

Water Supply Forecast Correction Curves



Kyle Dittmer

Hydrologist – Meteorologist

December 15th, 2009

CRFG - Workshop

Columbia River Inter-Tribal Fish Commission

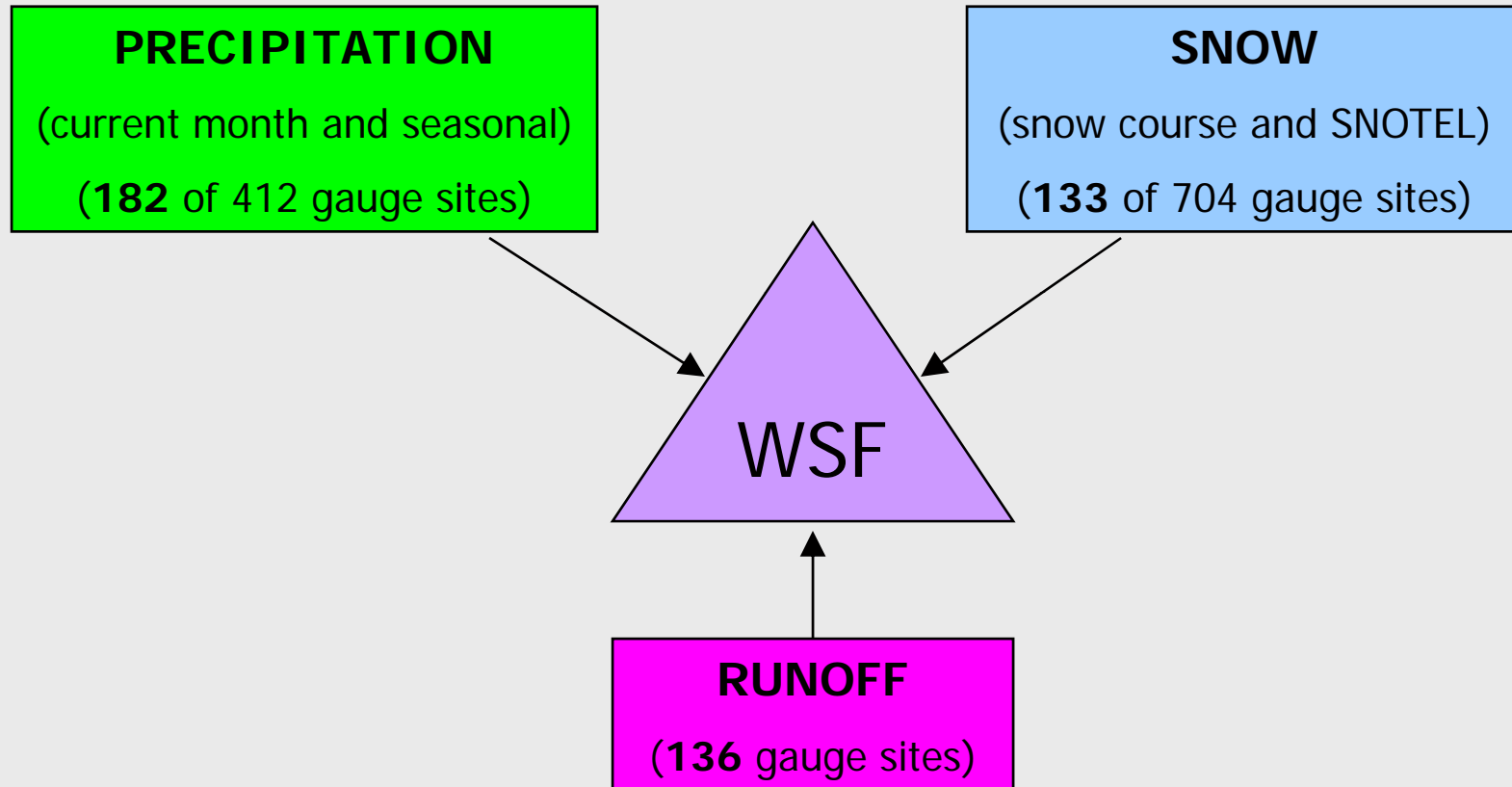
Portland, Oregon

Introduction



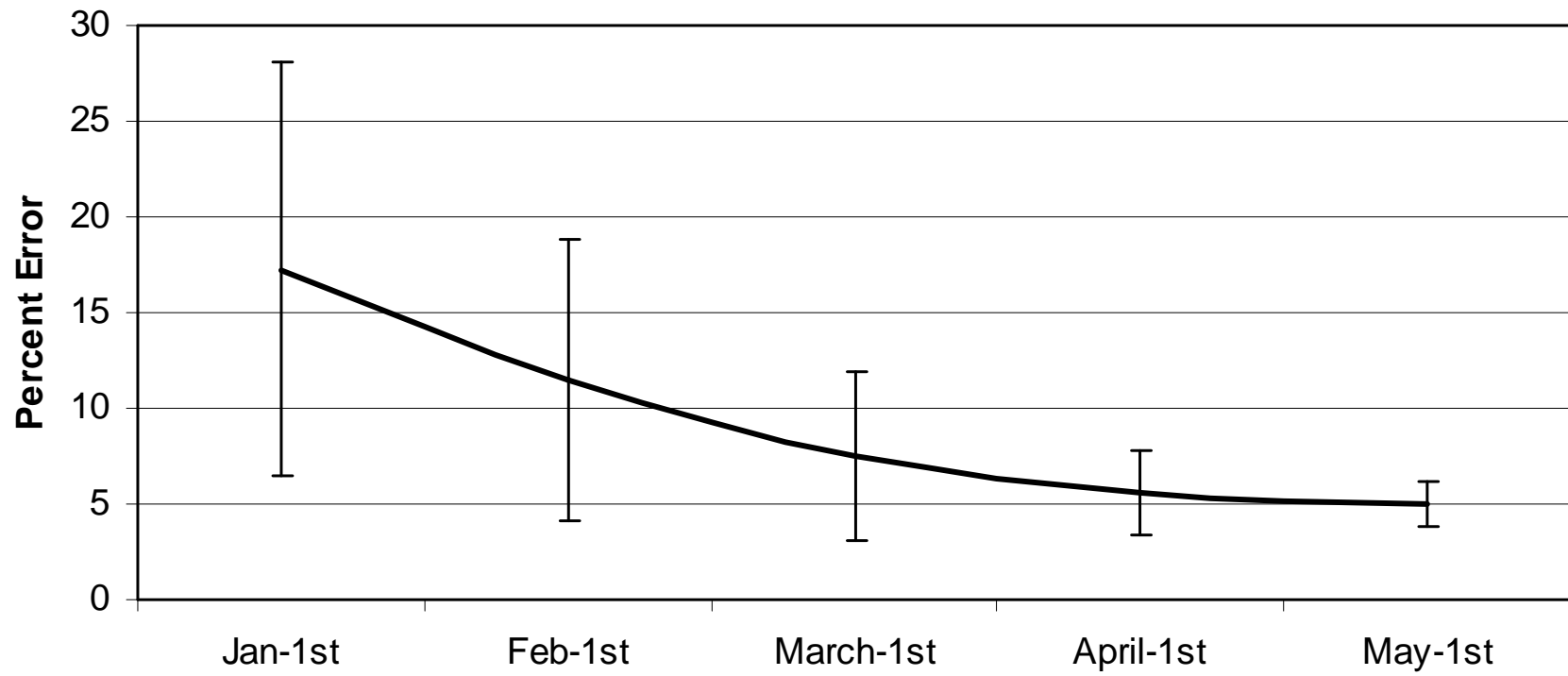
- Curves seek to add value to monthly Water Supply Forecasts (WSF) by projecting future seasonal trends.
- Historical WSFs and observed runoff data are used to compute the series of curves.
- Four volume-based water year classes are devised for each forecast location.

Water Supply Forecasting

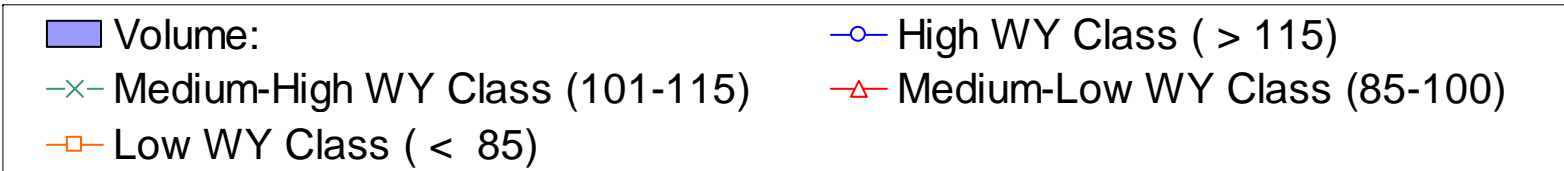
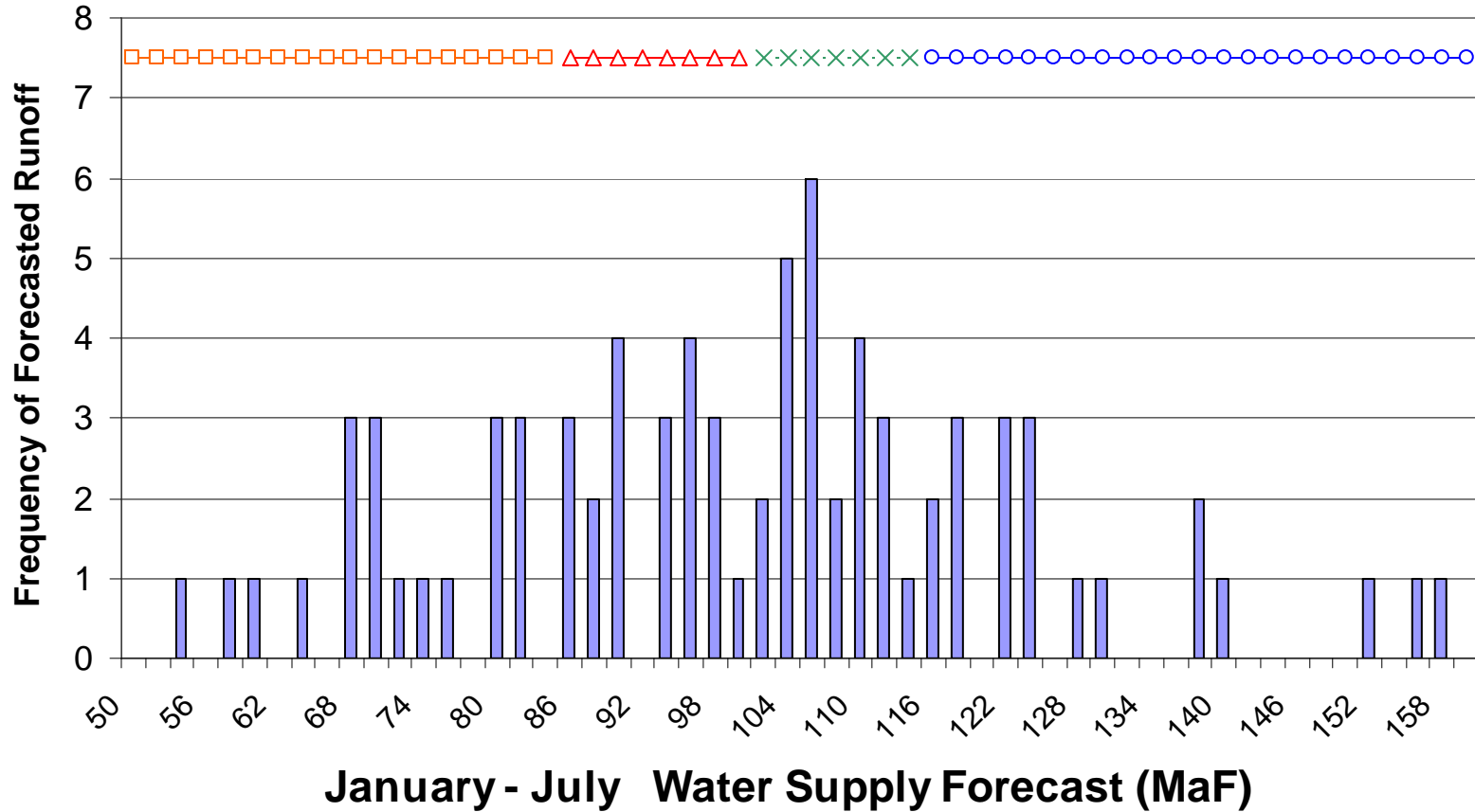


$$WSF = \{[(PRECIP+SNOW+RO)-a]^*(b-c)\} + MA$$

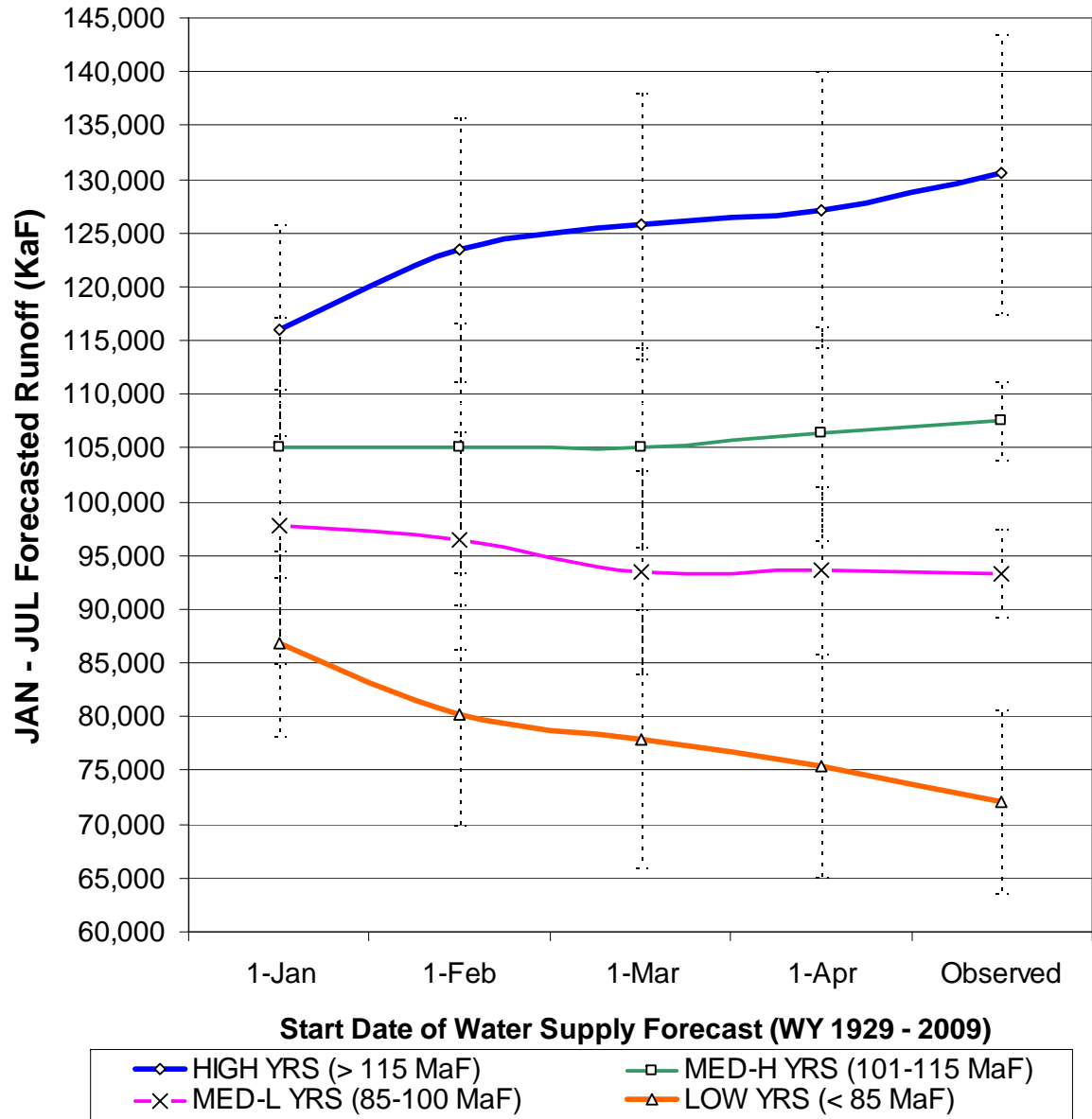
Water Supply Forecast Error



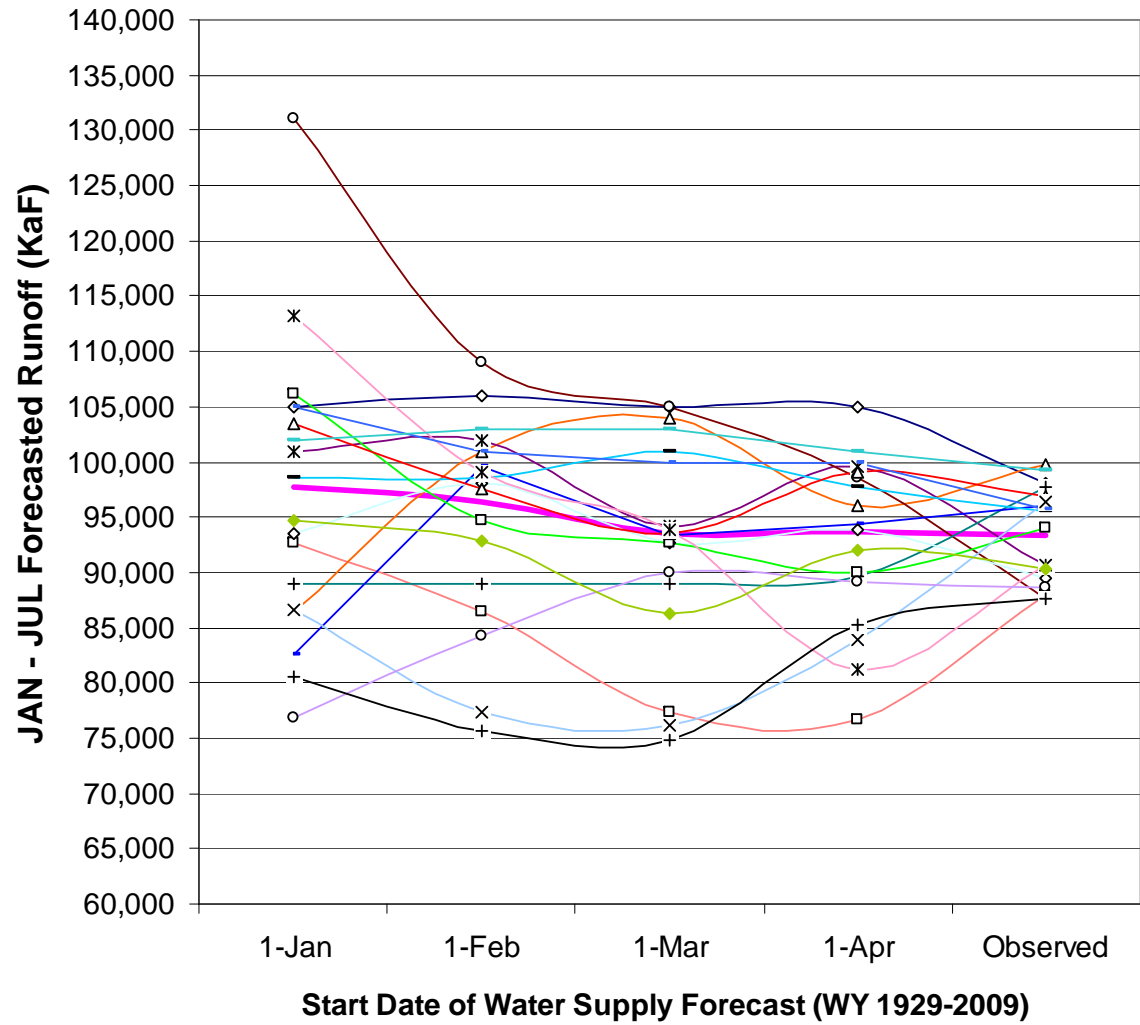
COLUMBIA R. at THE DALLES: WY 1929 - 2009



COLUMBIA RIVER at THE DALLES



COLUMBIA RIVER at THE DALLES



MED-L YRS (85-100 MaF)	◇ 2000	□ 1993	△ 1990
* 1989	○ 1985	+ 1980	— 1970
— 1968	◇ 1966	□ 1963	△ 1962
X 1955	* 1942	○ 1936	+ 2003
— 2007	— 2008	◆ 2009	

How to Use a Curve



- Pick one Master curve for the Columbia at The Dalles in January. Repeat procedure using subsequent forecasts (Feb., March, and April).
- Use the CIG (UW) VIC Hydro model results to “hedge” on picking the correct Master curve.
- The Dalles curve determines a sub-basin curve. Then, add/subtract the sub-basin “differential” (i.e., start month of WSF vs. historical observed volume) to the current watershed WSF.

Example of Calculation



- Use January 1st 2004, Columbia at The Dalles: Official forecast was 103 MaF. Indicators suggested a “Medium-High” curve.
- The correction differential for January for a Medium-High curve is +2 MaF (107 MaF, observed, minus 105 MaF, average January).
- The Dalles corrected forecast = 105 MaF.

Test Results to Date:



- WY 2003-2009 failed, except 2006. For WY09, 12/13 out of 29 Columbia basins and 9/2 out of 13 Upper & Middle Snake basins performed well, for MH and ML category. RMS error was 10-90% less than the official forecast.
- Problem: Incorrect selection of the Master Curve. So, more error is introduced to basins.
- A more objective approach is being tested: consensus forecasting (CIG, RFC, CRITFC MEI).

Summary



- A correction differential applied to a WSF can give a better forecast by trending and to minimize “flip-flop” of forecast. Curves have been developed for 40 regional watersheds.
- Curves are divided by High (*La Nina*) and Low (*El Nino*) classes plus two Medium Water Year classes.
- After each season, add forecast values and the observed runoff to database in order to strengthen the regression.
- Future: (1) Consensus forecasting to pick the Master Curve. (2) Give results for other water year classes – let user pick.
- Benefits: (1) Reduced forecast error, (2) Minimize overdraft of reservoirs, (3) Better long-range water management, (4) More water for fish needs and other uses.