



Colorado River District

Protecting Western Colorado Water Since 1937

MEMORANDUM

October 6, 2011

TO: BOARD OF DIRECTORS, CRWCD

FROM: ERIC KUHN *EK*

SUBJECT: *COLORADO RIVER INTERSTATE ISSUES*

1. Colorado River Basin Study

At the River District's seminar in Grand Junction, Terry Fulp, Deputy Regional Director for the lower Colorado River Region gave a presentation on the status of the Colorado River Basin study.

The basin study is intended to be used for planning and discussion purposes. It is not a NEPA document. Reclamation will not be making any formal decision at the end of the study. A final report is due about July 2012.

The study is intended to take a comprehensive look at future water supply and demand conditions and propose/identify a number of different solutions and strategies for the future. The River District staff has been involved in the study process from the beginning. Dave Kanzer has been participating in the management team meetings. Additionally, the River District has a contract with Erin Wilson of Leonard Rice Engineering. Ms. Wilson provides the River District and CWCB technical assistance. Ted Kowalski is the CWCB study manager. The costs for the contract are shared by over 10 parties, the River District, Southwestern Water Conservation District, the City of Grand Junction, and the seven Front Range Water Council members.

To date, most of the study effort has been to develop hydrology and assemble future water demands. The next phase, which is developing solutions and strategies, is where the rubber meets the road. There is no doubt that the study results will show that in the future, the demands for Colorado River water will far exceed the available supply, and by 2050, large shortages in the Lower Basin will be common and the Upper Basin will have trouble meeting its 1922 compact obligations at Lee Ferry in many years. I believe this will be true whether or not the hydrology is based on the gauge record, paleo reconstructions or climate change scenarios.

The climate change scenarios will show the largest shortfalls. In addition to less water at Lee Ferry, high temperatures and longer growing seasons will increase crop irrigation requirements (CIR). As Terry Fulp showed us at the seminar, the projected mean natural flow at Lee Ferry in 2060 is about the same as the 1988 to 2007 mean. The increase in CIR for the Upper Basin alone could be upwards of a million acre feet per year of additional consumptive

use. The increase for CIR for existing agriculture in the Lower Basin is smaller because the growing season in the lower Colorado River valleys is already 365 days per year.

The study will consider a number of different “plausible” future scenarios: current trends, slow growth, expansive growth, and a high tech/green revolution/new world order (formally referred to as the Enhanced Environment and Healthy Economy Scenario) future. This is similar to how Denver does its integrated resource plan (IRP). One of my concerns is that with all of these futures, there will be a tendency for each state to overstate its demands for Colorado River water, with the possible exception of California.

Developing options and strategies will be entertaining. At the recent Water Education Foundation meeting on Colorado River issues in Santa Fe, the planning manager for the Central Arizona Project and the new Arizona Director of Water Resources stated that Arizona wanted the focus to be on “augmentation” strategies; large desalination plants and imports from distant rivers like the Mississippi or the Yukon. On a more serious note, it will be interesting to see how the study handles the issue of opening up the basin to interstate marketing.

Once results from this study are available, it might make a good topic for a meeting with the board of the Southwestern Water Conservation District.

2. Upper Colorado River Commission (UCRC) Activities

This summer our intern, Lisa Wade, compiled a spreadsheet model to examine the tradeoffs associated with different interpretations of Articles IV (b) and IV (c) of the 1948 Compact. These two articles address how the UCRC divides up a curtailment among the four Upper Division states. The UCRC Engineering Committee will have a meeting on October 7th to review the model.

I believe that this tradeoff tool will be helpful to focus the discussion among the commissioners, but these discussions still have the potential to be quite contentious.

3. Basin Hydrology

2011 was a great year for recovering reservoir levels. The WY 2011 releases past Lee Ferry will exceed 12 million acre feet. As a practical matter, this puts the risk of a shortage in the Lower Basin off until 2016 or later.

The early season forecasts for 2011/2012 are consistent with a second straight La Nina year, dry and warm to the south, but average to perhaps above average from the central Rockies north.

From Colorado’s perspective, it has been an interesting year. The Colorado and Platte River systems were very wet, but drought conditions in the Arkansas and Rio Grande River Basins are approaching those seen in 2002. In the last two months, inflows to Lake Powell have

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dropped off dramatically to below average flows. It would not surprise me if conditions this winter turns dry south of I-70.

REK/ldp
Attachment

1.1 Storyline for the Current Trends Scenario

1.1.1 *Demographics and Land Use*

Population – Populations in the Colorado River Basin, the adjacent water-dependent basins, and the Southwestern United States grow at rates commensurate with the “best estimate” demographic projections. Population growth generally occurs centered in existing urban areas.

Agricultural Land Use – There are nominal increases in irrigated agricultural lands primarily due to the build out of currently planned agricultural water supply projects. Agricultural land use growth varies by location with some agriculture to urban land conversion occurring and lower economic-value crops being phased out in some areas.

1.1.2 *Technological and Economics*

Agricultural Water Use Efficiency – Current trends in agricultural water use efficiency continue making modest improvements to on-farm and system efficiency through projects such as those supported under the Salinity Control Program. These improvements result in little change to Colorado River Basin consumptive use. No radical changes in technology are anticipated. Agricultural uses are generally consistent with today’s practices (e.g., no major changes in techniques, crops, or practices).

M&I Water Use Efficiency – Water use efficiency increases according to current Colorado River Basin water provider policies (e.g. Southern Nevada Water Authority’s [SNWA’s] current gallons per capita per day [gpcd] planning goals) and technology. External factors, beyond the control of Colorado River Basin water providers, that limit the water use of fixtures and appliances (e.g., federal statutes) continue resulting in “natural” increases in in-home efficiency. Water use efficiency changes vary by location according to local goals and mix of water use categories. No radical changes in technology are anticipated.

Water Needs for Energy – Water needs for energy expand relative to population growth and current regulations, policies, and planning for the energy industry. Current requirements for renewables are met according to current schedules. Fossil fuel development and, in particular, oil-shale development occurs according to current plans. No dramatic changes to global economies or energy demand that would spur additional consideration occur (e.g., increased fossil fuel prices.)

1.1.3 *Social and Governance*

Institutional and Regulatory – Federal and state laws and regulations affecting the Basin continue in a similar manner as today. Despite the potential for sunseting of future regulations and agreements, the operations of the Colorado River are relatively unchanged.

Flow-dependent ESA Needs – There is no expansion of the federal endangered species program, change to the needs of currently listed ESA species, or updates of existing Biological Opinions. Operations for ESA needs continues according to recent practices, agreements, and regulations.

Flow-dependent non-ESA Needs – No change is anticipated in currently realized ecosystem needs or operational practices to meet needs. Operations to meet ecosystem needs continue according to recent practices.

Social Values – Social values that affect water use in all categories remain consistent with the recent past. These values include continued support for ongoing planned M&I and agricultural conservation efforts as well as support for the ESA and its implementation.

Tribal Use – Tribal use develops according to current settlements and use patterns.

1.2 Storyline for the Economic Slowdown Scenario

1.2.1 Demographics and Land Use

Population – Populations continue to grow primarily in urban centers but at slower rates than “current trends.” Population growth is consistent with moderate to low economic growth or a slow economic recovery period followed by economic and subsequent population growth that is less robust than occurred in the recent past.

Agricultural Land Use – There are nominal increases in irrigated agricultural lands primarily due to the build out of currently planned agricultural water supply projects. Agricultural land use growth varies by location with some agriculture to urban land transfer occurring and lower economic-value crops being phased out in some areas.

1.2.2 Technological and Economics

Agricultural Water Use Efficiency – Lack of economic growth results in decreased revenues and reduced capital investment for routine and long-term maintenance. Reduced maintenance results in an overall decline in on-farm and delivery efficiency. These efficiency reductions require greater diversions to meet consumptive use requirements. However, Colorado River Basin consumption changes little as additional losses are returned to the Colorado River system.

M&I Water Use Efficiency – Water use efficiency increases according to current policies (e.g., SNWA’s current gpcd planning goals) and technology. External factors that limit the water use of fixtures and appliances (e.g., federal statutes) continue resulting in “natural” increases in in-home efficiency. Water use efficiency changes vary by location according to local goals and mix of water use categories. No radical changes in technology are anticipated. Aging infrastructure and lack of capital investment due to economic slowdown result in some acute water loss events. However, these events are generally absorbed by the long-term natural trends toward greater efficiency.

Water Needs for Energy – Water needs for energy expand relative to population growth and current regulations, policies, and planning for the energy industry. Current requirements for renewables are met according to current schedules. Despite the regional economic slowdown, global energy demand and in particular fossil fuel development (including oil-shale development) occurs according to current plans. No dramatic changes to global economies or energy demand that would spur additional consideration occur (e.g., increased fossil fuel prices.)

1.2.3 Social and Governance

Institutional and Regulatory – Economic slowdown and focus on economic efficiency lead to no significant change in institutional and regulatory requirements. Existing federal and state laws and regulations affecting the Basin continue.

Flow-dependent ESA Needs – No change is anticipated in currently realized ecosystem needs or operational practices to meet needs. Operations to meet ecosystem needs continue according to recent practices.

Flow-dependent non-ESA Needs – No change is anticipated in currently realized ecosystem needs or operational practices to meet needs. Operations for ecosystem needs continue according to recent practices.

Social Values – Economic efficiency is overwhelming driver affecting social values. Social values that affect water use in all categories trend toward preferences for human water use and systems over other concerns. This focus is driven largely by a lack of funds for capital outlay and a lack of societal willingness to take on new programs.

Tribal Use – Tribal use continues to develop but at slower than planned rates due to economic conditions and pressure to reduce tribal expenditures or federal settlement expenditures.

1.3 Storyline for the Expansive Growth Scenario

This storyline includes 2 branches: (C1) slower technology adoption, and (C2) rapid technology adoption and slight increase in social values. Once quantified these branches could produce 2 scenarios.

1.3.1 Demographics and Land Use

Population – Rapid population growth focused around urban centers with sprawl to outlying areas is driven by rapid economic recovery followed by a period of prolonged growth. This population growth is similar to typical “High” demographic projections for the southwest Basin States.

Agricultural Land Use – Agricultural land use increases at a slightly faster rate than current trends due primarily to economic growth resulting in faster development of currently planned projects. Agricultural land use growth varies by location with some agriculture to urban land transfer occurring and lower economic-value crops being phased out in some areas.

1.3.2 Technological and Economics

Agricultural Water Use Efficiency – (C1) Lack of economic growth results in decreased revenues and reduced capital investment for routine and long-term maintenance. Reduced maintenance results in an overall decline in on-farm and delivery efficiency. These efficiency reductions require greater diversions to meet consumptive use requirements. However, Colorado River Basin consumption changes little as additional losses are returned to the Colorado River system.

(C2) Economic conditions result in investment and rapid adoption of new technologies resulting in significant increases in agricultural water use efficiency. These technologies result in denser cropping patterns and higher yields with subsequent greater overall consumptive use demand. Irrigation techniques and delivery system water control are significantly improved over current trends. Gains in distribution efficiency partially offset the increased consumptive use.

M&I Water Use Efficiency – (C1) Water use efficiency increases according to current policies (e.g., SNWA’s current gpcd planning goals) and technology. External factors that

limit the water use of fixtures and appliances (e.g., federal statutes) continue, resulting in “natural” increases in in-home efficiency. Water use efficiency changes vary by location according to local goals and mix of water use categories. No radical changes in technology are anticipated.

(C2) Increased federal investment in water-saving technology and conservation programs results in a substantive increase in water-saving technology (e.g., WaterSmart, EnergyStar, landscape technology). These technologies are applied Basin-wide, resulting in reduced demand and consumptive use.

Water Needs for Energy – (C1) Water needs for energy expand relative to population growth and current regulations, policies, and planning for the energy industry. Current requirements for renewables are met according to schedules. Fossil fuel development and, in particular, oil-shale development, occurs at a faster rate due to economic drivers spurring growth in energy production.

(C2) Water needs for energy expand relative to population growth and current regulations, policies, and planning for the energy industry. However, investment in technology results in adoption of water-saving techniques (e.g., dry cooling). Renewable energy requirements continue, with an emphasis on dry cooling due to an increase in social considerations related to carbon production. World economic conditions do not favor new fossil fuel development in the southwest.

1.3.3 Social and Governance

Institutional and Regulatory – (C1) Federal and state laws and regulations affecting the Basin continue in a similar manner as today. Despite the potential for sunseting of future regulations and agreements, the operations of the Colorado River are relatively unchanged.

(C2) Changing social values lead to increased governmental regulation, including the enactment of climate change and greenhouse gas mitigation measures. These measures primarily manifest themselves in more-integrated management of water and energy (water use efficiency).

Flow-dependent ESA Needs – No change is anticipated in currently realized ecosystem needs or operational practices to meet needs. Operations to meet ecosystem needs continue according to recent practices.

Flow-dependent non-ESA Needs – No change is anticipated in currently realized ecosystem needs or operational practices to meet needs. Operations for ecosystem needs continue according to recent practices.

Social Values – (C1) Social values that affect water use in all categories remain consistent with the recent past. These values include continued support for ongoing planned M&I and agricultural conservation efforts as well as support for the ESA and its implementation.

(C2) Slight increase in social values and subsequent pressure focused on conservation efforts results in management of the Basin with increased flexibility for multiple water uses (e.g., recreational). Trends continue toward M&I conservation adoption.

Tribal Use – Due to economic forces, tribal use and development occurs at a rate faster than currently planned. In addition, new tribal claims and settlements are realized.

1.4 Storyline for the Enhanced Environment and Healthy Economy Scenario

This storyline includes two branches: (D1) current growth trend, and (D2) higher growth and technology. Once quantified, these branches could produce two scenarios.

1.4.1 *Demographics and Land Use*

Population – (D1) Populations in the Basin, the adjacent water-dependent basins, and the Southwestern United States grow at rates commensurate with the “best estimate” demographic projections. Population growth generally occurs centered in existing urban areas.

(D2) Rapid population growth focused around urban centers driven by rapid economic recovery, followed by a period of prolonged growth. This population growth is similar to typical “High” demographic projections for the southwest Basin States.

Agricultural Land Use – There are nominal increases in irrigated agricultural lands primarily due to the build-out of currently planned agricultural water supply projects. Agricultural land use growth varies by location, with some agriculture to urban land conversion occurring and lower economic-value crops being phased out in some areas.

1.4.2 *Technological and Economics*

Agricultural Water Use Efficiency – (D1) Current trends in agricultural water use efficiency continue making modest improvements to on-farm and system efficiency through projects such as those supported under the Salinity Control Program. These improvements result in little change to Colorado River Basin consumptive use. No radical changes in technology are anticipated. Agricultural uses are generally consistent with today’s practices (e.g., no major changes in techniques, crops, or practices).

(D2) Economic conditions result in investment and rapid adoption of new technologies, resulting in significant increases in agricultural water use efficiency. These technologies result in denser cropping patterns and higher yields with subsequent greater overall consumptive use demand. Irrigation techniques and delivery system water control are significantly improved over current trends. Gains in distribution efficiency partially offset the increased consumptive use.

M&I Water Use Efficiency – Increased federal investment in water-saving technology and conservation programs results in a substantive increase in water-saving technology (e.g., WaterSmart, EnergyStar, landscape technology). These technologies are applied Basin-wide, resulting in reduced demand and consumptive use.

Water Needs for Energy – Water needs for energy expand relative to population growth and current regulations, policies, and planning for the energy industry. However, investment in technology results in adoption of water-saving techniques (e.g., dry cooling). Renewable energy requirements continue, with an emphasis on dry cooling due to an increase in social considerations related to carbon production. World economic conditions do not favor new fossil fuel development in the southwest.

1.4.3 Social and Governance

Institutional and Regulatory – Changing social values lead to increased governmental regulation, including the enactment of climate change and greenhouse gas mitigation measures. These measures primarily manifest themselves in more-integrated management of water and energy (water use efficiency).

Flow-dependent ESA Needs – ESA flow targets for existing listed species are met and recovery of the species is maintained.

Flow-dependent non-ESA Needs – Increased social values lead to institutional agreements for ecological flows sufficient to ensure a resilient ecosystem (in timing, amount, and location).

Social Values – Increase in social values and subsequent pressure focused on conservation efforts results in management of the Basin with increased flexibility for multiple water uses (e.g., recreational). Trends continue toward M&I conservation adoption and public demand for in-stream flows (tourism, Wild and Scenic Rivers).

Tribal Use – (D1) Tribal use develops according to current settlements and use patterns.

(D2) Due to economic forces, tribal use and development occurs at a rate faster than currently planned. In addition, new tribal claims and settlements are realized.