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WATER PLANNING REPORT

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Evaluation of Empirical Methods for Estimating Crop Water Consumptive Use for Selected Sites in Nevada



Southern Nevada Water Authority
State Water Resources Program
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Department of Conservation and Natural Resources
DIVISION OF WATER PLANNING

Criddle, Radiation, Penman, Corrected Penman and Pan Evaporation, estimated the consumptive use to be 48.97, 48.81, 48.89, 48.69 and 48.57 inches, respectively. Using actual evapotranspiration measured from lysimeters managed for maximum production, resulted in an average of 48.90 inches which is 12.65 inches greater than Technical Release-21 estimates. Data from other locations resulted in similar differences.

The Standard methods offered a wide range of evapotranspiration estimates. For the Standard Blaney-Criddle, Hargreaves, Hargreaves Adjusted, Penman, Jensen-Haise and Pan Evaporation methods ($K = 1.00$), the evapotranspiration estimates were 53.15, 75.93, 85.65, 64.30, 65.53 and 71.87 inches for Fallon, respectively. With the exception of the Blaney-Criddle method, the remaining standard methods are more difficult to apply and used data that required more personal judgment on the part of the user than was justifiable. The Standard methods, therefore, appear too limited as an estimator of actual consumptive use.

Due to the "cookbook" style of the procedures and the flexibility of the computer program, the FAO Modified methods permitted the use of more limited data that were readily available and required a minimum of personal judgment.

Therefore, based upon the results established in this study, the methods as a group that prove to be the most reliable in predicting consumptive use in Nevada are the FAO Modified methods.

The FAO estimates without the crop coefficients (k_c) estimated more reliably than the Standard methods. The FAO Modified methods consistently over-estimated actual or measured evapotranspiration by an average of 13 percent, while the Standard methods, excepting Blaney-Criddle, over-estimated by an average of 32 percent.