



News and Updates

Presenter: Edie Zagona

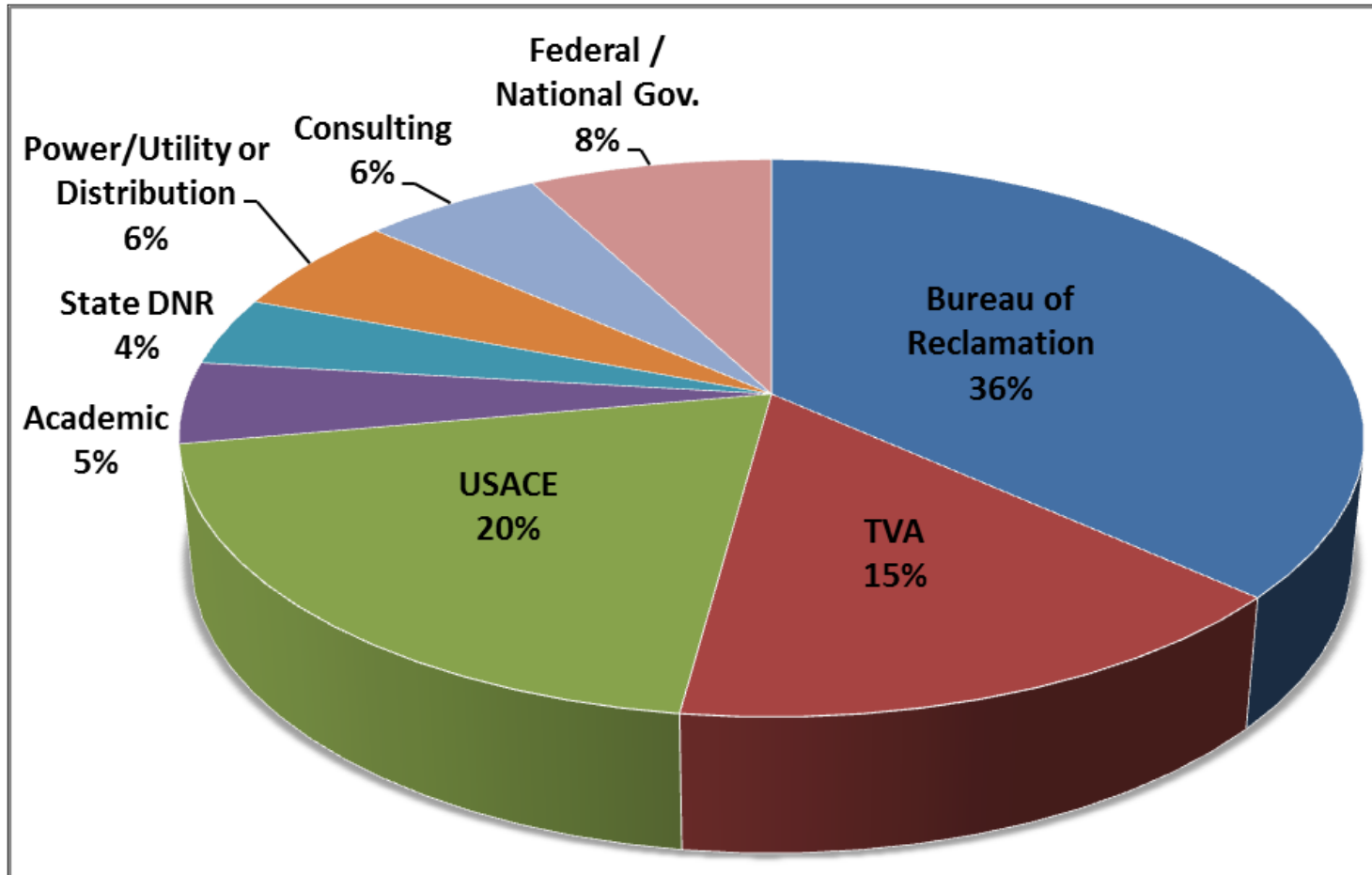
2015 RiverWare User Group Meeting
February 3, 2015

Where did we come from?

- First commercial license 1998
- First User Group Meeting June 1999
 - Gallon of gas: \$1.12
 - Clinton was in the White House
 - RiverWare 2.1 had just been released
 - Solaris workstations
 - Corps of Engineers began collaborative R&D
 - Reclamation and TVA plus 13 other Licensees

Where are we now?

- RiverWare 6.6 released Jan 8, 2015
- Over 800 licenses Issued to over 100 entities



RiverWare Licenses

Bureau of Reclamation (25 offices)

- Upper Colorado Regional Office
 - Albuquerque AO, Provo AO, Western Colo. AO, Durango Four Corners, El Paso FO
- Lower Colorado Regional Office,
 - Yuma Area Office, Boulder Canyon Operations Office
- Great Plains Regional Office
 - Eastern Colorado AO, Montana AO, Pueblo AO, Oklahoma-Texas AO
- Mid Pacific Regional Office
 - Lahontan Basin AO, Klamath Basin AO, South-Central California AO
- Pacific Northwest Regional Office
 - Columbia Cascades AO, Ephrata FO, Snake River AO, Upper Snake FO
- Technical Service Center - Denver

RiverWare Licenses

Tennessee Valley Authority – River Operations, Knoxville, TN

U.S. Army Corps of Engineers (12 offices)

- Albuquerque District
- Boise Outreach Office
- New England District
- Ft. Worth District
- Kansas City District
- Little Rock District
- Portland District
- Sacramento District
- Seattle District
- Tulsa District
- Walla Walla District
- Hydrologic Engineering Center (HEC)

RiverWare Licenses

5 Federal Agencies

- Federal Energy Regulatory Commission
- USGS
- National Park Service
- International Boundary Water Commission
- U.S. Water Master's Office, Reno

14 State Water Agencies

- DWR: Arizona, California, Idaho, Utah, Oregon
- Montana Dept of Natural Resources
- New Jersey Dept of Environmental Protection
- New Jersey Water Supply Authority
- Central Utah Water Conservancy District
- Colorado Water Conservation Board
- Colorado River Board of California
- Colorado River Commission of Nevada
- New Mexico Interstate Stream Commission
- Colorado River Board of California

RiverWare Licenses

8 Electric Utilities – US and Canada

- BC Hydro
- Bonneville Power Administration
- Grant Co. Public Utility District
- Idaho Power
- Hydro Quebec
- PacifiCorp
- Southwest Power Administration
- Lower Colorado River Authority

13 Districts, Utilities, Cities

- Central AZ Project
- Dallas Water Utilities
- East Bay Municipal Utility District
- Las Vegas Valley Water District
- Lower Colorado River Authority
- Lower Neches Valley Authority
- Metropolitan Water District of S. CA
- Northern Colorado Water Conservancy District
- Tarrant Regional Water District
- Truckee Meadows Water Authority
- Cities of Fernley, Lompoc, Santa Barbara

RiverWare Licenses

8 Universities and Research Labs

- Oak Ridge National Lab
- Pacific Northwest National Lab
- Pardee Rand Graduate School
- Lawrence Livermore National Lab
- Texas A&M University
- University of Arizona
- University of Wyoming
- Washington State University

20 Consulting Companies

- Carol Marra Consulting
- CDM Smith
- DiNatale Water Consultants, Inc
- Freese and Nichols, Inc
- HDR Inc
- Hydros Consulting Inc
- Intera Inc
- Jacobs Engineering Group Inc
- Keller-Bliesner Engineering
- Lotic Hydrological, LLC
- MBK Engineers
- Precision Water Resources Engr
- Riverside Technology Inc
- Spronk Water Engineers, Inc
- Stetson Engineers, Inc
- Tetra Tech, Inc
- Water Balance Consulting
- West Yost Associates
- Western Resource Advocates
- Wilson Water Group

International RiverWare Licenses

Mexico

- Comisión Nacional del Agua (Mexico, D.F.)
- Comisión Internacional de Límites Y Agua (CILA MEX/EUA)
- Instituto Mexicano de Tecnología del Agua (IMTA) (Juitepec)
- Instituto Tecnológico y de Estudios Superiores de Monterrey
- University of Zacatecas
- Universidad Autónoma de Chihuahua

Colorado River – Minute 319 to the 1944 Treaty with Mexico

Rio Bravo – currently developing a model to operate the river (Rio Grande)

Other applications Mexico...

International RiverWare Licenses

China - Institute of Water Resources
and Hydropower Research (Beijing)

Eastern Africa

Nile Basin Initiative (NBI)

Eastern Nile Technical Regional Office
(ENTRO)

- *Institute of Technology, Bahir Dar University, Bahir Dar, Ethiopia*
- *Ethiopian Institute of Water Resources, Addis Ababa, Ethiopia*

(Also independent modeling efforts in the Nile Basin by Kevin Wheeler and others)

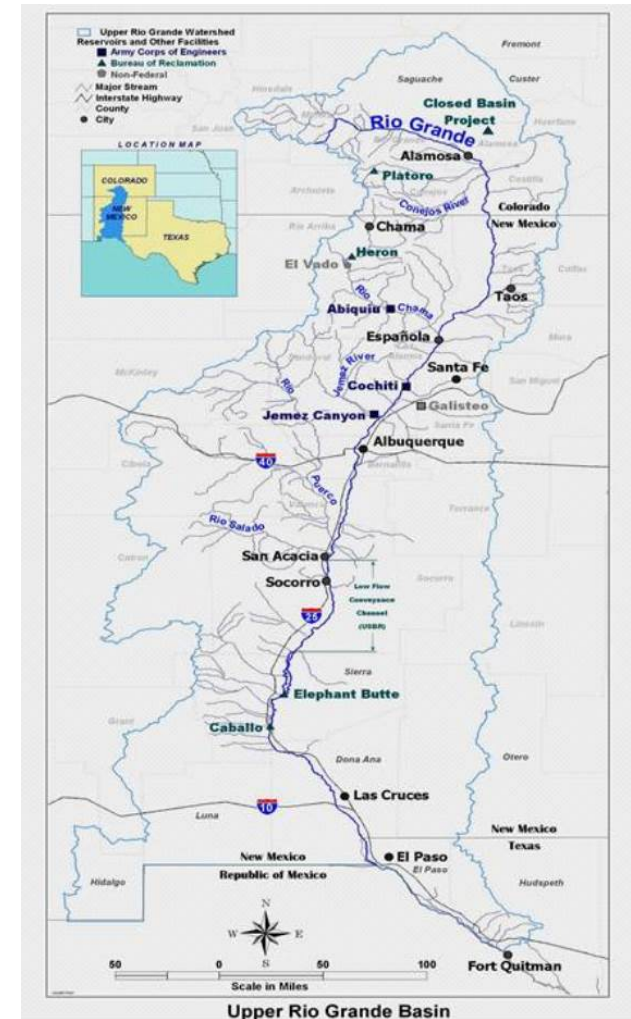


Big Basin Multi-objective: Rio Grande

Headwaters in Colorado all the way to Texas

- Water Rights and Water Accounting
- Salinity Modeling and Groundwater
- Soil Moisture Modeling throughout

- One daily After the Fact Accounting model that is converted to various applications
 - Long term planning
 - Annual operating plan
 - Monthly Timestep planning model



Applications throughout Reclamation

Colorado River Basin



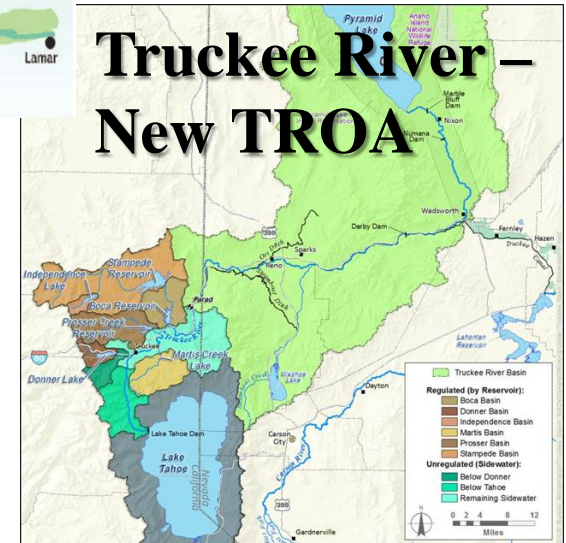
San Joaquin Restoration



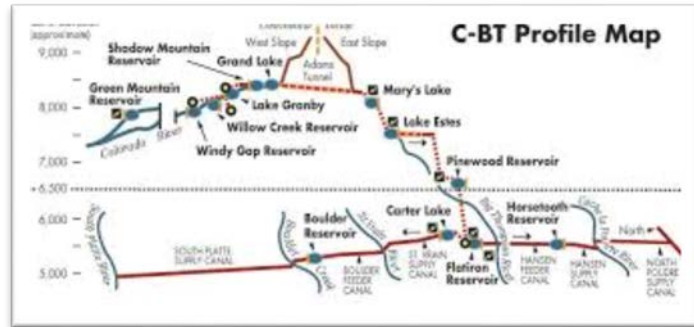
FRYINGPAN-ARKANSAS PROJECT



Truckee River – New TROA

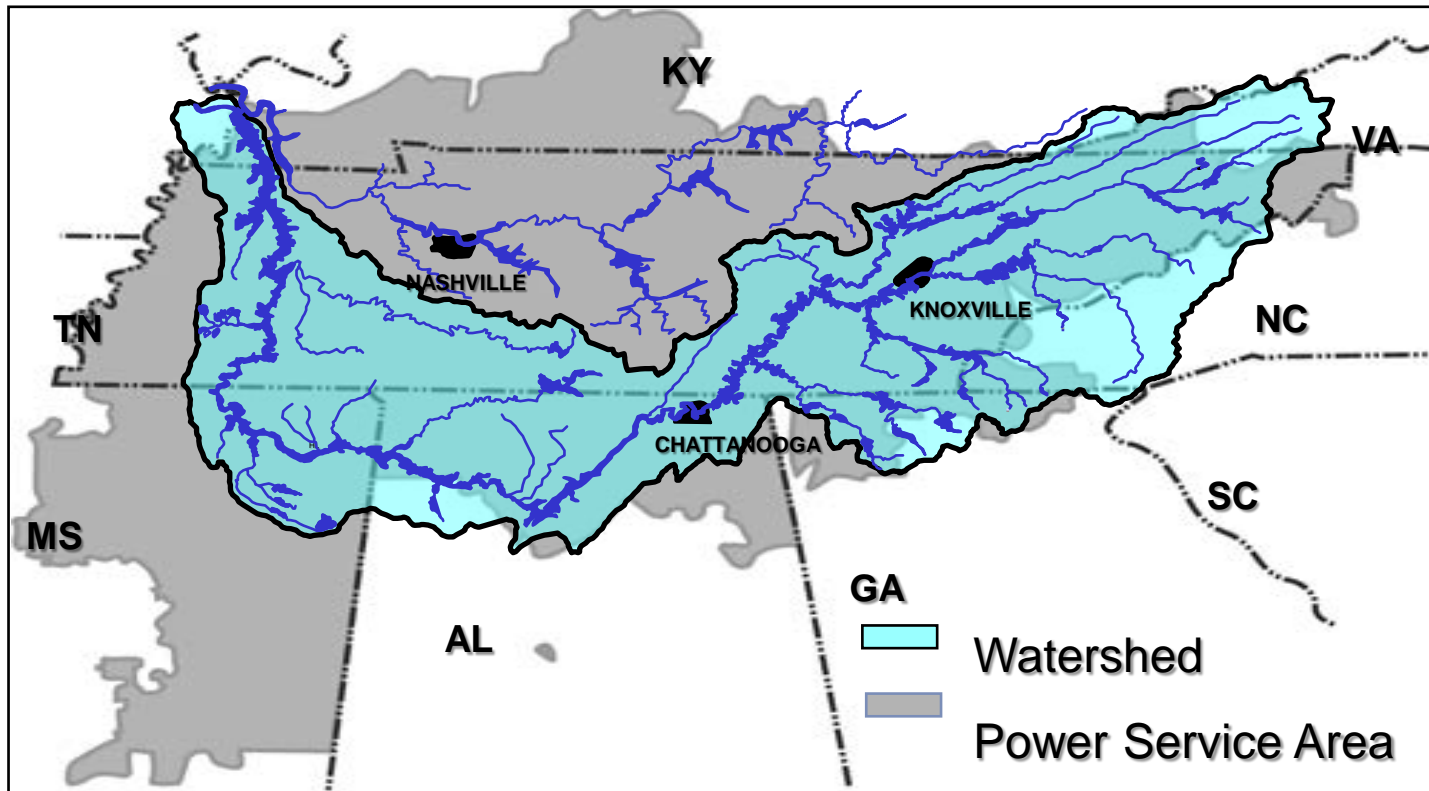


Snake River



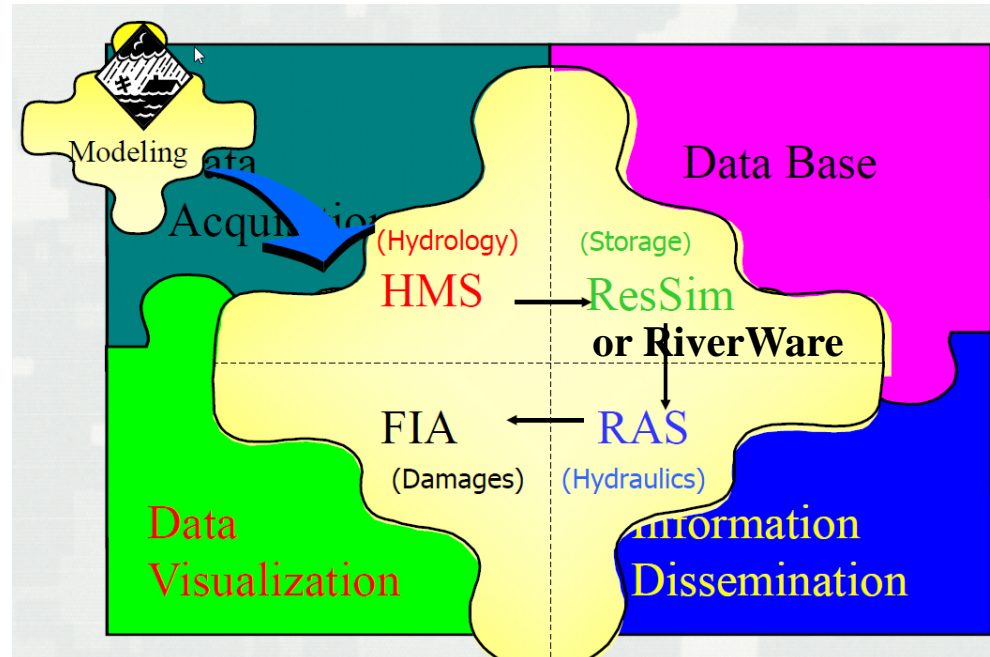
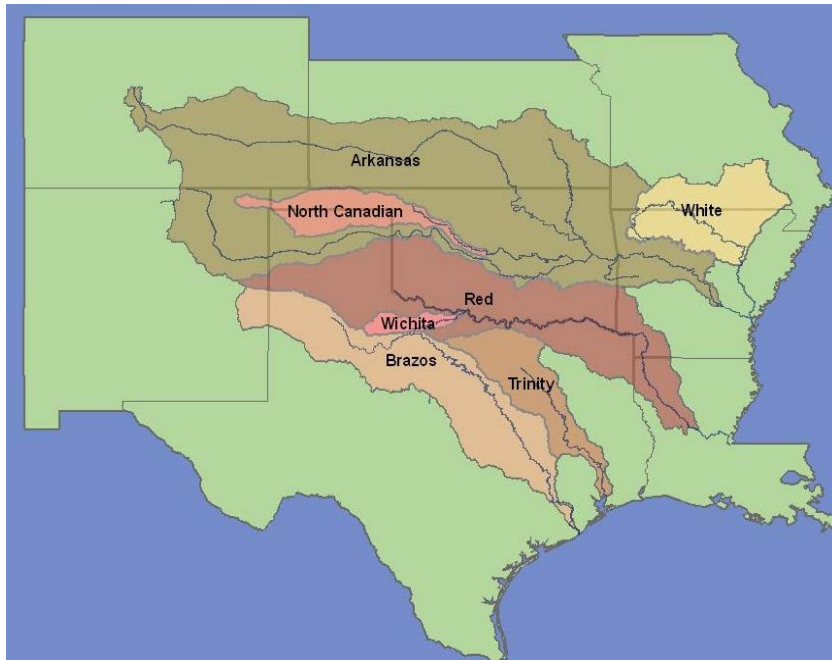
TVA

- Daily and hourly operations, hydropower optimization
- New FEWS System



Applications: USACE

- Continued use of long term planning models for yield, flood control policy, changing operational criteria



Corps Water Management System (CWMS)

- Starting to move into more Operations type models

Bonneville Power Administration



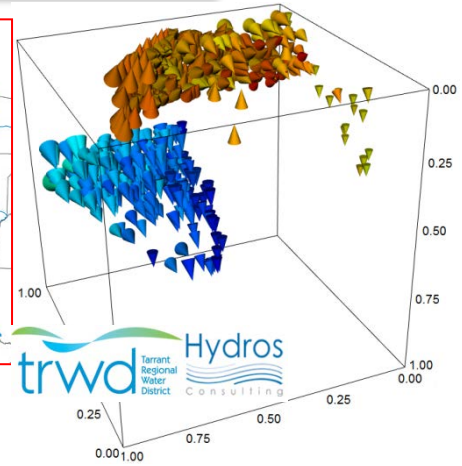
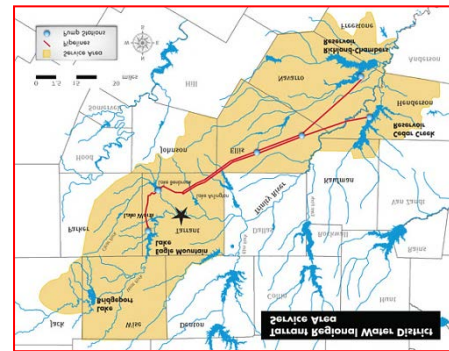
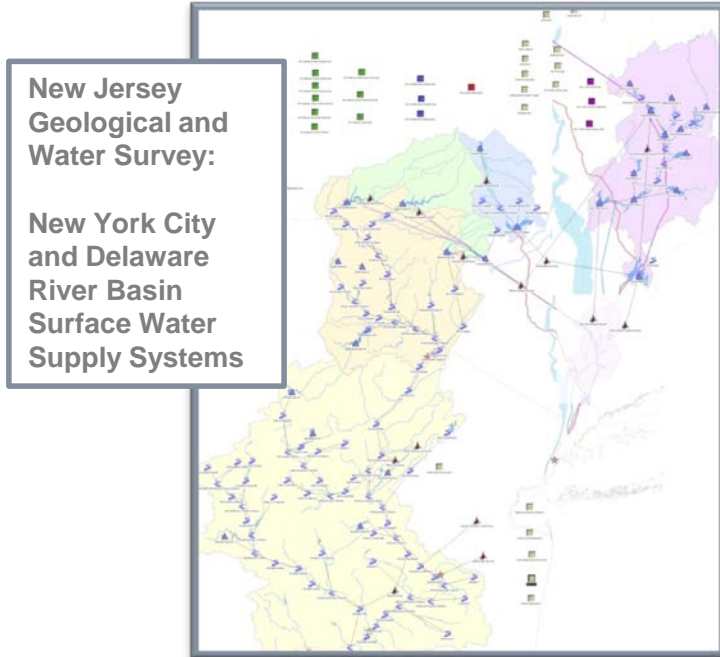
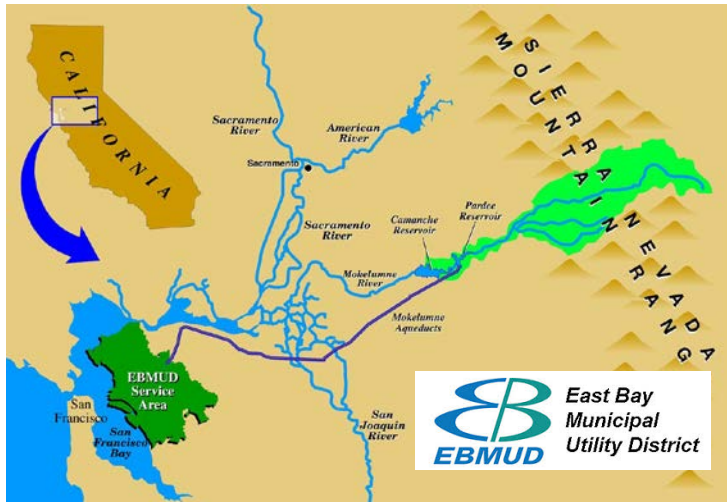
Operates the Federal Columbia Power System

A Current CADSWES Project

- Develop RiverWare adapter for Deltares FEWS Integrated Data/Modeling System
- Develop operations models for hourly scheduling for up to 30 days



Other interesting and evolving applications....

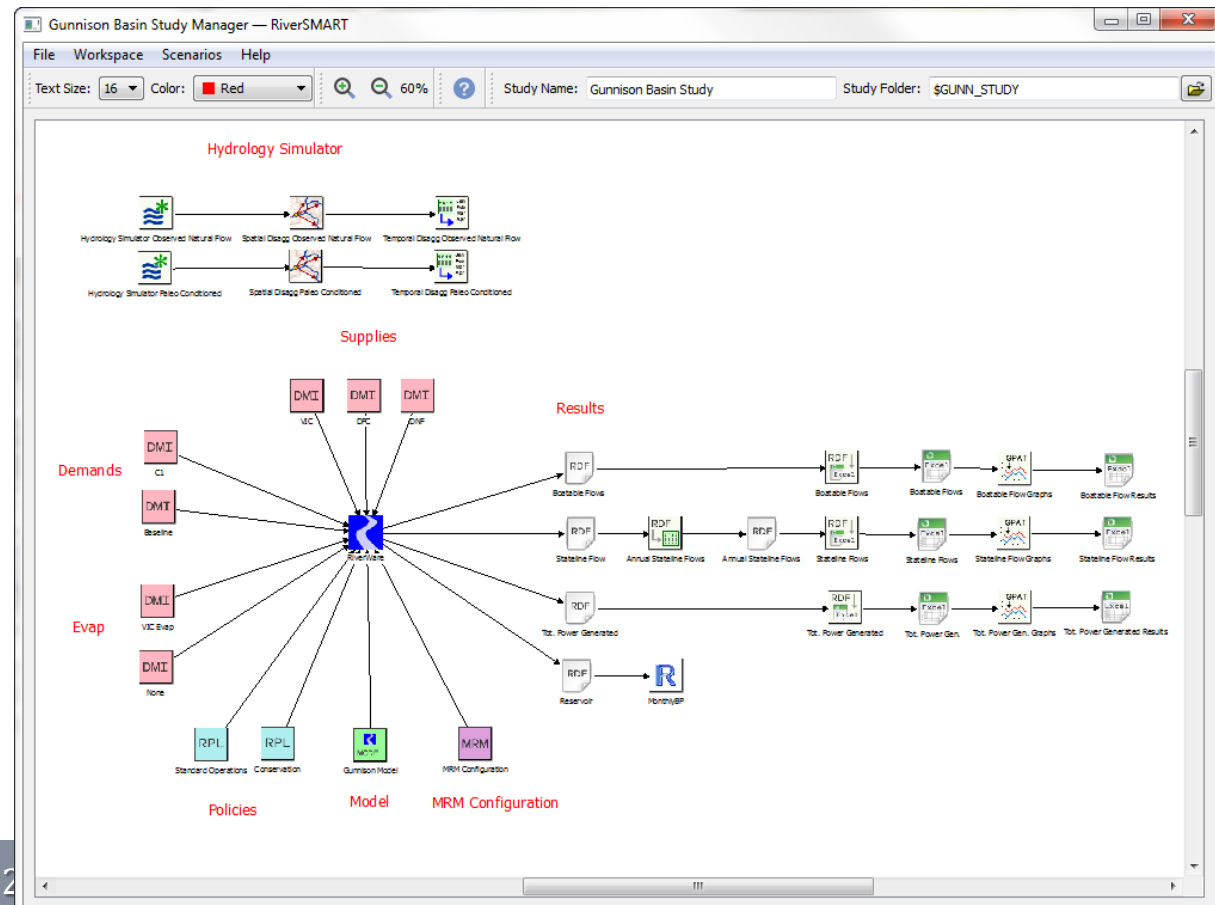


CU/TRWD/Hydros – Optimization with Multi-objective Optimization Evolutionary Algorithms (MOEAs)

RiverWare Study Manager and Research Tools (RiverSMART)

Facilitates large studies with many combinations of inputs by organizing and executing scenarios

- Develop Scenarios that consist of combinations of alternative
- Provide Graphical Representation
- Manage Execution
- Organize Outputs
- Archive the study



Where are we going soon?

- Gallon of Gas: \$1.12?
- Clinton in the White House?

Help us identify user needs....

- Web Maps and Web Viewers
- Scenario Stakeholder Interaction
- Integration into data/model frameworks
(RiverSMART, FEWS, CHPS, CWMS, DHI Customized)
- More powerful and flexible hydropower optimization



Where should we go long term?

- Web?
- Mobile?
- Supercomputing?
- Operating Systems?
- Redesign Interfaces?
- Optimization via MOEAs?
- New output Utilities?
- Database connections?

