

July 8, 2011

Bureau of Reclamation
Attn: Ms. Pat Adams, LC-2721
P.O. Box 61470
Boulder City, NV 89006-1470
Via Email: ColoradoRiverBasinStudy@usbr.gov

RE: Colorado River Basin Study Interim Report #1 Comments

Dear Ms. Adams:

Thank you for this opportunity to comment on the Colorado River Basin Study (CRBS) Interim Report #1. The undersigned representatives of non-governmental organizations have been following the development of the CRBS and have been contributing members of the CRBS work groups.

General

We are pleased to see this first interim report on the Colorado River Basin Study, as it reaffirms our conviction that better data on water supply, demands, and river conditions are essential to sustainable management of the water for the people, economy and environment that depend on water from the Colorado River and its tributaries. To that end we encourage Reclamation and its cost share partners to focus efforts leading up to the second interim report on:

- a) greater transparency of demands data, with geographic specificity that shows not only when demands are expected to increase, but where and for what purpose, as well as
- b) metrics for healthy river flows that are capable of projecting how various scenarios impact the ecological health and economic value of the rivers of the Colorado River basin, beyond the fundamental requirements of flows mandated to protect endangered species.

The Interim Report refers to the groups who have joined to comment on this letter as “environmental groups” and at least once as a collaborative of NGOs (non-governmental organizations). Please refer to the groups in the future as conservation organizations. Moreover, while we endeavor to work together for the convenience of both ourselves and the Project Team, the undersigned would prefer not to be referred to as a formal collaborative.

In addition, we believe that it is important (e.g., p. SR-11) to acknowledge that, while the CRBS is a joint effort of Reclamation and the states, the Project Team also includes major contractors and their staff from Lower Basin States. Thus, the Project Team is not an exclusive conversation between federal and state governments, although it does not include conservation groups.

Status Report

CRBS must acknowledge Mexico as part of the basin but clarify that the CRBS does not include Mexico.

Despite the acknowledgement of Mexico in the Executive Summary and the Status Report's Background and Need section (p. SR-2) about the importance of the Colorado River water to Mexico, a lay reader could assume that the Colorado River basin does not actually include Mexico (e.g., Figure 3, p. SR-10). While the scope of the current study need not include Mexico, the study should explicitly note in both the Executive Summary and the Status Report that Mexico is part of the basin but is not included in CRBS.

Statements such as "The purpose of the Study is to define current and future imbalances in water supply and demand in the Basin" and the definition of the study area as "the hydrologic boundaries of the Colorado River Basin plus the adjacent areas of the Basin States that receive Colorado River water" are inconsistent with the basin's actual hydrologic boundaries and implicitly slight Mexico. In light of Reclamation's laudable efforts to reach out to Mexico through the on-going binational negotiations, future reports should clarify that the basin includes Mexico and that the study area only includes the U.S. portion of the basin: "the hydrologic boundaries of the Colorado River Basin *within the United States* plus the adjacent areas of the Basin States that receive Colorado River water."

- Figures 8, 9, and 10 on SR26-28 document scheduled deliveries to Mexico over a timespan that includes some high flow years. Does the "other losses" category in this table include water spilled at Hoover Dam? It might be helpful to acknowledge these spills as a component of the system water balance in wet periods, though we suggest identifying them separately from the "other losses" category so that they can be identified as flood flows.

The Study must address the water imbalances that affect communities, economies and ecosystems.

Section 2.1: The Reports justifies the need for the CRBS predominantly in the context of hardships borne by urban water providers. To comport with SECURE and the intent of taking action to secure water for communities, economies, and ecosystems, justification for the study must also include complete descriptions of the ecological imbalances that currently exist within the basin and the likely further deterioration of ecosystems caused by additional water development, absent implementation of appropriate solutions.

The Study should recognize the economic value of recreation alongside irrigation and other water dependent industries

Section 2.0. In discussing the need for the CRBS, the report notes that more 30 million people rely on the Colorado River to meet some or all of their municipal water needs and

that the same water source irrigates nearly 4 million acres of land in the Basin which generates more than \$3 billion per year in agricultural benefits. Although the value of water based recreation in the Colorado River Basin cannot be fully quantified, a recent economic review for The Nature Conservancy concludes recreation in the basin may be worth over \$10 billion annually to the U.S. economy, which includes total (direct and indirect) spending on water based recreation in 9 national parks of around \$1.3 billion annually and total spending on fishing of \$3.6 billion annually. *Ecosystem Service Valuation of the Colorado River Basin: A Literature Review and Assessment of the Total Economic Values of the Colorado River Basin* (available at <http://www.conservationgateway.org/file/ecosystem-service-valuation-colorado-river-basin-literature-review-and-assessment-total-economi>)

Technical Report B – Water Supply Assessment

Reclamation has made groundbreaking advances in its work to develop a climate change dataset that downscales outputs from the array of Global Circulation Models for use in the Colorado River Simulation System (CRSS) model. Reclamation’s recent publication “SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water 2011” projected that Colorado River flows are expected to decline by mid-century by 8.5%, but did not produce a projection that could be input to CRSS. Reclamation’s work on climate change in the context of this Basin Study will create unprecedented capacity to view the impacts of climate change in the context of the Colorado River Compact and other policies that bear on how water is distributed in the management of the Colorado River. We encourage Reclamation to complete its work on this dataset without delay.

The report notes that “the Current Trends scenario in particular relies on knowledge of historical consumptive uses and losses as well as planning data and expertise to estimate future trends in water demands. Therefore, historical consumptive uses and losses data were compiled.” We recommend explaining the difference between demand and consumptive use for each of the sectors assessed in the report. For most sectors, users demand a specified volume of delivered or applied water; most agencies project future demands based not on consumptive uses but instead on delivered water. This distinction should be made explicit. Assessing diversions and groundwater withdrawals will also require an assessment of return flows, which raises the importance of water quality issues as such returns presumably will decline in quality in the future due to increased water use efficiency and subsequent reduction in dilution flows. Interestingly, the phrase “water quality” does not appear at all in Technical Report C.

The analysis of water supply for the CRBS reflects a systematic and defensible approach. With the four distinct techniques (Observed Resampled, Paleo Resampled, Paleo Conditioned and Downscaled GCM Projected), the Project Team has developed and used appropriate tools and methods to identify the probable range of future water supply scenarios. The Project Team must continue its efforts to identify and correct potential bias in the VIC (Variable infiltration Capacity) model results (and other aspects of the hydrological modeling). It will also be important to explain the relationship between the

CRBS results and those published in the SECURE report, as the Project Team builds on these results and analyses as the basis for an in depth consideration of the implications associated with the scenarios developed and identified in Technical Report A.

The Report has used the scientifically defensible approach of averaging the different GCM model outputs, essentially treating them as if they are all equally likely. However, given that global emissions are at the top end or in exceedance of the selected IPCC scenarios, using the average of all GCM outputs may overestimate flows for the purpose of the CRBS. Given all of the work that Reclamation has put into developing these data, we recognize it may not be possible to fix this potential over-estimation in the context of the CRBS. However, we do believe that it would be helpful for Reclamation to note that the climate change projections used in the CRBS may overestimate flows for this reason.

Figure B-36 – The title for top graph should read “temperature” not “precipitation”.

Technical Report C – Water Demand Assessment

Current Trends - M&I Water Use Efficiency (4.1.2)

The “Current Trends” scenario assumes that “Water use efficiency increases according to current Colorado River Basin water provider policies ... and technology.” This assumption, driven by water provider policies rather than by empirical trends, will under-estimate future M&I water use efficiency savings. Water providers throughout the basin underestimate their customers’ responses to water efficiency appeals. For example, the 2009 SNWA Water Resources Plan projects a 17% per capita reduction in demand from 2009 to 2035; SNWA’s per capita deliveries declined 31% from 1990 to 2008. Customers in the service areas of Denver Water, San Diego County Water Authority, and SNWA, among others, exceeded water use savings projections. Water provider policies and projections of future efficiency gains are too cautious and do not reflect current trends.

The recent Pacific Institute report *Municipal Deliveries of Colorado River Basin Water* (available at http://www.pacinst.org/reports/co_river_municipal_deliveries/) documents an average long-term decline in per capita deliveries of more than one percent per year. This is the current trend, and should be used in place of water provider policies.

Current Trends - Water Needs for Energy (4.1.2)

Given the extreme volatility in oil shale planning and development, the level of development assumed in “Fossil fuel development and, in particular, oil-shale development occurs according to current plans” should be described explicitly. A June 25, 2011 *New York Times* article (at <http://www.nytimes.com/2011/06/26/us/26gas.html>) notes that current plans for oil-shale development may greatly exaggerate its availability and profitability, suggesting that choosing the correct date for “current plans” will be critical toward determining the likely demand such development will place on Colorado River basin water.

Economic Slowdown - Demographics and Land Use (4.2.1)

This scenario, or perhaps a new scenario, should reflect the potential demographic impacts of climate change. Such impacts will likely differ regionally – population growth may well be halted entirely or in fact become negative in some areas of the Southwest such as

Phoenix, Las Vegas, and the Coachella Valley due to extreme summer temperatures, while population growth may shift to the north or out of the basin states entirely. Although speculative, this is consistent with scenario planning in that the possibility exists that regular summertime temperatures of 115°F or more and resultant energy costs associated with air conditioning may prove excessive for many people, especially in conjunction with an overall economic slowdown, causing a net out-migration and population declines.

Expansive Growth (4.3.2) In the Expansive Growth storylines, growth is strong, so changes in agricultural water use efficiency for the C1 storyline should be brought upon by slower technology adoption, not “lack of economic growth”.

Approach to Quantifying Demand (5.1)

- Table C-3.
 - Categories of consumptive demand proposed for use in the Study are agriculture, M&I, energy, minerals, and fish, wildlife, and recreation; and these individual demands will be summed over a given geographic area to define the total demand for that area. However, the Table C-3 definition for fish, wildlife and recreation demands is limited to National Wildlife Refuges, National Recreation Areas, state parks and off-stream wetland habitat needs and is not consistent with the parameters in this same table which include ESA listed species and all other river ecosystem water needs. It not clear which of these demands will be included in Storyline D: Enhanced Environment and Healthy Economy or how they will be included. We look forward to working with Reclamation in finding an appropriate way to quantify and characterize the non-consumptive demands that are integral to Storyline D: Enhanced Environment and Healthy Economy.
 - Implicitly including phreatophyte losses in the Upper Basin water budget through the natural flow computations reduces transparency of the demand projections, and may or may not allow losses to be adjusted for changes in precipitation and temperature due to climate change, as the Interim Report says will be done for irrigation, outdoor municipal use, evaporation, and phreatophyte losses in the Lower Basin (page C-20). Phreatophyte losses in the Upper Basin should be made more transparent.
 - In the definition of ‘operational losses’ (C-17), it is not clear if all such losses are included, such as effluent discharges to the ocean by customers of the Metropolitan Water District, discharges to the Salton Sea by the Imperial Irrigation District and the Coachella Valley Water District, and effluent produced by Colorado’s Front Range water users. If these are not included as “operational losses” then perhaps there should be another way of capturing information about those losses for consideration in the Basin Study.
- Figure C-3. – The geographical extent of the Colorado River Basin study area omits agricultural water users on the lower South Platte River that are dependent on Colorado River diversions through the Colorado-Big Thompson project. The “Front

Range” hashed area should be extended to include the entire Northern Water Conservation District’s boundaries (see http://www.ncwcd.org/project_features/cbt_maps.asp).

- Section 5.3.2. In discussing possible impacts to agricultural demands due to changes in precipitation and temperature, Appendix C-4 indicates agricultural demands increased by approximately 5 percent for each °F (not °C as currently written) increase in temperature.
- Section 6.1. Climate change will certainly impact the timing and quantity of evapotranspiration requirements for agriculture, but it is important to note in this section that users’ existing water rights may prohibit earlier (in the season) diversions of water.
- Section 7.1
 - On p. C-25, the Report describes CAP’s reporting on exports to the Gila Basin. For the purpose of the Basin Study, is the Gila River a separate basin? If so, would uses supplied from the Gila Gravity Main Canal (WMIDD, Yuma Mesa, YID, North Gila, Gila Monster, Unit B) be considered exports?
 - Figure C-5. Reclamation should include the actual numbers for each bar in the figure; potentially in an appendix, or within the actual bar like Figure C-6. This would improve several additional figures, including Figure C-7, Figure C-8, etc. Without specific quantification, the graphs are only helpful for capturing a vague understanding of relative demands.
- Section 7.2
 - The numbers provided in the narrative descriptions of each state’s historical consumptive use do not always comport with the corresponding figures of consumptive use by category. For example, the text states “Colorado consumptive use has grown from approximately 2.1 maf in 1971 to a high of 2.7 maf in 1989”, but Figure C-8 indicates that Colorado consumptive use in 1971 was approximately 1.8 maf, and that the consumptive use in the high year of 1989 was no higher than 2.4 maf.
 - Figure C-9. (and similar) – Recent decreases in consumptive use may in large part be caused by drought, but there are many other factors influencing whether or not demands will return to pre-drought levels in the future (e.g. agricultural users may have changed cropping types or patterns in response to the drought, some may have sold their rights to municipalities, others may have retired). Therefore, it is not appropriate to use the maximum from 1999-2008 as a gauge of measure, an average or median value would be better. Furthermore, using the maximum as a baseline for projecting future demands will result in an incongruous step-change between historical and future demands, reducing transparency in the projections.

Appendices:

- Appendix C2: **Plausible Range of Parameter Characteristics**
 - There is a growing literature exploring the potential impacts of climate change on business and residential migration patterns and location decisions, suggesting that some areas of the Southwest may experience net out-migration

due to temperature extremes and other climate-related factors. This new research suggests that Table AC2-1's "Plausible Low End of Range" of "Slow growth: Increases principally in existing urban areas" may not in fact fully capture the low end of the range. Based on this new research, we recommend that the low end of the range be expanded to include a scenario in which some portions of the basin experience population declines.

- We agree that "M&I consumer efficiency continues according to current trends" is a reasonable assumption. It will be important to quantify these current trends using real data and not on water provider policies.
- Appendix C3, Table AC3-1: In the D2 storyline for population distribution, expansive growth may incorrectly include sprawl to non-urban areas. The text in Section 4.4.1. describing the storyline indicates, correctly, that there is no sprawl in D2, in contrast to storylines C1 and C2.
- Appendix C4: **CLIMATE CHANGE EFFECTS ON COLORADO RIVER BASIN IRRIGATION DEMANDS**

This Appendix notes that "irrigation demands in only six of the seven Colorado River Basin states were estimated," but it excludes both California and New Mexico, so only five of the basin states are included. California's exclusion is especially surprising given that, until recently, California's agricultural use exceeded all upper basin uses combined. Although California agricultural uses are predominantly within the Salton Sea watershed, they present a clear and quantifiable demand that should be included in this climate change assessment. We suggest that additional analysis would be helpful to identify where crop shifting may occur when temperatures rise beyond a particular crop's tolerance or economically efficient growth, and the concomitant impact on water use.

Technical Report D: System Reliability Metrics.

The importance of protecting and restoring healthy river flows throughout the rivers of the Colorado River basin, both to the communities that depend on them for tourism and recreation dollars as well as to the fish and wildlife that rely on them, cannot be overstated. We realize that Reclamation and its cost-share partners have committed to developing metrics to assess the health of aquatic and ecological resources in the rivers of the Colorado River basin, and look forward to working with all of you to develop a robust approach.

We note the discussion on D-7 citing a possible methodology for these metrics as an example of a quantitative metric with indirect measurement, and see real promise in this approach as a means to assess the health of rivers at a large scale throughout the basin. However, we have identified many rivers and reaches of significance where flow targets have not been necessarily been established to date, and believe that a robust approach to measuring healthy river flows should not be restricted to established targets. This is particularly important as the Basin Study will project unprecedented changes to both supply and demand that impact every river and every reach, resulting in unprecedented

changes to instream flows. Instream flow targets have not been established for many rivers and reaches in the basin, as these targets have typically only been established in anticipation of changes to river flows.

We also look forward to developing an indirect measure for assessing how various scenarios impact economies that rely on tourism and recreation dollars.

Conclusion

Again, thank you for this opportunity to comment. The undersigned believe that achieving a final report to look seriously at a suite of options that can solve the current and future, climate-change affected imbalances between supply and demand on Colorado River Basin water while protecting the communities, economies and ecosystems that depend on that water is imperative. We look forward to working with Reclamation, the states and other members of the Project Team to move forward towards a comprehensive and transparent Interim Report #2 over the next several months.

Sincerely,

Drew Beckwith, Western Resource Advocates

Michael Cohen, Pacific Institute

John Gerstle, Trout Unlimited

Kara Gillon, Defenders of Wildlife

Melinda Kassen, on behalf of the Theodore Roosevelt Conservation Partnership

Jennifer Pitt, Environmental Defense Fund