

COMPUTER MODELING

Custom Program Development

City of Cañon City - Water Supply Master Plan

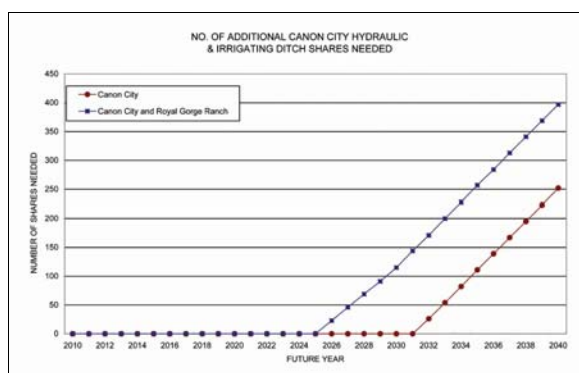
Martin and Wood created a FORTRAN computer program named CAÑON to determine the adequacy of the City's existing water rights to provide for the City's future water requirements.

For a study period of 1950 through 2004, CAÑON adjusted the historical Cañon City daily streamflow by subtracting reservoir releases from the gaged flow, adding historical upstream diversions by exchange, and adding historical diversions in the reach just upstream from the gage to obtain the "natural" daily streamflow at the gage.

Then CAÑON distributes each day's natural streamflow to each water right in the Cañon City area, in order of priority, and limits each non-Cañon City water right to its historical diversion. Because all of Cañon City's water rights are municipal water rights, the daily yield for each municipal water right was not limited to its historical diversion, but rather limited to the lesser of its decreed rate or the remaining available natural flow at the Cañon City gage after water was distributed to all water rights senior to the given Cañon City water right. On a daily basis throughout the 55-year study

period, CAÑON compares the total yield of the City's water rights to the City's future water requirement. CAÑON keeps track of the amounts of the deficit or shortage in the ability of the City's existing water rights to satisfy the City's future water requirements, thereby providing information so that the City can identify the amounts of water needed in the future to render a full supply for the City's needs.

The study concluded that Cañon City has an adequate water supply through the year 2030, but that the City will need to acquire more shares in the Cañon City Hydraulic and Irrigating Ditch in the future, acquire raw water storage, or obtain approval of a plan for augmentation.



Kiowa Resources - Fulton Ditch Loss

As part of an overall yield evaluation for the Fulton Ditch, a large agricultural ditch diverting off the South Platte River north of Denver, ditch losses over the length of the ditch were a significant parameter. Martin and Wood developed a spreadsheet model that applied measured ditch cross-sections, soil hydraulic coefficients, ditch gradients, and inputted river diversions to calculate the loss through each measured segment of the ditch. The model applied iterative

calculations to adjust the stage at the ends of each segment in response to the underlying soil characteristics and the cross-section profile of the segment. The stage for the start of a segment was set by the ending stage of the previous segment. The total losses for the ditch under a given river diversion rate were output at the end of each model run. The model results compared very favorably with other reported losses.