

## Colorado Basin River Forecast Center

### Water Supply Forecasting Tools

#### Statistical Water Supply (SWS)

SWS is a software package to develop and run principal component regression equations that relate measurements of observed climate conditions (predictor variables) and seasonal streamflow volume.

Predictor variables routinely include:

- Precipitation (for a month or period of months)
- First of month snow water equivalent (SNOTEL data)
- Monthly stream flow volumes
- Climate Signals:
  - o El Nino Southern Oscillation Index (ENSO SOI)
  - o Multivariate ENSO Index (MEI)
  - o Pacific North American Index (PNA)

The output from these equations is a seasonal volume, for example a volume for the months of April through July. This output is a conditional probability distribution, not a single value. The standard output provides the 10%, 50%, and 90% exceedance values.

The SWS system is easy to calibrate, maintain, and run. However equations are developed to run only at specific times (i.e. the first of each month January-June) and for a specific pre-defined forecast period (April-July, May-July, etc.). The SWS is limited in that sense compared to the Ensemble Streamflow Prediction (ESP) method, however the SWS requires much less extensive calibration, maintenance, and data requirements. Both methods are used in tandem when developing seasonal water supply forecasts.

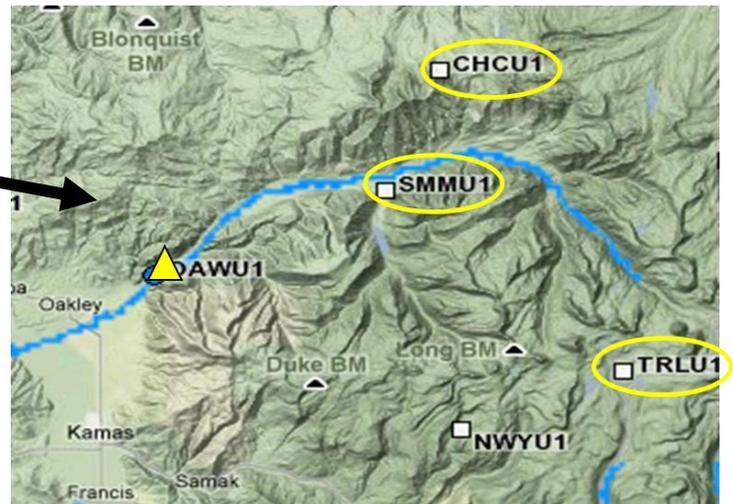
Sample Equation for April 1st:

April-July volume Weber River @ Oakley, UT (OAWU1) =

- + 2.43 \* Apr 1<sup>st</sup> Smith & Morehouse (SMMU1) Snow Water Equivalent
- + 1.81 \* Apr 1<sup>st</sup> Trial Lake (TRLU1) Snow Water Equivalent
- + 1.25 \* Apr 1<sup>st</sup> Chalk Creek #1 (CHCU1) Snow Water Equivalent
- + 3.55 \* Nov-Mar Heber (HEBU1) Precipitation
- 13.58



Example: April 1<sup>st</sup> equations for streamflow forecasts of the Weber River at Oakley, Utah (OAWU1) use three SNOTEL sites (circled) and a lower elevation precipitation site.



Predictor variables generally require 30 years of historical data (1980-2010) to be considered for an equation. Ideally the sites also reside within the river basin being considered, however due to a limited period of record and limited high elevation data networks this is not always possible. In those instances nearby stations at similar elevations and aspects may be considered.