Our Model

Physically based Conceptual Model

- SNOW-17
  - Temperature index
- SAC-SMA
  - Two layer
  - Fixed evaporation
    - monthly
    - Controlled by snow cover
- Unit Hydrograph
- Diversions
  - Measured
- Consumptive Use
  - Uses Irrigated area and MAT
- Lag/K
  - Variable

Calibrations

- Strongly input driven
  - Accuracy is mainly limited by the density of the precipitation sensors
- Upper Colorado re-calibrated using SNOTEL data
  - Better representation of snow
  - problems with data set

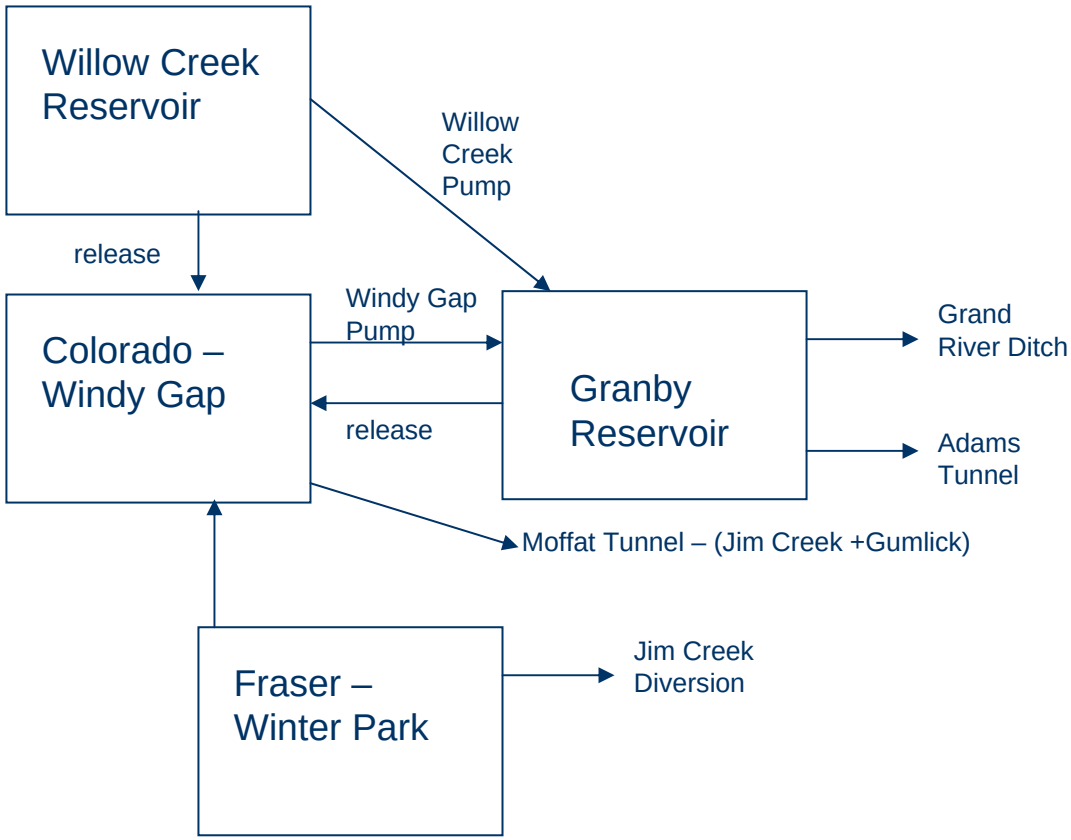
Calibrations

- We calibrate for unregulated flow
  - Account for measured diversions
  - Consumptive use is accounted for internally
- Calibrations over many basins
  - Basins have similar characteristics and calibration parameters
- Zones (spatial scale)
  - Above 11000, 9500-11000,8000-9500, etc.
  - Three zones maximum
  - Scale of basins 100-200 nm
- Time step
  - 6 hours above Lake Powell
  - 1 hour below (Arizona, New Mexico, Virgin and Sevier rivers)

Calibrations

- Where are calibrations done?
  - Where continuous records are available
  - This has been relaxed in recent years
- Example - Above Cameo
  - 29 basin with 3 areas per basin ~ 80 calibrations
- Natural/simulated flows are calculated down basin to Powell
- Calibration years are 1976-2002
  - Will be extend to 2005 soon (will trim 1976)
  - Typically update every 3 years

Colorado – Windy Gap



Realtime Simulations

- Operationally we simulate regulated flow
  - Subtract diversions and consumptive use
  - Add reservoir regulation
- Quality Control Precipitation/Temperature/Freezing Level
  - 6/24 hourly using gages only
  - 1 hourly using gages and radar
- The model is adjusted as needed
  - We strongly depend on accurate flow data to make these adjustments
  - Minimalist approach
  - Add precipitation/increase melt rather than change model states
- Snow in the models is updated the first of each month
  - November through April

Realtime Simulations

- Strengths
  - Accounts for the effect of soil moisture
  - “Continuous” in time and space
- Weaknesses
  - Difficult to relate model states to physical measurements
  - Future precipitation/temperatures are unknown