Jim Woodruff Section 7 Consultation - Follow-on Technical Modeling Workshop, Columbus GA

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Additional topics for discussion

- Power guide curve simulation in HEC-5
- New Lanier turbines/generators
- Ramp-up/ramp-down rate limits
- Woodruff stability considerations
- Seasonal rule curves, guide curves and spawning releases

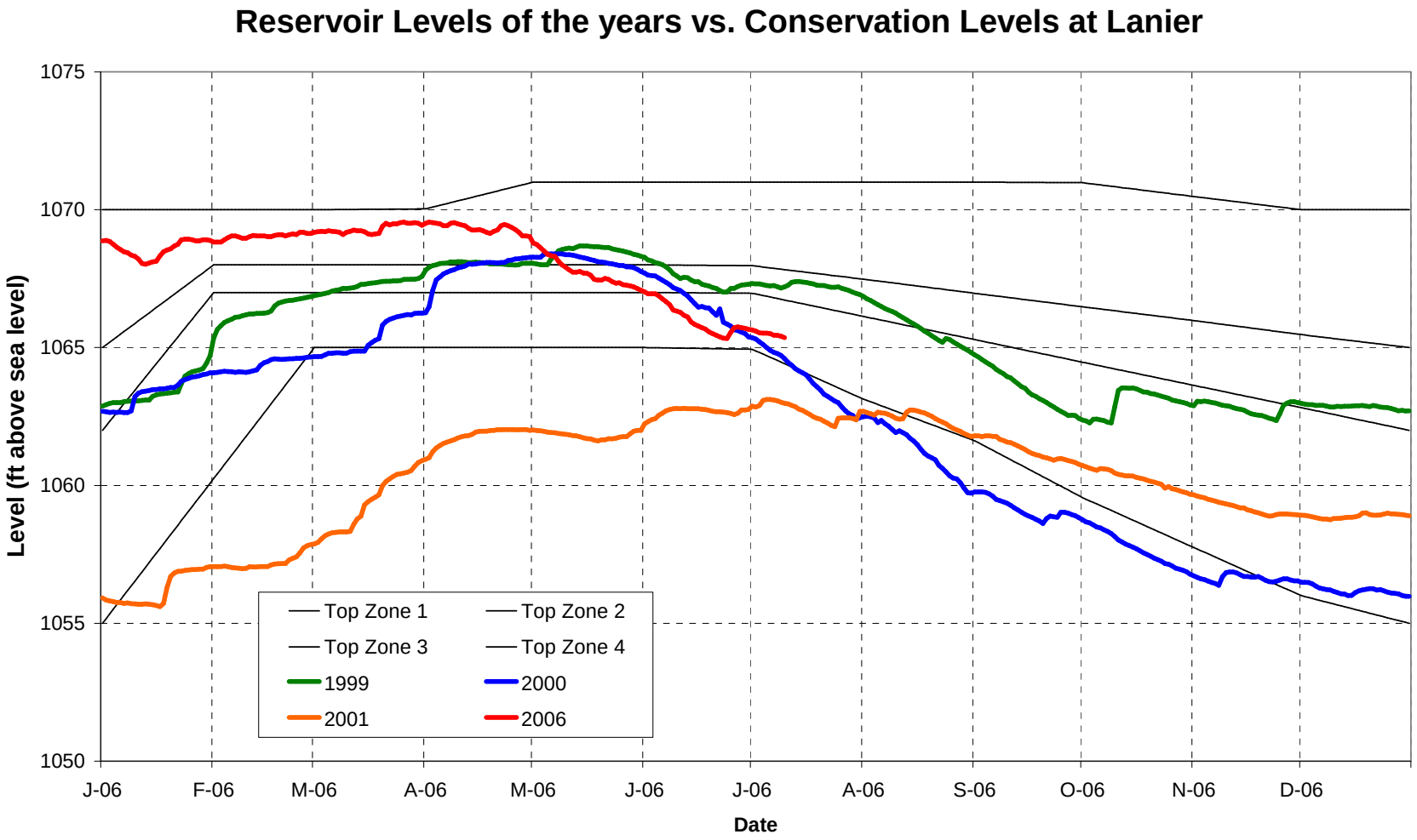
Power guide curve simulation in HEC-5

Corps of Engineers
Daily Minimum Hours of Generation – 12 months

Current Model Setting			
Zone	Buford	West Point	WF George
1	3	4	4
2	2	2	2
3	2	2	2
4	0	0	0

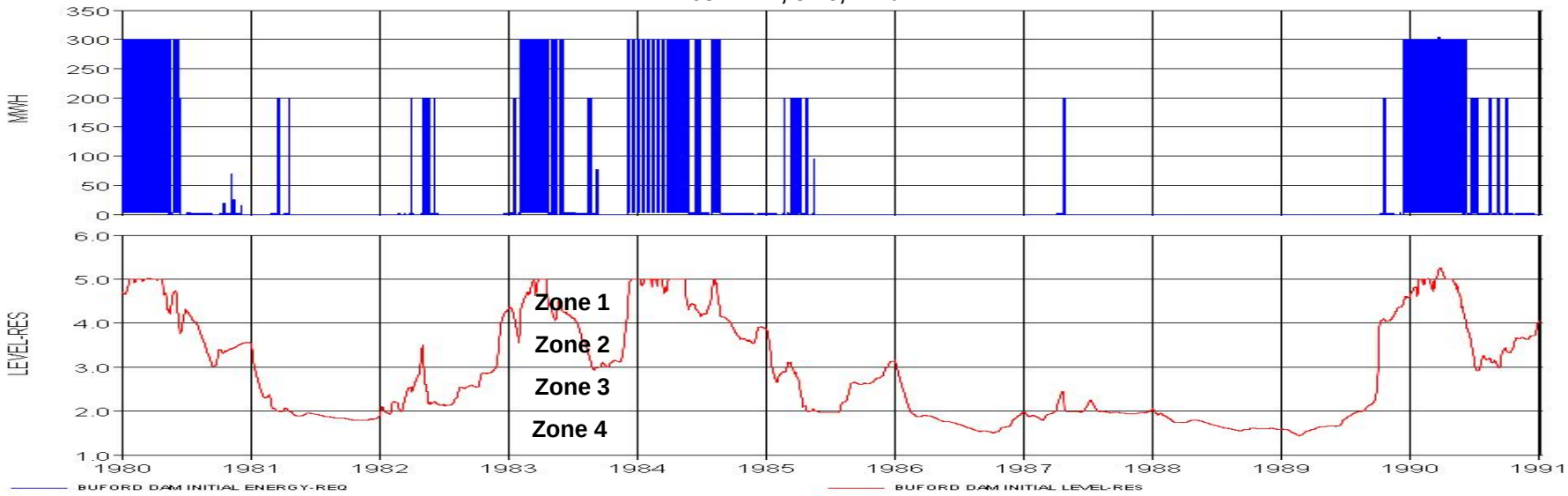
Source: Col. Taylor's letter to Carol Couch, 12 June 2006

Lanier rule and guide curves

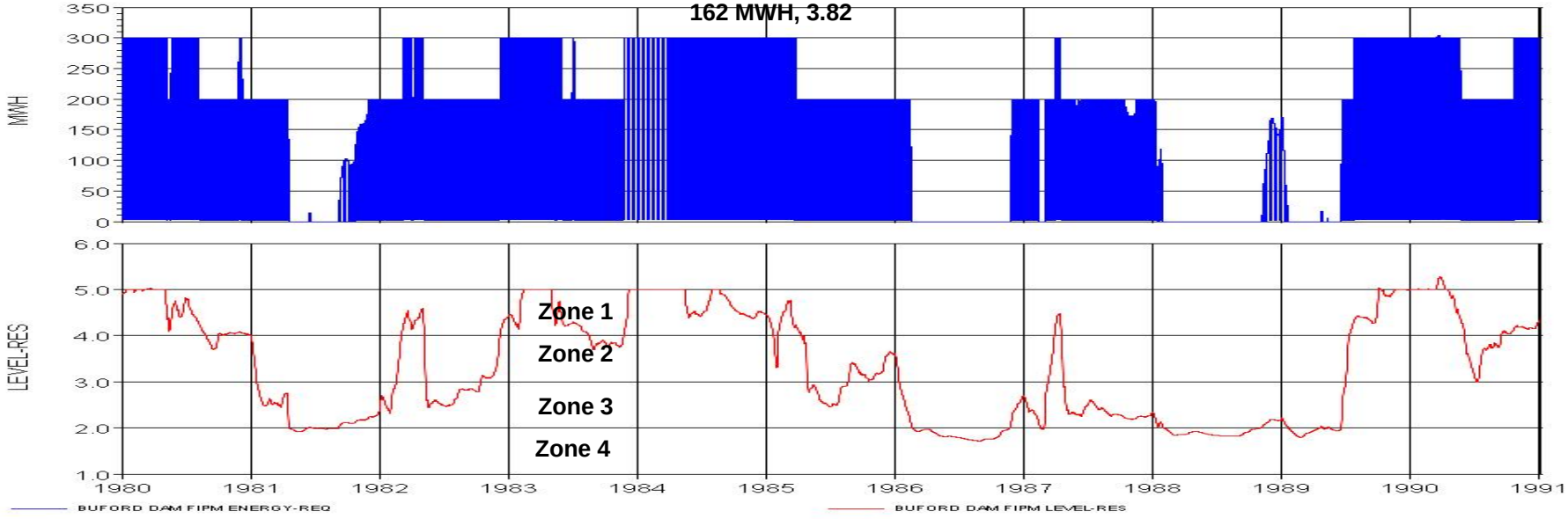


USACE INTERIM.DAT/ARC FIPM.DAT - Lanier

Mean ER, level, % FIPM:
68 MWH, 3.46, 42%

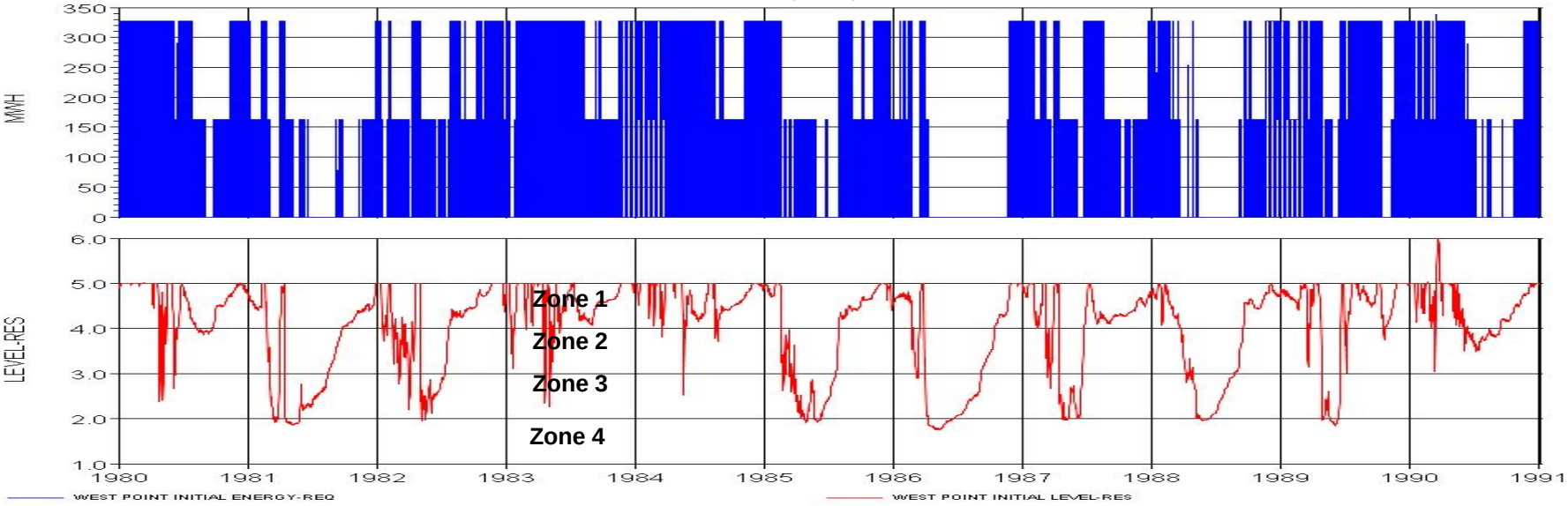


Mean ER, level:
162 MWH, 3.82

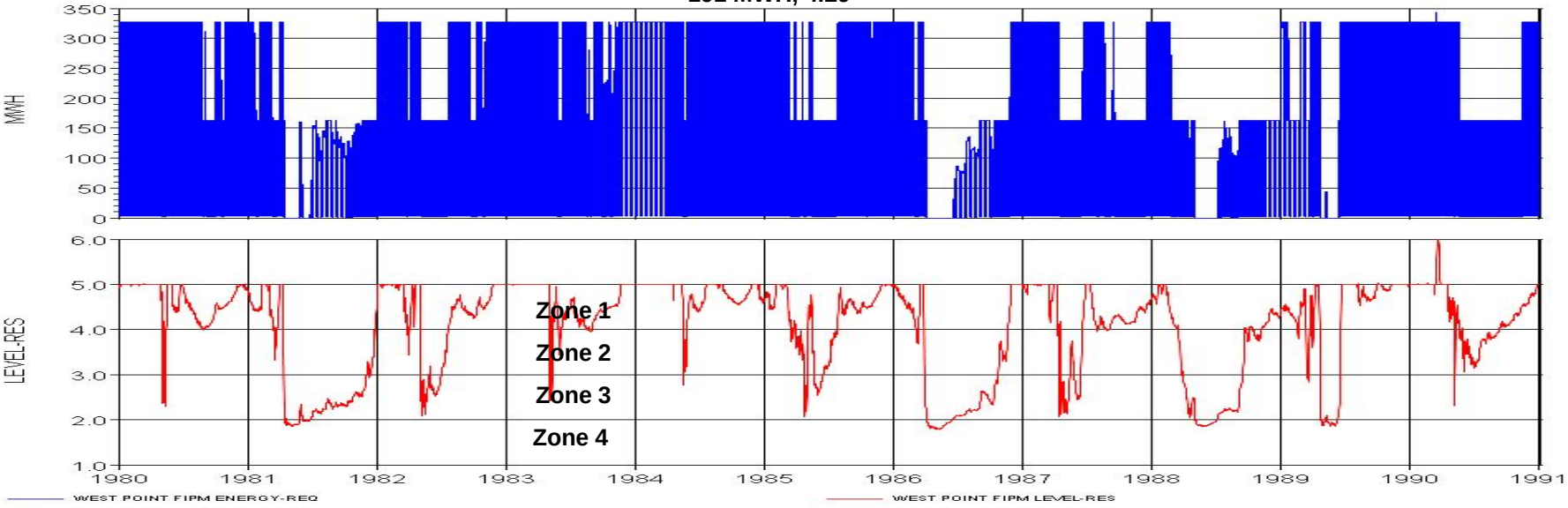


USACE INTERIM.DAT/ARC FIPM.DAT – West Point

Mean ER, level, % FIPM:
154 MWH, 4.28, 81%



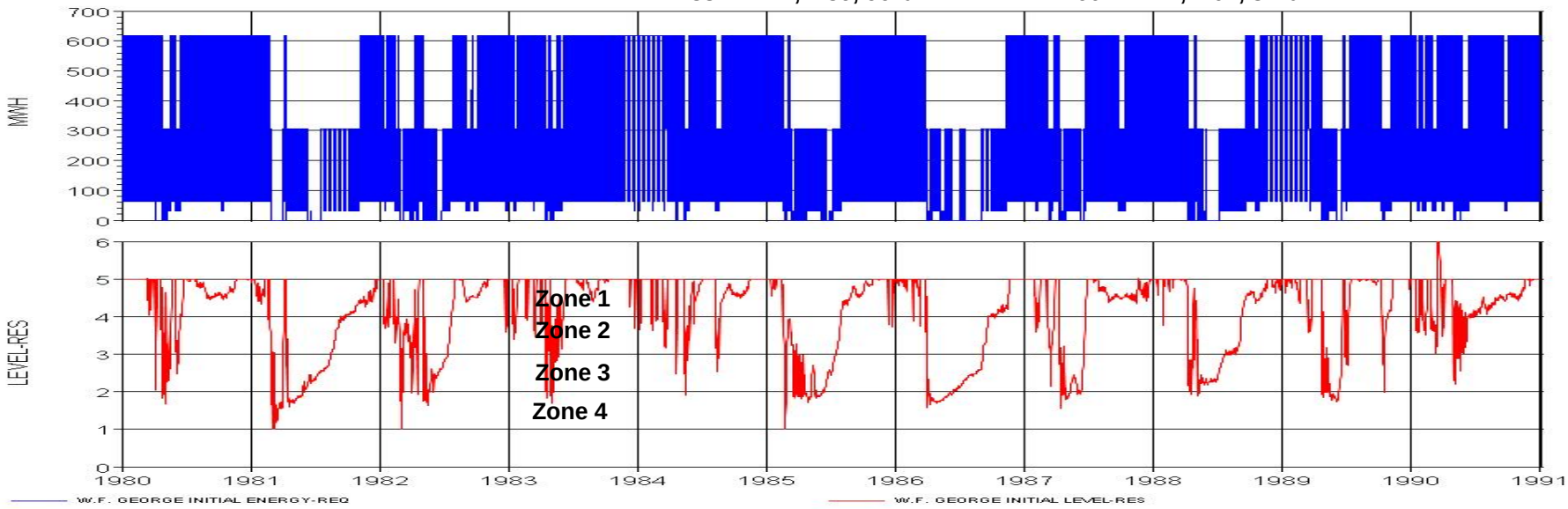
Mean ER, level:
191 MWH, 4.29



USACE INTERIM.DAT/ARC FIPM.DAT – W.F.George

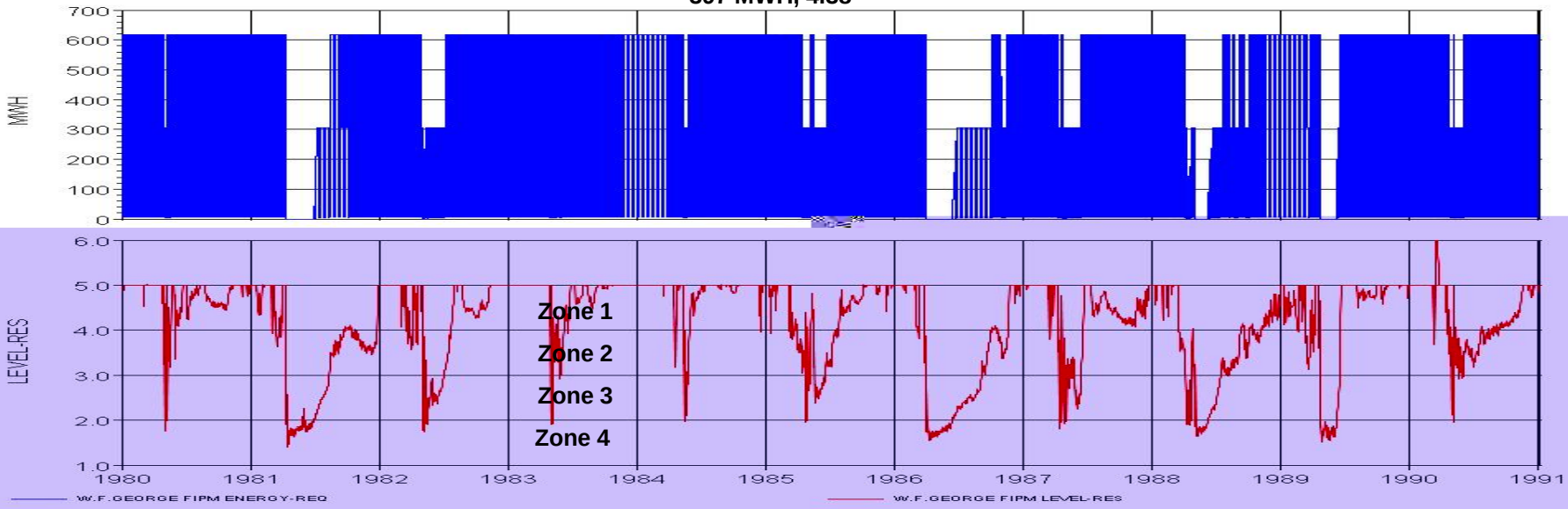
Mean ER, level, % FIPM ER:
382 MWH, 4.39, 96%

System ER, mean level, % FIPM ER:
604 MWH, 4.04, 81%



Mean ER, level:
397 MWH, 4.38

System ER, mean level:
750 MWH, 4.16



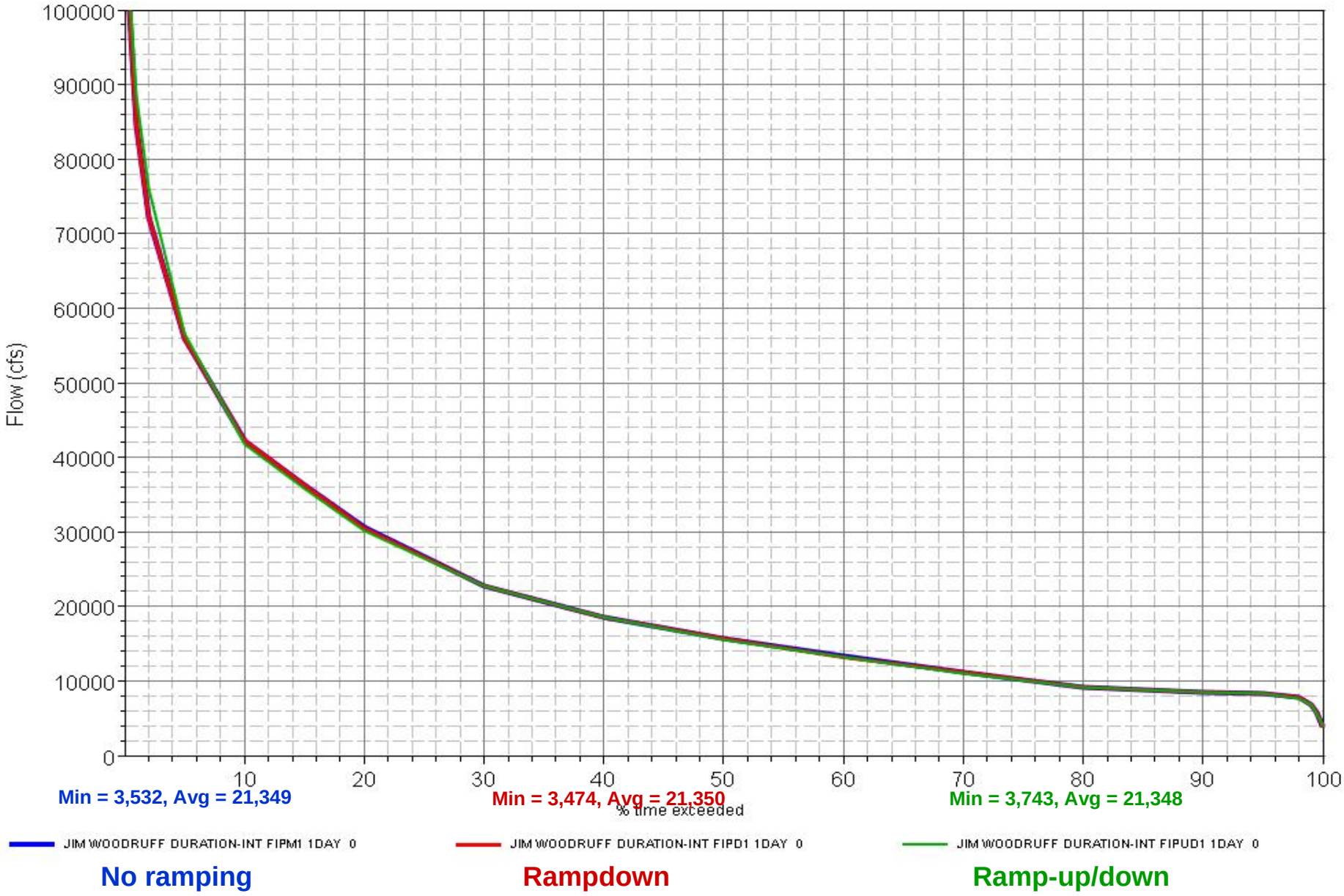
New Lanier turbines/generators

- Penstock capacity: 9,000 -> 12,000 cfs
- Machine capability: 100 mw -> 130 mw(?)
- Power guide curves: 30% PF reduction(?)

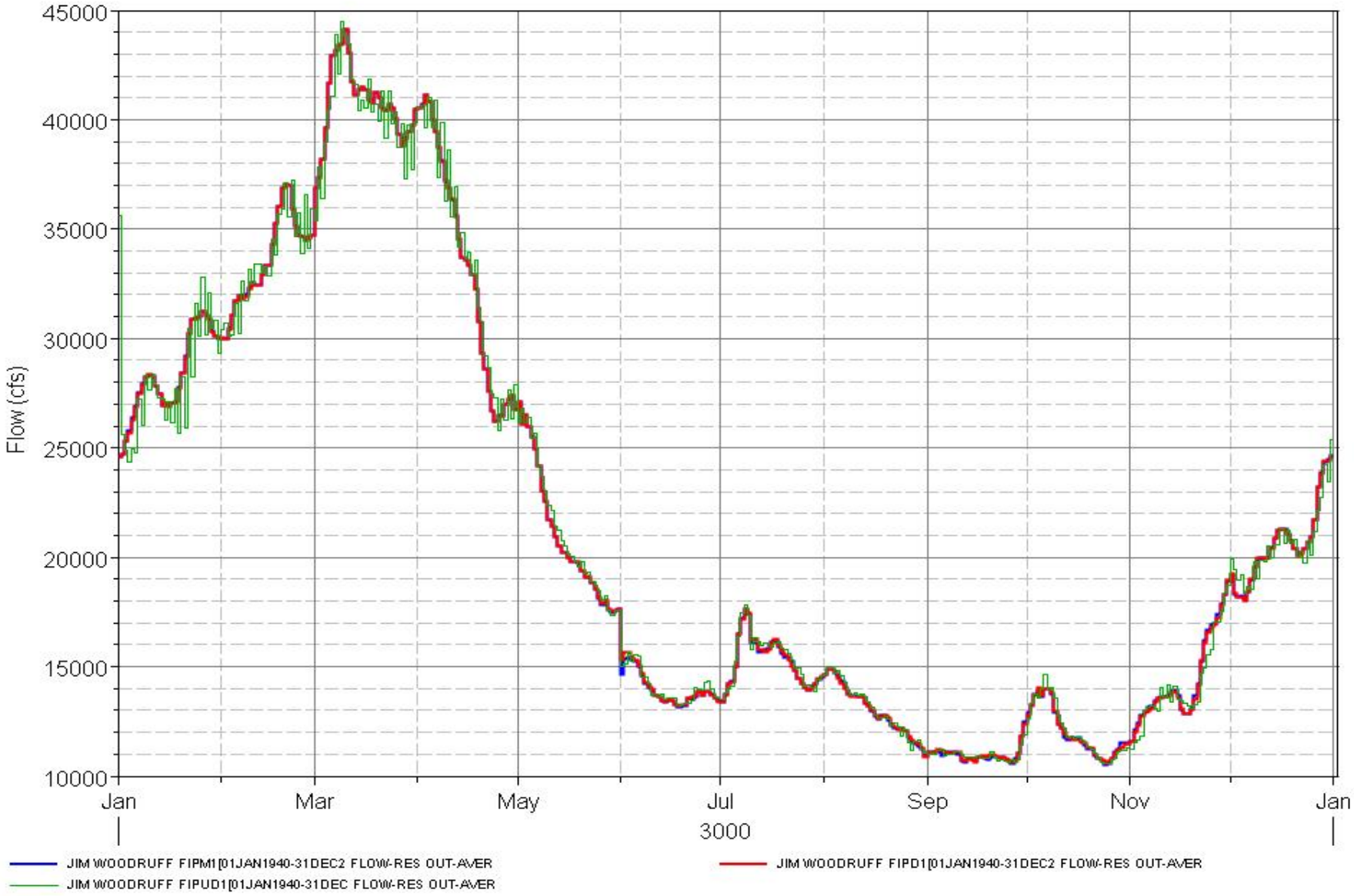
Zone	Hours use, old	Hours use, new(?)
1	3	2.3
2	2	1.5
3	2	1.5
4	0	0

- Increased off-peak, weekend releases to maintain Morgan Falls storage, Atlanta MIF
- Updated P1, P2, PC, PF, PD, PQ, PT, PL, PP, PS, PE records

Ramp-up/ramp-down rate limits

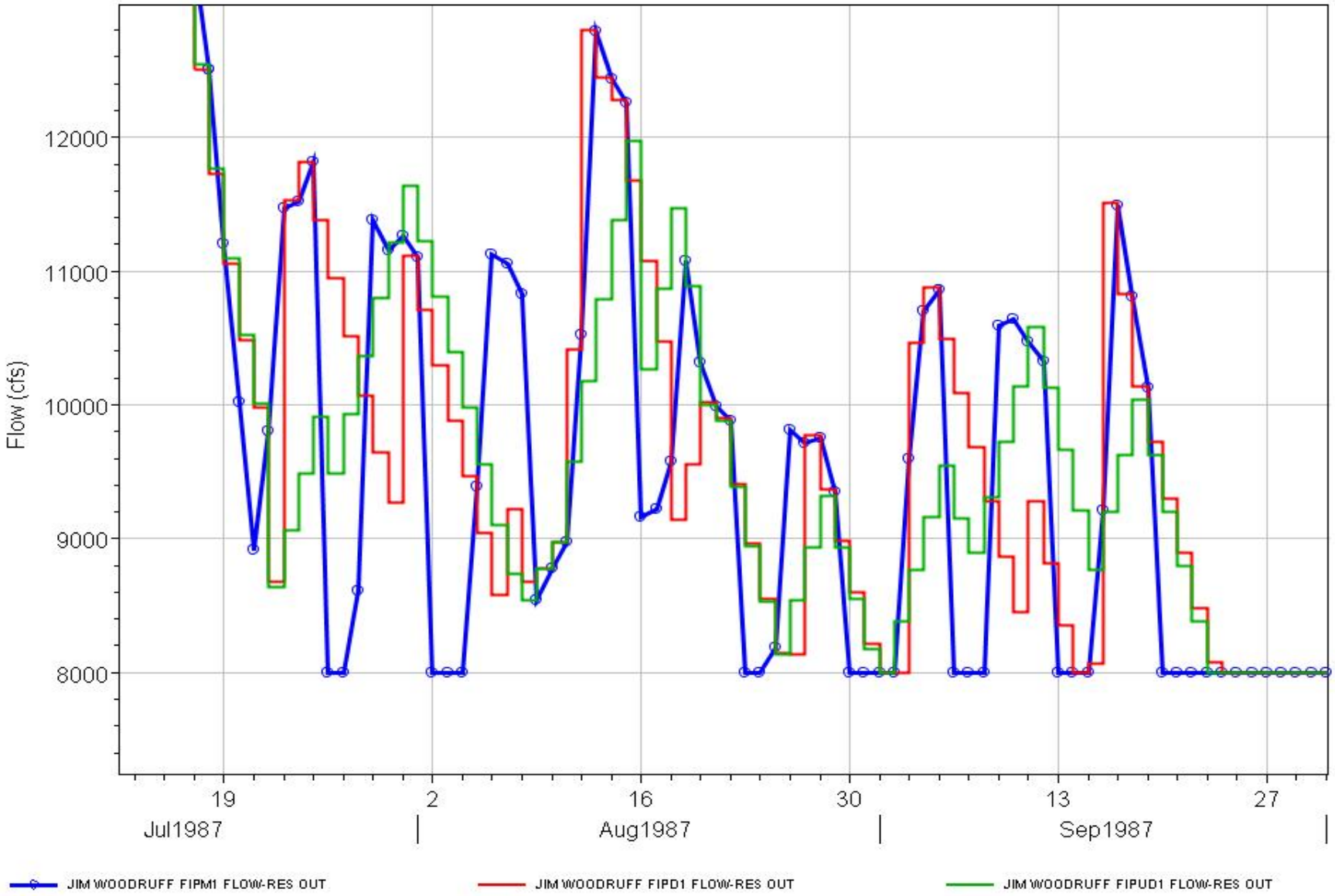


Ramp-up/ramp-down rate limits



No ramping **Rampdown** **Ramp-up/down**

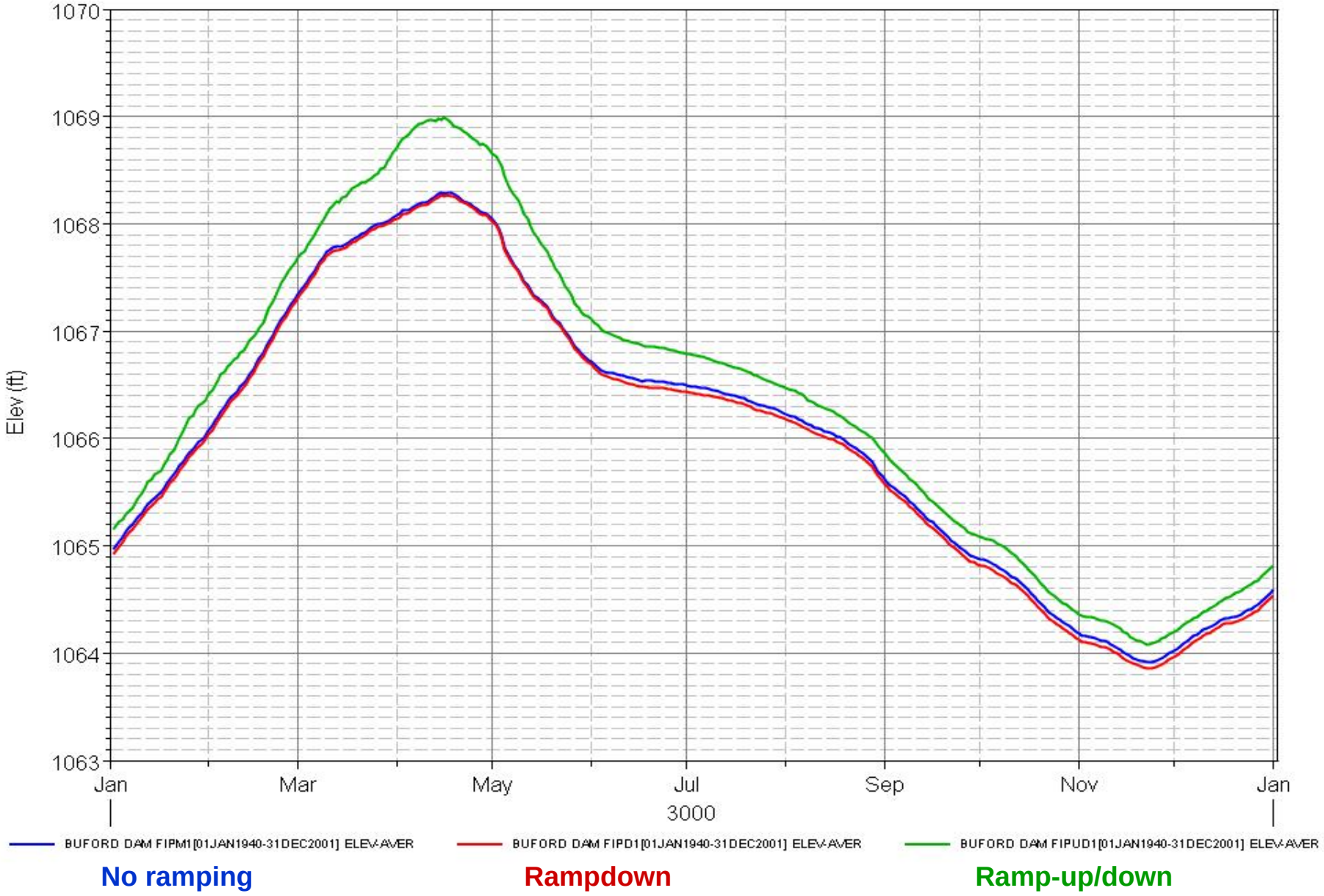
Ramp-up/ramp-down rate limits



No ramping **Rampdown** **Ramp-up/down**

Ramp-up/ramp-down rate limits

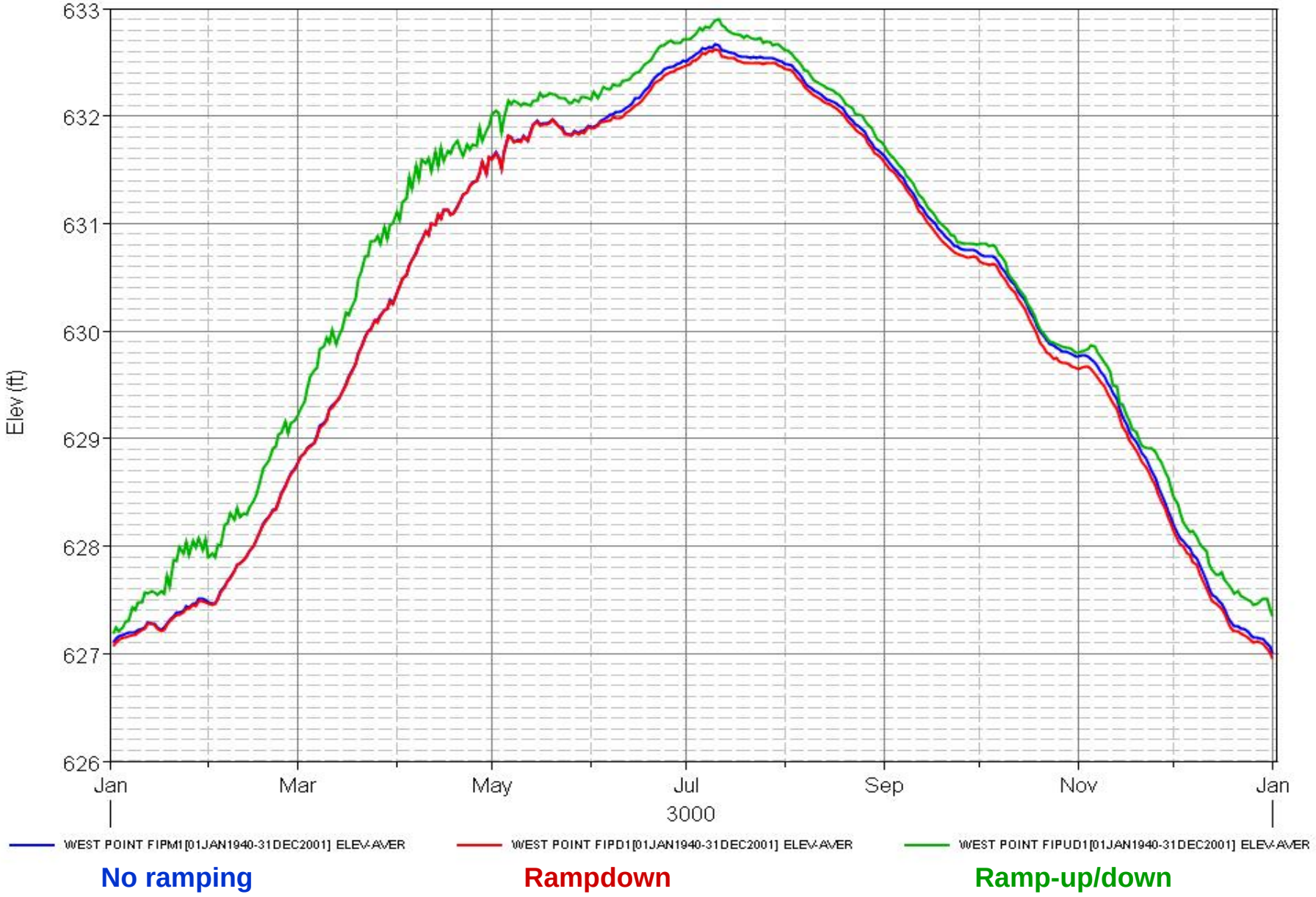
Lanier average daily pool elevation, 1939-2001



No ramping **Rampdown** **Ramp-up/down**

Ramp-up/ramp-down rate limits

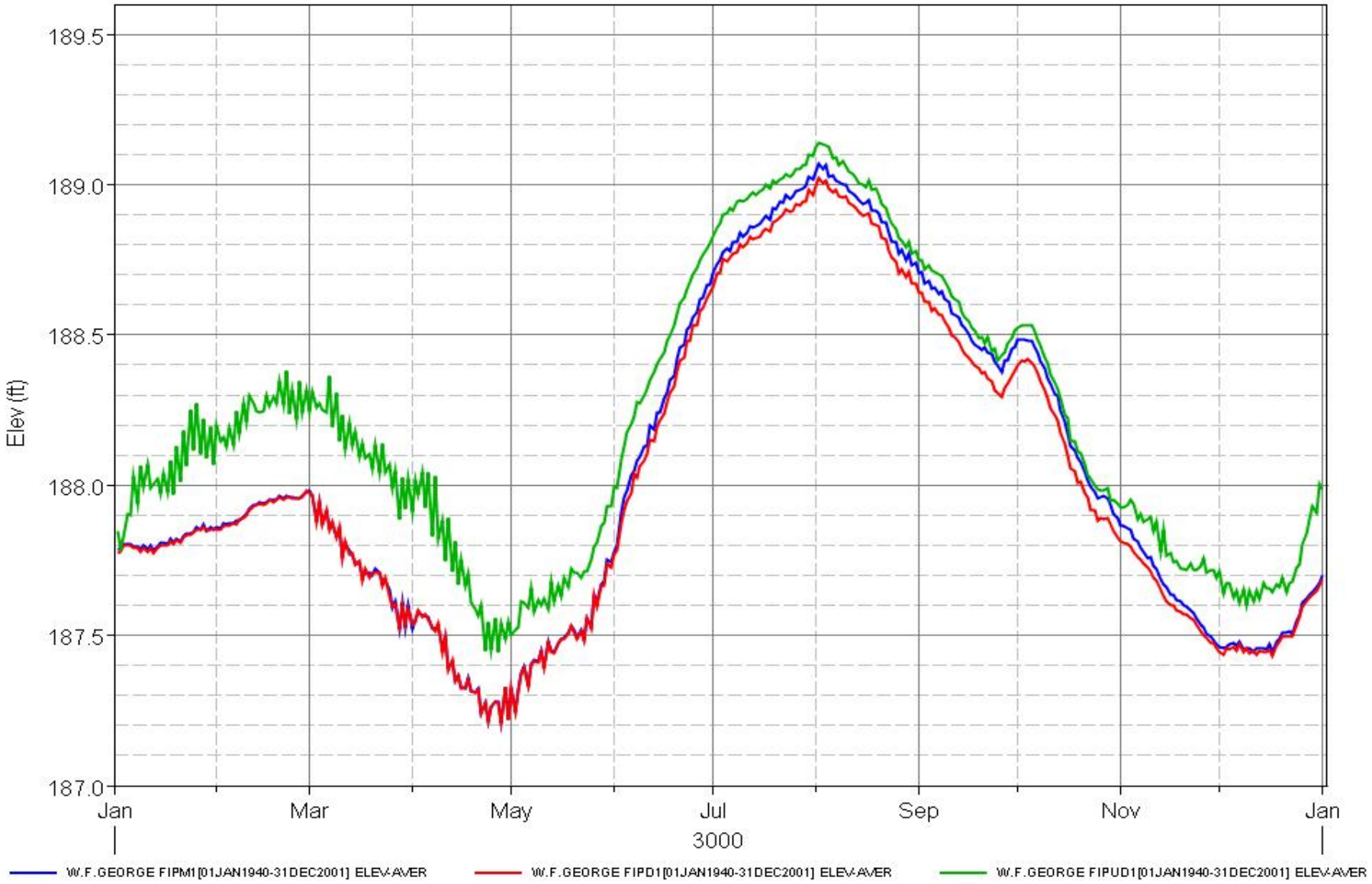
West Point average daily pool elevation, 1939-2001



No ramping **Rampdown** **Ramp-up/down**

Ramp-up/ramp-down rate limits

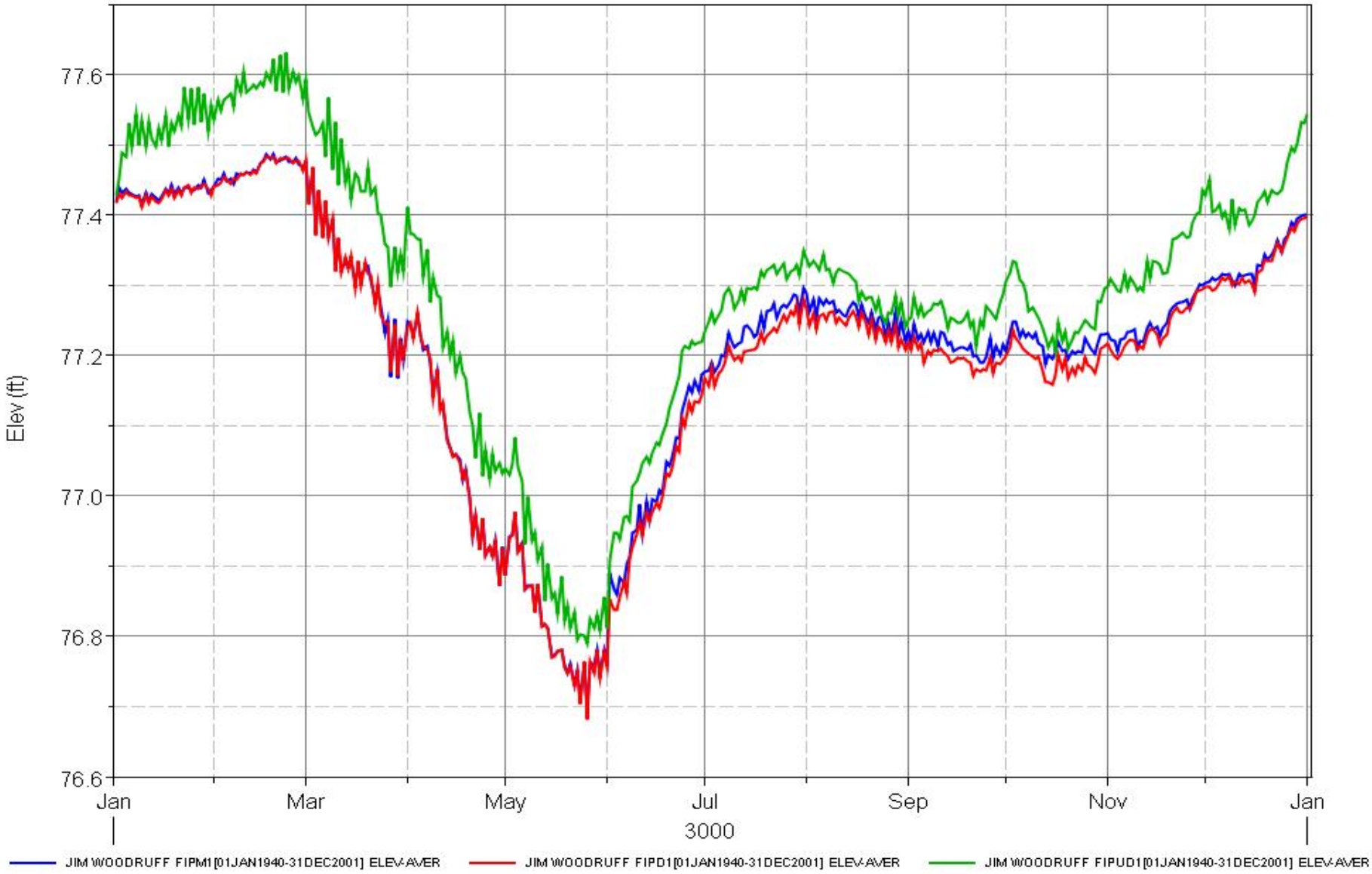
W.F. George average daily pool elevation, 1939-2001



No ramping **Rampdown** **Ramp-up/down**

Ramp-up/ramp-down rate limits

Jim Woodruff average daily pool elevation, 1939-2001



No ramping **Rampdown** **Ramp-up/down**

Woodruff stability considerations

- Woodruff conservation pool, USACE INTERIM.DAT model:
  - BC = 75.0, TC = 77.8, • = 2.8 feet
  - 89,104 af = 44,823 dsf

- Woodruff conservation pool to allow 37,400-cfs spawning releases to bottom of conservation pool:
  - BC = 76.0, TC = 77.5, • = 1.5 feet
  - 51,969 af = 26,201 dsf

- Woodruff minimum conservation pool limits (combining RRM head limitation, 37,400-cfs release
  - BC = 76.0, TC • 77.25, • **= 1.25 feet**
  - **42,259 af = 21,305 dsf**

Seasonal rule curves, guide curves and spawning releases

- Rule curves – induce drawdown and refilling of system storage
  - Fall/winter drawdown
    - Induced drawdown releases > BI
  - Year-round
    - At-site power, MIF requirements: releases > BI
  - Spring refilling
    - Induced refilling releases < BI

- Guide curves – balance system storage among reservoirs to equalize Pr {refill to TC}

Seasonal rule curves, guide curves and spawning releases