Consumptive Use Study Workgroup - Technical Recommendation to the Commission

Background

Article VI of the 1948 Upper Colorado River Compact states, "The Commission shall determine the quantity of the consumptive use of water, which use is apportioned by Article III hereof, for the Upper Basin and for each State of the Upper Basin by the inflow-outflow method in terms of man-made depletions of the virgin flow at Lee Ferry." However, this method is not in use today. There is general recognition that this method is outdated, inaccurate, and infeasible. Article VI further provides that the Commission may adopt a different method by unanimous action.

Over the past nine years, the Upper Division States, Commission staff, and Reclamation, through the CU Study Workgroup, have been working together on an irrigated lands CU estimation study focused on the Upper Colorado River Basin (UCRB) that includes: 1) a review and analysis of the various CU estimation methods currently used by the States and Reclamation, 2) a review and expansion of climate and meteorological information to enable the consideration of state-of-the-art CU estimation methods, and 3) a detailed trial and evaluation of two crop coefficient methods (CCMs) and several remote sensing methods (RSMs).

Through the use of the States' Upper Colorado River Basin Fund MOA revenues and with additional support from Reclamation, the CU Study Workgroup conducted the CU Study. The goal of the study was to provide a comprehensive analysis of CU estimation methods for agricultural irrigation that could be deployed across the entire UCRB.

CU Study Final Report Recommendation

The final report of the CU Study recommends the following procedures:

1) For Irrigated Acreage Mapping, the development of more frequently updated irrigated acreage maps. This involves the review and integration of GIS data provided by the Upper Division States using a new remote-sensing-based mapping technique for defining irrigated land extents.

2) For Reference evaporation (ET) (ET_{ref}), the use of the ASCE Standardized Penman-Monteith reference crop equation for alfalfa, which is also the standard reference crop used by METRIC and SSEBOP (the RSM models in the study). For supporting climate data, the bias-corrected gridMET dataset was recommended.

3) For Potential ET (ET_{pot}), the use of the ASCE Standardized Penman-Monteith alfalfa-based reference ET_{ref} with a new supplemental dual crop coefficient model (the ET Demands model) as a backup method for estimating CU.

4) For Actual ET, the contractors recommended the use of the Automated METRIC (eeMETRIC) method, which can be developed with the OpenET platform or independently, as it consistently performed better than the SSEBOP method. The contractors also recommended continued monitoring and increased understanding of eeMETRIC and other CU estimation methods and ensembles as developed by the OpenET platform.

5) For Effective Precipitation, the contractors recommended (with continued oversight, development, and investigation) the use of a supplemental model (ET Demands).

Based on the CU Study Final Report and its recommendations, the Commission staff requested that the CU Study Workgroup develop and provide a technical recommendation to the Commissioners identifying the most appropriate CU estimation method for application across the UCRB for use by the Commission as a potential replacement for the consumptive use component of the inflow-outflow method.

CU Study Workgroup Recommendation to the UCRC

Based on considerations regarding accuracy, consistency with the best available science, relative cost, and the ability of the method to produce timely information, the CU Study Workgroup recommends the Commission consider adopting the procedures outlined in the CU Study Final Report Recommendations above and further described in the CU Study and technical appendices. The potential adoption of this CU method by the Commission is not intended to replace or affect any existing intrastate CU programs or processes. The CU Study Workgroup recognizes that this technical recommendation may necessitate a discussion of other non-technical considerations.

This recommended CU method relates only to the use of these methods for interstate purposes, for the uniform estimation of irrigated lands' CU across the Upper Division States and pursuant to Article IV of the Upper Colorado River Basin Compact. For all other water use sectors and transit loss, the CU Study Workgroup recommends the Commission continue to work directly with the Upper Division States and Reclamation to utilize the estimation procedures applicable for those sectors, including direct metering, use of existing statistical estimation methods, and other science-based methods.

Supporting Considerations

1. There are multiple irrigated lands CU estimation methods presently in use by the Upper Division States and Reclamation and the information is not generated every year. Likewise, current CU estimation methods do not produce data in a timely manner.
2. To date, Reclamation has been using the modified Blaney-Criddle method with its proprietary Indicator Gage Method to develop the irrigated lands portion of its Consumptive Use and Losses (CU&L) data. Reclamation intends to move forward with the above-mentioned CU method to recalculate and republish historic CU&L data for future reporting. Reclamation has indicated that it would prefer to adopt the recommended method jointly with the Commission and the Upper Division States.
3. Modified Blaney-Criddle is no longer recommended by the American Society of Engineers (ASCE) and is no longer recognized as state-of-the-science.
4. Reclamation uses estimated CU to compute the Upper Colorado River Basin (UCRB) natural flows each year. The computed natural flow data are then used in Reclamation's Colorado River Simulation System (CRSS) model, which will likely be used to support long-term planning considerations. Better agreement between Reclamation's and the States' CU estimates has the potential to improve the performance of the CRSS model.
5. The recommended irrigation CU method directly estimates actual ET and does not require an additional adjustment from ET_{pot}, such as the Indicator Gage Method.
6. There is the potential for cost-sharing agreements or supplementary funding with Reclamation that may offset additional near-term costs to the States of implementing the recommended CU method. The long-term O&M costs related to the implementation of a comprehensive CU program using the recommended CU method and the potential for cost-sharing with Reclamation need further investigation.
7. CU estimation methods are a rapidly developing field of science, and new or updated methods are expected to improve CU results in the future. Reclamation, the Commission, and the Upper Division States may need to conduct/establish periodic reviews to understand and evaluate these new developments in CU estimation science.