

Conditional vs. Historical AHPS Simulations - Updated February 2006

The National Weather Service (NWS) is now producing AHPS probability products for two different types or modes of model simulations, Conditional and Historical. The difference lies in how the Ensemble Streamflow Prediction (ESP) system is run. The ESP can make up to 54 simulations based on weather data from the past. Each simulation produces a trace (or hydrograph) of the streamflow for that year for the period of interest.

Initially, the NWS provided only the Conditional Simulation mode for the Long Range Probability Outlooks. In this mode, the ESP model conditions each year's simulation by initializing the snow/soil/runoff component to reflect current river and soil conditions at the start date. The model uses a temperature and precipitation time series for the period of interest for each simulation year. The time series are adjusted for the anticipated conditions indicated by the Climate Outlook.

The ESP is run for 54 different simulations all based on current conditions. To determine the Flood Probability of Exceedance (POE) values, the peak flows for each year's simulation are selected and then ranked in ascending order. Since 53 of the 54 peak flows (i.e., 98%) are above the lowest, a 98% POE is assigned to the lowest value. Other values are assigned similarly.

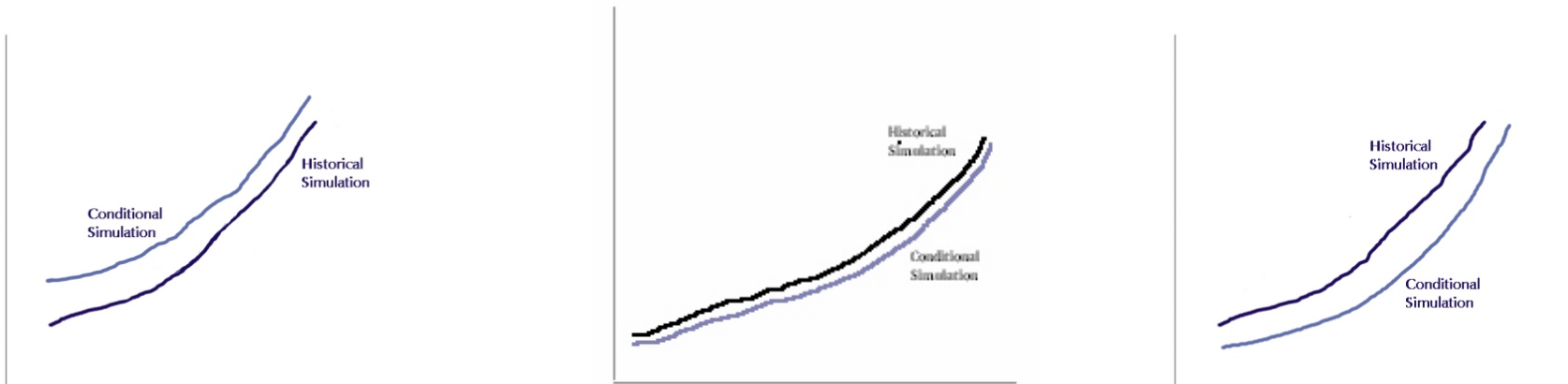
The Historical Simulation mode initializes the ESP for current conditions only at the beginning of the model run. The simulation is only run once using 54 years of weather data. This produces a continuous 54-year hydrograph of streamflow data. The peak flows for each year are selected for the period of interest and ranked to determine POEs.

The Conditional Simulation biases the POEs to current conditions while the Historical Simulations reduces this bias in order to reflect "normal" conditions. Normal conditions are assumed since running the ESP in continuous mode allows the snow/soil/runoff component of the model to apply 54 years of sequential data to the entire simulation which then more accurately reflects a mix of wet/dry, warm/cool and normal climate periods rather than only the current climate bias.

The Probability of Exceedance (POE) for River Stage graph shows the chances of the river going above various levels during the forecast period labeled above the graph. Similar graphs are available for flow and volume of water at this forecast location. The **conditional simulation** line indicates chances of the river going above given levels based on current conditions. The **historical simulation** line indicates the chances of the river going above a given level based on “normal” or “average” conditions.

These long-range forecasts or outlooks allow you to see what computer simulations can tell us about extended periods. Remember that this information is *indicative*, that is, it only gives you probabilities or chances of possible scenarios. It should be expected that conditions can and will change over such extended periods. These forecasts are updated monthly and should be consulted on a regular basis.

Here are some possible scenarios to help you understand this graphic:



More wet than “normal” conditions for the outlook period.

The plot of the conditional simulation indicates that there is a greater chance for higher water than “normal” that a historical simulation would predict.

Slightly dry but near “normal” conditions for the outlook period.

The plots of conditional and historical simulations are very close over the whole range of probabilities, but the conditional water levels are slightly less than the historical simulation.

More dry than “normal” conditions for the outlook period

The plot of the conditional simulation indicates that there is a greater chance for lower water than “normal” that a historical simulation would predict.