

RECLAMATION

Managing Water in the West

Institutional Solutions for Water Resource Conflicts

A Forum for Reclamation Managers
Workshop Summary

**U.S. Department of the Interior
Bureau of Reclamation**



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Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Contents

	Page
Background	1
Introductory Speakers	1
Case Studies	6
Day Two Introductory Speakers	14
Panel Discussions.....	15
Day Two Afternoon Speakers.....	19
Day Three Presentation.....	22

Background

The Institutional Solutions for Water Resource Conflicts Workshop held in Salt Lake City on September 24-26, 2007, provided a forum for Reclamation managers to discuss regional experiences with water conflict and collaboration. Topics included the genesis of conflict, turning conflict into collaboration, conflict management tools, and lessons learned. Case studies from each of the five regions were prepared and discussed. Two panel discussions were convened. One was devoted to the roles of money, power, and the law in water conflict. The other examined the role of science in conflict management. Finally, new directions in conflict management research were explored.

This document provides summaries of the presentations that were given at the workshop and the various discussions that took place. For a complete text of any of the presentations, please contact Douglas Clark (drclark@do.usbr.gov, 303-445-2271) for a workshop compact disc.

Introductory Speakers

Rick Gold, recently retired UC Regional Director, provided the opening remarks. He listed competition over limited resources, differing values, historic antagonisms, and fear of “*what a potential opponent might attempt next*” as primary causes for conflict. To manage conflict, he suggested that Reclamation managers become willing to “give up control” of the issue at hand, collect relevant quality data, determine the limits of the resource under dispute, seek for a middle ground, and work to discover the “leverage points.” To be successful, a manager must have a thorough understanding of the issues at hand, his or her own position on the issues, and the positions of each of the other stakeholders. He or she must closely evaluate the risks associated with various stances and courses of action. Managers must make certain that all of the right people have become involved in the conflict management process. They must also understand how and when to use leverage. He stressed that it is important to have a willingness to dedicate the appropriate amount of time and effort necessary for a successful conclusion—likely more than anyone imagined or bargained for. And it is important to know when and how to conclude, i.e., “to close.” Mr. Gold’s final advice was to “be diligent, honest, thorough, and lucky.”

Matthew McKinney, Director of the Public Policy Research Institute at The University of Montana, was the plenary speaker for the workshop. In the course of the workshop, he made two presentations. The first was entitled *Western Water Conflict and Collaboration: Managing Wicked Problems*.

A so-called “wicked problem” is characterized by (a) a complex network of independent actors who may have common, non-conflicting, or competing interests, (b) complex relations among the parties, and (c) varying types and levels of power. Furthermore, the problem resolution process may be plagued with incomplete information, misinformation, differing views as to what information is relevant, differing data collection and assessment procedures, differing interpretations of the data, and varying levels of comfort with risk and uncertainty. Further still, multiple jurisdictions may be involved with competing missions and mandates. There may be a lack of transparent decision-making or public involvement. Finally, multiple opportunities for appeal may exist.

With “wicked problems,” stakeholders cannot agree as to how to name “the problem.” Moreover, it is not possible to move on to framing options or proposing alternative solutions, because interested parties view each other essentially as parts of the problem. No common rules and no common experience exist for defining the core issue. Measures of success are, therefore, elusive.

In such situations, progress is sometimes possible if the parties can build a common vocabulary and set guidelines for civil dialogue. The right political timing is critical. When a window of opportunity opens, forums should be artfully designed to meet the needs and interests of the stakeholders, as well as the seminal characteristics of the problem at hand.

Wicked problems in the past have been addressed through a great variety of methods. Two bedrock principles, of course, have traditionally governed the management of western resource conflict: prior appropriation and scientific management. In addition, a variety of participatory approaches have now emerged: citizen initiatives, public participation, public interest litigation, and negotiation and mediation. Devolutionary movements have included the Sagebrush Rebellion, place-based collaboration, and the country supremacy movement. Each successive strategy has emerged in response to the shortcomings of the preceding approaches to decision-making and dispute resolution, and each incorporated the best ideas of the time. While each of the strategies began at a different time and place, they have braided together at the beginning of the 21st century, creating a “confluence” of ideas or methods. While each of the methods can play a useful role in conflict prevention or resolution, each can also foster conflict.

At present, *collaborative approaches*, also called *collaborative governance*, offer the hope that inclusive, informed, and deliberative public processes can create more livable communities, vibrant economies, and healthy landscapes than previous approaches. Corollaries of this proposition are that collaborative governance both results in decisions that receive broad public support and saves time and money when compared to lobbying, litigation, and other ways of shaping public policy or resolving public disputes. Moreover, it provides the most direct and meaningful form of public participation, effectively integrates social and

political values with scientific and technical considerations, and makes implementation easier because the stakeholders have helped to shape the proposed policy.

Joint fact-finding, i.e., confronting a factual dispute by convening a data-gathering team comprised of scientists representing both sides of a conflict, can be a useful tool in collaborative processes. It has shown promise for fostering legitimacy, salience of information, and transparency.

Evaluation is an essential component of any collaborative process. It helps users to adjust, adapt, and improve their solutions. It maintains and builds support by measuring progress and documenting success. And it enhances the user's ability to provide workable solutions in subsequent collaborative activities.

Miguel Rocha, *Water 2025* and Title XVI Program Coordinator, spoke on behalf of *Water 2025*, which is the Secretary's initiatives to prevent crisis and conflict over water in the Western United States. *Water 2025* focuses on stretching existing water supplies through collaboration, technology and innovative, market-based solutions. It is designed to produce results and demonstrate investments that can help in preventing crises and conflict in the West. System Optimization Review grants and Challenge Grants are used to accomplish the *Water 2025* goals.

Water 2025 is based on five realities and four key tools.

Five Realities

- Explosive population growth in the areas of the West where water is already scarce.
- Water shortages occur frequently in the West.
- Over-allocated watersheds can cause crisis and conflict.
- Water facilities are aging.
- Crisis management is not effective in dealing with water conflicts.

Four Key Tools

- Conservation and Efficiency
- Markets
- Collaboration
- Improved Technology

From FY 2004 to FY 2007, *Water 2025* has awarded 122 Challenge Grant projects which leverage \$25.5 million in Federal funding with local partnerships into almost \$96 million in water management improvements in 16 Western States. Those 122 projects will create new water banks, promote the use of advanced technology to improve water management, and increase collaboration among Federal, State, tribal, and local entities. Projects include converting dirt canals to pipelines, installation of water measurement devices and supervisory control and data acquisition (SCADA) systems, and, as mentioned above, water marketing. To date, the sixteen completed projects have contributed 76,000 acre-feet in annual water savings.

Lorri Gray, Director of the Lower Colorado Regional Office, speaking on behalf of the Managing for Excellence initiative, reaffirmed Reclamation's intention to "recruit, train, and nurture personnel who have the skills needed to manage processes involving technical capabilities as well as communications and collaborative processes" as laid out in the National Academy of Science guidelines. Furthermore, "collaborative competencies should be systematically related to job categories and the processes of hiring, training, evaluating the performance of, and promoting employees. Reclamation should facilitate development of the skills needed for succeeding at socially and politically complex tasks by adapting and adopting a small-wins approach to organizing employee efforts and taking advantage of the opportunities to celebrate and build on successes."

Ms. Gray next addressed the Lower Colorado River Multi-Species Conservation Program which involved a 10-year collaboration amongst a large and diverse array of stakeholders. The logistics of a large collaboration effort are daunting, indeed—especially as people come and go in the process. She used early morning sessions to refresh memories and bring stakeholders up to speed. She also looked for "points of tentative agreement" (POTA) to advance the process towards closure. She noted that "push back" in the process can come from many sources. For instance, a biologist once told her that there "are no biological solutions for political problems." Her reply was that policy deliberations can ensure funding for biological work.

The Lower Colorado River Multi-Species Conservation Program (MSCP) is a coordinated, comprehensive, long-term multi-agency effort to conserve and work towards the recovery of endangered species, and protect and maintain wildlife habitat on the lower Colorado River.

The MSCP's purposes are to:

- Protect the lower Colorado River environment while ensuring the certainty of existing river water and power operations,

- Address the needs of threatened and endangered wildlife under the Endangered Species Act, and
- Reduce the likelihood of listing additional species along the lower Colorado River.

The MSCP covers areas up to and including the full-pool elevations of Lakes Mead, Mohave and Havasu and the historical floodplain of the Colorado River from Lake Mead to the United States-Mexico Southerly International Boundary, a distance of about 400 river miles. Conservation measures currently focus on the area from Hoover Dam to the border, but may include Grand Canyon in the future.

Developed between 1996 and early 2005, the plan for this 50-year effort includes 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. It also includes measures to protect and enhance an additional two listed and four non-listed species. In addition, the MSCP partners will participate in recovery programs for endangered razorback sucker and bonytail when those programs are finalized for the lower Colorado River. Presently, existing populations of these fish are maintained and augmented through a rearing and stocking program that also preserves the genetic diversity of these species.

Implementation of the program began in April 2005 with the signing of a Record of Decision by the Secretary of the Department of the Interior. The Department will provide 50 percent of the program's estimated \$626 million cost, and California, Nevada, and Arizona will jointly provide the other 50 percent (CA-50%, NV-25% and AZ-25%). The implementation activities are based on adaptive management principles, which allow program conservation measures to be adjusted over time based on monitoring and research. The Bureau of Reclamation, in consultation and partnership with a Steering Committee made up of stakeholder representatives, is the primary implementing agency for this activity.

Aaron Wolf, professor of geography in the Department of Geosciences at Oregon State University, spoke about the history of conflict and cooperation over shared water resources. Some of his research has been developed collaboratively with Kristel Fesler and Nathan Eidem. From the Klamath basin in the Pacific Northwest to the Jordan River in the arid and hostile Middle East, water conflicts are inherent and increasingly disruptive. Water which crosses boundaries-- be they economic sectors, legal or political jurisdictions, cultural divides, or international borders-- sets the stage for disputes between users trying to safeguard access to a vital resource, while protecting the natural environment. Without strategies to anticipate, address, and mediate between competing users, intractable water conflicts are likely to become more frequent, more intense, and more disruptive in the American West, the United States, and around the world.

Wolf presented research findings on cooperative and conflictive behavior over fresh water resources in the Western US and internationally. Internationally, there are 263 watersheds which cross the political boundaries of two or more countries. These international basins cover 45.3% of the land surface of the earth, include about 40% of the world's population, and account for approximately 80% of global river flow (Wolf et al. 1999). Despite the tensions inherent in the international setting, riparians have shown tremendous creativity in approaching regional development, often through preventive diplomacy, and the creation of "baskets of benefits" which allow for positive-sum allocations of joint gains.

To assess how these events play out at different scales, incidents of cooperation and conflict were collected and coded using a standardized classification system, compiled into event databases for the US West and internationally, and tested against a GIS of potential indicators of conflict. Cooperative incidents outnumbered conflictive ones in all study areas. Qualitative analysis showed cooperation and conflict severity depends upon alterations in institutional frameworks, confirming the following working hypothesis, as suggested by Wolf et al. (2003): "The likelihood of conflict rises as the rate of change within the basin exceeds the institutional capacity to absorb that change."

This suggests that there are two sides to the dispute setting: the rate of change in the system and the institutional capacity. In general, most of the parameters regularly identified as indicators of water conflict such as drought, dam building, and population growth are actually only weakly linked to the probability of dispute. Institutional capacity within a basin, however, whether defined as water management bodies or treaties, technical competence, or generally positive international relations, is as important, if not more so, than the physical aspects of a system.

Likewise, the number and severity of incidents in Oregon were affected by actions at all levels of government: local, state and Federal. This is especially apparent when stakeholders were faced with protocol changes that subsequently lead to uncertainty. The results of this research support alteration from a traditional focus on increasing supply and diversion to stakeholder mediations and the creation of institutions prepared for future uncertainty of water resource availability.

Case Studies

Connie Rupp, Manager of the Bureau of Reclamation Albuquerque Area Office, presented a water conflict case study focusing in primarily on issues surrounding the Middle Rio Grande silvery minnow, which was listed as an endangered species in 1994. The Middle Rio Grande Endangered Species Act Collaborative Program (Collaborative Program) has as its goals to (a) protect and improve the

status of listed species, (b) recover the endangered species, (c) protect the interests of existing and future water users, (d) secure interim and long term funding, and (e) comply with state and Federal law, including compact delivery obligations.

Sources of conflict surrounding the endangered fish are manifold. Ms. Rupp noted, for instance, that the Collaborative Program itself has been a moving target, unable to stabilize its processes and relationships. Increased demand, owing to population growth and urbanization, has put increasing pressure on the already over-allocated water resources in the Middle Rio Grande. The parties in the collaborative process have very divergent interests and consensus has proven to be challenging. In addition, at some point, Reclamation will be unable to meet flow targets for the minnow using supplemental water from the San Juan-Chama project, which is building systems to divert and use the water. Drought conditions continue. Scientific consensus on the base needs of the fish needs to be established. Non-water requirements such as habitat restoration and fish passage also exist.

Faced with these and other challenges, Reclamation is pursuing a two-pronged approach. First, the Bureau is trying to find flexibilities in the biological opinion that will require less supplemental water. More specifically, the question is being put forward as to whether there is any flexibility in the requirement for continuous flows to Elephant Butte from November 16 to June 15. This requirement relates to the spawning and recruitment needs of the fish. Other flexibilities are also being pursued. If spawning occurs earlier in the spring, perhaps the June 15 date can be pushed back. Still other issues are these. Can the requirements for managing river recession be changed, so that more river miles can be dried in a twenty-four hour period? Is there a need to have varying flow targets for dry, average, and wet years? Can the minnow survive in isolated pools? What kinds of flows are needed for recruitment? (*A Population and Habitat Viability Assessment* is going forward to reach some consensus on these and other issues). Finally, when a section of river has dried, but rains rewet the river, is it necessary to start the river recession management process over again?

There has also been an effort to identify flexibilities in water management that will support the biological opinion without requiring the use of supplemental water. Can the Army Corps of Engineers use deviations at Cochiti Dam to modify the spring hydrograph and ensure spawning/recruitment flows? Can the Middle Rio Grande Conservancy District ensure flow levels at key drains in the river system? Can the state agree to the use of surplus water credit? Can native water storage at Abiquiu be of any help? The overall goal for a sustainable biological opinion will be to get each one of the stakeholders to make a commitment to contribute to meeting the opinion's requirements in exchange for obtaining ESA coverage. There is general support to move to adaptive management to obtain more flexibility.

In summary, it is hoped that by finding flexibilities in management strategies and in the biological requirements that resolution of these conflicting demands for water in the Middle Rio Grande can be mitigated.

Jerry Gregg, Manager for the PN Region's Snake River Area Office, presented a case study on water issues surrounding the Eastern Snake Plain Aquifer.

Water in the Idaho's Eastern Snake Plain is over-allocated amongst a large array of users, including irrigation districts, fish farms, municipalities, industry, dairy interests, and rural-domestic users, among others. Primary conflicts have occurred among ground water and surface water interests. Ground water withdrawals have diminished natural flows and impacted senior surface water diverters. Rules that help define the legal relationship between surface and ground water users—statutes, administrative rules, and case law—have been developed, but until recently, have remained untested. Idaho is currently experiencing a prolonged dry period. Seven of the past eight years have been dry, and conflicts are now coming to a head.

During the 1980s and 1990s, the foundations of conjunctive management were laid. Seminal events included the Snake River Basin Adjudication, drought-induced disputes between senior surface water users and junior ground water users, and new regulations intended to govern delivery calls made by senior surface water users against junior ground water rights. Subsequent droughts have also pitted surface and ground water users against one another. Reclamation has worried about the potential effects of reduced storage on contractors and salmon flow augmentation.

Ground water users have so far unsuccessfully tested the constitutionality of the conjunctive management rules. The Idaho Water Resource Board has been tasked by the legislature to develop a comprehensive management plan. The governor of the state held a water summit. The combination of a recent drought and the potential prospect of global warming, however, have proved to be barriers to compromise.

In sum, the primary issue is entitlement to water. Surface water users argue that prior appropriation should be the guiding principle for allocations. Ground water users contend that other factors need to also be taken into account such as optimum water use and full economic development. Idaho courts must ultimately decide how the water resources will be allocated.

Lenny Duberstein is the Manager of the Planning and Program Development Division in the USBR Montana Area Office. He presented a pair of case studies for the GP region. The first had to do with the recovery of the pallid sturgeon on the Lower Yellowstone River.

Three Federal agencies, a Montana state agency and a national conservation group have formed a partnership to protect and enhance endangered pallid sturgeon populations in the Lower Yellowstone River at Intake Diversion Dam near Glendive, Montana. This new partnership provides an opportunity to collaboratively reach sound resource management decisions for the operations of the Lower Yellowstone irrigation project in accordance with the Endangered Species Act. Construction of the Reclamation-owned dam began 100 years ago. It is a 12-foot-high rock-filled crib weir that diverts water from the Yellowstone River into a canal and lateral system that provides water to about 55,000 acres of cropland in three irrigation projects.

The U.S. Fish and Wildlife Service has identified the Lower Yellowstone River as a priority recovery area for pallid sturgeon. The diversion dam poses a barrier to the migration of the sturgeon to historic spawning habitat. Fish entrainment also has been identified as an issue at the diversion dam. Fish, including pallid sturgeon, released above the dam, can become trapped in the main canal.

Reclamation, the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Montana Department of Fish, Wildlife and Parks, and The Nature Conservancy have signed a memorandum of understanding (MOU) to address this issue. The MOU calls for the five entities to work together to evaluate and then design and build modifications at the dam that would allow pallid sturgeon to pass upstream and which would reduce fish entrainment into the main canal.

Reclamation is currently working with the Fish and Wildlife Service, the Corps of Engineers, the State of Montana, and TNC to implement fish passage and entrainment protection at Intake. In July 2006, the Corps (at the request of Reclamation), completed a conceptual design for two proposed fish passage alternatives. The Service convened an independent panel to review the conceptual designs and provide recommendations to Reclamation in preparation of issuing a biological opinion on the proposed fish passage alternative as it relates to pallid sturgeon. The Corps has incorporated recommendations from the panel into a revised conceptual design.

The MOU partners will work together to comply with environmental laws. The Water Resources Development Act of 2007 has been enacted into law, thereby authorizing the Corps to assist Reclamation and provide funding for the project. Reclamation will now move forward with formal consultation with the U. S. Fish and Wildlife Service (Service) and initiate National Environmental Policy Act (NEPA) compliance activities. The President's FY 2008 budget increased Reclamation's Lower Yellowstone funding from \$96K to \$300K specifically for NEPA work and specified \$15 million in the Corps' budget for design and construction of the ecosystem restoration project. Pending the outcome of those two processes, Reclamation will work with the appropriate parties to initiate final design and construction activities.

The second GP case study concerned operation of the Yellowtail Unit. Yellowtail Dam, located in Montana, is 525 feet high forming a reservoir about 72 miles long when full, extending into the Bighorn Basin in Wyoming. The reservoir, occupies a steep narrow canyon for the first 60 miles before opening up onto a wide flat area at the head of the reservoir. The Yellowtail Unit was authorized by the Flood Control Act of 1944 as a multi-purpose feature of the Pick-Sloan Missouri Basin Program to provide benefits through hydropower generation, flood control, irrigation, municipal and industrial water supply, recreation, fish and wildlife enhancement and sediment control. The Bighorn Canyon NRA was authorized in 1966 to provide for public outdoor recreation of Yellowtail Reservoir.

Reclamation is responsible for the operation of the project, including lake levels and flow releases to the Bighorn River. Reclamation coordinates water discharged by this unit with the Army Corps of Engineers, the BIA Irrigation Project, the Western Area Power Administration, the National Park Service, Montana Fish, Wildlife and Parks, Wyoming Game and Fish, and special interest groups such as guides, outfitters, concessionaires, Friends of Bighorn River, Friends of Bighorn Lake, etc. Flow targets and desired lake levels have been developed over many years with input from a host of sources.

Local, state, and Federal entities are concerned that the Bighorn River system is not being managed in a way that fully protects and utilizes the system's resources to address the multiple demands, needs, and expectations of the public. Operating objectives include recognition of all downstream senior water rights, meeting contractual obligations, maintaining storage space for flood control, maximizing power benefits, maintaining lake levels for recreation, fish, and wildlife, and maintaining river flows for the river fishery.

Reclamation initiated the Bighorn River System Long-Term Issues Group in March 2007 to address various issues in the basin surrounding operations of the Unit such as, coordination of uses, recreational opportunities, power generation, state and tribal rights, administration of water resources, effects of flows, effects of drought, fish, wildlife, legal obligations, and updating managers. Reclamation has convened this group, but is not directing it. The group has been convened to identify, explore, and recommend alternative courses of action to local, tribal, state, and Federal entities responsible for managing the Bighorn River system resources. Responding to issues identified by the group, investigations initiated include: a Flood Pool Reallocation Study, a Reservoir Sediment Management Study, and the Bighorn River Habitat Maintenance Study.

Jason Phillips, Program Manager in the Reclamation Mid-Pacific Regional Office, presented a case study on the San Joaquin River Restoration Program (SJRRP). This program is a comprehensive long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River, ensure irrigation supplies to Friant Water users, and restore a self-sustaining fishery in the river.

The SJRRP is a direct result of a settlement reached in September 2006 on an 18-year lawsuit to provide sufficient fish habitat in the San Joaquin River below Friant Dam near Fresno, California, by the U.S. Departments of the Interior and Commerce, the Natural Resources Defense Council (NRDC), and the Friant Water Users Authority (FWUA). The settlement received Federal court approval in October 2006.

Broadly speaking, there are two settlement goals. The first is to restore and maintain fish populations in “good condition” in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish. The second is to reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the settlement.

The Friant Division, including Friant Dam and Millerton Lake, the Friant-Kern Canal, and the Madera Canal was constructed as an initial feature of the Central Valley Project in the 1940s. It was designed and is operated as a conjunctive management project, providing water supplies to about 1 million acres of highly productive agricultural land and several urban areas underlain by an overdrafted groundwater basin in the San Joaquin Valley in Central California. Friant Dam is operated to divert the majority of flow from the San Joaquin River, leaving portions of a 152-mile segment downstream to the Merced River dry in most years. Shortly following completion of Friant Dam, historic runs of salmon and other fish in the San Joaquin River downstream of the dam ceased.

The most recent conflict regarding the San Joaquin River began in 1988, when a coalition of environmental groups, led by NRDC, filed a lawsuit challenging the Federal defendants’ compliance with the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA) in connection with their renewal of the long-term water service contracts between the United States and the Central Valley Project, Friant Division contractors. Most of the Friant Division long-term contractors intervened as defendants. Through amended complaints the plaintiffs subsequently included a claim asserting that the Federal defendants must operate Friant Dam/Millerton Lake in accordance with California Fish and Game Code section 5937 which requires the owner or operator of any dam in California to allow sufficient water to flow through or around the dam in order to keep the downstream fishery in “good condition.” The District Court ruled that the contracts were not entered into in violation of NEPA, but held that approval of the renewal contracts violated procedural requirements of ESA. On June 24, 1998, the Ninth Circuit Court of Appeals affirmed most of the District Court’s rulings but remanded to the District Court the issue of the applicability of Section 5937 to the operation of Friant Dam (the Court of Appeals rejected arguments that Section 5937 was preempted on its face by Federal law).

From 1998 to 2003, without direct involvement by Federal defendants, FWUA and NRDC attempted to settle the remanded issue. In 2003, those discussions were terminated, and on July 19, 2003, the plaintiffs filed their Seventh Amended Complaint in which they added the Secretary of Commerce and the National Marine Fisheries Service as additional defendants and added some claims asserting that the long-term renewal contracts do not contain all the provisions required by the CVPIA and that some of the provisions that were included in those contracts are not consistent with the CVPIA. In an Order issued on August 27, 2004, the Court found that Reclamation violated Section 5937, and scheduled a trial on the issue of remedy. During the summer of 2005, at the request of California Senator Diane Feinstein and Congressman George Radanovich, FWUA and NRDC reinitiated settlement discussions. In November 2005, the Federal government became involved in those discussions, and in Spring 2006, the negotiators involved the State of California in concurrent discussions since the State would have a significant role in the implementation of any settlement.

After more than 18 years of litigation of this lawsuit, known as Natural Resources Defense Council, et al., v. Kirk Rodgers, et al., a settlement was reached on September 13, 2006. The settlement, between the NRDC, Friant Water Users Authority (FWUA), and the Departments of the Interior and Commerce, is based on two parallel Goals.

Before and during settlement negotiations, the settling parties conducted extensive technical studies to gain a better understanding of the physical conditions along the river, and to identify possible modifications, both structural and operational, that would be needed to successfully establish and sustain naturally-reproducing fish. This process revealed uncertainty and disagreement on fundamental issues such as minimum flows, water temperature, habitat suitability, genetic stock, surface water and groundwater interactions, construction costs, and economic consequences to the Friant Division. At the urging of Federal elected officials, the parties began to work toward their mutual goals and agreed on a quantity of water that would be dedicated for restoration purposes.

Cynthia Hoeft is the Director of the Resource Management Office in the Reclamation Yuma Area Office. **Jennifer McCloskey** is the Deputy Area Manager of the Yuma Area Office. They co-presented a case study on the Drop 2 Project. Faced with the worst drought in one hundred years, growing populations in Nevada and Arizona, and losses of beneficial flow to New Mexico in the neighborhood of 70,000 acre feet per year, the Yuma Area Office initiated a formal study in 2004 to find solutions.

The Drop 2 project was proposed as mitigation for the growing problems. The proposed project would provide additional regulating capacity to maximize within the United States the beneficial use of Colorado River water released from Parker Dam. It includes construction of a storage reservoir with a capacity of 8,000 acre-feet; an inlet structure off the All-American Canal (AAC); and an outlet structure

that connects the reservoir back to the AAC. The reservoir would be used to store diverted, excess Colorado River water from the AAC as water schedule adjustments are made during inclement weather or higher than normal flow periods. The regulated water would be used by the Imperial Irrigation District as part of its Colorado River water entitlement. The proposed project lies within Reclamation withdrawn lands and would be located 30 miles east of El Centro, California, in Imperial County.

The Collaboration Maturity Model was used to work through the planning process for this project, which involved numerous and diverse stakeholder interests. This model is adapted from the Capability Maturity Model developed at Carnegie Mellon University. It provides a roadmap for improving relationships with stakeholders using collaboration. Over time, as trust increases, stakeholder relationships can access more meaningful *levels of collaboration*.

The first level is *Ad Hoc*. Reclamation was at the ad hoc level during the fourth year of a drought. The parties had a problem, but did not know what to do about it. At this level stakeholders typically have little, if any, regard for one another.

The second level is *Zero Sum*. At this level, the stakeholder mentality is often “for me to win someone else has to lose.” When Reclamation set about instituting a formal process to study where and how much storage it should add to the system for optimum benefit, it moved to the zero sum phase. In this phase, as predicted, it received many cross-cutting comments.

The third level is *Diplomacy*. This involves the use of middlemen working back and forth between stakeholders seeking common ground. At this stage, mediators may also be brought in to resolve conflicts. The Bureau responded to the sometimes hostile comments by opening dialog, increasing transparency, and working diplomatically with various stakeholder groups. Many groups did not want to meet with the others. There were also issues around the science and the interpretations of the science. Reclamation acted as the middleman in these processes.

The fourth level is *Direct Bargaining*. At this level the stakeholders have found enough trust in one another to craft solutions directly without relying on the use of intermediaries or mediators. The Drop 2 project graduated to this level when Southern Nevada stepped in and began direct bargaining with the conservation interests. A working group was established. Participants included Reclamation, Southern Nevada, and four NGO’s. Reclamation’s role changed from mediator to information provider.

Finally, the fifth level and last level is *Partnering*. This is the highest level and truest form of collaboration. At this level, strong personal working relationships

have been established as trust has been built up over time. True partnership is often like a marriage where another's problem becomes our problem and vice versa. A "we are in this together" attitude begins to develop.

Reclamation has not reached this level yet in the Drop 2 project process, but is steadily working in that direction. As the Bureau's relationship with Southern Nevada Water Authority transitions to customer/service provider, it hopes to see that the project will greatly benefit from having a strong partnership in place. At this level, contractual documents and sound processes are essential, but they are not in themselves sufficient for a good outcome. Hard won trust is essential for the project to continue towards successful completion. This partnership, Reclamation hopes, will grow over time, culminate in the successful completion of other projects, and move towards the alleviation some of the ongoing water disputes in the lower Colorado River basin.

Day Two Introductory Speakers

Dennis Kubly, Chief of the Reclamation Adaptive Management and the Environmental Resources Group, in the UC Region indicated that in the wake of *Water 2025*, Reclamation needs a way to understand the genesis of water conflict and techniques for managing it. Randy Peterson, his supervisor, referred Dennis to Dr. Aaron Wolf at Oregon State University. Dr. Wolf had conducted previous global studies where he had learned that (a) cooperation is as common as conflict, (b) suspected social and biophysical predictors of conflict were not, in reality, predictors, (c) the presence or absence of institutional capacity is a prime predictor of conflict, and (d) conflict is most likely when the pace of change outpaces the institutional capacity for managing it. Dennis then hired Aaron Wolf, using Reclamation R&D funds and regional matching funds, to conduct a similar study in the UC Region. At the same time, he hired Douglas Clark from Reclamation's Remote Sensing and GIS Group to provide GIS data in support of Aaron's work and to oversee the project. In the course of the research, Doug Clark, Dennis Kubly, Aaron Wolf, Amy Cutler, and Nathan Eidem conducted a set of focus groups to determine how conflict is currently handled in the UC Area Offices.

Douglas Clark is a physical and social scientist with the Bureau of Reclamation, TSC. During his tenure with the USBR, he has worked extensively on the *Water 2025* water conflict hot spot effort. With **Dr. Aaron Wolf**, **Dennis Kubly**, and **Amy Cutler**, he is a principal investigator for the Western Water Institutional Solutions research water conflict management project. Clark reported on the findings of the three focus groups held in Upper Colorado Region area offices. Managers reported that they routinely spent 50-100% of their time managing conflict. They also reported that the causes of conflict included rapid change (particularly from external sources), failure to include all stakeholders in a

negotiation, stakeholder reluctance to see beyond their own interests, and ambiguities in the law. The likelihood of conflict did not depend solely upon supply and demand, but also upon the quality and durability of the relationships among diverse stakeholder groups.

Nathan T. Eidem, a doctoral candidate at Oregon State University, manages the Transboundary Freshwater Dispute Database (TFDD). His research focus is on water resources planning and management, including transboundary water relations, participatory governance, and groundwater quality. At the Institutional Solutions workshop he presented the results of his research on water conflict and cooperation in the UC region since 1970. Overall, the majority of the events during that time period were more cooperative than conflictive. Statistical analyses indicated a potential relationship between drought frequency and the intensity of accounting unit intensity, although none of the regression models were statistically significant. A statistically significant relationship was discovered between drought frequency and the intensity of events relating to fish passage when the two were regressed against each other. Further studies must be conducted to investigate this relationship. Timeline analysis showed that despite the relationship of hydropolitical intensity to drought frequency, no consistent relationship between drought severity and intensity in any one year existed.

Panel Discussions

The first panel, entitled “The Role of Power, Money, and the Law in Conflict-Collaboration Processes,” was facilitated by **Jennifer Gimbel**, Associate Director for Operations, Bureau of Reclamation. The panel members were **Lenny Duberstein** for the GP Region, **Dave Trueman** for the UC, Randy Chandler for the LC, **Jason Phillips** for the MP, and **Matt Howard** for the PN.

Power used appropriately can bring parties to the table that might not otherwise come. Used inappropriately, it can also be summoned to bully and, thus, to enrage one or more of the parties. It was advised that when the second case applies, the rest of the collaborative partners should see this for what it is and find ways to counter it.

It behooves those involved in collaborative processes to make themselves keenly aware as to who has real power and who does not. Getting powerful stakeholders involved in a collaborative process can help to gain leverage with Congress and other legislative entities. Organizations that have Congressional recognition can have immense power even when they do not have official status under the law.

Political power and/or leverage can be helpful, but parties seeking it out should be cautious. While it can, as stated above, get reluctant parties to the table and keep

them there, it can also invite micro-management by those in power, such as the main office or Congressional staff. In addition, it is worth remembering that any deal made at the negotiating table can change once it goes before Congress or other powerful government entities.

Team building can be a positive political or power-building exercise when done properly. For instance, in the Colorado River System, the Basin States and Federal agencies have found numerous venues for team building—as well as many opportunities to test the limits in collaboration. It was viewed as essential that team building initially occur in the course of working through some of the easier problems such as developing annual operating plans, conducting interagency meetings to share data on the river, conducting water user conferences, and working toward shared goals such as salinity control. In such cases, dialog and debate are often somewhat more theoretical in nature and less politically charged. But success can build on success. Relations can be built that will be useful when tougher issues, such as ESA issues, or drought-created issues such as water allocations, shortages, and surplus EISs present themselves.

Money can be a driving force in a settlement process. Given its technical competence, Reclamation, for instance, can engineer extremely creative solutions for problems, provided it is given enough time and money. Thus, money can buy useful technical expertise.

Parties at risk of losing their access to water resources sometimes expect compensation, even when they may not be legally entitled to it. Bringing money to the table may offer the only means for getting a solution. The panelists agreed that one should never underestimate the power of money to create solutions.

Money can come with strings, however, if it is available at all. And, indeed, lack of money has been known to foster creative solutions. One panelist cautioned that collaborators should beware of solving hard issues by using the Federal checkbook. Such solutions can result in complete failure of the process if the administration is unable to support the agreement. Outcomes such as these were said to occur frequently in Indian water rights negotiations.

The *law* can assist or exacerbate water conflicts. The prior appropriation doctrine can assist by providing clear guidance as to who is entitled to receive water. The law can also assist in bringing parties to the negotiating table. As one panelist pointed out, initially, parties to a conflict may want to impose an outcome on their adversaries. Litigation offers an avenue for this. However, going to court is expensive in terms of money, time, and emotional wear and tear. After some period of time, the parties may conclude that mediation and negotiation are desirable. In brief, litigation can wear parties down and predisposes them to collaboration.

The law can also exacerbate a water conflict. As one panelist put it, the law can force parties into an arrangement where no one is happy. Or the law may favor one party over the others, thus making that party less willing to compromise. In such a case, the participants that lose out may become polarized and entrenched in their positions.

Vagueness in the law can foster collaboration. As noted above, if one side is clearly favored under the existing legal framework, it may be less willing to compromise or negotiate at all, thinking it can impose an outcome. Flexibilities or ambiguities in the body of law can offer opportunity for creative win-win solutions.

One panelist summarized the discussion by calling power, money, and the law a *three legged stool*. For a successful settlement, all three legs are required. Power or politics must be aligned with funding (Congressional or other) and with the authorities that the law provides to make for a successful outcome and implementation.

Leadership is required to make the three legs come together. Ms. Gimbel said that leadership is like the road to Oz. One needs the brain of the Scarecrow (following Betsy Rieke's advice to "THINK"), the heart of the Tinman (following Rick Gold's admonition to own the issue), and the courage of the Lion.

The second panel explored the role of science in conflict-collaboration processes. This session was facilitated by **Curt Brown**, Director of Research and Development. Panel member included **Jeff Nettleton**, GP; **Chris Gorbach**, UC; **Carol Erwin**, LC; **Jason Phillips**, MP; **Pat McGrane**, PN.

The question of when it might be appropriate to engage in *educational efforts* around scientific issues was raised. Panel members generally saw educational efforts as most effective when they were *designed to open up lines of communication*. In this regard, educational efforts have been successfully used when they were designed in such a way as to let each party instruct all the others about their particular water usage. These processes can help clear up misperceptions and faulty information.

In some cases, a multi-party educational effort has led stakeholders who thought they were competing over water resources to actually become partners. This was the case with Rapid City and the Rapid Valley Water Conservancy District, where the irrigation district's needs for water were declining at the same time that the city's needs were growing. Rapid City's agreement to provide the District with water treatment plant effluent and to subcontract for supplemental water out of Pactola Reservoir on an as-needed basis met the District's future needs and allowed the City to contract with Reclamation for all of the available storage in Pactola.

Multi-attribute trade-off analysis has been used as a science educational tool. It has been successfully employed, for instance, to help stakeholders identify the performance and impacts of alternatives. And it has also helped parties to see how those alternatives could support their own objectives. Moreover, it can be useful for reminding stakeholders with long-held desires for a particular structure just what their underlying objectives were, and it can show them how other alternatives might satisfy those objectives as well.

Tribal experts have been found to be effective for helping to instruct Tribal members. The Tribes, it was pointed out, use experts they trust, but these same experts can also serve as instructors.

During conflict and collaboration processes, issues sometimes arise around *scientific uncertainty*. It was noted that the degree of uncertainty is directly related to the complexity of the system. Sensitivity analysis was proposed as a way to bracket potential outcomes when the parties cannot agree on assumptions. In addition, scientists and engineers can often quantify risks associated with uncertainty. Contingency plans can be prepared in case the most likely projected outcome does not occur.

Adaptive management strategies can be of use in such cases. With adaptive management, alternate plans will already have been explored. When uncertainty revolves around biological issues, it is sometimes more fruitful to try various alternatives and then monitor the results, than to engage in extensive studies. In the view of one panelist, however, adaptive management requires clear milestones in order to be fully successful. Another panelist cautioned that more scientists and more studies do not always resolve uncertainty. More science can also create more uncertainty. Still another panelist mentioned that those presenting scientific findings must have excellent communication skills and must be able to establish a rapport with the parties. Poor communication skills and inadequate “people skills” can result in an adverse outcome.

The panel noted that another point to keep in mind is that political problems may not be solvable with science. While science can inform a discussion, it can rarely referee a dispute. Sometimes one or more of the parties does not want to even know or acknowledge the science that exists, because it may not support their particular set of objectives. In view of this, one panelist pointed out that science will not resolve issues unless the involved parties want the issues resolved. He noted that it is important that common goals are established at the beginning of the collaboration process and that all parties stay committed to the process and reaching the goals.

Joint scientific investigations (also known as *joint fact-finding*), were offered up as a possible way to mitigate differences over science. Such ventures were seen as potentially helping the involved parties to become familiar with the relevant

data. These ventures helped prevent arguments over data, i.e., they helped prevent arguments about what was actually present in the basin.

Experiences with *peer-review*, *joint development processes*, or *independent science* were mixed. Universities had the potential of being unbiased. The USGS was considered to offer reliable expertise. Those undertaking collaborative processes were cautioned, however, to make certain that independent experts were at pains to thoroughly familiarize themselves with local data and conditions. In other words, for instance, the dynamics of stream hydrology can vary from one place to another. The dynamics that apply in an expert's own region may not apply in the local region in question. Owing to this fact and others, it was noted that reports generated from independent sources were not always useful. Panelists also expressed the view that *blue ribbon panels* can be subject to political pressures.

The panelists had several recommendations for increasing the institutional capacity within Reclamation for managing issues around science in collaborative processes. First, the bureau should become proficient in emerging technologies such as ground water modeling, the use of flood control rule curves, and methods for assessing climate change. Other emerging technologies mentioned included desalination, water conservation, conjunctive use, and source water protection.

Day Two Afternoon Speakers

Elizabeth Ann (Betsy) Rieke, Manager of the Reclamation Lahontan Basin Area Office, examined the role of leadership in the successful resolution of water resource conflicts. She challenged leaders and prospective leaders of conflict resolution processes to become rigorously introspective. A leader must examine the “culture of her brain,” i.e., the sum total of her ways of perceiving, processing, and responding. This involves thinking deeply about how she learns, approaches problems, communicates, relates to others, and how she was trained.

Introspection with regard to brain-culture is important because it helps to dispel such illusions as: “every problem can be solved”; “there is one solution to each problem”; “every solution is rationally based”; “hard work will produce a solution”; and “hard work will also persuade others as to the efficacy of one's own solution.” “Retraining the brain” requires careful and continual observation, extensive reading, focused training, and intensive thought.

Good leaders in a conflict management process “make the problem their own.” They build suitable teams, determine what is required for success, identify and explore alternatives, and seek out mutually beneficial solutions. They make sure that they are asking the right questions. They are doggedly optimistic. They listen to others with great care. They build strong teams. They build both

conventional and non-conventional relationships. Finally, they develop the ability to know when to bring a negotiation process to a close.

Above all, leaders are thinkers. They look deeply and critically into themselves and thoughtfully into the problem environment in which they are working.

Curt Brown summarized the morning's discussions and presentations by noting that it is important to know the law, the authorities, the policy frameworks, the authorizing legislation, and what Reclamation's senior management wants and expects. It is important to know what one can and cannot really undertake and what, if any, flexibilities exist. In these regards, he noted that it is important to explain when, how, and under what conditions one will, as dispute resolution leader, communicate with his or her superiors.

Dispute resolution leaders also must know where they need to have control and where they can relinquish control. Finally, they also must have a clear idea as to what constitutes success, knowing that this definition may differ from party to party.

In his second presentation, **Dr. McKinney** addressed the following question: "What constitutes collaborative success?" How is success measured? The short answer is that success has different meanings for different process participants: process managers, stakeholders, funders, scholars, conveners, politicians, etc. (In dispute resolution processes that he himself directs, Dr. McKinney uses a process evaluation survey which asks about the participant's background, time in the dispute resolution process, alternate processes he or she might have taken and at what cost, and solicits suggestions for improvement. It also asks questions about the quality of the process itself).

One measure of collaborative success is *outcomes*. Were the desired objectives achieved? Were the outcomes superior to the best alternative to collaboration? Were underlying issues resolved? Were the outcomes founded on solid data and sound analyses? Can the outcomes be successfully implemented? Relatedly, will the parties make a good faith effort to implement the agreement? Do potentially fatal political, technical, or financial obstacles exist?

Another measure of success is the soundness of the process. For instance, did all interested parties have an opportunity to put their cases forward? In addition, did these parties feel that they received due process? Were the various alternatives evaluated in an expeditious manner? Was there a net gain in intellectual capital, i.e., did the parties and the process managers learn something substantial? Did the process result in trust building and the establishment of good working relationships amongst the parties? Was the public able to review and comment on the process in a credible way?

Still other measures of collaborative success include: (a) comparing the outcomes to the stated and unstated goals of the collaborative process such as improving the overall understanding of the multifaceted problem, (b) comparing the outcomes to preconceived results such as economic or environmental enhancement, (c) comparing the collaborative outcomes to those that might have been reached using other processes such as administrative hearings, litigation, or lobbying, and (d) comparing outcomes to theoretic benchmarks such as the principles of deliberative democracy.

In sum, measurement of collaborative success is not simply a matter of comparing outcomes to the perceived objectives of the stakeholders. Many other criteria can and must be applied. For those interested in this line of inquiry, Dr. McKinney has produced an article in *Society and Natural Resources*, which reviews the literature on evaluation and provides empirical evidence based on some fifty cases.

Nina Burkardt is a Research Social Scientist with the Policy Analysis and Science Assistance Branch (PASA) at the USGS Fort Collins Science Center. Since 1987, she has worked with her PASA colleagues to help stakeholders plan and undertake collaborative decision processes, and has conducted research to determine factors leading to success in environmental negotiations. She gave a presentation devoted to the Legal Institutional Analysis Model (LIAM). It was developed by USGS researchers to help managers diagnose the setting of a site-specific policy. It analyzes the parties involved in a natural resource dispute in terms of roles and power. The LIAM program locates each stakeholder on a grid that simultaneously measures their willingness to negotiate and their attachment to the status quo. It also assesses sources of power and compares them across organizations at the negotiation table. The LIAM analytic, then, identifies likely negotiation behaviors. For more information about LIAM, please see the following Web site: http://www.fort.usgs.gov/Research/research_tasks.asp?TaskID=2240 .

Beaudry Kock is the Assistant Director of the MIT-USGS Science Impact Collaborative (MUSIC). MUSIC is an action research group engaged in the analysis and support of complex stakeholder-oriented environmental decision making. He presented a paper on his research with agent-based modeling.

Agent-based simulations model phenomena as dynamic systems of interacting agents. These agents have programmable attributes such as tastes, preferences, values, skills, and levels of knowledge. Once agents and their attributes are identified in the system, rules governing interactions among them are developed. A bounded spatial landscape is also provided over which interactions can take place. The system evolves over time as interactions occur. After numerous model runs, a range of outcomes develop. The relative likelihoods of these outcomes, given initial conditions and the rules for interaction, can be calculated.

Agent-based modeling provides for understanding the potential for water conflict or collaboration. It also has the potential of demonstrating the effectiveness of proposed alternatives. In sum, both the construction and running of the model help stakeholder groups to better understand and manage their complex water system. Diverse social, economic, and environmental components can readily be integrated.

Agent-based modeling can capture multiple scales of social and economic dynamic systems. It allows agents to act both rationally and irrationally, and it addresses macro-scale uncertainty by making detailed micro-scale specifications.

Day Three Presentation

Dr. Aaron Wolf gave an overview of his forthcoming book entitled, *Sharing Water, Sharing Benefits: Working Towards 21st Century Solutions*. He began with an overview of hydropolitics in the Western United States which included discussion of the contradictory, competing, and often antiquated body of laws and the growing multitude of diverse users and jurisdictions. He also touched on other phenomena impinging on Western water resources such as population growth, urbanization, the effects of oil and coal extraction, unquantified Indian water rights, and climate change.

He then spoke about the four stages of negotiation over water conflict:

- **The Adversarial Stage** where the main focus is on water rights and the skills that must be developed for resolution include trust-building and self-awareness, which can open up the possibility of considering that there is more to a situation than the parties originally thought and develop within them an increased willingness to listen.
- **The Reflexive Stage** where the focus shifts from rights and positions to needs and interests. Listening skills in this stage are pivotal for success. Attempts are made to shift the nature of the negotiations in such a way as to increase the amount of resources and to maximize mutual gain.
- **The Integrative Stage** where the needs expressed in the second stage coalesce and form a group interest. Participants are asked to think about how to enhance benefits throughout the region, primarily by thinking comprehensively about resources beyond just water. They explore a new way of thinking about the dynamic natural and social systems within which relationships are embedded. This might include geographic units other than the basin they have previously focused on.

- **The Action Stage** where capacity building becomes the focus. The analysis here is on institutional capacity. Governance structures are created or adapted to complement existing institutions and structures. These afford an opportunity for ongoing discussions, community building, and progress toward meeting the resource management, restoration, and sustainability goals.

These four stages correspond in many regards with Mortimer Adler's hierarchy of physical, emotional, intellectual, and spiritual needs and with the tenets of many religious traditions.

Dr. Wolf closed by speaking to and illustrating various practical process techniques such as seating adversaries next to each other, conducting shared vision exercises, active listening, alliance identification, and allowing for caucusing sessions.

The workshop ended with the compilation of a road map for building institutional capacity in Reclamation, which will be sent under a different cover.