

Streamflow Regulation Accounting for the South Platte Basin

U.S. NATIONAL WEATHER SERVICE

PROJECT SUMMARY

Diversions, trans-basin imports, and reservoirs can have major impacts on streamflow. Modeling this regulation is challenging for long-range streamflow forecasting. Riverside Technology, inc. developed, implemented, and verified models that captured the effects of streamflow regulation for a highly-regulated river system using National Weather Service forecasting system tools.

LOCATION
Colorado, U.S.A.

PERIOD
2003 – 2008

PROJECT DETAILS

As part of an effort to provide Advanced Hydrologic Prediction Services (AHPS), the National Weather Service (NWS) is using the NWS River Forecast System (NWSRFS) to prepare long-range probabilistic forecasts of streamflow. The presence of extensive systems of streamflow regulation to capture and divert runoff in many parts of the country require additional effort and different procedures to characterize and accurately predict the effect of this regulation for developing long-range forecasts.

The goals of this project were to develop a general strategy and approach for NWS to address streamflow regulation in preparing 90-day probabilistic forecasts and to assist the Missouri Basin River Forecast Center (MBRFC) in developing, implementing, and evaluating a specific strategy and approach for the South Platte River basin.

The objectives of the first phase were to identify regulation issues and develop strategies to better apply NWSRFS technologies and procedures in river basins where regulation has significant impacts. Riverside Technology, inc. (Riverside) compiled responses from River Forecast Centers (RFCs) around the country regarding regulation issues and approaches. Riverside then outlined strategies for addressing various types of regulation, as well as an overall implementation plan that could be used as an outline for regulation modeling. Based on this general plan, a specific implementation plan was prepared for the South Platte basin.

Subsequent phases executed the implementation plan for headwaters and downstream basins of the South Platte River to the Colorado state line. Riverside is working on the final phase for the remainder of the sub-basins of the South Platte. The streamflow regulation along these rivers includes many small irrigators, large canal companies, off-channel storage, large trans-basin imports, and large systems of on-channel reservoirs supplying water for municipal and agricultural uses, all operating within the context of the water rights system in Colorado.

The implementation process has utilized information from the State of Colorado's South Platte Decision Support System (SPDSS) to quantify regulation in the various basins. Unique modeling techniques have been identified to capture the effects of a wide range of regulation activities. Riverside has worked with MBRFC staff to evaluate the degree to which the regulation modeling improves long-term forecasts of streamflow variables by testing the implementation in an ensemble forecast mode using historical data.

The results of the South Platte implementation have been used to guide future implementation of streamflow regulation accounting models in the South Platte and elsewhere.



The Cache la Poudre River in Colorado

RELATED PROJECTS

Calibration of the St. Mary and Milk Rivers

Hydrologic Calibration Analysis for the North Central United States

South Platte Decision Support System

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