

## Hydrologic Data Processing and Analysis Software

### The Customer

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United States Bureau of Reclamation (Reclamation), Eastern Colorado Office [2013]

### The Challenge

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Reclamation needed a software tool to automate processes to retrieve data from various sources and load into its HDB Oracle database, on Windows and Linux operating systems. Data include snow and precipitation data from the Natural Resources Conservation Service (NRCS) and streamflow forecast ensembles from the National Weather Service (NWS). These data are used in the operation of major water projects such as the Colorado-Big Thompson Project, Pueblo Reservoir, and Ruedi Reservoir. The data also are used as input to Reclamation's modeling tools, including RiverWare and the NWS Community Hydrologic Prediction System (CHPS). An ability to read RiverWare Data Format (RDF) files from the RiverWare modeling software also was needed.

### The Solution

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TSTool software from Colorado's Decision Support Systems (CDSS).

### The Impact

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Improved data processing automation has increased Reclamation business process efficiency, transparency, and quality control.

### The Implementation

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The CDSS TSTool software previously had been updated with features to read time series from and write to the HDB database. These commands were enhanced to fully handle observed and modeled time series, including ensembles from the NWS. A custom ReclamationHDB datastore type was implemented in TSTool with configuration properties specific to the HDB database. The ReadRiverWare() command was enhanced to read RiverWare RDF files. In addition to these enhancements, Reclamation was able to utilize features implemented on other projects, including the ability to read NRCS web services for snow and precipitation, streamflow data from the United States Geological Survey (USGS) National Water Information System (NWIS) web services, and the State of Colorado's web services.

OWF worked with Reclamation to define software requirements, enhanced the TSTool software, defined automated tests using Reclamation's test database, and delivered software for installation on Reclamation's computer system. Because the TSTool software is compatible with Reclamation's enterprise HDB database design and is written in Java, TSTool can be installed in any Reclamation office on Windows and Linux computers. RiverWare modelers also can utilize the new features to process model results.



*Horsetooth Dam and Reservoir near Fort Collins, Colorado (credit: Reclamation)*