Water Supply Forecast Correction Curves

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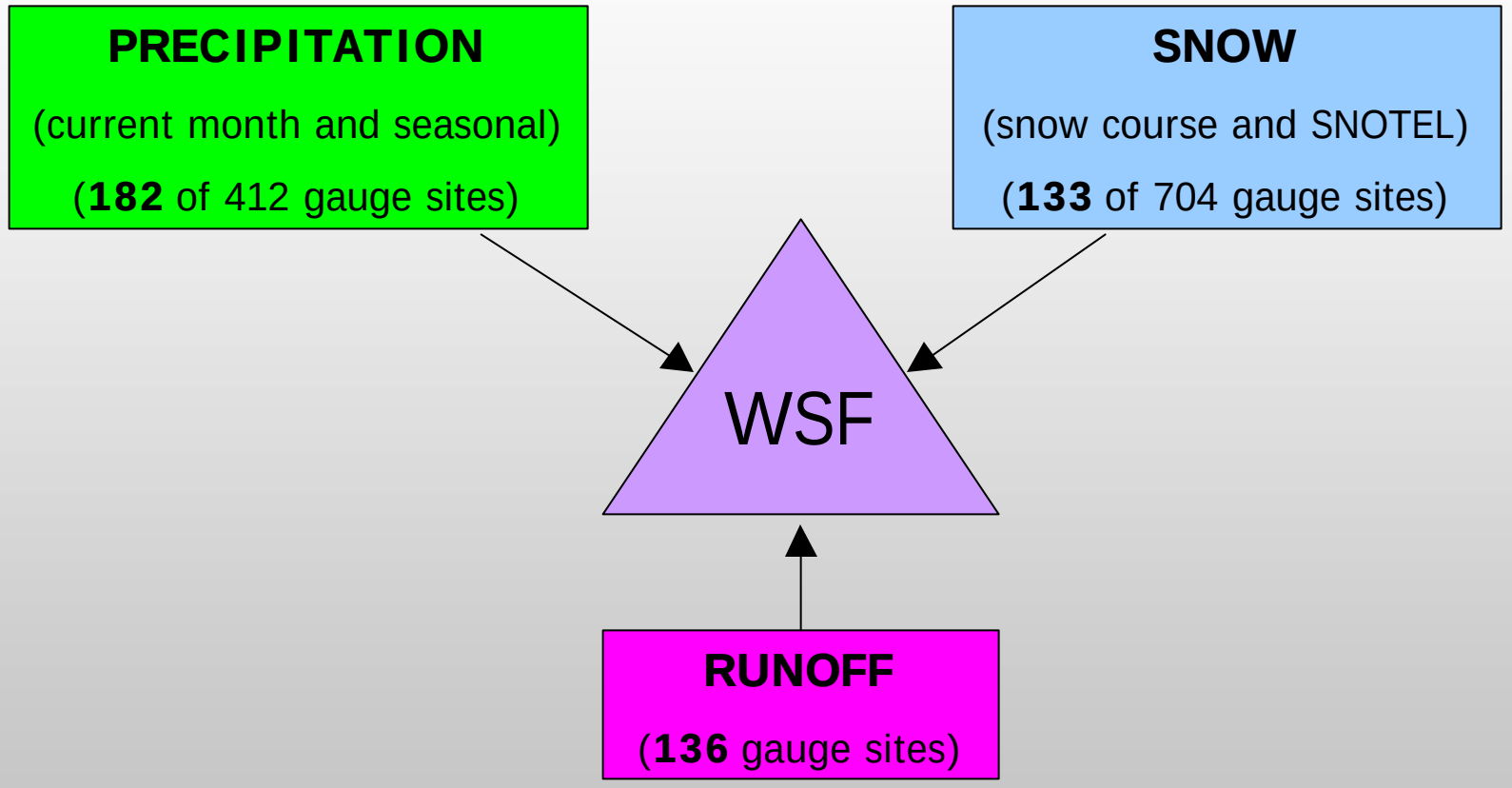
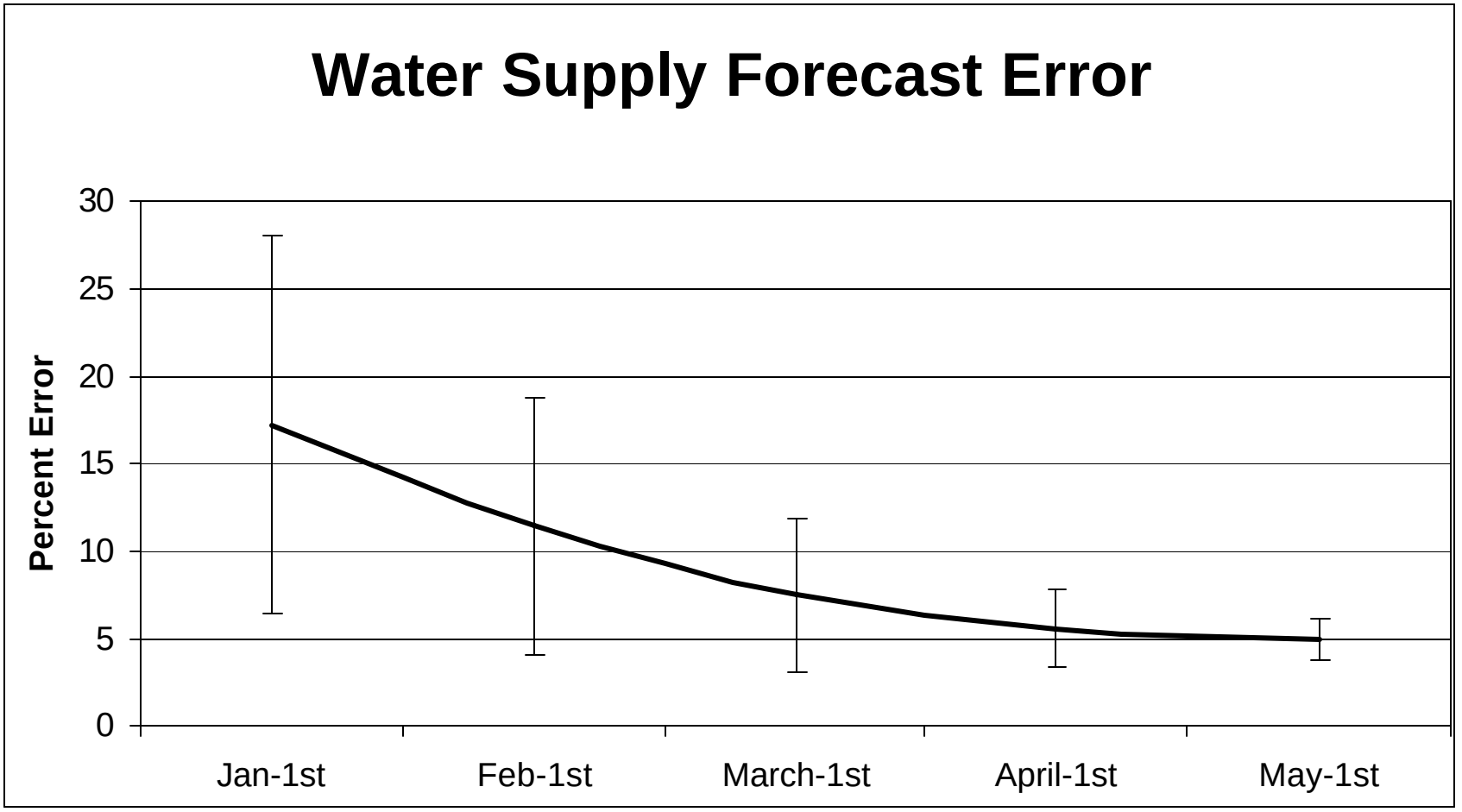
Introduction

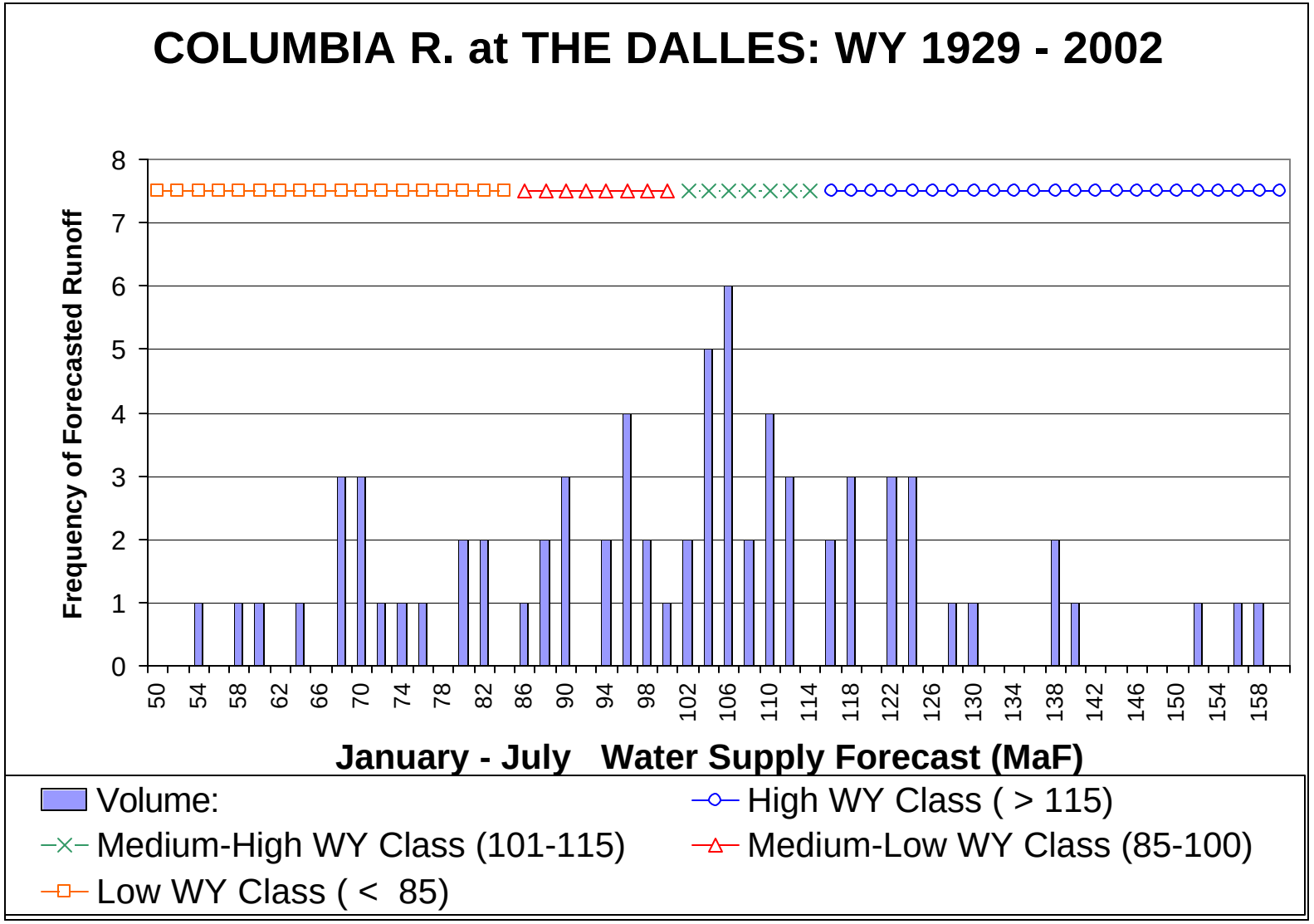
- Curves seek to add value to monthly Water Supply Forecasts (WSF) by projecting future seasonal trends.
- Historical WSFs and observed runoff data are used to compute the series of curves.
- Four volume-based water year classes are devised for each forecast location.

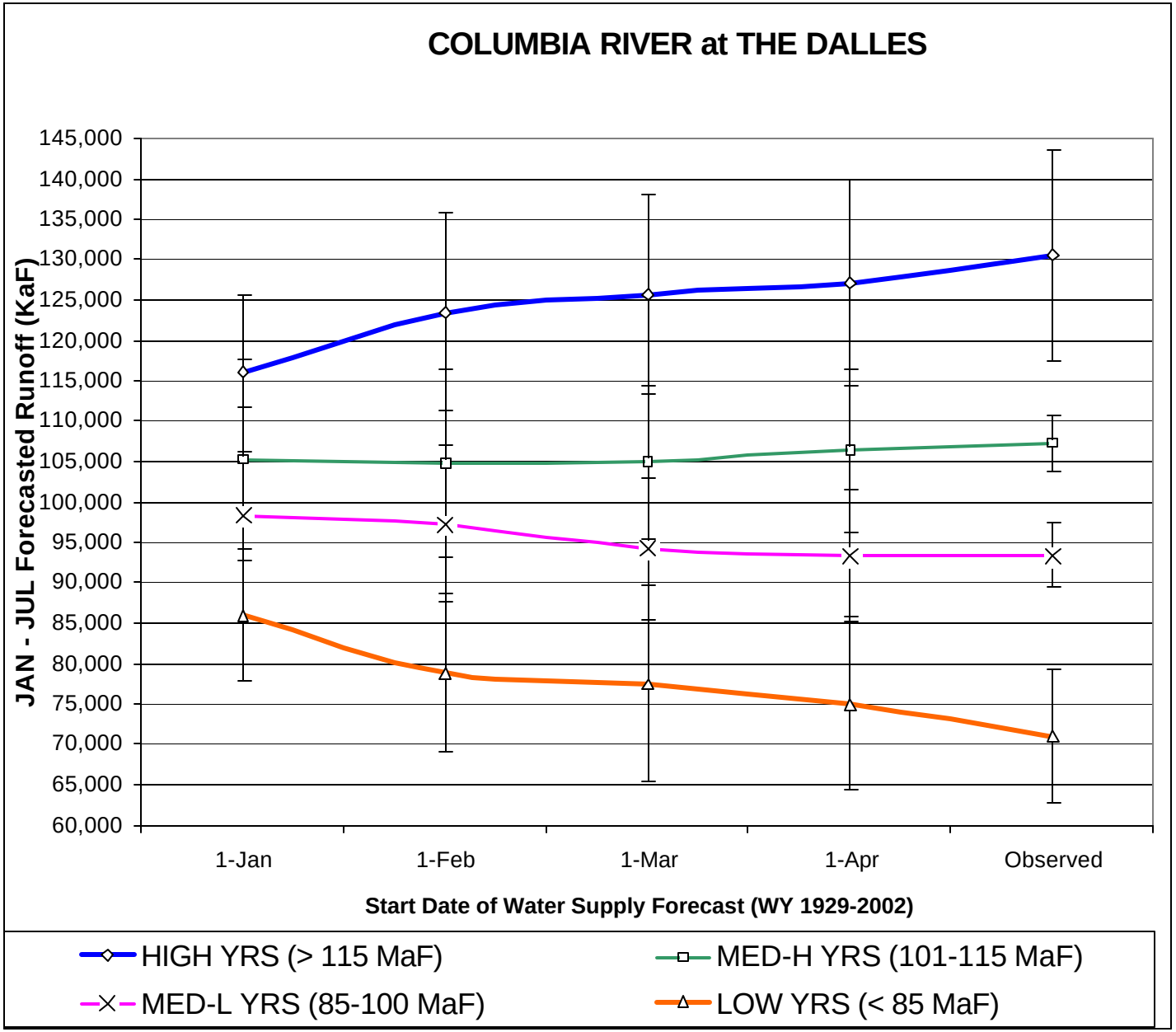
Water Supply Forecasting

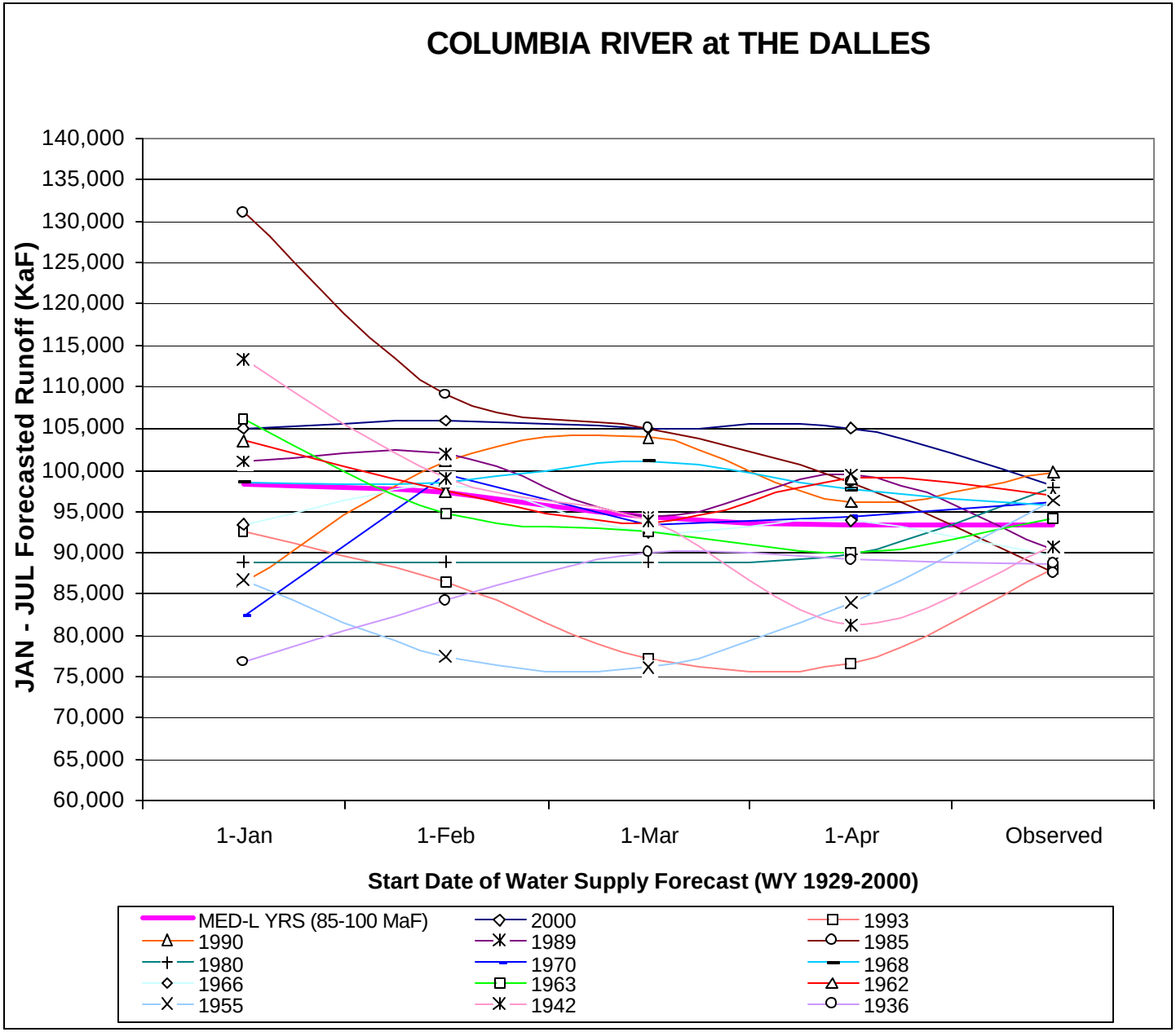


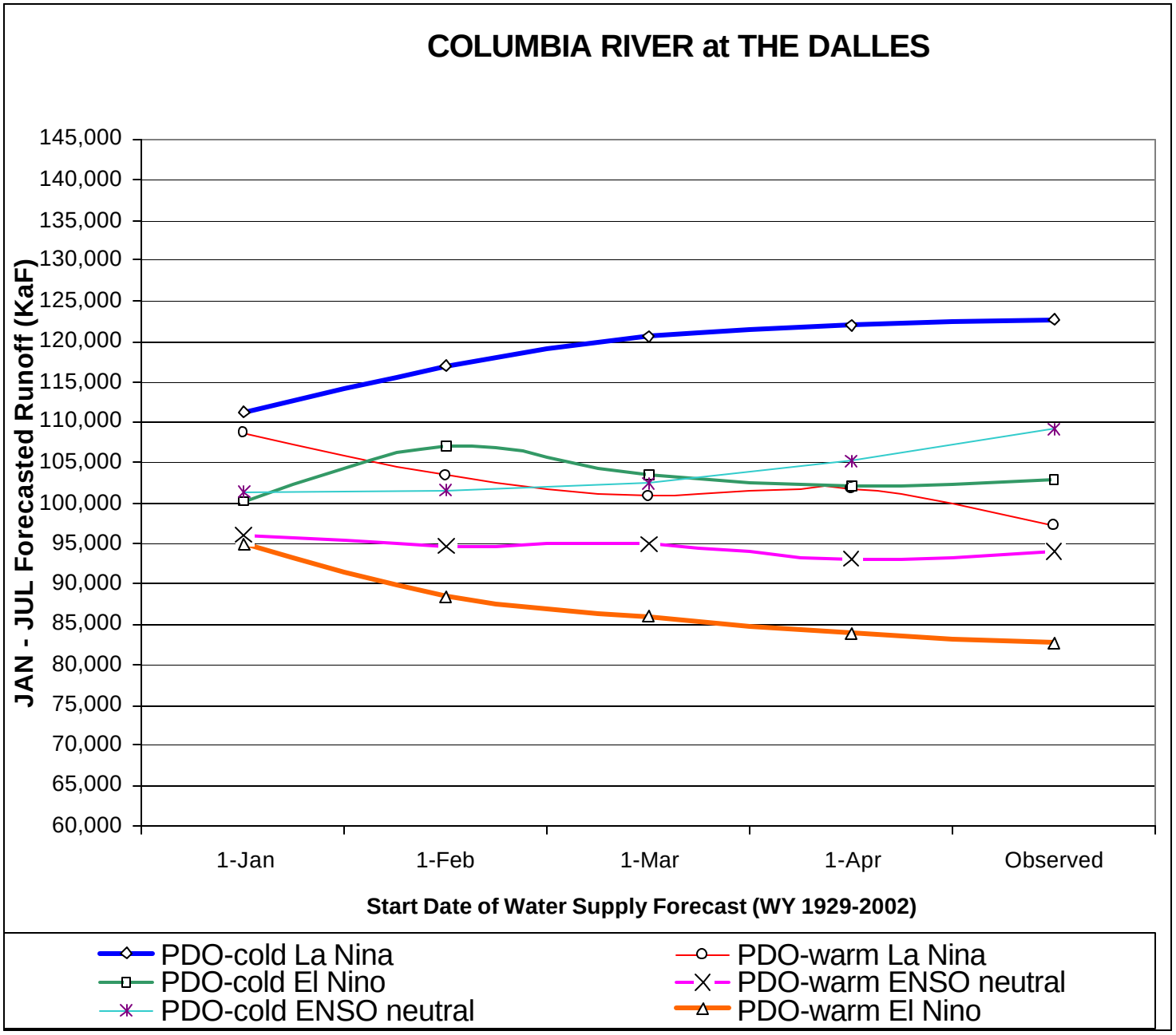
$$WSF = \{[(PRECIP+SNOW+RO)-a]*(b-c)\}+MA$$


Water Supply Forecast Error
Percent Error
30
25
20
15
10
5
0
Jan-1st
Feb-1st
March-1st
April-1st
May-1st


COLUMBIA R. at THE DALLES: WY 1929 - 2002
Frequency of Forecasted Runoff
0
1
2
3
4
5
6
7
8
50
54
58
62
66
70
74
78
82
86
90
94
98
102
106
110
114
118
122
126
130
134
138
142
146
150
154
158
January - July Water Supply Forecast (MaF)
Volume:
High WY Class (> 115)
Medium-High WY Class (101-115)
Medium-Low WY Class (85-100)
Low WY Class (< 85)

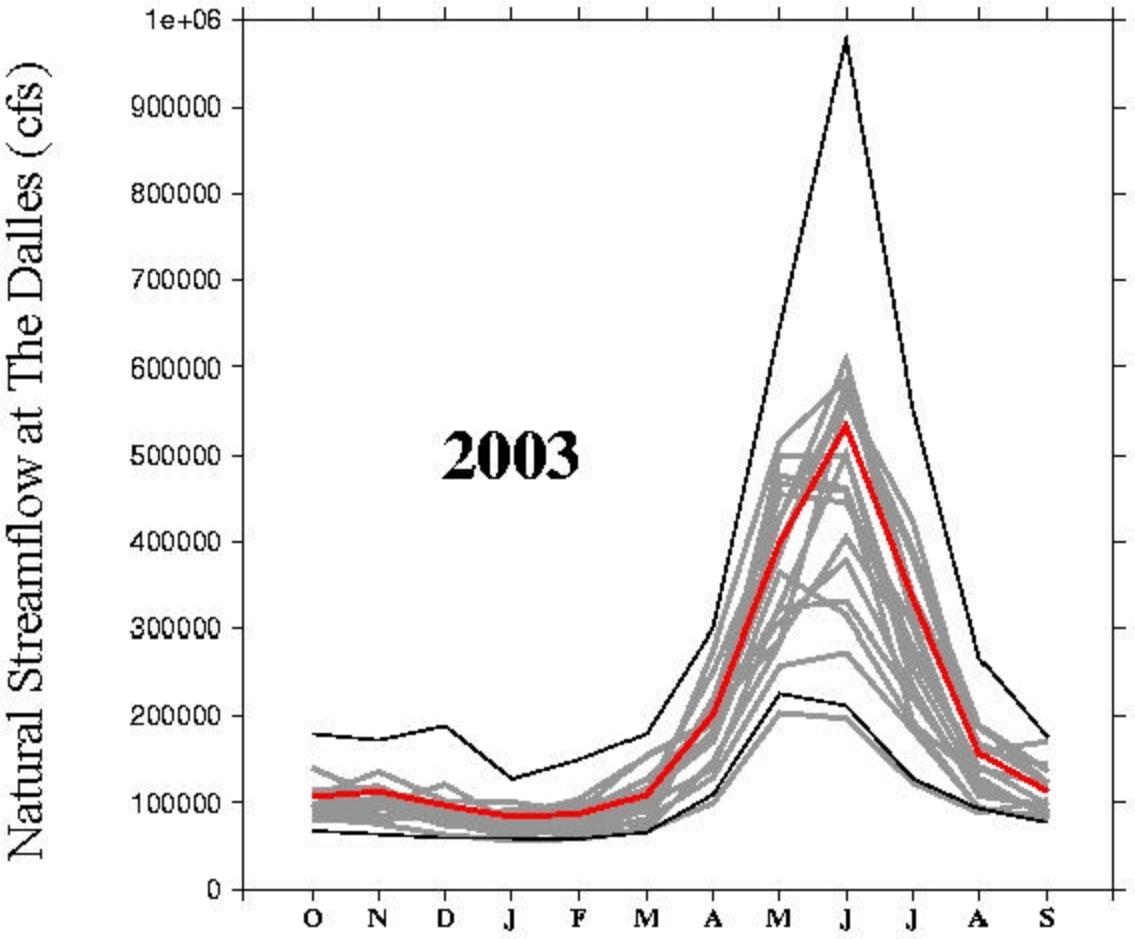

COLUMBIA RIVER at THE DALLES
JAN - JUL Forecasted Runoff (KaF)
145,000
140,000
135,000
130,000
125,000
120,000
115,000
110,000
105,000
100,000
95,000
90,000
85,000
80,000
75,000
70,000
65,000
60,000
1-Jan
1-Feb
1-Mar
1-Apr
Observed
Start Date of Water Supply Forecast (WY 1929-2002)
HIGH YRS (> 115 MaF)
MED-H YRS (101-115 MaF)
MED-L YRS (85-100 MaF)
LOW YRS (< 85 MaF)


COLUMBIA RIVER at THE DALLES
JAN - JUL Forecasted Runoff (KaF)
140,000
135,000
130,000
125,000
120,000
115,000
110,000
105,000
100,000
95,000
90,000
85,000
80,000
75,000
70,000
65,000
60,000
1-Jan
1-Feb
1-Mar
1-Apr
Observed
Start Date of Water Supply Forecast (WY 1929-2000)
MED-L YRS (85-100 MaF)
2000
1993
1990
1989
1985
1980
1970
1968
1966
1963
1962
1955
1942
1936

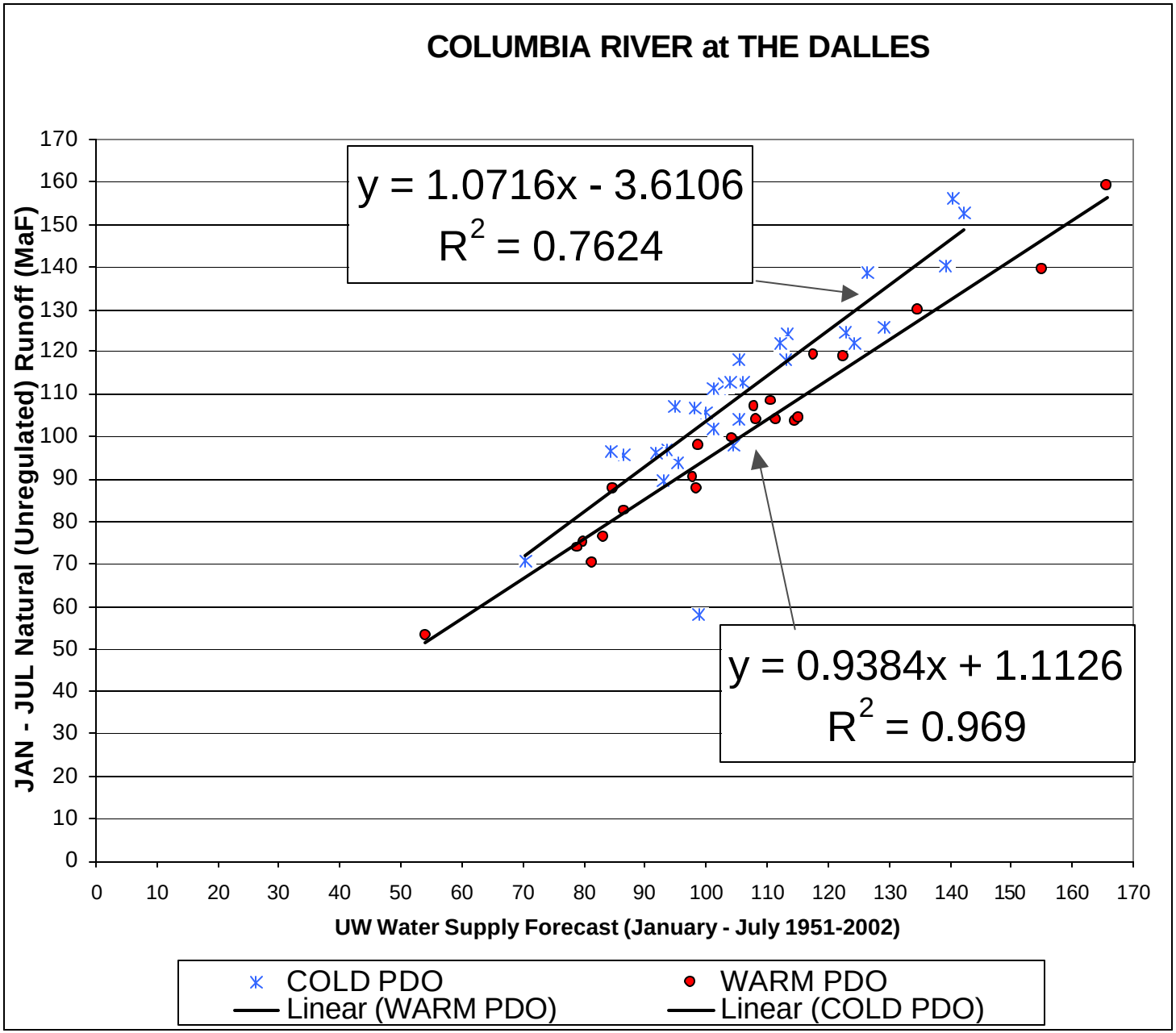

COLUMBIA RIVER at THE DALLES
JAN - JUL Forecasted Runoff (KaF)
145,000
140,000
135,000
130,000
125,000
120,000
115,000
110,000
105,000
100,000
95,000
90,000
85,000
80,000
75,000
70,000
65,000
60,000
1-Jan
1-Feb
1-Mar
1-Apr
Observed
Start Date of Water Supply Forecast (WY 1929-2002)
PDO-cold La Nina
PDO-warm La Nina
PDO-cold El Nino
PDO-warm ENSO neutral
PDO-cold ENSO neutral
PDO-warm El Nino

How to Use a Curve

- Pick the Master curve (The Dalles) closest to the Jan. 1st WSF. Repeat procedure…using subsequent forecasts (Feb., March, and April).
- Use the UW-CIG 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 (WSF starting month vs. historical observed volume) to the current sub-basin WSF.



http://www.ce.washington.edu/~hamleaf/DallesForecast.html


COLUMBIA RIVER at THE DALLES
y = 1.0716x - 3.6106
R2 = 0.7624
y = 0.9384x + 1.1126
R2 = 0.969
JAN - JUL Natural (Unregulated) Runoff (MaF)
UW Water Supply Forecast (January - July 1951-2002)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
COLD PDO
WARM PDO
Linear (WARM PDO)
Linear (COLD PDO)

Summary

- A correction differential applied to a WSF can give a better forecast by trending. Curves developed for 40 regional sites.
- Curves divided by High (*La Nina*) and Low (*El Nino*) plus two Medium classes.
- Benefits: (1) More water for fish needs, (2) Minimize overdraft of reservoirs, (3) Better long-range water management.