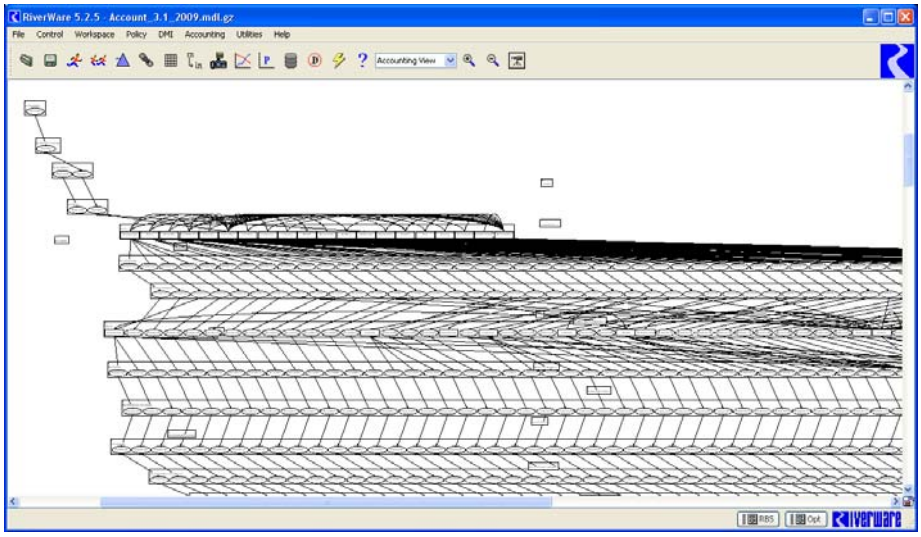
URGWOM
Accounting Model User Manual
version 3.1



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Executive Summary

A user manual for the accounting module of the Upper Rio Grande Water Operations Model (URGWOM) is presented that includes background information on operations and numerous considerations when coordinating actual operations with day-to-day accounting completed with the Accounting Model. The model is used by the Bureau of Reclamation (Reclamation) for updating the status of accounts for contractors for San Juan-Chama Project water and other water users in the Rio Grande Basin where data are input daily and simulations are completed through yesterday's date to complete after-the-fact accounting.

Steps to complete simulations with the Accounting Model include running script files to access up-to-date reservoir data from the U.S. Army Corps of Engineers (Corps) and using the data management interface (DMI) in the Accounting Model to import the data for dam releases, reservoir pool elevations, and weather data. Additional reservoir values are hand-entered using a Simulation Control Table (SCT) in the RiverWare software application used for the Accounting Model. Numerous accounting supplies are set throughout the year for the deliveries for water users.

Deliveries include releases of Albuquerque Bernalillo County Water Utility Authority (ABCWUA) San Juan-Chama Project water to their surface water diversion and releases of Middle Rio Grande Conservancy District (MRGCD) San Juan-Chama Project water for meeting their diversion needs after native supplies have been exhausted. Other deliveries include the release of Reclamation's leased San Juan-Chama Project water for Biological Opinion (BO) compliance, the movement of San Juan-Chama Project water to the Cochiti Recreation Pool, and letter water deliveries by contractors for San Juan-Chama Project to payback the river for depletions in the basin. Deliveries may also include the release of native Rio Grande water from Prior and Paramount (P&P) storage for the six Middle Valley pueblos or from Emergency Drought storage. Transfers between accounts are also input for native Rio Grande water at El Vado Reservoir designated for P&P storage or Emergency Drought storage or for the lease of contractor San Juan-Chama Project water by Reclamation. The status of accounts is determined in the model using established reservoir accounting methods and accounting loss rates applied to deliveries of San Juan-Chama Project water.

After simulation results are checked including the reconciled releases of Rio Grande water, a run is finalized for the day. Releases of native Rio Grande water are reconciled each day in the model using established methods in the model as the total reservoir outflow minus the input deliveries from the other accounts and the storage of native Rio Grande water is updated. Tools are available to prepare annual accounting reports at the end of the calendar year.

I. Introduction

The accounting module of the Upper Rio Grande Water Operations Model (URGWOM) is used by the Bureau of Reclamation's Albuquerque Area Office (Reclamation) for updating the status of accounts for contractors for San Juan-Chama Project water and other water users in the Rio Grande Basin in New Mexico (Figure 1.1). URGWOM was developed using the RiverWare software application developed by the Center for Advanced Decision Support for Water and Environmental Systems (CADSWES) at the University of Colorado at Boulder. RiverWare is a software package used for simulating reservoir operations and includes the capability for modeling complex water accounting configurations. RiverWare has been used to set up models for the Rio Grande basin in New Mexico, including the Accounting Model.

Simulations are completed with the Accounting Model where data are input daily and model runs are completed through yesterday's date to complete after-the-fact accounting. Water in storage at the different reservoirs in the basin is designated to different storage accounts in the Accounting Model with the storage for each account updated daily. Daily data for total reservoir outflows and reservoir pool elevations are imported and the deliveries for each account are hand-entered in the model. The resulting storage for each account is then computed during the simulation.

Deliveries include releases of Albuquerque Bernalillo County Water Utility Authority (ABCWUA) San Juan-Chama Project water to their surface water diversion and releases of Middle Rio Grande Conservancy District (MRGCD) San Juan-Chama Project water for meeting their diversion needs after native supplies have been exhausted (Note that the name "Albuquerque" is used for the ABCWUA accounts in the model). Other deliveries include the release of Reclamation's leased San Juan-Chama Project water for Biological Opinion (BO) compliance, the movement of San Juan-Chama Project water to the Cochiti Recreation Pool, and letter water deliveries by contractors for San Juan-Chama Project to payback the river for depletions in the basin. The status of accounts is determined in the model using established reservoir accounting methods and accounting loss rates applied to deliveries of San Juan-Chama Project water (URGWOM Tech Team, 2005).

Hand-entered deliveries may also include the release of native Rio Grande water from Prior and Paramount (P&P) storage for the six Middle Valley pueblos or from Emergency Drought storage. Transfers between accounts are also input for native Rio Grande water at El Vado Reservoir designated for P&P storage or Emergency Drought storage or for the lease of contractor San Juan-Chama Project water by Reclamation. Releases of native Rio Grande water are reconciled each day in the model using established methods in the model as the total reservoir outflow minus the input deliveries from the other accounts and the storage of native Rio Grande water is updated (URGWOM Tech Team, 2005).

Actual deliveries for water users are determined prior to running the Accounting Model through communication with MRGCD, ABCWUA, Reclamation, and other contractors

and after the need for movement of water from Heron, El Vado, and Abiquiu Reservoirs has been determined through interagency communication with facility operators, total outflows are determined and needed gate changes at the dams are called in to damtenders. Operations are conducted through coordination with the Accounting Model user. Resulting total releases will then be evident in the total outflows imported to the model on the following day.

Running the Accounting Model each day entails running script files to access up-to-date reservoir data from the U.S. Army Corps of Engineers (Corps) and using the data management interface (DMI) in the Accounting Model to import the data for dam releases, reservoir pool elevations, and weather data. Additional reservoir values are hand-entered using a Simulation Control Table (SCT). Accounting supplies are then set each day for the deliveries for water users. After results are checked including the reconciled releases of Rio Grande water, a run is finalized for the day. Tools are available to prepare annual accounting reports at the end of the calendar year.

Note that this user manual is written for model users that have received RiverWare training and are able to navigate through RiverWare fairly efficiently including all the DMI and accounting capabilities. This user manual is not meant to serve as a manual for using the RiverWare software application.

Figure 1.1. Rio Grande Basin Map

II. Water Uses and Other Considerations

Water allocated to several different water users is tracked in the Accounting Model each day. These include water uses by all the different contractors for San Juan-Chama Project water and special uses of native Rio Grande water. Tracking water for the different uses in separate accounts includes representation of storage of allocated water for each user and releases of that water to meet the water user's demands but also includes transfers between water users and negotiated exchanges. Decisions about actual operations are set prior to running the model but include consideration for the movement of water to meet all the different water user's demands and implementing potential exchanges. These decisions are made with consideration for all operational and legal constraints. All of these considerations are discussed below for each reservoir. A model user must have good general background knowledge of all of these topics to be involved with day-to-day operations and for consideration when setting accounts in the model each day.

2.1. Heron Reservoir

Actual diversions from the San Juan basin through the Azotea tunnel are input to the Accounting Model and the resulting inflows to Heron Reservoir, after losses between the tunnel outlet and Heron Reservoir, accumulate in the FederalSanJuan account at Heron Reservoir. Storage accounts are included at Heron Reservoir for each contractor for San Juan-Chama Project water based on the contractor name. A Begin Year Allocation is input by the model user for each contractor at the beginning of each calendar year with consideration for the full allocation for each contractor (Table 2.1) and whether the water is available in the FederalSanJuan account.

Native Rio Grande water is effectively bypassed at Heron Dam, but gate operations do not entail making daily adjustments to releases to bypass inflows each day. Operations entail adjusting the release of native Rio Grande water during the runoff every few days such that storage of Rio Grande water does not accumulate at the reservoir. During other times of the year, inflows of native Rio Grande water are small, so generally, no native Rio Grande water is released until some threshold storage amount is reached as determined informally by Reclamation, and the accumulated Rio Grande water is then evacuated to El Vado Reservoir in a short duration release. Releases are set in this manner to effectively bypass Rio Grande water but also assure operations are conducted in a practical manner.

Note that at the beginning of a calendar year, there is a 350 acre-ft adjustment set up as a transfer from the Rio Grande account to the FederalSanJuan account for transfer of water rights to offset evaporation and recreation impacts on the losses of San Juan-Chama Project water. This transfer is reflected in the December 31 initial conditions in an Accounting Model which are set up with reference to the final storage values from the

previous year's Accounting Model. Releases of native Rio Grande water may be set at the end of a year to finish the calendar year with 350 acre-ft of Rio Grande water in storage in anticipation of this end-of-year accounting adjustment.

Table 2.1. Allocations to Contractors for San Juan-Chama Project Water

Contractor	Allocation (acre-ft)
ABCWUA	48,200
MRGCD	20,900
Jicarilla Apache Nation	6500
Santa Fe	5230
Santa Fe County	375
Cochiti Rec Pool	5000
Department of Energy (Los Alamos)	1200
Pojoaque Valley Irrigation District (PVID)	1030
Espanola	1000
Belen	500
Town of Bernalillo	400
Town of Taos	400
Los Lunas	400
Red River	60
Twining	15
Uncontracted	2990
Ohkay Owingeh (f.k.a. San Juan Pueblo)	2000
TOTAL ALLOCATION:	96,200

Contractors may store current year allocated San Juan-Chama Project water at Heron Reservoir until the end of the calendar year unless Reclamation issues waivers that allow for that water to be stored at Heron until September 30th of the following year. This is typically done for contractors that will later lease their water to Reclamation to use to meet Endangered Species Act flow targets in the Middle Valley, but may also be allowed when the water will be used for other purposes. Waiver water is included with current year allocated water in the contractor storage accounts at Heron Reservoir, but waiver balances are tracked separately with expression series slots in a data object called HeronWaiverTracking based on the initial Carry Over Storage for each account and contractor water released from Heron Dam year-to-date.

As discussed further below, allocated water for contractors is released to meet their downstream demands such as letter water deliveries or to fill allocated storage space at El Vado or Abiquiu Reservoirs. Some contractors may lease their water to Reclamation to use for Biological Opinion compliance.

2.1.1. Reclamation Leases

For this user manual, supplemental water is defined as water designated to be released to meet target flows in the Middle Valley for Biological Opinion compliance (Service, 2003). There are two sources for supplemental water: water may be leased by Reclamation from contractors for San Juan-Chama Project water or native Rio Grande water may be stored as Emergency Drought water at El Vado to be used for targets (Refer to section 2.2.3 for more details on Emergency Drought water). Leases of San Juan-Chama Project water by Reclamation from contractors are set up as transfers from the source account for the contractor to Reclamation's account. These transfers are usually implemented at Heron Reservoir, but may be enacted at El Vado or Abiquiu Reservoir. That water is then moved downstream from Heron Reservoir to available storage space for Reclamation. Contractors usually lease waiver water to Reclamation, so the water is generally leased before the September 30th waiver date and then must be moved downstream before September 30th.

2.1.2. Deliveries to Downstream Allocated Storage Space

Some contractors have allocated storage space at El Vado or Abiquiu Reservoirs for storage of San Juan-Chama Project water. Allocated water at Heron Reservoir is moved to available storage space before the end of the year or potentially before the waiver date, if the contractor has been granted a waiver to continue storing current year allocated water into the following year. Water is generally moved at Reclamation's discretion, such that water user demands can be met and to simply allow for the system to be operated in a practical manner.

MRGCD would generally prefer to receive current year allocated water at El Vado Reservoir after the runoff unless the water is needed sooner to meet their demand in the Middle Valley. Unless ABCWUA needs their water sooner to meet their demand for the surface water diversion, ABCWUA water is delivered throughout the year and may be moved in a manner to provide rafting flows below El Vado Dam. Rafting flows would generally be provided on weekends starting Memorial Day weekend or by the July 4th holiday through the Labor Day weekend. Reclamation's lease water or water allocated to other contractors that have allocated storage space at Abiquiu Reservoir may also be moved from Heron Reservoir to Abiquiu in a manner to augment rafting flows below El Vado Dam. Storage space at Abiquiu Reservoir is allocated up to a pool elevation of 6220 ft (Easement approvals from land owners are needed for storage above 6220 ft). Allocated storage space for individual contractors is presented in Table 2.2, but the space is adjusted each year by the Corps for estimated sedimentation at the reservoir.

Table 2.2. Contractor Allocated Storage Space at Abiquiu Reservoir

Contractor	Allocation (acre-ft)
ABCWUA	170,900
Santa Fe	6720
MRGCD	2000
Los Alamos	1439
Espanola	1199
Town of Bernalillo	480
Twining	18
TOTAL	182,756

Cochiti Rec Pool water is ideally moved during late June or early July to replace evaporation losses to the pool at Cochiti Lake and enhance fish and wildlife habitat in the Cochiti delta (Corps, 1996). The timing is set after the runoff when natural flows are preventing the release of San Juan-Chama Project water and before the summer when natural flows may be released from storage at Abiquiu Reservoir. Cochiti Rec Pool water is then also released in late October to refill the pool in a one-foot increment and again in November, December, and January to refill the pool in half-a-foot increments as needed.

Note that temporary exchanges may be implemented where a contractor may release water to meet another contractor's demand and that water is then paid back by the recipient as a delivery from the recipient's storage at Heron Reservoir or another reservoir to the original source contractor's storage account. These exchanges may be implemented to simply allow for actual operations to be conducted in a practical manner.

2.1.3. Letter Water Deliveries

Contractors for San Juan-Chama Project water may cause depletions in the basin and then use their allocated San Juan-Chama Project water to payback the river. Depending on when the original depletion occurred (irrigation season versus non-irrigation season), a payback may be a transfer from a contractor's account to MRGCD's account as a payback to MRGCD or a non-irrigation season release from the contractor's account for delivery to Elephant Butte Reservoir to effectively payback the Compact delivery. Paybacks are determined by the Office of the State Engineer using the regional groundwater model or based on water right permit requirements and the deliveries are requested as letters from the State to Reclamation, hence the name "letter water deliveries." Letters may identify a source location for a delivery, but generally, a transfer or release is set soon thereafter from the most practical location. The transfer or release from the account is set in the Accounting Model by the model user. Note that if a contractor has water in storage at El Vado or Abiquiu Reservoir, the water would ideally be delivered from that location. Alternatively, deliveries may be made directly from Heron Reservoir to MRGCD's account at El Vado Reservoir or released for delivery to Elephant Butte Reservoir depending on the payback location.

2.2. El Vado Reservoir

A storage account is included at El Vado Reservoir for MRGCD's San Juan-Chama Project water. Storage accounts also exist in the Accounting Model for other contractors that may lease storage space at El Vado Reservoir from MRGCD, but MRGCD has the primary storage allocation. Within the Accounting Model, Rio Grande releases reconcile during a simulation to reflect any potential release from storage, storage of inflows, or bypass of native inflows based on the actual total outflow and any San Juan-Chama Project water being bypassed or released from storage. The following factors should be considered when checking the reconciled release of native Rio Grande water.

2.2.1. Prior and Paramount (P&P) Storage

The storage and release of P&P water for the six Middle Rio Grande Valley pueblos (Cochiti, Santo Domingo, San Felipe, Santa Ana, Sandia, and Isleta) is tracked separately in the Accounting Model. A storage requirement is computed separately using a procedure completed through coordination between Reclamation, the Bureau of Indian Affairs (BIA), and the pueblos. Water is transferred from the Rio Grande account at El Vado Reservoir to an IndianStorage account in the Accounting Model based on the computed storage requirement where actual operations are conducted to store native Rio Grande water as needed prior to the transfer and assure water is available in El Vado Reservoir for P&P storage. The transfer would generally be made on May 1st in the model, but coordination between agencies may result in the transfer being implemented on a different date. Water is released from P&P storage, as set separately in the Accounting Model, if the flow from the mainstem combined with native flows from the Rio Chama would not meet the established demand for the pueblos as determined by the pueblos and the Designated Engineer at the BIA. Such a release would be made independently of the available supply for MRGCD. Unused P&P storage is transferred back to the Rio Grande account at the end of the irrigation season. This transfer may be implemented when initial conditions are set for a new Accounting Model for the following calendar year.

2.2.2. Article VII of the Rio Grande Compact

Article VII of the Compact (States of New Mexico, Colorado, and Texas, 1938) stipulates that water may not be stored in Reservoirs constructed after 1929 if there is less than 400,000 acre-ft of usable water in project storage where usable water is calculated as the sum of the water in storage at Elephant Butte Reservoir, not including any San Juan-Chama Project water or Compact credit water, plus the total water in storage at Caballo Reservoir. If Article VII is not in effect, native Rio Grande water is stored at El Vado Reservoir as *not* needed to meet the demand for MRGCD, Rio Chama Acequias below Abiquiu Dam, or the pueblos. Water is stored in a manner such that the reservoir can be filled at an appropriate time while also maintaining outflows that are less than the downstream channel capacity of 5000 cfs *throughout the runoff*. If Article VII is in

effect, inflows of native Rio Grande water are bypassed above the storage needed for P&P storage or any potential storage of Emergency Drought water. Some native Rio Grande water may be stored prior to the May 1st date when the magnitude of the P&P storage requirement is computed in anticipation of a transfer that will be at least 16,500 acre-ft.

2.2.3. Relinquished Credits and Storage of Emergency Drought Water

Article VII of the Compact also allows New Mexico to relinquish Compact credits to Texas to allow storage of native Rio Grande water at El Vado Reservoir for such purposes as Emergency Drought water for MRGCD and Reclamation. The allocations to MRGCD are used to meet their diversion demand in the Middle Valley, and allocations to Reclamation are used for meeting Biological Opinion requirements. Allocations for storage may not be used by MRGCD or Reclamation until the water is needed. When MRGCD or Reclamation decides to use the allocation, inflows of native Rio Grande water are stored under Article VII, and the water is transferred in the Accounting Model to the MRGCDDrought or SupplementalESA accounts at El Vado Reservoir. MRGCD will generally use Emergency Drought water after native Rio Grande supplies stored at times when stipulations of Article VII were not in effect are exhausted, and Reclamation will use Emergency Drought water to meet targets in the Middle Valley before using any available leased San Juan-Chama Project water.

2.3. Abiquiu Reservoir

Storage accounts are included at Abiquiu Reservoir for allocated storage space for ABCWUA, Santa Fe, MRGCD, Los Alamos, Espanola, Twining, and Bernalillo as previously listed in Table 2.2 with storage of Cochiti Rec Pool water also possible. Other contractors may temporarily lease space from those with the primary storage space allocations. The pool for MRGCD serves as an operating pool to facilitate the movement of MRGCD water from El Vado Reservoir through Abiquiu Reservoir to the Middle Valley. Reclamation's storage of leased San Juan-Chama Project water at Abiquiu Reservoir is tracked with the Reclamation storage account. Reclamation water is used to meet target flows, and ABCWUA water is used for the surface water diversion and to offset the impacts of historic groundwater pumping (i.e. any letter water deliveries). All other contractors' sole use water is represented as letter water deliveries as discussed in section 2.1.3.

Rio Grande releases reconcile during a simulation to reflect any potential release from storage, storage of inflows, or bypass of native inflows based on the actual total outflow minus any San Juan-Chama Project water being bypassed or released from storage. Native Rio Grande water is bypassed at Abiquiu Reservoir but may be stored if needed to limit flow below the dam to 1800 cfs (and 3000 cfs at Chamita and 10,000 cfs at Otowi). Note that no San Juan-Chama Project water would be released if operations are conducted for downstream channel capacities. Stored Rio Grande water may be locked

in storage until after the irrigation season as carryover storage, but this operation is conducted through coordination with the Corps.

2.4. Cochiti Lake

San Juan-Chama Project water is not stored at Cochiti Lake except for Cochiti Rec Pool water, so any release of San Juan-Chama Project water would be a bypass of flows from upstream. Rio Grande releases reconcile during a simulation based on the actual total outflow minus any San Juan-Chama Project water being bypassed. Rio Grande water is generally bypassed unless storage is required to maintain flows under the downstream channel capacities at the Central Avenue gage in Albuquerque or at the San Marcial railroad bridge. Carryover storage is possible at Cochiti Lake. Native Rio Grande water may also be stored for Cochiti deviations if implemented. Operations for Cochiti deviations are conducted by the Corps, and any resulting storage is reflected in the Rio Grande storage account at Cochiti Lake in the Accounting Model.

2.5. Elephant Butte Reservoir

Separate accounts are included in the Accounting Model for the New Mexico Compact credit and the Colorado credit. Adjustments to the storage in the Rio Grande and Compact credit accounts are made based on the annual Compact calculations and are reflected in the initial December 31 conditions in the Accounting Model as set up with reference to the previous year's Accounting Model. Transfers may be implemented within the year from the Compact credit account to the Rio Grande account if there is a Compact credit relinquishment as communicated by the New Mexico Interstate Stream Commission (ISC). Storage in the Rio Grande account is equal to the total reservoir storage minus any San Juan-Chama Project water in storage and minus any positive storage in the Compact credit accounts. Any tracked Compact debt, as negative storage in the Compact credit account, would not affect the amount of water in the Rio Grande account (i.e. the amount of water in the Rio Grande account cannot exceed the total reservoir storage).

Storage accounts for ABCWUA and Santa Fe are included at Elephant Butte Reservoir in the Accounting Model that would be used to reflect storage of contractor San Juan-Chama Project water delivered from upstream that would later be exchanged for Rio Grande water by on-site depletions or in upstream reservoirs above the location of the contractor's actual water use. Such exchanges have been implemented to allow continued storage of San Juan-Chama Project water by contractors when the space is not available upstream and is tracked in the Accounting Model. Such operations would be communicated to the model user by Reclamation.

III. Inputs and Model Set Up

The Accounting Model is usually run each business day by a designated expert at Reclamation. Setting up and running the Accounting Model each day entails running batch files for Reclamation to obtain up-to-date needed information from the Corps' system. Database Data Management Interfaces (DMIs) in the current model are invoked to import needed information from the updated database files. Database files have the format of the Corps of Engineers Hydrologic Engineering Center's Data Storage System (DSS). An established Simulation Control Table (SCT) is used with the model to input reservoir data that must be hand-entered or filled with dummy data. Accounting supplies that represent water user deliveries or transfers are set manually by the model user. After a run has been completed with all inputs set appropriately, an output DMI is run to export results to the database files, and a batch file is executed to send the updated database files back to the Corps' system. Refer to Appendix A for a list of steps to be completed to run the Accounting model each day with detailed discussion on aspects of the different steps provided below:

3.1. Batch Files

Script files are executed regularly on the computer system at the Corps' Albuquerque District Office to transfer updated database files from the Corps' system to Reclamation's Sun Microsystems UNIX machine as needed. A batch file called morning.bat is executed by the model user at Reclamation's office that will then transfer the files from Reclamation's UNIX machine to Reclamation's local area network (LAN) if the files on Reclamation's Sun machine are newer. After an Accounting Model simulation has been completed using the updated data and after output DMIs have been executed to update the database files on Reclamation's LAN with the model output, another batch file called afternoon.bat is executed by the model user to copy the updated DSS files from the LAN to overwrite the files on Reclamation's UNIX machine. Also, the script files that run regularly on the Corps' system will recognize the updated Accounting Model on Reclamation's system and pull the model file over to the Corps' system. Refer to the URGWOM Accounting Module DSS Database DMI Documentation by Stockton (2009) for detailed discussion on the data transfer process and the code used in the batch files written as scripts with the WinSCP software package.

3.2. DMIs

Database DMIs are established in the Accounting Model to import data for completing a run and exporting output to database files after a simulation has been completed. DMIs are included in separate groups within the model, and the model user executes multiple input or output DMIs at once by invoking the respective group.

3.2.1. Input

Before input DMIs are executed to import needed inputs to complete the Accounting Model run for the day, the Run Control in RiverWare must be adjusted to simulate from the Start Timestep of January 1st of the current year through a Finish Timestep *set to yesterday's date*. The model user then clicks on the button with the green check to accept the change to the simulation period.

After the morning.bat batch file has been executed, four input database DMIs are all invoked at once by running the DMI group called InputAllData_DBDMI. The four DMIs (InputCorpsMorningReportData_DBDMI, InputDCPData_DBDMI, InputETToolboxData_DBDMI, and InputYearLongFillInData_DBDMI) import updated data for the following: all the reservoirs in the system, needed USGS gaged flows, crop consumption and open water evaporation values from the ET Toolbox (Reclamation, 2010), and fill-in data for needed inputs where actual data are not available yet. Refer to the URGWOM Accounting Module DSS Database DMI Documentation by Stockton (2009) for detailed discussion on the source for data and the slots in the Accounting Model set with these input DMIs. Note that a separate fifth input database DMI called InputReservoirDataThatWasManuallyEntered_DBDMI is included in the model that has been used historically to import reservoir data that had already been manually input and need to be imported again to a new model where the setup process is being repeated. This DMI is not currently used and would need to be reviewed if it is to be used again.

3.2.2. Output

After an Accounting Model run has been completed for the day with all the appropriate inputs, output is exported to the DSS files using two output DMIs. Both DMIs are invoked by running the DMI group called OutputAllInputData_DBDMI. The two DMIs, OutputReservoirDataDBDMI and OutputSJAccountingData_DBDMI, export data that were hand-entered, values computed in the model to be imported for subsequent simulations, or results to be archived.

3.3. SCT

An SCT is used to hand-enter data that may have been faxed to Reclamation or provided by some other means. SCTs are separate files that are opened in RiverWare by selecting the file name under Utilities – SCT – Open SCT in the RiverWare menu.

The reservoirdataSCT2.0.sct file is used to hand-enter values missing for the last timestep (Refer to Figure 3.1 for a screen capture of the SCT in RiverWare). A list of values that may need to be entered is included in Table 3.1 with a source location for the data. Note that the outflows from Heron and El Vado Reservoir from the referenced fax sheet (actually obtained by file transfer within Reclamation's system) may be overwritten with the values from the USGS data collection platform (DCP). (Refer to Appendix B for a

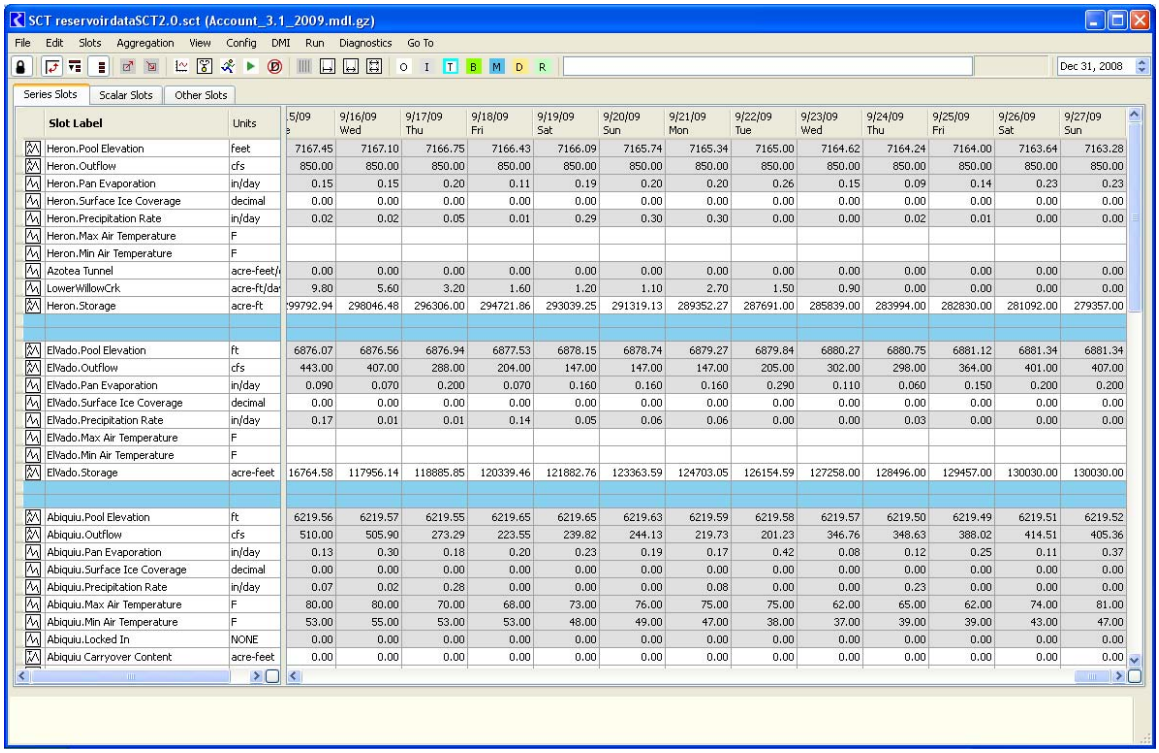
sample fax sheet referenced to obtain values that need to be hand-entered.) Pan evaporation values are not used in the winter at the upstream reservoirs since evaporation pans are often frozen, so temperature data are input for computing an evaporation rate during the winter. Values for Nambe Reservoir are faxed monthly, so dummy data are often used to complete simulations until actual data are available. Dummy data may also be used for Elephant Butte and Caballo Reservoirs if data are not yet available from Reclamation's El Paso office. The model will execute without Caballo data, but Elephant Butte data are required to complete a run. Reservoir outflows are overwritten with final USGS data monthly, but monthly Accounting Models with preliminary outflows are archived to maintain a record of the data available at the time reservoir operation decisions are made.

Table 3.1. Data to be Hand-Entered with the reservoirdataSCT2.0 SCT

Slot Label	Source for Data to be Hand-Entered
Heron.Pool Elevation	Fax sheet from file transfer [1]
Heron.Outflow	Fax sheet from file transfer [1, 2]
Heron.Pan Evaporation	Fax sheet; not needed from Nov-Mar when evap is computed
Heron.Surface Ice Coverage	Fax sheet; defaults to zero – reset as needed
Heron.Precipitation	Fax sheet from file transfer [1]
Heron.Max Air Temperature	Fax sheet; not needed from April-Oct when pan evap entered
Heron.Min Air Temperature	Fax sheet; not needed from April-Oct when pan evap entered
Azotea Tunnel	Fax sheet from file transfer [1]
LowerWillowCrk	Fax sheet from file transfer [1]
ElVado.PoolElevation	Fax sheet from file transfer [1]
ElVado.Outflow	Fax sheet from file transfer [1, 2]
ElVado.Pan Evaporation	Fax sheet; not needed from Nov-Mar when evap is computed
ElVado.Surface Ice Coverage	Fax sheet; defaults to zero – reset as needed
ElVado.Precipitation Rate	Fax sheet from file transfer [1]
ElVado.Max Air Temperature	Fax sheet; not needed from April-Oct when pan evap entered
ElVado.Min Air Temperature	Fax sheet; not needed from April-Oct when pan evap entered
Nambe.PoolElevation	Fax; *dummy data may be used*
Nambe.Outflow	Fax; *dummy data may be used* – reference USGS DCP value
Nambe.Pan Evaporation	Fax; *dummy data may be used*
Nambe.Surface Ice Coverage	Fax; defaults to zero – reset as needed
Nambe.Precipitation Rate	Fax; *dummy data may be used*
Nambe.Max Air Temperature	Fax; *dummy data may be used*
Nambe.Min Air Temperature	Fax; *dummy data may be used*
Elephant Butte.PoolElevation	If not faxed from El Paso; *dummy data may be used*
Elephant Butte.Outflow	If not faxed from El Paso; *dummy data may be used*
Elephant Butte.Pan Evaporation	If not faxed from El Paso; *dummy data may be used*
Elephant Butte.Precipitation Rate	If not faxed from El Paso; *dummy data may be used*

[1] Fax sheet with reservoir data actually sent by file transfer to Reclamation's system. The file is located on the Water Ops team drive in the ALB-CHAMA/FORMS/Daily Accounting Logs/Daily Accounting Logs 2010 directory

[2] Outflows from Heron and El Vado from the fax sheet (i.e. damtender records) may be used to overwrite original USGS DCP values. The fax sheet values may then be overwritten later with the final USGS data.



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	9/24/09 Thu	9/25/09 Fri	9/26/09 Sat	9/27/09 Sun
Heron.Pool Elevation	feet	7167.45	7167.10	7166.75	7166.43	7166.09	7165.74	7165.34	7165.00	7164.62	7164.24	7164.00	7163.64	7163.28
Heron.Outflow	cfs	850.00	850.00	850.00	850.00	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	0.09	0.14	0.23	0.23
Heron.Surface Ice Coverage	decimal	0.00	0.00	0.00	0.00	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	0.02	0.01	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	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	0.00	0.00	0.00	0.00
Heron.Storage	acre-ft	99792.94	298046.48	296306.00	294721.86	293039.25	291319.13	289352.27	287691.00	285839.00	283994.00	282830.00	281092.00	279357.00
ElVado.Pool Elevation	ft	6876.07	6876.56	6876.94	6877.53	6878.15	6878.74	6879.27	6879.84	6880.27	6880.75	6881.12	6881.34	6881.34
ElVado.Outflow	cfs	443.00	407.00	288.00	204.00	147.00	147.00	147.00	205.00	302.00	298.00	364.00	401.00	407.00
ElVado.Pan Evaporation	in/day	0.090	0.070	0.200	0.070	0.160	0.160	0.160	0.290	0.110	0.060	0.150	0.200	0.200
ElVado.Surface Ice Coverage	decimal	0.00	0.00	0.00	0.00	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	0.03	0.00	0.00	0.00
ElVado.Max Air Temperature	F													
ElVado.Min Air Temperature	F													
ElVado.Storage	acre-feet	16764.58	117956.14	118885.85	120339.46	121882.76	123363.59	124703.05	126154.59	127258.00	128496.00	129457.00	130030.00	130030.00
Abiquiu.Pool Elevation	ft	6219.56	6219.57	6219.55	6219.65	6219.65	6219.63	6219.59	6219.58	6219.57	6219.50	6219.49	6219.51	6219.52
Abiquiu.Outflow	cfs	510.00	505.90	273.29	223.55	239.82	244.13	219.73	201.23	346.76	348.63	388.02	414.51	405.36
Abiquiu.Pan Evaporation	in/day	0.13	0.30	0.18	0.20	0.23	0.19	0.17	0.42	0.08	0.12	0.25	0.11	0.37
Abiquiu.Surface Ice Coverage	decimal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Abiquiu.Precipitation Rate	in/day	0.07	0.02	0.28	0.00	0.00	0.00	0.08	0.00	0.00	0.23	0.00	0.00	0.00
Abiquiu.Max Air Temperature	F	80.00	80.00	70.00	68.00	73.00	76.00	75.00	75.00	62.00	65.00	62.00	74.00	81.00
Abiquiu.Min Air Temperature	F	53.00	55.00	53.00	53.00	48.00	49.00	47.00	38.00	37.00	39.00	39.00	43.00	47.00
Abiquiu.Locked In	NONE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Abiquiu Carryover Content	acre-feet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 3.1. Screen Capture of the Reservoir Data SCT

3.4. Setting Accounts

After data have been input with DMIs and reservoir data have been hand-entered as needed, accounting supplies are set for the delivery of water for contractors for San Juan-Chama Project water and other users. Deliveries are set to accounting supplies with separate accounts included for each potential delivery location from a source storage account. A list of the accounting supplies for the movement of water from each storage account at each reservoir is accessed in RiverWare by selecting the Accounts tab for a reservoir object, opening the storage account of interest, and double clicking on any cell in the Outflow column (Refer to Figure 3.2 for a sample list of accounting supplies from the Albuquerque (i.e. ABCWUA) storage account at Heron Reservoir). If only one supply exists from a storage account, the delivery is set directly to the Outflow series for the storage account. If the Outflow series is not evident when double clicking on the account to Edit the account, right click on the account and select Open Account to find the Outflow series for the storage account.

The nomenclature for the column headings when setting a supply from a selected storage account is the destination object, which is the next downstream object in the model for deliveries downstream or the reservoir object for accounting transfers within a reservoir, followed by the name for the destination account. For a transfer within a reservoir, the destination account is the name of the destination source account. For a delivery downstream, the destination account is named based on the following format: ContractorName-Origin-ContractorName-Destination. For example, the account with a

name of BelenHeronRGOtowi is the account name representing the downstream movement and transfer of water from the Belen account at Heron Reservoir to the Rio Grande account at Otowi.

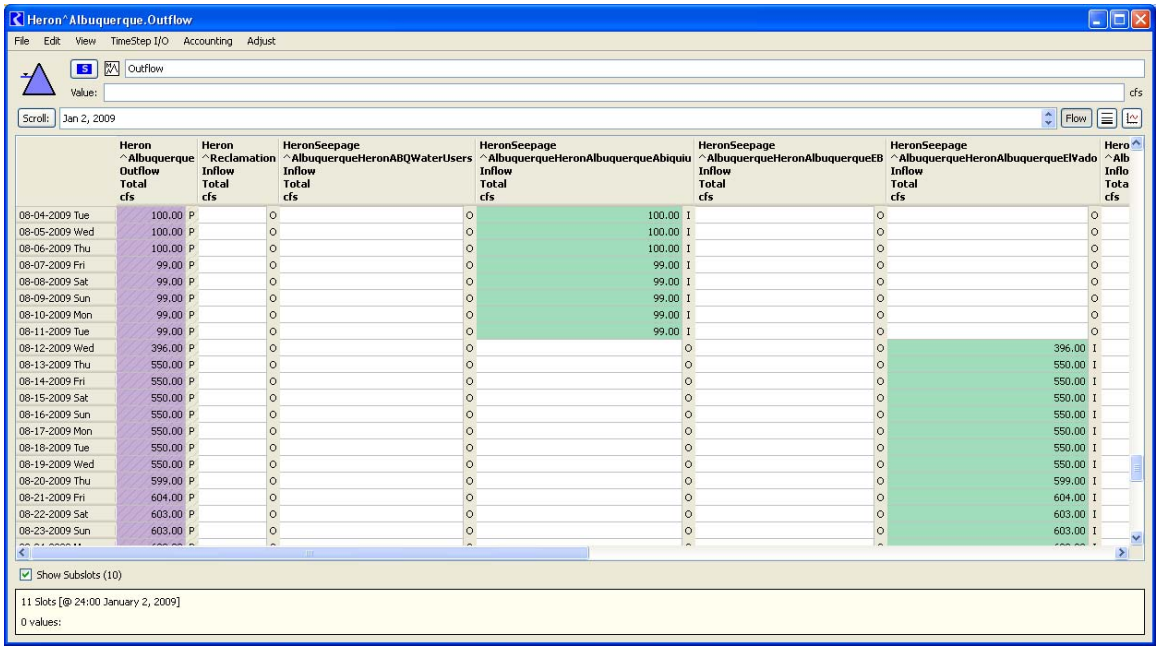


Figure 3.2. Screen Capture of Sample Inputs for Accounting Supplies – for the Albuquerque Account at Heron Reservoir

For a given day within a year, accounting supplies are usually only set for a few specific deliveries, but several accounting supplies are set throughout the year including supplies for the following deliveries: Contractors for San Juan-Chama Project water may transfer water to Reclamation's account as a result of a lease. Contractor water may be moved from storage at Heron Reservoir to allocated storage space at El Vado and/or Abiquiu Reservoir. ABCWUA deliveries to their surface water diversions are set out of Abiquiu Reservoir with separate deliveries for the payback for historic and current groundwater pumping, and other contractors may also deliver water to the Rio Grande account at Otowi as letter water deliveries. MRGCD will deliver their San Juan-Chama Project water from El Vado Reservoir to meet their diversion needs in the Middle Valley, generally after native Rio Grande supplies have been exhausted. Also, at the beginning of the year, initial allocations of San Juan-Chama Project water are set at Heron for each contractor.

In addition to deliveries of San Juan-Chama Project water, the model user sets accounting supplies for the transfer of native Rio Grande water in storage at El Vado Reservoir to be transferred to the IndianStorage account for Prior and Paramount (P&P) storage or to the SupplementalESA or MRGCDDrought accounts as Emergency Drought water. Releases of native Rio Grande water at each dam are reconciled during the simulation based on the input total outflow minus all the input accounting supplies for the release of San Juan-Chama Project water at each reservoir and releases to other users.

3.4.1. Begin Year Allocations

For the first day of each year, values for the Begin Year Allocation are input for the storage accounts at Heron Reservoir for each contractor for San Juan-Chama Project water. Allocations are input based on the values in Table 2.1 unless the storage in the FederalSanJuan account is less than the total yield of 96,200 acre-ft. If allocations are curtailed, the Cochiti Rec Pool account gets a full allocation, and remaining allocations are prorated based on the ratio of the available supply to the full allocation for remaining contractors. Additional allocations would then be made at a later date following the additional inflows to Heron Reservoir from San Juan diversions during the runoff.

3.4.2. Reclamation Leases

Several contractors for San Juan-Chama Project water lease their water to Reclamation. These leases are represented as transfers from the contractor storage accounts at Heron Reservoir to Reclamation's account. Accounting supplies at Heron Reservoir are set for each contractor for the lease amounts based on final agreements made between Reclamation and each contractor. Reclamation generally leases waiver water still in storage from the previous year allocation for the source contractor, so transfers are implemented by the current waiver date of September 30th. These accounting supplies for each contractor are set based on the final values provided by Reclamation.

3.4.3. Deliveries to Downstream Available Storage

San Juan-Chama Project water will be moved downstream to allocated storage space in a manner that is practical given all the considerations for the current year. When a delivery is made for MRGCD, the accounting supply is set from the MRGCD account at Heron Reservoir for the MRGCDHeronMRGCDElVado account. Deliveries of allocated water for ABCWUA to Abiquiu Reservoir are set for the accounting supply from the ABCWUA account at Heron Reservoir for the AlbuquerqueHeronAlbuquerqueAbiquiu account and deliveries to El Vado Reservoir would be set for the AlbuquerqueHeronAlbuquerqueElVado account. Other contractors including Santa Fe, Bernalillo, Los Alamos, Espanola, and Twining also have allocated storage space at Abiquiu, and any deliveries for those contractors would be set in the same manner.

Reclamation water in storage at Heron Reservoir as a result of transfers before the waiver date will likely be moved to El Vado or Abiquiu Reservoir depending on available storage space. If waiver water was leased, the water is moved downstream before the waiver date. Accounting supplies at Heron Reservoir are set for the delivery from the Reclamation account at Heron Reservoir to the Reclamation account at El Vado or Abiquiu Reservoir, whichever applies for that delivery.

3.4.4. Deliveries to Albuquerque Diversion

Deliveries of ABCWUA San Juan-Chama Project water from Abiquiu Reservoir to their surface water diversion are input for the AlbuquerqueAbiquiuABQWaterUsers account. Values for deliveries are provided by ABCWUA in a spreadsheet with ABCWUA's needs for a month. The spreadsheet includes the calculations for the diversion associated with a release with consideration for losses. Refer to Appendix C for a sample page from the spreadsheet. Note that ABCWUA letter water deliveries as a payback for historic and current groundwater pumping are set separately as discussed in section 3.4.6.

3.4.5. Deliveries of MRGCD San Juan-Chama Project Water

Deliveries of MRGCD's San Juan-Chama Project water are set first at Abiquiu Reservoir with the MRGCDAbiquiuMRGCDMiddleValleyDiversions accounting supply. That source operating pool for MRGCD at Abiquiu Reservoir is then maintained with releases from El Vado Reservoir set with the MRGCDElVadoMRGCDAbiquiu supply. Releases are made based on the calls by MRGCD to meet their diversion demand in the Middle Valley. MRGCD typically will use native Rio Grande water in storage at El Vado Reservoir and bank San Juan-Chama Project water until native supplies have been exhausted. Releases from storage are set to meet their demand at Cochiti that is not met with natural flows from the mainstem and the Rio Chama.

3.4.6. Contractor Deliveries to Payback the River at Otowi

Letter water deliveries are set based on the specific magnitudes in letters received from the State. Accounting supplies are set to transfer water from the source contractor to the MRGCD's San Juan-Chama account at El Vado (or Abiquiu) Reservoir if the depletions occurred during the irrigation season when they impacted MRGCD. Deliveries to payback the Compact are set for the corresponding contractor storage account to the respective account with a destination of "RGOtowi". The model user may use some discretion when setting the exact timing for the delivery and for identifying whether the payback should come from a contractor's storage at El Vado or Abiquiu Reservoir or directly from Heron Reservoir.

3.4.7. Deliveries to the Cochiti Rec Pool

San Juan-Chama Project water at Heron Reservoir allocated to maintain the Cochiti Rec Pool is ideally delivered during late June or early July and again in the late fall and winter through coordination with the Corps. Deliveries are set with the accounting supply out of Heron Reservoir with a destination of the Cochiti Rec Pool. Some water may also be delivered as part of temporary exchanges as discussed in section 3.4.10.

3.4.8. Transfers to P&P Storage at El Vado Reservoir and Releases

Native Rio Grande water in storage at El Vado Reservoir is transferred to the IndianStorage account each year to represent P&P storage for the six Middle Valley pueblos. The amount of storage required is provided each year as a result of computations and communication between the pueblos, BIA, and Reclamation. Transfers would generally be set on May 1 in the Accounting Model using the RioGrandeElVadoToIndianStorageElVado supply, but the actual timing is dependent on the status of communication between the agencies. Note that even if the storage restrictions of Article VII of the Compact are in effect, some native Rio Grande water may be stored prior to implementing the transfer to assure water is available to allocate for P&P storage. Releases from the IndianStorage account are set to the Outflow series for the IndianStorage account. Unused water is reverted back to the Rio Grande account using the Transfer Out series for the IndianStorage account.

3.4.9. Transfers to Emergency Drought Storage and Releases

If a relinquishment occurs, the transfer from the NMCredit account at Elephant Butte Reservoir to the Rio Grande account is set to the Transfer Out series for the NMCredit account. If subsequent allocations for storage of Emergency Drought water at El Vado Reservoir are used, the resulting storage of native Rio Grande while Article VII is in effect would be evident in the Rio Grande account, and the transfer to either the MRGCDDrought or SupplementalESA account at El Vado Reservoir is then subsequently set by selecting the corresponding supply when double clicking on the Transfer Out series for the Rio Grande storage account. Releases from the MRGCDDrought or SupplementalESA accounts as called for by MRGCD or Reclamation are set to the Outflow series for either of these storage accounts.

3.4.10. Potential Exchanges

Some experience is required to set accounting supplies for potential short-term exchanges, but some water may be temporarily exchanged between contractors to simplify actual operations and gate changes. For example, to afford some flexibility in actual operations, ABCWUA may deliver water from Abiquiu Reservoir to maintain the Cochiti Rec Pool, and Cochiti Rec Pool water will then be delivered from Heron Reservoir to Abiquiu Reservoir to make up for the delivery to Cochiti Lake. Some exchanges may be specifically negotiated between contractors to allow for specific needs to be met efficiently. Also some paybacks may be required for loans made in past years.

3.5. Green Book

All deliveries of San Juan-Chama Project water are noted on pages in a handwritten log of operations referred to as the Green Book. These notes include details of the volume

magnitude, source, and destination for any deliveries or exchanges. Functionality has been added to RiverWare to include these notes in the model file as annotations. This capability is still being tested, but ultimately, all Green Book entries would be kept within the model file in the future. Instructions are presented below for setting up annotations with the notes for deliveries of San Juan-Chama Project water as written in the Green Book.

The following steps should be followed to complete the initial set up of the Note Group Manager in the Accounting Model if not already established:

1. Click on Note Group Management under the menu list for Utilities in the model.
2. If needed, click on the button in the upper left corner to show all the Note Groups.
3. Use the Create Note Group button to add separate note groups for each reservoir: Heron, El Vado, Abiquiu, Nambe, Cochiti, Jemez, Elephant Butte, and Caballo.

A screen capture of how the included note groups for each reservoir should look in the Note Group Manager is presented in Figure 3.3. Different colors can be selected to use for the note icon for each group if desired. The groups are sorted in alphabetical order.

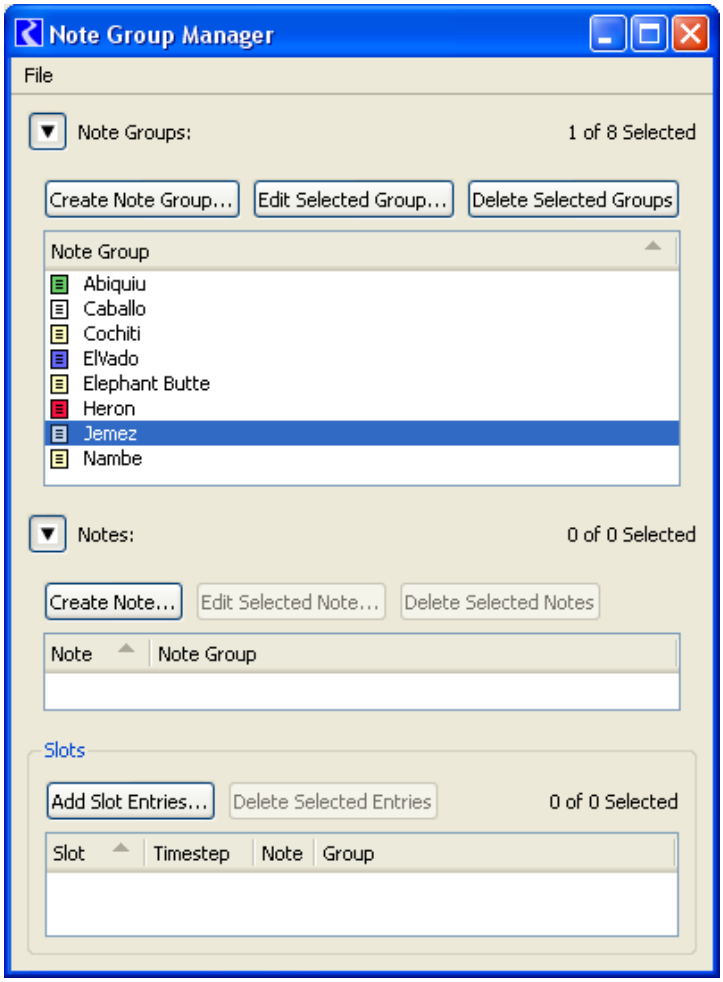


Figure 3.3. Screen Capture of Note Group Manager with Note Groups for Each Reservoir

Data objects are in the Accounting Model that include expression series slots for computing the total daily inflow and outflow to the storage accounts at each reservoir for each contractor for San Juan-Chama Project water. Notes about deliveries should be set up on these expression series slots. These expression slots can then be referenced in Tabular Series Slot Reports generated in the Output Manager in the model accessed under the Utilities in the menu. These Tabular Series Slot Reports can be configured to match the format for pages in the current hard copy Green Book so configured pages can be printed and saved in the hard copy Green Book.

The following steps should be followed to set up a note:

1. Identify the location for a particular delivery to be tagged with a note in the inflow or outflow expression series slot within the Green Book data object for the contractor and reservoir.
2. Select only the first slot for the range in the series when the delivery occurs.
3. Right click and select Add Note…
4. Within the Note Group Manager that opens, select the appropriate reservoir as the Note Group.
5. If needed, click on the button next to Notes to open the section for creating a note (Reference Figure 3.3 for a screen capture of the Note Group Manager).
6. Click on the Create Note button
7. Type the note with a description of the delivery (Refer to Figure 3.4 for sample language for a note).
    - The note can also be edited after first created by clicking on the Edit Selected Note button where the original note is displayed followed by a window for entering a new note to be used. Refer to Figure 3.4 for a sample screen capture of the window for editing a note.
8. Click on the Add Slot Entries button and select the particular slot in the appropriate data object where the note should be located.
    - For this approach, notes are not tagged to the specific accounting supply or the storage account outflow slot for the reservoir object. The notes are maintained on the established data objects developed specifically for creating the Green Book pages.
    - Under Timesteps, select the timestep at which the annotation should be posted.
    - Only one note is needed, so the annotation should only be tagged to a single first timestep for the range that the delivery occurred – leave the box to Apply Over Timestep Range unchecked.
    - Click OK
    - Refer to Figure 3.5 for a screen capture of the Note Group Manager with a sample note created.

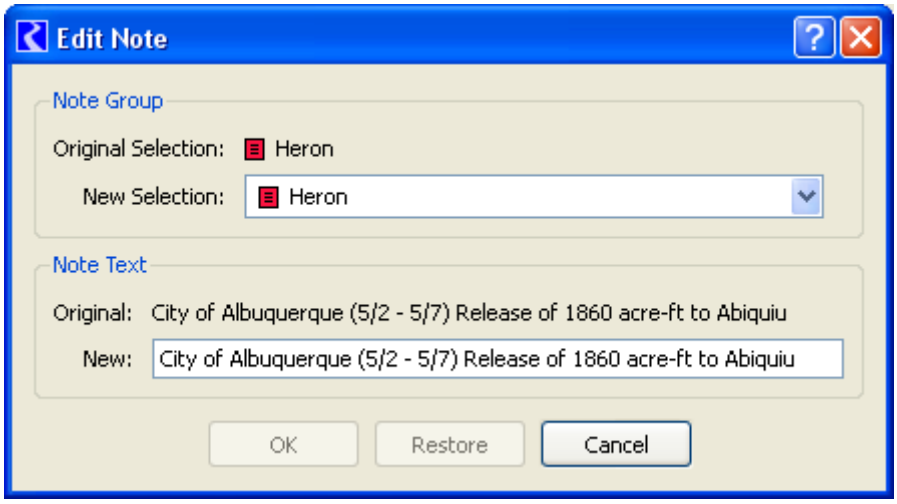


Figure 3.4. Sample Dialog to Edit a Note

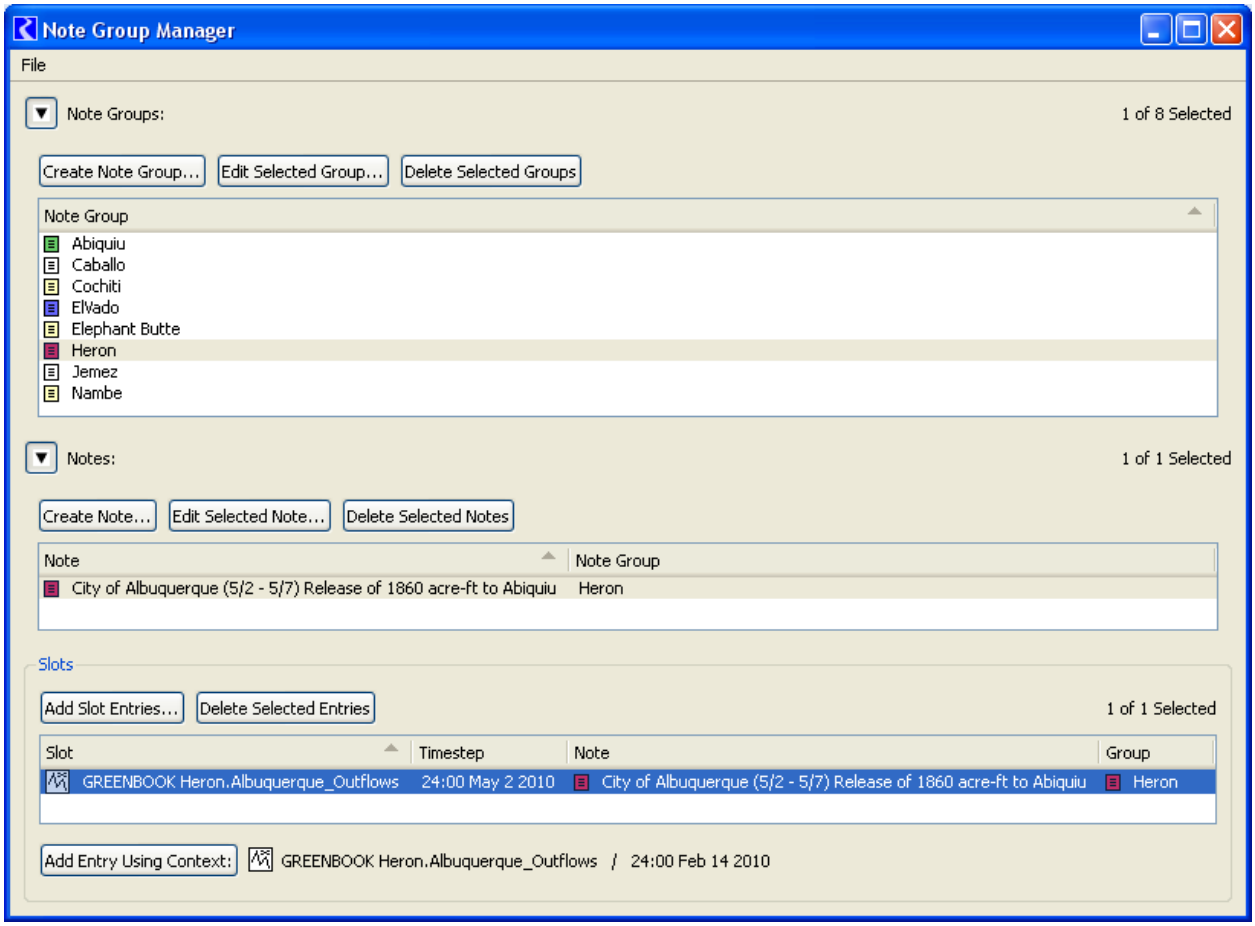


Figure 3.5. Note Group Manager with Sample Note Created

An icon for the note will now appear on the expression series slot referenced for the note at that selected timestep. Separate notes should be set up for each delivery (or transfer) that occurs by repeating the steps above.

IV. Model Run

After all inputs are set with the DMIs, hand-entered values to the SCT, and input values for accounting supplies, a simulation can be completed. To complete a simulation, open the Run Control (Figure 4.1). (The Controller should be set to Inline Simulation and Accounting.) The simulation period should have already been set for running the DMIs with an Initial timestep of December 31st (a Start timestep of January 1st for the current year) and a Finish timestep of yesterday's date. Click on the Start button to initiate the run. A simulation may take a minute or two to complete.

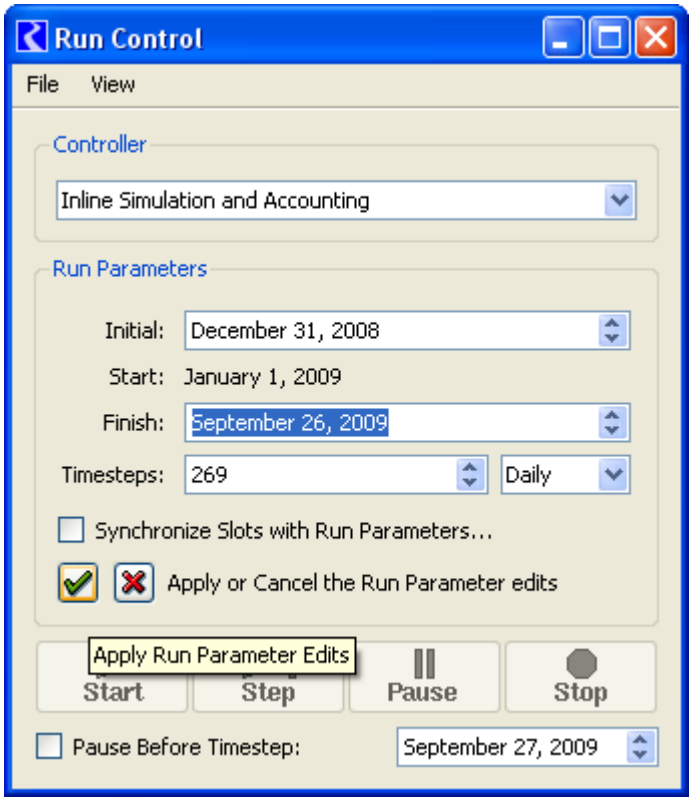


Figure 4.1. Screen Capture of Run Control in RiverWare

4.1. Check Rio Grande Outflows and Storage

After a first simulation has completed, results should be checked with specific focus on the reconciled release of native Rio Grande water at each reservoir and the resulting storage. Releases of native Rio Grande water are not input to the Accounting Model. These values are reconciled based on the actual total outflow and the input deliveries of San Juan-Chama Project water and releases to other users with RiverWare rule policy language (RPL) accounting methods set up for each reservoir. These methods can be viewed or edited by selecting Open Accounting Methods RPL Set under Accounting on the menu bar. The final release of native Rio Grande water and storage of native Rio Grande water must be checked after each simulation. Releases of San Juan-Chama

Project water may need to be adjusted if actual requested deliveries were not reflected in the actual reservoir outflows. This may be indicated by a computed negative Rio Grande storage in the model.

At Abiquiu Reservoir, storage in the Rio Grande account should be close to zero unless water has been stored for flood control operations to maintain downstream flows below the channel capacity. At Cochiti Lake, storage should also be close to zero unless water has been stored for flood control operations or Cochiti deviations. At El Vado Reservoir, the release of native Rio Grande water and subsequent storage specifically needs to be checked with reference to the Article VII status. If Article VII of the Compact is in effect, the same storage of native Rio Grande water should be maintained unless a release from storage is implemented to meet the MRGCD demand or to transfer to the P&P account.

4.2. Gate Changes

Actual deliveries of San Juan-Chama Project water are determined prior to running the Accounting Model and gate changes are implemented at each reservoir with consideration for the release of native Rio Grande water and all operational and legal constraints. After needed deliveries have been identified through communication with MRGCD, ABCWUA, Reclamation, and other contractors and the need for movement of water from Heron, El Vado, or Abiquiu Reservoirs downstream has been determined, total outflows are determined and needed gate changes at the dams are called in to damtenders. Resulting flows will then be evident in the total outflows imported to the model on the following day. Deliveries of San Juan-Chama Project water are then set in the Accounting Model to update the status of the accounts. Rio Grande outflows are reconciled in the simulation as the total outflow minus any release of San Juan-Chama Project water. Resulting conditions are then checked and deliveries may be adjusted based on the actual outflow that occurred.

V. Annual Reports

After a model run has been completed for a full Accounting Year, an annual accounting report is prepared that provides numerous tables with monthly summaries of the status of the accounts throughout the year. Expression series slots are included in the model to compute all the needed values for these accounting reports. Refer to the report by Stockton (2010) for detailed documentation on the expression slots. These values are exported using the AnnualReportOutput control file DMI in the Accounting Model (Note that the current or previous year may be included at the beginning of the DMI name in the model). A template spreadsheet is used to take the results and produce numerous tables for the annual report. Instructions are included on a sheet called StartHere in the template with details for running the DMI and importing all needed values into the spreadsheet. Tables are included on separate sheets. Buttons are included in the sheet to execute macros for importing the data and printing each table or all the tables at once.

Note that a similar application is being developed to populate HDB with the values from the expression series slots and produce all the same tables using Crystal Reports. This approach will eventually replace the template spreadsheet as the means for archiving accounting information from the Accounting Model in HDB and producing accounting reports each year.

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Appendix A – Steps to Run Accounting Model Each Day

1. Run the morning.bat file.
2. Start RiverWare and open the current model.
3. Reset the Run Control to have a Finish Timestep of Yesterday's date (and an Initial Timestep of December 31 of the previous year) and click on the green check mark.
4. Run all input DMIs – On the menu bar, select DMI – DMI Groups – InputAllData_DBDMI.
5. Open the SCT for entering reservoir data – On the menu bar, select Utilities – SCT – Open SCT and choose the reservoirdataSCT2.0.sct.
6. Fill in reservoir data as needed (Refer to Figure 3.1).
7. Set all accounting supplies as needed (Refer to Section 3.4)
8. Run the model
9. Check the resulting Rio Grande releases and storage at each reservoir.
10. Make any required adjustments and rerun the model as needed.
11. Record deliveries in Green Book.
    - Enter all deliveries into the hard copy Green Book.
    - Include annotations in the model using the instructions provided in Section 3.5.
12. Save the model.
13. Run the output DMIs – On the menu bar, select DMI – DMI Groups – OutputAllInputData_DBDMI
14. Close the model
15. Run the afternoon.bat file.

Appendix B – Sample Fax Sheet with Reservoir Data

FAX TRANSMITTAL		# OF PAGES:	
TO: ED KANDL		FROM:	USBR, CHAMA
AGENCY: USBR, ALBUQUERQUE		PHONE#	575-756-2175
FAX# 505-462-3793		FAX#	575-756-2453

HERON RESERVOIR

	DATE: 2/26/2010	DATE: 2/27/2010	DATE: 2/28/2010	DATE: 3/1/2010
MIDNIGHT ELEVATION	7157.64	7157.63	7157.64	
PRECIPITATION		0	0	0.05
MAX TEMP		42	42	47
MIN TEMP		2	17	2
PRESENT TEMP				28
HOOK				
EVAP				

	TIME	READING	TIME	READING	TIME	READING
PRESENT ELEVATION					915	7157.64
	TIME	READING	TIME	READING	TIME	READING
GATE OPENING #1 / #2		0 / 0		0 / 0	915	0 / 0
PRESENT FLOW Q=CFS						

	DATE	ACRE FEET	DATE	ACRE FEET	DATE	ACRE FEET
AZOTEA mean daily A/F	2/26/2010		2/27/2010		2/28/2010	
WILLOW CREEK mean daily A/F	2/26/2010		2/27/2010		2/28/2010	

	other data:		other data:		other data:	
include other initializers, changes, ect.	55% Ice Cover		55% Ice Cover		55% Ice Cover	

EL VADO RESERVOIR

	DATE: 2/26/2010	DATE: 2/27/2010	DATE: 2/28/2010	DATE: 3/1/2010
MIDNIGHT ELEVATION	6873.85	6873.84	6873.84	
PRECIPITATION		0	0	0.02
MAX TEMP		44	42	48
MIN TEMP		8	23	6
PRESENT TEMP				34
HOOK				
EVAP				

	TIME	READING	TIME	READING	TIME	READING
PRESENT ELEVATION					1145	6876.84
	TIME	READING	TIME	READING	TIME	READING
GATE OPENING #1 / #2		0.20 / 0		0.20 / 0	1145	0.20 / 0
GUAGE HEIGHT		1.86		1.86	1145	1.86
PRESENT FLOW Q=CFS		78 CFS		78 CFS		78 CFS

	SEEPAGE: 0.22 / 0.84	SEEPAGE: 0.22 / 0.84	SEEPAGE: 0.22 / 0.84
include other initializers, changes, ect.	100% Ice Cover	100% Ice Cover	100% Ice Cover

Appendix C – Sample Sheet with ABCWUA Water Needs for Diversion

Albuquerque Bernalillo County Water Utility Authority Drinking Water Project											
Date of Release	SJC Release from Abiquiu (cfs)	Loss Rate Heron to POD (%)	Loss Rate Abiquiu to POD (%)	Date of Diversion (3-day lag)	SJC Available for Diversion (cfs)	SJC Available for Diversion (af)	Actual TOTAL Diversion (cfs)	Actual TOTAL Diversion (af)	Actual SJC Diversion (af)	Daily Diversion Over (+) or Under (-) (af)	Cumulative Diversion Over (+) or Under (-) (af)
1/29/2010	26.00	3.0	1.921	2/1/2010	25.50	50.58	49.47	98.1	49.1	-1.5	-1.5
1/30/2010	26.00	3.0	1.921	2/2/2010	25.50	50.58	49.08	97.3	48.7	-1.9	-3.4
1/31/2010	26.00	3.0	1.921	2/3/2010	25.50	50.58	49.73	98.6	49.3	-1.3	-4.7
2/1/2010	26.00	3.0	1.921	2/4/2010	25.50	50.58	49.43	98.0	49.0	-1.6	-6.3
2/2/2010	26.00	3.0	1.921	2/5/2010	25.50	50.58	50.33	99.8	49.9	-0.7	-6.9
2/3/2010	26.00	3.0	1.921	2/6/2010	25.50	50.58	49.74	98.6	49.3	-1.3	-8.2
2/4/2010	26.00	3.0	1.921	2/7/2010	25.50	50.58	49.89	99.0	49.5	-1.1	-9.3
2/5/2010	26.00	3.0	1.921	2/8/2010	25.50	50.58	49.88	98.9	49.5	-1.1	-10.4
2/6/2010	26.00	3.0	1.921	2/9/2010	25.50	50.58	49.34	97.9	48.9	-1.6	-12.1
2/7/2010	26.00	3.0	1.921	2/10/2010	25.50	50.58	50.04	99.2	49.6	-1.0	-13.0
2/8/2010	26.00	3.0	1.921	2/11/2010	25.50	50.58	32.33	64.1	32.1	-18.5	-31.5
2/9/2010	26.00	3.0	1.921	2/12/2010	25.50	50.58	33.09	65.6	32.8	-17.8	-49.3
2/10/2010	26.00	3.0	1.921	2/13/2010	25.50	50.58	50.28	99.7	49.9	-0.7	-50.0
2/11/2010	26.00	3.0	1.921	2/14/2010	25.50	50.58	49.76	98.7	49.3	-1.2	-51.3
2/12/2010	26.00	3.0	1.921	2/15/2010	25.50	50.58	37.67	74.7	37.4	-13.2	-64.5
2/13/2010	26.00	3.0	1.921	2/16/2010	25.50	50.58	50.06	99.3	49.6	-0.9	-65.4
2/14/2010	26.00	3.0	1.921	2/17/2010	25.50	50.58	50.07	99.3	49.7	-0.9	-66.4
2/15/2010	26.00	3.0	1.921	2/18/2010	25.50	50.58	46.20	91.6	45.8	-4.8	-71.1
2/16/2010	26.00	3.0	1.921	2/19/2010	25.50	50.58	41.81	82.9	41.5	-9.1	-80.2
2/17/2010	26.00	3.0	1.921	2/20/2010	25.50	50.58	50.21	99.6	49.8	-0.8	-81.0
2/18/2010	26.00	3.0	1.921	2/21/2010	25.50	50.58	48.03	95.3	47.6	-2.9	-84.0
2/19/2010	26.00	3.0	1.921	2/22/2010	25.50	50.58	48.97	97.1	48.6	-2.0	-86.0
2/20/2010	26.00	3.0	1.921	2/23/2010	25.50	50.58	50.17	99.5	49.8	-0.8	-86.8
2/21/2010	26.00	3.0	1.921	2/24/2010	25.50	50.58	48.85	96.9	48.4	-2.1	-89.0
2/22/2010	26.00	3.0	1.921	2/25/2010	25.50	50.58	46.50	92.2	46.1	-4.5	-93.4
2/23/2010	26.00	3.0	1.921	2/26/2010	25.50	50.58	49.84	98.8	49.4	-1.2	-94.6
2/24/2010	26.00	3.0	1.921	2/27/2010	25.50	50.58	49.51	98.2	49.1	-1.5	-96.1
2/25/2010	26.00	3.0	1.921	2/28/2010	25.50	50.58	49.20	97.6	48.8	-1.8	-97.9

End of January 2010 balance of -82.6 acre-feet to be credited as offset to stream depletion effects for SP-4819 and third-party SJC water leases.