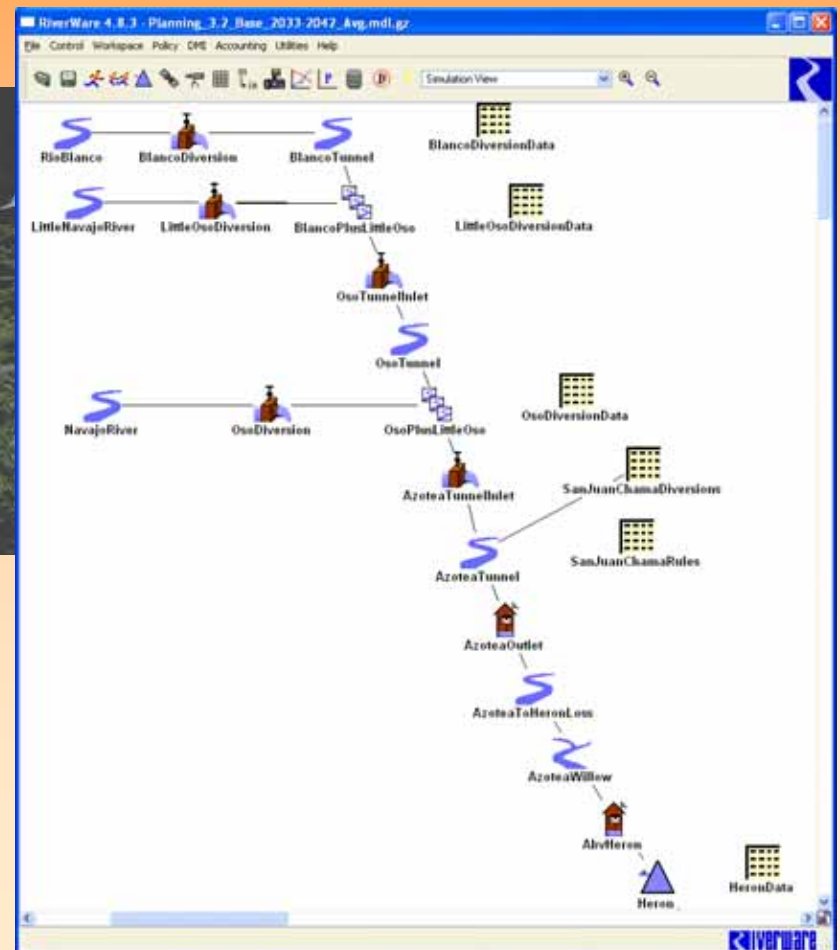


Modeling San Juan-Chama Project Water with the Upper Rio Grande Water Operations Model (URGWOM)



Craig Boroughs, Ph.D., P.E.

URGWOM Technical Team

RiverWare User Group Meeting

February 6, 2007

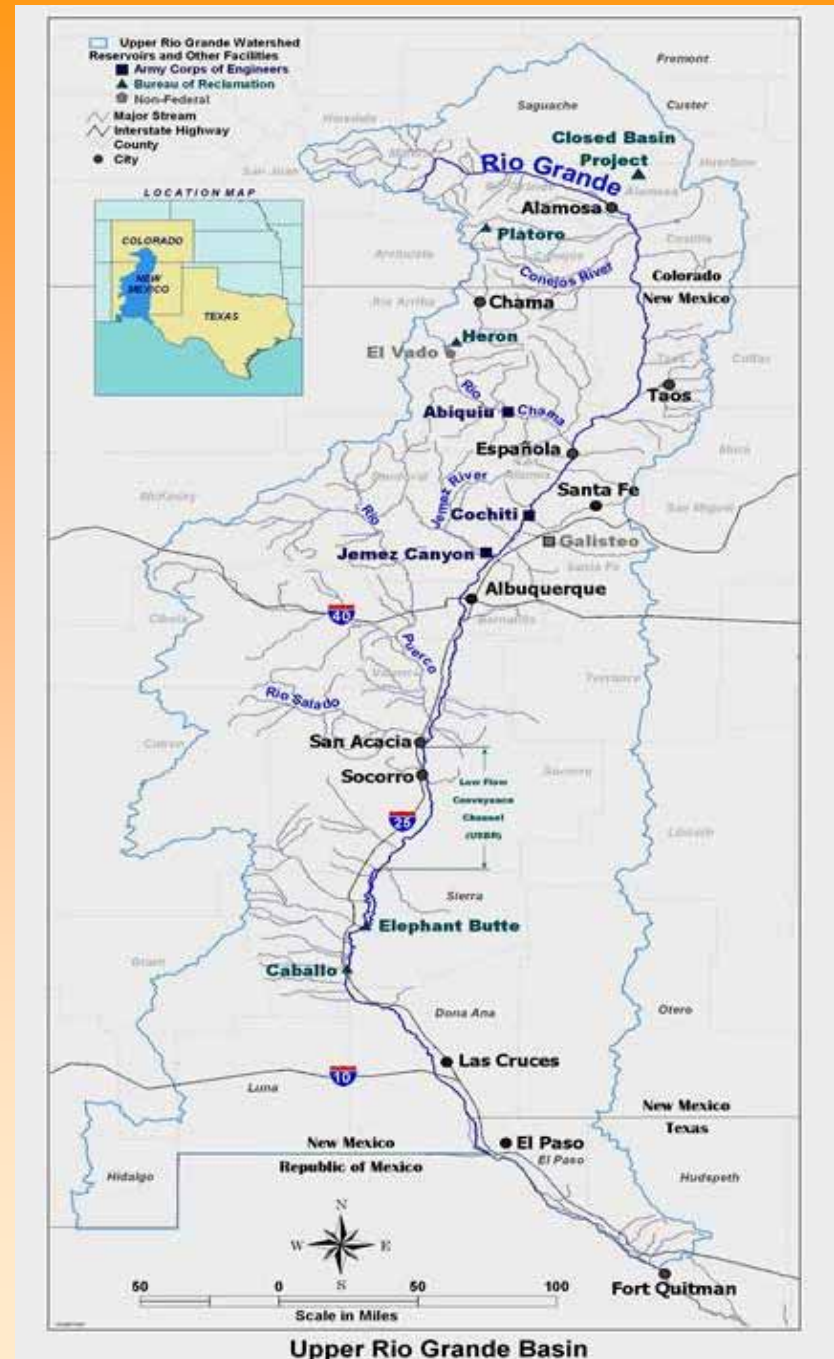
Acknowledgments

- Brad Vickers, Corps and Reclamation Contractor
- Marc Sidlow, Corps
- Mike Roark, USGS
- Don Gallegos, Corps
- April Sanders, Corps
- Michael Gabora, ISC
- Bill Miller, Corps Contractor
- Dave Wilkins, Corps Contractor
- Tomas Stockton, Reclamation Contractor
- Nabil Shafike, ISC
- Garret Ross, Reclamation
- Steve Bowser, Reclamation
- Mark Yuska, Corps
- Leslie McWhirter, Corps

Upper Rio Grande Basin

System from Colorado state-line to Texas state-line modeled with URGWOM

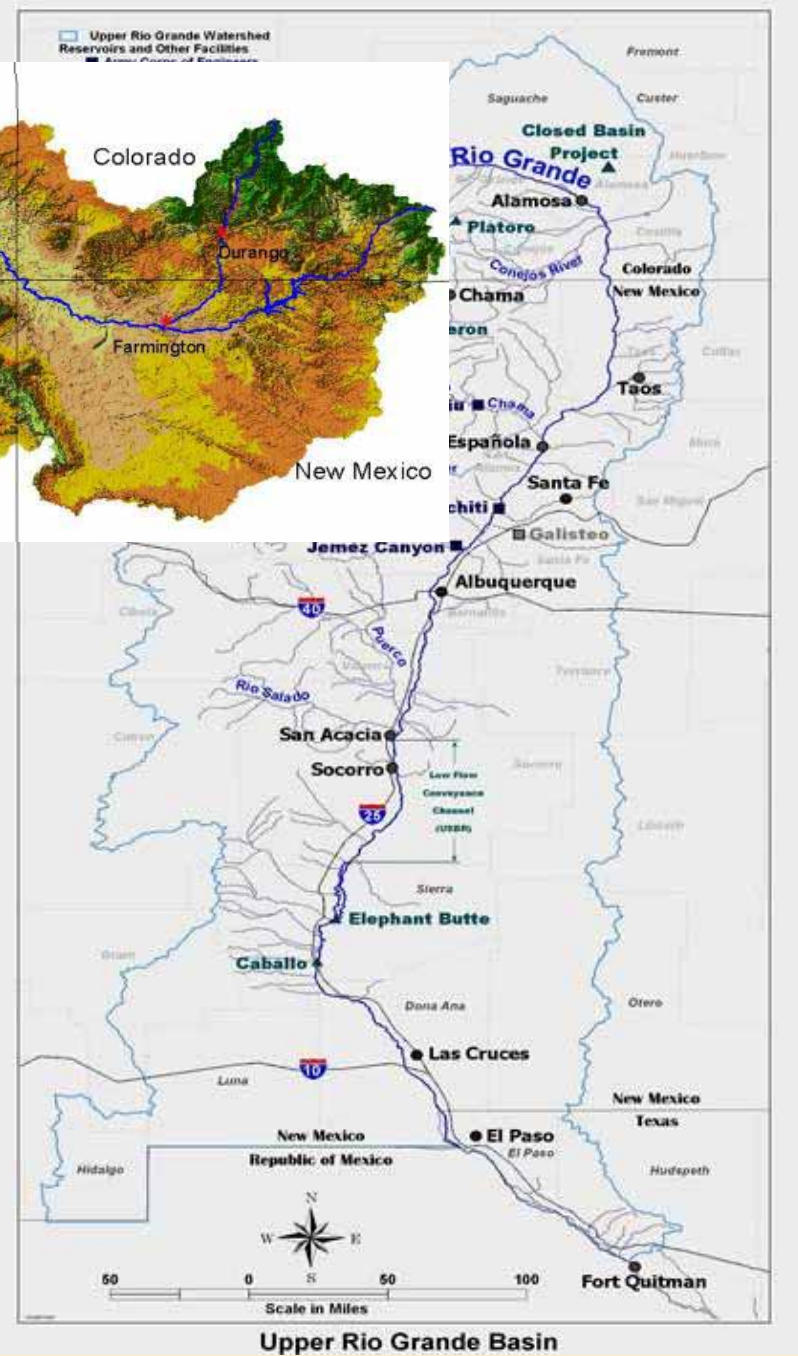
including the Rio Chama and San Juan-Chama Project diversions



San Juan-Chama Project

- Authorized by Congress in 1962
 - Colorado River Storage Act amended to allow diversions from the San Juan River to the Rio Grande basin.
 - for municipal, domestic, industrial, and agricultural uses
 - Provides a portion of New Mexico's allotment under the Upper Colorado River Basin Compact.

San Juan- Chama Project



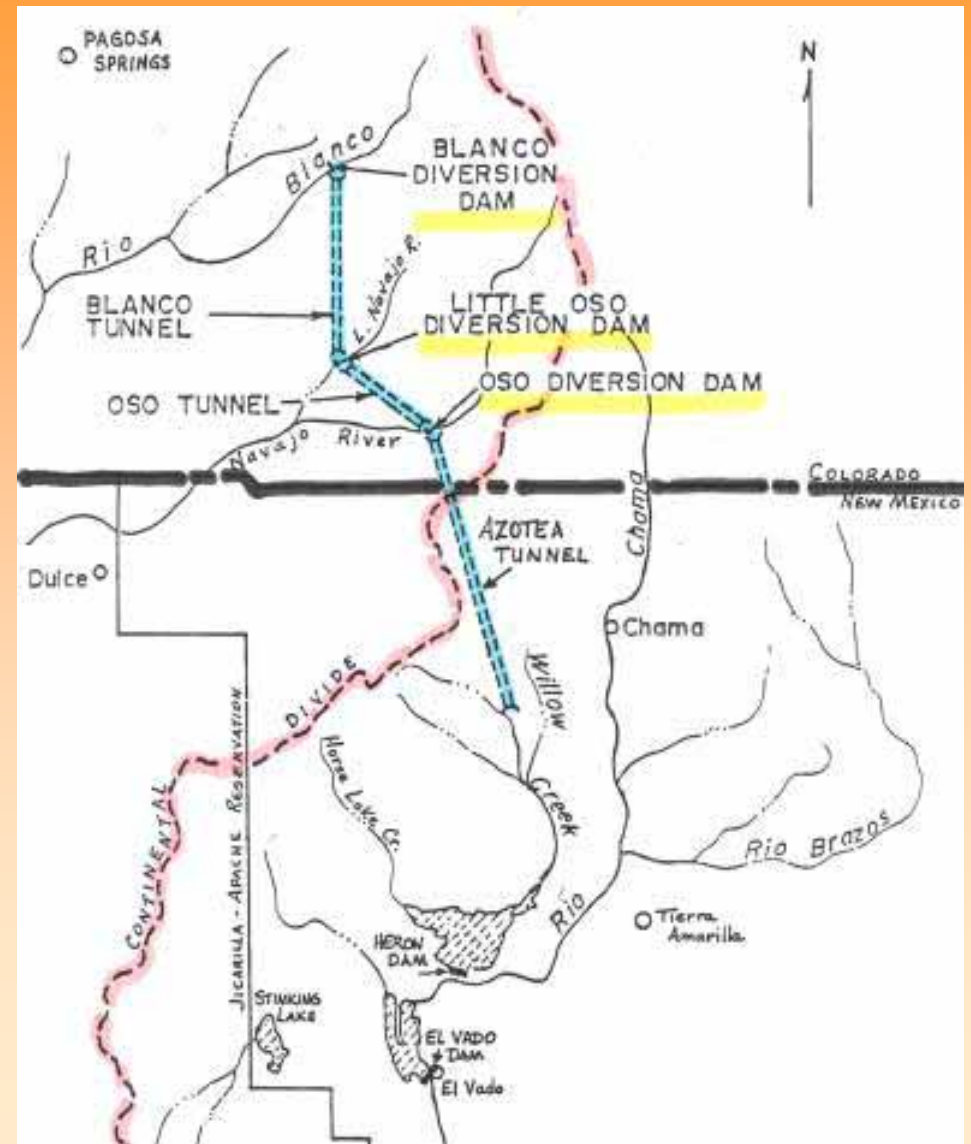
San Juan-Chama Project



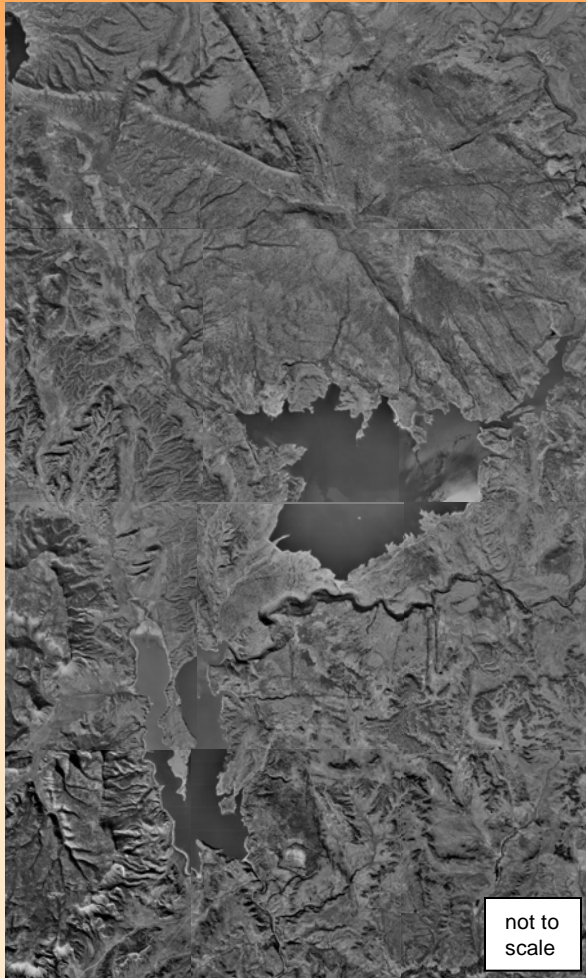
Map courtesy of San Juan Recovery Implementation Program



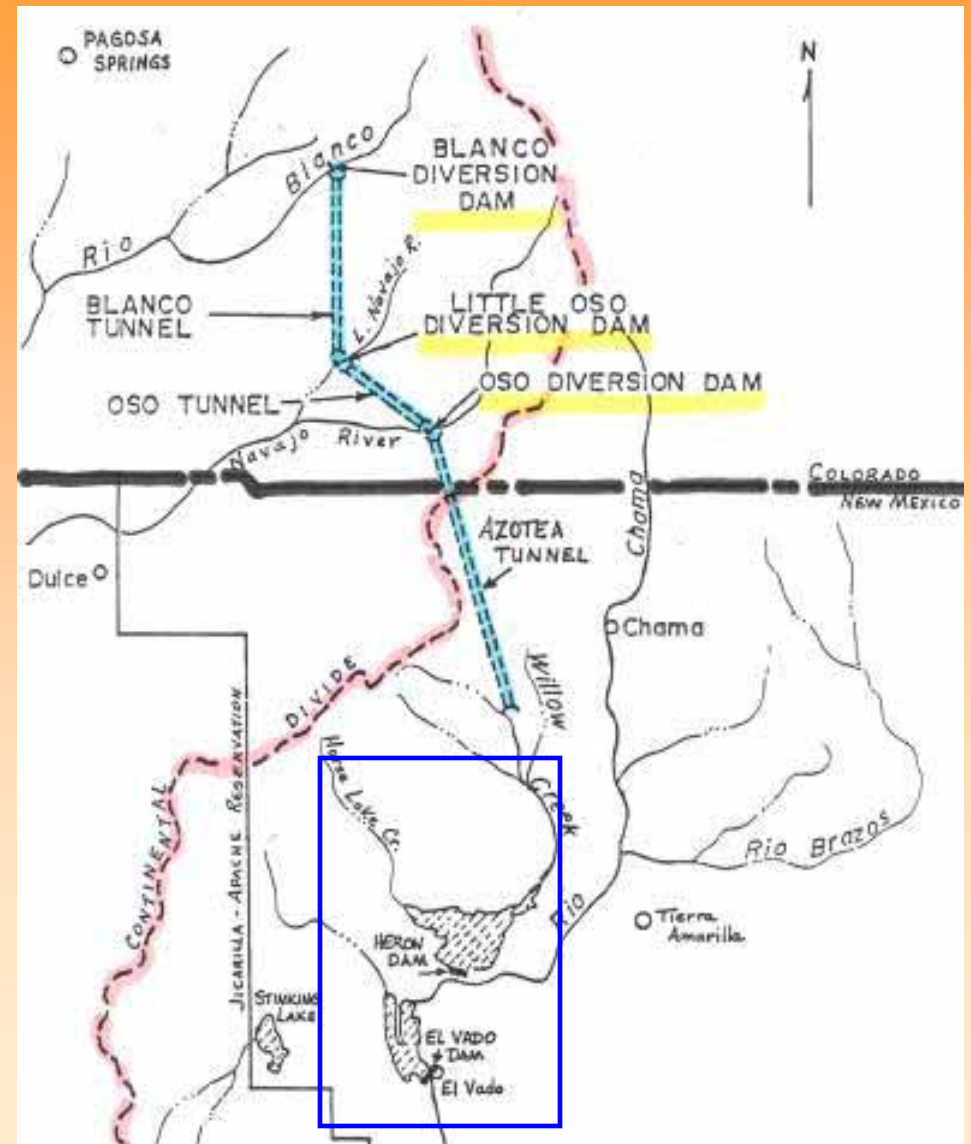
San Juan-Chama Project



San Juan-Chama Project



not to scale



San Juan-Chama Project

- Background Information
 - Allow New Mexico to Use its Portion of San Juan Water under the Upper Colorado River Compact

San Juan-Chama Project

- Background Information
 - Allow New Mexico to Use its Portion of San Juan Water under the Upper Colorado River Compact
 - Minimum Bypasses at Diversions:

| MONTH | RIO BLANCO (Blanco Diversion) | LITTLE NAVAJO RIVER (Little Oso Diversion) | NAVAJO RIVER (Oso Diversion) |
|-----------|----------------------------------|---|---------------------------------|
| January | 15 | 4 | 30 |
| February | 15 | 4 | 34 |
| March | 20 | 4 | 37 |
| April | 20 | 4 | 37 |
| May | 40 | 27 | 88 |
| June | 20 | 27 | 55 |
| July | 20 | 27 | 55 |
| August | 20 | 27 | 55 |
| September | 20 | 27 | 55 |
| October | 20 | 4 | 37 |
| November | 20 | 4 | 37 |
| December | 15 | 4 | 37 |

San Juan-Chama Project

- Background Information
 - Allow New Mexico to Use its Portion of San Juan Water under the Upper Colorado River Compact
 - Minimum Bypasses at Diversions
 - Contractor Allocations:

| Contractor | Allocation (acre-ft) |
|--------------------------|----------------------|
| Albuquerque | 48,200 |
| MRGCD | 20,900 |
| Jicarilla | 6500 |
| Santa Fe | 5605 |
| Cochiti Rec Pool | 5000 |
| Department of Energy | 1200 |
| PVID | 1030 |
| Espanola | 1000 |
| Belen | 500 |
| Bernalillo | 400 |
| Taos | 400 |
| Los Lunas | 400 |
| Red River | 60 |
| Twining | 15 |
| Uncontracted | 2990 |
| San Juan Pueblo | 2000 |
| TOTAL ALLOCATION: | 96,200 |

San Juan-Chama Project

- Background Information
 - Allow New Mexico to Use its Portion of San Juan Water under the Upper Colorado River Compact
 - Minimum Bypasses at Diversions
 - Contractor Allocations
 - Total Annual Diversion Limit: 270,000 acre-ft/year
 - Limited Diversion for Decade: 1,350,000 acre-ft/10 years
 - Limited by Available Storage at Heron Lake



San Juan-Chama Project

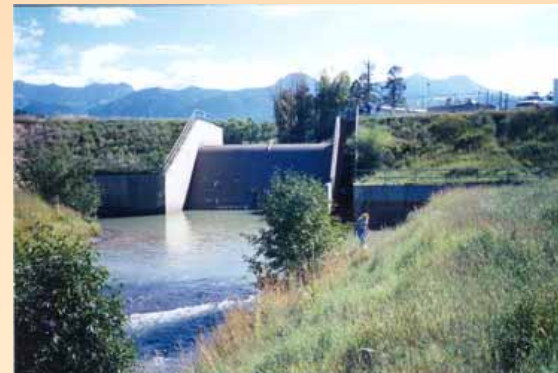
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San Juan-Chama Project

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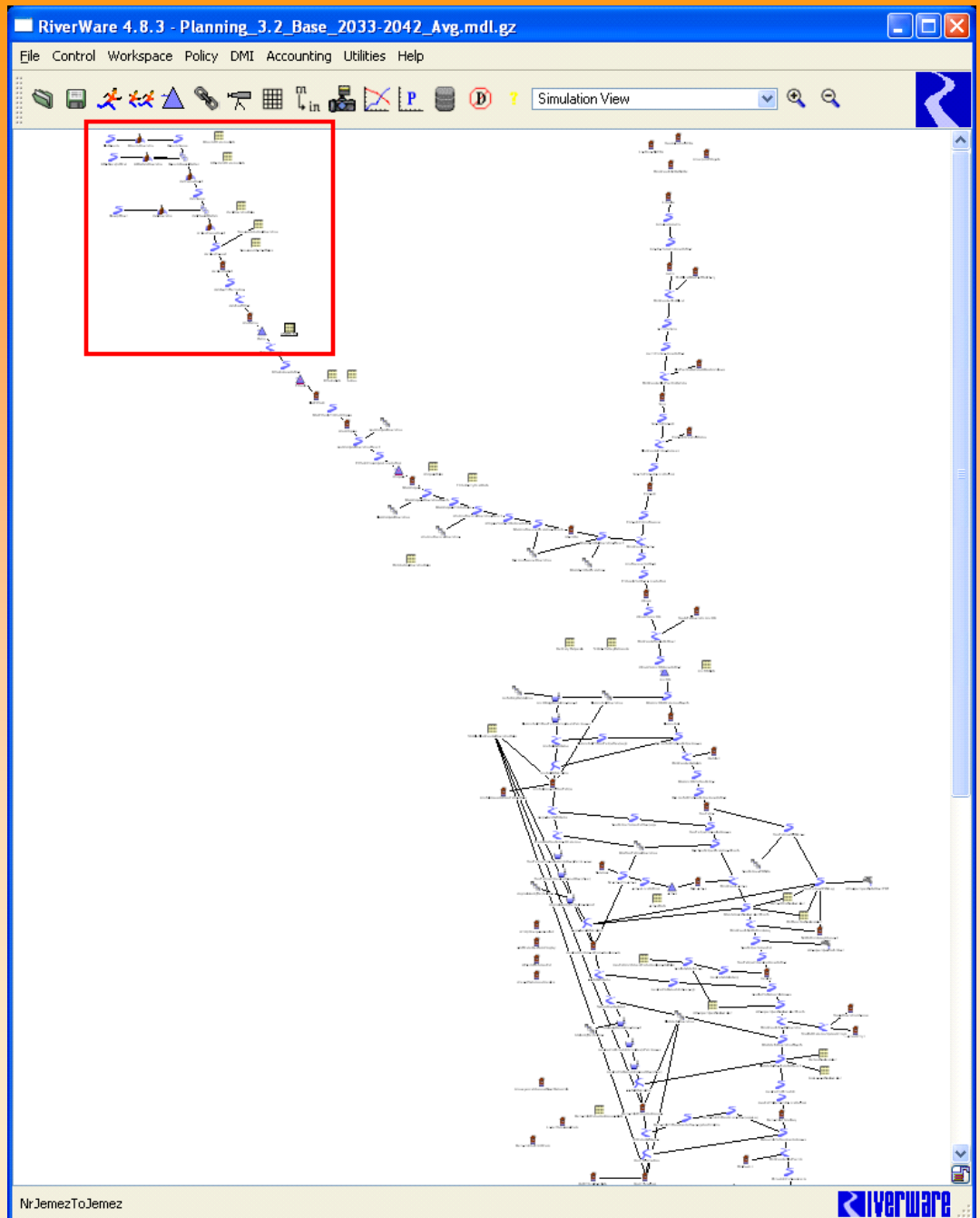
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- If the trans-basin diversion is limited (< 150 cfs), specific algorithm for setting each of three diversions.
- Diversion Capacities
 - Blanco Diversion: 520 cfs
 - Oso Diversion: 650 cfs
 - Little Oso Diversion: 150 cfs



Oso
Diversion

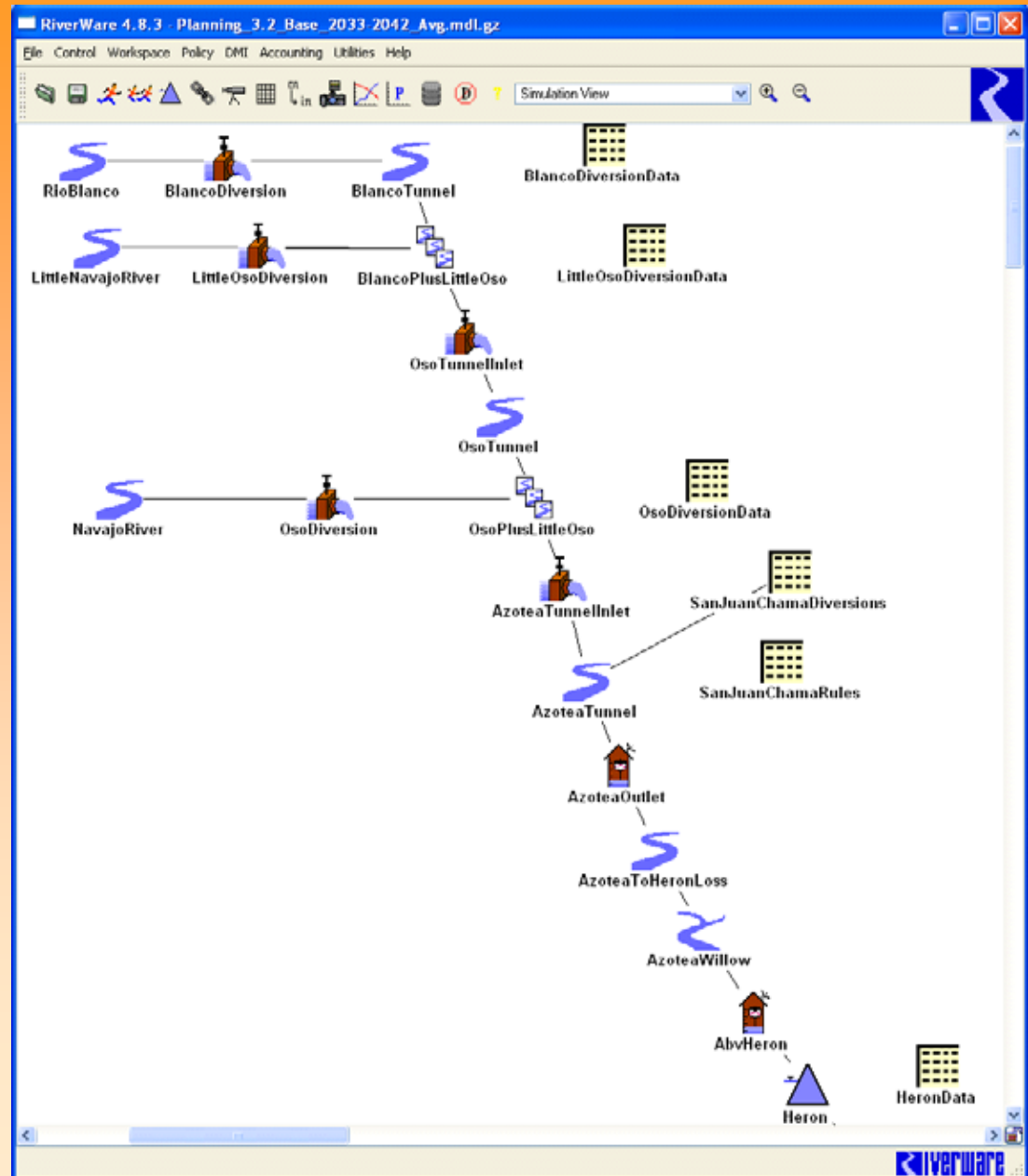
San Juan- Chama Project

URGWOM
Workspace



San Juan- Chama Project

- Physical System



San Juan-Chama Project

- Operations
 - Two different water types to be considered.
 1. San Juan
 2. Native Rio Grande
 - Allocations of San Juan water at Heron Lake made to contractors on January 1
 - Additional allocations may be made on July 1 up to the contracted allocation.

San Juan-Chama Project

- Operations

- Allocated water still in Heron Lake on December 31 is lost

...unless Reclamation issues waivers to allow for water to be stored an additional 120 days (until April 30th).

- Priorities

- Priorities are entered for transferring San Juan water based on Release Type and Account.
 - At Heron Lake, priorities are also entered based on destination (Abiquiu or El Vado).

Priorities for Rule Execution

- Priorities

- For Each Dam:

1. Preparatory Rules – Identify the Required Release to Meet Demands
 - Compute Release of San Juan Water and Rio Grande Water

Priorities for Rule Execution

- **Priorities**

For Each Dam:

1. Preparatory Rules – Identify the Required Release to Meet Demands

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2. Set Outflow

- Initial Outflow based on Sum of Predetermined Release of San Juan water and Predetermined Release of Rio Grande water

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(e.g. Maximum Pool Elevation, Downstream Channel Capacities, Stepped Releases, Delta Storage Limits, Minimum Releases, Physical Constraints of the Outlet Works)

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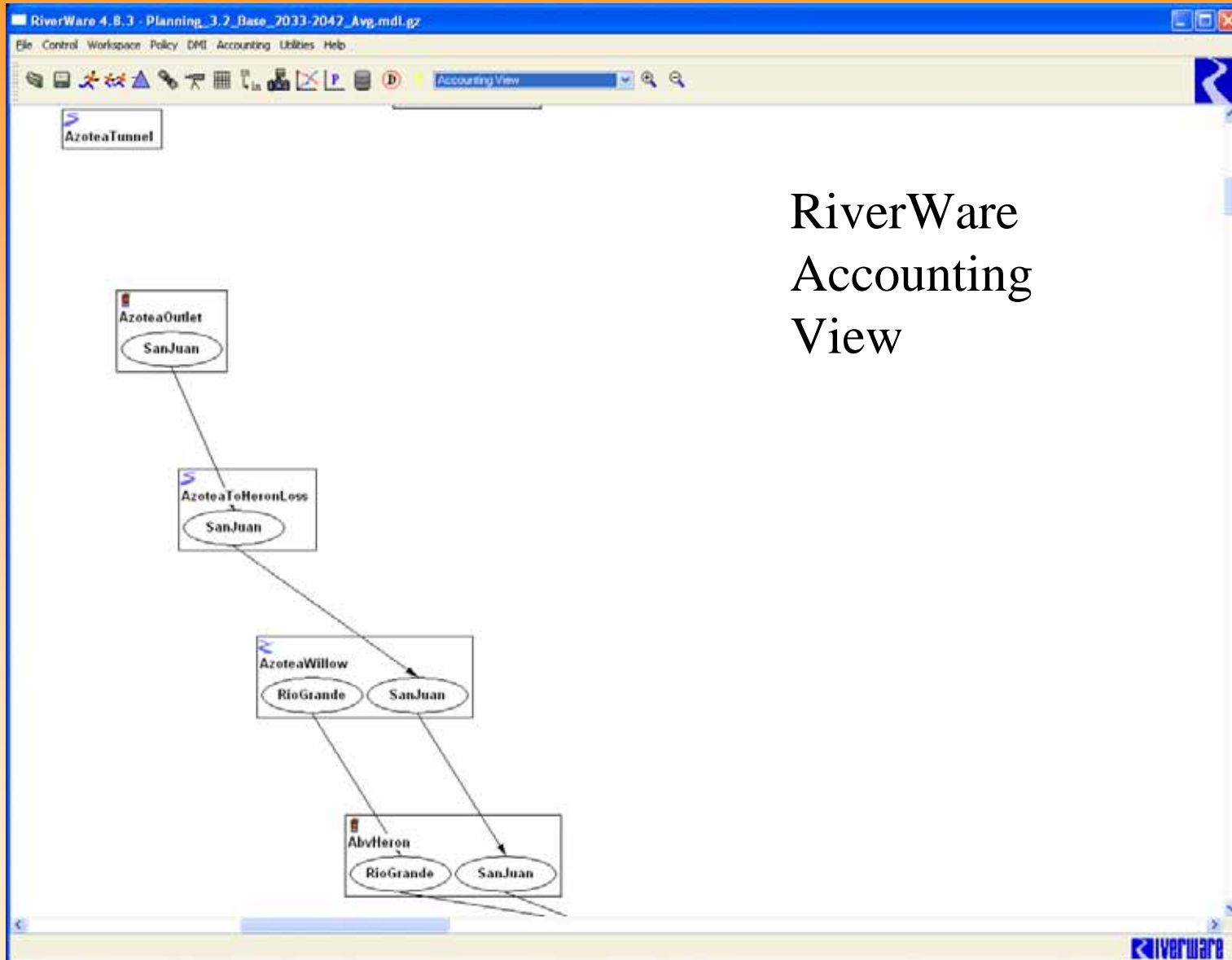
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3. Accounting Supplies Set based on Reconciled San Juan and Rio Grande release

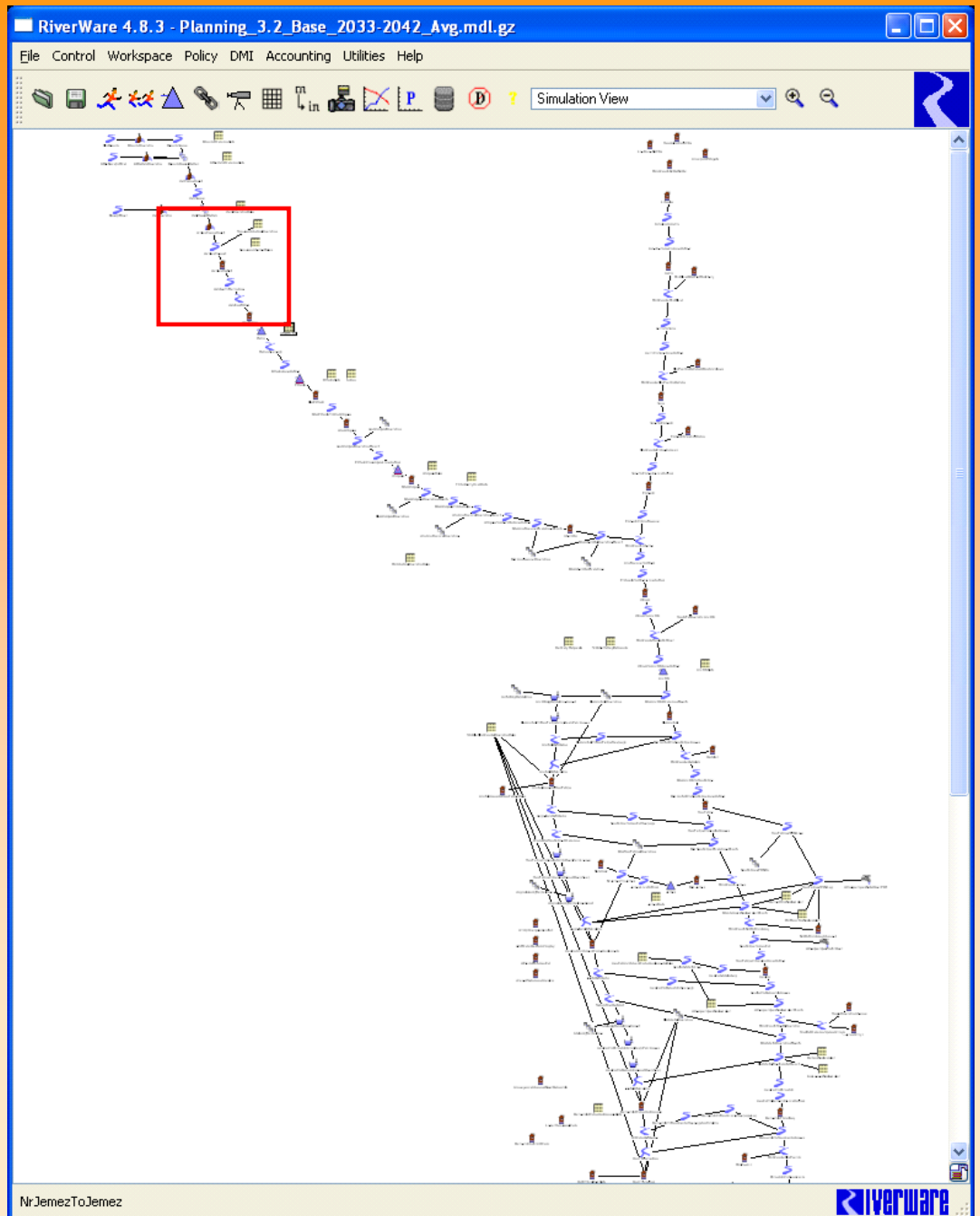
- to payback debts, fill storage accounts, or pass-through to a downstream destination.

Accounts

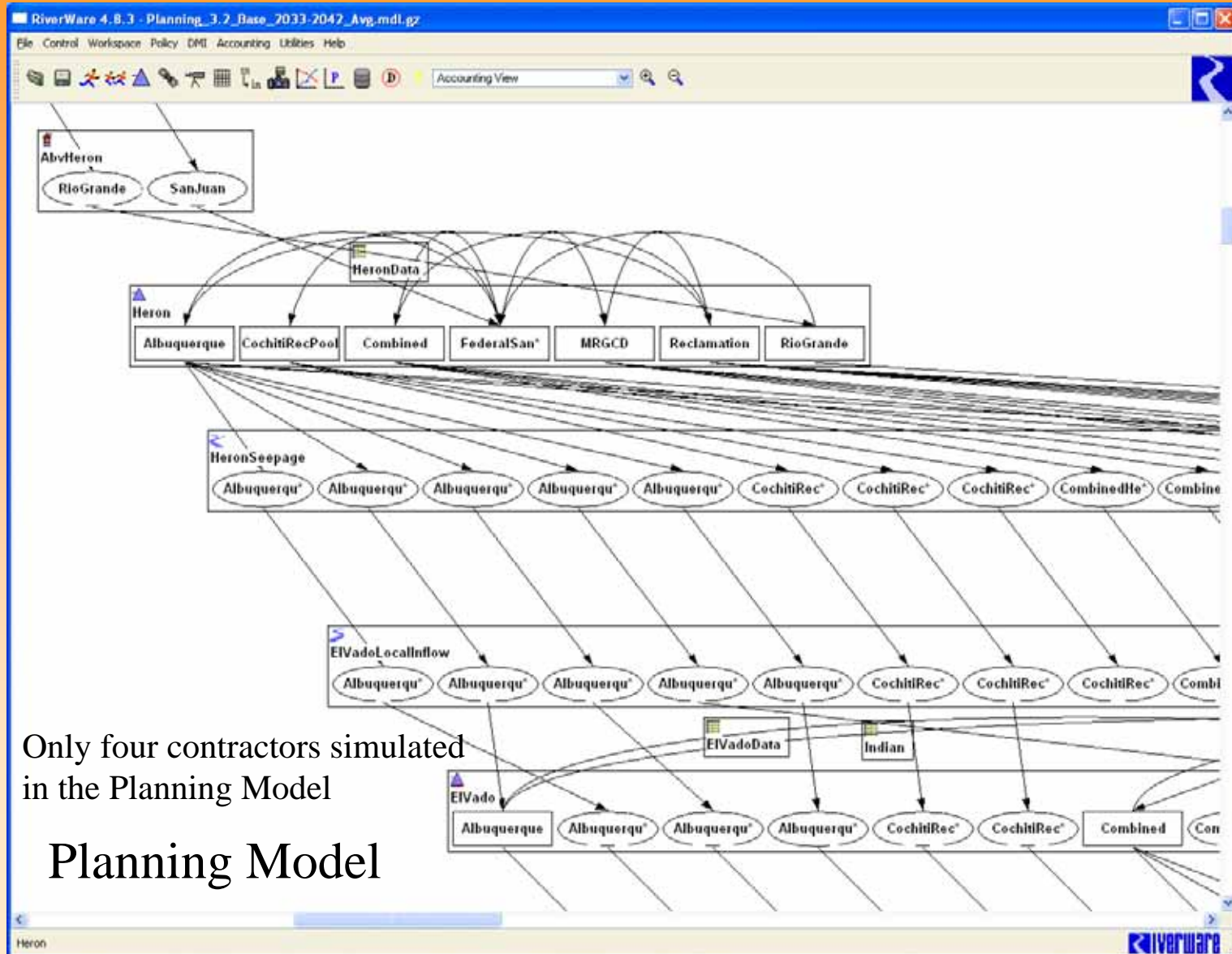


RiverWare
Accounting
View

URGWOM Workspace



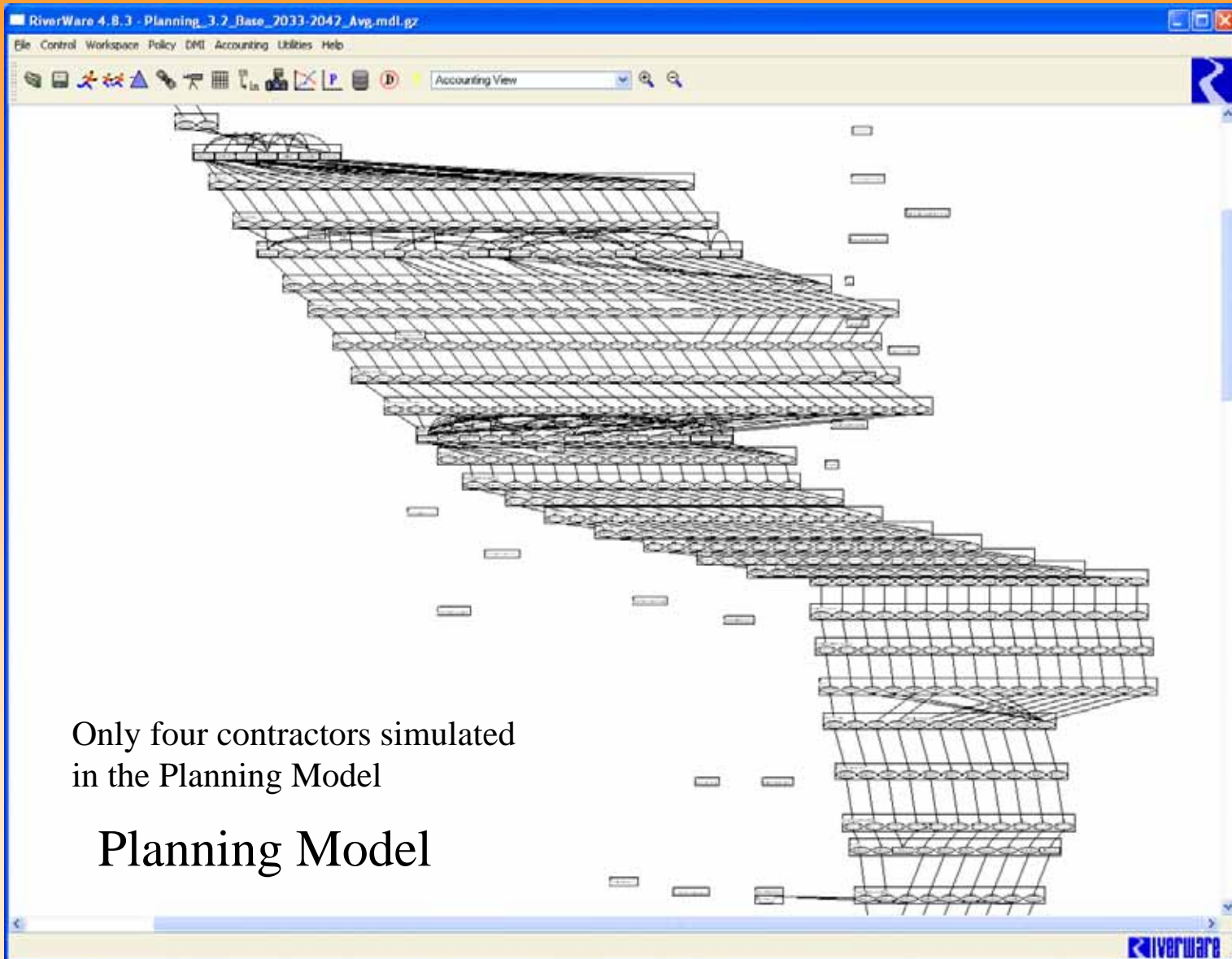
Accounts



Only four contractors simulated
in the Planning Model

Planning Model

Accounts

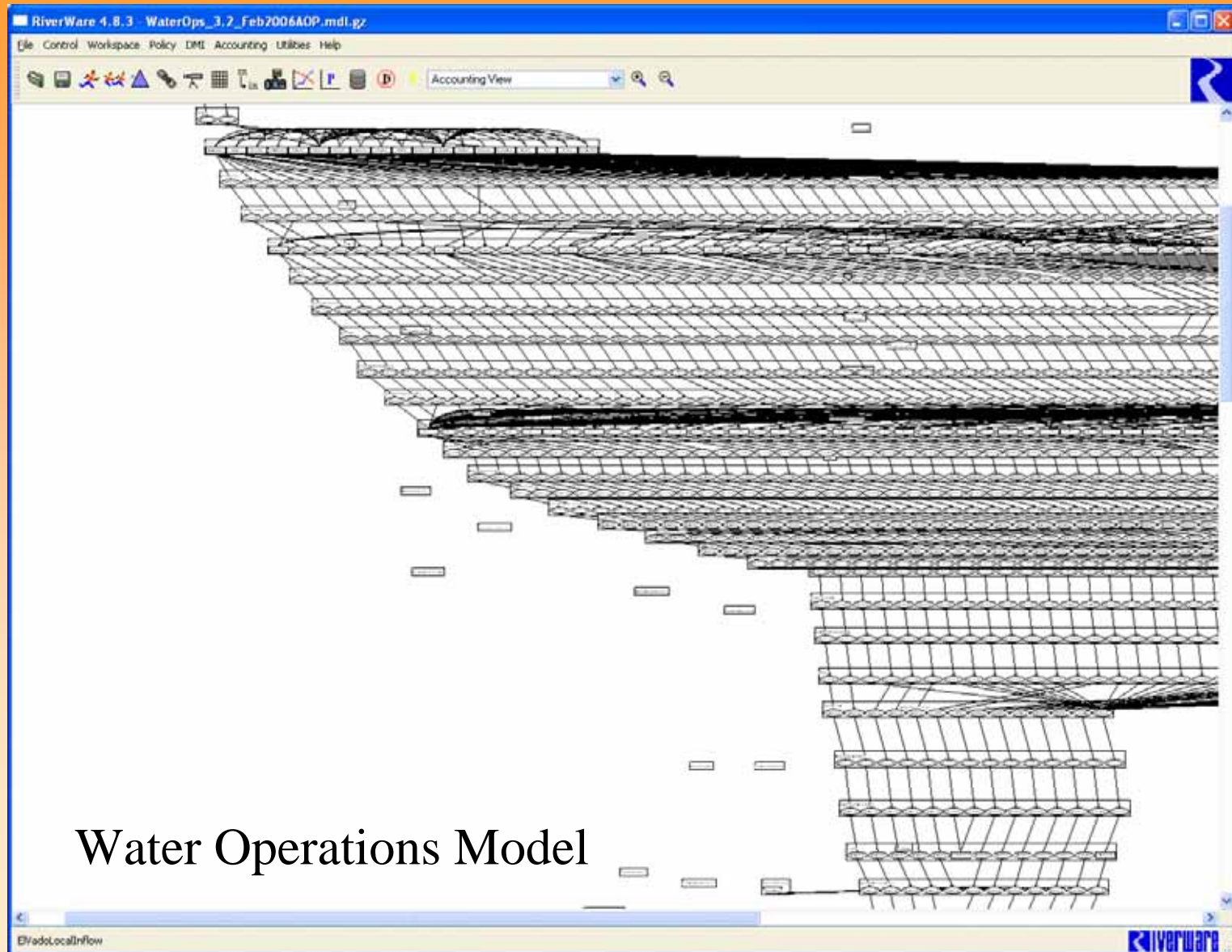


San Juan-Chama Project

– Contractor Allocations:

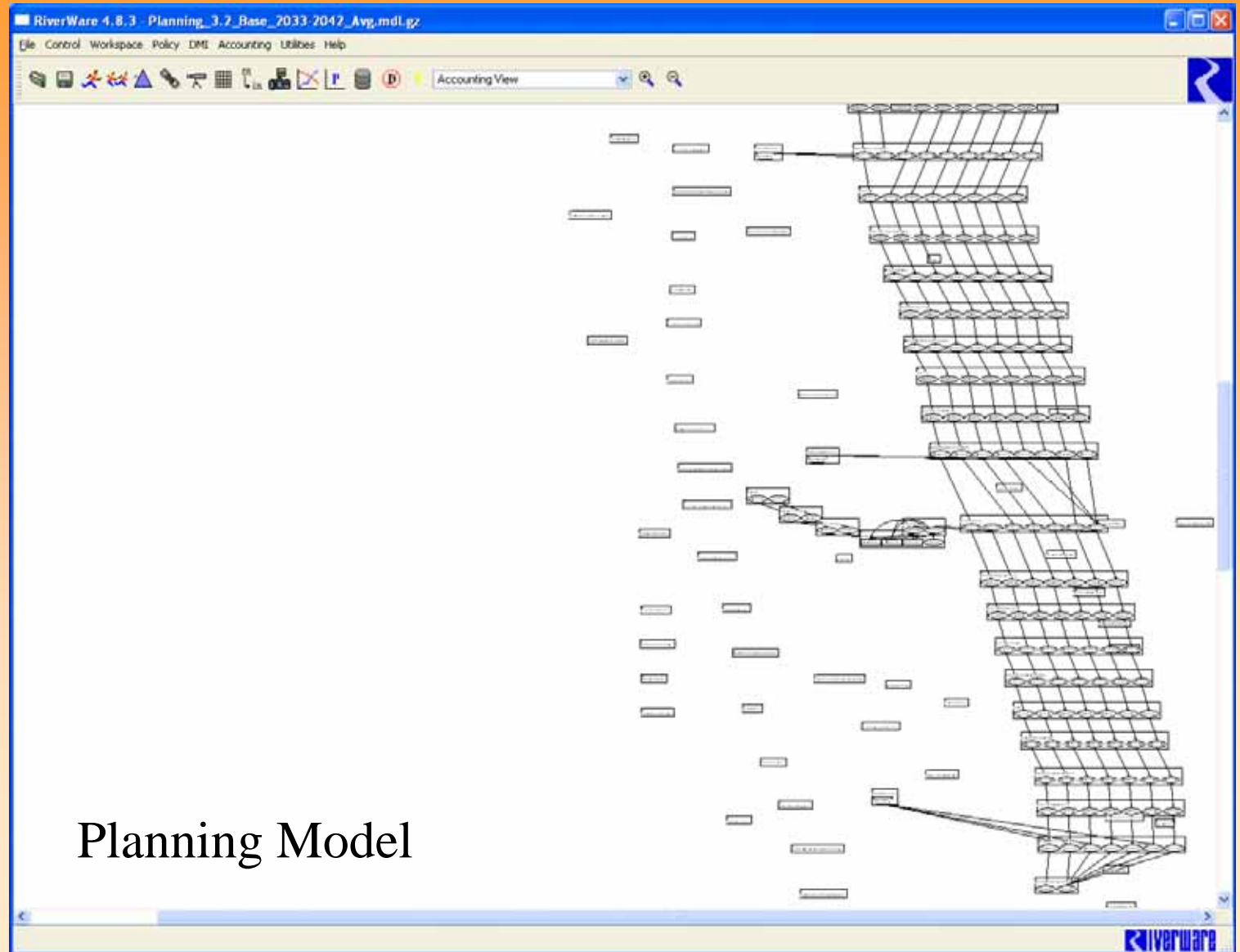
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Accounts



Water Operations Model

Accounts



Planning Model

Exchanges and Leases

- San Juan water may be loaned from one contractor to another.
- Exchanges are tracked separately from the accounting for San Juan water versus native Rio Grande water.
 - An exchange records a debt that needs to be paid back.

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- Exchanges are tracked separately from the accounting for San Juan water versus native Rio Grande water.
 - An exchange records a debt that needs to be paid back.
- Reclamation may lease San Juan water from contractors to use to meet downstream target flows.