R&D Scoping and Framing Workshop
R&D Roadmap: Managing Western Water as Climate Changes
February 20 and 21, 2008

Responsibilities, Challenges, and Needs
Perspectives of Reclamation Environmental Compliance and Ecosystem Restoration Managers

Note: The information presented herein is intended solely to facilitate a working level dialogue between the federal scientific community, and Reclamation water and environmental resource managers, on climate change research needs in support of Western water management. As such, "*this information has not been formally disseminated by the Bureau of Reclamation and should not be construed to represent any agency determination or policy*".[1]

Generally describe your region's environmental compliance and ecosystem restoration responsibilities *(this is meant to be a high level summary of your world):*

Environmental compliance activities by the Lower Colorado Region typically consist of discretionary Federal actions such as the construction of new facilities associated with the delivery of Colorado River water and other significant physical changes to existing Federal projects, operating guidelines for the main stem reservoirs, and changes in the location of use of Colorado River water that require Reclamation approval. The recently implemented "interim guidelines" for Lake Powell and Lake Mead are a prime example of the compliance necessary to implement new operational guidelines. In the Lower Basin, this action includes the implementation of potential shortages to Lower Basin users as well as a program that encourages extraordinary water conservation measures by individual water users to facilitate water transfer. The NEPA compliance completed as a result of the recent EIS covers the results of the action along river corridor, whereas potential "local" effects of the individual conservation projects (such as the lining of canals) may require additional compliance activities.

Regarding ESA compliance, the Multi-Species Conservation Program (MSCP) is a 50-year multi-agency effort to conserve and work towards the recovery of endangered species, and protect and maintain wildlife habitat on the lower Colorado River. Conservation and restoration activities are centered on the mainstem and include the goal of creating more than 8,100 acres of riparian, marsh and backwater habitat for four listed species and 16 other species native to the lower Colorado River. Covered activities include current and future operations as long as the potential effects of the future operations are within agreed to limits.

The LC Region is also a study partner for the Salton Sea Restoration Program in California and US-Mexico cooperative efforts for the lower Colorado River.

Describe the decisions that your region makes associated with environmental compliance and restoration responsibilities that may be affected by climate change:

Recently published projections of the potential effects of climate change on inflows into the Colorado River vary widely (from 0 to 40%) and are of great interest; however, additional research is both needed and warranted to quantify the uncertainty of these estimates in order to better understand the risks of current and future water resource management decisions. The uncertainties include the actual uncertainty in the climate response as well as the uncertainty due to differences in methodological approaches and model biases.

1/ Stated in accordance with Information Quality Act (Public Law 106-554), Final Information Quality Bulletin for Peer Review (Office of Management and Budget, December 16, 2004).

Recognizing this need, particularly in light of the drought in the Colorado River Basin, Reclamation's Lower Colorado (LC) Region initiated a multi-faceted research and development program in 2004 to enable the use of other methods for projecting possible future inflow sequences for Colorado River planning studies. The research and development effort has been designed to provide information for the near-term (e.g., some facets have already been completed and the information has been used in the recent EIS), as well as for the longer-term that involves collaboration with other research organizations (e.g., National Oceanic & Atmospheric Administration (NOAA) and USGS). This effort has two major thrusts:

- collaboration with other federal agencies and universities to conduct research to gain knowledge and understanding of the potential impacts of climate change and climate variability on the Colorado River; and

- improvement of Reclamation's decision support framework, including modeling and data handling capabilities, in order to utilize the new information when it becomes available.

As a part of this effort, the LC Region convened a climate technical work group to assess the state of knowledge with regard to climate change and modeling for the Colorado River Basin and to prioritize future research and development needs. This work culminated in a report that has been included as an appendix in the EIS and is available upon request. Key conclusions and recommendations that could affect our decision-making when establishing new operational guidelines include:

- For studies and management decisions involving shorter look-ahead horizons (e.g., less than 20 years), interannual to decadal variability may be a more significant uncertainty than that associated with near-term projected climate change. Evaluating the state of interannual/interdecadal oscillation phenomena such as ENSO, PDO, and AMO may add significant information with respect to the risk due to increased variability; and

- For longer look-ahead horizons (20+ years), further research and development is needed to translate climate protections from General Circulation Models (GCMs) to the spatial scales necessary for use in Colorado River planning studies.

- Although paleoclimatic information may not necessarily represent future climate scenarios, this information may be useful in framing assumed variability in future hydrologic sequences, particularly with respect to drought potential;

Current conservation and restoration activities fall within a short time horizon and have not considered climate change influences other than the signal already present in the existing base condition. Efforts are currently focused on a traditional approach of "natural preservation" which is directed by Biological Opinion commitments and measures. Adaptive management has been viewed as the means to address climate change for long-term maintenance and preservation of conservation and restoration projects.

What are the primary scientific or non-scientific factors that typically govern these decisions?

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Although there has a significant amount of observational research on the effects of global warming, there does not appear to be much experiment-derived knowledge about what a warmer climate might do to particular habitats or species. At this point, our primary approach is to better understand how climate change issues and perceived impacts are being dealt with by others, including courts, in NEPA. This will lay the groundwork for developing Reclamation's approach..

Who are the primary stakeholders affected by these decisions and summarize their primary concerns?

Lower Division States--minimize the potential impacts of climate change that may adversely affect the continued delivery of Colorado River water.

Water and Power Users-- ensure that any impacts of climate change do not adversely affect the operation and maintenance of water delivery and power systems to ensure continued delivery of water and power in accordance with contractual arrangements. Predictability of the resource is critical for the water and power users to plan for the future.

Regulatory agencies-- ensure that Reclamation continues to follow existing laws and regulations with respect to any discretionary Federal actions taken in response to climate change.

Environmental groups-- ensure that any discretionary decisions made by Reclamation in response to climate change to do not adversely impact animal and plant species and the environment.

In general, list the top three wishes that you would like for the scientific community to provide for you, in support of your region's environmental compliance and ecosystem restoration responsibilities that are related to understanding and utilizing climate change information.

1. Improve the ability to assess the potential effects of climate change on precipitation and runoff in the Colorado River Basin, particularly for time horizons of 20+ years.

2. Investigate the sensitivity of plant species to climate changes. We are interested in how climate changes impacts plants and how this could impact insects thereby furthering impacts to plants and animals.

3. Investigate the effect of climate change on the spawning and reproductive habits of threatened or endangered fish species on the lower Colorado River system.

This information may be able to assist in determining the best management practices for the successful establishment and maintenance of habitat under the Multi-Species Conservation Program.

Are there current or emerging *"project-specific applications"* in your region where answers to these three wishes may be beneficial to you in the near-term?

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Answers to the third question would be timely for implementation of the Multi-Species Conservation Program, which is in the early stages of development and could be implemented in such a manner to accommodate any anticipated effects of future climate change.

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