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**SENIOR STAKEHOLDERS MEETING ON CLIMATE AND WATER  
POLICY**

**March 20, 2002  
Portland, Oregon**

**Hosted by:  
The Climate Impacts Group  
Joint Institute for the Study of the Atmosphere and Ocean  
University of Washington**

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***Executive and General Meeting Summaries***

*Prepared by:  
Lara Whitely Binder  
UW Climate Impacts Group*

## EXECUTIVE SUMMARY

The Senior Stakeholders Meeting on Climate and Water Policy was held March 20, 2002 at the Northwest Power Planning Council offices in Portland, Oregon. The purpose of the meeting was to continue discussions initiated at the July 2001 Climate and Water Policy Meeting at Skamania Lodge, but in a small group setting with the region's senior water and natural resource managers.

The meeting began with two presentations on regional climate variability, climate change, and projected impacts of climate variability and change on Pacific Northwest (PNW) water resources. The presentation also included a brief overview of projected impacts on salmon, forests, and coastal systems. Discussions began immediately after the presentations. Major discussion points and conclusions include the following:

- **One-Year Versus Multi-Year Droughts.** An early and important distinction made by participants was the significance of one-year versus multi-year droughts. Research conducted by the Climate Impacts Group (CIG) on the hydrologic impacts of natural climate variability and human-induced climate change in the PNW shows an increased potential for multi-year droughts over the next 20 to 50 years. Participants agreed that while the region has managed to make it through difficult one-year droughts, multi-year droughts are an entirely different scenario. The region can generally weather a one-year drought using carry-over storage (where available) and groundwater. The reliability of those options is questionable after the first year of drought however.
- **Capacity For Autonomous Response To Drought.** The PNW's capacity for autonomous response to single year and multi-year droughts was a major focal point of the meeting. Autonomous responses are actions that could be expected to occur without any significant change in the region's approach to managing water. Participants identified the following possible autonomous responses to future single and multi-year droughts:
  - continued increase in groundwater use;
  - implementation of curtailment plants, drought year options, and temporary water transfers;
  - increased application of conjunctive management systems; and
  - market-driven responses (i.e., "water will follow the money").
  - Other possibilities include more storage and development of an integrated rule curve in the Columbia River.

The role of the Prior Appropriation Doctrine as an autonomous response was also discussed. Prior Appropriation was viewed by some participants as an appropriate mechanism for managing drought given that the doctrine already recognizes that water shortages will occur. This presumption is built into the doctrine with recognition of junior and senior water rights and the curtailment of junior rights in low flow years. Prior Appropriation also facilitates the transfer of water between uses, allowing some flexibility in water use during critical periods.

It is clear from the discussion on autonomous responses (and the region's management of the 2001 drought) that the current framework for managing drought in the PNW is based on the assumption that: 1) any drought is a one-year drought, and 2) that responses to the drought must be able to pull the region through any one drought season or year. As such, this framework often requires making economic and social tradeoffs between water use for agriculture, municipalities, and protection of threatened and endangered salmonids. The framework leaves the region vulnerable, however, to multi-year droughts.

The extent to which institutional and political culture shape drought management approaches also became evident during the meeting. Idaho's water management culture and autonomous drought response preferences are dominated by Prior Appropriation-derived market-based appropriations. Water curtailments are made as needed in Idaho; rights dating back to 1888 were curtailed in Idaho during the 2001 drought. Oregon and Washington also have allocation systems based on Prior Appropriation but water curtailment is too politically sensitive an issue to be relied on as the dominant approach. In all states municipal users, no matter how junior, are protected from curtailment.

- **Incorporating Climate-Related Drought Concerns into Planning and Policy Arenas.** An important step in minimizing climate-related hydrologic impacts is recognizing these potential impacts in long-term planning and policy arenas. Doing so is conceivable; there are many projections and assumptions planners must incorporate when developing long-range resource management plans. Population growth and endangered species concerns are two major variables. Climate change is a third variable. Including climate change in planning considerations, participants noted, might make a difference between two choices. Recognizing these impacts also makes sense from a risk-management perspective.

One challenge to including climate change in long-term planning is the likelihood of climate change projections being realized. Before individuals make significant changes, they will want to know what will happen. The risk otherwise is being wrong in a very costly way. "It is best to react to the crisis", a participant noted, "because everyone else is in it too." Gradual trends (changes of 1% per year) "are easy to deal with" but changes in extreme events or uncertainty test the basis for institutions. Elected officials, it was noted, operate on 2- and 4-year cycles. Events occurring in 10 to 20 year time frames are someone else's problem.

Examples of including climate change in long-range planning are available. Idaho has started incorporating climate change scenarios into stochastic modeling. Seattle Public Utilities and the City of Portland also included climate change impacts in recent long-term planning efforts.

- **Increased Collaboration.** Several examples of on-going or new collaborative efforts between PNW states were mentioned. Directors from the four PNW water resource agencies (ID, OR, MT, WA) are collaboratively exploring an interstate water bank and other initiatives under the four governors' salmon initiatives. Idaho and Washington are also cooperating on shared aquifer studies. Washington State's proposed 2002 Budget contains a number of studies related to improving negotiations with neighboring states and British Columbia, and

improving information on federal and tribal reservation water rights, and improving water rights dispute resolution processes (e.g., water court) and water rights records. Funding for all of these activities is contingent on Governor Locke keeping these items in the proposed 2002 budget.

Further discussion on adapting to the hydrologic impacts of climate change in the PNW is expected to continue at all levels (federal, state, and local) in the future. For more information on the March 20, 2002 Senior Stakeholders meeting, please do not hesitate to contact Philip Mote at the Climate Impacts Group (206-616-5346).

## **GENERAL MEETING SUMMARY**

### ***SENIOR STAKEHOLDERS MEETING ON CLIMATE AND WATER POLICY***

**March 20, 2002 - Portland, Oregon**

**Hosted by:  
The Climate Impacts Group  
Joint Institute for the Study of Atmosphere and Ocean  
University of Washington**

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The Senior Stakeholders Meeting on Climate and Water Policy was held on March 20, 2002 at the Northwest Power Planning Council offices in Portland, Oregon. The purpose of the meeting was to continue discussions initiated at the July 2001 Climate and Water Policy Meeting at Skamania Lodge, but in a small group setting with the region's senior water and natural resource managers. The list of participants and agenda for the meeting are attached.

#### **Introduction**

Professor Ed Miles of the Climate Impacts Group (CIG) began the meeting with a brief overview of the CIG and the purpose of the meeting. Professor Miles emphasized in his introduction that in addition to population growth and endangered species effects, Pacific Northwest (PNW) water resource managers need to consider a third variable in water management and planning efforts. That third variable is climate change.

#### **Presentations**

Two presentations were given while participants ate lunch. Philip Mote gave a presentation on what is known (and not known) about global and regional climate change. Dennis Lettenmaier presented an overview of the hydrologic impacts of climate variability and climate change in the PNW. The presentation also included a brief overview of projected impacts on salmon, forests, and coastal systems. Copies of the presentations are available by contacting Philip Mote at 206-616-5346.

#### **Summary of Discussion**

Discussion at the meeting was based on, but not necessarily limited to, five central questions:

1. How do the known and potential impacts of climate variability and climate change affect current water management plans and practices? How might management for current and future stresses on water supplies, such as population growth and instream flow requirements, be affected by climate impacts?

2. What institutional and political constraints may affect organizational response to changes in flow regimes and water use?
3. How do the roles of state, tribal, and federal agencies differ (if at all) in adapting to climate-induced stresses on water supplies?
4. What autonomous responses should be expected?
5. What variables must be monitored to better detect, define, and address climate-related changes in water resources? What other types of support information is needed?

Discussion at the meeting was participant-driven and therefore did not necessarily follow the order of listed questions. The unrestricted format was beneficial to the meeting, however, given that it allowed for an open, free-flowing discussion of the topics between participants. The format of this meeting summary reflects the open nature of the meeting.

Professor Miles began the meeting by reviewing the relationship between drought probabilities, climate variability, and climate change. Research conducted by the CIG on the hydrologic impacts of natural climate variability and human-induced climate change shows an increased potential for multi-year droughts over the next 20 to 50 years. Six multi-year droughts occurred in the 20<sup>th</sup> century; five occurred when the Pacific Decadal Oscillation (PDO) and the El Niño/Southern Oscillation (ENSO) were both in a warm phase.

The PNW's ability to weather a one year drought, much less a multi-year drought, is a significant concern. The PNW does not have the physical or social infrastructure to manage drought impacts (unlike a flood) and it is not clear who is in charge when a drought occurs. Given these concerns, discussion during much of the meeting was focused on the problem of multi-year droughts, autonomous responses to drought, and current planning for climate change impacts.

#### *One-Year Droughts, Multi-Year Droughts, and the Drought of 2000-2001*

The consensus among participants regarding drought management is that while the region has managed to make it through difficult one year droughts, multi-year droughts are an entirely different scenario. A one-year drought is generally weathered using carry-over storage (where available) and groundwater. The reliability of those options is questionable after the first year. Idaho was able to make it through the 2001 drought with the help of 12 million acre-feet (Maf) of storage. Idaho is particularly vulnerable now, however, even with good precipitation and normal snowpack due to the lack of carryover storage (1 Maf less storage this year).

A multi-year drought in Oregon would have its biggest impact on coastal communities, which have no storage and rely on summer rainfall. Oregon's Willamette Valley also has no carryover storage (except Owyhee). It is questionable "how [Washington] would make it" in a multi-year drought according to one participant. The drought of 2000-2001 put Washington on the margin. Given that growth in the state is 90,000-110,000 people per year, Washington would already be running into trouble [supplying water] with 2 million more people by 2020 even without climate change.

In any drought, high summer temperatures (or the absence of them) can have a significant impact. The 2001 drought was not as significant a problem as it could have been due to the mild summer.

### Prior Appropriation and Managing Water Rights in Drought Situations

The role of the Prior Appropriation Doctrine in managing drought was discussed at varying points throughout the afternoon. According to Karl Dreher, Director of the Idaho Department of Water Resources, the Prior Appropriation Doctrine is an appropriate mechanism for managing drought impacts. The prior appropriation doctrine already recognizes flow shortages will occur; this presumption is built into the system with recognition of junior and senior water rights. When shortages occur, junior water rights are curtailed.

Mr. Dreher also noted that prior appropriation facilitates the transfer of water between uses. Water rights are property rights that can be bought and sold. Therefore, when shortages occur, water rights holders can sell or lease their rights to higher order users that require the water (e.g., municipalities, industries). This approach has been taken through Idaho's Water Banking program.

The extent to which Washington, Idaho, and Oregon limit junior water rights varies greatly. In Washington, the growth of municipal, fish, and Public Utility District demands is cutting the margin between "real water" and "paper water". Even as this margin is narrowed there is a real reluctance in Washington to turn water off. The reluctance also exists in Oregon. Political sensitivities drive this reluctance. In no case would a junior municipal water right be shut off.

Idaho's curtailment practices are noticeably different from Washington and Oregon. Curtailment is viewed as a given response to shortages under the prior appropriation doctrine. Idaho curtailed rights dating back to 1888 during the 2001 drought. Junior municipal rights are protected by a provision in Idaho's state constitution allowing municipalities to "condemn" a senior water right for immediate use if there isn't enough water to fill a junior priority municipal right. Compensation to the senior rights holder is required.

### Agricultural Water Use Trends

Agriculture is a major water user in Washington, Oregon, and Idaho. The general consensus on agricultural water use between the Oregon and Idaho state water directors is that agricultural demand for water is *not* growing except in specific areas.

- In Idaho: According to Mr. Dreher, there are no major water rights being appropriated in Idaho. Irrigated agricultural acreage is decreasing overall largely as a result of commodity prices and the cost of electricity. Some farmers in Idaho have to lift irrigation water 1,000 feet or more to reach their fields. Irrigated acreage in the Snake River is also decreasing due to limitations in the water supply. When agricultural lands go out of production, nothing prevents that water from being sold to a better use (under prior appropriation).

- In Oregon: Groundwater is used for many higher value crops in Oregon but withdrawals are decreasing overall even with the same amount of land devoted to agriculture (more pasturage). Demands are increasing in the Willamette Valley.

No specific trends on agricultural use in Washington were mentioned.

### Drought and Hydropower Production

The effect of drought on hydropower production and power contracts was discussed briefly. According to Mr. Kehoe of the Bonneville Power Administration (BPA), BPA bought “a lot” of water rights in 2001 in response to the drought. BPA uses 1939 as a base year for critical flow and planning long-term contracts. Flows above that base period are considered “gravy”.

Mr. Kehoe also commented that power production on the Columbia is not a static operation. BPA has brought firm power production down by at least 1/3 (from 12,000 MW to ~8,000 MW) in the last 20 years due to fish issues. BPA believes reliance on river power production will be falling as the Pacific Northwest turns to other sources to meet increased demand due to regional growth.

### Autonomous Responses to Drought

Prof. Miles asked participants to consider what autonomous responses could be expected in the region as a result of water shortages<sup>1</sup>. The following responses were identified.

- Continued increase in groundwater use. Groundwater has rapidly become the water source of choice throughout the region. In Idaho, 95% of municipal and industrial water use is from groundwater. Groundwater is being tapped more frequently as a water source for several reasons:
  - In Washington, the state does not require a water rights permit for wells producing less than 5,000 gallons per day (gpd). Given the current backlog of surface water rights applications (over 7,000), drilling a well is considered a more expedient option when you can meet the exemption criteria. Similar provisions exist in Oregon, although the backlog in rights applications is nowhere as significant (approx. 600 applications).
  - Some surface water bodies are closed off to further appropriation.
  - Groundwater is less sensitive to annual droughts and therefore can typically carry users through a one-year drought or longer depending on the system.

Potential problems noted by participants with this autonomous response include:

- *The unaccounted use of groundwater in the region.* Washington estimates that 8,000-12,000 new exempt wells are drilled each year. Because of the exemption, the state does not know how many exempt wells exist or how they may be affecting aquifer

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<sup>1</sup> Autonomous responses are responses that would be expected to occur without any significant changes in the region’s approach to managing drought.



yields. Political sensitivities in the state legislature prevent the issue from being addressed.

- *Groundwater is susceptible to contamination, which may be difficult and costly to remediate.* In Idaho, the Boise metropolitan area is being weaned off groundwater to surface water because of the difficulty of protecting groundwater from contamination. Surface water rights also become available when farm land goes out of production.
- *Groundwater is not totally immune from the effects of drought.* Participants noted that while groundwater is less sensitive to one year droughts, groundwater is not immune to problems during a multi-year drought. Recovery is also slower.

- Implementation of curtailment plants, drought year options, and temporary water transfers. Oregon has curtailment plans and drought year options to move water temporarily from agriculture to municipal and industrial uses. Washington would also implement such plans. With no additional storage, major municipalities would have to conserve. According to one participant, municipalities would “take up a lot of the slack” by leasing water from farmers.

Water rights transfers in Washington are permitted assuming three criteria are met: the right has to be your water right, the amount has to be what you are using, and the transfer cannot harm anyone else. Emergency groundwater wells may be authorized in drought years. The Washington State Legislature passed a bill in the 2002 legislative session to facilitate movement between agriculture and other uses.

Oregon can arrange transfer years ahead, then trigger the transfer in a drought year. Emergency permits are also granted for groundwater. Idaho can process temporary transfers and exchanges during drought. The Water Bank allows for quick changes in the purpose and location of water use.

Potential problems noted by participants with this autonomous response include:

- The general reluctance in Washington and Oregon to curtail water rights.
- The availability of agricultural water rights on the west side of the Cascades is limited. Consequently, the ability to “take up the slack” may not be as much of an option on the west side.

- Increased application of conjunctive management systems. One innovation that is expected is an increased use of active conjunctive management systems for ground and surface water. Surface water is diverted, treated to drinking water standards, and pumped into the ground for groundwater recharge. Idaho is doing this in the Boise River area for municipal and irrigation uses. San Diego is implementing conjunctive management to stop seawater intrusion.
- Market-driven responses (i.e., “water will follow the money”). Mr. Dreher noted that the Pacific Northwest is just coming of age to the problems of California and Colorado. “Money moves water and money is where the people are so that is where the water will go”. As has been the case in California and Colorado, extensive projects to move water will be built to manage shortages. Mr. Cleary noted with some irony that in Oregon, people and water are already in

the same place but people are now moving away to areas where the water isn't because they want to get away from the water.

- More storage? More storage would be a certainty in the minds of some participants, and at least a topic of discussion for others.
  
- An integrated rule curve in the Columbia? An integrated rule curve could potentially provide the Army Corps of Engineers more flexibility in managing reservoirs on the mainstem Columbia. Adjustments to reservoir operations would be made in accordance to changes in supply. Col. Krueger of the Corps noted that if Congress authorized the Corps to develop an integrated rule curve, they [the Corps] would do it. The process would require a lengthy NEPA review process, however, so nothing would change quickly. The Northwestern Division Office has been revising the "Master Manual" for the Missouri River for 13 years so far. The review, brought on by drought in the 1980s, has been long and political with no changes made yet. A Systems Operation Review is not as big an effort as a Master Manual review.

Mr. Slaughter noted that southern Idaho does not have a lot of options for tradeoffs and adaptation to multi-year droughts. Most technological changes have already been accomplished. Consequently all Idaho is left with, in the opinion of Mr. Slaughter, is a regulatory response.

Prof. Miles noted how different cultures seem to be driving drought management approaches. Idaho's culture is market-based appropriations based on the Prior Appropriation Doctrine. In Oregon and Washington the issue is too politically sensitive. One participant noted that in addition to different cultures there are also different types of agencies participating as well. Some at the table belong to regulatory agencies, some to planning agencies.

### *Incorporating Climate Change Drought Concerns into Planning and Policy Arenas*

One of the goals of the meeting was to discuss how planning for the impacts of climate variability and climate change could be incorporated into long-range agency planning efforts and policy arenas. There are many projections and assumption planners must incorporate when developing long-range resource management plans. Population growth and endangered species concerns are two major variables. Climate change, Prof. Miles noted, is a third variable.

Several participants had general questions and comments about the feasibility of planning for climate change at this time. In the opinion of one participant, there is not enough predictive power to influence policy. Before individuals make any significant changes, they will want to know what will happen. The risk otherwise is being wrong in a very costly way. "It is best to react to the crisis", a participant noted, "because everyone else is in it too."

In the volatile energy sector, it is difficult to make decisions based on forecasts beyond 6 months to a year. BPA's meteorology department helps the agency make decisions related to climate. There are many factors outside climate that can affect BPA's generation needs. A recent example is the Enron failure. "How can you predict a failure like Enron and its impacts on the energy sector a year in advance?"

Another challenge is managing extreme events. Gradual trends (changes of 1% per year) “are easy to deal with” but changes in extreme events or uncertainty test the basis for institutions. Changes in extremes are an issue at a different level, “one that elected officials can’t deal with effectively”.

The perceived disconnect between the timing of impacts and policy-making time frames was also raised. Elected officials, it was noted, operate on 2- and 4-year cycles. Events occurring in 10 to 20 year time frames are someone else’s problem. Turnover rates are a potential barrier as well. At the regional level there are “too many wholesale changes” at the political levels with new governors and governors’ staff, new legislators, and new agency heads coming in every few years. New people continually have to be educated on issues.

Dr. Lettenmaier noted that many water management decisions are incremental. Consequently, the question is how climate change gets built into these incremental decisions. “Does it [climate change] make a difference in the decision?” Participants agreed that climate change might make the difference between two options.

Mr. Cleary stated that he would want to know the likelihood of multiyear droughts and who could respond to shortages. Who is most at risk? Mr. Dreher commented that a risk management approach is critical. What are the interruptible demands when availability falls below these models?

#### *Current Examples of Climate Inclusion in Long Range Planning*

Several examples where climate change is being or has been included in long range planning were mentioned during the meeting. Seattle Public Utilities has included climate change impacts on its long-term (20-year) projections on water supplies. Portland also recently included climate change in a long-term supply study.

Idaho has started incorporating climate change scenarios into long range planning as a risk management strategy. Idaho is finding in its stochastic modeling that everything is more variable. Changes in water supply from climate change are still small compared to interannual variations. Trends seem to be toward more variability – higher highs and lower lows.

#### *A Regional Drought Organization and Collaborative Efforts Among PNW States*

Professor Miles asked participants if a regional organization is needed to manage drought impacts and whether such an organization is likely to be created given what participants have heard during the meeting. There was limited discussion on this issue. Some participants felt that a regional organization was not likely. Another participant noted that it would depend what the organization would do.

Several examples of on-going or new collaborative efforts between PNW states were mentioned. Directors from the four PNW water resource agencies (ID, OR, MT, WA) are collaboratively

exploring an interstate water bank and other initiatives under the four governors' salmon initiatives. Idaho and Washington are also cooperating on shared aquifer studies.

Senator Fraser noted that the Washington State Legislature passed legislation in the 2002 session creating a climate information center. The state legislature also budgeted studies on improving negotiations with neighboring states and British Columbia, and improving the information given to the legislature and governor on federal and tribal reservation water rights. Another study will examine ways to improve water rights dispute resolution processes (e.g., water court) and water rights records. Funding for all of these activities is contingent on Governor Locke keeping these items in the proposed 2002 budget.

### Outreach

Several participants suggested outreach approaches for getting CIG's message into the planning arena. Senator Fraser recommended looking at ongoing planning processes (e.g., Washington's Watershed Planning Program, municipal water supply planning, etc). Agriculture and the timber industry might also want the information given the potential for economic impacts. A summer institute for K-12 teachers might also be an outlet for information. The National Drought Council proposed by Senator Domenici was another suggested forum.

Mr. Smith suggested that CIG find advocates at the governors' level, state legislatures, or Congress. Agencies will have to be told to include climate change in their planning; there is no money for the bureaucracies to pick it up. If the four governors pick it up [climate change planning], things could happen. The fact that this year is an election year for governors in Oregon and Idaho rules out this approach right now however. In the opinion of one participant, no governor will want to take on the issue of climate change planning as a campaign issue at this point.

### Meeting Adjournment

The meeting was adjourned promptly at 4:00. Participants encouraged CIG to continue its efforts with regional stakeholders. Prof. Miles thanked participants for their time.

## **Attachments**

*Final Agenda*  
*List of Final Participants*

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**FINAL AGENDA**  
**Senior Stakeholders Meeting on Climate and Water Resources**  
**March 20, 2002 ● 12:00-4:00 pm**

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12:00 – 1:00 Lunch and Optional presentations by the Climate Impacts Group:

12:00-12:20 “Global and regional climate change: what we know and don't know”  
12:25-12:55 “Climate impacts on the Pacific Northwest environment: An overview”

*These presentations are strongly recommended for those who did not attend the July 2001 Climate and Water Policy meeting, or for those who would like a refresher on the information presented at that meeting. Lunch is provided at no charge.*

1:00 – 4:00 Round Table Discussion. The round table discussion will be structured around the following questions. **The purpose of the discussion is to identify constraints and opportunities for reducing the region's vulnerability to climate-induced changes in water supplies.** The question format provides an opportunity for open discussion and feedback on the realities of managing water resources in the Pacific Northwest.

1. How do the known and potential impacts of climate variability and climate change affect current water management plans and practices? How might management for current and future stresses on water supplies, such as population growth and instream flow requirements, be affected by climate impacts?
2. What institutional and political constraints may affect organizational response to changes in flow regimes and water use?
3. How do the roles of state, tribal, and federal agencies differ (if at all) in adapting to climate-induced stresses on water supplies?
4. What autonomous responses should be expected?
5. What variables must be monitored to better detect, define, and address climate-related changes in water resources? What other types of support information is needed?

Break and refreshments will be provided in this 1:00-4:00 time frame.

4:00 Meeting adjourns

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*For additional information on climate and climate impacts in the Pacific Northwest, we recommend reading the following three papers prepared for policymakers for the July 2001 Climate and Water Policy meeting:*

- Scientific Assessment of Climate Change: Global and Regional Scales
- Effects of Climate Change on Water Resources in the Pacific Northwest: Impacts and Policy Implications
- Preparing for Climate Change in the Pacific Northwest: A Discussion of Water Resources Adaptation Pathways

These papers can be downloaded from the CIG web site ([http://jisao.washington.edu/PNWimpacts/Workshops/Skamania2001/WP01\\_agenda.htm](http://jisao.washington.edu/PNWimpacts/Workshops/Skamania2001/WP01_agenda.htm)) or sent to you via mail at your request.

**Attending Participants for the Senior Stakeholders Meeting on Climate and Water Policy  
March 20, 2002**

<b>First Name</b>	<b>Last Name</b>	<b>Title</b>	<b>Organization</b>
William	Brookreson	Acting Director	Washington Department of Agriculture
Tom	Byler	Water Policy Advisor to Governor Kitzhaber, M.D.	Oregon State Governor's Office
Paul	Cleary	Director	Oregon Water Resources Department
Terry	Courtney	Member	Columbia River Inter-tribal Fish Commission
Charles	Craig	Deputy Director	Oregon Department of Agriculture
Karl	Dreher	Director	Idaho Department of Water Resources
Karen	Fraser	Chair, Washington Senate Environment, Energy, & Water Committee	Washington State Legislature
Jim	Kehoe	Manager of Policy and Strategic Planning	Bonneville Power Administration
Jeffrey	Koenings	Director	Washington Department of Fish and Wildlife
Daniel	Krueger	Deputy Division Engineer	US Army Corps of Engineers, Northwestern Division
Dennis	Lettenmaier	Professor of Civil Engineering, JISAO/SMA Climate Impacts Group	Civil and Environmental Engineering, University of Washington
Edward	Miles	Professor of Marine Studies and Public Affairs, JISAO/SMA Climate Impacts Group	JISAO/SMA Climate Impacts Group
Philip	Mote	Research Scientist	JISAO/SMA Climate Impacts Group
Keith	Phillips	Special Assistant to the Director on Water Policy	Washington Department of Ecology
Richard	Slaughter		Richard Slaughter Associates
Curt	Smitch	Senior Resource Advisor to Governor Gary Locke	Washington State Governor's Office
Lara	Whitely Binder	Research Assistant	JISAO/SMA Climate Impacts Group



## NOTES