



Center for Advanced Decision Support for
Water and Environmental Systems (CADSWES)

UNIVERSITY OF COLORADO **BOULDER**

Welcome to the 2025 RiverWare User Group Meeting



Center for Advanced Decision Support for
Water and Environmental Systems (CADSWES)

UNIVERSITY OF COLORADO **BOULDER**

Department of Civil, Environmental and Architectural Engineering
College of Engineering and Applied Science



Mission of CADSWES...

Provide **Decision Support Tools** to Water Management Agencies that

- Bridge the gap between science and decision-making
- Transform information to knowledge to solve multi-objective problems
- Formulate problems and solutions in terms of risk, uncertainty and deep uncertainty

Transfer technology to agencies and other users

Educate the next generation of water resources engineers and scientists



Center for Advanced Decision Support for
Water and Environmental Systems (CADSWES)

UNIVERSITY OF COLORADO BOULDER

A General River and Reservoir Hydro-policy Modeling Tool

**Developed at the University of Colorado
Center for Advanced Decision Support for Water and Environmental
Systems (CU-CADSWES)**

1993 to present, through collaborative research and development with

Tennessee Valley Authority

U.S. Bureau of Reclamation

U.S. Army Corps of Engineers



— BUREAU OF —
RECLAMATION



US Army Corps
of Engineers ®

Sponsor: Bureau of Reclamation

Since 1993 in the Colorado River Basin
Collaborated and funded R&D of rulebased simulation
→ Ushered in new era of collaborative decision making
Funded much of RiverWare's basic functionality

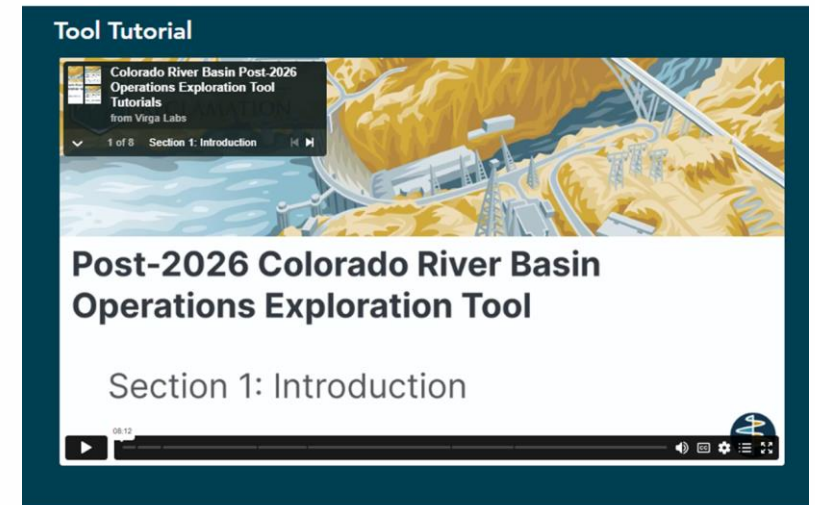
Research Grants since 2003 – grad student research
improved forecasting methods; stochastic simulation
multiobjective robust decision-making;
decision-making under deep uncertainty

Many Reclamation RiverWare applications:

Sub-basins in the CRB; operations and planning
Rio Grande
Pecos
Truckee-Carson
Yakima
Missouri Basin
Platte
Klamath
Snake
Arkansas

Reclamation offices
provide funding for
software enhancements
and support for model
development

CRSS – Colorado River Simulation
System - Long term planning,
Complex “Law of the River”



Sponsor: Tennessee Valley Authority

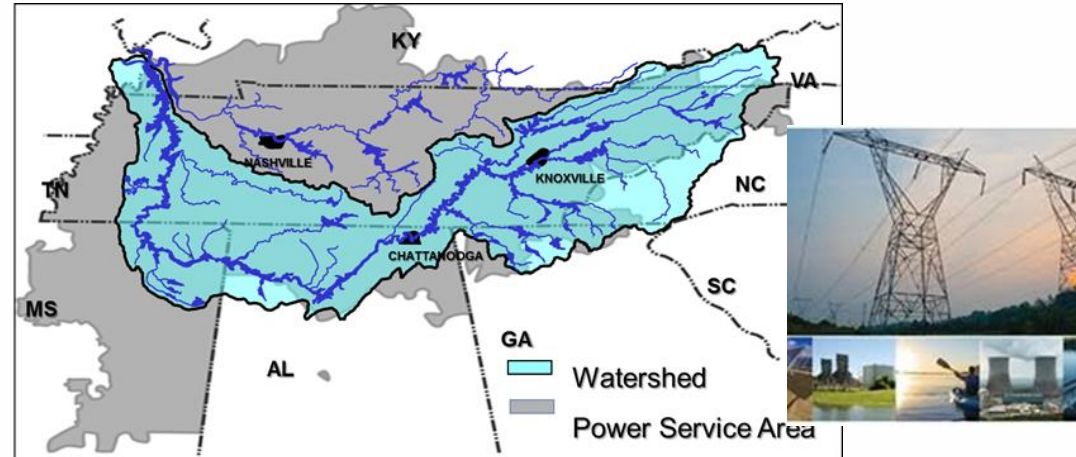
Since 1993

Development of RiverWare's **Premptive linear goal programming solver**

Collaborate with TVA on building models

Optimize value of hydropower generation while balancing water objectives:

WQ, water supply, navigation, flood control, recreation, etc.



Funded development of SCT

Slot Label	2/15 Tue	2/16 Wed	2/17 Thu	2/18 Fri	2/19 Sat	2/20 Sun	2/21 Mon	2/22 Tue	2/23 Wed	2/24 Thu	2/25 Fri
Norris.Outflow	8.26	8.12	8.13	8.19	8.19	8.19	8.19	7.84	8.19	8.19	8.19
6:00	8.26	8.11	8.13	8.19	8.19	8.19	8.19	8.19	8.19	8.19	8.19
12:00	8.28	8.13	8.13	8.19	8.19	8.19	8.19	6.80	8.19	8.19	8.19
18:00	8.25	8.13	8.13	8.19	8.19	8.19	8.19	8.19	8.19	8.19	8.19
24:00	8.23	8.13	8.13	8.19	8.19	8.19	8.19	8.19	8.19	8.19	8.19
MeltonHill.Outflow	8.05	8.60	9.24	9.26	9.24	9.24	9.24	9.24	9.35	8.69	8.64
Chattuge.Outflow	0.79	0.82	0.06	0.69	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Nottely.Outflow	0.79	0.76	0.06	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Lagged CTH + Lagged NTH	1.46	1.60	0.56	0.96	1.97	1.97	1.97	1.97	1.97	1.97	1.97
Hiwassee.Outflow	3.61	3.22	3.22	2.86	3.83	3.90	3.93	3.95	3.96	3.97	3.98
Apalachia.Outflow	3.45	3.43	3.43	3.58	4.05	4.05	4.05	4.05	4.05	4.05	4.05
BlueRidge.Outflow	1.37	1.46	0.48	0.15	1.20	1.20	1.21	1.21	1.22	1.22	1.23
Ocoee3.Outflow	1.61	1.96	1.94	1.39	1.91	2.03	1.94	1.90	1.88	1.86	1.86
Ocoee2.Outflow	1.60	1.97	1.94	1.42	1.88	2.02	1.94	1.90	1.88	1.86	1.86
Ocoee1.Outflow	2.28	2.11	2.06	1.95	2.05	2.23	2.13	2.04	1.99	1.95	1.93
Lagged CRH + Lagged DGH	17.54	17.95	16.45	14.65	13.08	14.92	17.67	19.00	19.00	19.00	18.42
Chilhowee.Outflow	10.21	11.11	10.32	12.60	9.62	8.98	8.75	8.66	8.61	8.58	8.56
Computed FLH Canal Inflow from TEC	12.37	11.50	13.41	12.51	11.81	10.31	9.53	9.57	9.59	9.86	
FtLoudoun.Hydrologic Inflow	1.34	1.24	1.65	4.31	4.54	3.05	2.34	1.94	1.68	1.49	1.35

Solver applied on Columbia River System, Lower Colorado

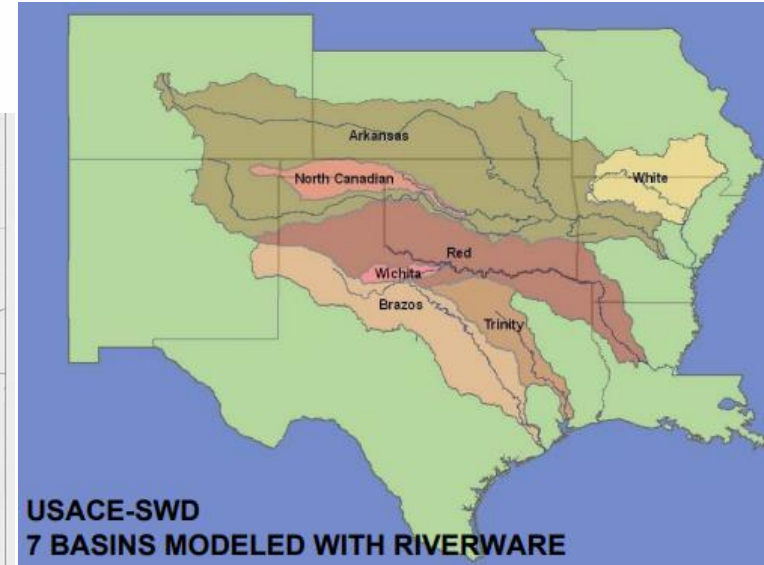
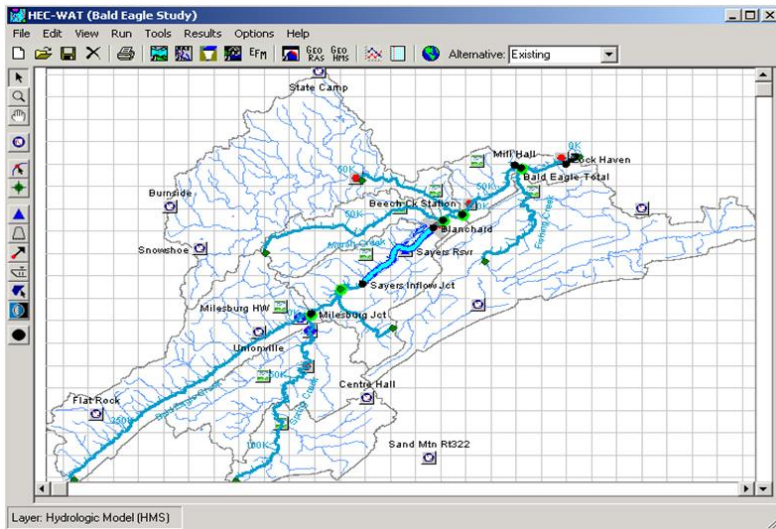
R&D – 3-year River Models Optimization Project

Portfolio Optimization – co-optimize hydro with TVA other resources (production cost model)

Sponsor: U.S. Army Corps of Engineers

Since 1998
Southwest Division and Albuquerque District

Implement SWD System Flood Control
in RiverWare rule function
Integrate RiverWare into CWMS, WAT, RTS

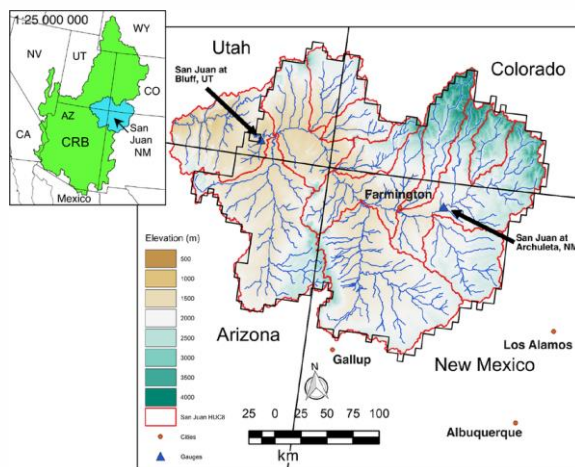


Many features and enhancements funded by USACE:

- Statistical slots
- scripts – original concept and many enhancements
- geospatial view and web maps
- groundwater- surface water modeling

User Presentations..... New and Evolving applications

Colorado River Basin



Tarrant Regional Water District



Klamath

San Juan River



Truckee-Carson Basin

Lake Whitney



Nile River Basin

On the Agenda....New in RiverWare!

- New Windowing Management
- Settings Manager
- New for operations: SCT, snapshots, notes, scripts, DMIs
- Advances in MOEA – RiverWare optimization
- Hydropower optimization
- Advances in USACE tool integration
- Data analysis tool

What is upcoming?

What are you thinking and wishing for?

Who Uses RiverWare?

Bureau of Reclamation – 27 offices

Tennessee Valley Authority – River Operations, Knoxville, TN

U.S. Army Corps of Engineers - 13 offices

12 Federal Agencies, Tribes and Research labs

35 State, City and District Water Agencies

11 Electric Utilities – US and Canada

32 Consulting companies and NGOs

14 Universities and research groups

22 Foreign Entities (consultants, govt agencies, universities, utilities)

Sesquiennial RiverWare User Meetings

- Find out about new/upcoming enhancements and the future of RiverWare
- Hear about interesting applications
- Meet other users and network
- Get to know the CADSWES Team
- Ask those burning questions
- Voice your opinion about what is needed or what you like/don't like

