TETRA TECH

Monthly URGWOM Ruleset

Next steps towards a monthly timestep rulebased run

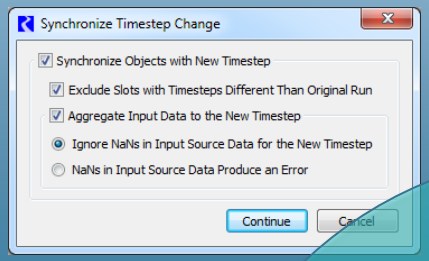
URGWOM AC Meeting: February 17th 2015

Jesse Roach
Tetra Tech Inc.

URGWOM: Daily to Monthly

RiverWare Changes

- Data Aggregation ✓
- Simulation Methods ✓
- Object Level Accounting Methods ✓



URGWOM Base Changes

- Rules Generalization
  - Initialization ✓
  - Expression Slot ✓
  - Utility Groups
  - Policy Groups
- Lags (Hyp. sim & rules logic)
- GW Parameters??
- Table series slots initialize

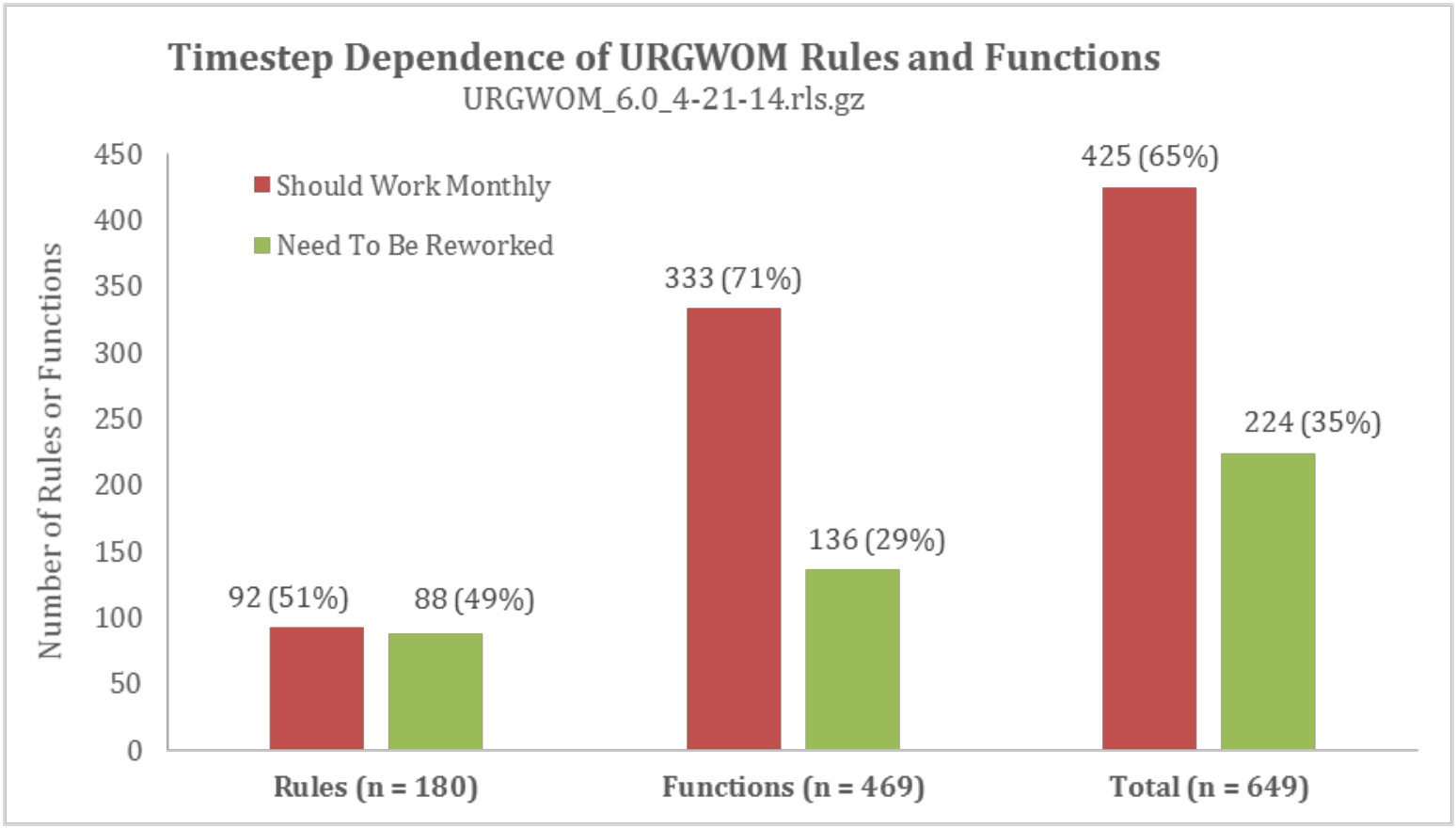
Changes for Automated Conversion

- Set lag times (& gw parameters?) using initialization rules or scripts
- Default data aggregation method override (e.g. Begin Year Allocation & Carry Over) (or re-do of logic associated w latter two)
- Table series slots rework

URGWOM daily to URGWOM monthly with a few mouse clicks

Monthly Timestep Policy

- January 14, 2015 decision to develop a separate ruleset
- January 28th Draft Technical Memo: development strategy



Suggested Approach - I

1. Create a test sequence that causes all rules to fire at a daily timestep.
   a. Start with full reservoirs and at least one very wet year followed by as many dry years as it takes to dry the system out (Article VII in effect and less than 100% SJC allocations).
   b. Use RiverWare Rule Execution Diagnostics to track which rules fire.
   c. Add additional hydrologic years or inputs as necessary to get all rules to fire if possible.

Suggested Approach -2

1. Create a test sequence that causes all rules to fire at a daily timestep.
2. Rewrite rules that are sensitive to timestep.
   a. Convert the test model and sequence created in Step 1 to a monthly timestep model.
   b. Get the monthly timestep test model to run without any errors. This was achieved with the CADSWES test model simply by disabling the 'Set MiddleValleyTargets CochitiDeviationsTargets' policy group (Roach 2014b), but with a longer run firing more rules, more changes may be required.
   c. Turn off as many policy groups as possible in daily model without causing a crash. Turn off the same ones in the monthly model and make any necessary changes to get monthly model to run.
   d. Starting with Heron, rewrite problematic rules at a monthly timestep until discrepancies between monthly and daily results are understood and accepted.
   e. Repeat for El Vado, then Abiquiu, then Cochiti, then Jemez, then Elephant Butte, then Caballo.
   f. One at a time, turn back on policy groups that were disabled in step 2-c, and modify monthly logic until discrepancies between monthly and daily results are understood and accepted.
   g. Optional recommendations:

Suggested Approach -2 continued

1. Create a test sequence that causes all rules to fire at a daily timestep.
2. Rewrite rules that are sensitive to timestep.
   a. Convert the test model and sequence created in Step 1 to a monthly timestep model.
   b. Get the monthly timestep test model to run without any errors. This was…
   c. Turn off as many policy groups as possible in daily model without causing a crash…
   d. Starting with Heron, rewrite problematic rules at a monthly timestep until…
   e. Repeat for El Vado, Abiquiu, Cochiti, Jemez, Elephant Butte, Caballo.
   f. One at a time, turn back on policy groups that were disabled in step 2-c ...
   g. Optional ideas/considerations:
      - Maintain rule numbers in both rule sets even if it means creating “dummy” rules that do nothing at a monthly timestep so that the two rule sets are more easily compared.
      - If the rule or function rewrite is general enough that the same logic would work for either timestep, update both the daily and monthly rule set so that they are identical for now.
      - Place comments in the description field of any rules that are rewritten stating either that they are different rules at a daily or monthly timestep, or that the rule was rewritten on a given date to accommodate daily and monthly time-steps.
      - Be particularly careful of logic in daily timestep that relies on travel lag, for example setting downstream reservoir operations based on upstream reservoir operations a day or two previously. Monthly logic will need to consider upstream operations during the same timestep. Hypothetical simulations may be required more at a monthly timestep than a daily because of the lack of built in lags and delays.

Suggested Approach – 3 & 4

1. Create a test sequence that causes all rules to fire at a daily timestep.
2. Rewrite rules that are sensitive to timestep.
3. Document the rule rewrites including either the daily and monthly rule code if there are two rules, or the old and new code if there is a single rule that was generalized. Also include comparisons of daily versus monthly model output where it is illustrative.
4. Test the new rule set on a longer validation run, perhaps a “historic hydrology current ops” run using inputs from 1950 through 2010.