Breakout Group Summaries
April 30, 2003

The following is a summary of the breakout group discussions based on notes taken by members of the group and the reports back to plenary. Groups were free to choose any of the 11 possible questions to discuss. In some cases, discussion covered topics beyond the specific scope of the provided questions.

Discussion Summary for the Municipal and Industrial Water Group

The municipal and industrial (M&I) water group chose to focus specifically on questions 5, 6, and 8.

Discussion Points for Question 5

Question 5 asked what the primary objectives should be in incorporating climate uncertainty into planning studies in the short term and the long term, and whether those objectives are different for the different time horizons.

Definitions of short term versus long term varied within the group. One participant suggested that short term meant 20 years (or whatever time horizon is required for planning the next major project). Other members of the group suggested anything less than 1 year, a “couple years out”, or any time horizon where decisions must be made to change or not change infrastructure.

Objectives for incorporating climate change varied. Including climate change should be done:

- to relate specific policy needs,
- to indicate ability to meet environmental objectives,
- to characterize future inflows (e.g., timing, volume, system yield, reliability),
- to characterize future demands,
- as part of contingency planning (for shorter time horizons), and
- to identify data needs (e.g., where to monitor for climate impacts).

Discussion Points for Question 6

Question 6 asked participants to identify the most important uncertainties associated with the current state of climate change scenario development. Identified uncertainties included:

- precipitation changes in general (summer and winter),
- extreme rain/drought (includes the intensity and frequency of storms),
- changes in technology,
- environmental response to climate change,
- changes in institutional/political settings (e.g., what if a court decides that hatchery fish are the same as wild fish?), and
- the compounding uncertainties associated with climate change models, downscaling, and hydrology models.
Discussion Points for Question 8

Question 8 asked participants to identify the institutional or political considerations impeding the incorporation of climate uncertainty in planning. Participants identified the following impediments:

- modeling/assessment tools change rapidly (do we choose a tool now or wait for a more advanced tool a few years from now?),
- perceptions that the change in climate may not be big enough to warrant action,
- lack of interest in city councils who may not be water suppliers and therefore not interested in assessing climate impacts (water supply may not drive political decisions),
- the aversion public agencies have to bearing bad news (e.g., lower supplies),
- general denial of problem (not wanting to admit that there may be problems with supply since the potential for less water in the future may affect economic development today),
- general skepticism and lag in public education about climate change impacts, and
- a general resistance to recognizing land use/zoning implications of climate impacts.

Discussion Summary for the Hydropower Breakout Group

General Issues

Simulation vs. Optimization in Planning

Both techniques can potentially address needed changes in operation and planning, but do so differently. Optimization on longer time horizons may not work better than simulation because of uncertainties in driving data. There are significant differences between operational models functioning at much finer temporal scales and planning models formulated to look at changes over longer time scales. Data requirements are different in each case as well (e.g. hourly data may be required for operational models, whereas planning models generally function at monthly or weekly time steps).

Multiple Stages of Investigation

Sensitivity – identifies areas of concern
Adaptation—addresses response capacity

Time and spatial scales of data and actual system operation and the potential limitations in the ability of general circulation models (GCMs) to provide useful information at small time and space scales may be an issue of concern in some cases. For example, real time operation of smaller hydro facilities may use hourly streamflow data. The ability to consider explicit changes in these short term operations may not be possible at the current stage of scenario development, but changes in monthly or weekly means from GCMs can be considered by adjusting the weekly or monthly means of fine time scale data (one simple way of conducting temporal downscaling).

The suggestion was made to provide unofficial alternate versions of interannual planning analyses (such as the Pacific Northwest Coordination Agreement planning process) using climate change streamflows. The focus of this would be education and familiarity of the management
and planning community to potential impacts in the context of current operations. This would be straightforward to do using the kinds of streamflow scenarios based on the historic record we now have available.

Demand changes need to be considered in more detail (as discussed in John Fazio’s talk).

Long-term changes in glaciers may have important implications for late summer streamflows that could increase vulnerability.

Potential changes in flood control and forecasting technology are major drivers in some systems and may need further study. Are the error characteristics or effectiveness of flood evacuation targets changing?

Shared data resources and integration of various planning processes is needed.

Need for institutional flexibility and feedback from monitoring programs (e.g. triggers for contingency plans).

**Discussion on Question 8 (Barriers)**

Question 8 asked participants to identify the institutional or political considerations impeding the incorporation of climate uncertainty in planning. Participants identified the following impediments:

- Political or jurisdictional boundaries don’t necessarily match physical boundaries (e.g. interstate and international jurisdiction in the Columbia basin)
- Short time scale of political decision processes and the relatively short tenure of politicians in office (time scale of politics ~ 4 years; time scale of climate change 20-40 years).
- Unwillingness of the public to pay higher power rates in the short term to avoid uncertain long-term impacts.
- Current water law may constrain water rights transfers, although this appears to be changing pretty well.
- Existing conflicts between hydro and other uses and users of water.
- Uncertainty doesn’t “play” well with policy makers. Every effort should be made to reduce uncertainties where possible and to stress no regrets, prudent, or low cost actions in talking to policy makers (e.g. emphasize the “low hanging fruit” in the short term).
- Prioritization of responses to climate change needs to be expressed in terms of risk and cost where possible in talking to legislators.

**Adaptation Opportunities**

The hydropower breakout group identified a number of possible opportunities for adapting PNW hydropower systems to climate change.

**Changes in Technology**

- Nuclear fusion power plants
- Wind turbines
- Photovoltaics
- Fuel cells
- Hydrogen electrolyses and storage technology

**Demand Side Management**
- Reduce avg demand via conservation and technology change
- Implement time of use or other alternate pricing schemes (i.e. reduce peak demand)

**Grass Roots Technology**
- Decentralization of power supply network (e.g. photovoltaics or fuel cells at people’s houses)
- Fuel distribution network instead of electrical distribution

**Regional Power Coordination**
- For example, in the future CA may have excess capacity in winter as more capacity is built to meet increased summer loads, and the Columbia could generate more power in summer to help with fish flows while reducing capacity requirements in CA.

**Conservation**
- Water conservation (primarily affecting other water uses)
- Energy conservation

**Reallocation**
- Reallocation of water rights and/or storage (permanent or temporary)
- Irrigation to hydro transfers (benefits fish and hydro)

**Discussion on Question 3 (Planning Horizons)**

There may be a desire to look farther ahead than current planning horizons of roughly 20 years because of cumulative threats of increasing temperatures, but other uncertainties probably overwhelm any useful analysis. This places an increased emphasis on adaptive management.

FERC licenses are an exception and typically have a very long time scale in comparison with most planning processes. Climate change should be included in the initial licensing process (although it’s not clear if it would necessarily change the outcome). Perhaps more important is the issue of designing in flexibility over the life of the license and right to review and amend the agreements if performance falls below expected levels. A formal process for making amendments to existing licenses currently exists, but such changes appear to be difficult to implement in practice.

The need for increased flexibility and mechanisms for updating of plans to reflect current information on evolving climate and system performance (e.g. BC Hydro’s frequent performance reviews and “consent to operate” guidelines for planning).

**Discussion on Uncertainty**

Some felt that uncertainties in the climate may actually be less than other uncertainties typically included in analysis (e.g. very uncertain estimates of future price of oil is frequently used in long
range energy planning).

Uncertainty is not typically the dominant rationale for including or not including information in long-term planning. Rather, sensitivity and perceived risk associated with various kinds of information defines inclusion. Relative unfamiliarity with climate information may explain some of the reluctance to include in planning.

Contingency planning may provide a way of coping with short term uncertainties, but there is an important issue with how to trigger such contingency plans if they include significant economic investments. Here ongoing uncertainty may prove to be a significant barrier to decision making. How can this be resolved?

**Discussion Summary for the Irrigation Water Group**

Summary point for question 1 (scales for evaluation)

- Need to get results to the Water Resource Inventory Area (WRIA) or similar watershed scale. WRIs, a term specific to Washington State, are roughly based on 4-digit USGS hydrologic unit codes.
- The 20-40 year time scale is appropriate (ex: orchards).

Summary point for question 7 (fundamental data/research needs impeding incorporation of climate change scenarios):

- There is a need for a repository for climate and hydrology model scenarios/results and continual redefining of scenarios; mold results into a form that can be used for planning.

Summary point for question 8 (institutional/political considerations impeding incorporation of climate change scenarios):

- Some people still don’t accept climate change
- In some areas (e.g., rural Oregon) there is a deep distrust of urbanites and government. This distrust makes it difficult to engage agriculturalists in conversation because of this.

*Other comments:*

Need to be able to relate predictions to observations. Need to adjust the historic record based on current and future scenarios to reflect climate change.

Drought versus climate change - role of climate in crop insurance pricing?

Sustainability of irrigation under climate change - effect of economics (power costs).

Need to get information out without concern for consequences. Access to information is important.

Good observations trump (good) models. Can we better document climate and trends?