Using Hydrologic Modeling to Manage Water Systems During Drought

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Especially during droughts, water supply systems are very concerned with ensuring that water supplies are sufficient to meet system demands. Hydrologic modeling can help water systems to design and implement a drought response plan that takes into account historical hydrologic data and a comprehensive picture of water use in the river basin.

Water systems generally design drought response plans to implement water conservation measures intended to increasingly reduce demands as drought intensifies. These plans usually have drought response triggers which are associated with different demand reducing measures that are to be taken by the water system according to the severity of the drought. Traditionally, water systems have tied drought response plan triggers to measures of remaining water supplies, such as the remaining storage in a reservoir or the current stream flow rate at the water supply intake. As an alternative to the traditional approach to setting drought triggers, hydrologic modeling may provide the necessary information to set probabilistic drought triggers. For example, instead of designing a plan that calls for the first set of drought response measures to trigger when the water supply reservoir's actual elevation reaches two feet below the normal elevation, an alternative is to trigger the measures when the probability of reaching three feet below normal elevation within the next month reaches 50% or greater. There are many variations on how the triggers could be designed so that they are most appropriate for the water system.

The advantage to designing a drought response plan with probabilistic triggers is that much more information can be factored into the equation for triggering drought response measures than can be otherwise considered. Examples will be shown that depict how the Division of Water Resources uses hydrologic models during drought to forecast the potential for the drought to increase in severity in the near term.