Lower Rio Grande RiverWare Model

URGWOM Advisory Committee

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Previous Contract/Project

- Previous contract between Hydros and USACE ending September 2013
- Hydros developed a daily-timestep RiverWare model of the Lower Rio Grande from Elephant Butte Reservoir to Hudspeth County
- Includes Elephant Butte Irrigation District and El Paso County Water Improvement District No. 1
- Includes Rio Grande Project accounting and Rio Grande Compact accounting
- Reservoir operations according to 2008 operating agreement

Previous Contract/Project

- Model is designed to run in two modes:
  - Historical/calibration mode using observed data
  - Operations mode using 2008 operating agreement (D3 Rules)
    - Still using historical CIR, inflows, evaporation, etc…

Current Project/Contract Tasks

- Current Contract – Hydros is sub to Tetra Tech
- Basic Award plus two Option Items
- Add integer timestep lag times
- Address issue of daily CIR out-of-synch with daily observed diversions
- Refinement of D3 policy (new operating agreement) and comparison with actual project accounting
- Addition of alluvial aquifer on Mexico side of river across from EP #1 and downstream of EP #1

Current Project/Contract Tasks

- Obtain additional data for EP #1 area of the model below Courchesne Bridge
- Add local inflow points for Caballo to Leasburg, Leasburg to Mesilla, and Mesilla to El Paso
- General improvements to ruleset efficiency and model usability

- Phase II (Option 1): Model Calibration
- Phase III (Option 2): Merge with URGWOM

Integer Timestep Lags

- According to the 2010 Operations Manual:

River Reach	Travel Time (hrs)	Cumulative Travel Time (hrs)
RG at Caballo	0	0
Percha Diversion Dam	2	2
Leasburg Diversion Dam	18	20
Mesilla Diversion Dam	10	30
American Diversion Dam	36	66
International Diversion Dam	2	68

Integer Timestep Lags

- In Lower Rio Grande Model:

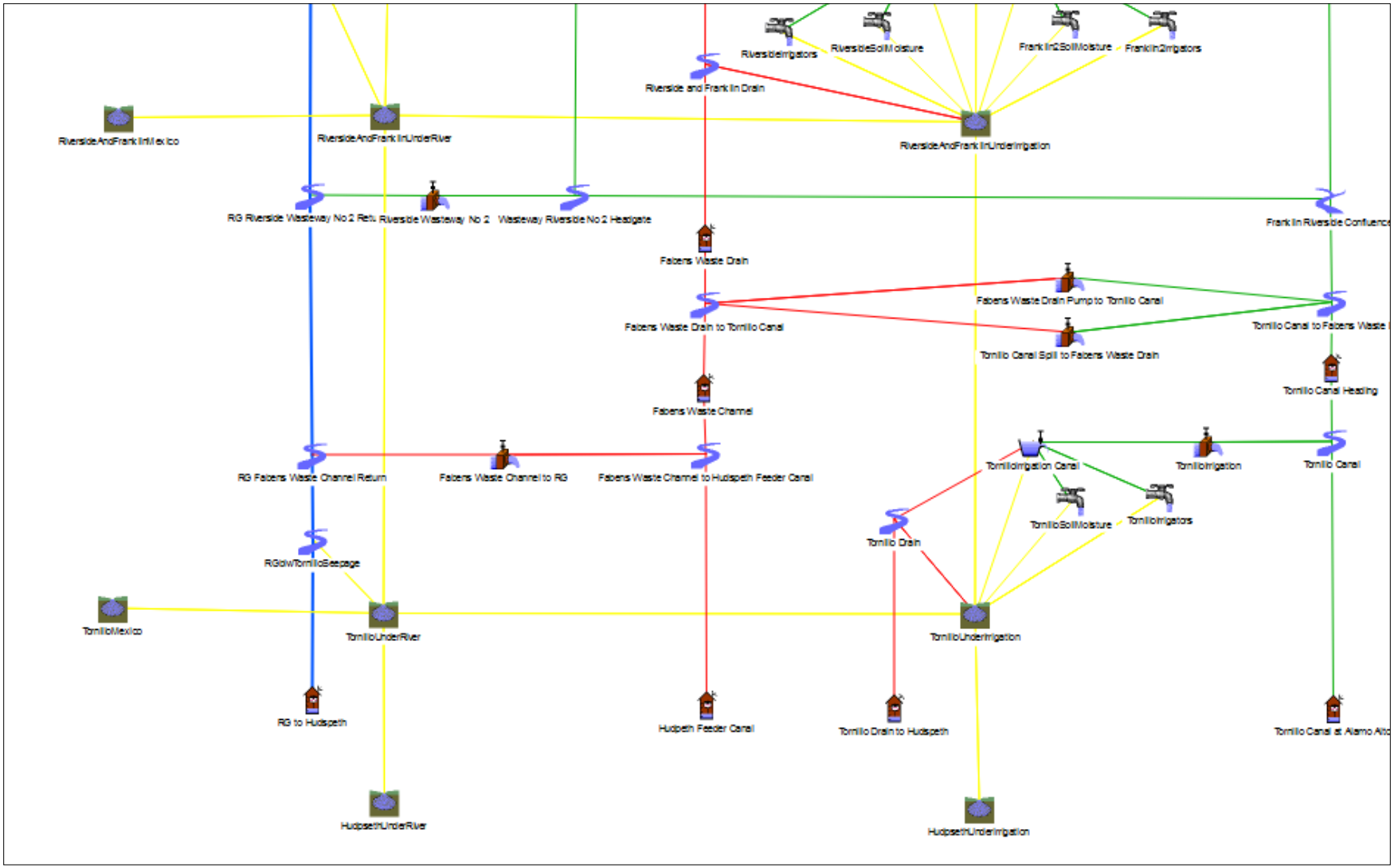
River Reach	Travel Time (hrs)	Cumulative Travel Time (hr)
RG at Caballo	0	0
Percha Diversion Dam	0	0
Leasburg Diversion Dam	24	24
Mesilla Diversion Dam	24	48
American Diversion Dam	24	72
International Diversion Dam	0	72

Additional Groundwater Objects

- Added to the west of each “under river” groundwater object in EP #1 below Courchesne Bridge gage
- Added downstream of Tornillo Under River and Tornillo Under Irrigation objects
- Represent the extent of the alluvial aquifer beyond the EP #1 area (remove the effect of the “no-flux boundary” automatically implied by RiverWare GW objects)
- Currently modeled as constant head boundaries. User input offset. Large areas so water table elevation does not change in inflows/outflows

Additional GW Objects

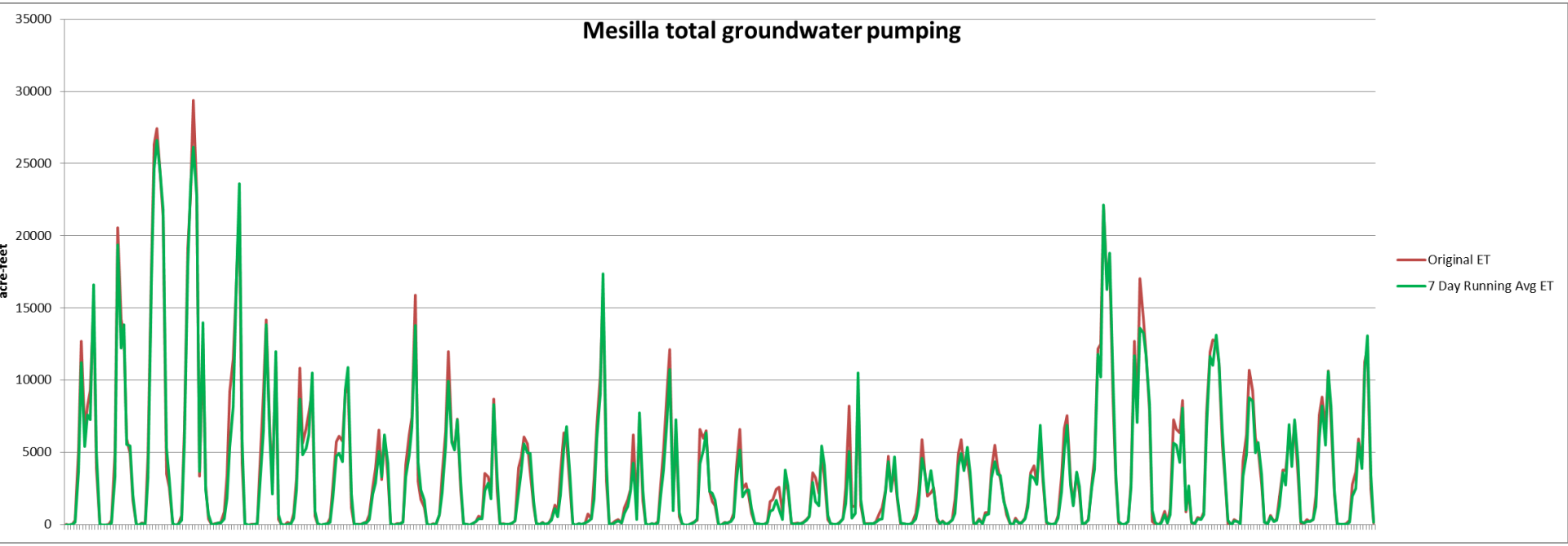
Hydros Consulting



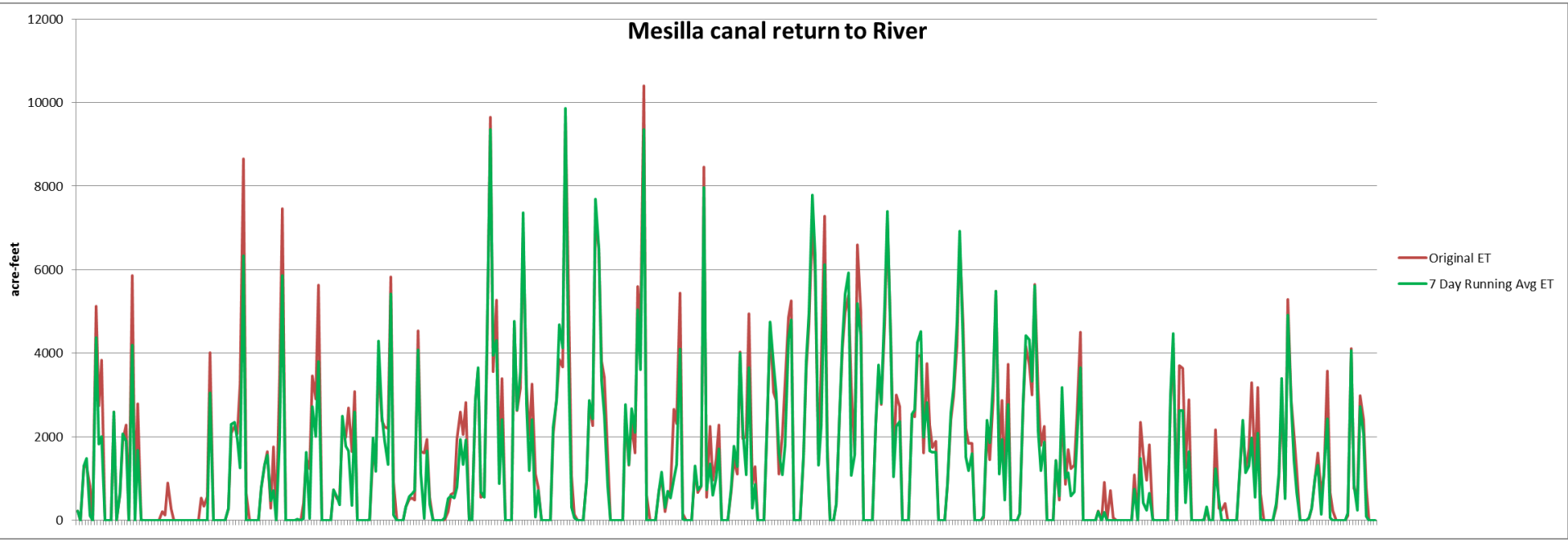
7-day Average CIR

- To “smooth out” daily CIR values
- Resolve issues where daily historical diversions are out-of-synch with daily CIR
  - Was resulting in additional GW pumping to make up CIR on days when observed diversion < CIR
  - Additional unused flows or waste flows on days when observed diversion > CIR
- Long-term solution is soil moisture modeling

7-day Average CIR

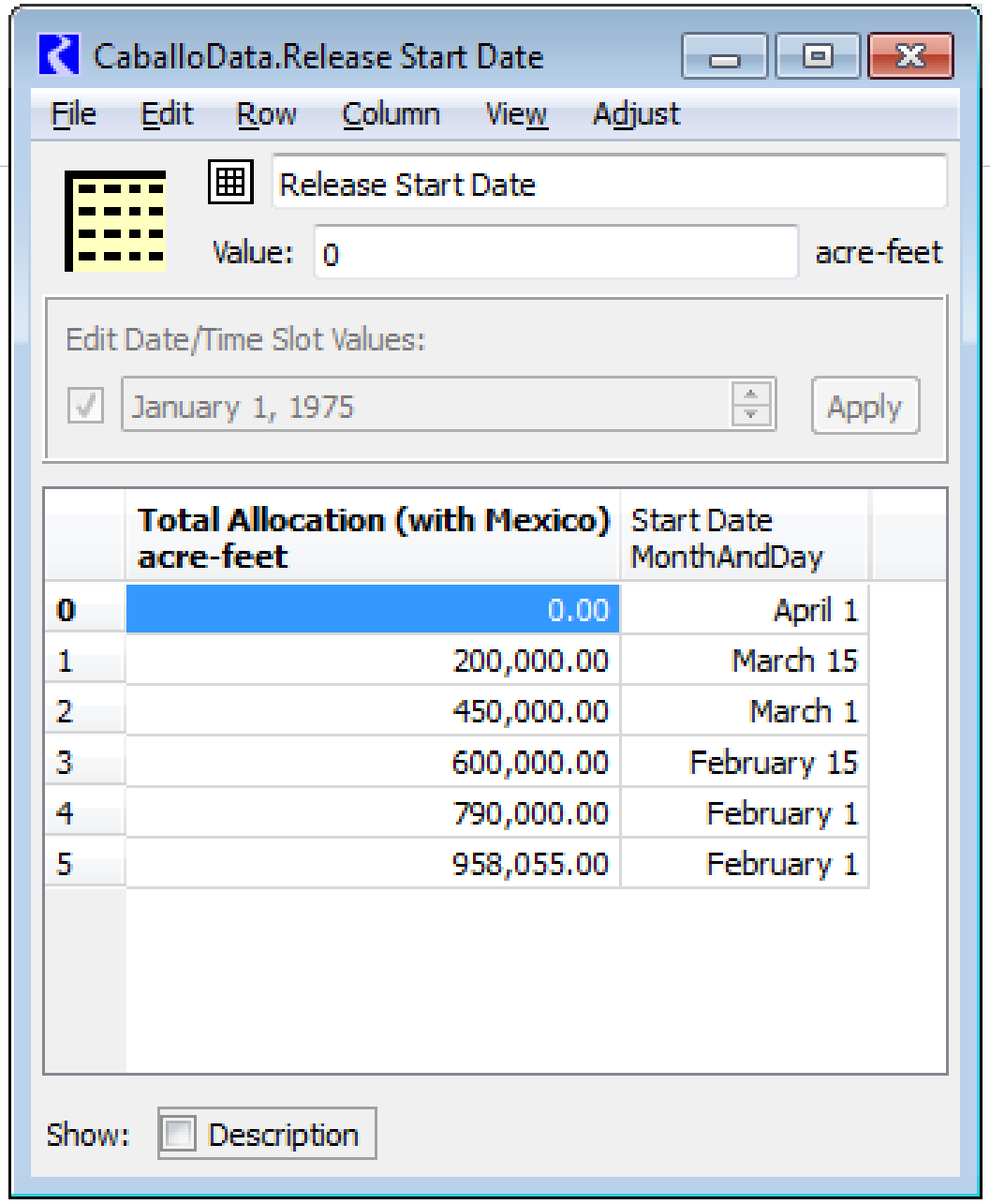


7-day Average CIR



General Improvements

- General improvements to ruleset efficiency and model usability
- Addition of configuration switches for historical vs planning mode
- Improvement to iterative approach to Caballo and EB releases
  - Release start dates function of allocation (use GW early in the year)
  - How to operate to meet demands?
  - Right now Caballo release iteration to exactly meet demands (performance cost)
- Further improvements as model calibration continues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Release Start Date
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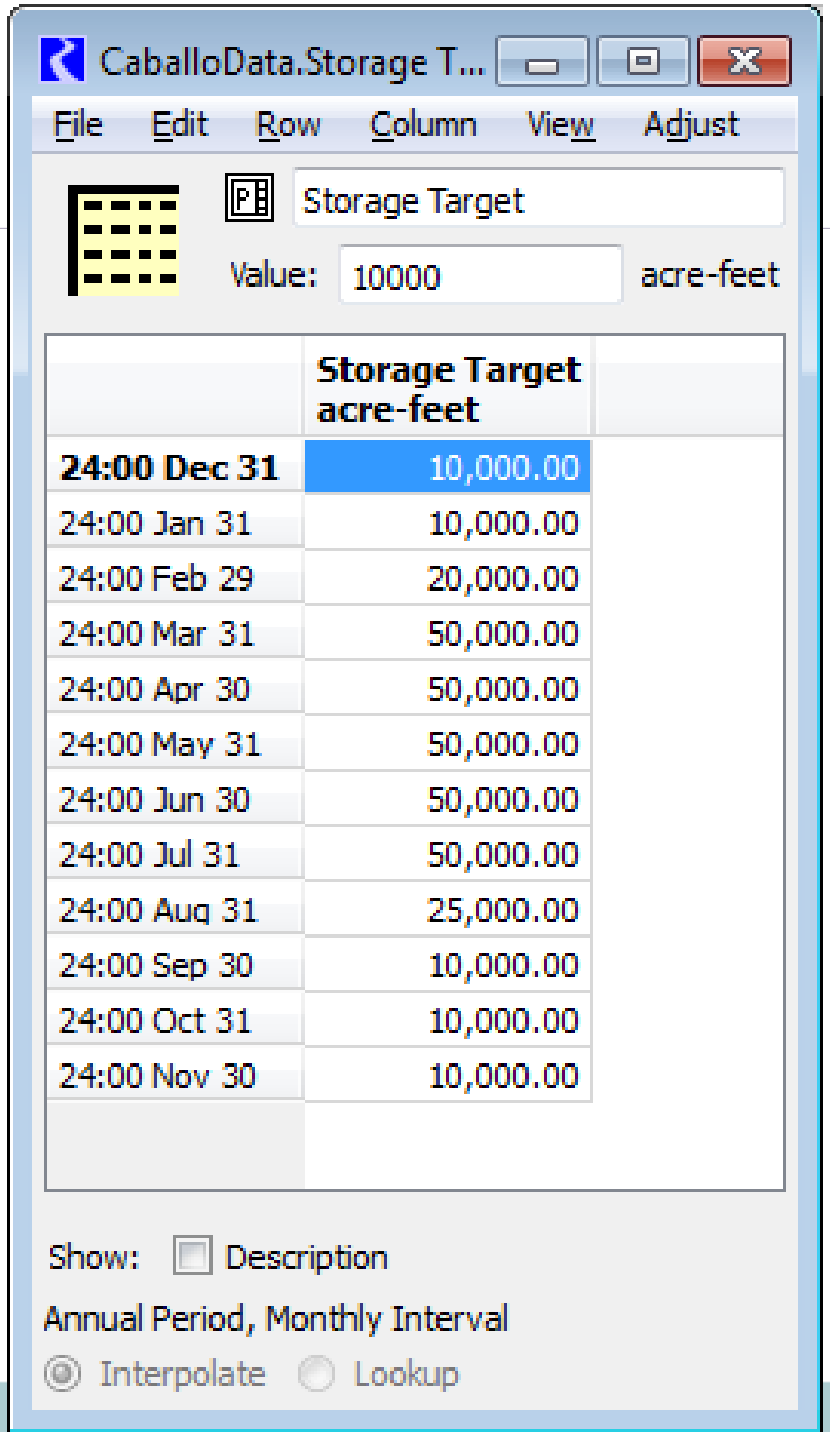
acre-feet
Edit Date/Time Slot Values:
January 1, 1975
Apply
Total Allocation (with Mexico) acre-feet
Start Date MonthAndDay
0 0.00 April 1
1 200,000.00 March 15
2 450,000.00 March 1
3 600,000.00 February 15
4 790,000.00 February 1
5 958,055.00 February 1
Show: Description


CaballoData.Storage T...
File
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Storage Target
Value:
10000
acre-feet
Storage Target
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24:00 Dec 31
10,000.00
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24:00 Aug 31
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24:00 Sep 30
10,000.00
24:00 Oct 31
10,000.00
24:00 Nov 30
10,000.00
Show:
Description
Annual Period, Monthly Interval
Interpolate
Lookup

New Operating Agreement – D3 Rules

- Used 2010 Final October Allocation spreadsheet to determine allocation logic
- Compared 2008-2010 model results with final allocation spreadsheet results from those years
- Good match with same starting conditions for each year
- Working with Reclamation to verify some modeling assumptions and clarify project accounting and operations…

Next Phase of Work…

- Model Calibration
- Merge with URGWOM