StateMod
Program Description

Maintenance Training Session #1

April 24-25, 2014

Programming Philosophy (1/2)

- Help the user
  - Input data units
  - Input data detail (average, monthly, daily)
- Backward compatible
  - Support old data formats
- Check input for reasonableness
  - Catch for potential problems before trying to simulate
  - Particularly for operating rules
- Detailed checking
  - Control variable (ichk) offers over 25 options
- Allow major control (on/off) without revising input
  - Control variables for wells, variable efficiency, time period, output units

Programming Philosophy (2/2)

- Minimize memory requirement
  - Read time series once per year
  - Print output to a binary file every time step
- Maximize local variables
  - Initialize data to scalars every time step
    - Dem = Demand(I,j)
- Performance is critical
- Help user/programmer find problems
- Once water is allocated, do not take away

Memory

- Two files of common block data
  1. Common.inc
     - All common blocks except daily
  2. Daily.inc
     - Daily data only
- Subroutine StateM
  - Contains current limits of model
  - Used unique values to allow easy replacement

Typical Operating Rule Structure (1/2) (see DivcarL)

- Three components prior to code:

1. Program description
   - DivcarL; It simulates a type 45 operating rule for carrier structures with Losses
2. Update History
   - rrb 2007/04/16 Revised to allow various owners to share in water supply and capacity
3. Documentation

   CallBy calling routine

   IW Overall water right order

   L2 Location of operation right in opr right table

Typical Operating Rule Structure (2/2) (see DivcarL)

- Code identifies steps associated with key steps
  - Step 1 Initialize
  - Step 2 Exit if not on this month
  - Step 3 Set Source data
- Detailed Output
  - Allows detailed results if requested

Flow Charts

- Main see Statem
- Baseflow see Virgin
- Simulate see Execut
- Report see Report
- Data check see Xdebug

Other (1/2)

- Database of input
  - Easier maintenance
- Memory limits
  - Western slope was near limit of old compilers
- Operating rule redundancy
  - Backward compatibility
- Documentation
  - Always room for improvement
- Daily return flows
  - If day 1 = 0, performance can be significantly improved

Other (2/2)

- Calibration in steps
  - Run in a monthly time step
  - Begin with stream and diversions
  - Add reservoirs, wells, plans, …
- Baseflows
  - Understand why negative base flows may occur
  - Eliminate them if possible
- Simulate
  - Limit degrees of freedom
    - Fix demand and reservoir data
      - Verify water right and operating rule operations
    - Sequentially free reservoirs & demands
  - Check
    - Monitor to/from ground water storage
    - Monitor water balance
    - Review output