URGWOM Water Quality

Advisory Committee Meeting

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Amy Louise, USACE

Water Quality in URGWOM

- Background
- RiverWare Design
- Testing Groundwater Objects
- Next Steps
- Future Salinity Modeling

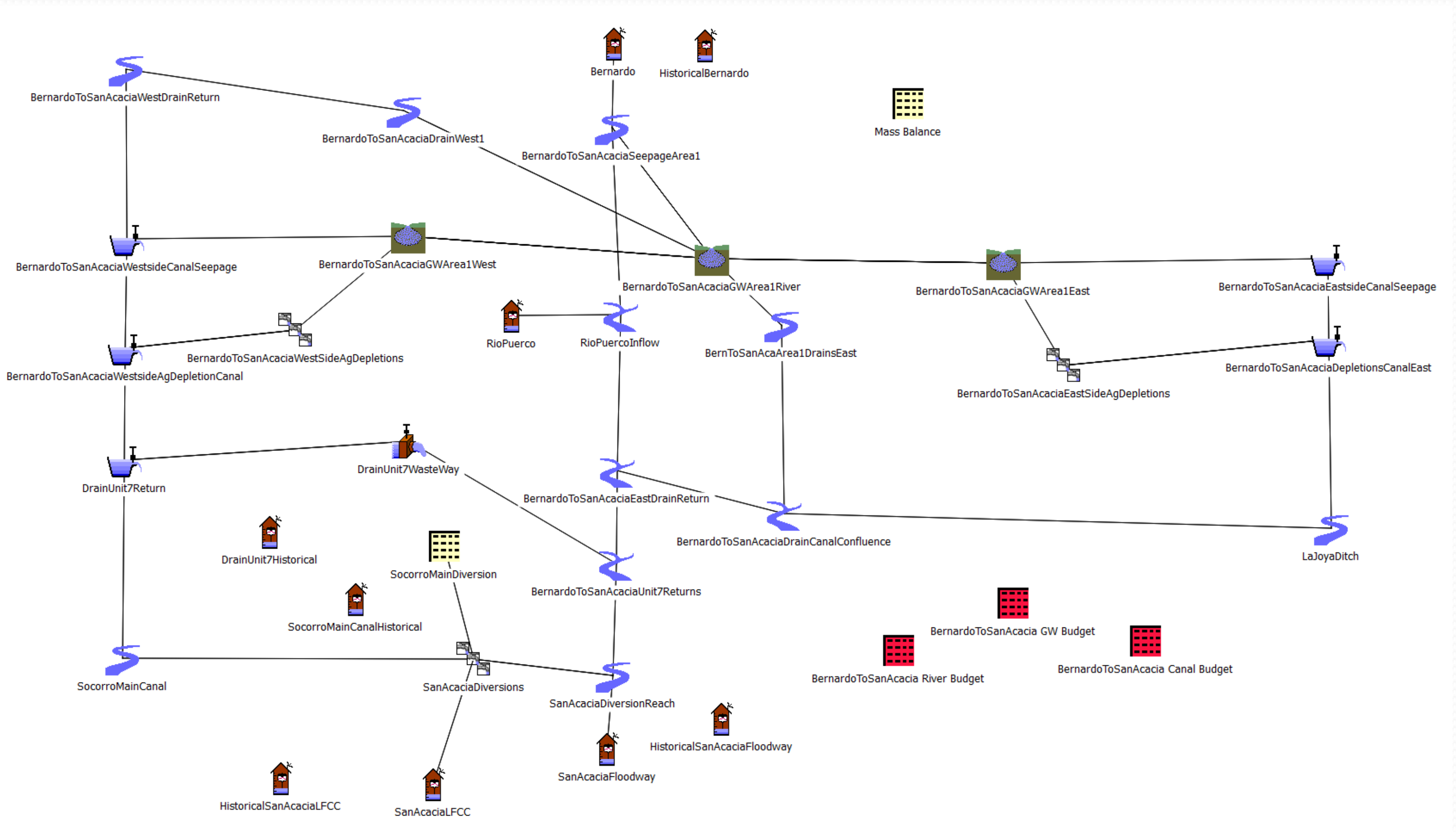
Background

- Five-Year Plan 2008
- Needs Survey completed 2008/2009
- Salinity Focus
- Surface water
- Ground water

RiverWare

- Design Document
- Final Comments on Design Document
- RiverWare
  - Model solutes in surface water
  - Add water quality in groundwater functionality
  - Upper and lower layer to simulate groundwater/surface water exchange area

Testing Groundwater Objects



Testing Groundwater Objects

- Existing salinity data
- One timestep during irrigation season
- Upstream/downstream transfer of water and salt between groundwater objects
- Vary thickness of upper zone to determine sensitivity of movement of water and salt into and out of groundwater objects

Testing Groundwater Objects

- Compared values in spreadsheet to values calculated in RiverWare
- No equations for evaporation in User Manual
- No equations for canal seepage and diversion canal objects in User Manual
- RiverWare equations are correct
- Equation errors in manual corrected

Testing Groundwater Objects

Equation 12-9

In Manual: Storage Proportion Previous (t + 1) = Storage Proportion (t)

The slot being set is Storage Proportion Previous. Storage Proportion Previous is being set at the next timestep equal to the current Storage Proportion. It enables the object to consider solving at the next timestep. A note will be added to the manual to clarify.

Equation 12-36

In Manual: Salt Conc Lower(t) = [Salt Conc Lower Intermediate(t) x Storage Lower Intermediate(t) – Salt Mass Flux Upper to Lower(t)]/Storage Lower(t)

Correction: Salt Conc Lower(t) = [Salt Conc Lower Intermediate(t) x Storage Lower Intermediate(t) + Salt Mass Flux Upper to Lower(t)]/Storage Lower(t)

Equation 12-40

In Manual: [Salt Conc Upper(t) Salt Conc Upper Intermediate(t) x Storage Upper Intermediate(t) + Salt Mass Flux Upper to Lower(t)]/Storage Upper(t)

Correction: [Salt Conc Upper(t) Salt Conc Upper Intermediate(t) x Storage Upper Intermediate(t) – Salt Mass Flux Upper to Lower(t)]/Storage Upper(t)

Testing Groundwater Objects

Equation 12-25

In Manual: Inflow from Surface Salt $\text{Mass}_i(t)$ =Inflow From Surface $\text{Water}_i(t) \times$ Inflow from Surface Salt $\text{Conc}_i(t) \times \Delta t$

Correction:

Compute Inflow from Surface Water Salt Flux: Inflow from Surface Water enters or leaves the upper layer. Inflow from Surface Water is a multi-slot and each column can be either negative or positive. Thus, the following computation must be performed on each column, i, of the slot. There must be an associated linked salt concentration for each flow:

$$\text{tempSaltMass} = 0 \tag{12-23}$$

For Each column, i, of the Inflow From Surface Water multi slot

If Inflow From Surface $\text{Water}_i(t)$ <= 0 (flow is out of this object, use this object's upper layer)

$$\text{Salt Mass for This Column} = \text{Inflow From Surface Water}_i(t) \times \text{Salt Conc Upper Previous}(t) \times \Delta t \tag{12-24}$$

$$\text{Inflow from Surface Salt Conc}_i(t) = \text{Salt Conc Upper Previous}(t) \tag{12-25}$$

Else (Flow is into this object, use linked object's values)

$$\text{Salt Mass for This Column} = \text{Inflow From Surface Water}_i(t) \times \text{Inflow from Surface Salt Conc}_i(t) \times \Delta t \tag{12-26}$$

End IF

$$\text{tempSaltMass} = \text{tempSaltMass} + \text{Salt Mass For This Column} \tag{12-27}$$

End FOR

$$\text{Inflow From Surface Salt Mass}(t) = \text{tempSaltMass} \tag{12-28}$$

Next Steps

- Data
  - Daily water quality data for Bernardo and San Acacia
  - Not much data for canals and drains
  - Determine time period for testing
  - Data between 1975 and 2004
- Test conceptual framework of modeling water quality in groundwater objects
  - Real or measured data for Bernardo to San Acacia Reach
- Water Quality User Manual equations and input values from RiverWare test reach

Benefits of Future Salinity Modeling

- Verify existing flow model
- Better understanding groundwater/surface water interaction and movement of salinity
- Better predict other constituents that might change as result of streamflow variations

Questions?