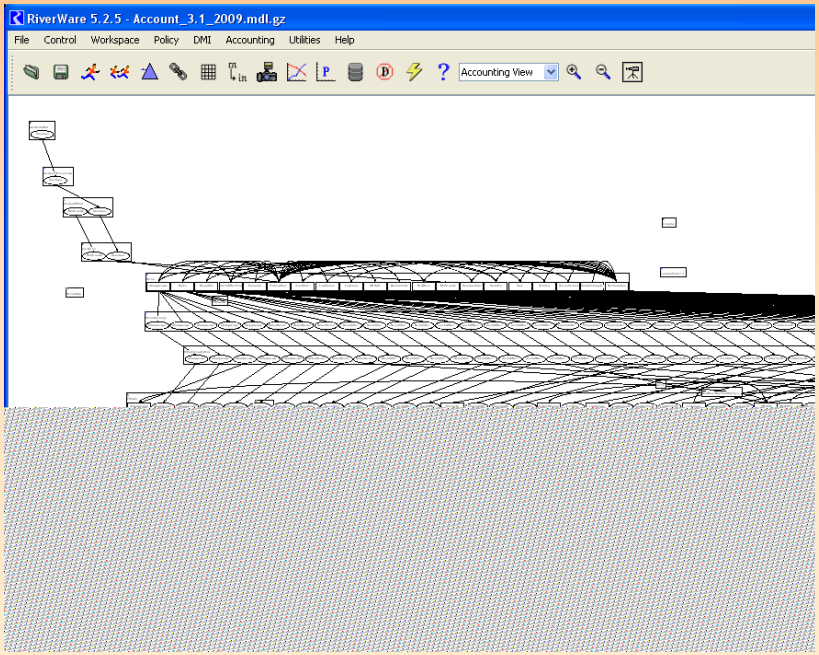
Accounting Model Updates

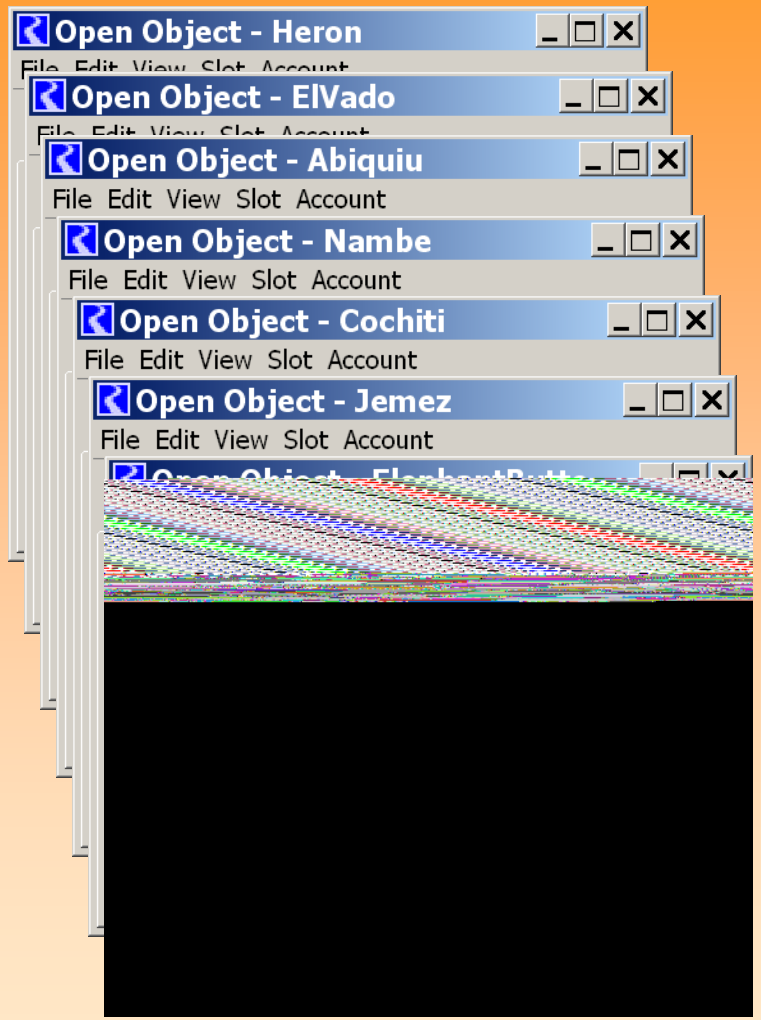


URGWOM Technical Review

October 14, 2010

Accounting Model Review

- The Accounting Module of URGWOM is used by Reclamation and the Corps daily to:
  - Catalog operational reservoir and reach data in the Middle Rio Grande from Heron Reservoir to Caballo Reservoir and calculate: storages, reservoir inflows, losses and ungaged tributary inflows.



Accounting Model Review - Inputs

- Actual data for upstream inflows, reservoir releases, and deliveries for individual accounts are input by the model user at a daily interval.
  - Model calculations are completed through yesterday's date.
  - Account storages at each reservoir are computed.
  - Established reservoir accounting loss methods are included.

SCT reservoirdataSCT2.0.sct (Account_3.1_2009.mdl.gz)

File Edit Slots Aggregation View Config DMI Run Diagnostics Go To

Series Slots | Scalar Slots | Other Slots

Slot Label	Units	5/09	9/16/09 Wed	9/17/09 Thu	9/18/09 Fri	9/19/09 Sat	9/20/09 Sun	9/21/09 Mon	9/22/09 Tue	9/23/09 Wed
Heron.Pool Elevation	feet	7167.45	7167.10	7166.75	7166.43	7166.09	7165.74	7165.34	7165.00	7164.62
Heron.Outflow	cfs	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00
Heron.Pan Evaporation	in/day	0.15	0.15	0.20	0.11	0.19	0.20	0.20	0.26	0.15
Heron.Surface Ice Coverage	decimal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heron.Precipitation Rate	in/day	0.02	0.02	0.05	0.01	0.29	0.30	0.30	0.00	0.00
Heron.Max Air Temperature	F									
Heron.Min Air Temperature	F									
Azotea Tunnel	acre-feet/	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LowerWillowCrk	acre-ft/da	9.80	5.60	3.20	1.60	1.20	1.10	2.70	1.50	0.90
Heron.Storage	acre-ft	99792.94	298046.48	296306.00	294721.86	293039.25	291319.13	289352.27	287691.00	285839.00
ElVado.Pool Elevation	ft	6876.07	6876.56	6876.94	6877.53	6878.15	6878.74	6879.27	6879.84	6880.27
ElVado.Outflow	cfs	443.00	407.00	288.00	204.00	147.00	147.00	147.00	205.00	302.00
ElVado.Pan Evaporation	in/day	0.090	0.070	0.200	0.070	0.160	0.160	0.160	0.290	0.110
ElVado.Surface Ice Coverage	decimal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ElVado.Precipitation Rate	in/day	0.17	0.01	0.01	0.14	0.05	0.06	0.06	0.00	0.00

Accounting Model Review - Inputs

- Typical deliveries input to the Model include:
  - releases of ABCWUA San Juan-Chama Project water to their surface water diversion,
    - (The name “Albuquerque” used for ABCWUA accounts in the model).
  - releases of MRGCD San Juan-Chama Project water,
  - releases of Reclamation’s leased San Juan-Chama Project water for Biological Opinion (BO) compliance,
  - movement of San Juan-Chama Project water to the Cochiti Recreation Pool,
  - letter water deliveries by contractors for San Juan-Chama Project to payback the river for depletions in the basin,
  - releases of P&P water for the six Middle Valley pueblos, and
  - releases of Emergency Drought water.

Accounting Model Review - Inputs

- Transfers between accounts at reservoirs are input
  - e.g. native Rio Grande water at El Vado Reservoir designated for P&P storage or Emergency Drought storage or
  - leases of contractor San Juan-Chama Project water by Reclamation.
- Releases of native Rio Grande water at each dam are reconciled as the total reservoir outflow minus individual releases from other reservoir accounts
  - Storage of native Rio Grande water updated.

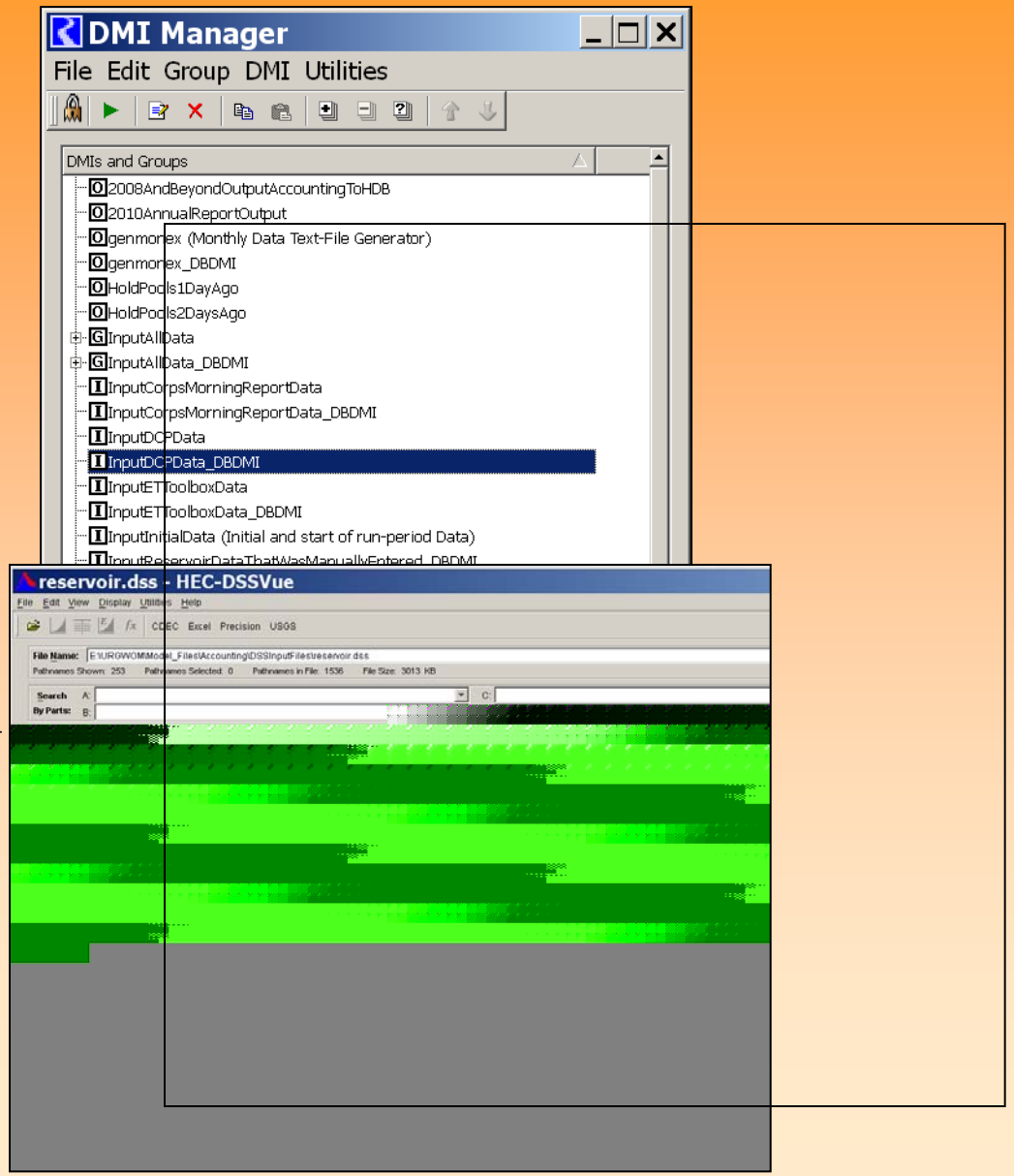
Accounting Model Review - Operations

- Actual deliveries are determined prior to running the model through communication with the Corps, Reclamation, MRGCD, ABCWUA, and other users.
  - After the needs for water from Heron, El Vado, Abiquiu, and Cochiti Reservoirs are determined through interagency communication with facility operators,

    ➔ total outflows are determined and needed gate changes at the dams are called in to damtenders.
- Operations conducted through coordination with the Accounting Model user.
- Resulting total releases are evident in the data imported to the model on the following day.

Accounting Model Enhancements

- Model simulations are now completed with RiverWare on a PC / Microsoft Windows platform
- Formerly used a Sun Workstation / Solaris Unix platform
- Switch to PC was enabled by directly interfacing accounting model input / output data slots with HEC-DSS database files on the PC platform.



Accounting Model Enhancements New Database DMIs

- New RiverWare database DMIs were established to replace control file/executable DMIs that ran on Solaris.
  - DMIs are used to import/export values from/to DSS files.
  - The new database DMIs enable Reclamation to use the Microsoft Windows (PC) version of RiverWare rather than the Solaris version of RiverWare
    - resulting in decreased model runtime;
    - allowing faster iterations by the model user to determine the releases needed to converge on downstream constraints, such as storage allotments or delivery requirements; and
    - providing the ability to cut, copy, and paste directly between RiverWare and other PC based applications such as Microsoft Excel.

Accounting Model Enhancements Database File Transfers

- RiverWare now interacts with data files on Reclamation's local area network (LAN).
- Reclamation's Sun workstation is still used for file transfers with the Corps.
- File transfers between Sun workstation and LAN at Reclamation are now accomplished using the non-proprietary WinSCP program and batch files.
  - ➔ File transfers are accomplished in Secure Shell (SSH) with automated WinSCP scripts called by batch files.
  - ➔ Eventually, WinSCP should be replaced by direct drive mapping or another approach for sharing files between the Corps and Reclamation (e.g. a virtual private network (VPN).

DAILY ACCOUNTING MODEL FILE TRANSFER OVERVIEW

Corps script files update DSS files on the Reclamation Sun daily with reservoir and stream accounting information.

Accounting Model and DSS Files are downloaded onto Reclamation Local Area Network in the morning.

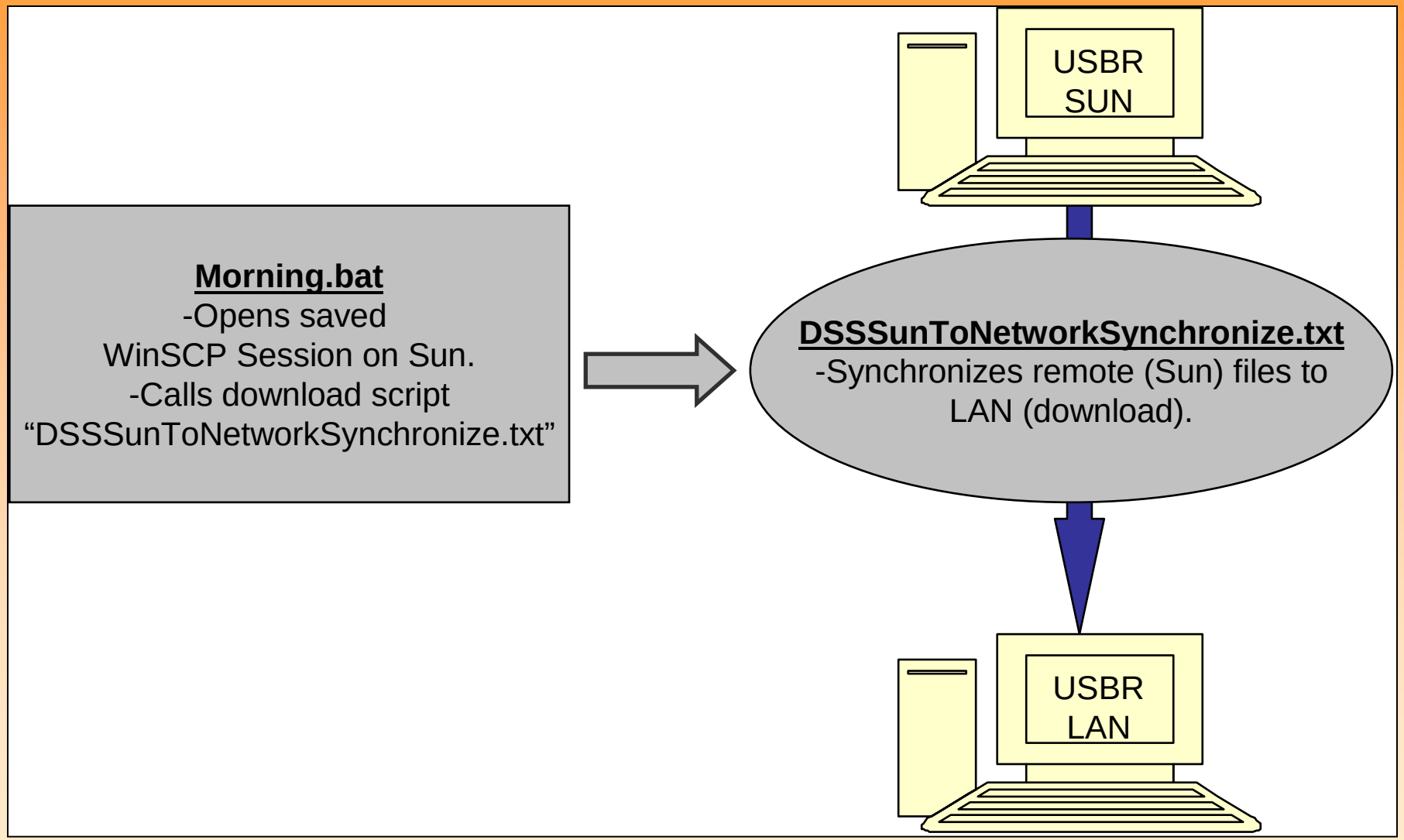
Accounting Model is updated using DMIs and hand entered information.

Updated Accounting Model and DSS Files are uploaded onto Reclamation Sun in the afternoon.

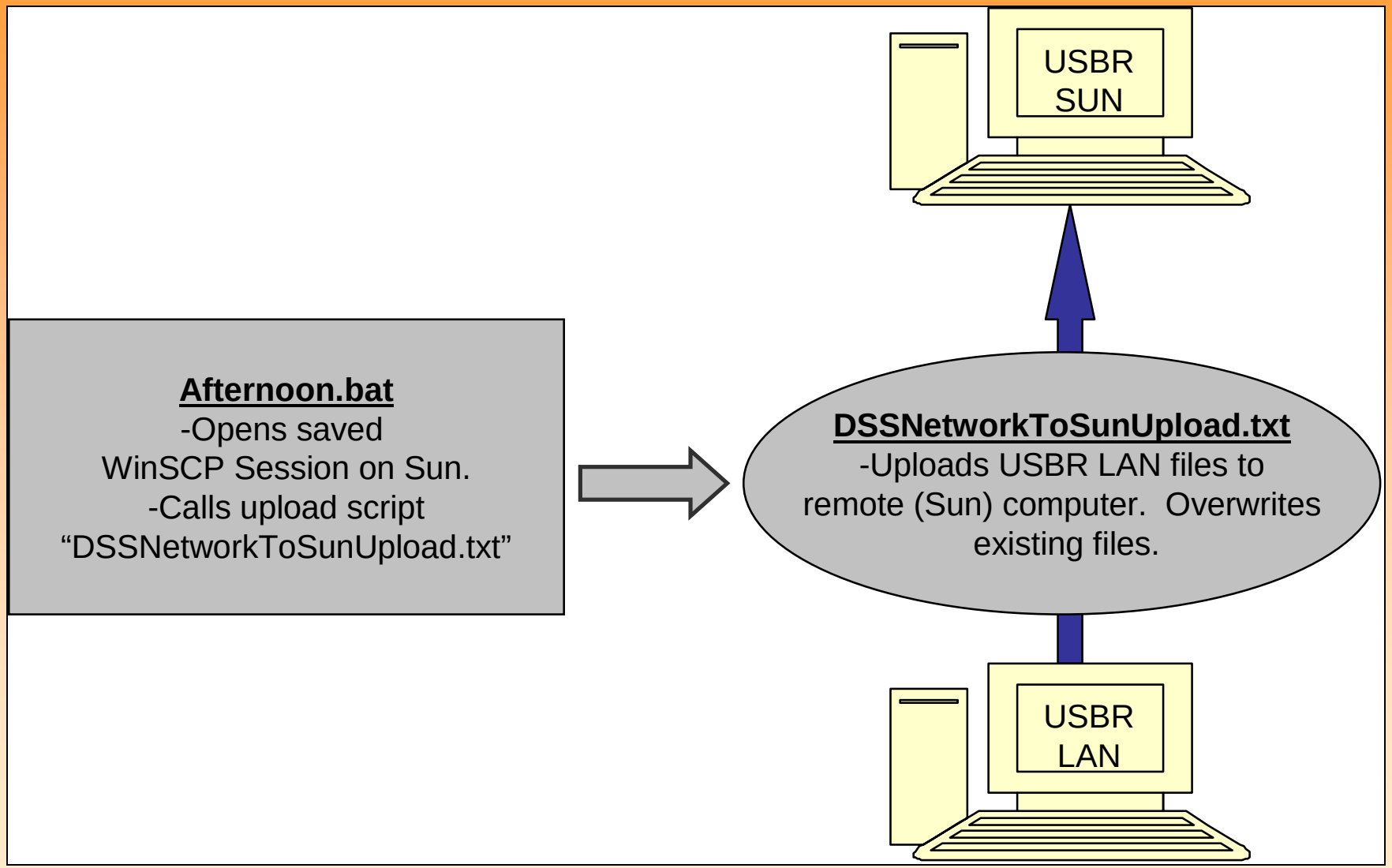
Accounting Model Enhancements Database File Transfer with Win SCP Scripts

- Two WinSCP scripts and two batch files are used to download and upload files between the model user's machine and the Reclamation LAN.
  1. For download, a batch file called morning.bat is executed.
     - This batch file calls a script which copies data files from the Sun to the LAN (existing files are only overwritten if the copied files are newer).
  2. For upload, the afternoon.bat file is executed.
     - This batch file calls a script that overwrites data files on the Sun with the files from the LAN.
- Batch files are run manually by the model user.

Win SCP Scripts – *Morning Download*



Win SCP Scripts – *Afternoon Upload*



Annual Accounting Reports

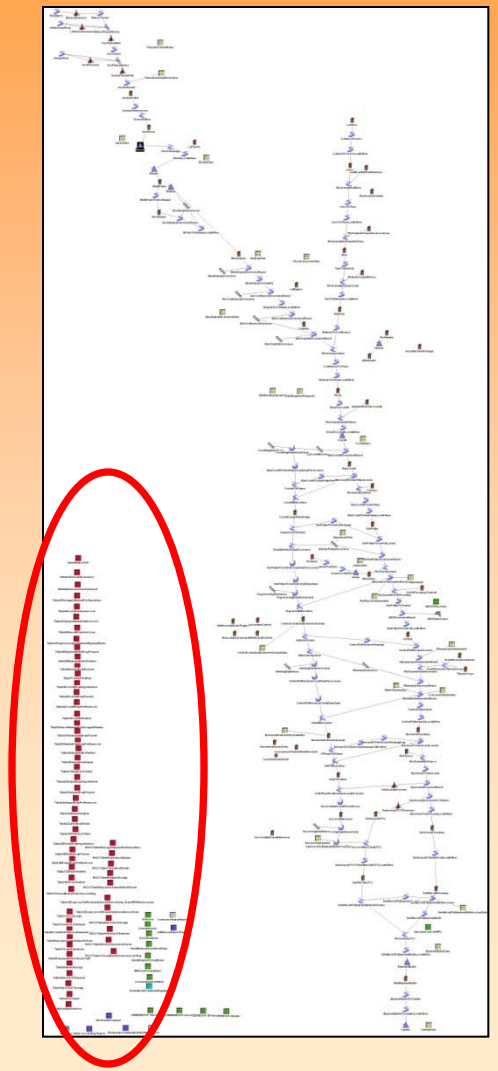
- Annual Accounting Reports are generated each year for the Engineer Advisors to the Compact Commission.
- Numerous tables are included
  - that summarize deliveries, transactions, and the status of accounts for the past year on a monthly basis
  - and with details on how depletions are apportioned between imported San Juan-Chama versus native Rio Grande water.
- The amount of presented information in the annual reports has increased over the years.

Accounting Model Enhancements

- Calculations for summary accounting tables used in the annual reports to the Engineer Advisors and Rio Grande Compact Commission were completely integrated into the URGWOM Accounting Module in *Expression Slots*.
- The overall process for developing summary accounting tables for annual reports was simplified.
- Accounting model output data used for annual and daily reports are now archived in Reclamation's HDB database and can be retrieved using automated report tables – daily reports are used now and annual report templates will be implemented next year.

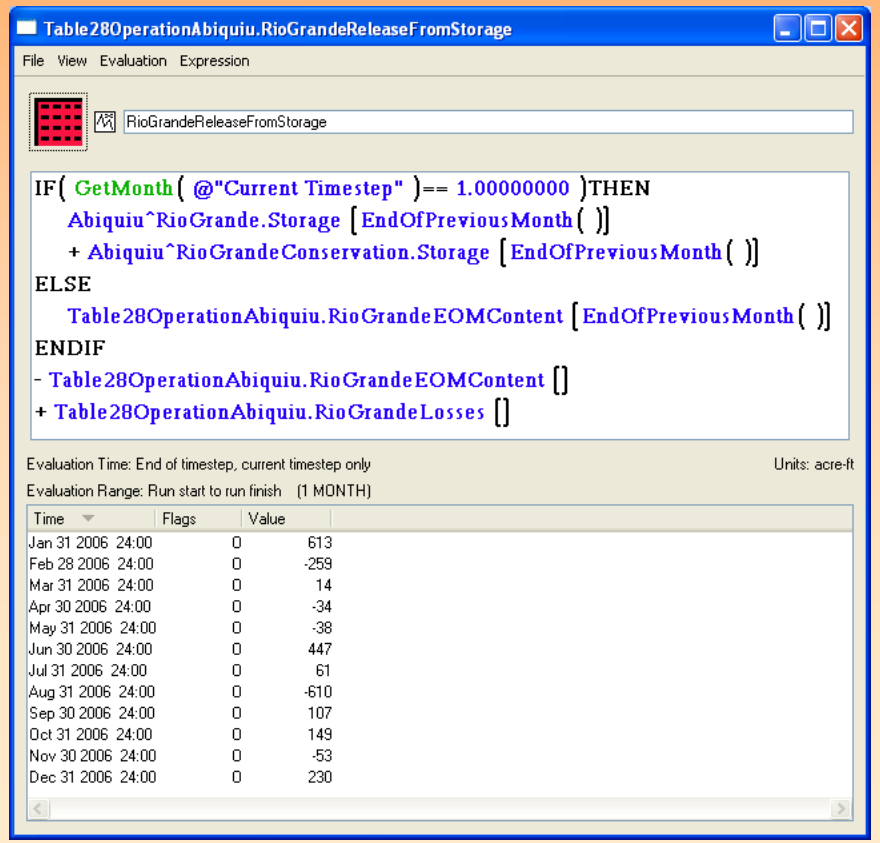
New Expression Series Slots

- RiverWare expression series slots were set up in the Accounting Model to evaluate needed values for annual accounting reports.
  - Expressions were validated using models for 2005, 2006, and 2007.



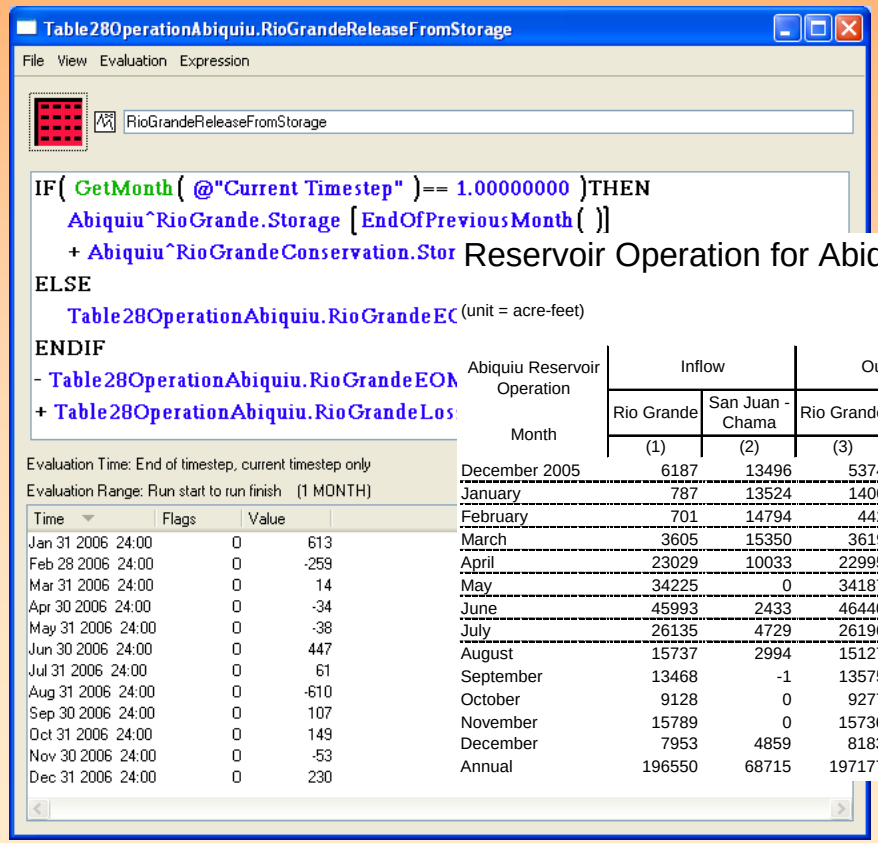
New Expression Series Slots

- Separate data objects were set up for each table in the annual report with an expression series slots used to compute values needed for each column in a table.



Time	Flags	Value
Jan 31 2006 24:00	0	613
Feb 28 2006 24:00	0	-259
Mar 31 2006 24:00	0	14
Apr 30 2006 24:00	0	-34
May 31 2006 24:00	0	-38
Jun 30 2006 24:00	0	447
Jul 31 2006 24:00	0	61
Aug 31 2006 24:00	0	-610
Sep 30 2006 24:00	0	107
Oct 31 2006 24:00	0	149
Nov 30 2006 24:00	0	-53
Dec 31 2006 24:00	0	230

- Evaluation Range – Monthly
- Solve at End of Timestep
- Reference Model Output
- Few Remaining Hand-Entered Values



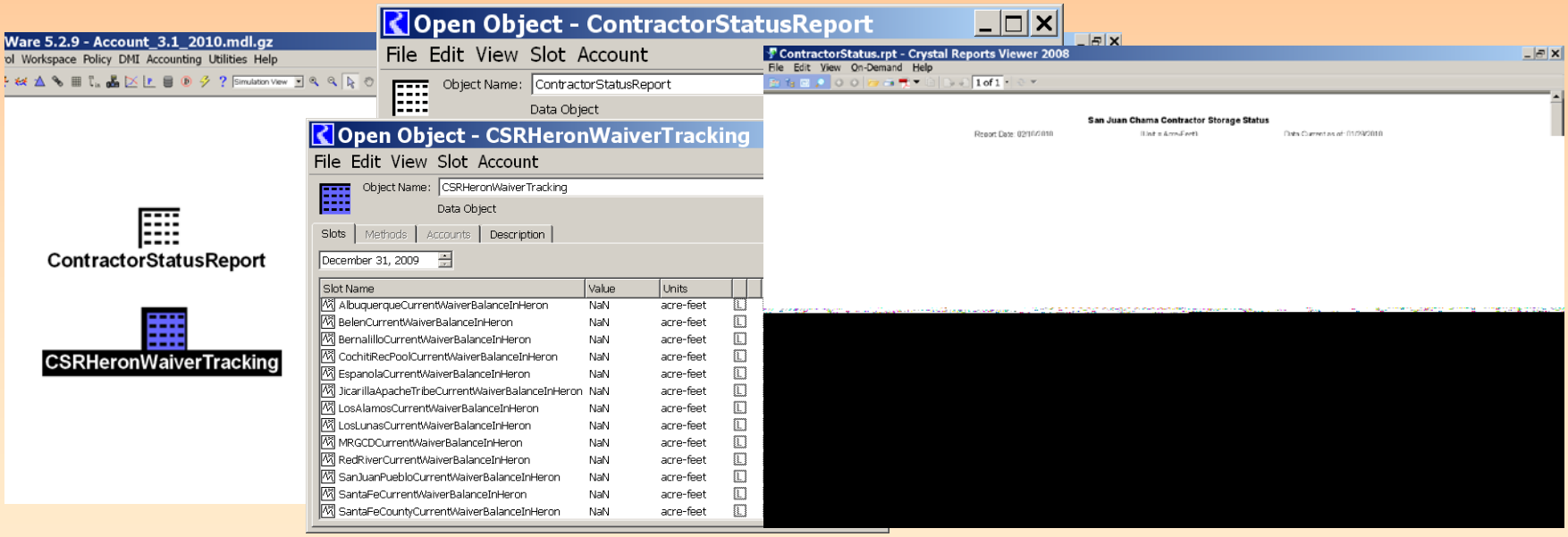
Reservoir Operation for Abiquiu Dam -- 2006

(unit = acre-feet)

Abiquiu Reservoir Operation	Inflow		Outflow		Losses		EOM Content				Release from Storage		Total Release
Month	Rio Grande	San Juan - Chama	Rio Grande	San Juan - Chama	Rio Grande	San Juan - Chama	Sediment	Rio Grande	San Juan - Chama	Total	Rio Grande	San Juan - Chama	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)			
December 2005	6187	13496	5374	2888	2	243	1727	660	131732	134119	-813	-10608	8262
January	787	13524	1400	1557	0	290	1728	48	143409	145185	613	-11967	2957
February	701	14794	442	707	-1	408	1732	305	157088	159125	-259	-14087	1149
March	3605	15350	3619	3894	0	823	1737	291	167721	169749	14	-11456	7513
April	23029	10033	22995	7160	6	1427	1755	331	169167	171253	-34	-2873	30155
May	34225	0	34187	6433	0	2131	1774	370	160603	162747	-38	6433	40620
June	45993	2433	46440	9598	4	2054	1818	-73	151384	153129	447	7165	56038
July	26135	4729	26196	1598	10	1329	1836	-123	153186	154899	61	-3131	27794
August	15737	2994	15127	0	9	804	1843	495	155376	157714	-610	-2994	15127
September	13468	-1	13575	1408	-2	969	1846	386	152998	155230	107	1409	14983
October	9128	0	9277	90	-1	793	1847	236	152115	154198	149	90	9367
November	15789	0	15736	0	0	500	1851	289	151615	153755	-53	0	15736
December	7953	4859	8183	1310	0	-300	1852	62	155464	157378	230	-3549	9493
Annual	196550	68715	197177	33755	25	11228							

Heron Waiver Tracking and the Contractor Status Report

- Waiver water in storage now tracked in the model.
- SJC Contractor water movement tracked in a single data object.
- Used to produce a daily Contractor Status Report through HDB and Crystal Reports.



Documentation and User Manual

- Detailed documentation was prepared for the
  - new database DMIs and data transfer approach and
  - all the new expression series slots.
- A user manual was developed with background information on operations and the model set up.
  - Detailed steps are included for running the Accounting Model each day.

Accounting Model Enhancements *Being Implemented or Under Development:*

- A new annotations capability is available in RiverWare for keeping notes of deliveries, transfers, and exchanges.
- Accounting Model input interface with Reclamation's HDB database.

Green Book Entries

- Notes about all deliveries, transfers, and exchanges are maintained in Reclamation’s handwritten Green Book.
  - Includes details of the volume, source, and destination for any deliveries or exchanges.
- A new RiverWare capability was created by CADSWES to set up notes directly within the model.

Other Accounting Model Enhancements and Updates

- ✓ Added Albuquerque Water User Diversion
- ✓ Added Santa Fe County and Reclamation Accounts in Heron
- ✓ Added Santa Fe (City) and Reclamation Accounts in Elephant Butte
- ✓ Recoded San Juan-Chama Loss to Elephant Butte in RPL
- ✓ Added Caballo Reservoir
- ✓ Updated ACAP Tables at El Vado, Elephant Butte, and Caballo

Steps to Complete Simulations

1. Run the morning.bat file.
2. Open the model – reset the Run Control to simulate through yesterday.
3. Run all input DMIs.
4. Enter data using the reservoir data SCT.
5. Set all accounting supplies as needed.
6. Run the model.
7. Check the reconciled Rio Grande releases and storage.
8. Make required adjustments as needed – rerun the model.
9. Record deliveries in the Green Book ➔ RiverWare annotations
10. Run the output DMIs – Save – Exit.
11. Run the afternoon.bat file.