

**Colorado River District  
2010 Annual Water Seminar  
Minding The Gap**

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**Minding The Gap  
Will an Old Platform Work for A New Train?**

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Thank you to the Colorado River District for the invitation to be on the program. It is an honor to be here today. Thanks to the audience you for taking the time to learn more about water.

Water leaders from around the state created the Water Congress 52 years ago to be the voice of Colorado's water interests to identify and work on water issues for which there is general agreement. We have historically been strong supporters of gathering information and studies to help make better informed decisions. The Statewide Water Supply Initiative, Colorado River Water Availability Study, and the Round Table process are recent examples.

Minding The Gap, Can an Old Platform Work for A New Train?

The "Old Platform" refers here to the Water Platform adopted at the first meeting of the Water Congress in June 1958. The "New Train" has to do with new approaches to water planning now being considered as well as the 3 to 5 million new residents that our State Demographers Office says are coming, along with their baggage.

What is this phrase "Mind The Gap"? For those that have been to London and used the subway system, these words are familiar. The London Underground has stenciled the phrase on many of the platforms and about the stations of their subway.

The problem occurs because the subway trains are straight and some of the platforms are curved or are of a nonstandard height. This creates a space between the platform and the train. Now it is human nature to want to fill that space with something . . . nature abhors a vacuum. Engineers may look at the potential for traveler injury and may enthusiastically say "I can fix that problem!"

But rather than do that, the government decision was made to use a simple catch phrase to create public awareness of the problem. To encourage subway travelers to just pay attention (thus depriving good engineers of countless hours of productive work and entertainment). So the phrase “Mind the Gap” was adopted in the late 1960’s. These gaps are crossed millions of times each year by passengers getting on and off the trains, but passenger accidents are reportedly very rare - on the order of 50 to 60 per year.

The phrase has been used on:

- A variety of T-shirts, coffee mugs, doormats
- Two albums
- A film
- A novel
- A theater company
- Several video games
- An on-line forum for a feminist group
- And now water supply planning.

In short, the Gap is the difference between supply and demand and considers Identified Projects and Processes (IPPs). Statewide, the municipal and industrial water supply gap is projected to begin in about 2030 and by 2050 reaches 189,000 to 629,000 Acre-feet, depending on the scenario. The numbers are being revised and do not include non-consumptive needs.

There is a new train of thinking in water planning processes that is being used in CWCB studies just now being rolling out. New approaches include extending the hydrologic record, integrating climate change into planning, forecasting demand under the shadow of drought, expectations from water conservation, and scenario planning. New factors to be considered include risk/consequences, financial limitations, prioritization, and managing our water supplies for multiple purposes.

The new train is loaded with issues, not to mention the problems of 3 to 5 million new residents. Our (the water community’s) station, our responsibility, is now what is always has been – managing and planning for our water supply.

As leaders of Colorado’s water community, our question today is to consider:  
Is our water platform the structure we want for our future?

In June 1958, Colorado’s water leaders from around the State met and adopted a platform for Colorado’s water future. Let’s examine that platform. (*Note italics are quotes from the original document.*)

*Colorado has in recent years, experienced a remarkable increase in population, nearly twice that of the rate of the national growth.*

The Colorado State Demographer project 3 to 5 million new Colorado residents by 2050.

*We now join together in dedicating ourselves to the task of securing full development of all of our available water resources, grounding our actions upon the fundamental proposition that equity must be done to and among all areas within the State.*

*State-wide collaboration is essential to the continued development of Colorado, if we are to realize the fullest possible benefits from our available water resources. It is a sad commentary upon the thinking processes of our people that the geographical barrier of the Continental Divide still remains a psychological barrier dividing our people as it divides our state. Conflict has arisen and persists between the two areas, with regard to the equitable distribution of our water resources, which has monopolized the time and energies of much of the State's best engineering and legal talent. Consequently, they have not had either time or opportunity to devote their talents, skills and energies to the solution of the many pressing problems which involve our relations with ourselves and our neighboring states and the Federal Government.*

*These facts now demand and fully justify the immediate and unified attention and action of our state and of all its people to the compelling end that there may be developed a forward-looking water policy, based upon complete internal harmony within the whole state and for the protection of our people and of future generations, against any encroachment upon Colorado's rightful share of the waters arising within her boundaries. Failure to fully protect our water resources against any external intrusion would be disastrous, leaving little for internal division by either negotiation or litigation.*

*Fair and equitable settlements can only result from thorough understanding of facts necessary for solution of problems, and the acceptance of those facts on the part of all citizens of the State. Settlement of conflicting intra-state demands upon Colorado's water must be based upon information and data.*

*We urge and recommend that the Colorado Water Conservation Board be directed and authorized immediately to complete its study of the water resources presently available in and to the State of Colorado, and the present and potential uses thereof.*

*This should be done in order to achieve the unified and harmonious development of those waters for beneficial use in Colorado to the fullest extent possible under the law. Adequate appropriations must be made by the State Legislature to the Water Conservation Board for such purpose.*

Fifty two years ago, we needed to study our water supply. This need is still with us today.

Historically, water projections relied heavily on observation, but there has always been uncertainty. In a 1957 article from *The Westerner* by William Nelson, associate editor of the *Daily Sentinel*, he considered the question of the amount of water available for appropriation. Drawing from work of Phillip Smith, then Secretary-Engineer of the River District, he said "No two sets of figures agree."

He gave a range of 472,000 acre-feet.

A range. There always seem to be a range. But wait.

As Nelson's analysis progressed, he cited a very specific number for the amount of water for which there is a definite purpose 2.5 Million Acre-Feet (MAF). This included water that was being used and that likely to be developed soon. Some projects that he included have not come on-line (oil shale development) and others have (the Fryingpan-Arkansas Project), but the factors tend to balance out. In the most recent CWCB report, the estimate of actual use in the Colorado River Basin in 2010 was 2.3 MAF and would be 2.7 MAF if existing facilities were used to at their maximum legal and physical capacity.

An arrow from 50 years ago finds its mark. William Nelson's figures were right on target. He relied on good data.

The general philosophy used for municipal water planning over the past several decades has been to use a 30-year period of record beginning in 1950. Denver Water reached a couple of years back into the late 1940s. Post World War II conditions were thought to reflect more accurately the role of modern development and river administration and the records are better.

Gradually the planning years were expanded to typically include the years of 1950 through 2005. This allows a look at critically dry periods in 1954 to 1956 and 1976 to 1977 as well as really wet periods in 1983 and 1984, and now the drought of 2000 to 2002.

Following a sequence of wet years in 1995, 1997, and 1999; 2000 was dry and 2001 was closer to average.

During the fall of 2001, water providers' attention was quickly focused on system protection from terrorism. Where are the water system vulnerabilities? Dam safety, water treatment plants, and contamination of supply received a lot of attention.

Who has maps of the distribution system?  
Are the design drawings for dams a public record?

Snowpack in the winter of 2002 started out low, but not alarmingly so. Water providers had seen it before. But the bottom dropped out in the spring and snowpack began rapidly disappearing. Had we really been in a drought since 2000?

With storage levels approaching critically low levels, the 2003 snowpack began to set up similarly to 2002. Another question was asked by many politicians. What kind of year had been used in planning processes to end the drought?

1957 – one of the wettest years on record. Should we rely on this?

And then St. Patrick's storm of 2003 changed everything. Snowpack levels rebounded and shortly thereafter streamflow soared. Criticism fall silent, at least for a while.

The public reaction to the drought set a new standard for what is possible in water conservation. But a new awareness has developed. A sense that our water systems are not only vulnerable to hydrology, governmental regulation, and lack of maintenance; but also to acts of sabotage.

In the field of hydrology, we are pretty good at extension of gage records – filling in incomplete records or synthesizing data from adjacent basins. We have skill at statistically describing historic yields. But statistical sampling and reordering of years (extension of the hydrology record), so that we can analyze different scenarios? Now we begin to venture into new territory. The theory of how to do this has been with us for decades. However many planners, probably most planners in Colorado, have not actively integrated this type of analysis into their water planning studies.

Through work of Connie Woodhouse, correlations between tree ring records have been developed for a 500-year period. Does the record show more serious droughts than the 1950 – 2005 years historically used for planning? Certainly. But important questions remain:

What do we plan for?

What can we afford?

How do we prioritize limited funds?

Upgrade a wastewater plant or repair a dam

Release water for stream habitat or retain it in storage

Build redundancy in the water supply system or replace a water main.

#### Colorado River Water Availability

How much water is left for development in the Colorado Basin? The Nelson article gave a range of 300,000 to 800,000. The CWCB Colorado River Water Availability Study cites two previous studies showing at minimum of 450,000 with a range of 500,000 to 1,000,000 above that. The new CWCB study using the extended hydrology shows about this as a minimum with a somewhat narrower range. However the range widens to 0 to 1,000,000 when running the alternate climate scenarios.

<u>Source</u>	<u>Colorado River Water Availability</u>
Previous CWCB studies	0.45 – 1.4 MAF
2007 USBR Study	0.48 – 0.94 MAF
2010 CWCB Study	
Model Period	0.43 – 0.79 MAF
Extended Hydrology	0.48 – 0.89 MAF
Alternate Climate	0 – 1 MAF
Nelson Article	0.3 – 0.8 MAF

In studying alternate climate scenarios, we are almost dealing with a new language. And suites of model runs. General Circulation Models are just that – general. They must be

downscaled to particular basins. We are uncertain as to how to consider alternate climate scenarios and how to integrate them into our decisions.

It is often assumed that the more we study something, the more certain we become. But this is not always the case. The more we learn about the complex relationships, the more variables there are to understand, we have to develop new equations to describe those relationships, data needs increase or have to be synthesized. Studying in more detail may mean we know less.

The current Water Needs Assessment and Colorado River Water Availability Study, Phase I alone are 750 pages. There is considerable information to absorb. Almost a new language to understand. Much discussion ahead as to what it means. And then there is Phase II. Perhaps a still larger effort needed. This will require our attention.

Purpose of modeling is not to predict the future. Models are a representation of reality. Their purpose is to help us get prepared for a likely future. They help us understand the outcome of complex relationships. They explain what has gone on before. Modeling facilitates critical thinking about our water systems and separates relevant information from unimportant. And helps us answer questions about what to do next.

In short, Modeling helps understand the strengths and weaknesses of our water systems. It serves as a gateway to dialogue.

And how do we do that?

### Implementation

*Recognizing that the Colorado Water Conservation Board is the agency of the state which is charged with the responsibility of promoting the conservation and utilization of the water resources of the state. There must be a more intense, continuous and intimate relationship between the Board and those concerned with water development in the various areas of the state.*

The Colorado Water Congress' first regular Executive Director, Gordon Scheer, worked hard to get basin dialogue groups started in the early 1960's. But to little avail.

The Basin Roundtable and IBCC are a manifestation of that statement. At least in intent. Are you satisfied? Is there adequate leadership? Information? Do you feel you have input on the process?

*There must be immediate expanded collaboration between the people of Colorado, members of the State Water Conservation Board, representatives of Federal Bureaus and Agencies, and the members of the State Legislature, so as to develop well understood and widely supported policies, formulated under the direction of the Board and implemented through its director and other personnel. Funds must be appropriated for the use of the State Water Conservation Board under terms such that they maybe expended only in accordance with its orders, and so as not to be divertible to any other state function.*

Over the past two years, water project loan funds managed by the Colorado Water Conservation Board have been depleted by over \$150 million in an effort to balance the State's budget. The Water Congress would like to see a plan for replenishing these lost funds.

### Conclusion

*It is imperative that Colorado completely abandon its past leisurely attention to and consideration of its water problems. We recommend an immediate reappraisal, and thereafter a continuous review of Colorado's position with respect to current and pending interstate water matters, to the end that there may be a complete and accurate analysis and determination of:*

- 1. the rights of Colorado in such matters*
- 2. how the same may be affected by the claims of other states and the Federal Government*
- 3. the future course of action to be taken by Colorado*

*No good purpose can be served by public controversy over matters which have not been given sufficient preliminary investigation to assure constructive approaches. We must have complete unity of purpose and objective in forming and carrying out a stable water policy for a unified State of Colorado.*

We do have much to discuss.

Thank you again for your time and the invitation to attend this great forum.

Minding the Gap means to be aware that it is there.

Not to fill it yet.

I almost entitled this talk "Mind the Gap, but wait until the door opens before stepping on board." Water supply problems will be addressed, but in their own time. This was a lesson from Wayne Aspinall that still applies.

Discussion is now needed on how we will deal with the issues of extended hydrology, climate change, and scenario planning. We cannot rely on one suite of model runs to provide us with answers or predict the future. This is our time. To learn. To create space for careful thought and constructive dialogue. To protect our funding.

Decision makers will continue to ask us "Do we have enough water?"

And our answer will be delivered from the platform on which we stand.