BEST PRACTICES FOR DETERMINING CROP HISTORICAL CONSUMPTIVE USE

Historical consumptive use (HCU) should be quantified in a month-by-month analysis by comparing monthly diversion records against the monthly irrigation water requirement (IWR) for every month in the study period. [1] The IWR can be calculated from approved methods, such as the commonly used Blaney-Criddle Method. The portion of the diversion that is not consumed is called the historical return flow, and properly computing this component is an essential part of the analysis. The portion of the historical return flow that was surface flow is typically considered to have returned in the same month as the diversion; however, the portion of the historical return flow that seeped into the ground should be timed or lagged back to the stream. The lagged timing is typically computed by a Glover analysis. The diversion minus the lagged historical return flow for each month is called the "net historical depletion". The final monthly average net historical depletion for all of the 12 months in a year is obtained by averaging the monthly net historical depletion in the study period. The final monthly average net historical depletion is the amount of water that can be made available in a change case for changed uses. Since the historical return flow typically has a lagging factor, a return flow obligation after the end of the diversion season is normally required to also be computed and maintained with the change of water right.

Models used to determine the irrigation water requirement require monthly temperature and monthly precipitation values for the field site. The weather factors are obtained from climate stations throughout Colorado; however, the values should be corrected for the field site if the elevation or precipitation is different than the climate station. The Colorado Decision Support System (CDSS) and Division of Water Resources (DWR) web sites provide the State Climatologist long-term average annual precipitation values for all locations in the state. The weather station long-term average should be compared against the State Climatologist value for the field site so that a precipitation correction factor can be applied to the weather station data for use at the field site. A temperature adjustment of 3.6 degrees cooler per 1000 feet of elevation gain is typically accepted if no other data exists.

The StateCU Program, available for free download at the CDSS website, can be used to compute the historical consumptive use in a month-by-month analysis. The program has an "orographic adjustment" feature that can be used to apply the long-term climate correction factors in the analysis and also has a feature that can weight the data from different climate stations instead of using the orographic adjustment. The weighted average feature should be used only if the resulting long-term average matches the State Climatologist long-term average. Water storage into the soil moisture profile is another component that may be used in the analysis and is a feature available in the StateCU program.

In many water rights change cases, it is appropriate to determine the monthly percentage of historical net depletions from the monthly historical average diversion and apply that percentage to the future diversions to determine the amount of credit obtained in a given future month. Under this approach, it is appropriate to determine maximum monthly credits, maximum annual credits, and a long-term annual average that may not be exceeded.

Applicable State Internet Products

StateCU download: http://cdss.state.co.us/DNN/Products/ConsumptiveUse/tabid/65/Default.aspx

CDSS Map with State Climatologist Precipitation: http://cdss.state.co.us/DNN/MapViewer/tabid/62/Default.aspx

1. Note: A simplified analysis of obtaining an average long-term monthly diversion and comparing once against a long-term monthly IWR, instead of performing a month-by-month analysis, will result in an incorrect historical consumptive use value because the water short months will be moderated by the water long months to incorrectly show consumption when irrigation water was not available by diversion or from soil moisture.