



River REPORT

Winter 2007-2008

A project of the Water Education Foundation

PREPARING FOR AN UNCERTAIN FUTURE: Climate Change and the Colorado River Basin

By Gary Pitzer

Variability is a way of life in the Colorado River Basin. Years of abundant snow in the upper reaches quickly give way to prolonged droughts that strain the ability of the system to meet all the water needs. The past decade has seen record-low annual river flows that haven't been seen in 100 years of record keeping. Now add the prospect of climate change and there is little, if any disagreement: warmer temperatures are here and will usher a new water supply paradigm in the Southwest.

Climate change, which in years past attracted a fraction of the interest that presently exists, is a high-priority matter for scientific study and political debate. It was prominently featured at the Water Education Foundation's sixth biennial Colorado River Symposium held in September in Santa Fe, N.M. Speakers

acknowledged that while much uncertainty exists regarding climate change and its exact impacts on water supply and the environment, it is pretty clear the future water scenario will be much different than the past.

"If I had to bet today knowing all that I know on Colorado River studies, you've got to suspect we're going to have less runoff," said Brad Udall, director of the Western Water Assessment at the University of Colorado/National Oceanic and Atmospheric Administration's Climate Diagnostics Center. "How much less, that's the huge question."

If recent research is any indication, permanent drought could be the norm for the Southwest. In a study published in the April 9, 2007 issue of *Science*, the National Center for Atmospheric Research (NCAR) reports that climate

change "will permanently alter the landscape of the Southwest so severely that conditions reminiscent of the Dust Bowl days of the 1930s could become the norm within a few decades."

The dire predictions have many convinced that immediate action is needed to prepare for the anticipated changes brought by more rain, less snow and increased temperatures.

"We really do need to articulate what people need to do in order to adapt to climate change because at this point there a lot of people extremely concerned but very few people with a plan for how to proceed," said Kathy Jacobs, executive director of the Arizona Water Institute.

Discussion regarding the arrival of climate change has ebbed and flowed, with scientists all the while seeking more

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Dear Readers

We recently held our sixth biennial Colorado River Symposium at The Bishop's Lodge in Santa Fe, where the 1922 Colorado River Compact was forged. Our first symposium in 1997 marked the Compact's 75th anniversary; this most-recent event marked its 85th.

The changes in that decade have been immense.

In the mid-1990s, the Colorado River was still enjoying a near 20-year cycle of plenty of water. We have since experienced a record drought. During these symposia we have gone from discussing the luxury of surplus criteria to dealing with the pain of shortage criteria. We confront modern-day issues not resolved by the Compact – water for the environment, Indian tribes and the Republic of Mexico. We also are faced with a Southwest projected to continue its rapid growth, creating additional water demands that are complicated by the uncertainties of climate change.

In this issue of River Report, Foundation Writer Gary Pitzer explores the scientific data related to climate change, its potential effects in the Colorado River Basin and what the various states are doing to address these challenges. These topics were featured at our September 19-21 symposium, The Colorado River Compact at 85 and Changes on the River, at the Bishop's Lodge. The full written proceedings of the symposium will be published in the spring.



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The mission of the Water Education Foundation, an impartial, non-profit, organization, is to create a better understanding of water issues and help resolve water resource problems through educational programs.

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WATER EDUCATION
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Basin Briefs

Upper Basin

Ridges Basin Dam Completed

A November “topping out” celebration in Durango, Colo., marked the completion of Ridges Basin Dam – the main feature of the Animas-La Plata Project (ALP). The Nov. 9 ceremony was the latest chapter in the development of the controversial project, which was first authorized in 1968.

“Completion of the dam is a testament to the dedicated efforts of the Colorado Ute Indian Tribes teamed with the project beneficiaries to get this work done,” said Rick Ehat, lead construction engineer and manager of the Bureau of

Reclamation’s Four Corners Construction Office.

Construction on the dam began in 2003. The 273-foot-tall dam forms a 120,000 acre-feet reservoir, Lake Nighthorse – named for former U.S. Sen. Ben Nighthorse Campbell. The entire ALP project is to be completed by 2012.

As originally authorized, the ALP would have redirected water from the Animas River to a 270,000 acre-feet off-stream reservoir for storage mainly benefiting users in Colorado and New

Mexico. A downsized version of the original ALP approved in 2000 eliminated all irrigation from the project and reduced the reservoir size. It also fulfilled the requirements of the 1988 Colorado Ute Indian Water Rights Settlement Act and the Colorado Ute Settlement Act Amendment of 2000 by delivering water to both Colorado Ute Tribes as well as several non-tribal participants.

The ALP also will supply 4,680 acre-feet per year through a pipeline from Farmington to Shiprock, N.M., for the Navajo Nation and the reservoir will provide recreational activities. •

Lower Basin

MSCP Project Dedicated

The Colorado River’s endangered fish species, the razorback sucker and bonytail, have gained 80 acres of new habitat at the Imperial National Wildlife Refuge northeast of Yuma, Ariz. In November, local, state and federal officials dedicated six large ponds at the refuge, which were constructed as part of the Lower Colorado River’s Multi-Species Conservation Program (MSCP).

More than a decade in the making, the joint federal/state 50-year MSCP is designed to promote recovery of six federally protected species while ensuring the certainty of existing river water and power operations. The Habitat Conservation Plan incorporates some 1,119 square miles, three states and 56 participating agencies, organizations and stakeholders along the Lower Colorado River.

In addition to the Imperial Ponds Conservation Area Project near Martinez Lake, officials plan to create a 12-acre marsh and a 34-acre cottonwood-willow tree forest at the Imperial wildlife refuge.

The MSCP boundaries stretch from La Paz, Mohave and Yuma counties in Arizona, to Riverside, Imperial and San Bernardino counties in California, and Clark County in Nevada. The program calls for restoration of 5,940 acres of cottonwood and willow habitat, 1,320 acres of honey mesquite, 512 acres of marshland and 360 acres of river backwaters. •

Final EIS Released

Plans to share future shortages on the Colorado River took another step toward completion in November when federal officials released the final Environmental Impact Statement (EIS) on Lower Basin shortage guidelines and coordinated Lake Powell-Lake Mead management strategies in times of drought.

The final EIS includes the preferred alternative, which was developed with input from the seven states that share the Colorado River. The preferred alternative would allow Lower Basin states to create additional supplies of water through water conservation and other programs. It also sets reservoir

levels in Lake Mead before an official shortage would be declared by the Secretary of the Interior. Specific reservoir conditions at Lakes Powell and Mead also are identified to determine the annual operation of these reservoirs to minimize shortages in the Lower Basin and avoid the risk of water delivery curtailments in the Upper Basin.

Development of the shortage guidelines and coordinated reservoir operation plans began in 2005. They are expected to be adopted by Interior in December, and take effect in January 2008. They would then be used each year through 2026 to develop the Annual Operating Plan for Colorado River reservoirs. •

Mark Your 2008 Calendar!

The Water Education Foundation’s Lower Colorado River Tour is set for March 12-14.

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FEATURE

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information to confirm the observation that a gradual warming has been occurring and the determination of whether long-range forecasting can be done based on model simulation.

A February 2007 report by the National Research Council, *Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability*, concluded that “higher temperatures will result in less Upper Basin precipitation falling as snow, increased evaporative losses, and will shift the timing of peak spring snowmelt to earlier in the year.” That prospect, combined with rapidly increasing populations and water demands and recurrent drought, “point to a future in which the potential for conflict among existing and prospective new users will prove endemic,” the report says.

Eric Kuhn, general manager of the Colorado River Water Conservation District, told participants at the symposium that “optimistic scenarios” point to a 10 percent reduction in Colorado River flows under future shortage estimates. Reduced flows are not a historic anomaly as tree-ring data analysis

indicates a 53-year period in the 1600s of annual flows between 13.2 and 13.3 million acre-feet, he said. The river is allocated based on the expectation of 16.5 million acre-feet of average annual flow.

In California, the state Department of Water Resources (California DWR) has signed an agreement with NOAA for working with the Regional Integrated Sciences and Assessments program on coordination of climate research applicable to water management. “The agreement is intended to foster an ongoing relationship with the research community to ensure that applied science is carried out to clarify uncertainties, improve impact quantification, provide forecasting tools, and transfer research to decision support,” according to California DWR.

Jacobs said the impact of reduced water on energy production is as worrisome a prospect as less water for homes, businesses and farms. “If you look at water and energy, and the water required to generate the energy that is projected we are going to need, you come to a scary conclusion,” she said. “So we really do need science looking at that issue.”

There also are the environmental impacts of climate change to consider.



Brad Udall, director of the Western Water Assessment's Climate Diagnostics Center

Subtle atmospheric alterations can have profound hydrologic impacts, particularly in regions where efforts are geared toward preserving and restoring endangered plants and wildlife. In the upper reaches of the Colorado River, warmer water temperatures for a longer period of the time are not beneficial to native trout nor the aquatic ecosystem that supports them.

“The big issue in the headwaters not having to do with dams and diversions is ... if the most dire predictions about climate change come true, we become ‘Bass Unlimited,’” said Melinda Kassen, director of Trout Unlimited’s (TU) Western Water Project. “It’s a very real issue for cold water fish that rely on snowmelt.”

This issue of *River Report* focuses on the potential impacts of climate change in the Colorado River Basin and the programs agencies are enacting to address concerns about water supplies. Much of the information is from the Foundation’s September Colorado River Symposium. The full proceedings of the symposium will be published in the spring. For more information on climate change, watch for the January/February issue of *Western Water*.

Is Climate Change for Real?

Climate change is controversial. Skeptics say similar episodes have occurred throughout the Earth’s history and that

Panelists at the symposium, L to R: Eric Kuhn, Colorado River WCD; Brad Udall; Jeanine Jones, California DWR; Anne Watkins, New Mexico State Engineer’s office; Kathy Jacobs, Arizona Water Institute; Tom Carr, Arizona DWR; and Terry Fulp, Reclamation



it is impractical to implement drastic changes to a phenomenon that it is going to happen regardless of human intervention. Others say the dramatic accumulation of greenhouse gasses in the atmosphere from industrial activity during the past century is directly linked to climate change.

Anne Watkins, special assistant to the New Mexico State Engineer, said she has observed opposition to the idea of human-induced climate change, with some lawmakers in the state questioning whether warmer temperatures are part of the natural climate variability.

Udall is among the international group of scientists and public officials who say the evidence is overwhelming regarding the cause of climate change. “When one deals with climate change science there are many uncertainties [but] there is no uncertainty whether warming is human-caused and whether it will continue and on this point I will not yield,” he said. “Make no mistake – it is [caused by] fossil fuel burning and greenhouse gas emissions.”

Udall said he understands “some people’s reluctance to deal with this,” but noted that denying any human factor in climate change “is like being a little bit pregnant.” As an illustration he pointed to a 1,000 megawatt, coal-burning power facility that burns the equivalent of 100 railroad cars full of coal each day. At 100 tons per car, the result is 50 cars worth of pure carbon “dumped in the air daily.”

Impacts in the Colorado River Basin

Record springtime temperatures in the Upper Colorado Basin and the hotter-than-usual June to September in Phoenix (which recorded nearly 50 days of temperatures at 109° F or greater) are signals of a changing climate and not part of the normal trend of variation, according to Udall. “When this drought started it was easy to believe that ‘Hey, this is just a historical norm drought, we’ve seen these before,’ but what is increasingly clear is that this is a drought



Another impact of climate change could be a reduction in energy production.

driven by temperature and not by precipitation,” he said.

While scorching temperatures are a fact of life in the desert, Udall believes the present conditions are linked to the emission of greenhouse gasses into the atmosphere. “Something different is going on with this drought and that something different has something to do with what we are causing,” he said. “There is an anthropogenic signal in this drought. How much? Hard to say but this is not like what we have seen in the past.”

According to Kuhn, the U.S. Bureau of Reclamation’s (Reclamation) estimate of potentially dry conditions in the Upper Basin would cause reservoir levels at Lake Powell to fall too low for power generation 40 percent of the time, with severe impacts on Arizona, Nevada and California. Under the scenario of 10 percent reduced flows, Nevada would run dry for eight straight years. “Obviously, we wouldn’t let that happen,” he said.

Of the 19 different computer models that the research team used for the NCAR study, all but one showed a drying trend in the swath of North America between Kansas, California and northern Mexico. The models predicted an average 15 percent decline in runoff for the Southwest between 2021 and 2040, compared to the average surface moisture between 1950 and 2000. Global warming causes a very different type of drought by sending rainstorm and snowstorm tracks northward and

by evaporating more moisture from the ground, according to the NCAR.

Officials recognize the changes on the horizon and are taking steps to deal with an altered future in which they must be creative to manage diminished water supplies. “This is really about sustainable water supplies for a growing population and that’s the real dilemma,” said Tom Carr, assistant director for statewide planning and conservation at the Arizona Department of Water Resources (Arizona DWR). “In this era of climate warming and potential reductions in water supply, how do you identify those sustainable water supplies to maintain water deliveries to the growing populations that we have.”

In Arizona, there are plans to reduce greenhouse gas emissions to 2000 levels by 2020 and to halve them by 2040. Achieving the goals will be a challenge because more than three-quarters of emissions come from motor vehicles and electricity generation.

The projected reductions are “a tremendous amount at the industrial and personal level,” Carr said. In what he described as Arizona’s “biggest change in water management since 1980,” the state now allows counties and communities outside active groundwater management areas to deny new subdivision plans if the water supply is inadequate.

At the statewide level, transitions are occurring in water allocations within the Central Arizona Project as Indian settlements result in increases in tribal

allocations and agricultural use of excess supplies is curtailed. The state is also “actively involved” in interstate water banking where surplus surface flows are stored for later use.

“Even though there a lot of questions about climate change in the general public, we are already reacting to the shortening of water supplies,” Carr said.

On the federal side, government officials believe incorporating climate change into reservoir operations depend on studies and better predictive climate models. “It is very clear we need to consider all this in our decision making. The question is how we do that,” said Terry Fulp, area manager for Reclamation’s Boulder Canyon operations office.

He said that given the “great deal” of historic variation in Colorado River flows, most research is looking at the degree of uncertainty that exists in predicting future water management. “The bottom line is to quantify uncertainty because if we can’t quantify it then we can’t assess the risk,” Fulp said.

Honing the modeling data is an evolving process. As it stands, climate models generate data for areas of about

100,000 square miles. For forecasting purposes, officials would like to see that dimension reduced.

“We need smaller scales [and] I am absolutely confident we will get there,” he said.

In the meantime, a “multifaceted” research effort that began in 2004 on the Colorado River continues. Fulp, who acknowledged “looking back on it, we should have gotten proactive a little sooner,” said Reclamation is collaborating with other federal agencies and university scientists to ensure the response to climate change is well coordinated and based on the best research.

“We are the water managers, we are not the climate scientists,” he said. “It does not make a lot of sense for us to be trying to do the research.”

Jacobs said the conclusions drawn from scientific research have to be effectively communicated to the policy-making level for the most informed decisions to be made. “The issue of climate change and water management

“Even though there a lot of questions about climate change in the general public, we are already reacting to the shortening of water supplies.”

—Tom Carr, Arizona DWR

decision-making is not easy,” she said. “Water management itself is phenomenally complex and totally institutionally constrained.”

Jeanine Jones, California DWR’s interstate resources manager, echoed Jacobs’ comments, noting “there’s a whole chunk of science going on that’s not being communicated at all to the decision makers.” In particular, she cited the potential advantages that exist with remote sensing operations and the data that could be acquired and used for a variety of purposes.

“As water managers, we are not exactly trained to deal with satellite imagery,” Jones said. “That represents a tremendous opportunity for us in terms of getting something useful from the science community.”

Water and Energy

While the Southwest has been struggling with drought, the prospect of permanently reduced water supplies has a dual effect: less water means less hydroelectric generation, which means more energy could come from carbon-emitting sources that contribute to climate change.

“The connections between energy and water could result in a serious crisis coming,” Jacobs said. “Shortages of both energy and water supplies are possible in the future, and the two are inextricably linked.”

The energy/water nexus is a significant issue in California, where the State Water Project (SWP) is the single greatest consumer of electrical energy. It is also the fourth greatest generator of power from hydroelectric turbines in the system. As the state seeks compliance with its new law to reduce greenhouse gas emissions, the spotlight has been turned to water use and its associated power consumption.

According to the California Energy Commission, water-related energy use, which includes conveyance, storage, treatment, distribution and wastewater

The city of Phoenix



collection/treatment, consumes about 19 percent of the state's electricity, 30 percent of its natural gas and 88 billion gallons of diesel fuel every year. Officials say more aggressive water conservation combined with retrofitting and other programs achieves reduced power demand (which brings less emissions) and improved water savings.

Writing in the September/October issue of *Southwest Hydrology*, Natural Resources Defense Council Policy Analyst Ronnie Cohen noted that the large amount of energy required in pumping, treating and conveying water to people means there is a great potential for energy savings. "Water conservation and recycling can help water agencies meet the demand for water under a variety of climate change scenarios, while simultaneously saving them energy and reducing the emissions that contribute to climate change," Cohen wrote.

Recognizing the need to minimize their carbon impact, local water agencies, particularly those in Southern California, are analyzing water transfers in terms of transactions occurring within the area as opposed to from up north, where energy is required to pump SWP water over the Tehachapi Mountains. "There's a lot of focus on the water conservation side because obviously, if you have to deliver less water you use less energy in terms of the delivery and treatment," Jones said.

Through voter-approved bond money, California DWR administers grants to local water agencies for integrated regional water management plans (IRWMPs), a process designed to promote cooperative, regional approaches to water planning and find areas of mutual benefit. IRWMPs emerged to counter the past practice by which individual water agencies pursued smaller, localized water projects – often in competition against neighboring agencies for water and grant funding. As water supplies tighten and the future becomes less certain, it is expected that IRWMPs will reflect the flexibility and diversity officials say is needed.



Drought has reduced water storage in Lake Powell by half.

"We expect to see a climate change adaptation component which really is not all that different from a water supply reliability component coming forward as part of that planning effort," Jones said.

At the state level, California DWR is seeking "newer and greener" sources of energy after choosing not to renew a contract with a coal-fired power plant in the Las Vegas area that provided partial power to the SWP, Jones said. The search for alternative energy sources has revived the discussion of nuclear power, which Jacobs noted uses "much more" water for cooling purposes.

The Arizona Water Institute is among the entities investigating the energy/water connection and how that paradigm could change under future climate scenarios. Despite the ongoing activity, Jacobs said a more comprehensive effort is needed. "There is a lot of piecemeal work going on but I don't see the holistic energy-water research proceeding as it should," she said. "We have really got to work this out more thoroughly."

Scientific investigation can be used to revisit and revise current assumptions about water supply and demand and the engineering required to move it to where it's needed. "We need to figure what

kind of changes we need to make in the assumptions," Jacobs said. "We need to insert science in developing planning scenarios so we can figure what our reliability needs are."

While planning for the long term, Jacobs said it's important for analysis to focus on the potential for "abrupt change" that could result from climate change, an aspect that current engineering assumptions are not geared toward. "The point is we can't use the past as analog to the future anymore," she said.

With that in mind, Jacobs said a process of "strategic monitoring" is needed to "identify trends and separate them from the noise." There is also the need for "smart" data systems that are able to synthesize different data sources, including recording precipitation and other relevant climate indicators. In the larger scheme, water managers have to look at where their water comes from and consider the "long-term implications" of increased surface water or groundwater storage, particularly the impacts on the environment and energy consumption.

Water managers should respond to climate change impacts through supply options and demand control, Jacobs said, noting "there's no question we need

a broad portfolio of solutions and can't just point to one." Desalination of brackish groundwater and seawater and water recycling "all have a high price tag" and are energy-intensive, she said.

Among the supply options discussed is new surface storage, which supporters say is necessary to capture the early, voluminous runoff that is expected. The issue is at the forefront in California, where Gov. Arnold Schwarzenegger has proposed two new surface storage sites and expansion of an existing reservoir as part of a comprehensive water plan.

The role of future storage is "the 800-pound gorilla," said Udall, referring to the controversial nature of the discussion. Republicans and Democrats in the California Legislature are about evenly split on the idea, with the former declaring new reservoirs absolutely necessary to boost the state's water supplies and the latter saying less

Geothermal plants, such as this one near the Salton Sea, are a clean renewable source of electricity.

expensive, more environmentally friendly options should be pursued first.

At the symposium, California DWR's Jones said "a variety of tools" are needed to manage the state's water supply. "Flexibility and diversification of your water supply portfolio is a good thing," she said. "Certainly there are places in California where reservoirs are needed for operational flexibility let alone storage opportunities."

Environmental Concerns

From the perspective of groups such as Trout Unlimited and state and federal wildlife agencies, climate change is an unknown variable in the quest to restore native fish to the Colorado River Basin. In an April report by the National Academy of Sciences (NAS), *Projected Impacts of Climate Change on Salmon Habitat Restoration*, researchers noted that restoration planning worldwide

"rarely accounts for future climate change," and that "given the increasing certainty that climate change is accelerating, models that ignore the potential effects of future climate may generate misleading predictions of the relative benefits of different [species] recovery strategies."

"Some of the thorniest issues we talk about at TU are things like whether it is worth doing restoration on the most southern coldwater fisheries," Kassen said. "Is it possible to restore enough habitat connectivity robustness in the system that ... the most southern native species are going to withstand [warmer temperatures]? It's not clear. We could just stop [and] not do it and consign those fisheries to history and say it's not worth it, but that's a really hard thing to do, given who we are and our mission. If there's an opportunity to create habitat and robustness in the system that gives those fish a chance, mostly our organization says you've got try and do it."

The NAS report on salmon habitat found that while climate change will have "a large negative impact" on the freshwater habitat of depleted Chinook salmon populations in the Pacific Northwest, habitat restoration and protection "can help to mitigate these effects and may allow populations to increase in the face of climate change." However, recovery targets will be "much more difficult to attain" because of the habitat deterioration caused by climate change.

"River basins that span the current snow line appear especially vulnerable to climate change, and salmon recovery plans that enhance lower-elevation habitats are likely to be more successful over the next 50 years than those that target the higher-elevation basins likely to experience the greatest snow-rain transition," the report says.

Then there is the increased fire danger. According to the Government Accountability Office, it is "generally agreed that the scientific community has reached consensus that climate change will ... cause forest fires to grow in size and



Calendar

severity,” with Alaska, the Southeast, the Southwest and the Northern Rockies at particularly high-risk. At a September hearing of the U.S. Senate Energy and Natural Resources Committee, University of Arizona Professor Thomas Swetnam testified that climate change is a contributing factor to increased wildfires.

“A recent influence of warming climates and increasing drought is apparently manifest in the rising areas burned and occurrences of ‘megafires’ in many places across North America and elsewhere.” Swetnam said. “Under increasing greenhouse gas scenarios, the available evidence points to a likely continuation of rising areas burned, more megafires, greater damages and costs incurred and additional human lives lost.”

Preparing for an Uncertain Future

Water has always been a focal point in the West, given that the region is so attractive for growth yet perpetually dry. Factor in the prospect of a much drier climate and it becomes clear that the tools and assumptions of the past are not those that will carry water managers into the future. However, the means of analyzing trends and determining the best course of action is far from perfect and is in fact an evolving process.

“It’s wild and woolly in the world of climate change science,” said Udall. “We are just now getting our hands on data sets to allow us to do a lot more detailed work in these hydrology models.”

As such, Udall said it is unrealistic for stakeholders to expect science to provide quick, simplistic answers to the complex questions related to climate change.

“Two years ago, a lot of you didn’t even know about this or care so it seems a little disingenuous to be frustrated after being aware of it for two years,” he told the Symposium audience.

Toward that end, Udall said that the work on climate change has to get smarter and more focused on the larger picture. “Too much science that has

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January

- 17-19 **2008 National Salinity Summit**, sponsored by Multi-State Salinity Coalition, Las Vegas, NV • Contact: email: donna.bloom@sbcglobal.net
web: <http://www.multi-statesalinitycoalition.com>
- 23-25 **50th Colorado Water Congress Annual Convention**, Denver, CO
Contact: 303-837-0812, email: cwc@cowatercongress.org
web: http://www.cowatercongress.org/default2.asp?active_page_id=102

February

- 16-19 **10th Annual Salton Sea International Bird Festival**, Imperial, CA
Contact: 760-344-5359, email: newriver@usa.net
web: <http://www.newriverwetlands.com/saltonsea.html>
- 21-22 **13th Water Conservation and Xeriscape Conference**, sponsored by Xeriscape Council of New Mexico, Albuquerque, NM.
Contact: 505-468-1021, web: <http://www.xeriscapenm.com>
- 28-29 **Climate Change Law**, sponsored by CLE International, Los Angeles, CA
Contact: 800-873-7130, web: <http://www.cle.com>

March

- 4-7 **Western States Water Council Washington Roundtable & 156th Spring Council Meeting**, Washington, D.C., web: <http://www.westgov.org/wswc/meetings.html>
- 12-14 **Water Education Foundation’s Lower Colorado River Tour**, Las Vegas, NV
Contact Diana Farmer, 916-444-6240, email: dfarmer@watereducation.org
web: <http://www.water-ed.org/tours.asp>
- 13-14 **Colorado Water Law**, sponsored by CLE International, Denver, CO
Contact: 800-873-7130, web: <http://www.cle.com>

April

- 3-4 **Water Education Foundation’s Annual Executive Briefing**, Sacramento, CA
Contact: Diana Farmer, 916-444-6240, email: dfarmer@watereducation.org
web: <http://www.watereducation.org/briefings.asp>
- 30-May 2 **81st Annual Conference & Exhibition**, sponsored by Arizona Water & Pollution Control Association, Mesa, AZ • Contact: 1- 888-559-8844
web: <http://www.awpca.org/calendar/conference/index.aspx>

May

- May 4-6 **12th Annual Reuse Research Conference**, sponsored by WateReuse Association, Denver, CO • Contact: Courtney Tharpe, ctharpe@watereuse.org, web: <http://www.watereuse.org/events.htm>

June

- 30-July 1 **Western Governors Association Annual Meeting**, Jackson Hole, WY
Contact: 303-623-9378, web: <http://www.westgov.org>

July

- 26-30 **2008 Soil and Water Conservation Society Annual Conference**, Tucson, AZ
Contact: 515-289-2331, web: http://www.swcs.org/en/conferences/2008_annual_conference

Contact Sue McClurg with your calendar items from July 2007 through December 2007 for inclusion in the Summer issue of River Report, smcclurg@watereducation.org or 717 K Street, Suite 317, Sacramento, CA 95814



Salton Sea Funding Regains Footing with Congressional Veto Override

While struggling to retain political relevance, the Salton Sea received good news in early November when a congressional override of a presidential veto kept alive the possibility that tens of millions in federal funds could be used to support restoration activities.

President Bush's Nov. 6 veto of the \$23 billion Water Resources Development Act (WRDA) would have nixed about \$30 million authorized for Salton Sea activities. The 2007 WRDA, the first such act in seven years, is the vehicle to seek funding of specific projects for flood control and environmental restoration, as well as local drinking water and wastewater treatment plants. Two days after the veto, members of the Senate and the House

voted 79-14 and 361-54, respectively, to override the veto.

Salton Sea advocates sought federal funding to help deal with many problems, including the reduced volume of water to the Sea, which in turn causes air quality problems. Money for the projects isn't a sure thing, however. Funding would need to be inserted into appropriations bills that would be considered next year.

"It should be noted that the [WRDA] does not spend a single dollar," Sen. Dianne Feinstein, D-California, said in a statement. "It simply authorizes projects, and does not appropriate funding. It will be up to appropriators to make the tough choices on which of these projects will ulti-

mately be funded – within the constraints of the regular budget process."

At the state level, the Salton Sea Ecosystem Restoration Program has unveiled a "preferred alternative" for the 75-year restoration process, an \$8 billion blueprint of marine sea, saline habitat, brine sink and engineered physical environment of barriers and berms. If approved, the plan would reduce the size of the sea, create marshy wildlife habitat and manage the dust to ease air quality problems.

Meanwhile, the Salton Sea Authority remains in flux amidst the defeat of crucial legislation – SB 187 by Sen. Denise Ducheny, D-San Diego – in the Legislature and the departure of key personnel. According to reports, the three-person staff of the Salton Sea Authority will be trimmed to either two full-time individuals or one full-time and one part-time employee, with a designated temporary director. The Coachella Valley Water District (CVWD) has provided a temporary director/coordinator to fill the role of former executive director Rick Daniels. Member agencies of the Authority (CVWD, Imperial Irrigation District and Riverside and Imperial counties) will pay a total of \$310,000 to help run it. Officials say the goal is to keep the Salton Sea Authority alive long enough for a bill funding restoration to make it through the Legislature next year.

The agency has been without a director before, running for seven years without a director. But that was long before the state had unveiled its restoration plan and lawmakers began seriously debating the cost and merits of saving and maintaining the sea.

Legislation by Sen. Ducheny would have set parameters for the use of \$47 million in state funds allocated through Proposition 84 to the Salton Sea Restoration Fund but the bill failed to make it to the governor's desk.

State officials are hoping to forge a conservancy or locally based state agency to steer the Salton Sea Restoration Plan. •

– Gary Pitzer

FEATURE ARTICLE

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been done in recent history on climate change has been single-principle, investigator-driven stuff,” he said. “We have got to demand bigger projects with more scientists collaboratively working together.”

President Bush in 2002 launched the federal Climate Change Science Program (CCSP) designed to improve climate research across 13 government agencies. According to a review of the program by a panel of the NAS, the CCSP has helped resolve disputes over whether the earth’s atmosphere is warming significantly or not, allowing scientists to compare data and agree that warming is occurring.

However, the panel’s report found that the program has made “inadequate progress” in supporting decision making, studying regional impacts and communicating with a wider group of stakeholders. Consequently, “use of new knowledge to support decision making and risk analysis is proceeding slowly.”

In the short-term, water managers are hopeful that modeling will continue to improve to the point where deductions can be made as to the type of seasonal variations to be expected. “I think the science is moving fairly rapidly but there is more to be done,” said Fulp with Reclamation. “We are hoping for much more precise and exact ideas about what might be in store for the basin.” At the same time, he acknowledged the need to strengthen the bond between scientists and those responsible for allocating water.

“The way we are going to move forward here is by these tight collaborations between the climate scientists and the water managers,” Fulp said. “If we sort of sit [back] the science will just keep going by us and a lot of it we’ll never know about if we are not very proactive.”

Moving forward in the face of remaining uncertainty is a fact of life in the world of climate change, Jacobs

said. “There is no reason why in this particular circumstance we should expect or ask for certainty prior to making decisions,” she said. “No matter how good the science gets, we will not have certainty. We may reduce the probabilities of being wrong but we will not have absolute certainty about being right.”

In New Mexico, officials are seeking to increase knowledge about climate change from the ground up as they organize informational meetings among a variety of civic and social organizations. “The idea [is] to try to create a new constituency of folks who not only understand climate change but understand the challenges we’re facing in New Mexico with regard to managing our water resources and have a whole new group of people talking to elected officials about how important this is,” said Watkins with the State Engineer’s office.

Effecting rapid change to long-standing public policy has been compared to turning around an aircraft carrier – it doesn’t happen in an instant. “Water managers are in kind of a dilemma,” said Carr with the Arizona DWR. “No matter what we can see out into the future, getting action to be taken today on a potential catastrophe that has no indication that it’s just right around the corner is very difficult in the public sector.”

Carr quoted renowned economist Milton Friedman, who said, “Only a crisis – actual or perceived – produces real change. When that crisis occurs, the actions that are taken depend on the ideas that are lying around.”

Based on Friedman’s statement, Carr said it’s important to “make sure that we have a lot of good ideas lying around.” There also needs to be a “ground level understanding” among water users that “certain changes may have to occur” as supplies tighten. At the macro level, switching permanent supplies from surface to groundwater

“The point is we can’t use the past as analog to the future anymore.”

– Kathy Jacobs,
Arizona Water Institute

requires energy, time and investment.

“We need to look at incremental changes ... but

keep laying out these are actions that can be taken for the long-term,” Carr said. “The large-scale investments have to be thought of before shortages arrive.”

Coming to grips with a waterscape changed by climate change is especially difficult for a region that has struggled with droughts and water shortages, says the NRC report on Colorado River management, which recommends a “comprehensive, action-oriented” study of urban water practices and changing demand patterns.

“Steadily rising population and urban water demands in the Colorado River region will inevitably result in increasingly costly, controversial, and unavoidable trade-off choices to be made by water managers, politicians, and their constituents,” the report says.

While a “wide array” of measures – conservation, water recycling and desalination – can be used to augment or extend water supplies, they “will be readily absorbed” by the growing population and water demands. “Technological and conservation options – although useful and necessary – in the long run will not constitute a panacea for coping with the reality that water supplies in the Colorado River basin are limited and that demand is inexorably rising,” according to the report.

Ultimately, the more that is learned the more water managers can better prepare themselves for the future, according to Udall.

“I do not want to oversell the ability of science to provide all the answers,” he said. “In the next 30 to 40 years it can do a reasonable job providing information. In the next five to 10 years we have the tools and the computer power to answer some of these questions.” •



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