

Innovations in Water Supply Modeling for the Lower Colorado River Authority in Texas

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Abstract: The Lower Colorado River Authority (LCRA) in Texas and a team of consultants recently developed a new computer model in the RiverWare development platform that represents the water supply and demands, and accounting operations for the associated water rights and contracts, of the lower Colorado River in Texas.

The RiverWare modeling environment uses individual "objects", linked together, to create a network representation of a river basin. There are roughly 20 different types of physical objects that can be used to build a river network, including reservoirs (storage reservoir, hydropower reservoir, pumped-storage reservoir), river reaches, diversions, stream gages, canals, and water users. The LCRA RiverWare model network consists of 168 physical objects and 24 additional data objects. The model simulates river and reservoir operations on a daily time step, with streamflow currently included for 59 years.

LCRA's implementation makes extensive use of RiverWare's accounting module. This module tracks the allocation and delivery of water to water users throughout the system. The allocation of native inflows in Texas is governed by a formal priority administration of the water rights, which is represented in the model. Deliveries of water stored in reservoirs to supplement natural supplies are based on contracts with LCRA. These are either long term contracts for firm supply or annual contracts for interruptible supply. RiverWare maintains separate storage accounts for firm supply and interruptible supply in LCRA's water supply reservoirs.

This water accounting network essentially "piggy-backs" on the physical network, and enables tracking of physical water by water type and owner. The model not only tracks the physical movement of water, but also the ownership of water (who it is being delivered to), and the sources of water.

This new model will help LCRA to conduct the periodic updating its Water Management Plan, to review water rights, and to conduct various planning activities for the lower Colorado River basin. The daily timescale and detail of the modeling effort promises to expand the LCRA's medium and long-range water supply planning capabilities.