CLIMATE AND WATER POLICY WORKSHOP

EXECUTIVE SUMMARY

July 16-17, 2001
Skamania Lodge, Stevenson, Washington

Climate Impacts Group
University of Washington

Klamath Basin (OR) field, 2001

Skagit River, WA 1996

Dworshak Dam, Idaho

EXECUTIVE SUMMARY
CLIMATE AND WATER POLICY WORKSHOP

July 16-17, 2001 · Skamania Lodge - Stevenson, Washington

The Climate Impacts Group (CIG) at the University of Washington assembled many of the region's senior water resource managers, policy makers, and users at Skamania Lodge on July 16-17, 2001, to discuss the implications of climate variability and climate change for water resources and water policy. The following is a brief summary of the meeting. A more detailed summary is available by contacting the CIG or visiting the CIG web site (http://jisao.washington.edu/PNWimpacts/).

MAJOR CONCLUSIONS FROM THE CLIMATE AND WATER POLICY WORKSHOP

The Climate and Water Policy Workshop provided a forum for dialogue among climate and hydrology researchers, water resource managers, water users, and public policy makers on a broad array of issues related to climate variability, climate change, and the challenges of planning for climate change. The following conclusions/findings can be drawn as a result of discussions held at the meeting:

- Although uncertainties still exist in the science of climate change, policy makers recognize climate change as a potentially significant threat to water resources in the Pacific Northwest. Instream flow requirements for endangered species, population growth, water rights, hydropower, and other demands are increasing the strain on water supplies; climate change is one more stressor for the region to deal with.

- Decision-makers and water resource managers want more detailed, smaller scale (subbasin) information on the impacts of climate change. Short/medium-term climate and streamflow forecasting (1-5 years) is needed (note: 1-year streamflow forecasts are already produced by CIG; 2-5 year forecasts are not likely to be feasible in the near future). Access to climate information (data and hydrology results) needs to be improved throughout the region.

- Organizations are not ready to plan for climate change by itself. Politics, scientific uncertainty, lack of familiarity with and/or complexity of the climate change issue, and the perceived length of time before impacts are realized keep many organizations from planning for climate change. More examples of how to prepare for climate change are needed.

- Climate change must "piggyback" on other planning and monitoring efforts where appropriate.

- Continued outreach and education to decision-makers is needed. The Climate and Water Policy Workshop served as a good starting point; additional meetings are recommended to continue discussions on adapting to climate change.

- Although impacts on water resources were the focus of the meeting, many policy makers must make water resource decisions with a much broader perspective in mind. Information on impacts to forests, coasts, and dryland agriculture is beneficial to water resource managers and decision-makers at most levels.

MONDAY JULY 16, 2001

Edward Miles, leader of the CIG, began the meeting with a brief overview of the challenges facing Pacific Northwest water resources, the role of the CIG, and the purpose of the meeting. Major points in Professor Miles's opening remarks included:

- Research conducted by the CIG on the impacts of climate variability and climate change on the Pacific Northwest environment indicates cause for concern, particularly in the realm of water resources. Warming temperatures could significantly impact winter snowpack and precipitation, leading to reduced summer flows.
- Droughts - particularly multiyear droughts - are our greatest vulnerability.
- The region needs to consider "buying insurance" in the form of planning to reduce vulnerabilities and increase adaptability to these changes. Given that it takes 20-25 years to change water supply systems, it's clear that we are late getting started.

Morning Presentations
8:45-12:00

The morning proceeded with a series of presentations on climate change, potential impacts on water resources, and adapting to climate change. Copies of the presentations are available on the CIG web site (http://jisao.washington.edu/PNWimpacts/).

Presentation 1: "Global and regional climate change: What we know and don't know" – Dr. Philip Mote, JISAO Climate Impacts Group, University of Washington

Dr. Mote's presentation addressed what is known about climate change and how well it is known, global climate change projections, and regional climate change projections. Major points of the presentation include the following:

- There are varying levels of certainty in climate change findings. Further global warming in the range of 1.4-5.8 °C (2.5-10.4 °F) is very likely by 2100. This is faster than any time in the last 10,000 years.
- Temperature trends in the Pacific Northwest indicate warming throughout the region. Urbanization is not a major source of warming.
- Climate model projections indicate that average summer

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Morning Presentations
(cont.)

temperatures in the Pacific Northwest could increase by 3.1 to 6.7 °F by the 2040s (mean change of 4.7 °F); average winter temperatures could increase by 3.2 to 6.7 °F (mean change of 5.2°F).

- Climate model predictions of average summer/winter precipitation changes have wider ranges. Average summer precipitation may range from a 7% decrease to a 9% increase by the 2040s; average winter precipitation may range from a 2% decrease to a 22% percent increase (summer = April-September; winter = October-March).
- Regional warming (3-6 °F by the 2040s) is likely to be faster than global warming.
- Despite uncertainties, global climate change is well established enough to take precautions.

Presentation 2: "Effects of Climate Change on the Hydrology of Water Resources of the Pacific Northwest and Columbia River Basin" – Prof. Dennis P. Lettenmeier and Alan F. Hamlet, JISAO Climate Impacts Group and the Department of Civil and Environmental Engineering, University of Washington

The second presentation examined (recent) historic effects of climate change on water resources, methods for quantifying and evaluating the hydrologic impacts of climate change, and areas of concern for water management. Highlights of the presentation include the following:

- A variety of graphs and figures detailing previous and potential impacts of climate variability and climate change on the Columbia River at the Dalles and the Cedar River. The presentation also assessed changes in the reliability of water resource objectives (flood control, firm energy, non-firm energy, Snake River fish flows, Mainstem Columbia fish flows, Snake River irrigation, and Lake Roosevelt recreation) as a result of climate change.
- The primary impact of warming in the Pacific Northwest is loss of mountain snowpack. Warmer temperatures generally result in higher winter flows, lower summer flows, and earlier peak flows.
- A consistent and robust result of climate change scenarios is some reduction in summer streamflow and

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Morning Presentations
(cont.)

an increase in drought frequency by the 2040s for the Columbia basin. The reductions in summer streamflows are likely to exacerbate existing conflicts over water, the impacts of regional growth, and weaknesses in infrastructure, water management practice, and management institutions.

- Other areas of concern include:
  - limited reservoir storage (and limited opportunity to build more),
  - water supply systems operated close to supply limits,
  - use of historic streamflow record for long range planning (the past will not necessarily be an accurate predictor of the future because of climate change),
  - use of statistical streamflow forecasting tools based on 30 year streamflow record,
  - inflexibility and fragmentation of water management institutions,
  - limited use of available streamflow forecasts incorporating climate change information, and
  - changes in intra-regional water availability.

Presentation 3: "A Preliminary Analysis of the Impacts of Climate Change on the Reliability of West Side Water Supplies" – Prof. Richard Palmer and Margaret Hahn, Department of Civil and Environmental Engineering, University of Washington

Professor Palmer's presentation addressed water supply challenges, water supply resources, and water demand for urban areas. The presentation also addressed climate change impacts on streamflow and storage. Focus areas for the presentation included the City of Portland and urban water supplies in the Puget Sound area (Seattle, Tacoma, King/Pierce/Snohomish Counties). Highlights of the presentation include the following:

- Water demand and precipitation patterns are out of sync – highest demand comes when precipitation is lowest.
- Urban water demand influenced by population, industry, housing mix, lot size, weather conditions (including temperature and precipitation), plumbing codes, and public response.
- Puget Sound area water demand is expected to increase in average years from 435 to nearly 500 million gallons per day (15% increase) by 2020. Portland area demand is expected

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(cont.)

to grow from 120 to 150 mgd (25% increase) by 2020.

- Increase in demand will stress systems that are already near system yields.
- Climate change will significantly impact the timing of the region's runoff by 2040. The lack of late spring snowpack will decrease the "stored" water available for the summer. This will extend the drawdown period and make the region more susceptible to drought.
- Climate change will also significantly impact annual minimum storage. Storage similar to those encountered in 1987 and 1992 will become more commonplace, even without increases in demand.
- Long-lead time, adaptive planning is needed to face these challenges.

Presentation 4: "Climate Variability and Human Adaptation: Some Thoughts on the Water Law and Policy Environment" – Dr. Doug Kenney, Natural Resources Law Center, University of Colorado

Dr. Kenney's presentation addressed the challenges of climate change policy and adaptation. Highlights of the presentation include the following:

- Policy-makers don't listen to climate scientists due to language barriers, the perception that climate change is not a fixable problem, and the belief that the problem is being handled at other levels. The one exception to this is drought.
- Using climate forecast information is professionally risky. Mistakes are tolerated if conventional techniques are used; not so for innovative techniques (e.g., climate forecasting). Demand to increase use can come from peer pressure and customer demand.
- Even without climate change, vulnerability to drought is increasing due to population growth and trends in water law and policy reform
- Best coping strategies entail risk management - reduce risks and reallocate risk
- Reducing risks involves promoting saved (or salvaged) water, promoting conservation (through voluntary efforts, price signals, technology, and mandates), and improving

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(cont.)

project and water system efficiency.

- Re-allocating risk: through permanent water transfers and temporary transfers (subordination agreements, dry year options, lease back arrangements, and water banks)

Presentation 5: "Adapting to Change and Uncertainty: Lessons From the West Coast of North America" – Prof. Chad Day, School of Resources and Environment, Simon Fraser University and Dave Marshall, Fraser Basin Council, Vancouver, British Columbia

Professor Day's and Dave Marshall's presentation compared the Columbia Basin with three large-scale governance systems and discussed the effectiveness of our decision-making systems. CALFED Bay-Delta Program, Puget Sound Water Quality Action Team (PSWQT), the Fraser Basin Council (FBC), and the Columbia were featured watersheds/watershed groups. Highlights of the presentation include:

- Criteria for evaluating watershed planning efforts: legislation; adaptive planning, implementation, and monitoring; representation; financing; leadership; and outcomes.

- British Columbia's Fraser Basin Council is an example of a successful large-scale watershed governance system. The Council is "governed" through a partnership with the federal, provincial, and local government, the First Nations (tribes), the private sector, and civil society. The Council is unique in that it brings a broad range of perspectives together, serves many roles within the Basin (catalyst, sustainability educator, facilitator, and conflict resolution agent), and develops new modes of cooperative decision making. The Council does not have any legislative authority.

- No forum exists where all interests can meet and share views and preferences for managing the Columbia basin.

Keynote Address: Governor Daniel J. Evans
12:00- 1:15

Former Washington State Governor and U.S. Senator Daniel J. Evans gave the keynote address during lunch on Monday, July 16. The address touched on a variety of Governor Evans's experiences as Governor and Senator. Governor Evans also recommended buying "insurance" against climate change in light of risk and uncertainty through planning and public policy decisions.

Breakout Sessions
July 16, 2001
1:30-4:15

During the afternoon, meeting participants assembled into three separate breakout sessions. All groups were assigned the same discussion questions. Meeting participants were assigned to groups according to their geographic location and area of interest. Discussion questions focused on:

- projected changes in snowpack and streamflow,
- impediments to using climate change in long-term plans,
- policy and planning opportunities, and
- adapting to climate change.

Although the questions were specifically listed, discussions in the groups varied significantly to include much broader discussions on climate change.

Group 1's discussions primarily focused on issues of climate change in public policy and energy issues (as they relate to supply/demand issues and price controls). Major discussion points included climate science and planning uncertainties, hydroelectric power production impacts on water use flexibility, and the value of price signals as a way to manage demand.

Group 2 began with a general discussion of the morning session's presentations. Discussions then progressed to the questions listed for the breakout sessions. Major points raised by Group 2 included the need for sub-basin level planning, the Klamath Basin irrigation controversy, climate change planning and the parallel to Y2K preparations, and impediments to using climate information

Group 3's discussions began with a brief presentation from Kyle Martin of the Columbia River Inter-Tribal Fish Commission on suggested adjusted flood control rule curves for the mainstem Columbia. The ensuing discussion loosely followed the listed breakout session questions, including dialogue on the need for more specificity on impacts and shorter-range forecasting, climate monitoring/forecasting data collection and coordination, and potential triggering events for climate change planning.

Report Back to Plenary and At-Large Discussion
July 16, 2001
4:30-5:30

Breakout groups reconvened in Stevenson A for the report back to plenary and general discussion.

Group #1 – Report to Plenary

1. Evidence presented on climate change shows that climate

Report Back to Plenary and At-Large Discussion (cont.) July 16, 2001

change is a compelling issue although there is lots of uncertainty. Climate information is not correctly used in planning; there are many knowledge gaps.

2. Issues in using climate change information in management: climate information lacks specificity. It is clear that supply and demand problems are looming with population growth. Climate change adds one more stressor to that problem. Climate change is not, by itself, today's driver for institutional change.

3. Technological change is needed. Population and demands for water and energy are going to increase dramatically. We need a huge jump in technology/efficiency to help offset the increase in demand.

4. Price signals work and the technology for instituting price signals is here. High value uses of water will survive.

5. Institutional adaptation to climate change – top down or bottom-up approach? Develop a nonregulatory regional forum? Bottom up approach recommended.

    - Subregional groups needed – "model watershed approach"
    - Provide a framework, allow locals to do the planning
    - Provide information and resources (a tool kit)
    - British Columbia starting with basic education

6. Improve type and availability of climate data and forecasting models. Expand outreach.

7. Do a better job with multiyear climate outlooks (start with El Nino Southern Oscillation patterns). Three to five year forecasts would have great utility in the Columbia River basin.

8. Evaluate climate change costs/benefits to power systems over next few decades.

Group #2 – Report to Plenary

Questions/comments from morning session:

- New opportunities arising from climate change
- Irrigation/flood management objectives compete with each other
- Need to remember that climate change discussions involve

Report Back to Plenary and At-Large Discussion (cont.) July 16, 2001

more than the potential for more droughts. Higher winter flows mean flooding is a possible threat.
- Expand flood control criteria (Corps would consider)
- Sub-basin planning, including fish impacts, needed
- Need to include impacts on ocean changes and impacts

Aspects of concern
- Concerns related to low flow: irrigation, navigation, water supply, fish
- Concerns related to High flow: flooding

Impediments to using climate information
- Need more quantitative information – climate change scenarios somewhat qualitative
- Political resistance to accepting the idea that climate is changing
- Time horizon: we have a lot of time so we can put it off.
- Public is not demanding action in adapting to climate change. Policy reacts.
- Projecting other changes: no one has talked about long-term changes in values.

Policy list in White Paper #3. Additional policy arenas where climate information could be beneficial (supplementing list on pg. 14 of White Paper #3)
- Columbia Basin treaty rights;
- Other tribal treaty rights;
- Synergies of demand-side management (energy and water);
- Growth management planning;
- Forest resources: add rangelands, fire;
- Water quality, TMDL (total maximum daily load);
- Air quality planning

What could we [CIG] do differently?
- Next meeting: Could have more industrial users here. Targeted papers could be helpful.
- Fact sheet/elaboration of 17 points
- More outreach needed to specific audiences.

<u>Group #3 – Report to Plenary</u>

No notes on the report to plenary for Group #3 available. Major points of discussion in Group 3's breakout session included the following:

Report Back to Plenary and At-Large Discussion (cont.) July 16, 2001

- The need for more specificity on impacts and shorter-range forecasting;
- The need to change flood control rule curves;
- The need for more data, more funding for data collection, and better coordination of data collection/accessibility;
- The need to fold climate change concerns into other planning and monitoring efforts;
- The need for support for climate change planning "from the top" (at the federal level). The administration needs to be convinced and Congress needs to provide resources.
- Potential triggers for change (in willingness to incorporate climate change into planning).

At-Large Discussion

Time was left at the end of the report to plenary for general discussion of the issues raised in the morning and afternoon sessions. Tom Fitzimmons raised a general question for the group to consider: what is the definition of the problem we [meeting participants and CIG] are dealing with? Climate change or sustainability? Is the problem better defined in terms of consumption? Sustainability might be a better definition of the problem we are trying to address. There was little discussion of this point.

Participants were asked to consider whether a second meeting on climate and water policy was needed, what would be discussed at a second meeting, and where the meeting should be held. The meeting adjourned at 5:15.

TUESDAY JULY 17, 2001

Breakout Sessions
8:30-10:00

Tuesday morning began with continued discussions in the breakout groups.

The second day of discussions for Group #1 primarily focused on factors keeping people from using climate information (addressed in a round table format), monitoring climate change impacts, and issues related to international cooperation and coordination. Group #2 primarily focused on general data collection needs, incorporating climate change into long-range planning, and the role of the CIG in the adaptation process. Group #3 primarily focused on approaches to designing a strategic response to climate change, levels of action (federal, state, local), climate data/monitoring needs, and coordination of U.S. and Canadian monitoring/research.

Report Back to Plenary and At-Large Discussion
July 17, 2001
10:00-12:00

Groups reconvened for final report to plenary and general discussion.

Group #1 – Report to Plenary

- Information is not used in a definitive way. Climate change is not currently deemed to be a critical issue, in part because of issues with time horizons - professional timescales vs. timescale of physical changes. As a result, the political support for considering these issues is lacking.
- Need for further education and forums like this one. Need to get the public involved at a grass roots level. Further education of upper level policy and decision makers.
- Broaden the scope of the issue to include other impacts such as forests and fish.
- Frustration about accuracy and uncertainty in scenarios. Data needs and monitoring processes should be evaluated. Researchers need better data to improve the accuracy of climate predictions, and practitioners need better tools/data for management.
- Changes in data services, reductions in funding and access to data works against appropriately including climate change information in policy.
- Lack of coordination. How best to collect, analyze and distribute data?
- Groundwater is a crucial missing piece.
- Better communication/coordination between subregional groups is needed, which is a complex organizational task. Some important decision processes are closed.

Group #2 – Report to Plenary

Monitoring:

- Lots of data already available; better coordination needed.
- One centralized source for climate information would be useful.
- Unified Climate Action Network (USGS) that is on the way is a step towards that.
- Long-term monitoring capability is at risk because of potential loss of stations. Need to make Congress aware of the need to couple long-term and short-term needs.

Strategies:

- What was the intention of the Skamania meeting? It was not

Report Back to Plenary and At-Large Discussion (cont.) July 17, 2001

as clear as it could have been.

- Climate change has to be integrated with other issues: ESA, salmon recovery, energy production, local watershed planning.
- Top-down vs bottom-up approach? Both! Use the open doors at any level. Increase interaction with planners and career policy people (not elected officials); bring the politicians in later.
- Lots of legal avenues for adapting to climate change: e.g change water law from the bottom-up.
- Sub-basin planning, technical recovery teams are places to tap into.
- Timing of the 2001 drought is useful: need more briefings, meetings.
- CIG in good position to serve as a catalyst.

Group #3 – Report to Plenary

- Need to involve key policy people, in conjunction with public outreach. A "bottom up" approach may be the most practical avenue available in the short term.
- Implementation of climate change scenarios may best be realized by creating data sets that can be used in an "off the shelf" manner for planning.
- We don't have a policy framework for using the technical information, so it's no help as it stands. Better data is needed to create the policy support needed. Glacier monitoring was mentioned as a missing piece.
- Truck coming down the road analogy. "Suppose we are standing in the middle of the road, and a truck is approaching. Efforts to better estimate the speed of the truck are of little help if there is no capacity to move out of the way. In the context of climate change, right now we have no ability to get out of the way [i.e., no real tools to improve water management]. This needs to be addressed."
- Good planning and coordination is taking place at some levels, but the need for more comprehensive understanding of the interactions between various management groups and water uses is essential.

Final question for the General Plenary Session:

How do we improve flexibility or increase our ability to manage our water resources, including climate change as one of a range of

Report Back to Plenary and At-Large Discussion (cont.) July 17, 2001

stresses?

Context for the question - climate change is not a priority issue but problems in water management system are. Problems include:

- Demand is outstripping supply
- Growing conflicts between uses
- A more difficult policy environment. Trade-offs in conflicts are becoming sharper (hydro/fish/agriculture; M&I uses/ hydro/fish).
- Rigidities in institutional arrangements (e.g. municipal transfers)
- Flexibility in prior appropriation?

Tom Fitzimmons suggested rephrasing of the question to put a more positive spin on it. Tom's rephrasing of the question:

> "How do we improve the capacity of the region's water resources and management system to address all demands on resources and the management system"

Karl Dreher raised the point that Idaho's experience with water banks shows that there is flexibility in the Prior Appropriation Doctrine. The ESA and the Clean Water Act are the two primary impediments limiting flexibility. Karl also noted that CIG could help answer the question just posed, and recommended that CIG do workshops on state/regional basis aimed at politicians and science educators (specifically mentioned Project WET [Water Education for Teachers]). Politicians must be engaged. However, term limits with legislators are a problem; continually having to reeducate people.

Before decisions are made that require investing, uncertainty has to be narrowed.

There was strong support for having a second Climate and Water Policy meeting within the next six months (approximately). Karen Fraser recommended having another meeting before the next session of the Washington State legislature (session begins January 2002). The CIG is willing to host another meeting and will begin planning for the event.

The meeting adjourned at 11:30 am.

------ end of meeting ----

For More Information

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- Klamath Basin field, 2001. U.S. Department of Agriculture. www.or.nrcs.usda.gov/pas/picsdrought.htm
- Skagit River, winter 1996. Photo: Lara McKinnon. Northwest Regional Floodplain Managers Association. www.norfma.org.
- Dworshak Dam, Idaho. Idaho Department of Water Resources. http://www.idwr.state.id.us/info/water/dams/Dworshak.htm

Climate and Water Policy Meeting - July 16-17, 2001, Skamania Lodge

Final Participants (listed by NAME)

Prefix	First Name	Last Name	Title	Organization
Mr.	Brian	Allee	Executive Director	Columbia Basin Fish and Wildlife Authority
Mr.	Jeff	Allen	State Director of the Environment for Senator Mike Crapo (ID)	U.S. Senate
Mr.	Greg	Armour	Secretary of the Board	Okanogan Basin Water Board
Ms.	Cynthia	Barton	District Chief (WA)	U.S. Geological Survey
Mr.	Jim	Barton	Chief, Hydrologic Engineering Branch, North Pacific Region	U.S. Army Corps of Engineers
Mr.	Gustavo	Bisbal	Senior Science and Policy Analyst, Fish and Wildlife Division	Northwest Power Planning Council
Mr.	Harold	Blackwolf, Sr.	Chairman, Fish and Wildlife Committee	Confederated Tribes of the Warm Springs Reservation
Mr.	Brian	Brown	Assistant Regional Administrator, Hydro Programs	National Marine Fisheries Service
Mr.	James	Buizer	Assistant Director, Office of Global Programs	National Oceanic and Atmospheric Administration
Mr.	Johnny	Carline	Chief Administrator	Greater Vancouver Regional District
Mr.	Jack	Clark	Solid Waste/Environmental Engineer	City of Kennewick
Mr.	Paul	Cleary	Director	Oregon Water Resources Department
Dr.	Stewart	Cohen	Adaptation and Impacts Research Group (AIRG), Sustainable Development Research Institute (SDRI)	Environment Canada/University of British Columbia
Mr.	Charles	Craig	Deputy Director	Oregon Department of Agriculture
Ms.	Linda	Crerar	Policy Assistant to the Director	Washington Department of Agriculture
Dr.	Chad	Day	Professor, School of Resource and Environmental Management	Simon Fraser University
Mr.	Karl	Dreher	Director	Idaho Department of Water Resources
Mr.	Angus	Duncan	Executive Director	Bonneville Environmental Foundation
Governor	Daniel	Evans	former Governor and U.S. Senator for Washington	Daniel J. Evans Associates
Mr.	Lee	Faulconer	Policy Assistant to the Director	Washington Department of Agriculture
Mr.	Tom	Fitzsimmons	Director	Washington Department of Ecology
Mr.	Joshua	Foster	Senior Program Development Specialist, Office of Global Programs	National Oceanic and Atmospheric Administration
Mr.	Stan	Fox	Assistant State Conservationist (OR)	U.S. Department of Agriculture, NRCS
The Honorable	Karen	Fraser	Chair	WA Senate Environment, Energy, & Water Comm.
Ms.	Laura	Gephart	Watershed Projects Coordinator	Columbia River Inter-Tribal Fish Commission
Ms.	Nancy	Glaser	Director of Strategic Planning	Seattle City Light
Mr.	David	Goodrich	Director, Climate Observations & Services Office	National Oceanic and Atmospheric Administration
Mr.	Kindy	Gosal	Community Liaison for the Environment Sector	Columbia Basin Trust
Mr.	Justin	Gould		Nez Perce Tribe
Mr.	Alan	Hamlet	Research Scientist, JISAO/SMA Climate Impacts Group	University of Washington
Mr.	Blair	Henry	President	Northwest Council on Climate Change
Mr.	Steve	Johnson	Executive Director	Washington Public Utility District Association
Ms.	Adrienne	Karpov	Program Manager, JISAO/SMA Climate Impacts Group	University of Washington
Mr.	Steve	Keller	Regional Director and Agency Drought Coordinator	Washington Department of Fish and Wildlife
Dr.	Doug	Kenney	Professor, Natural Resources Law Center	University of Colorado, Law School
Mr.	Jeff	King	Senior Resource Analyst, Power Planning Division	Northwest Power Planning Council

Dr.	Wayne	Lei	Director of Environmental Affairs	Portland General Electric
Dr.	Dennis	Lettenmaier	Professor of Civil Engineering, JISAO/SMA Climate Impacts Group	University of Washington
Mr.	Stephen	Lipscomb	Assistant District Chief for Hydrologic Data, Idaho Water District	U.S. Geological Survey
Dr.	Nathan	Mantua	Research Scientist, JISAO/SMA Climate Impacts Group	University of Washington
Mr.	David	Marshall	Executive Director	Fraser Basin Council
Mr.	Kyle	Martin	Mainstem Hydrologist	Columbia River Inter-Tribal Fish Commission
The Honorable	Larry	Mattson	Mayor Pro Tem	City of Yakima
Dr.	David	McAllister	Director, Habitat Division	Oregon Department of Fish and Wildlife
Mr.	Pat	McGrane	Program Manager for Rivers and Reservoirs	Bureau of Reclamation
Mr.	Ronald	McKown	ESA Program Manager	Bureau of Reclamation
Dr.	Edward	Miles	Professor of Marine Studies and Public Affairs, JISAO/SMA Climate Impacts Group	University of Washington
Mr.	Jim	Milton	Director	Tri-County Water Resources Agency
Mr.	Steve	Moddemeyer	Regional Relations and Sustainability, Office of Strategic Policy	Seattle Public Utilities
Dr.	Philip	Mote	Research Scientist, JISAO/SMA Climate Impacts Group	University of Washington
Mr.	Thomas	Myrum	Executive Director	Washington State Water Resources Association
The Honorable	Laird	Noh	Chair	Idaho Senate Resources & Environment Committee
Mr.	Barry	Norris	Administrator, Technical Service Division	Oregon Water Resources Department
Ms.	Kimberly	Nunes	Special Assistant to the Honorable Jay Inslee, Congressman (WA)	U.S. Congress
Mr.	Mike	O'Bryant	Reporter	Columbia Basin Bulletin
Dr.	Richard	Palmer	Professor of Civil Engineering, JISAO/SMA Climate Impacts Group	University of Washington
Mr.	Gary	Passmore	Director, Environmental Trust Department	Confederated Tribes of the Colville Reservation
Mr.	Scott	Pattee	Water Supply Specialist, Snow Survey and Water Supply Forecasting	U.S. Department of Agriculture, NRCS (WA)
Dr.	Don	Reading	Consultant, Ben Johnson Associates, JISAO/SMA Climate	University of Washington
Mr.	Jack	Robertson	former Acting Administrator for Bonneville Power Administration	(none)
Dr.	Edward	Sarachik	Professor of Atmospheric Sciences, JISAO	University of Washington
Mr.	George	Schneider	Water Resource Manager, Resource Management Branch	Seattle Public Utilities
Dr.	Richard	Slaughter	President, Richard Slaughter Associates, JISAO/SMA Climate	University of Washington
Ms.	Alexandra	Smith	Vice President for Environment, Fish, and Wildlife	Bonneville Power Administration
Mr.	Doug	Smith	Resource Planning Specialist	BC Hydro
Dr.	Amy	Snover	Research Scientist, JISAO/SMA Climate Impacts Group	University of Washington
Ms.	Nancy	Stephan	Manager, Weather and Streamflow Forecasting	Bonneville Power Administration
Mr.	Doug	Sutherland	Commissioner of Public Lands	Washington Department of Natural Resources
Dr.	Harvey	Thorleifson	Senior Program Manager	Natural Resources Canada
The Honorable	Cameron	Wheeler	Chair	Idaho House Resources & Conservation Committee
Ms.	Lara	Whitely Binder	Graduate Research Assistant, JISAO/SMA Climate Impacts Group	University of Washington

Climate and Water Policy Meeting - July 16-17, 2001, Skamania Lodge

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Prefix	First Name	Last Name	Title	Organization
Mr.	Jack	Robertson	former Acting Administrator for Bonneville Power Administration	(none)
Mr.	Doug	Smith	Resource Planning Specialist	BC Hydro
Mr.	Angus	Duncan	Executive Director	Bonneville Environmental Foundation
Ms.	Alexandra	Smith	Vice President for Environment, Fish, and Wildlife	Bonneville Power Administration
Ms.	Nancy	Stephan	Manager, Weather and Streamflow Forecasting	Bonneville Power Administration
Mr.	Pat	McGrane	Program Manager for Rivers and Reservoirs	Bureau of Reclamation
Mr.	Ronald	McKown	ESA Program Manager	Bureau of Reclamation
Mr.	Jack	Clark	Solid Waste/Environmental Engineer	City of Kennewick
The Honorable	Larry	Mattson	Mayor Pro Tem	City of Yakima
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Mr.	Kindy	Gosal	Community Liaison for the Environment Sector	Columbia Basin Trust
Ms.	Laura	Gephart	Watershed Projects Coordinator	Columbia River Inter-Tribal Fish Commission
Mr.	Kyle	Martin	Mainstem Hydrologist	Columbia River Inter-Tribal Fish Commission
Mr.	Gary	Passmore	Director, Environmental Trust Department	Confederated Tribes of the Colville Reservation
Mr.	Harold	Blackwolf, Sr.	Chairman, Fish and Wildlife Committee	Confederated Tribes of the Warm Springs Reservation
Governor	Daniel	Evans	former Governor and U.S. Senator for Washington	Daniel J. Evans Associates
Dr.	Stewart	Cohen	Adaptation and Impacts Research Group (AIRG), Sustainable	Environment Canada/University of British Columbia
Mr.	David	Marshall	Executive Director	Fraser Basin Council
Mr.	Johnny	Carline	Chief Administrator	Greater Vancouver Regional District
Mr.	Karl	Dreher	Director	Idaho Department of Water Resources
The Honorable	Cameron	Wheeler	Chair	Idaho House Resources & Conservation Committee
The Honorable	Laird	Noh	Chair	Idaho Senate Resources & Environment Committee
Mr.	Brian	Brown	Assistant Regional Administrator, Hydro Programs	National Marine Fisheries Service
Mr.	James	Buizer	Assistant Director, Office of Global Programs	National Oceanic and Atmospheric Administration
Mr.	Joshua	Foster	Senior Program Development Specialist, Office of Global Programs	National Oceanic and Atmospheric Administration
Mr.	David	Goodrich	Director, Climate Observations & Services Office	National Oceanic and Atmospheric Administration
Dr.	Harvey	Thorleifson	Senior Program Manager	Natural Resources Canada
Mr.	Justin	Gould		Nez Perce Tribe
Mr.	Blair	Henry	President	Northwest Council on Climate Change
Mr.	Gustavo	Bisbal	Senior Science and Policy Analyst, Fish and Wildlife Division	Northwest Power Planning Council
Mr.	Jeff	King	Senior Resource Analyst, Power Planning Division	Northwest Power Planning Council
Mr.	Greg	Armour	Secretary of the Board	Okanogan Basin Water Board
Mr.	Charles	Craig	Deputy Director	Oregon Department of Agriculture
Dr.	David	McAllister	Director, Habitat Division	Oregon Department of Fish and Wildlife
Mr.	Paul	Cleary	Director	Oregon Water Resources Department
Mr.	Barry	Norris	Administrator, Technical Service Division	Oregon Water Resources Department

Dr.	Wayne	Lei	Director of Environmental Affairs	Portland General Electric
Ms.	Nancy	Glaser	Director of Strategic Planning	Seattle City Light
Mr.	Steve	Moddemeyer	Regional Relations and Sustainability, Office of Strategic Policy	Seattle Public Utilities
Mr.	George	Schneider	Water Resource Manager, Resource Management Branch	Seattle Public Utilities
Dr.	Chad	Day	Professor, School of Resource and Environmental Management	Simon Fraser University
Mr.	Jim	Milton	Director	Tri-County Water Resources Agency
Mr.	Jim	Barton	Chief, Hydrologic Engineering Branch, North Pacific Region	U.S. Army Corps of Engineers
Ms.	Kimberly	Nunes	Special Assistant to the Honorable Jay Inslee, Congressman (WA)	U.S. Congress
Mr.	Stan	Fox	Assistant State Conservationist	U.S. Department of Agriculture, NRCS (OR)
Mr.	Scott	Pattee	Water Supply Specialist, Snow Survey and Water Supply Forecasting	U.S. Department of Agriculture, NRCS (WA)
Ms.	Cynthia	Barton	District Chief (WA)	U.S. Geological Survey
Mr.	Stephen	Lipscomb	Assistant District Chief for Hydrologic Data, Idaho Water District	U.S. Geological Survey
Mr.	Jeff	Allen	State Director of the Environment for Senator Mike Crapo (ID)	U.S. Senate
Dr.	Doug	Kenney	Professor, Natural Resources Law Center	University of Colorado, Law School
Mr.	Alan	Hamlet	Research Scientist, JISAO/SMA Climate Impacts Group	University of Washington
Ms.	Adrienne	Karpov	Program Manager, JISAO/SMA Climate Impacts Group	University of Washington
Dr.	Dennis	Lettenmaier	Professor of Civil Engineering, JISAO/SMA Climate Impacts Group	University of Washington
Dr.	Nathan	Mantua	Research Scientist, JISAO/SMA Climate Impacts Group	University of Washington
Dr.	Edward	Miles	Professor of Marine Studies and Public Affairs, JISAO/SMA	University of Washington
Dr.	Philip	Mote	Research Scientist, JISAO/SMA Climate Impacts Group	University of Washington
Dr.	Richard	Palmer	Professor of Civil Engineering, JISAO/SMA Climate Impacts Group	University of Washington
Dr.	Don	Reading	Consultant, Ben Johnson Associates, JISAO/SMA Climate Impacts Group	University of Washington
Dr.	Edward	Sarachik	Professor of Atmospheric Sciences, JISAO	University of Washington
Dr.	Richard	Slaughter	President, Richard Slaughter Associates, JISAO/SMA Climate	University of Washington
Dr.	Amy	Snover	Research Scientist, JISAO/SMA Climate Impacts Group	University of Washington
Ms.	Lara	Whitely Binder	Graduate Research Assistant, JISAO/SMA Climate Impacts Group	University of Washington
The Honorable	Karen	Fraser	Chair	WA Senate Environment, Energy, & Water Comm.
Ms.	Linda	Crerar	Policy Assistant to the Director	Washington Department of Agriculture
Mr.	Lee	Faulconer	Policy Assistant to the Director	Washington Department of Agriculture
Mr.	Tom	Fitzsimmons	Director	Washington Department of Ecology
Mr.	Steve	Keller	Regional Director and Agency Drought Coordinator	Washington Department of Fish and Wildlife
Mr.	Doug	Sutherland	Commissioner of Public Lands	Washington Department of Natural Resources
Mr.	Steve	Johnson	Executive Director	Washington Public Utility District Association
Mr.	Thomas	Myrum	Executive Director	Washington State Water Resources Association

BREAKOUT GROUPS - JULY 16-17, 2001

Group 1**: D. Lettenmeier, N. Mantua, R. Slaughter

First Name	Last Name	Title	Organization
Gustavo	Bisbal	Senior Science and Policy Analyst, Fish and Wildlife Division	Northwest Power Planning Council
James	Buizer	Assistant Director, Office of Global Programs	National Oceanic and Atmospheric Administration
Jack	Clark	Public Works Director	City of Kennewick
Linda	Crerar	Policy Assistant to the Director	Washington Department of Agriculture
David	McAllister	Director, Habitat Division	Oregon Department of Fish and Wildlife
Karl	Dreher	Director	Idaho Department of Water Resources
Angus	Duncan	Executive Director	Bonneville Environmental Foundation
Karen	Fraser	Chair	WA Senate Environment, Energy, & Water Comm.
Kindy	Gosal	Community Liaison for the Environment Sector	Columbia Basin Trust
Doug	Kenney	Professor, Natural Resources Law Center	University of Colorado, Law School
Ronald	McKown	ESA Program Manager	Bureau of Reclamation
Ken	Messerle	Chair	Oregon Senate Natural Resources, Agriculture, Salmon, and Water Committee
Jim	Milton	Director	Tri-County Water Resources Agency
Laird	Noh	Chair	Idaho Senate Resources & Environment Committee
Gary	Passmore	Director, Environmental Trust Department	Confederated Tribes of the Colville Reservation
Jack	Robertson	former Acting Administrator for Bonneville Power Administration	(none)
George	Schneider	Water Resource Manager, Resource Management Branch	Seattle Public Utilities
Doug	Smith	Resource Planning Specialist	BC Hydro
Harvey	Thorleifson	Senior Program Manager	Natural Resources Canada

Breakout Group 2**: R. Palmer, P. Mote, L. Whitely Binder, D. Reading

First Name	Last Name	Title	Organization
Brian	Allee	Executive Director	Columbia Basin Fish and Wildlife Authority
Jeff	Allen	State Director of the Environment for Senator Mike Crapo (ID)	U.S. Congress
Jim	Barton	Chief, Hydrologic Engineering Branch, North Pacific Region	U.S. Army Corps of Engineers
Harold	Blackwolf, Sr.	Chairman, Fish and Wildlife Committee	Confederated Tribes of the Warm Springs Reservation
Brian	Brown	Assitant Regional Administrator, Hydro Programs	National Marine Fisheries Service
Gary	Chandler	Co-chair	WA House Agriculture and Ecology Committee
Paul	Cleary	Director	Oregon Water Resources Department
Lee	Faulconer	Policy Assistant to the Director	Washington Department of Agriculture
Stan	Fox	Assistant State Conservationist	U.S. Department of Agriculture, NRCS (OR)
Mary	Gautreaux	Field Representative for Natural Resources, Senator Ron Wyden (OR)	U.S. Congress
David	Goodrich	Director, Climate Observations & Services Office	National Oceanic and Atmospheric Administration
Blair	Henry	President	Northwest Council on Climate Change
Steve	Johnson	Executive Director	Washington Public Utility District Association
Wayne	Lei	Director of Environmental Affairs	Portland General Electric
Stephen	Lipscomb	Assistant District Chief for Hydrologic Data, Idaho Water District	U.S. Geological Survey
David	Marshall	Executive Director	Fraser Basin Council
Larry	Mattson	Mayor Pro Tem	City of Yakima
Thomas	Myrum	Executive Director	Washington State Water Resources Association
Alexandra	Smith	Vice President for Environment, Fish, and Wildlife	Bonneville Power Administration
Doug	Sutherland	Commissioner of Public Lands	Washington Department of Natural Resources

***** NOTE: Actual participation in groups varied. Some listed participants may not have stayed for the breakout sessions.***

Group 3**: E. Miles, A. Hamlet, A. Snover, S. Cohen

First Name	Last Name	Title	Organization
Greg	Armour	Secretary of the Board	Okanogan Basin Water Board
Cynthia	Barton	District Chief	U.S. Geological Survey
Johnny	Carline	Chief Administrator	Greater Vancouver Regional District
Betsy	Close	Chair	Oregon House Water and Environment Committee
Charles	Craig	Deputy Director	Oregon Department of Agriculture
Chad	Day	Professor, School of Resource and Environmental Management	Simon Fraser University
Daniel	Evans	former Governor and U.S. Senator for Washington	Daniel J. Evans Associates
Tom	Fitzsimmons	Director	Washington Department of Ecology
Josh	Foster	Senior Program Development Specialist, Office of Global Programs	National Oceanic and Atmospheric Administration
Nancy	Glaser	Director of Strategic Planning	Seattle City Light
Justin	Gould		Nez Perce Tribe
Steve	Keller	Regional Director and Agency Drought Coordinator	Washington Department of Fish and Wildlife
Jeff	King	Senior Resource Analyst, Power Planning Division	Northwest Power Planning Council
Kelli	Linville	Co-chair	WA House Agriculture and Ecology Committee
Kyle	Martin	Mainstem Hydrologist	Columbia River Inter-Tribal Fish Commission
Pat	McGrane	Program Manager for Rivers and Reservoirs	Bureau of Reclamation
Steve	Moddemeyer	Regional Relations and Sustainability, Office of Strategic Policy	Seattle Public Utilities
Barry	Norris	Administrator, Technical Services Division	Oregon Water Resources Department
Kimberly	Nunes	Special Assistant to the Honorable Jay Inslee, Congressman (WA)	U.S. Congress
Scott	Pattee	Water Supply Specialist, Snow Survey and Water Supply Forecasting	U.S. Department of Agriculture, NRCS (WA)
Nancy	Stephan	Manager, Weather and Streamflow Forecasting	Bonneville Power Administration
Cameron	Wheeler	Chair	Idaho House Resources & Conservation Committee