Memorandum – DRAFT

To: URGWOM Technical Team Members
Date: June 22, 2017
Subject: Notes of June 20, 2017 URGWOM Technical Team Meeting

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These notes summarize the salient matters discussed at the June 20, 2017 Upper Rio Grande Water Operations Model (URGWOM) Technical Team meeting. The meeting began at 9:00 am in the large conference room at the USGS New Mexico Water Science Center, 6700 Edith Blvd., Albuquerque, NM. An attendance list is included on page five.

The meeting Agenda topics include a discussion of changes to Elephant Butte Reservoir releases logic, Platoro Reservoir operations; MRGCD water supply operations analysis, Scenario Explorer and script enhancement updates, Lower Rio Grande (D3) demand-based rules and ET Toolbox overview.

Elephant Butte Reservoir release patterns

Lucas presented a follow-up report to the presentation made at last month's Team meeting. Lucas reported that he spoke to John Langford and Ken Rice (Elephant Butte Dam operations) to better understand how they operate the Elephant Butte power plant. This year only two generators are online and the plant is being operated differently than it will be operated in the future. As a result of this discussion and improved understanding, Lucas discussed the following proposed changes to URGWOM:

- Allow for partial generator capacity use in the future, not to exceed total demand;
- "Cleaned up" rule 20;
- Implemented a maximum generator release as a function of reservoir head;
- Changed rule "Set Elephant Butte Pattern Based Release"; and
- Added two new functions.

Lucas suggested that there may be some disconnect in turbine specifications on maximum release as a function of head compared to what is being seen currently and the rating tables provided by John Langford. Lucas also changed the CaballoData.StorageTarget rule related to definition of dry, average, and wet years. There may be some version control issues that led Lucas to believe that the year type definitions for the Lower Rio Grande operations would not be applicable for Caballo Reservoir operations. Lucas will review these changes as Marc and Nabil have found possible changes to D3 operations that may have impacted year type definitions. For now, Lucas will leave the previous set of rules in the model pending clarification on turbine operations and year type definition.

Platoro Reservoir operations

Jesse provided an update on the status of his work on the review of Platoro Reservoir operation (conservation storage only). Jesse reviewed with the Team the three types of conservation storage in Platoro Reservoir: storage in lieu of diversion, storage for release to meet compact deliveries and its own decreed storage right. Jesse had considered implementing a decree storage approach where the junior Platoro storage right would be included in the water rights solver, but ultimately this approach would have involved a huge accounting rework. Instead, Jesse implemented decree based conservation storage as a function of system inflows, return flows and irrigation demands. Subsequent testing showed that the storage logic underestimated historical additions to storage, but with a 70% calibration factor simulated decreed conservation storage more closely matched historical storage levels.

Once conservation storage has been added, the model must also know how and when to release it. The simulation of storage release is difficult due to the nature of the criteria used by the District officials to make decisions about the timing, amount and duration of the release of water. Jesse proposed basing the release on an empirical historical relationship between the percent of maximum storage released in a given year between the peak storage and November 1st as a function of Platoro inflows. For Platoro inflows of 40,000 AF (dry), the model targets a release of 56% of peak storage, and for inflows of 100,000 AF (wet), the model targets a release of 20% of peak storage. These changes to the Platoro Reservoir operations are outlined in Jesse's May 26, 2017 Memorandum, previously circulated to Team members. Jesse requested comments on his Memo by the end of June.

Middle Rio Grande Conservancy District historical demand review

Jesse presented an update to his work on developing demand curves for MRGCD release from Cochiti based on wet, average or dry water supply conditions. The MRGCD overall demand was obtained from river operations telephone conference calls. Daily diversion estimates from conference call notes were compared with recorded daily diversion data and data from the Accounting Model with mixed results. Irrigation season flow past Otowi was also compared with MRGCD diversion data, also with mixed results. Jesse reported that the calculated Middle Rio Grande crop demand is a strong predictor of actual (historical) diversions, except for diversion at San Acacia.

The analysis of historical MRGCD operations are outlined in Jesse's June 16, 2017 Memorandum, previously circulated to Team members. Jesse requested comments on his Memo by the end of June.

RiverWare Scenario Explorer

Patrick updated the Team on the status of development on the RiverWare Scenario Explorer (RSX), a tool designed to facilitate data exchange between model developers and stakeholders. From RiverWare a model run(s) can be exported to RSX by defining input slots

which can be adjusted to create different scenarios, and output slots for visualization. RSX will be functional with the release of RiverWare v.7.2, and will be accessible to anyone with a free license, in the same manner as the RiverWare viewer license. For users with the full RiverWare license, RSX will be a functionality that can be launched from within RiverWare. In RSX, scenario files can be saved as separate files for future reference or sharing with other RSX users. Model developers can create multiple scenarios in RW and export all of them in a single RSE file so that a RSX user could have immediate access to multiple predefined runs, e.g. AOP 30%, 50%, and 70% exceedances.

Patrick presented a demonstration of the RSX process and an example of data output format. Most of the CADSWES effort since spring has been in the development of XML file export formats and interface improvements. Remaining tasks for completion of development of the RSX included interface refinement, documentation and help system and licensing (similar to RW viewer). Patrick anticipates that the RSX will be complete by the end of the calendar year and will be included in RiverWare v.7.2.

Conrad inquired as to how many RiverWare licenses are in use in the basin downstream of Elephant Butte Dam. David Neumann said he didn't know off the top of his head; perhaps three, IBWC, Reclamation, and Zhuping (Texas A & M). Conrad advised that he anticipates that Nabil will be asked this question when he meets with the Paso del Norte Watershed Council on July 13, 2017.

RiverWare Enhancements

David reported on the script management improvements that will facilitate common activities for RiverWare users such as the tab organization of script groups and improved ability to share specific scripts. Script functionality enhancements include the ability to create a script that executes other scripts; however, this functionality can only be one layer deep, i.e., it can call any script or script from a top level script, but the called script(s) cannot call another script. This enhancement will be included in RiverWare v. 7.1, to be released later today.

David also reported on updates to the output canvas manager, such as the ability to show teacups and text items (not stream lines) on the simulation view and geospatial view of RiverWare workspace. There will also now be animation controls accessible from the RiverWare workspace to control the visualization state of these items on the workspace.

Lower Rio Grande (D3) pattern based rules

Nick reported that Hydros has updated rules which inadvertently included D1 and D2 logic to have D3 logic as intended. This fix has been made, tested and documented. This problem could be the cause of the problem that Lucas had encountered in his review of the Elephant Butte operating rules. Hydros also added the ability to manually change Lower Rio Grande initial diversion ratio as request by Nabil. Steve referred the Team to the Memorandum circulated by Marc on June 12, 2017 for additional information about these changes.

Kyle Douglas-Mankin asked for definition of D1/D2 vs. D3 and Steve explained that D1/D2 is a linear regression on historical data before 2008 to calculate the reservoir release from Caballo necessary to deliver a given amount of water to the head gate diversions. D3 on the other hand incorporates logic from the 2008 Operating Agreement on how Rio Grande Project water is divided between EBID and EP#1.

ET Toolbox Overview

Al Brower gave an update on content and capability of the ET Toolbox including many functionalities that may be new to members of the Technical Team including:

- Daily 24 hour NEXRAD based precipitation totals by 1km grid cell;
- MRGCD canal & drain schematics with flow data;
- MRG reservoir operations schematics with teacup diagrams;
- MRG water quality schematics and current data;
- Evapotranspiration (ET) information including:
    - Temperature no longer from real time stations (none exist in the Middle Valley any longer, according to Al's knowledge);
    - Temperature, precipitation and wind based on 5km x 5km pixel forecast data;
    - 1km x 1km calculation of ET based on reference ET and crop mix;
    - There is an effective precipitation calculation based on a simple and old USBR equation, but that is not actually used in ET Toolbox crop demand calculation. ET Toolbox assumes 100% of precipitation is available to crop on the day of the storm and none after that (no soil storage);
    - Reach summary includes daily precipitation for the reach based on NEXRAD data;
    - Toolbox shows seven days past and seven days projected depletion;
    - Historical NEXRAD precipitation is available as daily totals at 1km x 1km resolution for previous one year only.

Other Business: May 1 AOP review

Marc presented modeled and observed data from May 1, 2017, 50% exceedance AOP runs compared to what has actually happened to date for reservoir storage, inflows, outflows, and several gages on the mainstem. Overall results were very close to projections. In the past week or so flows have fallen off more quickly than forecasted.

The next meeting of the Team has been scheduled for July 11, 2017 will be for the purpose of discussing ET as it relates to URGWOM as well as the status and use of the ET Toolbox. The meeting will begin at 9:00 am at a location to be determined later.

The meeting adjourned at about 11:30 am.

ATTENDANCE LIST
URGWOM TECHNICAL TEAM MEETING
June 20, 2017

NAME	REPRESENTING
Marc Sidlow	USACE
Jesse Roach	Tetra Tech / USACE Contractor
Ken Peterson	Tetra Tech / USACE Contractor
Kyle Douglas-Mankin	USGS
William Miller	WJM Engineers/USACE Contractor
Carolyn Donnelly	USBR
Lucas Barrett	USBR
Ken Richards	USBR

Those participating via telephone conference:

Nick Mander	Hydros Consulting
Steve Setzer	Hydros Consulting
Conrad Keyes Jr.	USACE Contractor
Jerry Melendez	USBR
David Neumann	CADSWES
Patrick Lynn	CADSWES
Andrew Lieuwen	Albuquerque Water Utility
Al Brower	USBR Contractor
Ashenafi Madebo	Colorado Division of Water Resources