WESTERN RESOURCE
ADVOCATES

July 15, 2010

Ray Alvarado
Section Chief
CWCB Water Information Section
1580 Logan St., Suite 200
Denver, CO 80203

Re: Comments on Colorado River Water Availability Study – Phase I Report – Draft

Mr. Alvarado,

Western Resource Advocates (WRA) would like to offer the following comments on the Colorado Water Conservation Board's (CWCB), "*Colorado River Water Availability Study – Phase I Report – Draft.*"

The Colorado Water Availability Study (CRWAS) marks an important milestone in the history of water supply planning in Colorado – one for which the CWCB should be commended. The report is a major step forward in assessing climate change impacts on water supply, and makes Colorado a leading thinker on this topic. Furthermore, this is but one of several studies funded by CWCB that aims to quantify this state's future water needs, determine the availability of future supplies, and craft solutions that meet future demands for both consumptive and non-consumptive uses. Together, all of these reports help create a robust decision-making environment for today's and tomorrow's water managers.

In general, the draft CRWAS report suggests that climate change will have a far-reaching impact on western slope river flows, and casts serious doubt on past assumptions of the additional availability of Colorado River water to meet Front Range demands. CRWAS describes how increased temperatures and decreased summer precipitation will lead to earlier runoff from watersheds and cause significant reductions in natural river flows. Combined with increased crop irrigation requirements, the take home message is that less water will be available to meet future demands across the state.

CWCB Must Complete Phase II

Notably, CRWAS Phase I does not take into account currently planned projects that would further affect Colorado River flows, such as Denver Water's Moffat Expansion or Northern's Windy Gap Firming Project; nor does it address the impact conditional water rights would have on water availability if they are put to use, like those owned by oil shale companies. These topics are to be addressed in Phase II of the report, along with additional beneficial uses and "nonwater right" future consumptive and non-consumptive uses.

WRA encourages Phase II to include a robust evaluation of the non-consumptive needs necessary to support healthy fisheries and riparian ecosystems, and consider them as a legitimate demand when assessing future

water supplies available for development. One example are the recommended flows established by several federal biological opinions for ESA-listed fish species in the Colorado River basin. Flow analysis should consider both minimum and optimal base flows, as well as flushing flows and the occasional high flows necessary for riparian health. This evaluation should clarify that high flows are not "wasted" but rather serve essential ecological functions in our state's rivers.

WRA also encourages Phase II to include indirect consequences of climate change, such as increased municipal water demands for landscape irrigation, or increased cooling water demands for electricity production in the face of larger air-conditioning needs.

It is imperative for CRWAS Phase II to move forward and capture these additional demands in order for decision-makers to have the most accurate understanding of future Colorado River uses. Clearly, the State needs to act cautiously toward any plans for additional diversions of water out of the Colorado River basin, because additional large-scale development of Colorado River water complicates how we will meet our legal obligations to downstream states under the Colorado River Compact and law of the river.

Main Text Must Include 2070 Projections

CRWAS relegates drier 2070 projections to the technical appendices because, "[c]omparison of the distribution of 2040 and 2070 projections show that climate-induced effects on streamflow are very similar for the two time frames", and "2070 projections were biased toward dry conditions". There are several reasons that 2070 projections should be included in the main text and discussed with the same rigor as those for 2040.

CRWAS shows that streamflows at 2040 and 2070 are similar at *Glenwood Springs* (Figure 1), but that is not the case at other nodes. Glenwood is at the base of a high-altitude watershed that may not be as greatly impacted by climate change as locations downstream. For example, results in the appendix show that flows at the Colorado state line could be as different as 1 million AF between 2040 and 2070. Data presented in CRWAS conflict with the statement that 2040 provides a "reasonable representation" for potential stream flow reductions at 2070. It would be worthwhile for the study to perform evaluations of the differences between 2040 and 2070 at other locations in Colorado, or further downstream (e.g. Lee Ferry), before fully discounting the results.

Furthermore, the suggestion that 2040 stream flows are very similar to 2070 streamflows, despite vast differences in average temperatures at these two time periods, casts doubt on the reliability of the modeling methodology. Work performed by other climate researchers using the same emissions scenarios shows declining flows from 2040 to 2070,[1] and preliminary results of the Bureau of Reclamation's Colorado River basin modeling also show declining flows. Its seems highly unlikely that 2040 can be representative of 2070 if the "median" model is 2 degrees (F) warmer in 2070 compared to 2040, and the "hot and dry" model is 3.5 degrees warmer (Figure 2).

[1] Christensen & Lettenmaier. 2006. *A Multimodel Ensemble Approach to Assessment of Climate Change Impacts on the Hydrology and Water Resources of the Colorado River Basin*. Hydrology and Earth Systems Science Discussions (3), 3727–3770.

Additionally, one CRWAS objective was to include models that covered a range of future projections covering the 10th percentile to the 90th percentile. This objective has not been met for the 2040 projections. An evaluation of the cumulative distribution of model projections shows that the 2040 projections cover a range from the 18th to the 92nd percentile; in effect, biasing the results towards a more wet selection of potential futures than what was initially planned (see Figure 1). This shortcoming at 2040 could be mitigated, or at least balanced, by including the drier 2070 projections.

Finally, discounting the 2070 projections leaves water managers without valuable, long-term information. All of CWCB's other reports are using 2050 as a planning horizon to model future demands and supply opportunities. One could easily argue that the potential impacts of climate change are best evaluated on the longest-term basis possible (i.e. 2070), so that currently planned projects and processes can utilize this information. Planning a project that will be complete in 2050, with climate information only available to 2040 seems counter-productive to the purpose of CRWAS. Furthermore, ignoring potential futures that are a distinct possibility will only make future water supply challenges that much greater.

Range of Water Availability is Broad and Misleading

The 0 – 1 million acre foot range of future water availability described by CRWAS is unhelpful for planning purposes and leaves the reader with no feel for what scenario is most likely. Phase I assumes that all future climate projections are equally probable, yet three of the five climate projections used in CRWAS indicate that no water will be available for future consumption at 2040. Other scientific research, mentioned earlier, clearly points to what will be the most probable impacts of climate change in the Colorado River basin – hotter and drier. The CRWAS should report the existing state of science and acknowledge these trends when discussion future water availability.

Concluding Remarks

We recognize the great amount of effort put into this report and commend CWCB for moving forward on such an important topic. We further encourage the State to set aside adequate funding to prepare Phase II of the study. Finally, we hope CWCB finds a way to incorporate 2070 findings into the main text of the report. We would be happy to meet with CWCB staff to provide any clarification of these comments or to provide additional information.

Thank you.

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Western Resource Advocates

FIGURES ON NEXT PAGE

cc: Alex Davis (DNR)
Jennifer Gimbel (CWCB)

Figure 1. Comparison of Five 2040 Selected Projections to all 2040 Projections (CRWAS Figure 2-11).

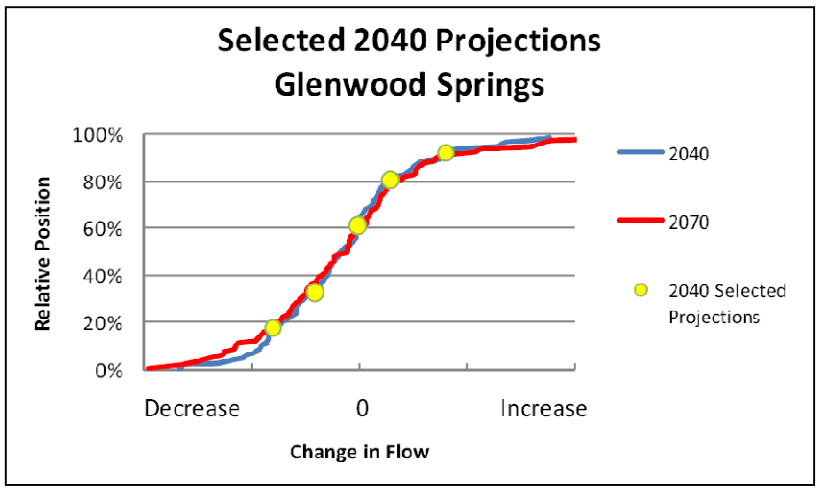

Figure 2. Characteristic Conditions for the 112 Projections of Future Temperature and Precipitation (CRWAS Figure 2-9).