

Water Supply Forecast Correction Curves



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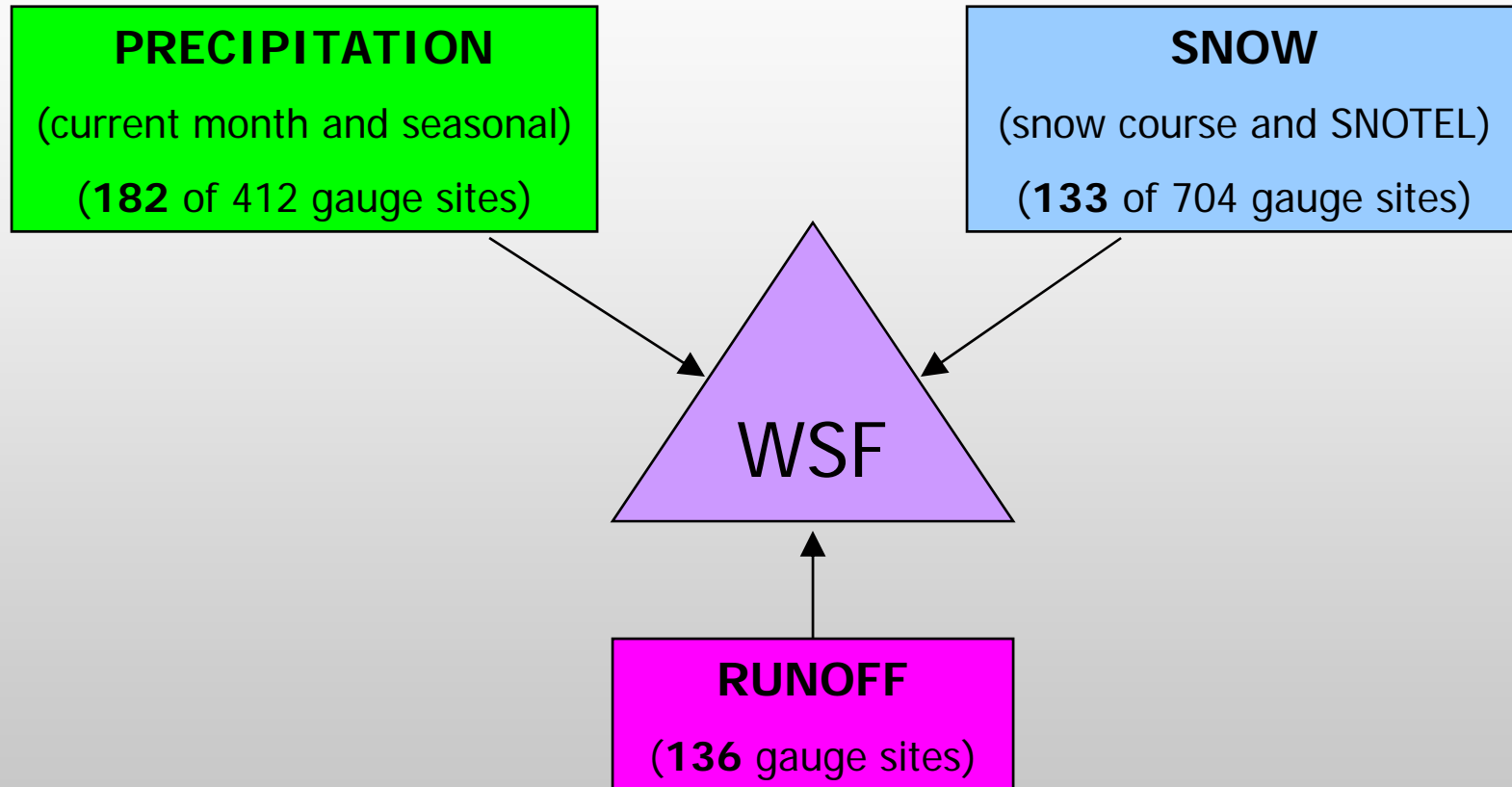
Portland, Oregon

Introduction



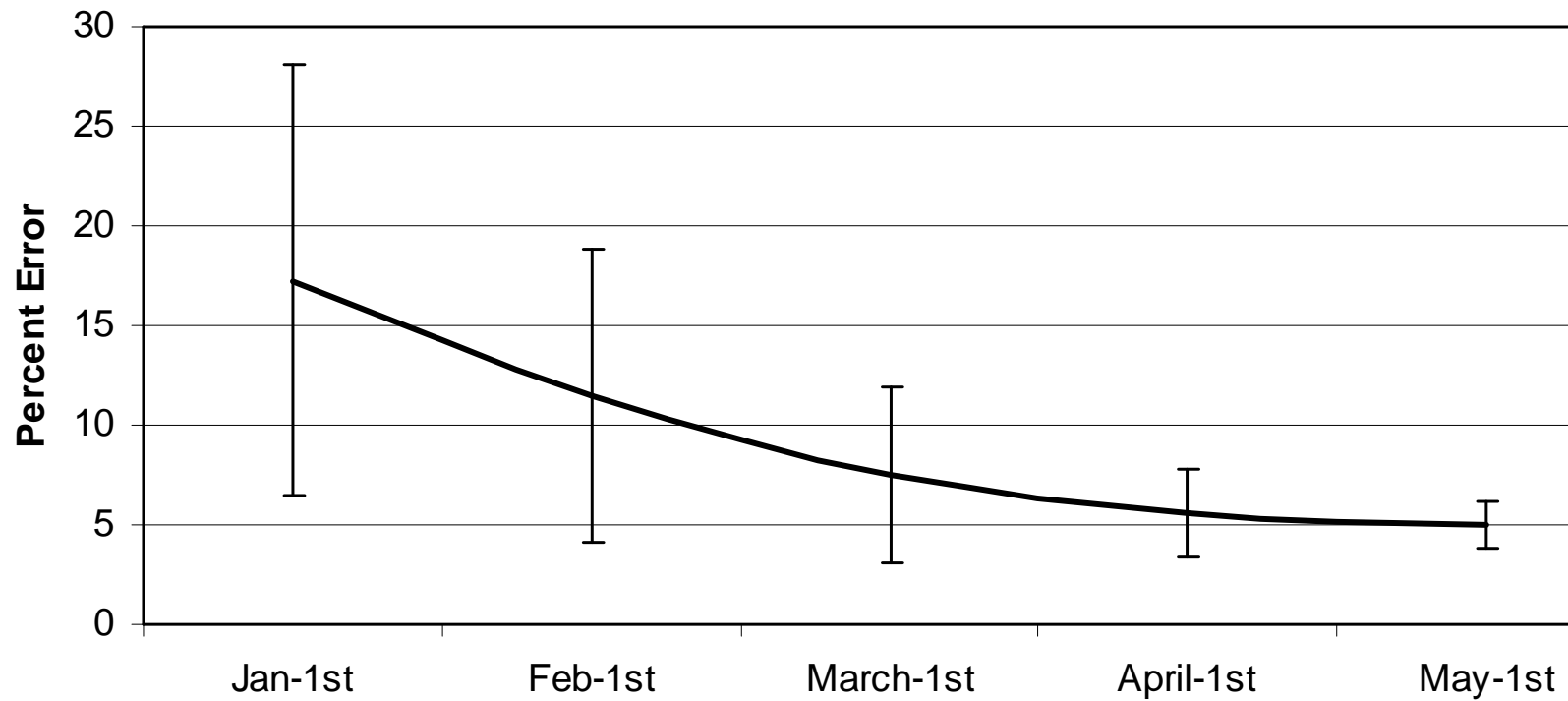
- Curves seek to add value to monthly Water Supply Forecasts (WSF) by projecting future seasonal trends.
- Historical WSFs and observed runoff data are used to compute the series of curves.
- Four volume-based water year classes are devised for each forecast location.

Water Supply Forecasting

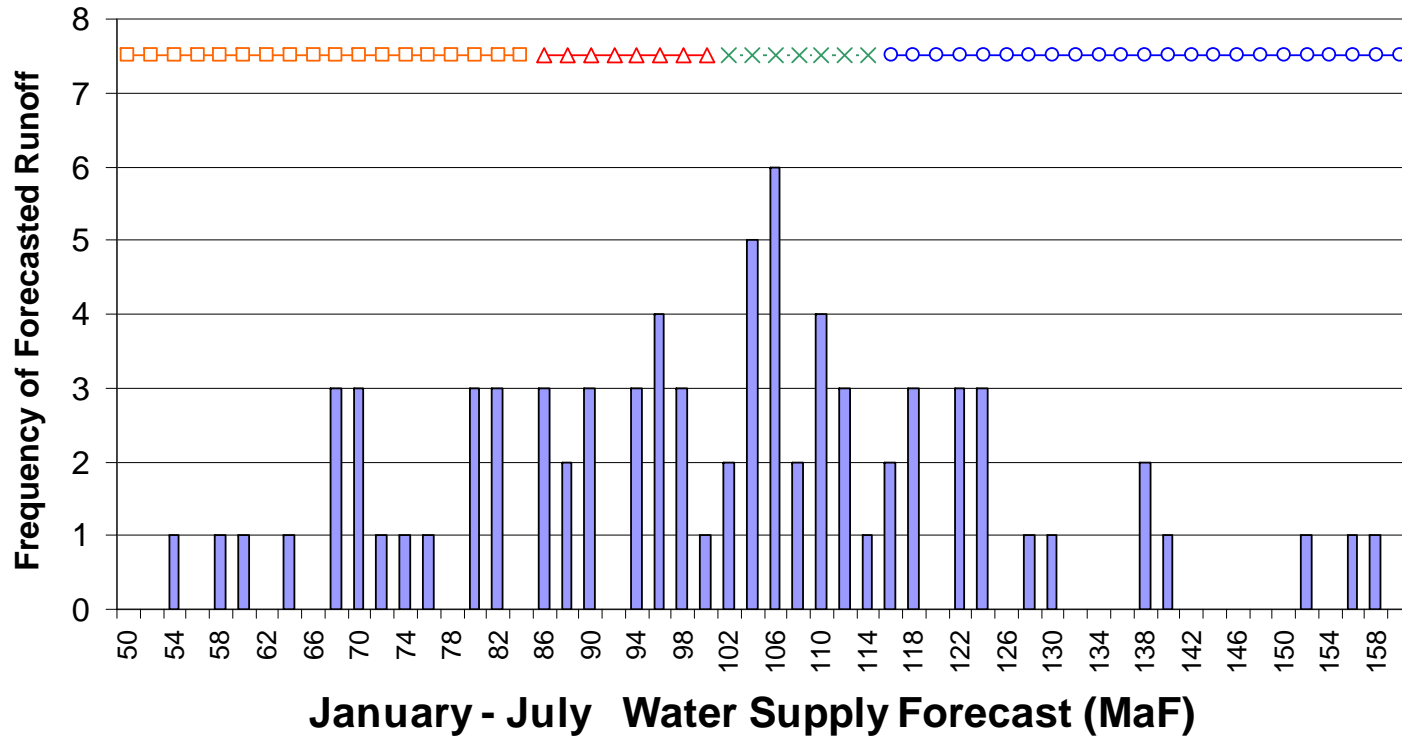


$$WSF = \{[(PRECIP+SNOW+RO)-a]^*(b-c)\} + MA$$

Water Supply Forecast Error

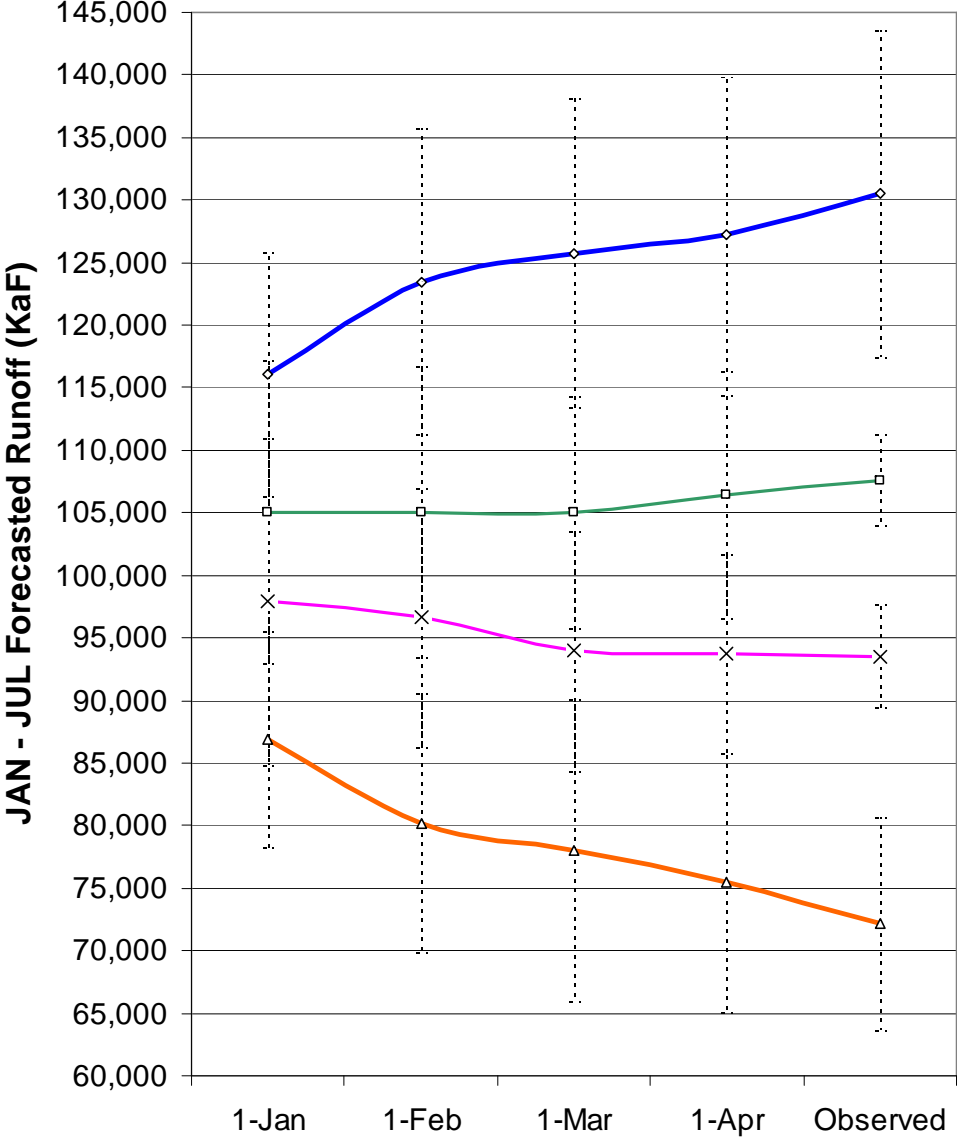


COLUMBIA R. at THE DALLES: WY 1929 - 2008



- Volume:
- x- Medium-High WY Class (101-115)
- Low WY Class (< 85)
- High WY Class (> 115)
- △- Medium-Low WY Class (85-100)

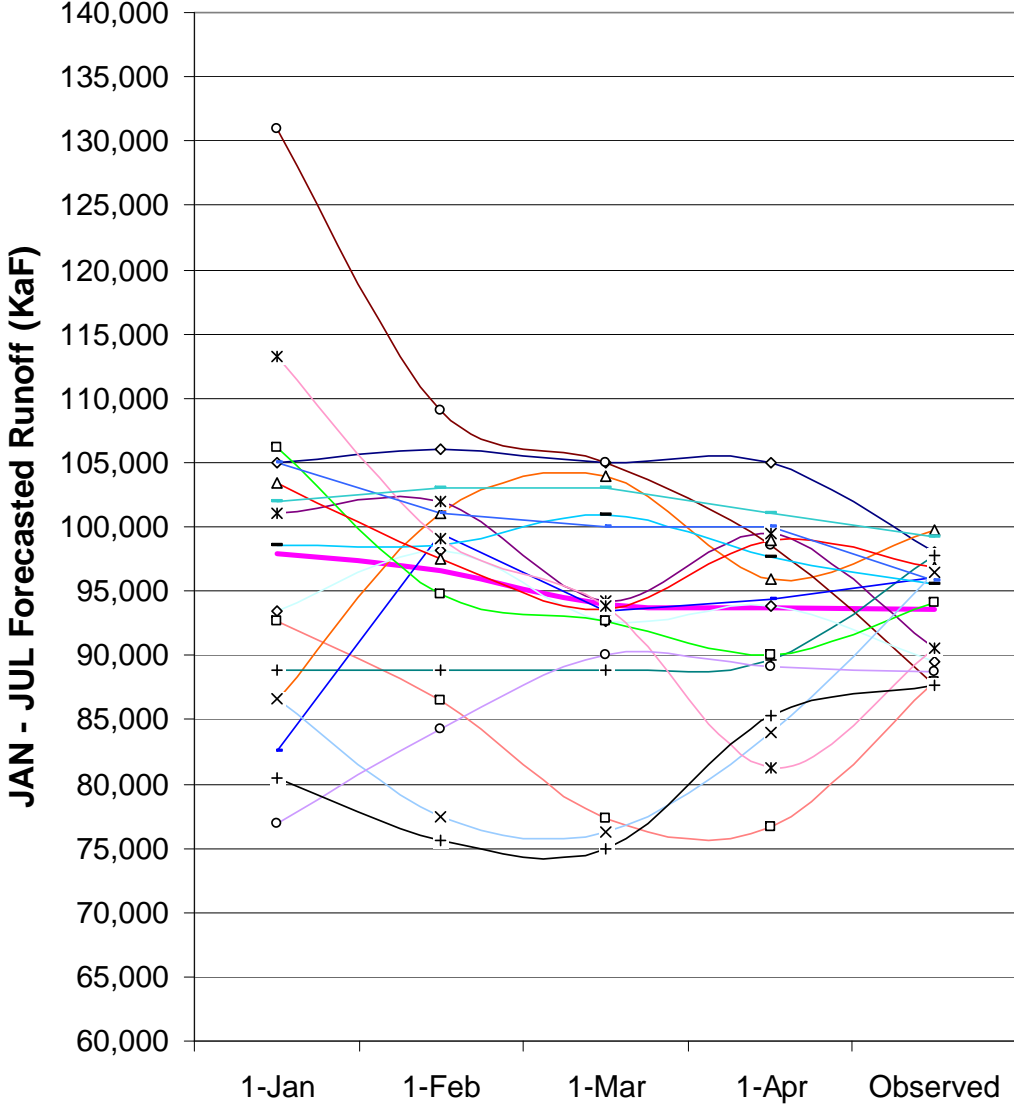
COLUMBIA RIVER at THE DALLES



Start Date of Water Supply Forecast (WY 1929 - 2008)

- ◆ HIGH YRS (> 115 MaF)
- MED-H YRS (101-115 MaF)
- × MED-L YRS (85-100 MaF)
- ▲ LOW YRS (< 85 MaF)

COLUMBIA RIVER at THE DALLES



Start Date of Water Supply Forecast (WY 1929-2008)

- | | | |
|------------------------|------|------|
| MED-L YRS (85-100 MaF) | 2000 | 1993 |
| 1990 | 1989 | 1985 |
| 1980 | 1970 | 1968 |
| 1966 | 1963 | 1962 |
| 1955 | 1942 | 1936 |
| 2003 | 2007 | |

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 (Starting 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 - 2008 failed, except 2006 (13 out of 28 watersheds saw improvement). The RMS error was 10-90% less than official forecast.
- Problem: Incorrect selection of the Master Curve. Hence, more error is introduced.
- 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.