

RECLAMATION

Managing Water in the West

RiverWare Overview

Lincoln, NE

August 8, 2006



U.S. Department of the Interior
Bureau of Reclamation

RiverWare

- A general-purpose reservoir and river system modeling tool that can be used for a variety of applications
 - Short-term operational scheduling
 - Mid-term forecasting
 - Long-term planning and policy studies
- Operating "policy" is input by the user and is easily modified
- RiverWare offers the capability to model any river basin

RECLAMATION

RiverWare

- Model is built by the user via an object-oriented approach
- It is customized to the basin of interest and available data
- A variety of choices for engineering methods are offered for various facets of the river basin modeling

RECLAMATION

RiverWare

- Timestep is flexible based on data availability. Can be:
 - Hourly
 - Daily
 - Weekly
 - Monthly
 - Annual

RECLAMATION

RiverWare

Can be run in any of three modes:

- Pure Simulation
- Rule Based Simulation (normally Reclamation's interest)
- Optimization

RECLAMATION

RiverWare

- Pure Simulation –
 - Allows for solving releases and other parameters upstream, downstream or a combination of both
 - Solution can be forward or backward in time
 - Input data requirements are flexible given that the system is neither over-constrained nor under-constrained. Examples of input:
 - Storage
 - Releases
 - Inflows
 - Target elevations

RECLAMATION

RiverWare

- Rule Based Simulation –
 - Simulation can be driven by if-then statements reflecting operating policy
 - Rules written by the user
 - User has the flexibility to change our update rules
 - Rule priorities can be switched using a graphical rule editor

RECLAMATION

RiverWare

- Optimization –
 - Provides a mechanism to deal with competing and even conflicting operational objectives
 - Utilizes pre-emptive Goal Programming to explore multiple objectives such as:
 - Water Supply
 - Flood Control
 - Hydropower
 - Fish and Wildlife
 - Recreation

RECLAMATION

RiverWare

- Water Accounting –
 - Allows user to create storage, flow and diversion accounts to track water ownership throughout a river basin
 - Allows separate treatment of “physical” and “paper” water
 - Allows representation of water rights, accruals, carryovers and exchanges

RECLAMATION

RiverWare

- Water Quality –
 - Built in capabilities to model
 - Temperature
 - Total dissolved solids
 - Dissolved oxygen
 - Can be done in Reservoirs and Reaches
 - Several Water Quality Routing Methods are Available
 - Can be linked to water quality models

RECLAMATION

RiverWare

- Ground Water
 - Aquifer Storage
 - Return Flow
 - Linkages to Other Models

RECLAMATION

RiverWare

- Typical Objects –
 - Storage Reservoir
 - Power Reservoir
 - Pump Storage Reservoir

RECLAMATION

RiverWare

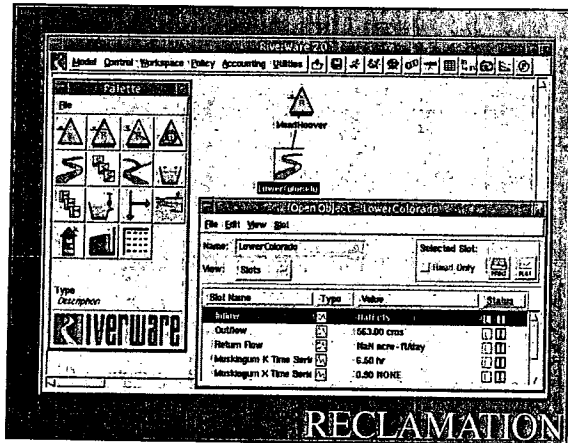
- Typical Objects —
 - River Reach
 - Confluence
 - River Gage

RECLAMATION

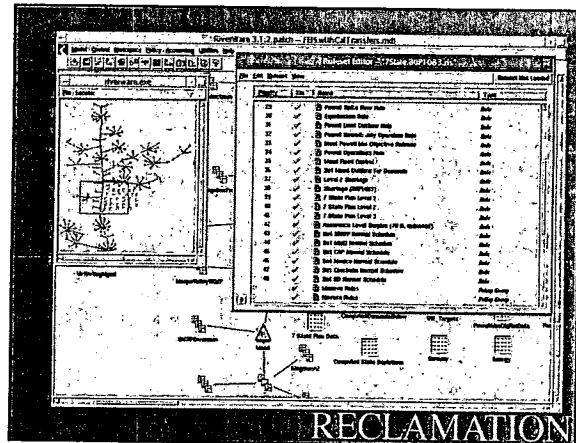
RiverWare

- Typical Objects —
 - Water users
 - Aggregate Diversions
 - Individual Diversions
 - Groundwater Storage

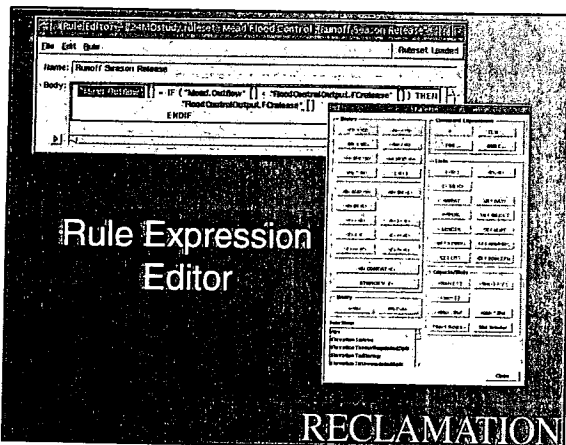
RECLAMATION



RECLAMATION



RECLAMATION



Rule Expression Editor

RECLAMATION

RiverWare

- Reclamation Basins Using RiverWare
 - Colorado
 - Rio Grande
 - Truckee
 - Yakima
 - Pecos

RECLAMATION

RiverWare

- Other RiverWare Users:
 - Tennessee Valley Authority
 - Corps of Engineers (Ft. Worth, Tulsa, Kansas City)
 - State Water Resources Agencies in Colorado Basin
 - Metropolitan Water District
 - Numerous other stakeholders

RECLAMATION

RiverWare

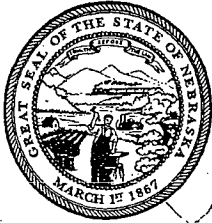
- Developed by the University of Colorado with funding from Reclamation and Tennessee Valley Authority
- Other collaborators include Corps of Engineers, state water resources agencies and stakeholder organizations
- Product is maintained (new releases, user support, training)
- Product is licensed

RECLAMATION

RiverWare

- Thank you for your attention
- Questions ?
- Relevant websites:
 - <http://cadswes.colorado.edu/riverware>
 - <http://cadswes.colorado.edu/riverware/training/>
 - <http://cadswes.colorado.edu/PDF/ReleaseNotes/RiverWareHelp.pdf>

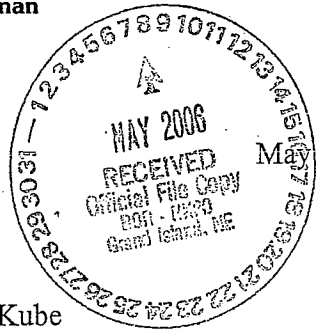
RECLAMATION



Dave Heineman
Governor

STATE OF NEBRASKA

DEPARTMENT OF NATURAL RESOURCES
Ann Bleed
Acting Director



May 5, 2006

NAME	INITIAL	ACTION	DATE
Alice			
Steve	SA		
Mike			
JACK			

IN REPLY TO:

To: Mike Kube

From: Steve Gaul *Steve Gaul*

Subject: Request for Additional Bureau of Reclamation Assistance on Scoping Costs for Platte River Advanced Decision Support System in Nebraska

REMARKS:

Mike, last September the Bureau of Reclamation issued a report entitled "Evaluation of Capabilities and Needs for a Platte River Advanced Decision Support System (PRADSS) in Nebraska". We greatly appreciated Reclamation's work on that report and at this time would like to request some additional assistance. Page 10 of the report stated:

"To develop a cost estimate, further investigation is needed to determine:

- *Can some of the primary DSS needs be met through analyses/tools other than the initial PRADSS model?*
- *What preliminary analyses and data are needed as input into the initial PRADSS model?*
- *Are these data available?*
- *What, if any, additional data need to be collected?*

The development of a cost estimate which includes an investigation into this type of information is recommended at this time. This cost estimate should specifically discuss database development separate from model development, since this database could potentially be used for input into additional PRADSS tools or models in the future. Model development should proceed once this estimate has been provided to decision makers and the necessary funds become available."

At this time we would like to request Reclamation work in accomplishing that cost estimate. We would appreciate it if the work could be accomplished by June 30, 2007 and we would expect to expend significant Nebraska Department of Natural Resources staff time in compiling database portions of the effort and assisting with other activities.

I would appreciate your thoughts on whether your Technical Assistance to States program, general program or some other authority would be the most appropriate venue for accomplishing this work and whether there would be any cash contribution required of the Department. I would appreciate the opportunity to discuss this potential effort with you. Please let me know your thoughts and thank you for your consideration.

cc: Brian Dunnigan

clrshare/planning/gaul

060387