July 21, 2010

Ray Alvarado, CRWAS Study Manager
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

Dear Ray:

Thank you for the opportunity to submit comments on the draft of the CWCB's Colorado River Water Availability Study (CRWAS) Phase I Report. These comments represent the common views of the signers, who are among the members of the Steering Committee of the Water Adaptation Initiative of the Rocky Mountain Climate Organization (RMCO). In addition to considering the draft report in Steering Committee meetings, many of the signers of this letter also are members of the CWCB's Climate Change Technical Advisory Committee and have had the opportunity to review and discuss the draft report in meetings of that committee.

The signatures on this letter should not be taken to mean that this letter represents the overall views on the draft report of any of the organizations represented on RMCO's Water Adaptation Steering Committee. Instead, these comments represent the shared views of the individual signers on the particular points expressed here. Some organizations represented by the signers of this letter may submit separate, more comprehensive comments on the draft report.

The purpose of the RMCO Water Adaptation Initiative is to seek adoption and implementation of the water-related elements of Governor Ritter's Colorado Climate Action Agenda and of the recommendations of the blue-ribbon Climate Action Panel convened by RMCO in 2006 to address Colorado's contributions and vulnerabilities to climate change. Of the RMCO panel's 70 recommendations, 15 address actions to meet Colorado's water needs in a changed climate. One of those recommendations, adopted unanimously, is:

> To ensure that the new Colorado River water supply study is complete, relevant, widely accepted, and useful for future decision making, the state government should ensure that the potential effects of climate change are considered in the study.

We applaud the CWCB and its contractors for devoting a significant portion of Phase I of CRWAS to considering the potential effects of climate change on the Colorado River. The information that has been gathered and presented in the report is good, useful information that goes beyond previous efforts and will be of significant value in helping people understand how much Colorado River water may be available to our state in the future and what decisions should be made with respect to future water supply and use. The following specific comments about the draft report are intended to suggest changes that may make the final Phase I Report – and the Phase II Report to follow – more "complete, relevant, widely accepted, and useful for decision making," to use the language from the recommendation of RMCO's Climate Action

Panel. Our comments should be taken as our thoughts on how to improve a good effort, not a criticism of the overall effort.

Presentation of Information

Most of our comments deal with how information gathered in the phase I report is presented to make the report more useful. To begin with, we suggest that the executive summary should include, at its beginning, a clear explanation of what the Phase I Report covers, what it does not cover, and how it fits in the context of other studies and related work on Colorado River water availability. A better summary is also needed of the key information contained in the report. In later comments, we also make some specific suggestions on improving the presentation of some detailed information in the report.

Colorado River Compact

The data, assumptions, and methodology used to produce the projection shown for 2040 in Figure 3-37 on page 3-45 are not described or disclosed in sufficient detail to make it possible to understand or review this projection of the amount of water that may be available within the state under the Colorado River Compact. Since future water availability in Colorado under the Compact will be studied in considerably more detail in the CWCB's upcoming Colorado River Compact Compliance Strategies Study and the Bureau of Reclamation's on-going Colorado River Basin Water Supply and Demand Study, we recommend that the CWCB remove the section of the CRWAS report that deals with Colorado River Compact issues and revisit this aspect of the study as additional information becomes available in Phase II.

2070 Projections

As you are of course aware, the Phase I effort included gathering of information from some projections of climate and hydrological conditions for both 2040 and 2070, but only the 2040 projections were used as a basis for the text and figures of the body of the draft report. The 2070 projections were included in the appendices only, not in the body of the draft report, on the grounds that 4 of the 5 individual projections done for 2070 projected drier conditions at Glenwood Springs than the average of 112 individual projections for those conditions in 2070 that have separately been done for the U.S. Bureau of Reclamation for an ongoing larger study of the Colorado River.

Individual members of our Steering Committee have expressed a variety of concerns about how the draft report treats the 2070 projections. The major points on which we are in agreement are:

- There should be fuller treatment of the 2070 projections done for the Phase I report, which were selected based on broad review and consideration, along with a fuller

explanation of the concerns expressed in the draft report about the 2070 projections and their limitations.

- Projected river flows at Lee Ferry are more important than at Glenwood Springs for determining the availability of water from the river; therefore, comparing the results of different projections at Lee Ferry would be more significant than comparing them at Glenwood Springs. Even focusing on the flows of the Colorado River at the state line would be more meaningful than focusing on flows at Glenwood Springs.
- We are aware that other studies consistently show an increasing climate change effect on Colorado River flows later in the century, and we suggest that that point be included in the final report and, to the extent possible, an explanation of any differences shown in the analysis done for this report.
- Today's state-of-the-art modeling is not perfected and will continue to improve. Also, the 112 model runs done for the Bureau of Reclamation are preliminary and neither peer-reviewed nor even published. All modeling, whether the 112 preliminary projections done for the Bureau or the projections done for this report, has uncertainties. Clear statements about ranges of projections and the degree of uncertainty associated with them are at least as important as the quantitative results from the projections themselves.

Likelihood of Projected Outcomes

A specific instance of how the degree of uncertainty could be better described occurs in the table on Page V of the Executive Summary, which states, "Each of the selected climate projections is equally probable and differs from the other 99." This is misleading - the report includes neither a probability analysis of future climate scenarios nor an accuracy analysis of climate models. Instead, the report should state that the climate projections were selected to represent some of the range of outcomes resulting from many more projections, with no attempt to identify whether any possible outcomes are more likely than others. Similarly, at Page 2-22, the report states, "IPCC did not assign a likelihood to the SRES scenarios—all are considered equally probable 'alternative images of how the future might unfold' (Nakicenovic et al., 2000, Technical Summary)." A more accurate way to describe the likelihood is as the referenced Technical Study actually states, "IPCC did not assign alikelihood to the SRES scenarios—each is considered 'one alternative image of how the future might unfold.'"

Presentation of Climate Data

As many people will look to the Phase I Report almost as much for what it says about possible climate changes in Colorado as for what it says about future water availability in the state, it is important that care be taken to accurately represent the results of the climate projections made in the Phase I effort. Too often in the draft report, an average of different projections is presented as single projection, when it is more important and accurate to present both the range of the different projections as well as an average. For example, in Table 2 of the Executive Summary of the draft report, there is a statement that temperature by 2040 "increases basin-

wide by 3.3 to 3.7 degrees." Instead, an accurate statement would be that projections for future temperature increases at individual sites within the basin by 2040 range from 1.6 to 5.0^{o}F (with a combined average increase of 3.3^{o}F) at the low end (at Grand Lake) to 2.0 to 5.4 ^{o}F (with a combined average of 3.7 ^{o}F) at the high end (at Fruita). Similar care in accurately stating both projected ranges and averages of climate values should be exercised throughout the report.

Band Charts

We believe the blue shading used in the band charts of hydrographs is inherently misleading, by implying that the shaded areas convey combined results of different projections. It would be more accurate to present the individual lines from different projections without the shading, making it easier for readers to follow how individual projections move up and down over the year.

Integration of Phase I and Phase II

We recognize that the CWCB faces choices on how much time and effort should be spent making changes in the Phase I report before it is finalized, compared to dealing with issues in the Phase II report. Once all comments are submitted to the CWCB on the draft Phase I report, we urge the CWCB to continue to reach out to affected and interested parties around the state to help it decide what to do in the Phase I final report and what to leave to Phase II.

Again, we complement the CWCB and its contractors for the good work done in Phase I of this study, and for the opportunity to submit these comments.

Sincerely,

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