years.
      · Combined with dams in Umatilla River to block fish passage to spawning grounds
      · Conflicted with treaty of 1855 in which Tribes ceded control of 6.4 million acres of land for the rights to occupy and govern the 172,000 acre Umatilla Indian Reservation
        · Includes reservation of rights to fish in the streams on the reservation and implied reservation of water right.
  c)Umatilla Basin act of 1988 – resulted from a decade of negotiations and planning between Tribes, districts and BOR.
    1) Requires WEID, HID & SID to exchange rights to withdrawals from the Umatilla River for equivalent amount of water from Columbia.
      · Phase I completed in 1990 – maintains up to 140 cfs in Umatilla below Three-Mile Falls Dam.
      · Phase II completed in 1999 – leaves approximately 83 cfs of water per year in the river.
    2) Success of UBP – measured by number of returning adult fish each year in ten years after initiation of first phase.
      · Increases in coho, fall and spring chinook runs.
      · Year 2000 return of adult spring chinook – all time record of 5000.
  d) Need for Phase III.
    1) Low flows continue in lower river from July through September.
    2) Current Status – negotiations with WID and BOR on Phase III.
      · Could be submitted to Congress for legislation as early as spring of 2001.
    3) Elements – transfers WID's Umatilla water rights to Columbia River (20,000-acre feet).
      · Primary benefits to pacific lamprey, fall chinook, coho and others.
II. Water Quality in the Umatilla River
  a) Background – climate, land uses, stream flow characteristics, population, beneficial uses, fish habitat and runs.
  b) Water quality standards and water quality limited criteria.
  c) Temperature issues.
III. Biologically Based Fish Flows from Phase III – Water Quantity v. Quality
  a)Current flow dynamics – what was accomplished with Phases I and II.

b) Problem areas – what is left undone.
c) The Phase III solution – 20,00 acre-feet of additional water to Umatilla.

IV. Additional Options to Address Water Quantity/Quality

a) Habitat Restoration.
b) Phase III mitigation v. district boundary expansion.
   1) Boundary expansion
   2) District conservation measures v. return flow.
   3) Habitat Restoration.
c) ESA – What are Phase III benefits to Steelhead and Bull Trout?
   1) ESA v. Tribal Reserved Water Rights
      · Who takes the "heat" for habitat restoration?
d) Umatilla Basin TMDL – Draft document issues.
e) Treaty rights/other Litigation, Settlement Agreements, etc …

Article handed out:
Northwest Water Law and Policy Project Fall 2000 Volume 7, Number 1

Tribes Work with Irrigators to Return Water and Fish to the Umatilla River
By Harold Shepherd, Policy Analyst, Confederated Tribes of the Umatilla Reservation

The Confederated Tribes of the Umatilla Indian Reservation are once again working with a local irrigation district and the U.S. Bureau of Reclamation (BOR) to restore much needed water flows to the Umatilla River in northeastern Oregon. The Tribes and the district are negotiating the final phase of what has been recognized as a model for the peaceful resolution of water disputes to restore the fishery upon which the Tribes depend and to maintain the stability of the local irrigation economy. Once completed, "Phase III" of the Umatilla Basin Project would complement beneficial effects of the first two phases of the project, resulting in year round flows to revive struggling salmon and other species.

History of the Project

Shortly after the adoption of the Reclamation Act of 1902, the BOR developed projects to supply water to agricultural users in the lower Umatilla Basin. As a result of these and other water withdrawals, the lower Umatilla River ran dry for six months of each year by the early 1920x. Such conditions, and an array of dams in the Umatilla, blocked fish passage to spawning grounds resulting in the extinction of spring Chinook, fall Chinook, and Coho salmon and almost eliminated steelhead runs in the Umatilla Basin for a period of 70 years.

The Tribes found these actions contrary to an 1855 treaty in which the Tribes ceded control of 6.4 million acres of land in return for the right to occupy and govern the 172,000-acre Umatilla Indian Reservation. In addition, the Treaty expressly reserved the Tribes' right to fish at all usual and accustomed sites off reservation and the exclusive right to fish in the streams on the reservation.

Rather than resorting to litigation to recover their water, however, the Tribes worked with irrigation districts, the BOR, and the state of Oregon to develop a project to restore traditional fish runs while maintaining the local agricultural economy. After nearly a decade of negotiations and planning, the Tribes and local stakeholders encouraged Congress to adopt the 1988 Umatilla Basin Project Act, which authorized the BOR to develop a plan to restore instream flows for anadromous fish while allowing established irrigation to continue.

Building on Success

In general, the plan operates by requiring the West Extension, Stanfield, and Hermiston irrigation districts to exchange their rights to water with-drawls from the Umatilla River for an equivalent ("bucket-for bucket") amount of water from the Columbia River. Phase I of the plan was completed

in 1990 and maintains up to 140 cubic feet per second (cfs) of flow in the Umatilla below Three-Mile Falls Dam. Phase II was completed in 1999 and leaves approximately 83 cfs of water per year in the river. These exchanges allow tribal and state fisheries managers to maintain “target flows” in the lower Umatilla during critical fish migration periods in the spring and fall.

The real success of the Umatilla Basin Project, however, is best measured by the number of returning adult fish each year. In just ten years after initiating the first phase, coho and fall chinook numbers have increased dramatically. The year 2000 return of adult spring chinook hit an all time record of 5,000—comparable to past runs of the much larger Snake River basin. Such numbers have prompted Indian and non-Indian fishermen to flock to the river.

While the Basin Act is a significant step in the right direction, there is still work to be done in the Umatilla. Currently, the lower river continues to run dry from July through September due to irrigation withdrawals near the town of Echo and downstream. As a result, the Tribes are once again negotiating with the Westland Irrigation District, the BOR and others to develop legislation for “phase III” of the basin project which may be submitted to Congress as early as Spring of 2001. As with Phases I and II, Phase III would provide additional fish related benefits by transferring Westland’s Umatilla River water right to the Columbia River.

The Tribes hope that Phase III will allow the river to flow year round once again and restore pacific lamprey, fall chinook salmon, and other fisheries to the river. In doing so, the parties will also set a strong example by achieving these goals in a cooperative rather then a litigious manner.

Water Quantity as it Relates to Water Quality

Keith Underwood, Project Leader for the Lake Roosevelt Monitoring Program

Good afternoon. I am one of many people on the Lake Roosevelt Monitoring Program. I represent the Spokane Tribe on the Lake Roosevelt Program. Others are the Colville Tribe, Washing Dept. of Fish and Wildlife, Eastern Washington University has a number of different professors on there including Dr. Scholls and Dr. Black.

Slide of Lake Roosevelt. 151 miles long. Approximately 350 feet deep at the dam. Spokane River has a major influence on there, contributing about 7% of the flow. Kettle River contributes about 3%. San Paul River contributes about 3%. The Spokane Tribe currently rears fish as mitigation for the loss of salmon from Grand Coolie Dam. We are also rearing rainbow trout; about 500,000 rainbow trout go in annually. They are reared at Spokane hatchery and released after the annual drawdown. Cocanie are reared at the Sherman Creek Hatchery for about 6 months and then released. But the goal is to get fish imprinted in the Sherman Creek area so they will come back and spawn there.

The overall project goal of the Lake Roosevelt Monitoring Program is to build a fisheries management plan that recommends hydro operations and different management options such as habitat improvement, more hatcheries, etc. The second goal is to do monitoring and evaluation of the management plan in the future.

Right now we are doing a whole bunch of tasks to try to find out what makes Lake Roosevelt tick. There is not a great understanding of how a regulated river operates. Lake Roosevelt is a very deep river. It does not act like a reservoir because the water retention time can be as low as 12 days and as high as about 60-100 days. Depending on the year. It can't be called a lake because it is flowing too fast. So what we try to do is assume we don't know anything about a reservoir or a river, and go in and study every aspect of the lake. We've done extensive studies in water quality, zooplankton, etc. The ultimate goal is to develop a model that can predict the result of management options and its effects on fish production and other measurables. That is the ultimate goal. It is a pretty lofty goal. We just got through our scientific audit. ISRP agrees that that may be an unattainable goal. But we are going to attempt it anyhow.

The fish we are managing again are rainbow trout, kokanee, and walleye. Those are the three primary fishes we are concerned with today. We are also maintaining an open mind. Are these the right fish to be managing in Lake Roosevelt. Maybe we want to do something different. Sturgeon is another important fish, but we have not looked at them before because of the unique methods you need to use to sample sturgeon. We have just started a project this year to look at them. And other species.

The major impact to Lake Roosevelt is hydro operations. That's the biggest ugly for us to work with right now. After that, we will start looking at other issues. The remainder of this talk today is to talk about hydro operations and its effects, and maybe challenge the thought process, that quantity equals quality. Because in Lake Roosevelt, that may not be the case.

Slide of Grand Coolie Dam. Let me talk about the hydrograph of Lake Roosevelt quickly. In January, we are at pretty close to full pool. And then we start coming down to meet a projected flood control point and also to produce power. So we are trickling down here trying to meet this end point that they are constantly redefining as we get down towards April. By April to early May we are hitting our lowest flood control point, and then we start coming up to fill the pool for recreational issues, for fisheries issues and also to make sure that we have a surplus of water so that we can

provide salmon flows in August. And then in August, we will dip down another ten feet to provide flows for the lower river. And then from there we are going up. And annually this is a huge war over how you run the reservoirs, and what are the right flow targets, etc. And sitting up on Lake Roosevelt, I'm usually on the other end of the argument than the lower river folks and trying to figure out how to operate this thing fairly and equitably. Sometimes we get what we want and sometimes we don't. And I think we can say that for both sides of the fence.

Here's a brush stroke of just how it operates. So what happens to Lake Roosevelt when we are down here at the trough? Well this is at the confluence of the Spokane and the Columbia (slide). This is called two rivers, and it's on the reservation. This is where we have a RV Park and a boat launch. So this is at full pool, 1290. This is at 1208 this is our maximum flood control requirement and as you can see, we've lost a lot of habitat, and its pretty ugly for recreational users and such. That was the first week of May.

This is the Colville River; up at Kettle Falls (slide) upper end of the reservoir, (slide) and this is what it looks like at 1208. Again, we've lost some habitat.

This is Kettle Falls, about half way into the reservoir at a boat launch area (slide). This is it at 1208 (slide) and that's what's left of the marina. As you can also see, there is some mass wasting here. If you look at this substrate, this is pretty indicative of the whole reservoir: very sandy substrates. Very unstable banks. We have a huge amount of sloughing every year when the lake goes down because the hydraulic pressure basically just sucks the shoreline down.

(Over head) This is lake elevation again. I'm going to compare and contrast two years. This is 1997 and 1998. 1997 was a big water year, it was 130% of normal. 1998 was about an average year, around 100% of normal. So in Lake Roosevelt again we went down (all in averages) average around 1220. In 1998, the lowest extent was about 1258. Due to flood control requirements. The bigger the water year, the lower we go down. Also our water retention times when way down as well. 1997 water retention times went down around 10 days and 1998 they were approximately 30-40. The average for 1997 was about 27 days and the average for 1998 was about 45 days. Now you might say, "now that's not that big of a difference," but it is.

(Overhead) Here are some isotherms. This is at spring canyon. Right next to the dam. This is 1997. Sown to 33 meters, we are virtually isothermal the whole year round. You get a slight change around July. If you get a severe shift on the graph, you have more change in temperature and you get changes in density resulting in stratification. We don't get that. That's why we call this more of a regulated river than a lake. (Overhead) 1998, same place, this time we went down much deeper to verify this. We are fairly isothermal but you can see some gradients. Now this is where I'm going to start-arguing quantity is not always quality. So why do I want colder water in the lower part of the lake than in the upper part of the lake? Well kokanee don't like warm water. They are a salmon, and they want about 15 degrees C. If you look at this graph, at temperatures of 15 and lower in June kokanee are near the surface. If you look at the middle graph in August, kokanee are down at the bottom and the reason they are is because they are trying to find that cold water. When we exceed 15 degrees C, we are challenging kokanee's ability to survive at that point. In 1997, we had a huge fish kill in September and the reason is that lake was hot. (Overhead) We went out there one day and it was 26 degrees isothermal: bathwater.

So, what we would like to see in Lake Roosevelt is a water system that's not just ripping through there. We get a lot of water through there and we don't build up any cold water reserves. The reason there's a cold water reserve (according to modeling) is that right in front of the dam there's a slow tumble of cold water. When the water rips through that makes that tumble move faster and it pushes

it up. When it's slower then the water slides over the top of that tumbling water and we retain that cold water reserve. In average years, we still do deplete it, but we deplete it later on. And hopefully in cool years we won't be going so warm.

Another problem with quantity is entrainment. We loose our fish over the dam. Here's an example where we were looking at the best time to release rainbow into Lake Roosevelt and we found that if we release the fish while the Lake's coming up, we have a higher probability of retaining our fish than if we put them in when the lake's going down. There are points on here that show high levels of entrainment up to 100%, so we're loosing everything that we're putting in. So quantity doesn't add to any fish production in Lake Roosevelt.

I want to try to get into the Water Quality issue. If you have more water you get more turbity. You have a lot of water coming down, you stir up the sediments you suspend more solids. A primary food source in the lake is zooplankton. Because our lake goes up and down, so much we have virtually no benthic production. It's all basically water column production. So we have found that as we increase turbidity we decrease density of zooplankton. It's the primary food source for kokanee and rainbow trout. Also it reduces their fecundity, that is how many offspring can be put out. The food source for the zooplankton is chlorophyll A. We've shown that as you increase chlorophyll A you will increase zooplankton to some extent but you will get decreased fecundity. So what happens in high water: you're flushing water, you're increasing turbidity and you're decreasing chlorophyll A because you're not giving the system enough time to produce phytoplankton which ends up feeding the zooplankton, so you are basically decreasing zooplankton production. As temperature increases, zooplankton increases. As residence, time increases production for zooplankton increases. As chlorophyll A increases zooplankton increase. As lake elevation increases so does zooplankton. Population growth decreases with increases in turbidity.

What we are trying to strive for in Lake Roosevelt (overhead of elevations for last 10 years) is eliminate these inverted spikes. We want to keep this thing flat. If we had it our way, this would be one flat line. We know we're not going to get that. And even though we'd like to have that, we are trying to be realistic, that's not real. So again what we are attempting to do is to try to find ways to maintain productivity, as high as we can in Lake Roosevelt but at the same time provide for those flows that are needed down stream. And that's really tricky. Different ideas we are playing with are to build baffles in our littoral areas, start mass seeding our littoral areas so that our systems aren't so dependant on the palagic system, not so dependant on the water column. And trying to figure out ways to deliver water that would not increase entrainment: for example we are putting up strobe lights on our dam to see if we can scare fish away from the dam to try to bump up productivity for the fish site.

Water Quality Jurisdictional Issues
Rick Eichsteadt, Nez Perce Tribe

Slide 1:

# Water Quality Jurisdictional Issues

Presented by Rick Eichsteadt
Columbia River Basin Tribal Water Quality Conference
November 15, 2000

Slide 2:

## Tribal Sovereignty

- ***Tribal sovereignty is the source of the power Tribes can exercise over their property and members.***
- Tribes have been recognized as "domestic dependent nations."
  - *Cherokee Nation v. Georgia*, 30 U.S. (5 Pet.) 1 (1831).
    - Trust responsibility arises out of this dependence.
    - Make the U.S. a three sovereign system: federal, state, and Tribal.
    - Tribes are recognized as having a distinct political status, not merely a racial classification.

Slide 3:

## Regulation: State, Tribal, Federal

- Concurrent v. Exclusive Jurisdiction
- Sources of Power

–Tribes: Inherent Tribal Sovereignty
–States: Police Power
–Federal: Constitution, Treaties, Federal Statutes

Slide 4:

## Regulating Water Quality

- Regulating On-Reservation Non-Indian Activities

–The *Montana* Test: Tribes have the inherent authority to regulate non-Indians or fee lands on the Reservation when the regulated activity threatens or directly affects the political integrity, economic security, or health and welfare of the Tribe. *Montana v. U.S.*, 450 U.S. 544 (1981).
–*Montana v. EPA*, 137 F.3d 1135 (9th Cir. 1998).
•Montana, county, and municipalities, which owned fee interests in land located within boundaries of the Flathead Indian Reservation, challenged grant by EPA of treatment-as-state (TAS) status to the Confederated Salish and Kootenai Tribes, allowing Tribes to establish water quality standards (WQS) for Reservation.
•Ninth Circuit held that regulation which allowed Tribes to exercise authority over non-Indians owning fee interests in land located within Reservation reflected appropriate delineation and application of inherent Tribal regulatory authority.

Slide 5:

## Regulating Water Quality (continued)

- Regulating Off-Reservation Non-Indian Activities

–*City of Albuquerque v. Browner,* 97 F.3d 415 (10th Cir. 1996).
•Pueblo of Isleta promulgated water quality standards that were approved by EPA in accordance with CWA§ 518.
•The Rio Grande River flows through Albuquerque before flowing into the Pueblo of Isleta. Albuquerque operates a waste treatment facility on the Rio Grande.
•Isleta's water quality standards are more stringent than New Mexico's. Water quality of Rio Grande was required to meet Isleta's standards when they entered Isleta territory.
•10th Circuit ruled that Isleta could establish water quality standards more stringent than federal standards and that EPA has authority to require upstream NPDES dischargers to comply with downstream tribal standards.

Slide 6:

## Tribal Regulation of Water Quality

- Treatment as a State: CWA§ 518. To obtain Clean Water Act authority, a Tribe must:

–Be federally recognized;
–Have a governmental body capable of carrying out governmental duties;
–Authority to regulate (jurisdiction); and
–Capability to carry out functions of the program.

- Obtaining EPA Approval

–Tribe submits Water Quality Standards to EPA for Review
–EPA reviews Tribe's Water Quality Standards to determine if they comply with the Clean Water Act and federal regulations.
–EPA completes ESA consultation.
–EPA approves Water Quality Standards.

- Drafting Standards: Unique Tribal Considerations

–Tribal Designated Uses: cultural, ceremonial, fishery, wildlife.

Slide 7:

## Challenges to Tribal Jurisdiction

- *South Dakota v. Yankton Sioux,* 522 U.S. 329 (1998)

–Land surplus act by which unallotted reservation lands were opened for settlement did not preserve opened tracts' reservation status, but resulted in diminishment of reservation, such that the State of South Dakota ultimately acquired primary jurisdiction over tracts in question.
–Waste site constructed on such non-reservation land was subject to environmental laws of South Dakota and not the Tribe.

Slide 8:

## Map

Nez Perce Tribe
1863 Reservation
Indian Land Ownership

Slide 9:

## Jurisdiction: Conflicting Viewpoints

- Federal / Tribal Perspective
  - Reservation not disestablished or diminished.
  - *U.S. v. Webb*, 219 F.3d 1127 (9th Cir. 2000)
    - Reservation not diminished.
- State Perspective
  - Disestablished or diminished reservation.
  - *In re SRBA*, Case No. 39476 (5th Judicial District of Idaho, Nov. 10, 1999)
    - Reservation was diminished.
- North Central Idaho Jurisdictional Alliance.

Fights all Tribal jurisdiction.

Slide 10:

## Options for Proceeding

- Submit Treatment-as-a-State Application.
- Request EPA to Develop Reservation Specific Federally Promulgated Standards.
  - Colville Standards.
  - 40 C.F.R. § 131.35.
- Opt in to Federal Core Water Quality Standards.
- Find other options to avoid jurisdictional conflicts.

- Memorandum of Agreement (MOA).
- Informal cooperation.

Slides 11 & 12:

## MEMORANDUM OF AGREEMENT AMONG THE U.S. ENVIRONMENTAL PROTECTION AGENCY THE IDAHO EIVISION OF ENVIRONMENTAL QUALITY AND THE NEZ PERCE TRIBE RELATEING TO THE DEVELOPMENT OF A TMDL FOR WINCHESTER LAKE

WHEREAS, the U.S Environmental Protection Agency (EPA), the State of Idaho Division of Environmental Quality (DEQ), and the Nez Perce Tribe (collectively "the Parties") each desire to develop a government-to-government agreement for the development of a "total maximum daily load" (TMDL) strategy for Winchester Lake with the assistance of a community based group; and

WHEREAS, the Parties with to work together to build, support, and promote cooperation among citizens, business, and governments at the community level for purposes of formulating effective community support and a Winchester Lake TMDL;

THERFORE, the parties enter into this Memorandum of Agreement (the Agreement), and agree as follows:

1. The Parties will jointly appoint and support a Watershed Advisory Group (WAG) composed of community members to provide public input and develop watershed management recommendations for achieving water quality requirements in Winchester Lake.

2. The Parties will each provide staff and nominate experts from other government agencies to Technical Committee, which will provide technical advice to the WAG and will draft the TMDL, in addition to any other assistance each respective agency desires to provide.

3. The TMDL produced by the WAG and the Technical Committee, will, as agreed by the Parties, be jointly presented to EPA under the Clean Water Act for final action. This agreement does not constitute EPA approval of any TMDL.

4. For purposes of developing the TMDL, the Parties agree that the water quality standards EPA has approved for the State of Idaho are an appropriate measure for calculating the TMDL.

5. Communications between the Parties while implementing this Agreement generally will be at the staff level. If a dispute arises, the issue will be presented to immediate supervisors, and the staffs will present the matter to progressively higher levels of management until consensus is reached.

6. The Parties recognize that each Party reserves all rights, powers, and remedies now or hereafter existing in law or in equity, by statute, treaty, or otherwise. Nothing in this Agreement is or shall be construed to be a waiver of the sovereignty of the Nez Perce Tribe, the State of Idaho, or the United States. By entering into this Agreement, the Parties reserve, and to not waive, their claims to jurisdiction over all or parts of Winchester Lake and sources of pollution affecting Winchester Lake. This Agreement is intended solely for the purposes of facilitating inter-governmental cooperation between the Parties, and creates no rights in third parties or the right to judicial review.

7. This Agreement shall be effective upon the date of signature by all of the Parties. Any Party may voluntarily withdraw from this Agreement by providing thirty (30) days written notice to the other Parties.

Signature Blocks for representatives of:

Nez Perce Tribe
Idaho Division of Environmental Quality
U.S. Environmental Protection Agency

Dated November 1997.

Slides 13 & 14:

Copy of a letter, on letterhead with the seals of BOTH the Nez Perce Tribe and the State of Idaho

March 31, 2000

William Stelle, Jr., Regional Director
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National Marine Fisheries Service
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P.O. Box 2870
Portland, Oregon 97208-2870

Re: Short Term Activity Exemption of Total Dissolved Gas Supersaturation Standard

Dear Gentlemen:

This letter is a joint response from the Nez Perce Tribe and the State of Idaho to request on February 17, 2000 by the National Marine Fisheries Service (NMFS) for a short term activity exemption to allow exceedance of the water quality standard of 110% total dissolved gas (TDG) supersaturation in the North Fork of the Clearwater River Below Dworshak Dam and the Clearwater River below the North Fork between April 3 and August 31, 2000. The stated reason for the NMFS request for exceedance of the TDG standard is to supplement flows in the lower Snake River to achieve flow objectives as set forth in the 1995 Federal Columbia River Power System Biological Opinion and the 1998 supplement to that document.

The Nez Perce Tribe and the State of Idaho, in consultation with various state and federal agencies, have reviewed the information provided by the referenced request for a short-term activity exemption. The Nez Perce Tribe and the State of Idaho grant a short term activity exemption to allow exceedance of the TDG standard up to 120% for 12 of the highest hourly measurements during 24 hour spill, as measured at the U.S. Army Corps of Engineers Dworshak fish hatchery monitoring station, for the lower North Fork Clearwater and the mainstem Clearwater Rivers during the period April 3 through August 31, 2000. This short-term activity exemption is granted by the Nez Perce Tribe and the State of Idaho under the conditions set forth in Attachment A.

This joint response to your request for a short term activity exemption represents a collaborative effort between the Nez Perce Tribe and the State of Idaho and is designed to address the needs of migrating and resident fish and to optimize water management in the Snake and Clearwater River Basins. We look forward to working with you and other federal, tribal and state agencies to successfully implement this short-term activity exemption process.

Sincerely,
(Signature)

Samuel N. Penney
Chairman
Nez Perce Tribe

(Signature)
C. Stephen Allred Administrator
Idaho Division of Environmental Quality

cc: James Yost
Karl Dreher
Rod Sando
Chuck Clarke
Mike Field

Slide 15:

## Federal Trust Responsibility

- Applies to federal government and all its agencies to all actions and implementation of federal statutes affecting Tribal people, land, or resources.
  - Extends to management of fisheries, water projects, and federal lands.
- Government to Government Consultation
- Protection of Tribal sovereignty and self-government.
- Protection from state interference
- Protection of Tribal health and Tribal resources.
- 25 U.S.C.A. § 175.

Requires the U.S. Attorney General to represent Tribes in "all suits at law and equity."

Slide 16:

## Government-to-Government Consultation

- Executive Order 13084 provides that each "agency shall have an effective process to permit elected officials and other representatives of Indian tribal governments to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities."
- President's April 29, 1994 memorandum regarding Government-to-Government Relations with Native American Tribal Governments provides that federal agencies "shall assess the impacts of Federal Government plans, projects, programs, and activities on tribal trust resources and assure that Tribal government rights and concerns are considered during the development of such plans, projects, programs, and activities."

Slide 17:

## Questions / Comments??

- Write: Rick Eichsteadt, Nez Perce Tribe P.O. Box 305 Lapwai, Idaho 83540
- E-mail: ricke@nezperce.org

Temperature Guidance Criteria
John Palmer, EPA Seattle

We are going to talk about the Pacific Northwest Water Temperature Criteria Guidance Project. It's a two-year project; we are about half way through. The purpose is to establish EPA guidance for States and Tribes to use when they are adopting or revising water quality standards for temperature. Why are we doing this? First, water temperatures are critical for fish. Warm water kills fish if it is too warm. And humans have altered temperature regimes across the Pacific Northwest and so it is a water quality issue. That's the broad issue. Specifically, the reason for doing this project is because there is no clear guidance for states and Tribes as to what temperature regimes are appropriate for ESA listed salmonids. Currently at the states and some of the Tribes, we have temperature standards on the books. And at EPA, we do have national criteria for temperature, but with the emergence of the salmon issues in the northwest, there is a lot of uncertainty around the question of what are the appropriate temperatures for the fish. This project is about establishing clear guidance for states and Tribes on what temperatures are appropriate.

This project has quite a bit of background to it. I'm going to summarize a lot of work that proceeded it. First, a quick background on water standards (how the clean water act works). EPA sets water quality criteria at the national level. These are criteria which the states and Tribes can use for establishing water quality standards. Standards are adopted for protection of various beneficial uses. One beneficial use is salmon habitat. EPA then approves or disapproves a tribe or states standard, and we use EPA's criteria in order to make that judgement. Once the standards are set, those standards are used for the issuance of NPDS permits, or water permits. Areas that are in violation of those standards are put on the 303(d) list, and then TMDLs (Total Maximum Daily Loads – in other words, water clean up plans) are designed to clean up those waters to meet the standards. EPAs national water quality criteria for temperature do not specifically address the needs of the salmonids in the Northwest, and that's why we are doing this project. So that's Clean Water Act 101 (in two minutes).

Now for ESA 101 (part of it). Under section 7 of the endangered species act, federal agencies must consult with the National Marine Fisheries Service and/or the Fish and Wildlife Service on actions that may effect listed species. Now EPA approval of State or Tribal standards is an action that triggers a consultation. So when the salmon have been listed here over the last years in the Pacific Northwest, we have gotten into this business of consulting when approving Tribes and states standards. The whole purpose of consultation is to ensure that the action does not jeopardize the species survival. That's what section 7 is about.

The final background slide: In 1996, Oregon revised their water temperature standard. And this was the first standard in the northwest when we under went consultation with NMFS and USFWS. In an oversimplified explanation, they set a sample for 64 degrees [F] for salmon migration and rearing, 55 degrees for salmon spawning, and 50 for bull trout. So where those uses occur (migration, spawning, and bull trout) those are the water quality temperature standards in the State of Oregon. EPA consulted on this standard. During the consultation, there was concern about the 64 degree standard was of principal concern. The concern was that at 64 degrees there would be some sub-lethal effects, basically, stress that can occur to salmonids even at that temperature. What ultimately happened was that it did pass through consultation, but as a result of negotiations, we agreed to this project. This project was to do a complete analysis and really look at what was the appropriate temperature for salmonids. This project is actually a part of the consultation itself, referred to as a conservation measure.

That sets the stage in terms of background.

As I mentioned the states currently have temperature standards on the books. This map (overhead) overlays all the streams that are currently in violation of water quality temperature standards in the three states. Overlaid in the pink is the ESUs for the salmonids. As you can see, there is a high degree of overlap between streams in violation for temperature and where the threatened and endangered species exist. (Another overhead for bull trout overlaid with temperature impaired streams.) I show this to stress the importance of temperature in the habitat of these salmonids.

The project goals:

- Meet the biological requirements of native salmonid species for the survival and recovery pursuant to the ESA
- Provides for the restoration and maintenance of surface water temperature to protect and support native salmonids pursuant to the clean water act

- And meets the rebuilding needs of federal trust responsibility with treaty Tribes. (We are meeting three things: ESA, CWA, and tribal trust responsibilities. And we've been in discussions about what that means to meet each of those three.)
- Recognizes the natural potential and limitations of water bodies,
- Can be effectively incorporated by states and Tribes in their water quality standards programs.

Those are the goals for the project.

The guidance is being jointly developed by EPA, NMFS, USFWS, Oregon, Washington, Idaho, and the Tribes (participating tribal representatives on the policy group are the Nez Perce, CRITFC, and the Stillaquamish). The state and Tribes will use these standards to revise or adopt their temperature standards if necessary.

If NMFS and USFWS agree that what we come up with is protective, and if states and Tribes follow the guidance when developing their water quality standard, they have assurances that their standards will meet ESA requirements. So we are trying to do some up-front work with everyone involved, then, if Tribes and state follow this guidance they have assurance that its going to pass through ESA consultation and be approved by EPA. States and Tribes can adopt something different, but they would have the burden of going through a standard consultation and showing that the alternative standard is protective of ESA listed salmonids.

Project Overview: We are about halfway through. We expect to have final guidance October 2001, less than a year from now. We have two groups, a technical group that is really digging in to all these issues and trying to develop proposals. And then the policy work group that is the decision making body in terms of finalizing this guidance. The Technical Work Group is in the process of issuing technical issue papers and those should be available probably by the end of the year. Those technical issue papers have gone through peer review by a scientific panel in the Pacific Northwest.

Stakeholder input consists of outside input to the policy work group. We've had some input; we've had a call for technical information last summer. Coming up in January we are going to have a series of three workshops, one in each state, to invite the public at large to talk about where we are, what the project is about, and any information we've come up with thus far. We will also have public comment and workshops available when we have a draft.

We plan to have a draft available early this summer with another round of more formal workshops with public comment. The final guidance is expected to be adopted next fall.

This is what I consider to be one of the challenges of the project as a whole: We generally know what optimal and lethal temperatures are for salmonids. Fishery management agencies and hatcheries have done numerous studies and have a pretty good idea what the optimum temperatures are in terms of growth and what kind of effects fish have at different temperatures. But historically across the landscape, we also know that temperatures were not optimal everywhere all the time in the Northwest where salmon where abundant historically. We also know that in some situations the water were warm. That presents a real challenge and a problem in trying to set a standard for stream temperature. Salmon thrived even in the face of those warm temperatures probably due to behavioral adaptations. They know how to go to cold water. So that is probably how they adapted to warm water situations naturally. So the challenge is for us to set a temperature standard that is protective of fish, but somehow deals with the fact that in some situations, mainly in the eastern parts of the states and Idaho, that some water got warm in the summer naturally. So just setting one temperature number may not be the right approach to handling this. So we are trying to figure out another approach to this. Also it may not just be *how* cold, but it may be *how much* cold water. Which brings up a whole additional complexity in designing a temperature standard. Those are some of the challenges that the project faces.

(Overhead – general temperature/effects graph) In general: when you get up over 70 degrees, you start having lethal effects. When you get up over 60 degrees, you start having sub-lethal effects or stressful conditions. Above 60 degrees you start getting problems with infections, and disease, and the migrating spawning fish can impair their eggs, swimming speed can be effected, growth rates, and others. These are the sub-lethal issues we are trying to sort through.

(overhead). There are really two ways in which humans have impacted the temperature regimes in rivers and streams. One is the increase in maximum temperature: warming up the streams. Another is a decrease in the temperature variability within streams. Not only have we warmed up streams, but also we've reduced the variability with in streams. We have homogenized the systems so they are all one temperature where as in the past, there would be pockets of cold water and it would have been a variable environment. The

salmon could adapt to that and use the pockets of cold water. Both of these are very important when you think about temperature and how we've impacted the environment.

And finally four ways that humans have done that:

- riparian vegetation loss, reducing the shade and pools associated with that
- channel straightening and dikes, reducing variability and cutting off the channel from ground water flow and sources of cold water
- hydrologic alterations: i.e. rapid spring run off doesn't trickle through the system and keep the system colder in the summer months
- water withdraws and impounding, hold water and allow it to heat up, or reduce stream depth through withdraws

**Followed by**:

Comments of Patti Howard (policy team member, Nez Perce Water Department)

Main concerns with the project:

1) We need to make sure that the criteria developed are going to be protective enough of the salmonids to meet the treaty obligations of the government and the fishing needs of the Tribes.
2) We need to make sure that the criteria developed are implementable. There are many ways to approach this using watershed models, or ecosystem models. But all of these models we are finding have needs in terms of a lot of data collection and would require a lot of resources at the state and tribal staff levels to implement and ensure that they are being met.

Irrigation Project Success Story

James Thomas, Yakama Nation
Richard Mains, BIA

Slide 1:

Yakama Nation

## Water Quality

Slide 2:

## Soil Map of Reservation

Slide 3:

## Define the problem

- Soil erosion destroys productivity
- Suspended sediment impairs water quality

Slide 4:

## How Sedimentation Occurs

Slide 5:

## Define the solution

- Best science
- Bang for the buck
- Perception is more important than reality

Slide 6:

## A resource out of place

Slide 7:

## Tomorrow's drinking water

Slide 8:

## Develop a plan to implement the solution

- Break it down into bite sized pieces
  –Farm plan
  –Manage irrigation delivery
  –Manage irrigation drainage
- One bite at a time

  - –Satus Creek project(s)
    - •Plank Road
    - •North Satus Drain
    - •Monitoring
  - –WIP drain cleaning
    - •Education
    - •Communication
    - •Learn as we go
- Be deliberate and thorough
  - –A donkey is slow but has few accidents

Slide 9:

## Rotational Grazing

Slide 10:

## Sediment Basins and Treatment Wetlands

Slide 11:

## Tailwater Tarp Dams

Slide 12:

## The power of PAM

Slide 13:

## Surge Irrigation

Slide 14:

## ESA listed Steelhead spawning in Satus Creek

Slide 15:

## Work together

- The sum is greater than it’s parts
- Placing blame is counter productive
- Balance each other’s strengths and weaknesses
- Spread the word

–Help may come from unexpected quarters
–Education is most important step for solving a problem

Slide 16:

## Rill Irrigation Demonstration Project Design

Slide 17:

## Rill irrigation demonstration project participants

- Yakama Nation Environmental Program
- Bureau of Indian Affairs-Soil and Moisture Conservation
- Washington State University
- USGS
- Natural Resources Conservation Service
- Wapato Irrigation Project

Slide 18:

## Work together

Tribal Water Quality Standards Panel:
Basics of Water Quality - Gayle Killam, The River Network

Slide 1:

# Understanding the basic tools of the Clean Water Act

## Water Quality Standards

Gayle Killam
River Network
Columbia River Basin Tribal Water Quality Conference
Spokane, WA
November 15-16, 2000

Slide 2:

# Clean Water Act

- **Objective:** Restore and maintain the chemical, physical and biological characteristics of Nation's waters
- **National goals and policies:**
  - Eliminate pollution discharged to water by 1985
  - All waters will be "fishable and swimmable" by 1983
  - No toxic contaminants in toxic amounts

Section 101(a)(2) Clean Water Act

Slide 3:

# Water Quality Standards

"*A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act.*"

40 CFR 131.2

Slide 4:

## Water Quality Standards

- Components:
  - designated/beneficial uses
  - water quality criteria
  - antidegradation policy

Slide 5:

# Identifying Uses

- What are typical uses of rivers on tribal lands?

Slide 6:

# Designated/Beneficial Uses

- At least aquatic life and recreation
- Support most sensitive use
- All existing uses must be protected, but uses don't have to be existing to be protected

Slide 7:

# Water Quality Criteria

"*States must adopt those water quality criteria that protect the designated use. For waters with multiple use designations, the criteria shall support the most sensitive use."* 40 CFR 131.11(a)(1)

Slide 8:

# Identifying Criteria

- What chemical, physical or biological criteria should be monitored to protect existing uses of the water?

Slide 9:

# Water Quality Criteria

- Protection of different characteristics
  - **Chemical** – metals, bacteria, toxic contaminants, pH
  - **Physical –** temperature, sediment, flow
  - **Biological** – biological conditions of a waterbody, compared to reference site
- Classification of waterbodies - grouping different characteristics

Slide 10:

# Water Quality Criteria

- **Numeric** - measurable benchmarks

–maximum acceptable concentration (metals, bacteria)

–minimum or maximum acceptable level (dissolved oxygen, temperature)

–acceptable range (pH)

- **Narrative** - water quality goals

  –desirable biological condition

  –“free from” standards

Slide 11:

## How do uses and criteria work together under the Clean Water Act?

- Find your waterbody
- What uses exist?
- What uses are designated?
- What needs to be monitored to protect uses?
- What criteria are listed as critical to protect the use?
- What is missing?

Slide 12:

## Antidegradation Policy

- Protect existing uses – “Tier I”
- Maintain high quality waters – “Tier II”
- Protect outstanding waters – “Tier III”

Slide 13:

## Many Clean Water Act provisions depend on water quality standards

- Discharge permits (National Pollutant Discharge Elimination System)
- Water quality report (305(b))
- Impaired waters (303(d) list)
- Total Maximum Daily Loads (TMDLs)
- State water quality certification (section 401)

Slide 14:

# Role of Water Quality Standards

| | |
|---|---|
| Discharge Permits | Basis for permit effluent limits |
| Impaired waters list | When uses or criteria are not met |
| Water quality report | Whether designated uses are supported or not |
| Total Maximum Daily Load | Provide benchmark during development and implementation |
| State water quality certification | Basis for review of federal actions |

Slide 15:

# Questioning Standards: Key Questions

- Are all existing uses designated?
- Are criteria adequate to protect uses?
- Are the criteria being met?
- Is the Antidegradation Policy being implemented?

Slide 16

## Challenges:

· Conflicting standards in multi-jurisdictional waterbodies
· Developing criteria that address cumulative/synergistic effects
· Enforcement of narrative criteria
· Antidegradation review in impaired waters

## Opportunities:

· Triennial review
· Petitions

Tribal Water Quality Standards Panel:
Federal Core Water Quality Standards - Marcia Largerloef, EPA

Slide 1:

# Section I: Tribal Water Quality Standards Program

Section 518(e) of the Clean Water Act Criteria for Approval of Tribal Water Quality Standard Program

- Federally-recognized Indian Tribe
- A governing body carrying out substantial governmental duties and powers.
- The authority to regulate water quality within a reservation.
- The capability to carry out the functions of the program.

Slide 2:

# Procedures for Processing Indian Tribe Applications for Program Approval

- Pre-application Meeting
- EPA Headquarters consultation
- Submission of program or grant application to Tribal Coordinator
- Completeness Review
- Conference call to identify gaps or issues
- Establish Docket and Maintain Administrative Record
- Letter Requesting Comments from other Governments

Slide 3:

# Procedures for Processing Indian Tribe Applications for Program Approval (continued)

- Public Notice
- Review of State of Governments Comments
- Program Recommendation to Approve Capability
- Office of Regional Counsel prepares a decision memo
- Governmental review of EPA proposed finding of fact
- Headquarters concurrence
- RA signature on Decision of Document and approval letter

Slide 4:

# The Montana Test

Montana v. United States, 450 U.S. 544 (1981)

A tribe may retain inherent power to exercise civil authority over the conduct of non-Indians on fee lands within the reservation when that conduct threatens or has some direct effect on the political integrity, the economic security, or the health or welfare of the tribe.

Slide 5:

## EPA's Montana Test Guidance

- Requires showing that the potential impacts of a regulated activity on the tribe are serious and substantial.
- Is pollution being produced on non-member fee lands (or likely)?
- Are tribal members or resources exposed (or likely)?
- Does the exposure to the pollutants affect or have the potential to affect tribal politics, economics, or the health or welfare?

Slide 6:

# Section II:
# Core Water Quality Standards in Indian Country

Slide 7:

## WQS History

- Under Section 303 of the Clean Water Act (CWA) states adopt WQS
- CWA was amended in 1987 to allow recognition of Tribal water programs for funding and regulatory authority
- WQS regulation (40 CFR part 131) was amended in 1991 with procedures for Tribal program authorization

Slide 8:

## Development of Core WQS

Promulgation Concept

- Discussed at TOC meetings since 1998 and at various workshops
- Concept paper on Core WQS provided for Tribal comment in Fall 1999 – Spring 2000
- Over 60 Tribes provided written comments

Slide 9:

## Indian Country Under the CWA

- Reservations, including Tribal Trust Lands
- Dependent Indian communities
- Indian allotments, where a title has not been extinguished (e.g., individual or restricted allotments)

Slide 10:

## Status of Tribal WQS

- 16 Tribes have adopted WQS (nationwide)
- 10 additional Tribes have submitted WQS to EPA for approval
- Remainder of Indian Country does not have legally applicable WQS

Slide 11:

## Designated Uses in Core WQS

Designated uses to support the fishable/swimmable goals of the CWA or the next best use if not attainable

- Cultural and traditional uses
- Public water supplies where appropriate
- Agriculture, navigation and industrial purposes where applicable

Slide 12:

## Criteria in the Core WQS

- Narrative criteria
  " … waters shall be free from toxic, radioactive, conventional, non-conventional, deleterious or other polluting substances in amounts that will prevent attainment of the designated uses specified above …"
- Interpret numeric values for specific pollutants on case-by-case basis

Slide 13:

## Additional Provisions

- Antidegradation policy to protect existing uses of waterbodies and evaluate activities on high quality waters
- Mixing zones on case-by-case basis
- Compliance schedules for facilities that need time to construct additional treatment

Slide 14:

## Implementation Steps

- Consult with Tribe on appropriate uses and criteria for specific waterbody
- Identify applicable criteria of adjacent state/Tribe
- Determine which uses should be applied
- Interpret narrative criteria to protect uses

Slide 15:

## Implementation Steps (continued)

- Determine whether a mixing zone and/or a compliance schedule is appropriate
- Evaluate antidegradation procedures
- EPA would work, as appropriate, with adjacent Tribes, States, and other interested parties when implementing the Core WQS
- Respond to comments and issue final permit

Slide 16:

## Tribal Coverage Under the Core WQS

- Core WQS would not prevent Tribes from developing WQS at anytime
- Core WQS are automatically withdrawn upon EPA approval of a Tribe's own WQS
- Concept paper discussed two mechanisms: "Opt in" v. "Opt out"

Slide 17:

## "Opt-out" Provision

Written Request from Tribe

- "Opt-out" for reservations and tribal trust lands if one of the following items is met:
- Tribe has plan for adopting WQS within a reasonable time frame, or
- Tribe needs more time to consider options before developing a plan within a reasonable time frame, or
- Tribe and region will work on promulgating individualized federal WQS

Slide 18:

## Other Provisions

- "Regional administrator" could exclude a Tribe from the rule, without a letter, if in consultation with the Tribe, (s)he knows the Tribe has a plan to adopt WQS within a reasonable time
- Coverage of allotments in the proposed rule is deferred until EPA and DOI obtain better information on location of off-reservation allotment

Slide 19:

## Timeline for Proposed Rule

- Draft proposal was submitted to the Office of Management and Budget (OMB) in August for a 90 day review
- EPA has mailed a summary letter for response to comments received from Tribes
- EPA will respond to OMB's comments and expects to publish the proposed rule in the Federal Register in December 2000

Slide 20:

## Tribal Review of Proposed Rule

- Proposed rule will be sent to all Tribes
- Rule highlights specific issues for comment
- Public comment period will be at least 60 days
- EPA intends to conduct additional consultation meetings during the public comment period.

Tribal Water Quality Standards Panel:
401 Certification - Chris Gannon and Ryan Smith, Warm Springs

Mr. Gannon centered his talk on the cooperative agreement regarding 401 Certification and Relicensing of the Pelton-Round Butte Hydroelectric Project. The following is a copy of the letter of agreement between the parties cooperating on this effort.

# Letter of Agreement Between the Oregon Department of Environmental Quality, the Confederated Tribes of the Warm Springs Reservation of Oregon and the U.S. Environmental Protection Agency Regarding 401 Certification and Relicensing of the Pelton-Round Butte Hydroelectric Project

This letter of agreement is to clarify the roles, responsibilities and process for the Clean Water Act 401 Application/certification for the Pelton-Round Butte hydropower-relicensing project. The parties to the agreement include the Confederated Tribes of the Warm Spring Reservation of Oregon governmental entity (Tribes), the Oregon Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA).

Portland General Electric (PGE) and the power enterprise interest of the Tribes, Warm Springs Power Enterprises (WSPE), are both applying for 401 certificates as part of the ongoing federal Energy Regulatory Commission (FERC) relicensing process. The final license for the project will likely be issued singly or jointly to these entities. Due to the likelihood that the Tribes will soon be granted Treatment As a State (TAS) status by EPA, the 401 process becomes somewhat complicated. The parties to this letter of agreement are actively working together in order to ensure that this process runs smoothly and impartially and that communication lines are open with regard to the review of WSPE's and PGE's 401 applications.

The parties agree that the general goals of the 401 certification process for this project are to:

1. Develop compatible DEQ and Tribal 401 certifications containing consistent conditions for a given applicant's application.
2. Develop consistent DEQ and Tribal 401 certification conditions for similar attributes within the applications of each of the competing applicants.
3. Develop 401 certification conditions that are satisfactory to the issuing agencies (Note: optimally, although not necessarily, the certification conditions would be acceptable to both applicants).
4. Evaluate and act on the 401-certification applications in an effective, efficient and impartial manner.
5. Ensure an open and productive working environment with clear operating procedures.

## Roles and Responsibilities

The DEQ is responsible for evaluation and finding for the WSPE and PGE applications. Similarly, the Tribes will have such responsibility upon TAS approval. Since the Tribes' TAS status is pending, the EPA is presently responsible for 401 evaluation and findings in the Tribes' stead. Until the TAS has been granted, EPA will request and receive the WSPE and PGE applications for 401 Certification and be responsible for 401 evaluation and findings for both applications on behalf of Tribal interests. Once TAS status has been granted to the Tribes, EPA will act primarily as an observer, facilitating discussions only where necessary to avoid conflict or dispute. As observer, EPA will also strive to assure impartiality regarding application of water quality standards to competing applications. If EPA observes what could be construed as a bias towards an applicant, EPA will play a more active role and suggest reconsideration of action and maintain a written log of the issue and outcome for the public record.

The DEQ, the Tribes and the EPA have all agreed that they will meet periodically throughout the 401-certification process with the general goal to provide consistent 401 evaluation and compatible findings. Since there is shared concern for the boundary waters occupied by the project, the parties recognized that this up-front coordination is necessary to ensure that certificates issued by the 401 agencies will protect all applicable water quality standards and beneficial uses.

## Meeting Ground Rules, Descriptions and Objectives

The following ground rules have been established: 1) All meetings are to be between the parties to the agreement, although the parties may invite the applicants of other related agencies in on some meetings/workshops; 2) Information developed as a result of these meetings will become part of the public record; 3) Meeting minutes will be maintained, made part of the public record, and provided to the applicants. All meeting between the Tribal Government, EPA and the DEQ have thus far been productive and respectful. We expect that this will continue and we will establish additional meeting ground rules only as needed.

Proposed meeting objectives are as follows:

1) Discuss and consider State and Tribal water quality standards, parameter by parameter. This will ensure that the 401 agencies have a clear basis for how to interpret each entity's standards. From this review, the 401 agencies will develop a "Significance List" prioritizing which parameters will likely be issues in this certification process.
2) Discuss and consider the draft 401 application comments being developed by the individual 401 agencies for both applicants.
3) Discuss and consider any "provisional" 401 certifications being prepared by the individual 401 agencies based on each applicant's draft 401 application.
4) Discuss and consider the completeness of "final" 401 applications received and reviewed by the 401 agencies from both applicants.

5) Discuss, consider, and compare the draft 401 certificates being developed by the individual 401 agencies. Identify areas of inconsistency/incompatibility.
6) Strive to resolve any significant differences in the draft 410 certificates, thus creating a "coordinated" pair of 401 certificates in preparation for public notice.
7) Upon internal review by each 401 agency, discuss, consider and revise as appropriate the coordinated draft 401 certificates in preparation for public notice.
8) Discuss and consider written comment and oral testimony received during public noticing of the draft 401 certificates.
9) After considering public comment and modifying the 401 certificates as appropriate, discuss, consider and compare the 401s to ensure their adequacy, consistency and compatibility. Strive to resolve any significant issues prior to issuing the final 401 certificates.

## Dispute Resolution

Any significant disputes that arise between the parties to this agreement as part of coordinating the 401-certification efforts will be resolved according to the following steps:

1) Any dispute would first result in dispute resolution between the technical staff, informally working with EPA technical staff for input that may help resolve concerns.
2) If preliminary resolution fails, the parties will formally elevate the issue through their chain of authority to be resolved at progressively higher levels.
3) If the first tow dispute resolution steps fail, then either party may request that the parties agree to disagree regarding the issue at hand, thus maintaining their individual authoritative control. The 401 agencies recognize, however, that it is generally desirable to come to consensus, as opposed to agreeing to disagree. This letter of agreement would not preclude the 401 agencies from seeking-out alternate dispute resolution mechanisms as may be legally applicable nor does the letter of agreement preclude development of additional dispute resolution steps as the parties mutually deem necessary and appropriate.

Signature blocks for:

Elbert Moore, Director
USEPA Region X Office of Ecosystems and Communities

Langdon Marsh, Director
Oregon Department of Environmental Quality

Charles “Jody” Calica, Chief Operations Officer
Confederated Tribes of the Warm Springs Reservation of Oregon

Jeffery E. Sanders. Jr., Water Control Board Chair
Confederated Tribes of the Warm Springs Reservation of Oregon

Presentation accompanied by overheads:

Slide 1:

## CWA – Section 518

· 40 CFR; Parts 131.8
Pages 276-278
(Revised July 1993)

· TAS Authority for Tribes
(Treatment As a State)

· Includes 401 Authority …

Slide 2:

## TAS Requirements

1) Federally-recognized Tribe [CFR 131.3-(k)&(l)]
2) Governmental authority & capacity
3) Defined jurisdictional area.
   A-Montana Test
4) Technical capability for a Water Quality standards program.

Slide 3:

## REFERENCE:

EPA Office of Water Publication I.D.-
EPA-823-F-99-020
"Introduction to Water Quality Standards"

Fund Raising Strategies:

Private Foundations – Elizabeth B. Ferdig, Spirit of the Salmon Fund

The Spirit of the Salmon Fund is new. The purpose of the fund is to mobilize resources for the Columbia River Inter-Tribal Fish Commission, its four member Tribes, and Indian Country in General. Now focusing on fund raising for the commission and working on some national issues that will hopefully strengthen private fundraising and philanthropy in Indian Country.

Here, E.B. outlines some of the strategies for identifying and approaching private foundations for funds for water quality work by the Tribes.

Slide 1:

## Opportunities for Private Funding in Indian Country

- "Native American Programs" are typically under-funded
- Tax-benefits under-utilized
- Positive outlook - tremendous room for growth

Slide 2:

## Differences between federal grants & private grants

- More competitive
- More relationship-intensive
- Non-standard in approach
- Reporting requirements

Slide 3:

## Types of Private Funding

- Foundations
- Corporations
- Individuals

Slide 4:

## Researching Funding Sources

- Thorough research is important.
- "Stretching" funders' priorities usually does not pay off.
- Once a "good match" is found, research more!

Slide 5:

## ABCs of Prospect Research

- A - Ability
- B - Belief
- C - Contact

Slide 6:

# Abundance vs/Scarcity

- Belief: resources are limited
- Fact: there are more and more dollars going into the philanthropic community every year.
- Challenge: to get those dollars flowing into Indian Country - money follows money

Slide 7:

# Major Benefit for Donors

- Internal Revenue Code (IRC) 7871 makes contributions from individuals, foundations, & corporations tax-deductible for the entity donating to federally recognized Tribes.
- This means that donors DO NOT need tribal programs to be 501c3 to receive tax benefits.

Fund Raising Strategies:
Federal EPA Funding - Doug Cole, EPA

COLUMBIA RIVER BASIN TRIBAL WATER QUALITY CONFERENCE
NOVEMBER 15-16, 2000
SPOKANE, WASHINGTON

FEDERAL EPA FUNDING
**DOUG COLE**
**EPA R-10 TRIBAL PROGRAM**

# A COUPLE OF KEY POINTS

- Grant funds for tribal programs is increasing (bot so is the demands for those funds).
- Within EPA, get to know tribal coordinator, tribal specialists, and program specialists.
- Keep you eyes open for funding opportunities
  - -Network
  - -Beat the bushes
  - -Read the newsletter(s) and search the net
- Grant proposals/ projects must be sound (and awarded grants must be managed well)
- Leverage funds to maximize grant dollars
  - -Multiple use of each project
  - -Develop partnerships

# HELPFUL SOURCES OF INFO
# VIA INTERNET

**EPA HOME PAGE:** http://www.epa.gov/indian
(access to AIEO home page, esp. tribal grants info)

**TRIBAL GRANTS HANDBOOK:** http://www.epa.gov/indian/tribal.pdf
(via AIEO home page, a compilation of federal sources of financial and/or tech. assis. programs available for tribal environmental management

**EPA R-10 HOME PAGE:** http://www.epa.gov/r10earth

- General grants information (click on “grants programs”)

- Tribal grants information (click on “269 Indian Tribes”, then “Tribal Grants”)

- Tribal Newsletter (click on “269 Indian Tribes”, then “Monthly Newsletter”

# Wetland Development Grant Program (“104(B)(3)” Funds)

**Purpose**: Grants may be used to develop or enhance programs for the protection, management, or restoration of wetlands. Funding under this program may not be used for the operation or maintenance of existing wetlands programs.

**For Federal Fiscal Year 2001**:

Date of call letter - July 31, 2000

Deadline for submission of pre-application proposals - October 16, 2000

**Funding available within EPA Region 10**: approximately $1.2 million per year generally divided approximately equally between the four geographic areas of Alaska, Idaho, Oregon, and Washington.

Grants to Tribes have ranged from approximately $25,000 to $70,000.

**Grants are awarded competitively**.

**Match**: Grants require a minimum of 25% of the total project cost of each award.

# General Assistance Program (GAP)

**Purpose:** Provides funds for Tribes to build the capacity to development and administer environmental regulatory programs, including delegable programs, and to address environmental issues on tribal lands

**For Federal Fiscal Year 2001:**

- Date of call letter - November 7, 2001
- Deadline for submission - full and complete application postmarked by January 19, 200

**Funding Available:** base amount is $100K (up from $90K), depending on amount of unspent funds

**Tribes Must Meet Established Criteria**

- Work plan addresses a direct risk to human health and/or the environment

- Work plan demonstrates the fiscal and programmatic management capability of the tribal government
- Completed work plan is postmarked by Jan 19, 2001

**Match: None**

**Eligibility:** "Federally Recognized" Tribe

# BY THE WAY, JUST WHAT IS "MATCH"?

**Match**: A grant recipients nonfederal cost-sharing contribution, expressed as a percentage of total grant costs.

Can be provided as follows:

Cash Contributions - nonfederal funds from individuals and organizations (i.e., non-profits)
In-Kind Contributions - nonfederal third party non cash contributions (donated time)
Program Income - Depends on Agency rules, and program-specific restrictions

# WATER QUALITY PLANNING AND MANAGEMENT ("106" Funds)

**Purpose:** Assist Tribes in developing and implementing water pollution control or groundwater protection programs, including
- monitoring and assessments
- developing ordinances, regulations, programs, plans (TMDLs)
- establishing water quality standards
- developing TMDLs/wasteload allocations

**For Federal Fiscal Year 2001**
Date of call letter - Not Sent Yet
Deadline for submittal - Proposals due Jan. 12, 2001, Finals in March/April

**Funding Available within EPA Region 10**
$2.7M target
$60K base, with add-on for res. size, TWQS and UWA's

**Match Required:** 5%

**Eligibility:** TAS Required (for grant purpose only)

# NONPOINT SOURCE POLLUTION ("319" Funds)

**Purpose:** Assist Tribes in the implementation of EPA approved Nonpoint Source Management Programs, or the implementation of individual nonpoint source projects

**For Federal Fiscal Year 2001**

Date of call letter: Not Sent Yet
Deadline for submittal: Not Established Yet

**Funding Available (Tribal Set-Aside Only)**

$6M proposal (last year, $2.5M) - Nationally
Base Funding ($30K/$60K depending on size)
Competitive Funding between $50K/$100K, depending on need, for Watershed Projects

**Match Required:** 40% (may be reduced, depending on "need")

**Eligibility:**

Completed UWA
TAS (for grants purpose)

Slide:

# HYPOTHETICAL FUNDING MATRIX

TMDL Elements Funding

| | **Funding Source** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *TMDL Element* | **GAP** | **106** | **319** | **104(b)(c)** | **TMDL** | **USFWS** | **CAE** | **BPA** | **Non-Profits** |
| *Staff support* | X | X | X | | | | | | |
| *Scope* | X | | | | X | | | | |
| *WQS* | | X | | | | | | | |
| *Load Allocation* | | | | | X | | | | |
| *Monitoring* | | X | X | X | | X | | | |
| *Implementation* | | X | X | X | | X | X | X | X |
| *Public Participation* | X | | X | X | | | | X | |

# Contamination Issues Relating to Wildlife, Fish, and Human Health:

Potential Reproductive Effects on Kootenai River White Sturgeon - Gretchen Kruse, M.S. Candidate

Ms. Kruse presented a project she did for her masters thesis pertaining to the effects of environmental contaminants on reproduction and other physiological processes in Kootenai River Sturgeon.

Slide 1:
The Effects of Contaminants on Reproduction, Embryo Development and Related Physiological Processes in Kootenai River White Sturgeon, Acipenser transmontanus Richardson
By:
Gretchen Kruse, M.S. in Fisheries Resources University of Idaho
Major professor: Dennis Scarnecchia
Committee members: Jerry Exon and Jim Congelton

Slide 2:
## Contributing Agencies

· Bonneville Power Administration
· University of Idaho
· Koontenai Tribe of Idaho
· Idaho Department of Fish and Game
· US Fish and Wildlife Service
· Kootenai River Network

Slide 3:
## Study Area
## Displays a map of the Kootenai River System

Slide 4:
## Geology and Geography
## Graphic

Slide 5:
## Photo of Kootenai River White Sturgeon

Slide 6:
## Potential Contaminant Sources

· Mining
· Logging
· Agriculture
· Transportation
· Urban Development

Slide 7:

## Graphic:

Exposure Pathways

Slide 8:

## Biomarkers and Measurable Endpoints

Reproduction: Fecundity
Reproductive Hormones
Sperm motility

Physiology: Lesions
Deformities
Tumors

Behavior: Avoidance
Migration
Feeding

Slide 9:

## Project Goal

Use biomarker research in a baseline survey to evaluate the potential effects of organochlorine, organophosphate, organonitrate, and carbamate pesticides, polychlorinated biphenyls (PCBs), and metals in the aquatic system on Kootenai river white sturgeon.

Slide 10:

Chapter one: Adult life stage
Chapter two: Embryonic life stage
Chapter three: Juvenile life stage

Slide 11:

## Chapter One:

Effects of Environmental Contaminants on Reproduction in Sturgeon

Slide 12:

## Graphic

Slide 13:

## Objectives

· Determine baseline contaminant concentrations in ovarian tissue, river-bottom sediment and water
· Determine baseline plasma steroid concentrations and how they relate to ovarian tissue contaminant concentrations
· Assess potential relationship between egg size and ovarian tissue contaminant concentrations

· Determine if sediment and tissue contaminant concentrations have changed in the past 10 years

Slide 14:

## Hypotheses

$H_1$: There is no significant difference between ovarian tissue or sediment contaminant concentrations from samples collected during 1989-1991 and those collected during 1997-1999 (Mann-Whitney U test; $P<0.05$)

$H_2$: There are no significant correlations between ovarian tissue contaminant concentrations and egg size in broodstock females (Spearman rank test;  =0.05)

$H_3$: There are no significant correlations between ovarian tissue contaminant burden and plasma steroid concentrations in female sturgeon (Spearman rank test;  =0.05)

Slide 15:

## Methods
## Photos

Slide 16:

## Results

Slide 17:

## Sediment Residues

| Variable (mg/kg) | Concentration ppm | |
|---|---|---|
| | Range | Mean ±st.deviation |
| Cadmium | 0.10-0.60 | 0.39±0.19 |
| Copper | 2.90-14.00 | 9.41±4.07 |
| Iron | 240-4,600 | 3068±1392 |
| Lead | 11.0-34.0 | 23.1±7.68 |
| Manganese | 95.0-300 | 204±74.7 |
| Mercury | 0.01-0.02 | 0.02±0.01 |
| Zinc | 44.0-85.0 | 67.0±14.8 |
| Total Organic Carbon | 680-21,000 | 12,035±7925 |

Slide 18:

Water Residues

| Variable | Concentration | |
|---|---|---|
| | Range | Mean ±st.deviation |
| Iron (mg/l) | 0.48-1.00 | 0.07±0.19 |
| Manganese (mg/l) | 0.01-0.03 | 0.02±0.01 |
| Zinc (mg/l) | 0.01-0.22 | 0.04±0.07 |
| PCB Aroclor 1260 (ug/l) | - | 0.40 |
| pH | 6.71-7.50 | 7.10±0.31 |
| Temperature © | 11.9-12.9 | 12.4±0.39 |
| Conductivity ((mS/Cm) | 0.17-0.19 | 0.18±0.01 |
| Turbidity (nfu) | 12.2-55.1 | 27.0±14.35 |
| Dissolved Oxygen (mg/l) | 10.1-12.4 | 11.2±0.93 |

The PCB arochlor 1260 was only detected in one of the eight water samples

Slide 19:
Organochlorides in Ovarian Tissue

| Contaminant | Number of Samples | Concentration range ppb |
|---|---|---|
| DDE | 12 | 96-1800 |
| DDT | 8 | 30-88 |
| Aroclor 1260 | 10 | 180-1000 |

Slide 20:
Metals in Ovarian Tissue

| Contaminant | Number of Samples | Concentration range |
|---|---|---|
| Arsenic | 5 | .23-.80 ppm |
| Cadmium | 8 | .003-.94 ppm |
| Copper | 10 | 1.5-6.9 ppm |
| Iron | 12 | 15-53 ppm |
| Selenium | 12 | .88-12 ppm |
| Lead | 6 | .048-.540 ppm |
| Zinc | 12 | 21-170 ppm |

Slide 21:
## Comparison Between Sampling Periods
Graphic: Box graphs

Slide 22:
## Egg Size
Graphic: Statistical analysis

Slide 23:
## Plasma Steroids
Graphic: Statistical Analysis

Slide 24:
## Conclusion
- Potential stressors to adult reproduction:
- DDE
- DDT
- PCB Aroclor 1260
- Cadmium
- Selenium
- Zinc
- Iron
- Manganese

Slide 25:

# Chapter Two:
Effects of Contaminant Uptake on Survival of White Sturgeon Embryos

Slide 26:
## Objectives
· Determine route of contaminant exposure for embryonic sturgeon in relation to rearing media
· Assess relationships between contaminant uptake and embryo survival

Slide 27:
## Hypotheses

$H_1$: Contaminant concentrations in embryos did not significantly correlate with embryo mortality
(Spearman rank correlation analysis;  =0.05)

$H_2$: contaminant uptake and embryo mortality did not significantly differ among treatments (Kruskal-Wallace and Mann-Whitney U tests: $P< 0.05$)

Slide 28:
## Methods
## Photos

Slide 29:
## Results

Slide 30:
## Metal Bioaccumulation
Graphic: Box graphs

Slide 31:
## Egg Mortality
Graphic: Box graphs

Slide 32:
## Egg Mortality
Graphic: Box graphs

Slide 33:
## Conclusion
· Potential increased exposure to metals with river bottom contact

· Potential increased mortality due to:
  · Fungal Growth
  · Exposure to Copper and Aroclor 1260

Slide 34:

# Chapter Three:

Tissue Residues and Effects of Bioaccumulated Contaminants on Physiological Parameters in Juvenile White Sturgeon

Slide 35:

# Objectives

· Determine whole-body contaminant concentrations in juvenile sturgeon
· Assess acetycholinesterase concentrations for potential disruption
· Assess genetic chromosome damage in relation to contaminant burden
· Analyze liver tissue for histopathological damage

Slide 36:

# Hypotheses

$H_1$: Cholinesterase is not significantly inhibited by exposure to carbamate and organophosphate pesticides (Student's T-test; $P < 0.05$)

$H_2$: Cholinesterase activity and concentrations are not significantly correlated to contaminant residue concentrations (Spearman rank test: =0.05)

$H_3$: CV values in adult and juvenile sturgeon were not significantly different (Mann-Whitney U test: $P < 0.05$)

$H_4$: Tissue residue levels and CV values are not significantly correlated (Spearman rank test: =0.05)

Slide 37:

# Methods

Photo

Slide 38:

# Results

Whole-body Tissue Residues

| Parameter | Percent of Total Samples | Mean (±st. deviation) | Range |
|---|---|---|---|
| Zinc (ppm) | 100 | 17.3(3.78) | 9.90-24.0 |
| Cadmium (ppm) | 32 | 0.02(0.01) | 0.01-0.05 |
| Lead (ppm) | 20 | 0.95(0.51) | .57-1.80 |
| Cobalt (ppm) | 28 | 0.11(0.04) | 0.08-0.20 |
| Nickel (ppm) | 44 | 0.76(1.01) | 0.23-3.70 |
| Manganese (ppm) | 100 | 1.76(1.19) | 0.52-6.30 |
| Iron (ppm) | 100 | 31.9(68.2) | 0.30-350 |
| Chromium (ppm) | 68 | 0.45(0.34) | 0.16-1.30 |
| Aluminum (ppm) | 100 | 11.8(11.1) | 2.60-42.0 |
| Copper (ppm) | 100 | 2.40(4.27) | 0.29-17.0 |
| Arsenic (ppb) | 100 | 216(87.1) | 66.0-400 |
| Selenium (ppm) | 100 | 0.71(0.11) | 0.47-0.94 |
| Mercury (ppm) | 100 | 0.33(0.05) | 0.26-0.45 |
| DDE (ppb) | 8 | 72.0(7.07) | 67.0-77.0 |

Slide 39:

## Cholinesterase

Graphics: statistical analysis

Slide 40:

## DNA Assessment

Graphics: statistical analysis box graphs

Slide 41:

## DNA assessment

Graphics: statistical analysis

Slide 42:

## Liver Histology

N=25

| Abnormality | Percent of Sample |
|---|---|
| Lymphocyte Aggregations | 80 |
| High Levels of Melanin | 96 |
| Focal Necrosis | 32 |
| High Levels of Fatty Tissue | 4 |

## Conclusion

- Not bioaccumulated in tissues and do not appear to disrupt c cholinesterase activity or production:
  - Organophosphate pesticides
  - Organonitrate pesticides
  - Carbamate pesticides
- Potentially altering Cholinesterase production and DNA integrity:
  - Chromium
  - Lead
  - Aluminum
  - Iron
- Potential liver damage should be assessed in older fish

Slide 45:

## Historic Photo

Contamination Issues Relating to Wildlife, Fish, and Human Health:
Contamination as a Factor in Salmon Recovery - Don Steffeck, US FFWS

My presentation is going to be contaminants and there effects on salmon, and is this the missing piece of the puzzle. Its based on the white paper that a number of fish and wildlife field offices put together (copies available from me). I've been here for seven years now and heard a lot of discussion on the different aspects that are adversely effecting salmon. A lot of time they are summarized down into "4 Hs" which are habitat, hatcheries, harvest, and hydropower. A lot of times there is a kind of general discussion of water quality but there really hasn't been much talked about from a contaminant perspective. I think all those things are absolutely important. The purpose of putting this white paper together was to explore the idea that contaminants should be part of the overall evaluation of salmon conservation. One of the reasons that contaminants need to be considered as part of an ecosystem approach to restoration is that salmon are know to be particularly vulnerable to contaminants in their early life stages. A lot of laboratory work has been done showing that contaminant effects –especially on juvenile and early life stage salmonids- show that salmon are among the most sensitive species for a wide range of contaminants. That fact coupled with the fact that salmon life history shows them reproducing in fresh water and early life stages in the estuaries, where most of the contaminants sources are. So although they spend most of their time in the ocean, at their most sensitive life stages they are where most of the contaminants are.

So one of the things that we took a look at, since we know that salmon are sensitive to contaminants and that they do return to these fresh water areas, a fair question to ask is are there really many contaminant sources in the fresh water and estuarine areas? This is an important question so we looked at this in a detailed way. Contaminants can be found entering aquatic habitats through a variety of point and non-point sources. Some of these sources do have regulatory limits on them and controls that do reduce the amounts of contaminants, but there are still a lot of sources out there that could potentially effect salmon. One of the information sources we looked at was the EPA summary report of toxic releases. We looked at the summary and the data that was provided for 1995 which shows that there were over two billion tons of toxics that were released to surface waters by the largest dischargers in California, Washington, Idaho and Oregon. Again, this doesn't include non-point or non-industry sources. It just illustrates that there are a substantial amount of toxics that are being released as a result of human activity.

One of the other sources we looked at was mining. Mining for gold, copper, lead, etc. has occurred extensively throughout the west for the last 150 years. Past practices have created conditions that have lead to large-scale impacts on downstream aquatic resources such as in the Coeur d'Alene basin. And there is also large releases of mercury that was used in the gold mining process, that continues to leak into surface waters. There are others. We've been working in Idaho with the Shoshone-Banock Tribe and a number of federal and state agencies as well as industry. It's showing that phosphate mining is releasing fairly large quantities of selenium as a result of that two. There are a lot of different releases that occur during the mining process. Smelters are associated with mining and have released a lot of stuff into the air, which ends up back in the aquatic system.

We looked at the number of mines in the west. Based on a database by the Bureau of Mines in the Columbia Basin alone there are about 20,000 past and current mining sites. Not all of these are necessarily releasing contaminants, but we do know that many of them are.

Another source is related to pesticides through forestry, agriculture, commercial sites, or home and garden use. Nation wide about 4.5 billion pounds of pesticide active ingredients are used annually in about 20,000 different pesticide products. EPA data from field studies estimate that 67 million birds die from exposure to agricultural pesticides. We don't have data specifically on fish that I am aware of, but I think it does show that there is a real potential for impact. One other thing to take into account is that the testing for toxicity is done on the active ingredients and a lot of the time the inert ingredients can be harmful or just as harmful as the active ones. In addition irrigation drain water can move pesticides (or in areas of high selenium, move selenium) directly into the waterways. There is a recent study in the Willamette Basin by the USGS, and they concluded that pesticide and phosphorous concentrations were more important than habitat in determining where the fish were present. It's an indication that it's a very important issue.

On the non-point sources, including pesticides, we also looked at TMDLs. There are a high number of TMDLs for Oregon, Washington, and Idaho (900 stream segments in each WA and OR). Over half of those, TMDLs are for temperature or sediment, but a large segment are a result of contaminants. In addition to agriculture there are a large number of point sources out there. There are about 350 point sources requiring NPDES permits (as required under Clean Water Act for point surface water discharges). There is also information available about hazardous waste sites. Hazardous waste sites can also release contaminants through either wastewater run off, seepage, or contaminating the ground water. Using the EPA database for the Columbia Basin there are about 5000 known hazardous waste sites in the basin. Another source of contaminants in surface waters is spills. The data we have is from 1994; just in that one-year there were 430 oil spills recorded and 200 chemical spills. What this illustrates is that there are a lot of contaminant sources out there and potentially can effect salmon.

We were able to take some of the data, put it in a GIS system, and put it on a map. This is the state of Oregon (overhead) showing mining sites, hazardous waste sites or industrial discharges. There are sources throughout the basin. The next overhead shows the eastern Columbia River Basin and the mining sites located there. The cumulative effect of this should be considered as part of the overall evaluation of salmon.

Always the next question is: are these sources effecting biota, especially fish? One indication of whether or not there is an effect is documentation that there is exposure occurring at elevated levels. One of the ways that we can do that is by looking at fish consumption advisories. For the Columbia Basin there are a number of fish consumption advisories that have been documented. (Overhead) This is from EPA fish consumption advisory database. It shows the Columbia Basin and advisories and the contaminants of concern for each advisory. In the Columbia River there are advisories for dioxin. Yakama River Basin has a consumption advisory for DDT and DDE advisories – that wasn't know until a USGS evaluation in 1991/1992 - even though the DDT has been banned for over 20 years is still out there and is being picked up by the fish. Down around the Portland area you get consumption advisory for PCBs. My understanding is that there is a

consumption advisory all the way from Bonneville dam down through the estuary for PCBs, Dioxin, and DDT. Pretty much the whole Columbia River Basin has problems. Up on the Snake River are areas of high mercury, on the Owyhee River Drainage and Brownlie Reservoir they have mercury advisories. On the Willamette River, they have consumption advisories for fish, one of the main ones is for Portland Harbor. That advisory is for arsenic, pentachloriphenol, and creosote from the wood preservative industry. There are about 300,000 river miles in Oregon, Washington and Idaho that have fish consumption advisories. This all demonstrates that there is exposure in the fish in the same areas where you are going to find salmon.

We know there are a lot of sources. We know that there is exposure to fish. What are the contaminants effects? There is a lot of laboratory data on toxics effects on single contaminants that show that salmon are among the most sensitive fish and one of the sensitive of the aquatic organisms. In particular we worked on water quality criteria for pentachlorophenol, that's one we know is in the river system. That's one that salmon are the most sensitive [species] to its effects. And it is usually in the early life stages, the adults can kind of make it past that stuff. It's from eggs through smolts that most of the effects are occurring. We also no that there are fish kills intermittently as a result of spills or sometimes from other reasons. But there are also other effects beyond acute toxicity.

One of the concerns that I have is that (as mentioned by a previous speaker) its useful for Tribes to develop their own criteria to help them with their water quality standards. Over the years, USEPA has developed criteria for aquatic life usually based on exposure to contaminants in the water column. The idea is also to do criteria for the sediment and animals that live close to the sediment. And a third component is a wildlife criteria where exposure comes through the food. EPA has been working on that. They have done about 45 chemicals for aquatic criteria. But because of the lack of funding they haven't done any sediment or wildlife criteria. When you consider that there are somewhere between 100,000 and 200,000 chemicals out there, and we've only done 45 aquatic life and no sediment criteria, it illustrates that we've got potential. Most of the monitoring programs are going to use criteria that are already out there. There is a potential that we might be missing something. I hope that the Tribes as well as the federal and state agencies could partner with EPA and get a little bit more of that information done.

There are also effects that can really affect salmon that are not lethal. One of those is disruption later on in life in organisms that are exposed to contaminants young in life and have their endocrine systems disrupted. There is also known effects to the immune system. There are known effects for smolts when they are going from fresh water to salt water. That's a huge physiological change that those organisms have to make and it makes them more vulnerable to contaminants. Some really interesting work being done at NOAA is showing that some contaminants in very low levels (specifically diazanon) and effect salmons homing ability and their ability to be able to avoid predators.

What should we do about all this? We have documented that salmon are susceptible to contaminants, particularly at early life stages. And we know that there are contaminants in the rivers and estuaries. We know that fish are being exposed to contaminants and, at least conceptually, we know that effects can be expected to salmon.

What needs to be done? First, we need to get the agencies, the states, the Tribes, the universities and the general public educated to recognize that this is an issue that needs to be addressed. We need to pool our resources to address this issue as part of the overall

salmon conservation effort. This is not a silver bullet. I don't think that if we fix the contaminant problem that salmon are going to come back, but contaminants are a part of the overall stresses that are facing salmon. We need to work together to address that as well as the other serious impacts in the system.

Secondly, we really need to develop a strategy to identify issues and fill in the information gaps out there necessary to fix the problems. Specific ideas we came up with were to 1) collect existing information on sources, pathways, and effects on a watershed basis. If we can partner with the interested parties and develop a publicly accessible database, that would be a first step. There is a lot of information out there. If we could pool information from all these different sources, put together on a geographic basis so it could be used by people working in specific areas, that would be a great first step. 2) Identify what the data gaps are. Prioritize what are data needs are, and start getting the information we need to fill the gaps. 3) Once we have this additional information, quantify the effects on salmon and assess its relative importance. We have a pretty good hunch, but until we get that quantification its going to be hard to convince others that addressing this issue is a higher priority. Identify what the cleanup and restoration alternatives. Lastly, once information is available and options identified, we need to work together to implement specific actions that we've identified. And provide technical assistance to those who need it. Watershed councils, Tribes, and others would be recipients of this information when it's available. We need to work in a coordinated manner and in coordination with other conservation planning going on.

Our current game plan is to work with the federal agencies initially. I've sent out a copy of this to federal agencies and gotten a positive response back from them. We are in the process of trying to pool our existing talents right now, putting this white paper together. And the next step is to work with the Tribes, the states, and the general public trying to raise this as an issue that hopefully people will agree with us needs to be addressed.

Contamination Issues Relating to Wildlife, Fish, and Human Health:
Columbia River Basin Fish Tissue Contamination Study – Pat Cirone, EPA

The first step in any fish contamination study is getting the fish, so first I will lead us through the process of collecting fish in the Columbia River Basin for this study. Then, I will showed a bit about how EPA proposes to evaluate the data.

The study began collecting fish in 1996. It took two years to travel all throughout the basin. It took through 1999 to complete the analysis of the tissue. EPA is now in the process of evaluating the data. This is a joint cooperative effort with CRITFC and its member Tribes. We hope to have the results of the study out by January of 2001. The study was initiated because the four Tribes came to EPA with concerns about their fish, and what's happening with the regulated toxic chemicals in the basin, are they getting into the fish? What are the implications to the health of tribal members eating the fish?

EPA fisheries biologist worked with tribal members at every sampling station where fish were collected. There were 19 stations on the mainstem and in the tributaries. Different sampling techniques where used including dip netting, gill net, hook and line, lamprey collecting off rocks, taking fish by hand (from the cooling ponds at Hanford), and from hatcheries.

The next step was to identify the fish. The study included anadromous species: Coho, spring and summer chinook, steelhead, and pacific lamprey. Also resident fish: large lip suckers, bridge lip suckers, smelt, and mountain white fish, walleye, rainbow trout, and white sturgeon. These were chosen because they are eaten by Native Americans in the Columbia basin.

The fish were next weighed and measured to evaluate the fish health. One result of the study will be information about the condition of the fish. From 19 stations 266 samples were collected, 2000 in all.

Fish were taken to the lab for analysis. EPA looked at whole fish, fillets, and eggs because some people eat one part or another. The lab homogenized the tissues into a thin paste that they then analyzed using mass spectrometry. They analyzed for 233 different chemicals (man made and natural). They ended up with between 30 and 50 that were found above the detection limit.

The study in produced 40,000 bits of information from all those fish and all those chemicals. The goal now is to take that and explain what it means.

The first thing you do with the data is determine what are the contaminant levels in fish tissue. I am currently going through every possible source of data I can find to see if the contaminant levels in the basin are unique. At the beginning of the study we gathered this information and put it in a database accessible from the EPA web site as "Columbia River Contaminant" and contains data up to 1995, Pat will use this to compare with data from the study. Its important to see what these fish mean to you in the basin, but its also important to understand how they reflect the rest of the country. The levels are not any different. Contaminants are in the food chain, in all foods, not just fish. The levels in the Columbia Basin are not unique and the chemicals are the same as everywhere else in the United State, even in Alaska.

Again, we are back to the basic question, "can I eat the fish?" We looked at a study done by CRITFC looking at the consumption levels for the four member Tribes. Because risk is based on the toxicity of the chemical in that fish that you are eating *and how much*

you eat. One valuable piece of information is the consumption level by the Tribes in the northwest. Because we are EPA and need to provide protection for all people, we also look at the national consumption rate.

Now comes the hard part. There is a process for evaluating risk which is a mathematical simulation of what we think is happening biologically. I think people take that information and take is as an absolute. And that ends up being false because risk is simply a simulation and only focuses on one element – in this case eating fish – and it does not truly focus on your health as an individual. All it says is that if you eat the fish, by my mathematical approximation this is the likelihood of a disease occurring in a population. That risk is based on the toxicity of the chemical, the amount you eat, and also depends on other factors like body weight.

We have two ways of expressing mathematically the likelihood of disease. One disease is cancer. Because we don't understand the mechanism how cancer evolves, we think that there is no safe dose. So that's were the estimates of 1 in a million risk of developing cancer comes from. We mathematically approximate what we think happens biologically. We come up with a straight curve from zero to any level of risk and say that there is an associated chance. Just like the raffle today, you put a ticket in and you have a chance, a risk, of winning. In this case, we are talking about cancer, and every ticket counts. If you put in ten tickets, your chance increases.

So what we are going to do with the fish tissue data is look at the concentrations in the fish, look at the exposure for Native Americans, look at exposure for the population of people in the United States and estimate the likelihood, if they ate these fish with these likely contaminants what is their likelihood of developing cancer.

The other way of expressing risk is for other diseases besides cancer. We believe, based on science to date, that there are other diseases such as changes to your central nervous system, developmental diseases, immunological diseases, where there is such a thing as a safe dose. Which means you can be exposed at some level without anything happening. And then if at some point you exceed the safe dose, then we believe disease occurs. We are going to take those same chemicals and look at the possibility of exceeding that dose. It will vary depending on how much you eat. We will express this curve so that you as an individual or a population can compare your consumption and estimate your risk.

That's where we stop with a study like this. We say to you, as a group or as individuals, you need to decide how you feel about that risk. There are some things you can do, you can look at how you prepare food. Some studies say cooking or cutting out the fat reduces some of the chemicals (*some* studies). Older fish like the white sturgeon – older, fatty, large, - will probably have higher concentrations. Catfish, probably the fattiest fish, probably have a higher level of chemicals because its absorbed to that fat.

So that's where we are now. We are in that evaluation phase. We are working with the CRITFC member Tribes to try to get the data in a way that we can present it to all people, and then you make the decision how to interpret that. Either your tribe, your family or you as an individual.

Slide 1:

## Report Cover:

United State Environmental Protection Agency Region 10
Quality Assurance Project Plan
**ASSESSMENT OF CHEMICAL CONTAMINANTS IN FISH CONSUMED BY FOUR NATIVE AMERICAN TRIBES IN THE COLUMBIA RIVER BASIN**
Revision 6.0 December 16, 1996

Slide 2:

## Report Cover:

Columbia River Basin Fish Contaminant Survey Work Group
December Monthly Meeting
Seattle, Washington

Slide 3-8:

# Sites

COLUMBIA RIVER
Lower Columbia
Above Bonneville
Above the Dalles
Above John Day
Above McNary
Above the Confluence with the Snake

WENATCHEE RIVER
  USFWS Hatchery

WILLAMETTE RIVER
  ODFW Fish Ladder

WIND RIVER
  USFWS Hatchery

LITTLE WHITE SALMON
  USFWS Hatchery

HOOD RIVER
  ODFW Adult Collection Trap

FIFTEENMILE CREEK

UMATILLA RIVER

DESCHUTES RIVER

KLICKITAT RIVER
  WDFW Hatchery

YAKAMA RIVER

SNAKE RIVER
  IDFG Hatchery

CLEARWATER
  USFWS Hatchery

GRAND RONDE
  ODFW Hatchery

# Fish

ANADROMOUS
  Spring Chinook
  Fall Chinook
  Coho
  Steelhead
  Pacific Lamprey
  Eulachon (Smelt)

RESIDENT
  Mountain Whitefish
  Walleye
  Rainbow Trout
  Large-scale Sucker
  Bridgelip Sucker

# Chemicals - 233

Dioxin
Furan
PCB
Pesticides
Metals
PAHs

Slide 9:

## Map of River System with labeled sites

Slide 10:

## Report Cover:

A fish consumption survey of the Umatilla, Nez Perce, Yakima, and Warm Springs tribes of the Columbia River Basin

Technical Report 94-3

October 1994

Slide 11:

## Report Cover:

Estimated Per Capita Fish Consumption in the United States
Based on Data Collected by the United States Department of Agriculture's 1994-1996 Continuing Survey of Food Intakes by Individuals

Slide 12:

## Risk of Disease

Graph
Exposure vs. Disease

Slide 13:

## Report Cover:

The National Survey of Mercury Concentrations in Fish
Data Base Summary 1990-1995

Slide 14:

## Report Cover:

Columbia River Basin rivised contaminated data base abstracts
September 29, 1995

Slide 15:

## Report Cover:

Assessment of chemical contaminants in fish consumed by four Native American tribes in the Columbia River Basin
November 10, 1994

Slide 16:

## Report Cover:

Lower Columbia River Bi-State Program assessing human health risks from chemically contaminated fish in the lower Columbia River
Risk Assessment
May 1, 1996

Slide 17:

## Report Cover:

Assessment of Dioxins, Furans, and PCBs in Fish Tissue From Lake Roosevelt, Washington, 1994

Slide 18:

## Report Cover:

2000 Puget Sound UPDATE
Puget Sound Water Quality Action Team

Seventh Report of the Puget Sound Ambient Monitoring Program

Slide 19:

## Report Cover:

Assessment of chemical contaminants in fish consumed by four Native American tribes in the Columbia River Basin:
Volume 4. Quality Assurance summary to the Project Final Report

Revision 3.0
February 24, 2000

**Followed by a short slide show with photos of collection techniques, species, and collection sites.**

Columbia Tributary Lakes and Streams TMDL:
Working with the State and Community - Rosenda Shippentower, Umatilla Environmental Planning & Rights Protection

# 1. INTRODUCTION

This presentation is meant to illustrate the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) mostly positive involvement in the off-Reservation Umatilla River Basin Total Maximum Daily Load (TMDL) process which included a vast array of stakeholders. What made the process work well was the strong interest that the Umatilla River Basin (URB) stakeholders had in protecting human health and ensuring we had healthy watersheds in the Umatilla Basin.

Secondly, an update is also provided on the CTUIR's development of a tribal TMDL and Water Quality Management Plan (WQMP) for reservation waters.

# 2. TRIBAL BACKGROUND

The Umatilla Indian Reservation (UIR) was originally set aside by the Treaty of June 9, 1855, and included 245,000 acres. The current UIR consists of 172,000 acres.

There are approximately 3,900 residents of the UIR, with 1,440 tribal members, about 1,000 other Indians, and 1,460 non-Indian residents. The distribution of water means that water resources both serve, and are impacted by, all residents who are spread throughout the UIR on fee and Indian trust lands.

# 3. PHYSICAL CARACTERISTICS OF THE UIR

The UIR is located within the URB. The URB occupies approximately 2,500 square miles. The Umatilla River originates in the conifer forests of the Blue Mountains at over 6,000 feet elevation and flows west and then northwest through the semi-arid shrub steppe of the Deschutes-Umatilla plateau, entering the Columbia River at an elevation of 270 feet above sea level.

This confluence occurs at the town of Umatilla, OR, about 300 miles upstream from the Pacific Ocean. The hydrologic unit code for the Umatilla Basin, classified accordingly as a 'Sub-Basin' or 4$^{th}$ level watershed, is 17070103 (USGS Hydrologic Unit Code, 1989). Most of the Basin area, including the Blue Mountain uplands, is gently sloping. Expansive plateaus, steppes and rolling hills are incised by the narrow and steep-walled valleys of the Umatilla River drainage.

The Umatilla River main stem begins at the confluence of its North and South Forks, 90 miles from the mouth. It has eight major tributaries. The North and South

Forks of the Umatilla River and Meacham Creek in the upper Basin; Wildhorse, Tutuilla, McKay and Birch Creeks in the mid-Basin; and Butter Creek in the lower-Basin. Much of the mainstem and major tributaries have been straightened or levied.

## 4. A PARTNERSHIP

A core partnership was formed between the Umatilla Basin Watershed Council (UBWC), the CTUIR, and the Oregon Department of Environmental Quality (DEQ). The partnership formed two primary committees to make TMDL recommendations: the Umatilla Basin TMDL Technical Committee first convened in January, 1996, and the Umatilla TMDL Stakeholders Committee was established in January, 1998. All meetings were open to the public and advertised. The UBWC facilitated the Technical Committee. The Stakeholders Committee was co-chaired by Antone Minthorn, Chair, and CTUIR Board of Trustees, and Don Wysocki, soil scientist at the Agricultural Research Service.

The Technical Committee conducted watershed assessments and recommended the TMDL technical basis to the Stakeholders Committee for citizen review. In addition to Chairman Minthorn, Alanna Nanegos and William Burke represented the CTUIR on the Stakeholders Committee.

During TMDL development, Stakeholders Committee members appointed citizen/agency workgroups representing four selected land use categories (agriculture, transportation, forestry, forestry, urban) and flow restoration. These workgroups developed the core components of the WQMP. Rosenda Shippentower represented the Tribal Water Committee on the flow restoration workgroup.

## 5. TRIBAL TMDL

The CTUIR began the Tribal TMDL process in 1999. A UIR-wide committee, currently named the CTUIR Water Health Committee (WHC), was assembled as directed by CTUIR Board of Trustees Resolution 97-212, approved July 1997. The purpose of the WHC was to serve as an advisory body to the Tribal Water Committee on the measures required to improve water quality on the UIR and to assist in developing a Tribal WQMP.

Further, the WHC's role was to resolve conflicts related to assumptions involved in the Umatilla River Basin technical analysis; develop strategies to significantly reduce water pollution to meet tribal water quality standards and provide for beneficial uses; and make recommendations to the Tribal Water Committee for load and waste load allocations.

The roles and responsibilities of the WHC is to:

- Attend meetings to receive technical information from tribal staff.
- Review technical information.

- Make requests of the technical committee to summarize, analyze, and present specific technical information.
- Resolve conflicts related to basic technical assumptions, including process, methodologies, analysis, products.
- Develop recommendations for reduction of pollution; and
- develop recommendations for management strategies to achieve strategies to achieve improvements in water quality.

The WHC members include 5 Indians and 4 non-Indians all residents of the UIR. The WHC meets twice a month and very committed to their roles and responsibilities.

Given the CTUIR's significant involvement and contribution to the Umatilla River Basin TMDL, much of the data that was developed and gathered for the process is applicable to the UIR and will be used in the Tribal TMDL. CTUIR staff were involved in hydrology, ecology, aquatic biology, monitoring and policy, geographic information systems, and contributions in stream-monitoring data and habitat survey data.

Any cooperative information gathered that is relevant to the whole basin will be used in the Tribal TMDL to illustrate trends or impacts from outside the UIR boundaries. Conceptually, the Tribal TMDL and the Umatilla River Basin will compliment each other by providing information and mechanisms that will meet the water quality goals of the Clean Water Act both on the UIR and throughout the basin.

Thus, the cooperative effort that was developed between the CTUIR, Oregon DEQ, the UBWC was instrumental in the development of the Umatilla River Basin TMDL and will significantly contribute to the Tribal TMDL.

Columbia Tributary Lakes and Streams TMDL:

TMDLs submitted by the Colville Tribe: Okanagon watershed water quality management plan - Chris Fisher, Colville Tribe

The Okanagon Watershed water quality management plan was funded through the clean water centennial grant. It was administered by Washington Department of Ecology. The Okanagon Conservation District sponsored/facilitated most of the meetings. It took three and a half to complete it.

(Overhead map of Okanagan River system). Area used by summer chinook, steelhead, great sockeye. So there are some important fisheries uses, primarily for tribal use because stocks are relatively low. The runs are a mix, but the strongest part is hatchery run.

There was a real concern that the document not in any way addresses water rights issues and try to avoid water quantity issues. The Okanagan basin is primarily agricultural producing soft fruits, etc. A lot of these tributaries are all diverted for irrigation. This is an important point that they didn't want to address water rights. You could sense a real reluctance by people from moving forward and addressing issues that probably need to be addressed.

There were three committees.

- TAC, technical advisory committee
- SAC, stakeholders advisory committee
- The county commissioners and the board from the conservation district

The TAC would take the first crack at technical issues. The SAC would refine/alter it. Then eventually it would get to the county commissioners and conservation district board for final approval. So there was a "water down effect."

The goal of the plan was to maintain or improve water quality in the Okanagan River. First the group looked at and identified different problems in different sub basins (various water quality parameters). Also identified the possible effects. The next step was to use a risk matrix to identify what kind of impacts it has to all these different land types (forest, range, etc.). this was a long process. the technical advisory committee went through each land type for each sub basin and identify low, medium, or high-risk impacts to the watershed. They went through all the sub basins. Once this was all rated, each was evaluated on a point system to determine the priority of which one had the most degraded water quality and which one ought to be addressed soon. Out of this there were 45 action items identified to address. Recommendations for remediation (i.e. "reestablish stream bank vegetation *where possible*") were influenced by stakeholders concerned that they were going to be directed to do something adverse to the way they currently conduct their work/lives. There is a concern that there are things that are wrong, they want assistance with fixing things, but they don't want to be held responsible. A lot of the "shall" words were changed to "should." Kept reiterating that this was "strictly voluntary."

There was some desire, after putting three years of work into the effort, to get some assurance (buy-off) from NMFS for the plan. It was inconsistent to expect a strictly voluntary arrangement to be approved by a regulatory agency. The lesson is to make sure that stakeholders know what they are getting into and what the outcomes will be.

Of those 45 action items, 14 are being moved forward. That is mostly because of a few people at the Okanagan Conservation District that have taken this on and want to see it

through. Keep on these projects to keep them alive so they don't just end up sitting on the shelf somewhere.

A little detail on Talent Creek and DDT levels there.
(As a side note: though many suggest that the TMDL work on temperatures ought to aim for lower temperatures, there are others who want to move things the other way. Temperature has been a problem on Talent Creek for some time and it is listed on the 303(d) list for temperature. Some people say they can't get the temperature down though they've tried for years and want to instead raise the temperature limit for the creek. That would be a bad precedent: we can't meet them, so just lower the bar.)

This (overhead) is 303(d) listings for the Okanagan. Remember the management plan is to "maintain" the water quality. The basin has listings for DDT, DDE, pH, deldren, temperature, etc. etc.. That's tough to maintain. Points out exceedances for DDT and DDE in fish. In a draft report/memo to a water quality staffer at DOE containing information regarding level of exceedence over limit of .001 micrograms/liter, Town Creek we are at .09-. 05, 500 times the state water quality limit in the Talent Creek (1995). Fish tissue also had serious exceedences. The last test was done on only four fish (1995) all of them had exceedences. I want to give you an idea of how long this has been occurring in the Okanagan River. This (overhead) is a chronology from Dept of Ecology data. 1983/1984: bottom fish wet weight DDT residues in muscle and the second highest in tissue compared to fish in other rivers. 1988: a class two inspection of the Okanagan wastewater treatment plant found DDT in sludge at 300 nanograms/gram, higher than is sediments from the Yakama River. 1989 a single fish sample from Okanagan had the highest level of DDT compared to fish from nine other lakes in Washington. 1994, DDT, PCB detected in tissue samples. 2000 and 2001 going to start sampling for to try to locate sources of DDT.

So, what has happened between 1995 and 2001? Absolutely nothing. We finally got DOE to the table this fall and hopefully are starting a strong effort to locate the sources of some of this DDT.

My point is don't drop the ball. I found out this information in 1996 and started talking to DOE saying they should be doing something. I said the tribe would be willing to take samples and send them wherever you want the analysis done. There was no follow up or feedback from them. Since then the department of health in Okanagan County has gotten involved, written letters to the DOE. Now we have the ear of DOE and will hopefully move forward in the coming year with fisher and sediment samples. Stick to your guns, keep the pressure on, and hopefully we will get this thing fixed if we can.

## Superfund:

Portland Harbor – Audie Huber, Umatilla

Coeur d'Alene Basin - Howard Funke, Coeur d'Alene Tribe

Due to technical difficulties, materials for this presentation are not available. The notes that follow where added in place of these presentations, as general information about the Superfund process.

# Superfund Process and Ecological Risk Assessment Overview

Helen Hillman
NOAA
Office of Response
& Restoration

## Superfund Process

- See Flow Chart 1

## Steps in the process 1

- See Flow Chart 2

## Steps in the process 2

- See Flow Chart 3

## RI/FS Negotiation Steps

- Decision to Start an RI/FS
- Formation of Case Team
- PRP Search
- Issue General Notice Letter
- Start Talking with PRP's, encourage PRP steering committee
- Notify Trustees
- Preliminary scoping of the RI/FS
- Develop RI/FS SOW
- Write Draft AOC
- Issue Special Notice Letter

- Good Faith Offer
- Evaluate PRP ability to conduct RI/FS
- Negotiations-lead to PRP RI/FS or EPA Fund Lead RI/FS

## The RI/FS

The RI/FS is an investigation designed to characterize a site, assess the nature and extent of contamination, evaluate potential risks to human health and the environment, and develop and evaluate potential remedial options. It accomplishes 2 objectives:

- Provides information to assess the risks posed to public health and the environment by site
- Evaluates a range of remedial alternatives (i.e. treatment, institutional controls) and a no action alternative

## RI/FS Process

- See RI/FS Process Chart

## RI/FS-Seven Major Steps

- Pre-RI/FS Scoping
- RI/FS Workplan Development
- Site Characterization
- Risk Assessment
- Treatability Investigations
- Development and Screening of Alternatives
- Detailed Analysis of Alternative.

## Pre-RI/FS Scoping

- EPA begins to determine the technical and administrative scope of the pending RI/FS
- EPA develops rough conceptual model, including
- Source areas
- Possible extent of migration
- Media of concern
- Pathways
- Possible risks
- Possible remedies
- EPA develops Scope of Work

## RI/FS Workplan Development

- Three Major Deliverables - the Work Plan, the SAP, and the Health and Safety Plan
- Work plan is subject to public review, is the overall plan for the investigation
- Sap includes a Field Sampling and Analysis Plan (FSAP) and a Quality Assurance Project Plan (QAPP)
- Trustee input on both is important

## Site Characterization

- This step is when the collection of field data occurs. Also, the analysis of data and report development.
- Data collection usually phased.
- Data management and accessibility important
- Lots of kind of data- chemical, biological, but also physical (geology, hydrology)

## Risk Assessment

- Both Human Health and Ecological Risk Assessment are Prepared as part of the Site Investigation
- Used to Develop Remedial action Objectives
- Can Be Performed by the PRP's or EPA

## Treatability Investigations

- May or may not be performed here
- Must be addressed in the RI

## Development and Screening of Alternatives

- PRPs develop specific remedial action objectives based on the RI data
- Range of response actions is developed
- Specific technologies may be screened in addition to cleanup options
- A range of remedial alternatives is developed and screened
- One option is "no action.

## Detailed Analysis of Alternatives

- Evaluation Criteria Include
- Overall protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and performance
- Short-term effectiveness
- Reduction of toxicity, mobility, or volume
- Implementability
- Cost
- State Acceptance
- Community Acceptance

## Uses of Eco Risk

- Inform public of baseline risk
- Determine need for remedy
- Identify threshold concentrations for effects and cleanup goals
- Evaluate risk of remedy
- Scope remedial monitoring

## Definition of Eco Risk

- Qualitative and/or quantitative

- Actual or potential impacts of contaminants
- On plants and animals (not humans, not domesticated animals)

## Defining Eco Risk

- Contaminant has ability to cause adverse effects
- Contaminant co-occurs with or contacts receptor long enough and with sufficient intensity to elicit effects

## Risk Assessment and Superfund

- 8 steps ("site screening" through "risk management")
- Multiple Scientific / Management Decision Points (SMDP) in the process

## Scientific Management Decision Point (SMDP)

- Consult between risk manager and risk assessment team, including Biological Technical Assistance Group (BTAG) and specialists
- Consensus decision-making
- BTAG includes trustees

## The Eight Steps

- Steps 1-2 Screening Level Risk Assessment
- Step3 Baseline Problem Formulation
- Steps4-5 Study Design
- Step6 Investigations and Analysis
- Step7 Risk Characterization
- Step 8 Risk Management

## Steps 1-2: Screening Level Risk Assessment

- Uses existing data and conservative (protective) assumptions
- Documents why the site is not a problem; OR focuses baseline risk assessment
- SMDP decides

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## Why You Care

- Indicates that no biological injury is likely
- OR:
- Some injury information may exist
- More study is needed

## Step 3: Baseline Problem Formulation

- Identify contaminants
- Identify receptors and life stages present
- Consider pathways
- Consider ecotoxicology

## Problem Formulation Outcome

- Conceptual model
- Assessment endpoints (species/effect)
- Risk questions (line of evidence and basic scientific approach)

## Why You Care

- Assessment endpoints specify species to be protected and mechanism of effect
- Risk questions identify approach
- CRITICAL STEP for Trustees

## Step 3: CPRD Recommends

- Evaluate sensitive species and life stages
- Consider appropriate mechanisms for effects depending on contaminant, species, and life-stage
- Gather other concurrent injury information where feasible

## Steps 4-5: Study Design

- Refine risk hypothesis
- Plan data interpretation
- Define "acceptable" risk
- Two SMDPs- for sampling design and for verification

## Study Design Outcome

- Risk hypothesis (measurement endpoints)
- Study design work plan
- Statistical methodology
- Verification of feasibility of field work

## Why You Care

- Use of surrogate species
- Collecting useful data for injury assessment
- Data interpretation methods set
- Data Quality establishment

## Steps4-5: CPRD Recommends

- Negotiate "acceptable" risk in advance, involve responsible parties
- Conduct site-specific analyses
- Measure "actual effects: where feasible

## Step 6: Investigations and Analysis

- Exposure Assessment
- Effects Assessment
  - Models
  - Lab studies

- Field studies

## Investigations Outcome

- Organisms are/are not exposed
- Effects are/are not occurring
- Causality
- Extent and magnitude
- Ancillary information needed for risk characterization

## Why You Care

- Data quality revealed
- Data analysis complete
- Injury indicated (or not)

## Step 6: CPRD Recommends

- Collect field data as input to models
- Measure bioaccumulation at the site
- Select appropriate reference sites
- Use appropriate values from literature
- Consider that Toxicity = Risk

## Step 7: Risk Characterization

- Lick to assessment endpoints
- Describe risk--what is affected, where, for how long
- Determine acceptability of risk
- Determine protective concentrations, threshold for risk

## Step 7: Risk Characterization

- Document uncertainty
- Conceptual model
- Parameter error
- Natural variation
- Model error

## Step 7: Risk Characterization

- Predict the future
  - Potential for natural recovery
  - Potential for recovery after active measures

## Risk Characterization Outcome

- Extent, magnitude of risk, probable duration
- Description of uncertainty
- Preliminary remediation goals

## Why You Care

- Risk characterization drives the remedy

## Step 7: CPRS Recommends

- Be creative, explore data graphically
- Don't rely solely on correlations
- Identify thresholds for effects
- Protective levels are the lowest thresholds

## Step 8: Risk management

- Determine need for remedial action
- Evaluate remedial alternatives
- Design monitoring based on risk
- SMDP

## Risk Management Outcome

- Determination of whether remedy is necessary based on risk
- Preliminary remedial goals
- Likely risk associated with remedial actions

## Why You Care

- Remedial goals may not equal injury thresholds
- Remediation may not compensate for injury
- Balancing short-term and long-term risks
- Appropriate monitoring

## Step 8: CPRD Recommends

- Accept that protective concentrations may not be feasible
- Remedies to reduce risk should not always include monitoring based on risk assessment

# Superfund Process

Pre-NPL
- Discovery
- Preliminary Assessment (PA)/ Site Investigation (SI)

Remedial Process
- National Priorities List (NPL)
- Remedial Investigations (RI)/ Feasibility Study (FS)
  - Proposed Plan…
    - Record of Decision (ROD)
    - Remedial Design (RD)
    - Remedial Action (RA)

Construction Completion…
Post-Remedial
- Operation & Maintenance (O&M)
- NPL Deletion
- Five Year Review

# Steps of the Superfund Remedial Process

1. Discovery
   - Discovery of hazardous waste through inventories by governmental agencies, review of State and Federal records, release notification, of informal citizen observation and notification.

2. Preliminary Assessment (PA)
   Site Investigation (SI)
   - Limited-scope assessment of the site and, if needed, a more in-depth investigation to identify the hazardous substances present and to collect data to determine the probability of NPL listing.

3. National Priorities List (NPL)
   - Priority list for long-term remediation based on Hazardous Ranking System, State Territory designation as a top-priority site, or EPA determination.

4. Remedial Investigation (RI)
   Feasibility Study (FS)
   - Technical Study of the site to investigate the scope of contamination and determine the remedial alternatives.

…Proposed Plan…
- Proposal of remedial action and level of cleanup to be implemented at the site

5. Record of Decision (ROD)

· Summary of the remedy decision for a site, including a description of the remedy's protectiveness, alternatives analyzed, and public comments.

6. Remedial Design (RD)
· Process of preparing the technical plans and specifications for implementing the selected remedial alternative.

7. Remedial Action (RA)
· Construction or other activities necessary to implement the selected remedy.

8. Construction Completion (CC)
· EPA determines that all physical construction of cleanup actions is complete, all immediate threats have been addressed, and all long-term threats are under control.

9. Operation & Maintenance (O&M)
· Activities conducted at sites after the RA is complete to ensure that the cleanup methods are properly working.

10. NPL Deletion
· All appropriate response actions by EPA and/or reasonable parties have been implemented, or a remedial investigation has shown that the release poses no significant threat to human health or the environment and remedial measures are not appropriate.

11. Five Year Review
EPA conducts a five-year review after initiation of the RA. Reviews may be conducted during phases of the RA, or after a site has been deleted from the NPL.

Ground Water and Water Quality:

Assessing Relative Importance of Hyporegeic Potential in the Umatilla River - Scott O'Daniel, Umatilla

The tribe has been involved in the preparation of a TMDL for temperature for about three years. During that process, we did some data collection that led us to look at some alternative hypothesis to the questions of heating in river systems and heat load allocation.

The title of this talk contains a couple key points. One is relative importance – keep that in mind as I go through the material. The second is hyporegeic potential – hyporegeic is just a fancywork for shallow ground water interaction. That portion of the groundwater in the bottom of the flood plain that interacts with the channel. The objectives for this project were primarily to make a spatially explicit tool that you could apply to a fourth level HUC watershed (a watershed the size of the Umatilla or John Day) and be able to get a yes/no response if hyporegeic potential is acting as a significant heat sink in the basin. The secondary objective was to try this on the Umatilla because we had a developed data source and a current need.

Umatilla watershed in Northeast Oregon drains a little less than 2 million acres of land through more than 9000 miles of perennial and intermittent streams. It's situated mostly in a desert environment that receives and annual of 14 inches per year in the middle (11-40 in different areas). The way we began to look at this river system to understand what this potential was, was to look first at physical parameters of the flood plain. We created this area (overhead) and that flood plain represents the historic flood plain, including some benches that are probably not inundated even in the 500-year flood. Most of the development in the basin is along the mainstem of the Umatilla River, including Umatilla, Hermiston, Stanfield, Echo, Pendleton, and the town of Mission.

The lines on the map (overhead) indicate the flight path of the data collection activity done in 1998 that used in this process. That data was collected by a FLIR flight (Forward Looking Infrared Radiometer), which basically is a camera mounted on the bottom of a helicopter that will take an absolute picture of temperatures to get precise thermal images of the river system as you fly over (for the first few millimeters of the water – it doesn't address stratified water columns.

(Overhead) This is a simple graph of what the land looks like. The relative amounts of land cover types are the same in the flood plain as they are in the basin. There is predominantly agriculture (twice as much as any other type), also perennial grasses, forestland, and riparian forest. The developed acres are less than 1000 in permanent human habitation in the flood plain that we identified. They represent a small portion of the land area, which is very unlikely to be "abandoned." That means there is a large portion, which is, has more flexibility in cover conversion that can take place with out disturbing the permanent habitation. This (overhead) is a profile of that. This is useful for understanding broad stretches of river and their thermal responses to other conditions. You can see McKie dam, reservoir and drainage, intersecting with the mainstem and producing a dramatic drop in temperature there that persists for probably 20 miles downstream. That is the only section of river managed explicitly in that manner. So the profile has a sharp gradient below Pendleton. (overhead of graphs) The places we concentrated our work were on the areas where temperature is falling – this is that area

where McKie reservoir releases into the mainstem, it drops about 35 degrees (F) at that confluence. That is a primary aid to salmon moving up to that point. A tangential issue is that once the salmon hit that point, there is a thermal barrier in front of them that they can't get through so they pile up where that water issues into the mainstem. We concentrated on those two cooling trends. We looked at the entire river system, not just those pieces on the reservation because the goal of this is not only to be able to formulate data with reference to the TMDL but to be able to manage on a system wide basis and do monitoring and evaluation at that scale. So it was important to capture and process data along the entire mainstem Umatilla because it's the longest single segment in the system and picks up all the variation from the tributaries as the enter. There is a plateau here: there was enough energy in the system to stop the water from additional heating. Why didn't that water go straight up until it equalized with air temperature as it would without any controls. So there are some controls operating here dampening the effects of all that heat. That's essentially what we looked at. We broke the data into two pieces and removed the line that showed the influence of McKie dam because we were not interested in the influence of the dam but in trying to understand that shallow groundwater influence. This dotted white line represents the 64-degree temperature standard. 60 miles out of 90 miles of the Umatilla River would be above that standard. We have probably maybe 9 or ten miles below that threshold. Umatilla is not cold at that time of the year. The FLIR data was taken in August of 1998. The purpose was to look at the most extreme heating conditions. We utilized basic variables from the literature.

When I talk about the hyporegeic zone, it's really that portion of the river where it interacts with both the deep ground water and the channel. Latitudinal it goes from the toe slope. It operates on a scale of several weeks to months. Arrows show flow patterns. In spring, you have high flows during melt out and near channel inundation – water is flooding out into those areas. As the head on the river drops. You have pathways that allow that water to move from off channel areas into the channel. That water has been impounded for weeks to month under the surface, under the gravel for weeks to months so it is very cold compared to the water that's in the late summer channel.

Some of our assumptions were that rivers like the Umatilla are desert streams that have short melt out windows. The water comes off faster than it did historically, but even historically it came off faster compared to basins with a high headwaters area. The other contributing factor is that the basin is oriented east to west so when that melt out window hits is goes quickly. There aren't those north south gradients to protect relic pockets of snow into late spring. The forests in the near channel environment are dependent on those processes that create those environments for wetlands and gallery appearing forests. No one talks about flood plains as an area where new wetland are created. But in flood events wetland are created. Those wetlands and other flood plain features contribute cold water back into the channel and they are a normative part of that environment that has been influenced by anthropogenic changes that has an important role in trying to understand all the diverse influences on temperature conditions.

Its relatively well known that you need those normative conditions to establish and maintain wetlands and a lot of ground water levels in those areas are important for those same functions. This whole process is not a replacement or an exclusive alternative to the kinds of work that shade based temperature modelers do but it's really complimentary. There are a number of shade based models, particularly that Oregon DEQ uses, that are

fairly sophisticated. But these don't take into account any other non-surface based influences on temperature.

So what we did is took that original temperature profile and calculated standard deviations above and below the mean from those regression lines. This really just thresholds the data to show you where its heating rapidly and where its cooling rapidly. We looked at multiple hypothesis to try to understand what was driving this cooling. We looked at popular sorts of data sets to explain it. There wasn't a correspondence with canopy cover data. We looked at primary tributaries to the mainstem. Largely these are dry at this time of year, none of these cooling areas conformed to the locations of the confluences. Small irrigation dams are mapped. They don't have significant backwater portions. They didn't see a sharp gradient occur at a dam location.

The area I'm going to talk about is a gravel bar that is inundated in the spring and in late summer drains into the channel contributing to the mainstem. This is a small feature, and once it hits the mainstem it doesn't persist. So the influence of these features is relative. None of this water is very cold. But it is instructive that this water coming out of this old channel is about four degrees colder than in the mainstem. Some of the features associated with this on the ground are the diversity of floodplain features. (Slide with main channel, side channel, relatively high amounts and types of vegetation, broad mosaic of features). Flood plain diversity associated with the effect; the more flood plain diversity the more opportunity for cold water to be entering the channel.

Finally, we looked at the index of those five components, weighting floodplain width half as much as the other did. We looked at total flood plain width between the toe slopes and in the second iteration looked at all of the areas in the diked areas (significant on Umatilla). The areas that rated High correspond very well with the areas of negative profile (cooling areas) from the FLIR data. One caveat is the lower portion of the basin where there is a lot of agricultural activity and irrigation return flows, etc. It probably wouldn't conform to the values that our index wants when measured against the FLIR profiles. The really intensive management for agriculture, water being taken out of the channel quickly and returned to the channel quickly doesn't conform to the normative cycles. Because they don't, it's a poor comparison against the physical index that we made.

The latitudinal dimension of the floodplain is very critical to trying to understand this question of thermal diversity. This model really looks at only temperature as comparison. This is an individually based model because it looks at each cell. It could be used for sediment, or many ways that interact with those other latitudinal flood plain features. If you have a large sediment load moving down and sinks down stream, the more variability you have will allow you to see more accumulation of sediment at smaller points in the system rather than this single wave of sediment moving down the system. Those areas that do have a high amount of latitudinal diversity show all the kinds of attributes that systems have in a healthy state, like large wood, fine sediment control and a lot of diverse channel morphology. The implications from this are that more removal of engineered structures and more normative cycles through release of the floodplain would allow it to come to a state where the assimilative capacity for temperature would increase. You would find more temperature sinks than you do currently.

Slide 1:

# Groundwater Primer

Scott O'Daniel
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Slide 1:

## Groundwater

- Definition:
- Subsurface water that occurs beneath the water table in soils and geological formations that are fully saturated.

Slides 3,4,5 Graphics:

## Components of the Hydrologic Cycle
## Confined and Unconfined Aquifers
## Unconfined and perched water table aquifers

Slide 6:

## Water Quality Monitoring

- Water Quality Monitoring
  - –Focus on Community water systems (that is where the resource is being used)
  - –Basin-wide monitoring of groundwater chemistry
  - –Focus on sand and gravel aquifers
  - –Initially target areas without a monitoring effort

Slide 7:

## How Much Do We Depend On Groundwater?

- **22%** of all freshwater withdrawals
- **37%** of agricultural use (mostly for irrigation)
- **37%** of the public water supply withdrawals
- **51%** of all drinking water for the total population
- **99%** of drinking water for the rural population

Slide 8:

## Components of the Groundwater Environment

- Hydrologic Cycle
- Groundwater flow
- Cone of Depression
- Zones of influence

Slide 9:

## Several Groundwater Challenges

- Land application of waste to sandy soils
- Leachate from landfills
- Role in surface water quality
- Leaking underground storage tanks

Slide 10:

## Groundwater Models and Simulations

- Three levels of modeling
  - –1) Advection Models (flow)
  - –2) Advection plus dispersion
  - –3) Realistic flow, dispersion, biological and chemical reactions

Slide 11:

## Characteristics of Aquifer Restoration

- Costly to perform
- Time consuming to plan and implement
- Only partially effective
- Typically driven by litigation, which may prevent full disclosure of facts

Slide 12:

## Conclusions

- Groundwater is an important water resource, which must be protected.
- Once groundwater problems exist, it may take 200-300 years for natural recharge to purge the problem.
- Incorporation of groundwater models in surface water models holds promise for an integrated biologically based planning tool.

# Section III
## Next Steps

Before adjourning, conference attendees gathered for a short discussion. It was an opportunity to gain an overall impression of the conference and the information presented. To discuss what it all meant. And to speculate on what should be done next.

Although we heard a variety of speakers working on different projects in different portions of the watershed, every participant and every speaker was there for one overarching reason. Water Quality is a unifying issue. Water quality is key to so many facets of our lives. The people, and the wildlife, and the economies of the Columbia River Basin are all dependent on adequate water quality. Clean water vital to restoring endangered aquatic species, to supporting traditional harvesting and cultural uses, to protecting human health, and to meeting treaty responsibilities and agency mandates.

This conference was designed as a preliminary, first step to engage the numerous Tribes and bands of the Columbia River Basin in discussion over an issue of concern to all. As conference planners, we envision several next steps.

First, that those of you who attended this conference will return to your organizations with your interpretations of this event and the information you heard. This was a technical, staff-level event, but you may have recommendations for your policy staff for actions or resolutions based what happened here.

Second, there have been some discussions started and contacts made that may be continued on an individual basis to strengthen ties and cooperation among various organizations.

And Third, this event provides the foundation for a follow up conference. There has been an expressed interest in planning another multi-day, results oriented conference. Next year's event will be more goal oriented and include more discussion about policy issues. It could be designed as a decision making forum, or another technical exchange with a greater emphasis on results and increased cooperation among the Columbia River Basin Tribes. A planning group has been formed including staff from different Tribes and consortiums and is meeting regularly to plan the next event for 2001.

For more information on the next Columbia River Basin Tribal Water Quality Conference, planned for Fall of 2001, contact CRITFC at (503) 238-0667.