Hydrologic Modeling Workshop

HEC-5 Modeling of ACF Interim Operation by Mobile District

May 24, 2006

Model Settings

- Demands
  - Hydropower
  - Water Supply
    - 2001 actual
  - Required Flow
    - Atlanta
    - Columbus
    - Jim Woodruff Outflow
- Operation
  - Balanced 4 federal reservoirs
  - Based on Comp Study Black & White

Model Settings

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C LANIER: OPERATES FOR ATLANTA AND WEST POINT DAM
C    TOP ZONE ELEVATIONS: /1: 1070-1071/2: 1065-1068/3: 1062-1067/4: 1055-1065/
C    POWER (WEEKDAYS):    /1: 3 HRS    /2: 2 HRS    /3: 2 HRS    /4: 0 HRS/
C    450 CFS CONTINUOUS RELEASE (LEAKAGE)
C ATLANTA MIF = 750 CFS
C ---------------------------------------------------------------------------
C WEST POINT: OPERATES FOR COLUMBUS, W.F. GEORGE
C    TOP ZONE ELEVATIONS: /1: 628-635  /2: 624-633 /3: 623-632/4: 621-630/
C    POWER (WEEKDAYS):    /1:   4 HRS  /2:   2 HRS /3: 2 HRS  /4: 0 HRS  /
C    675 CFS CONTINUOUS RELEASE (LEAKAGE)
C COLUMBUS MIF = 1,850 CFS (WP > 621.6), 1,200 CFS (WP < 621.6)
C ---------------------------------------------------------------------------
C W.F. GEORGE: OPERATES FOR WOODRUFF
C    TOP ZONE ELEVATIONS: /1: 188-190 /2: 187.5-189/3: 185.5-188/4: 184.5-187.0/
C    POWER (WEEKDAYS):    /1:   4 HRS /2:   2 HRS  /3: 2 HRS    /4: 0 HRS    /
C    POWER (WEEKEND):     /1:   2 HRS /2:   1 HRS  /3: 1 HRS    /4: 0 HRS    /
C    0 CFS AVERAGE DAILY MINIMUM RELEASE (CP)
C ---------------------------------------------------------------------------
C JIM WOODRUFF: OPERATES FOR CHATTAHOOCHEE
C    TOP ZONE ELEVATIONS: /1: 77.8/2: 77.1/3: 76.8/4: 76.74/
C    POWER: 7200 MWH/MONTH (WCP)
C    100 CFS CONTINUOUS RELEASE (LEAKAGE)
C ---------------------------------------------------------------------------
C  DEMANDS – YEAR 2000 ACTUAL.
C  NAVIGATION - NO DEMAND
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Woodruff Required Outflow

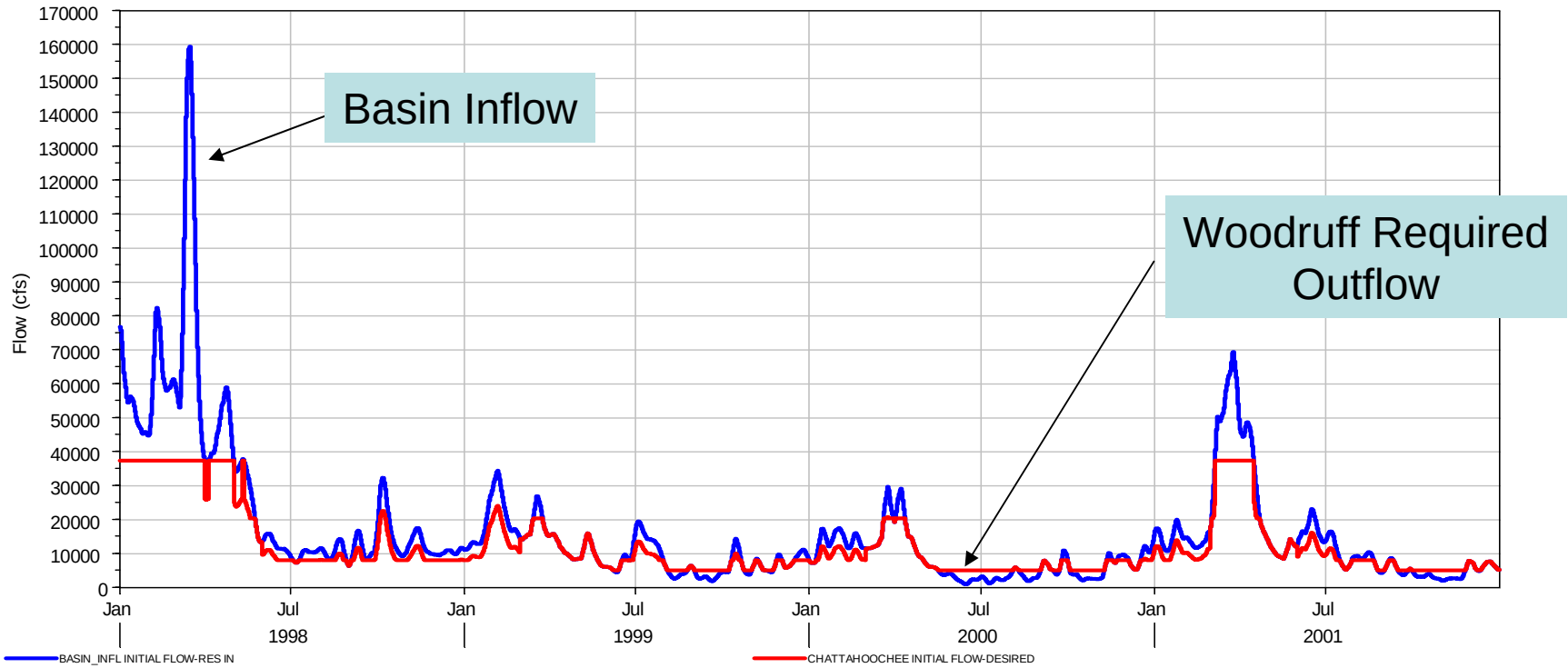
- Preprocess Spreadsheet (JWoutflows.xls)
  - Based on Basin Inflows (BI)
    - 7 day moving average
  - 2 Seasons
    - March – May (spawning)
    - June – February
  - Storage Ratio
    - 70%
    - 90%

JWoutflow.xls

	B	C	D	E	F	G	H
1		APALACHICOLA	BI Limits	Non-Spaw	Spawn		
2		JIM WOODRUFF	Upper	37400	37400		
3		FLOW_CUM	Middle	8000	20400		
4			Lower	5000	5000		
5		1DAY					
6		STELLA-JW 7DA	Storage Ratio	90%			
7		1-Jan-39					
8		2400					
9		31-Dec-01					
10		2400					
11		CFS					
12	**Index**	PER-AVER	Season	BI Bracket	Outflow 1	Outflow 2	Pre Endangered Release
13	01/01/1939	0	Non-Spawn	4	5,000	0	5000
14	01/02/1939	1,112.56	Non-Spawn	4	5,000	0	5000

Woodruff Required Outflow

- Values imported to DSS
- HEC-5 Chattahoochee Minimum Flow

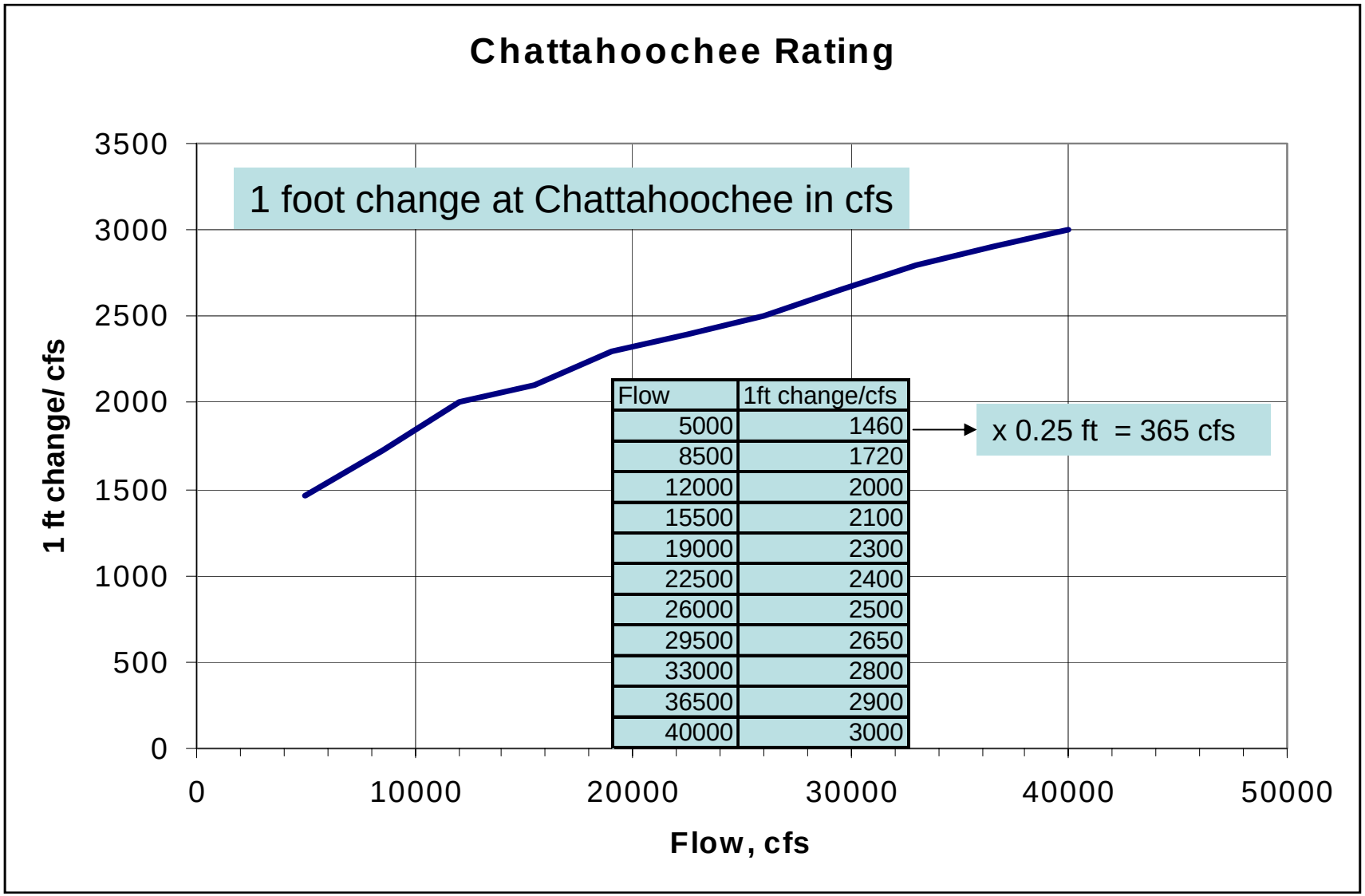


Interim Plan Ramping Rates

- Exceed Powerhouse Capacity (18,000 cfs)
  - 0.5 to 1.0 ft/day*
- Within Powerhouse Capacity and > 8,000 cfs
  - 0.25 to 0.5 ft/day*
- Within Powerhouse Capacity and < 8,000 cfs
  - 0.25 ft/day or less*

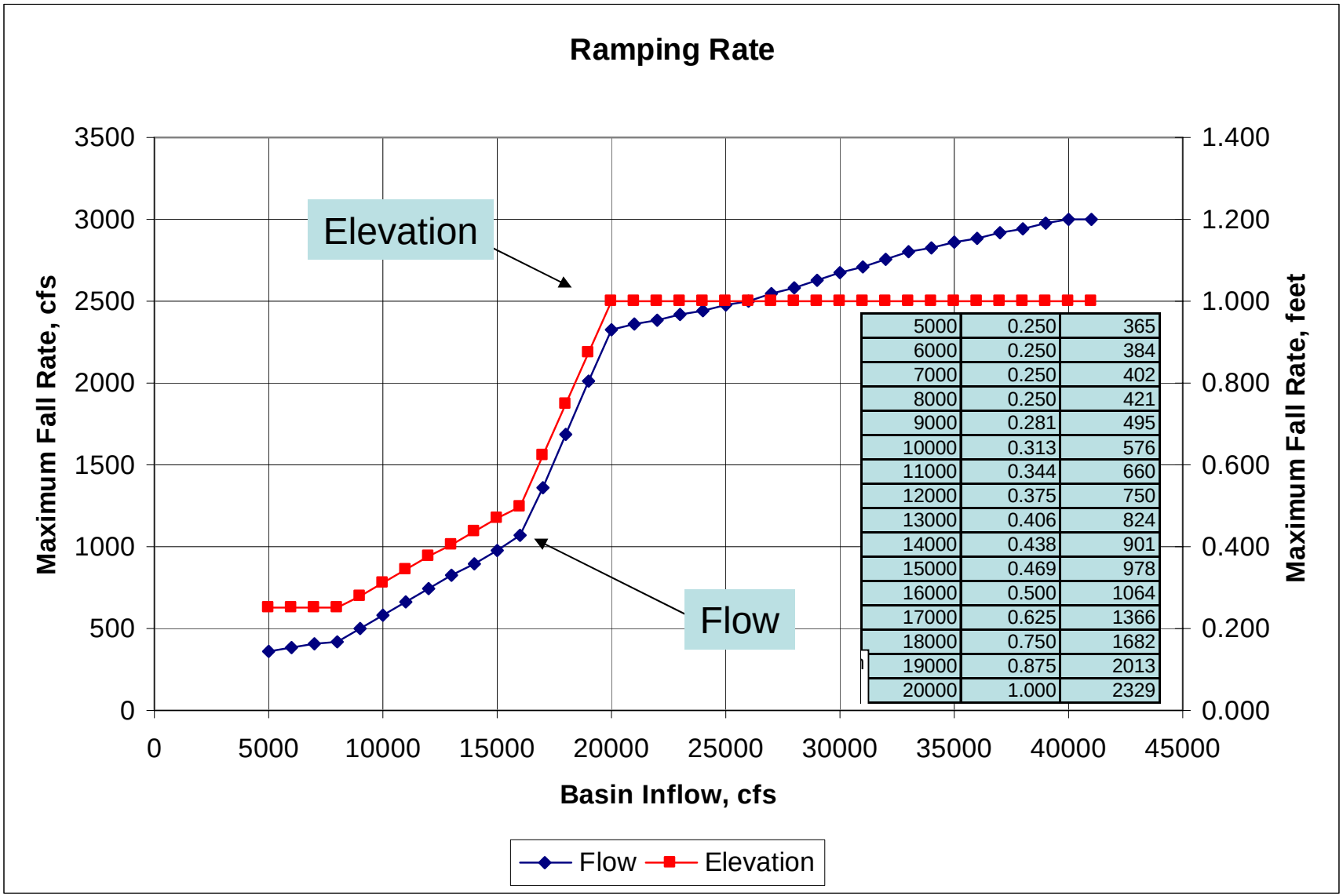
* Consistent with safety requirements, flood control operations, and equipment constraints

Ramping Rate Development



Flow	1ft change/cfs
5000	1460
8500	1720
12000	2000
15500	2100
19000	2300
22500	2400
26000	2500
29500	2650
33000	2800
36500	2900
40000	3000

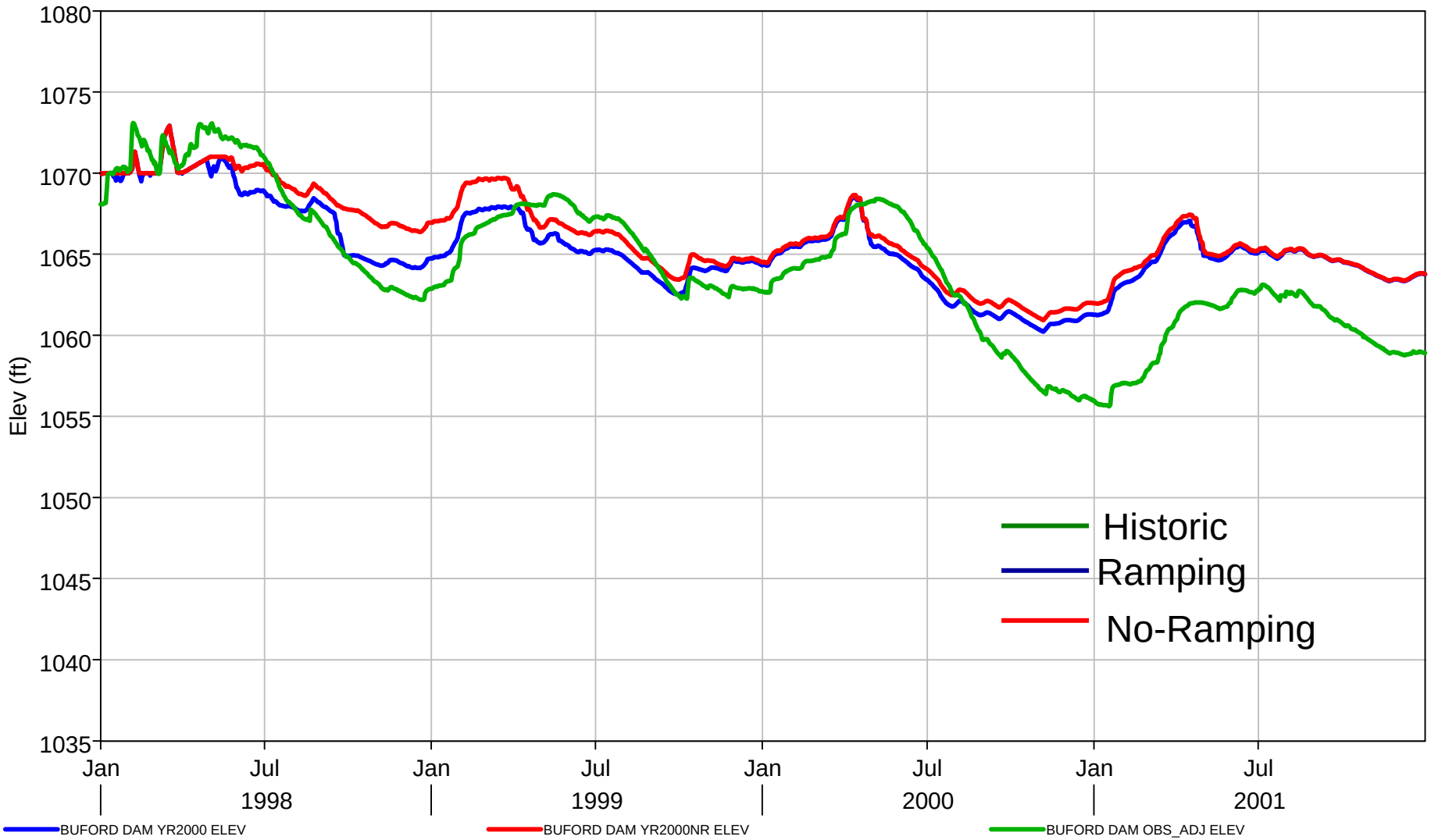
Maximum Fall Rate in Model



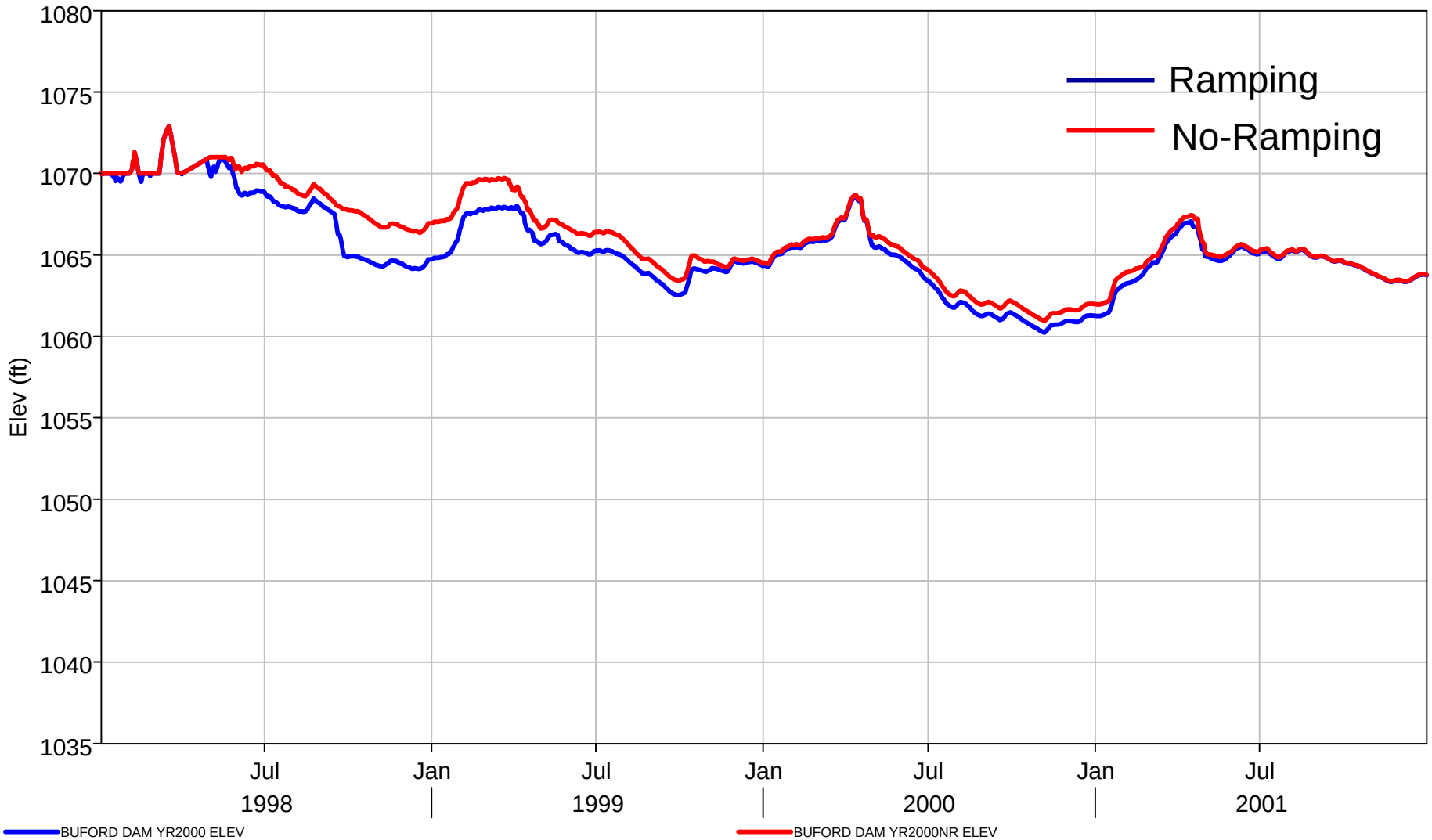
Model Runs

Model	Demands	Storage Ratio	Ramping
INTERIM_YR 2K	2000	70%	Yes
INTERIM_YR 2K_NR	2000	70%	No
INTERIM_90_ YR2K	2000	90%	Yes
INTERIM_90_ YR2K_NR	2000	90%	No

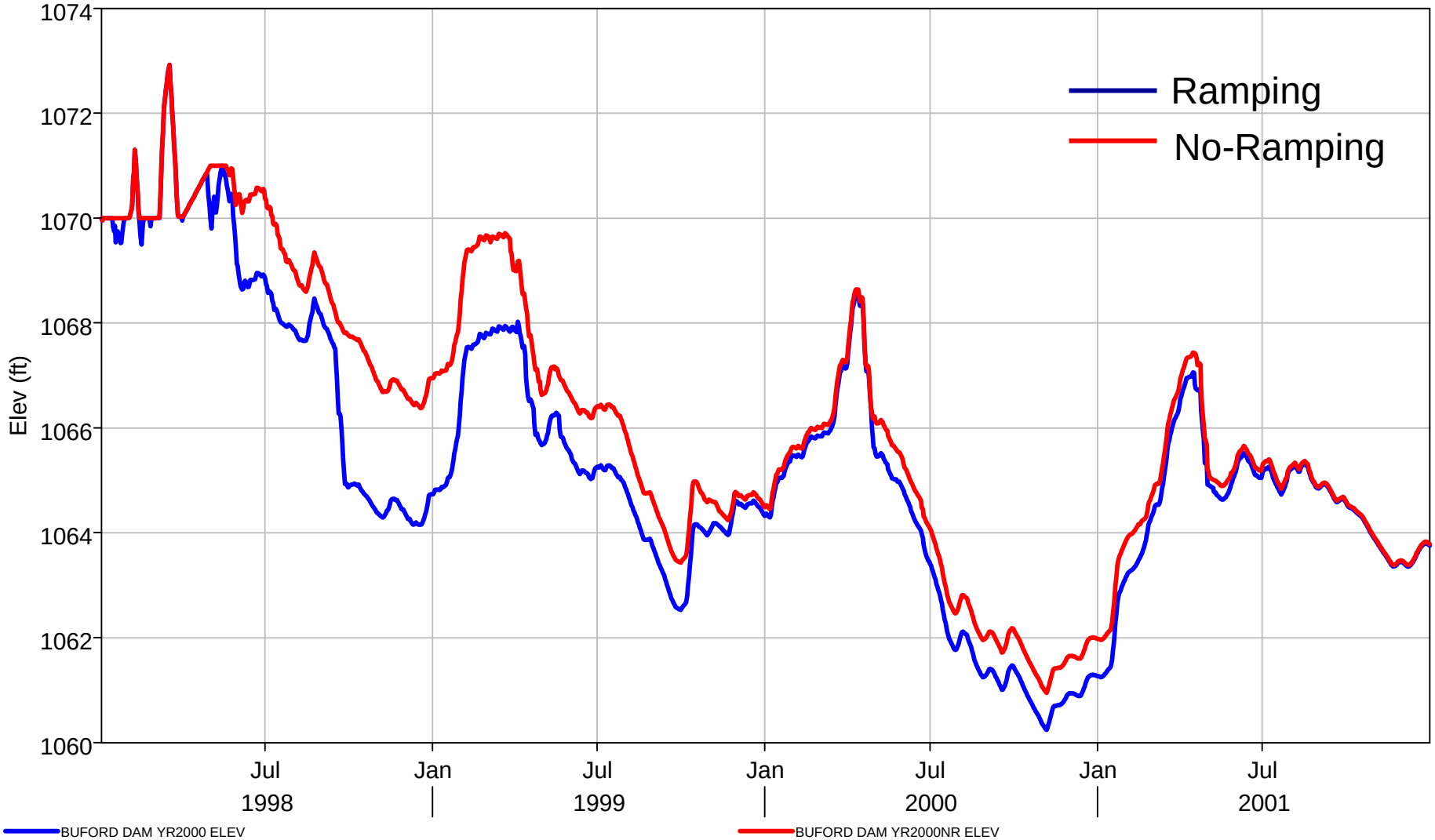
Buford - Ramping Impact



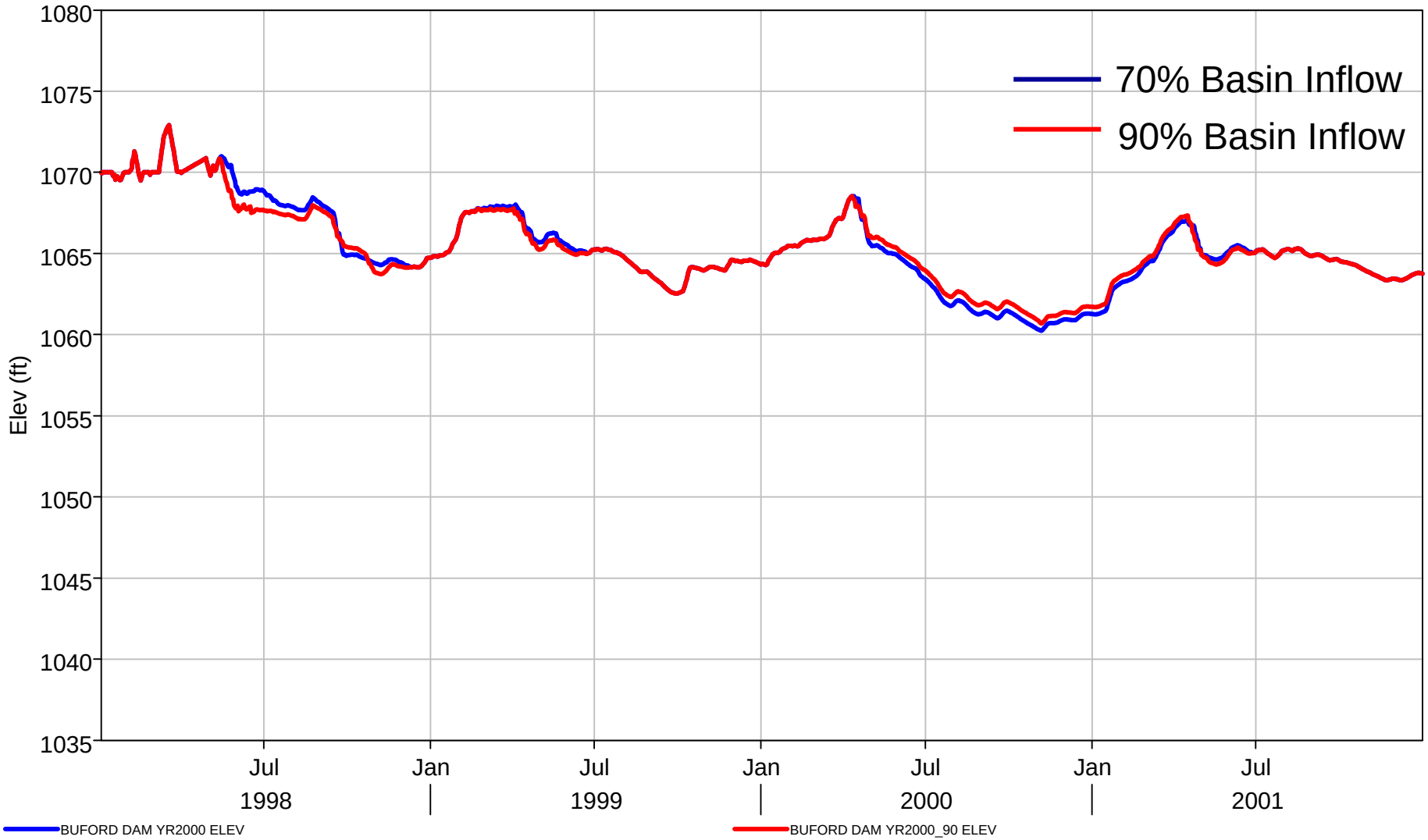
Buford - Ramping Impact



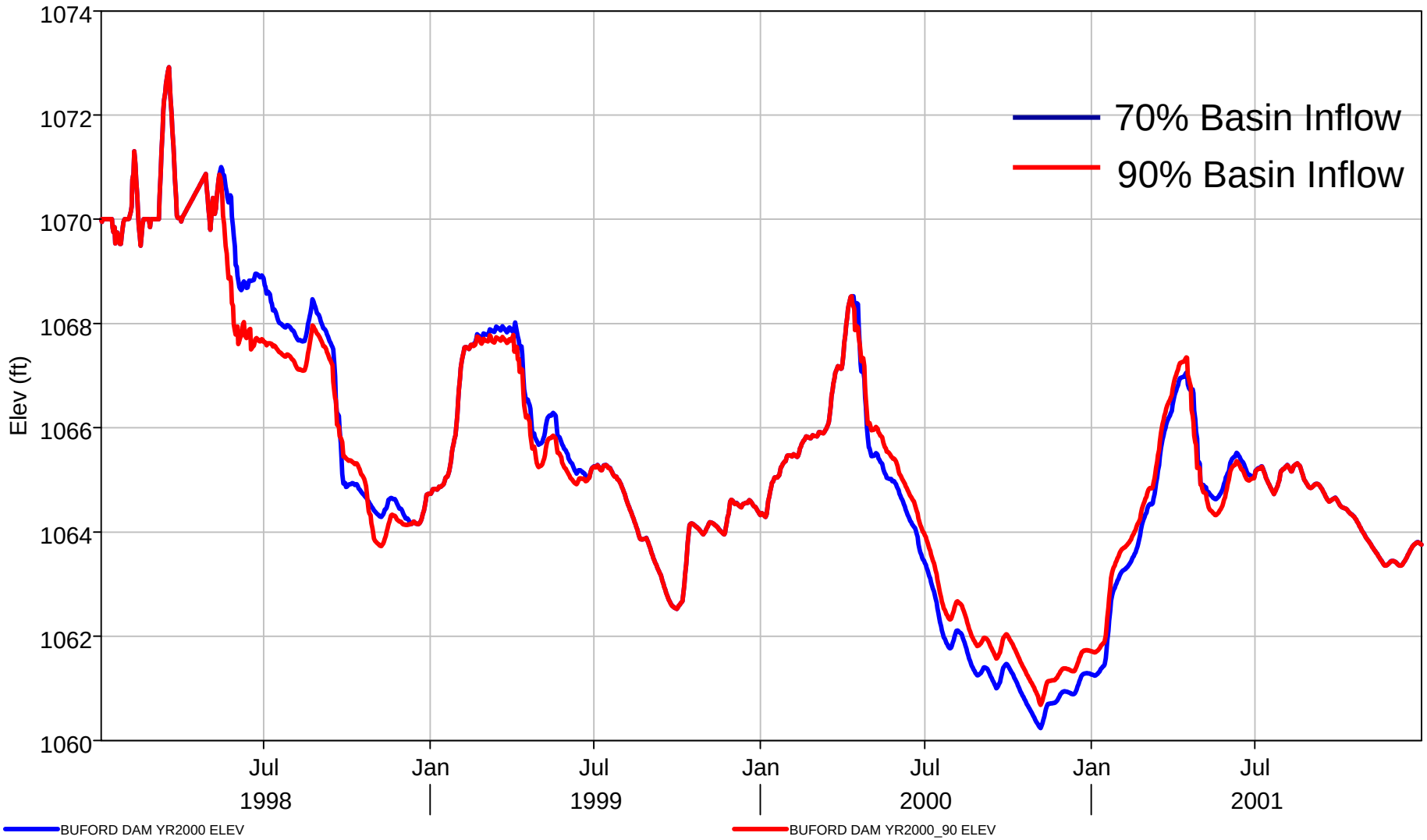
Buford - Ramping Impact



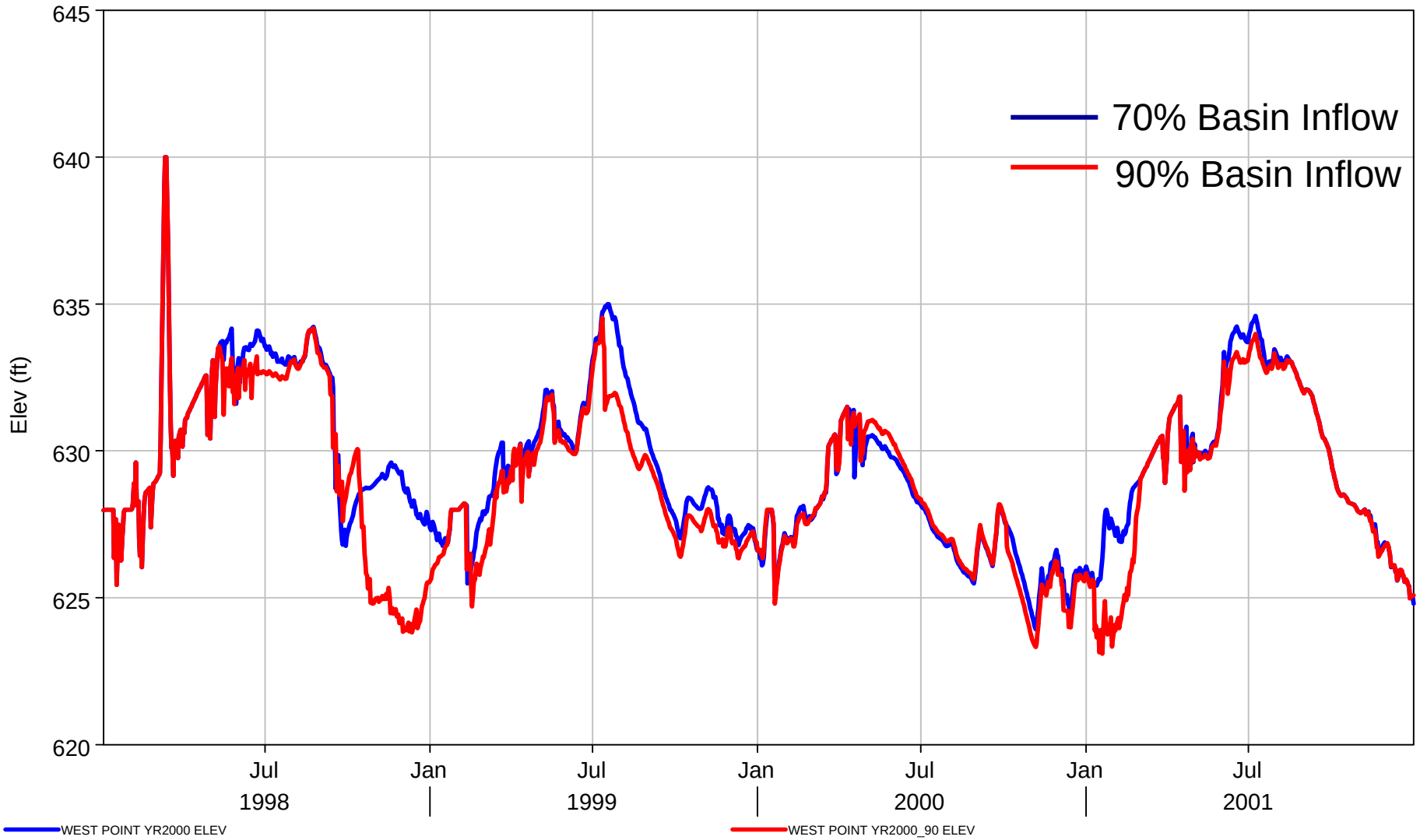
Buford - Storage Ratio Impact



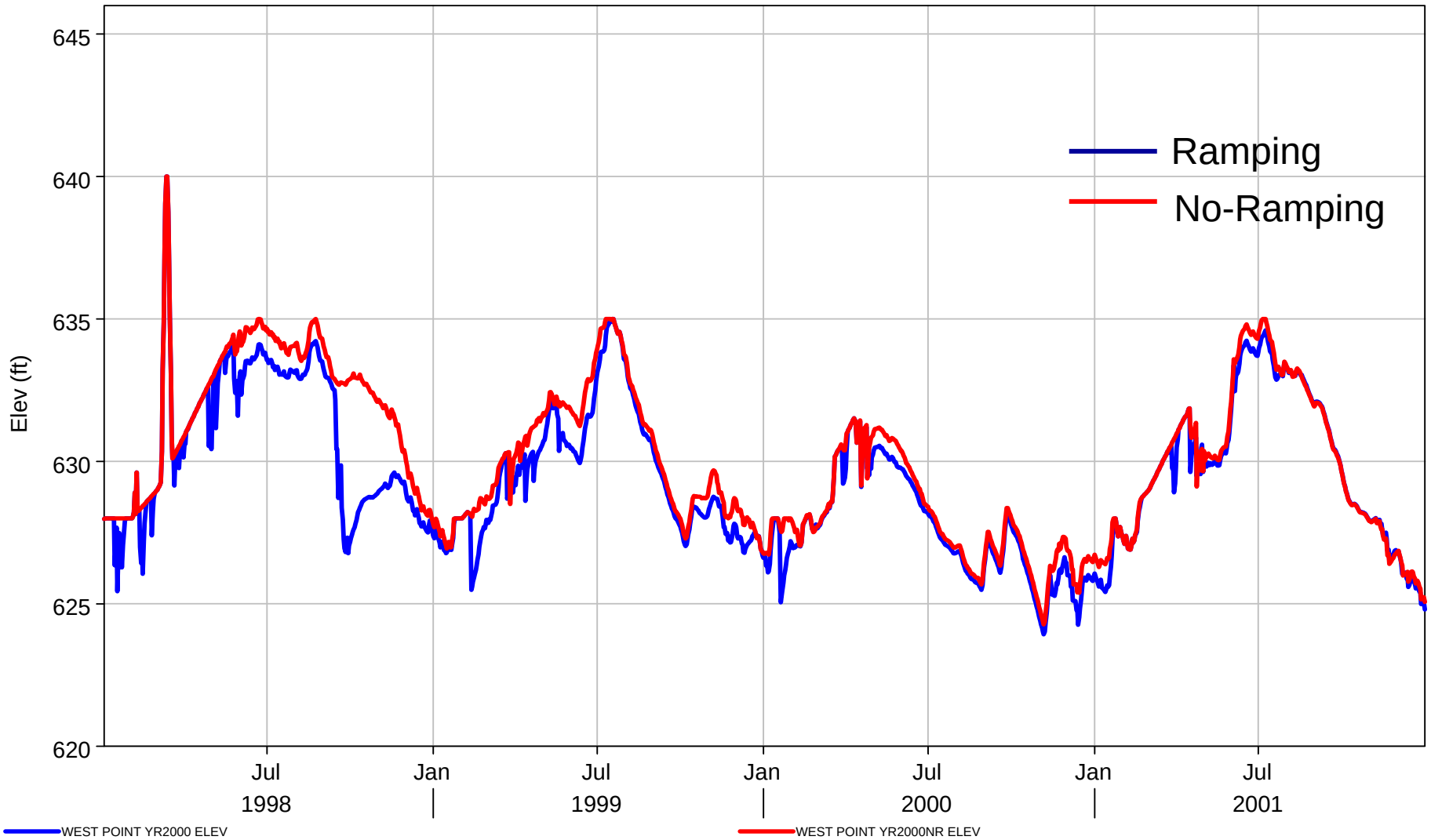
Buford - Storage Ratio Impact



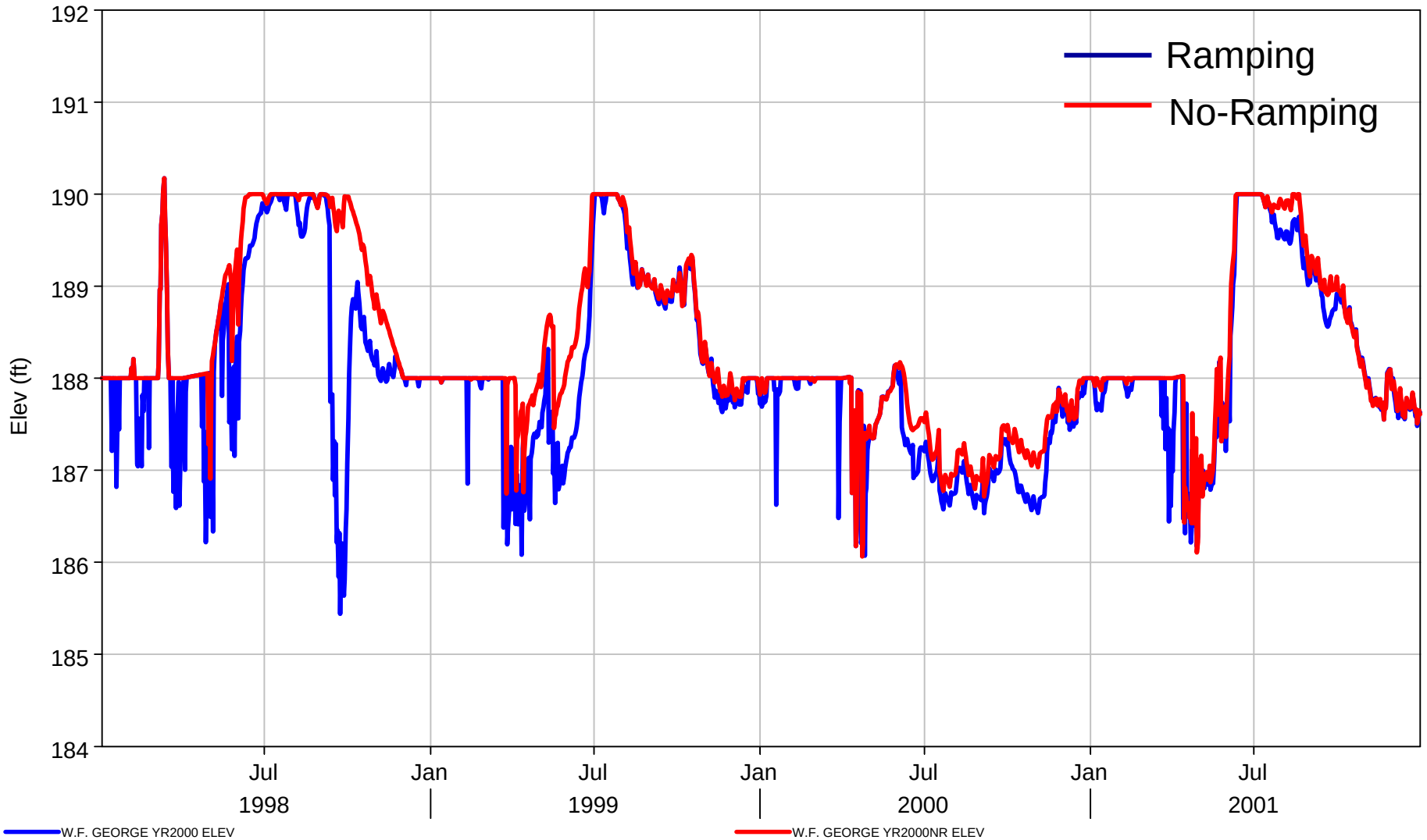
West Point - Storage Ratio Impact



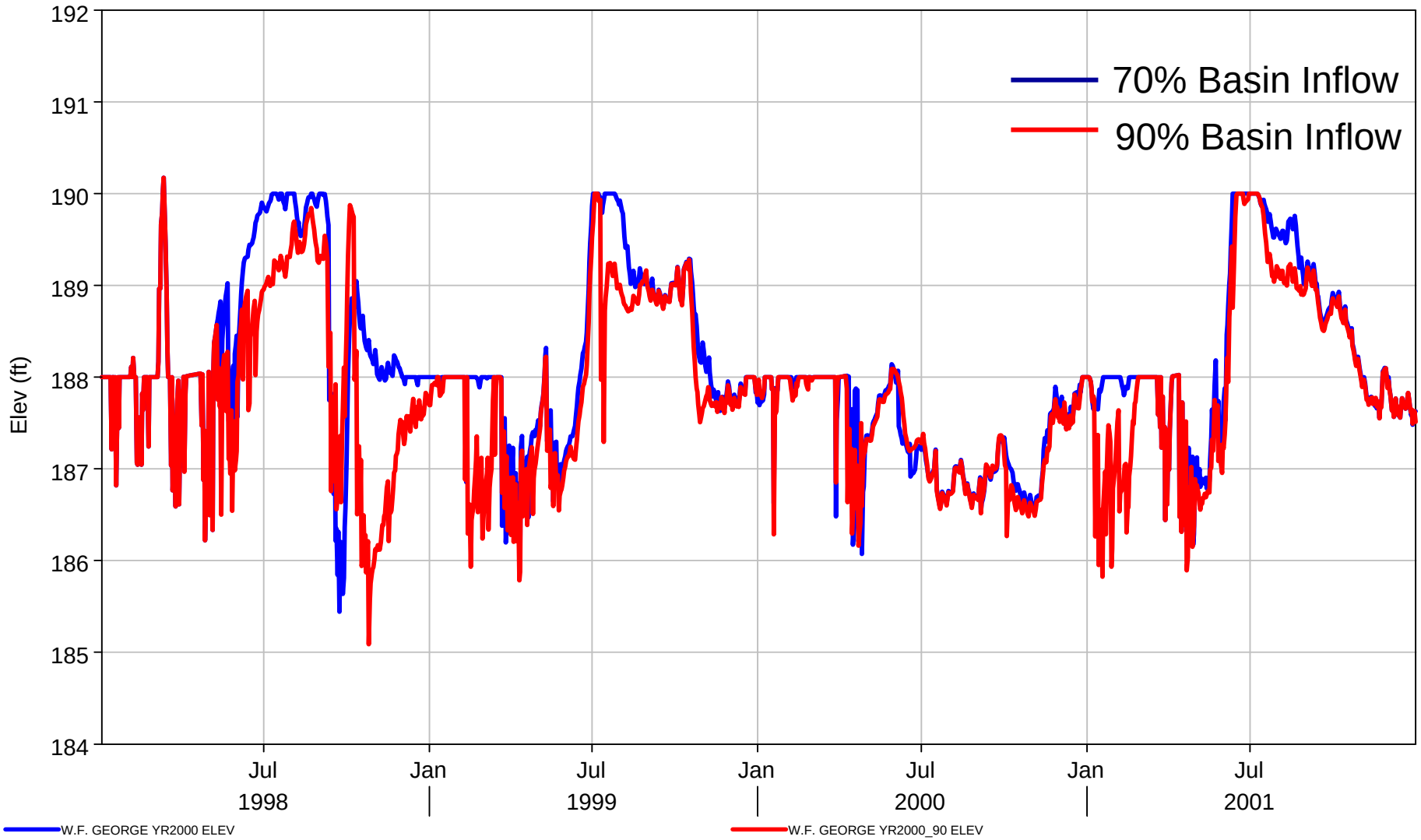
West Point - Ramping Impact



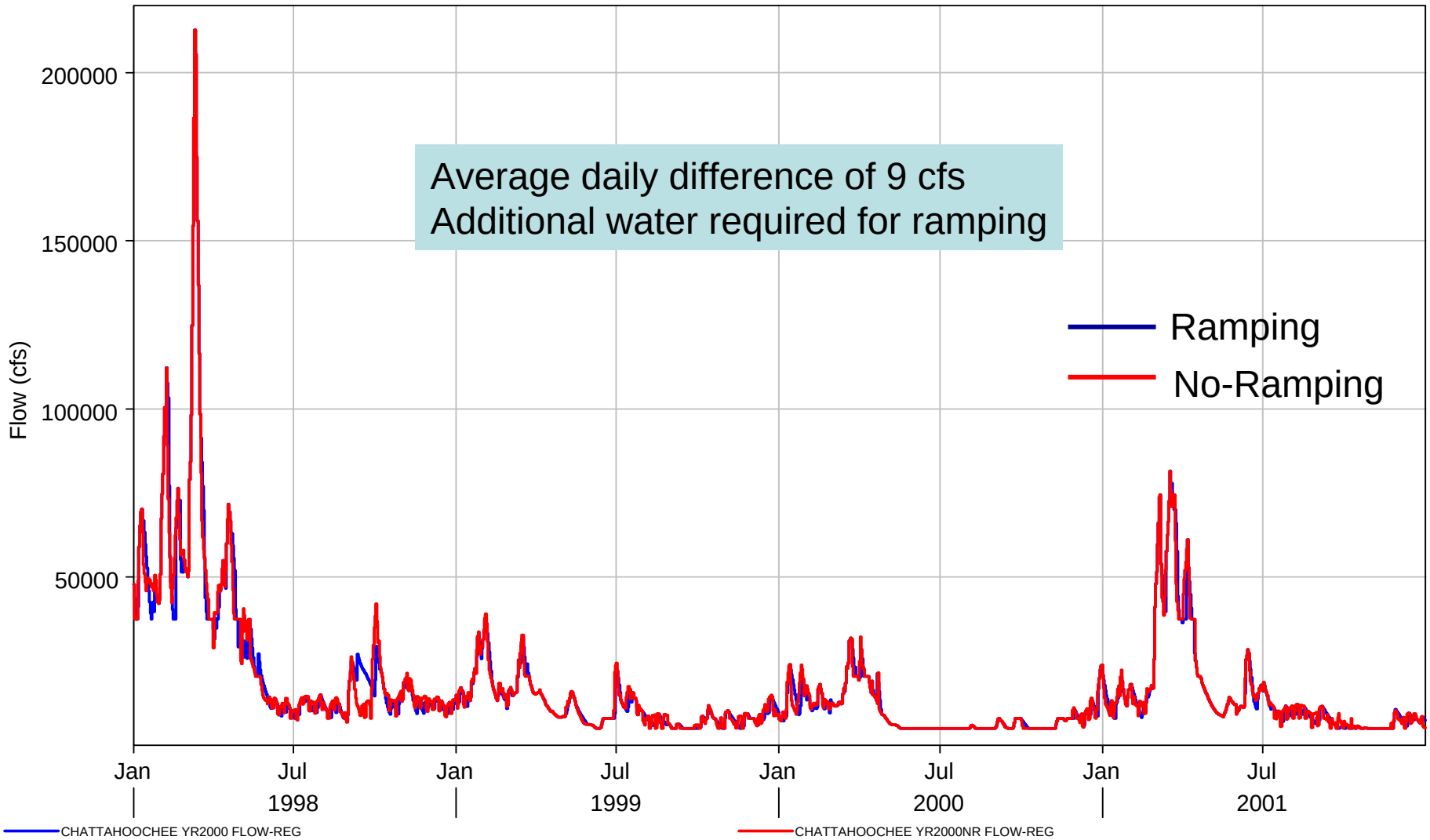
WF George - Ramping Impact



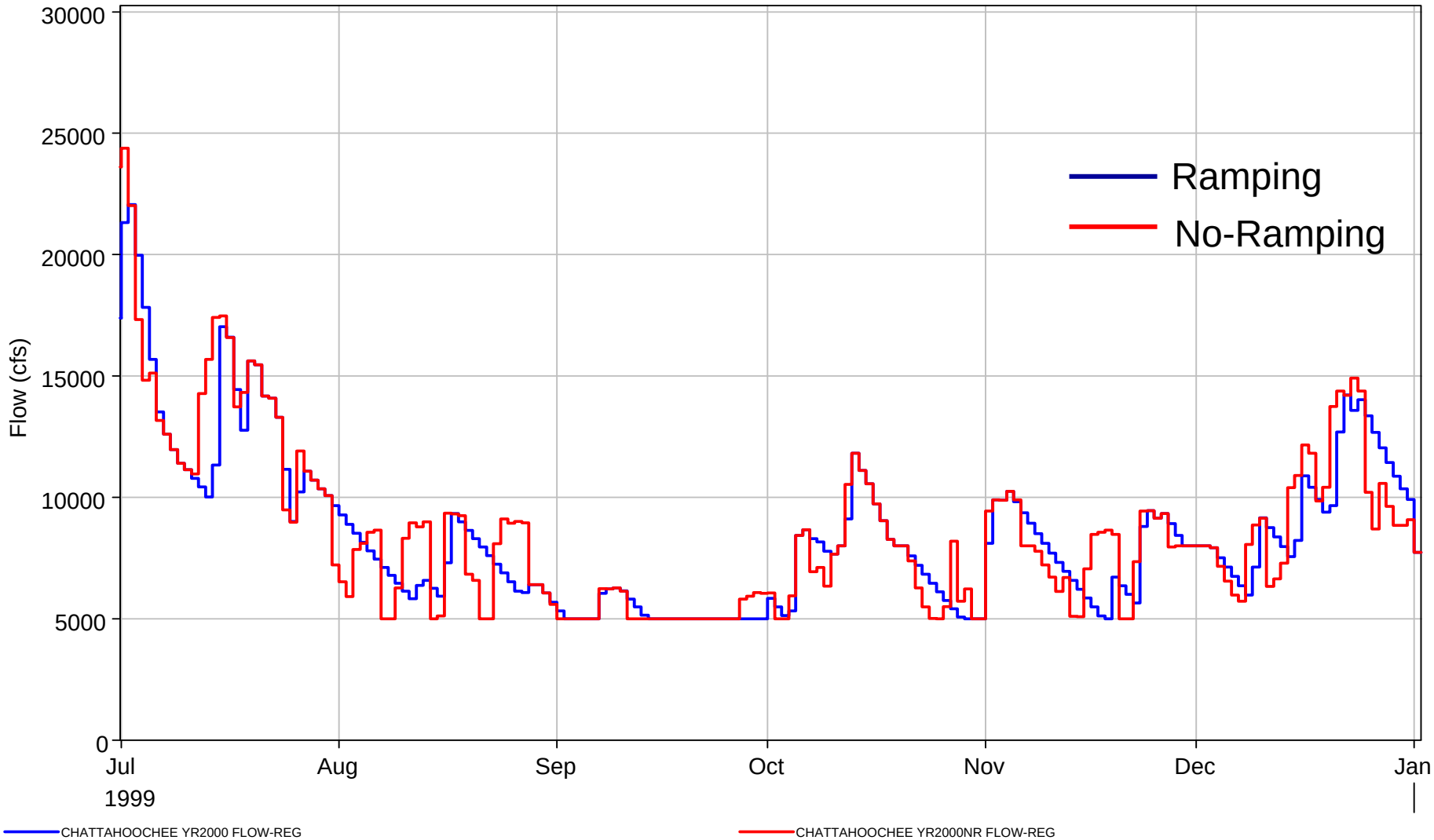
WF George - Storage Impact



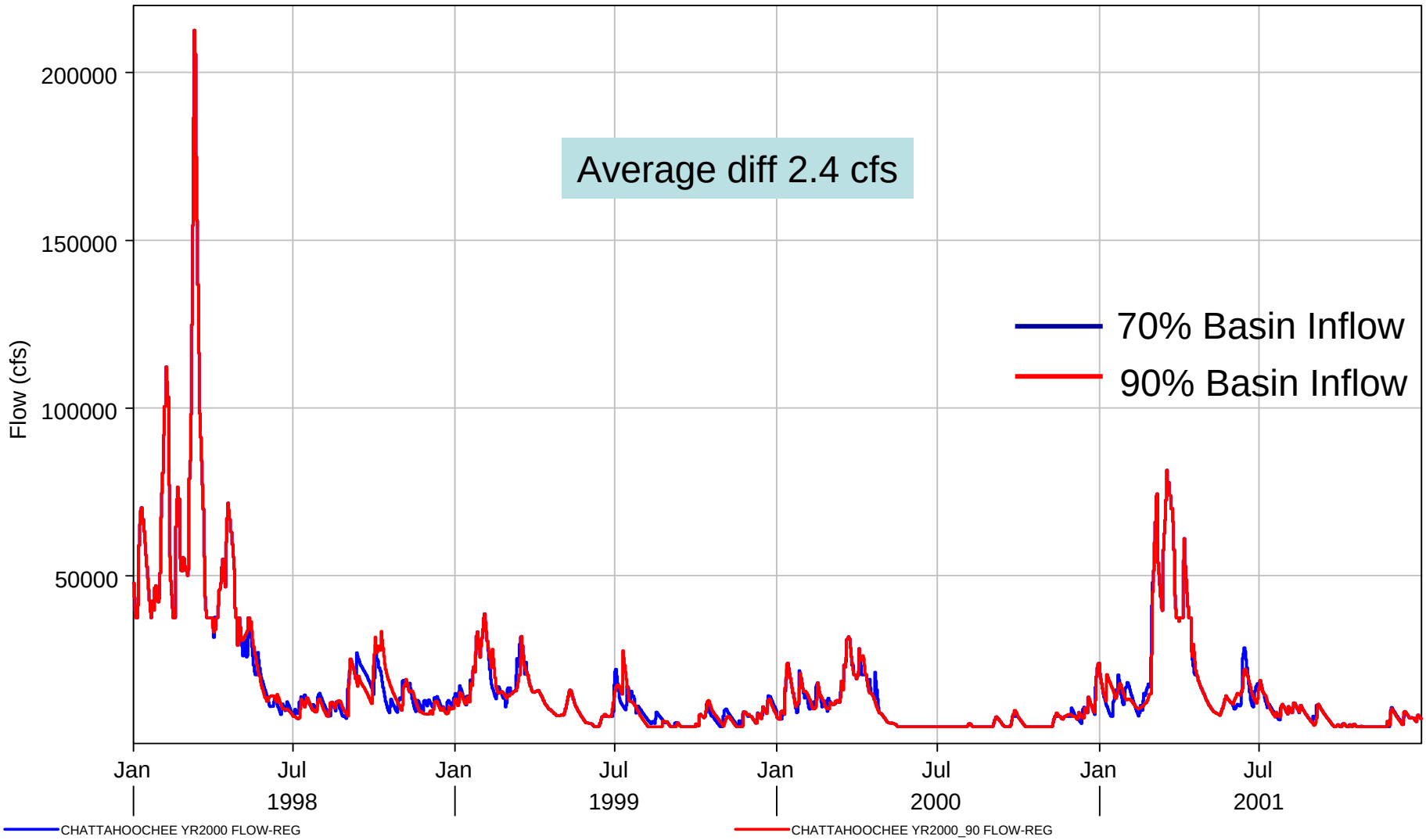
Chattahoochee - Ramping Impact



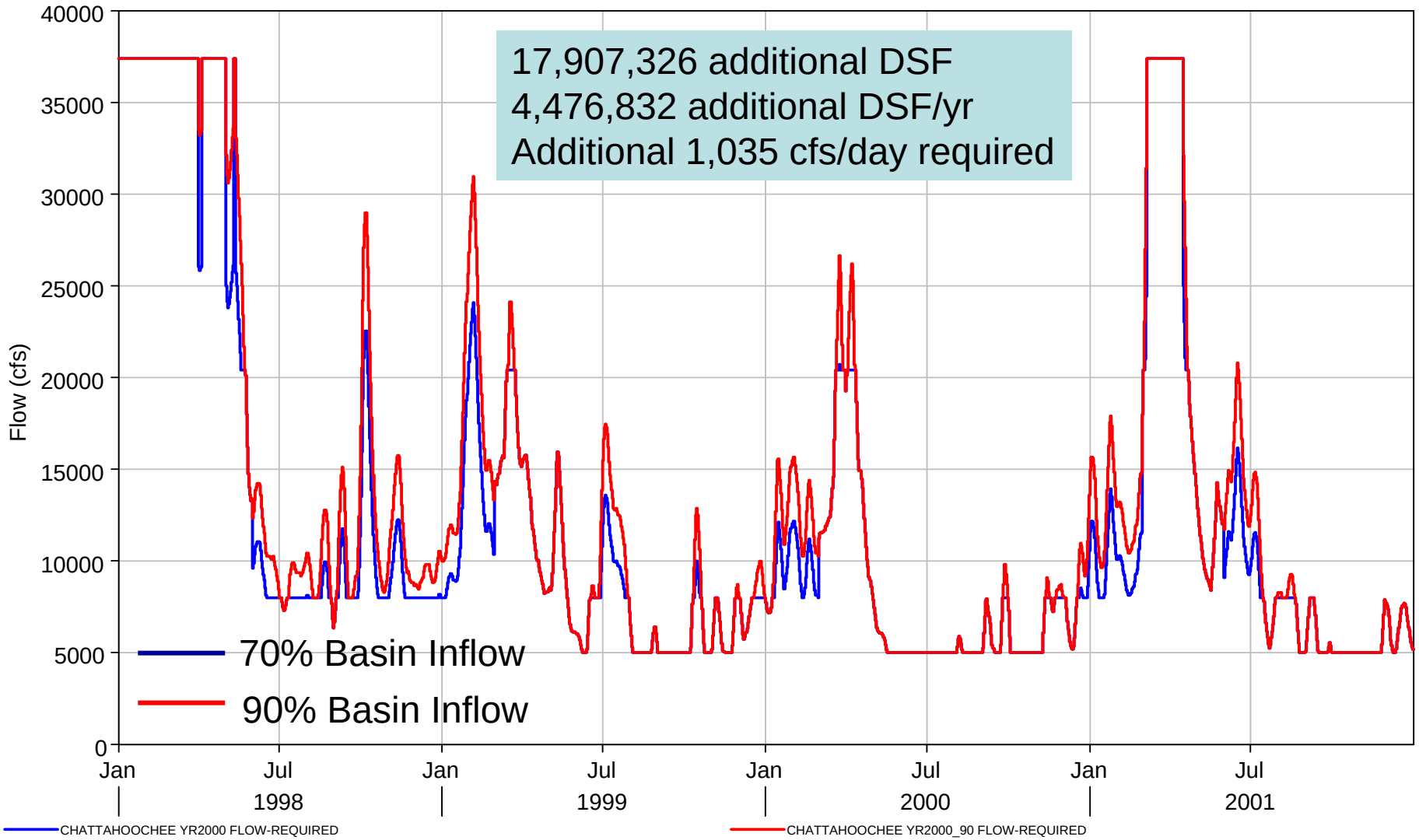
Chattahoochee - Ramping Impact



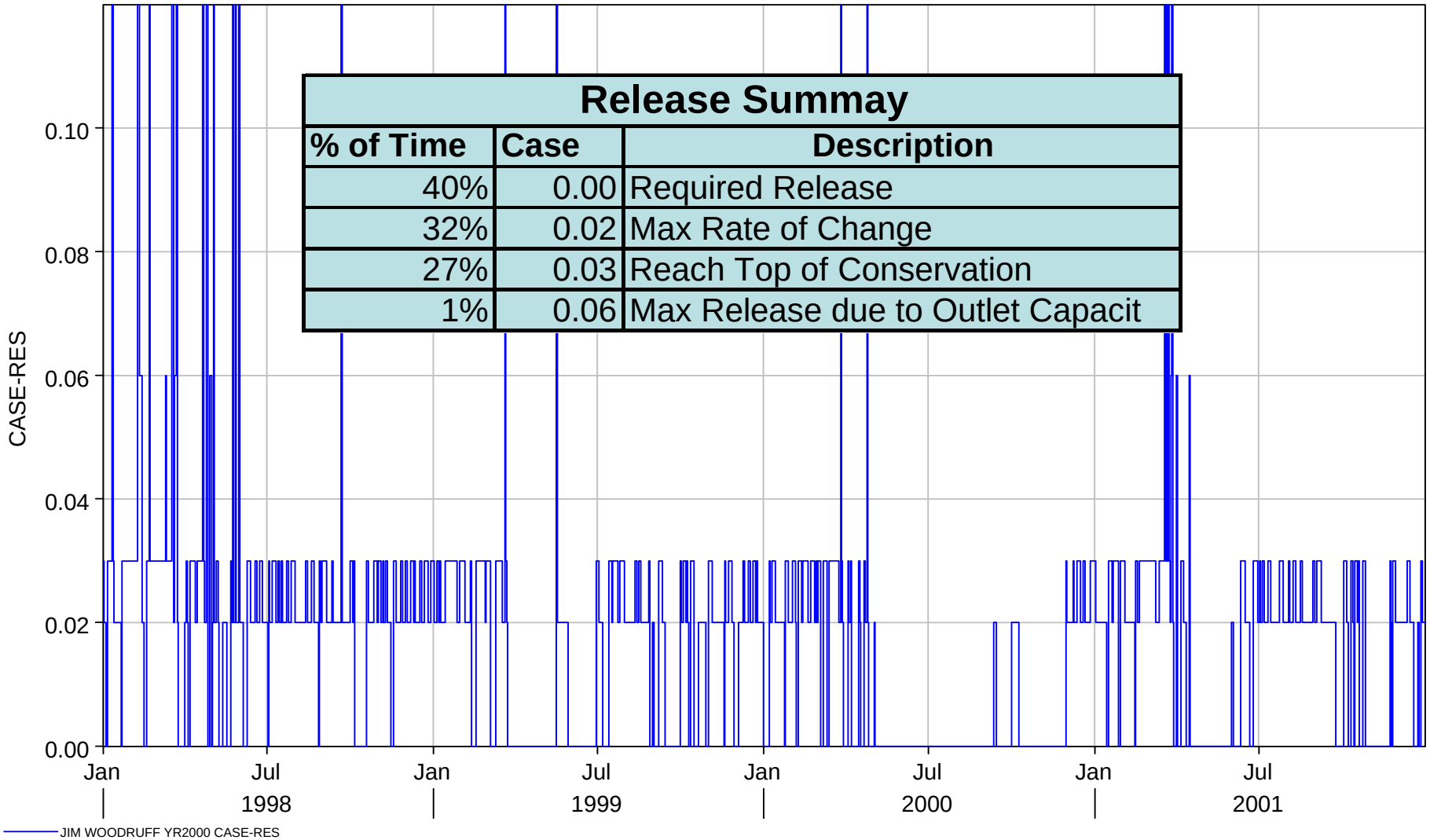
Chattahoochee - Storage Ratio Impact



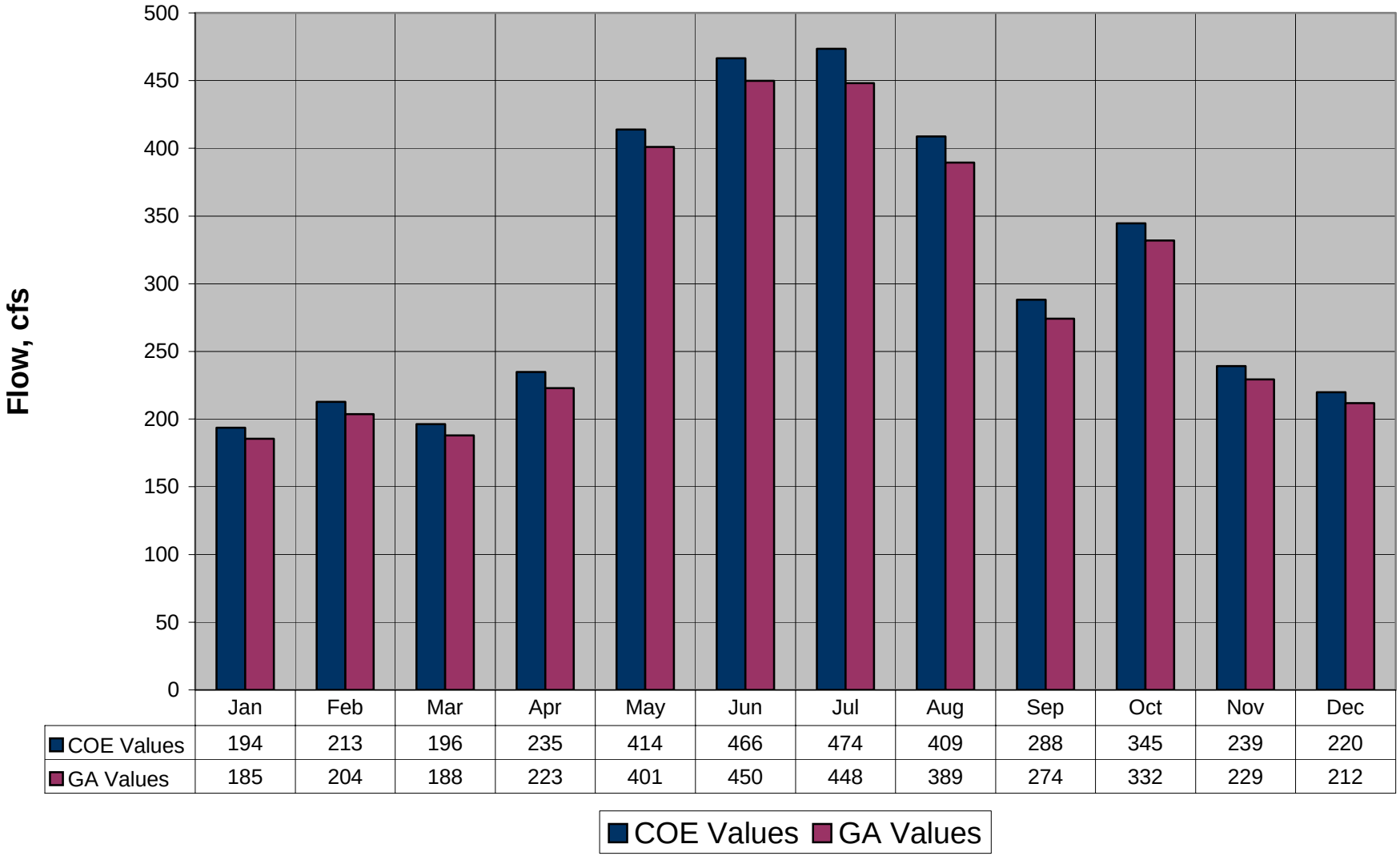
Chattahoochee - Storage Ratio Impact



Jim Woodruff Release Decision

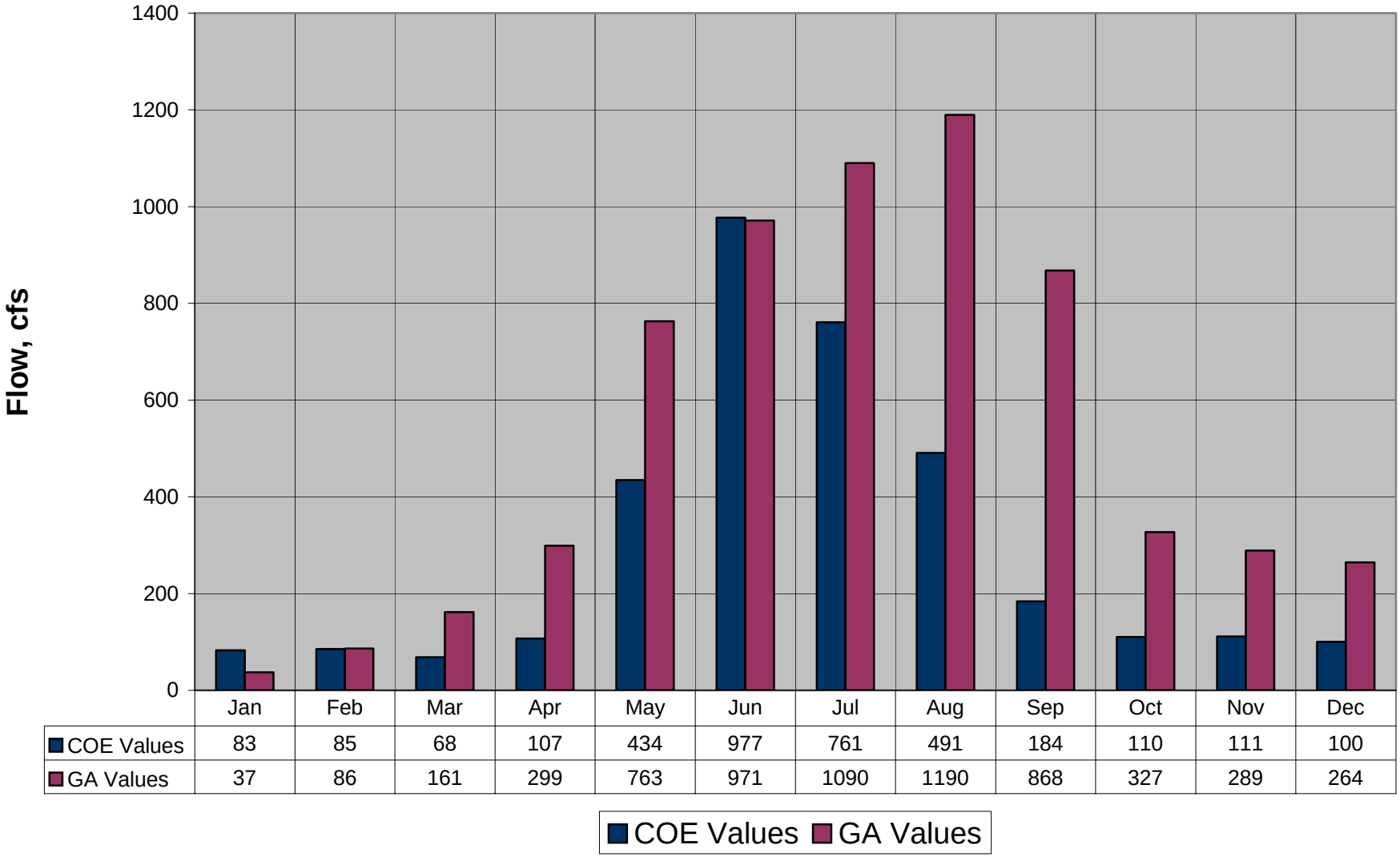


Net 2000 Demands above Whitesburg



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
COE Values	194	213	196	235	414	466	474	409	288	345	239	220
GA Values	185	204	188	223	401	450	448	389	274	332	229	212

Net 2000 Demands Jim Woodruff - Flint River



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
COE Values	83	85	68	107	434	977	761	491	184	110	111	100
GA Values	37	86	161	299	763	971	1090	1190	868	327	289	264

Summary

- Model captures
  - Basin Inflow – Woodruff discharge relationship
  - Fall ramping rate
  - Balance operation, greatest demand on downstream reservoirs

Next Step

- Incorporate improvements from modeling meeting
- Fine tune fall rate for flows > 20,400
- Period of record simulation
  - Measure impacts during critical period
- Reality check - water management team review modeling results to measure real life applicability