

Modeling of the Interim Operation Plan

Georgia EPD

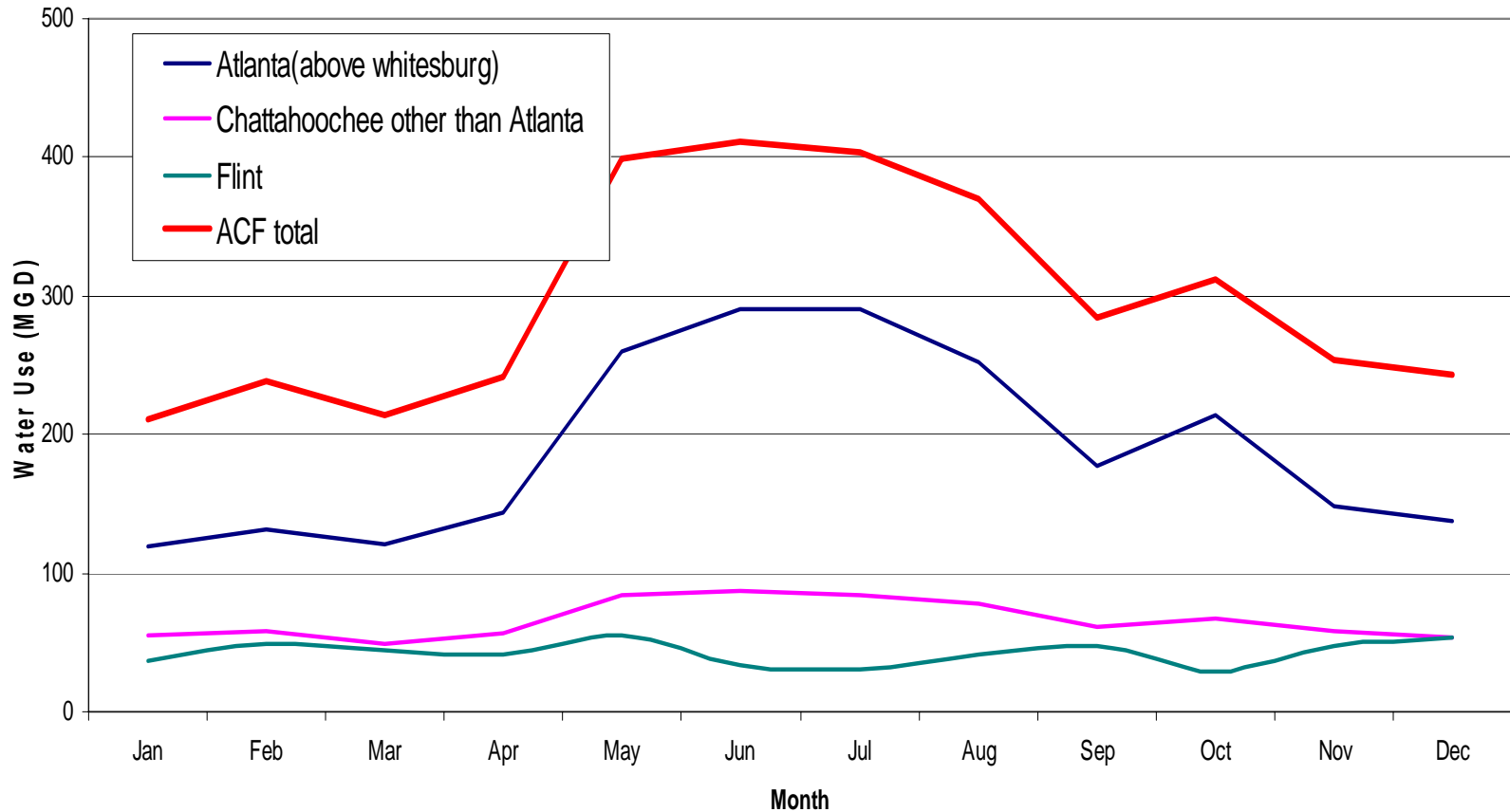
July 12, 2006 Modeling Workshop

1. Model Assumptions (HEC-5)

- A. Georgia Municipal & Industrial water use recorded in the year 2000
- B. Georgia dry year agricultural water use from previous Georgia EPD and USGS studies
- C. In-stream flow requirements at Atlanta and Columbus, Georgia
- D. Revised IOP (for spawning season and non-spawning season)
- E. Power generation specified by the Corps
- F. Basin Inflow provided by the Corps

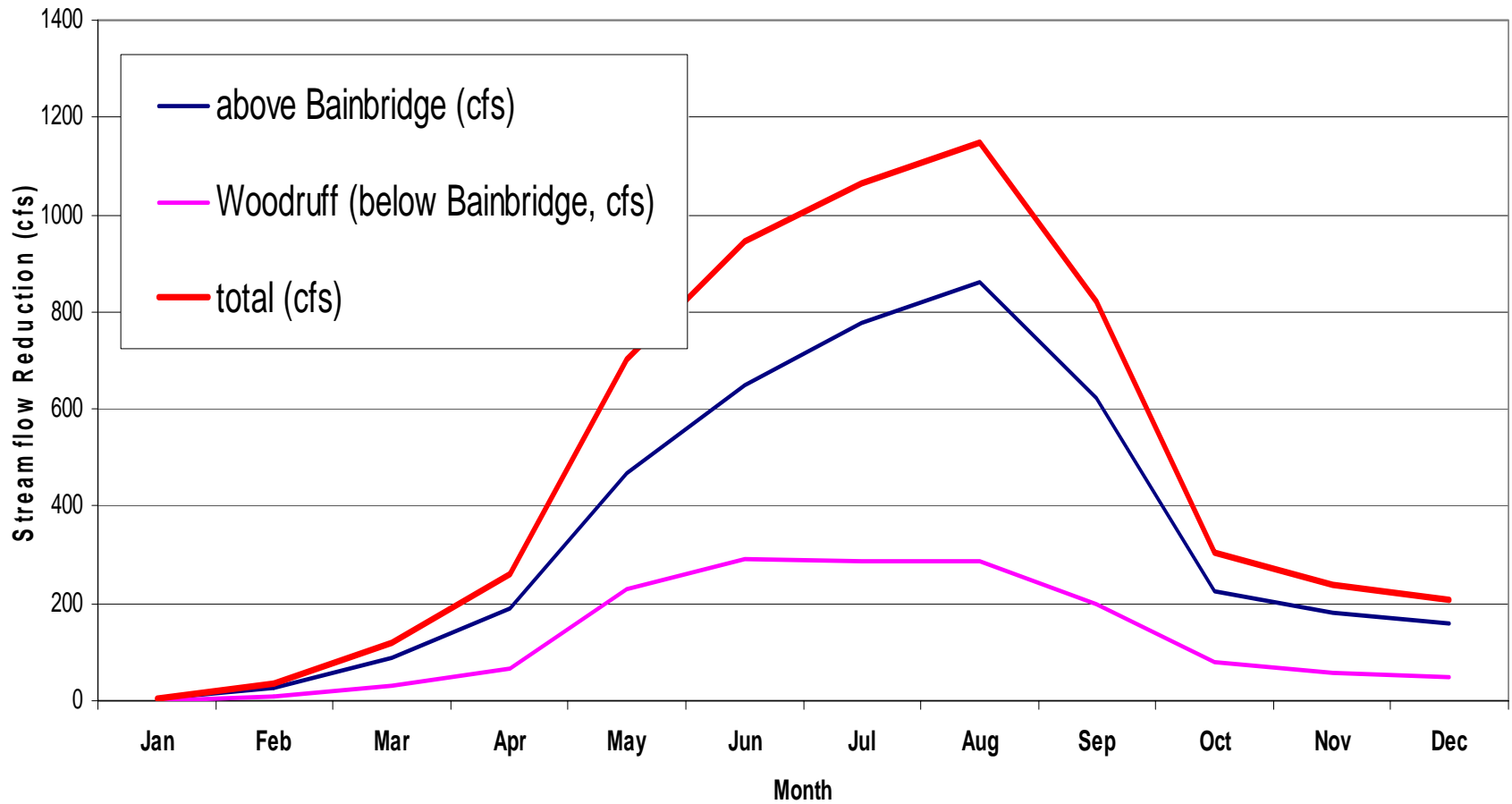
A. Georgia M&I Water Use (ACF)

ACF M & I Water Use (MGD)



B. Georgia Ag water use (ACF Basin)

Agricultural Irrigation Water Use Caused Streamflow Reduction



C. In-stream Flow Requirements

- Atlanta, Georgia: 750 cfs
- Columbus, Georgia:
 - 1850 cfs
 - 1200 cfs when West Point elevation is lower than 621.6 feet MSL
- Chattahoochee, Florida: specified in the next page

D. Revised Interim Operation Plan

- Spawning season (March ~ May)
 - $BI \geq 37400$ cfs: 37400 cfs
 - $20400 \text{ cfs} < BI < 37400 \text{ cfs}$: $\max(20400, 0.9 * BI)$
 - $BI < 20400$ cfs: $\max(5000, BI)$
- Non-spawning season (June ~ February)
 - $BI > 23000$ cfs: 16000 cfs
 - $8000 \text{ cfs} < BI < 23000 \text{ cfs}$: $\max(8000, 0.7 * BI)$
 - $BI < 8000$ cfs: $\max(5000, BI)$

E. Firm Power Generation (hrs)

Action Zones	Lake Lanier	West Point	W.F. George
Zone 1	3	4	4
Zone 2	2	2	2
Zone 3	2	2	2
Zone 4	0	0	0

E. Power Generation Assumptions (continued)

- Lanier in Georgia model:

- PC	8	.0	.697	.698	.826	.827	.879	.880	1.0
- PF	8	.001	.001	.083	.083	.083	.083	.125	.125

- Lanier in Corps model:

- PC	8	0	.796	.797	.862	.863	.896	.897	1.0
- PF	8	.000	.000	.083	.083	.083	.083	.125	.125

E. Power Generation Assumptions (continued)

- West Point in Georgia model:

- PC	8	.0	.369	.370	.560	.561	.687	.688	1.0
- PF	8	.001	.001	.083	.083	.083	.083	.167	.167

- West Point in Corps model:

- PC	8	0	.609	.610	.758	.759	.836	.837	1.0
- PF	8	.000	.000	.083	.083	.083	.083	.167	.167

E. Power Generation Assumptions (continued)

- W.F. George in Georgia model:

- PC	8	.0	.248	.249	.518	.519	.785	.786	1.0
- PF	8	.001	.001	.083	.083	.083	.083	.167	.167

- W.F. George in Corps model:

- PC	8	0	.309	.310	.643	.644	.818	.819	1.0
- PF	8	.000	.000	.083	.083	.083	.083	.167	.167

F. Basin Inflow

- Method of developing Basin Inflow
- Data of developing Basin Inflow
- Time series of Basin Inflow
- Consistence with unimpaired flow

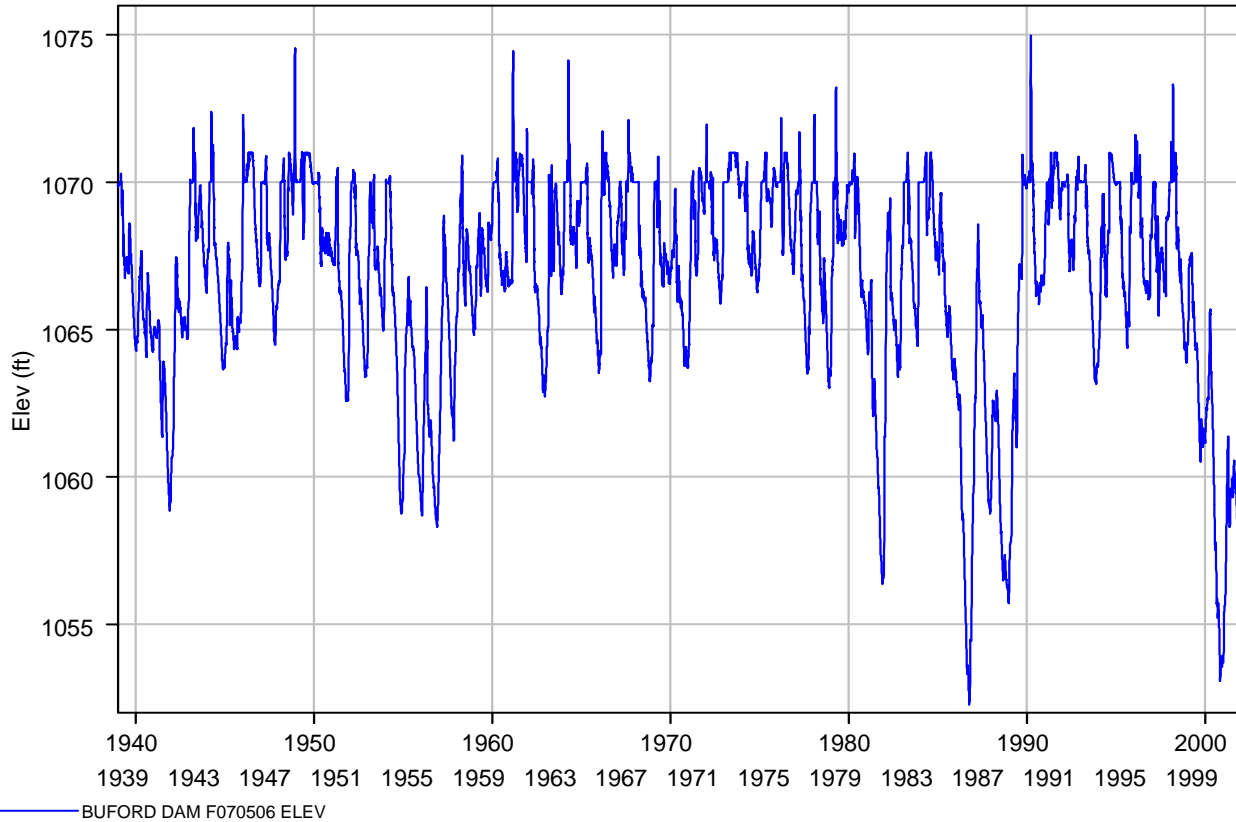
2. STELLA Model Assumption (Georgia model)

- Georgia STELLA model has the same assumptions as Georgia HEC-5 model
- US Fish & Wildlife Service STELLA model has different assumptions (see summary of last workshop). Note power assumption may be different from other models.

3. Model Results

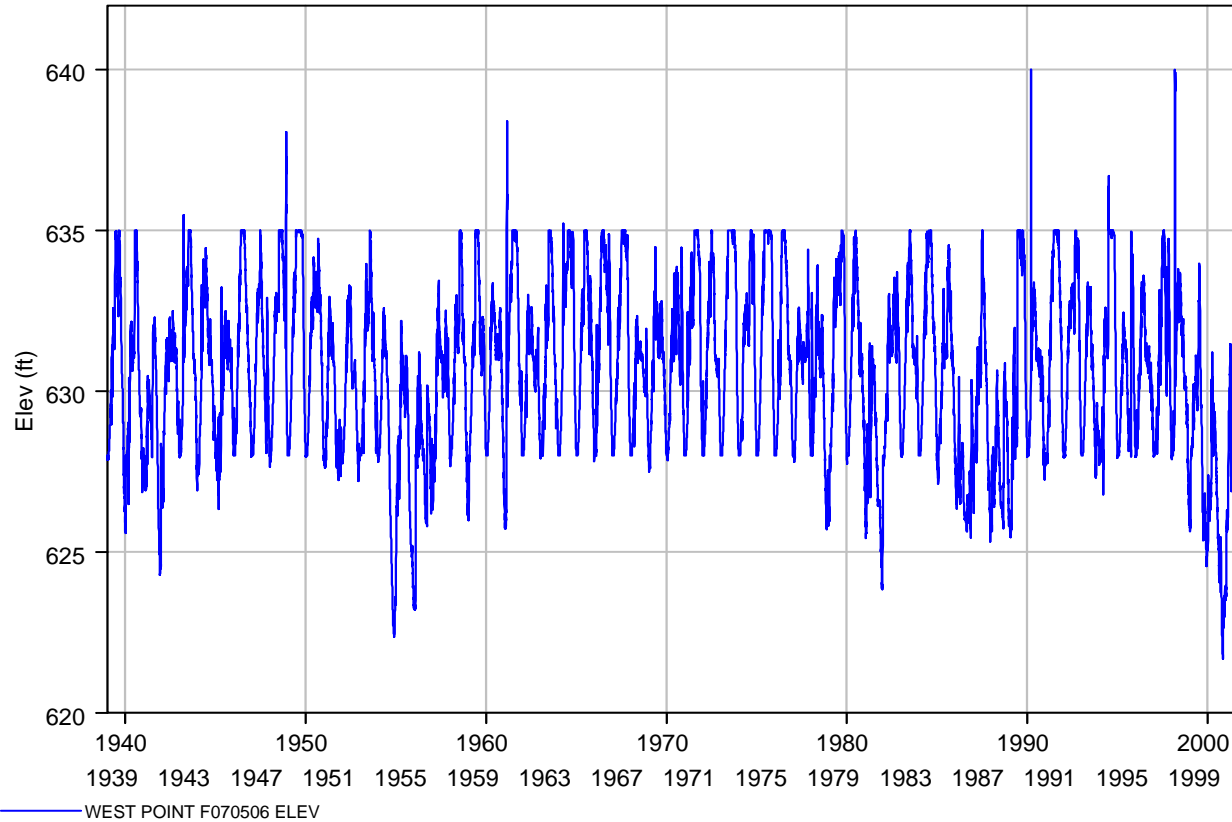
- Georgia HEC-5 model
- Georgia STELLA model
- USFWS STELLA model

GaEPD HEC-5 Results Lanier Elevation

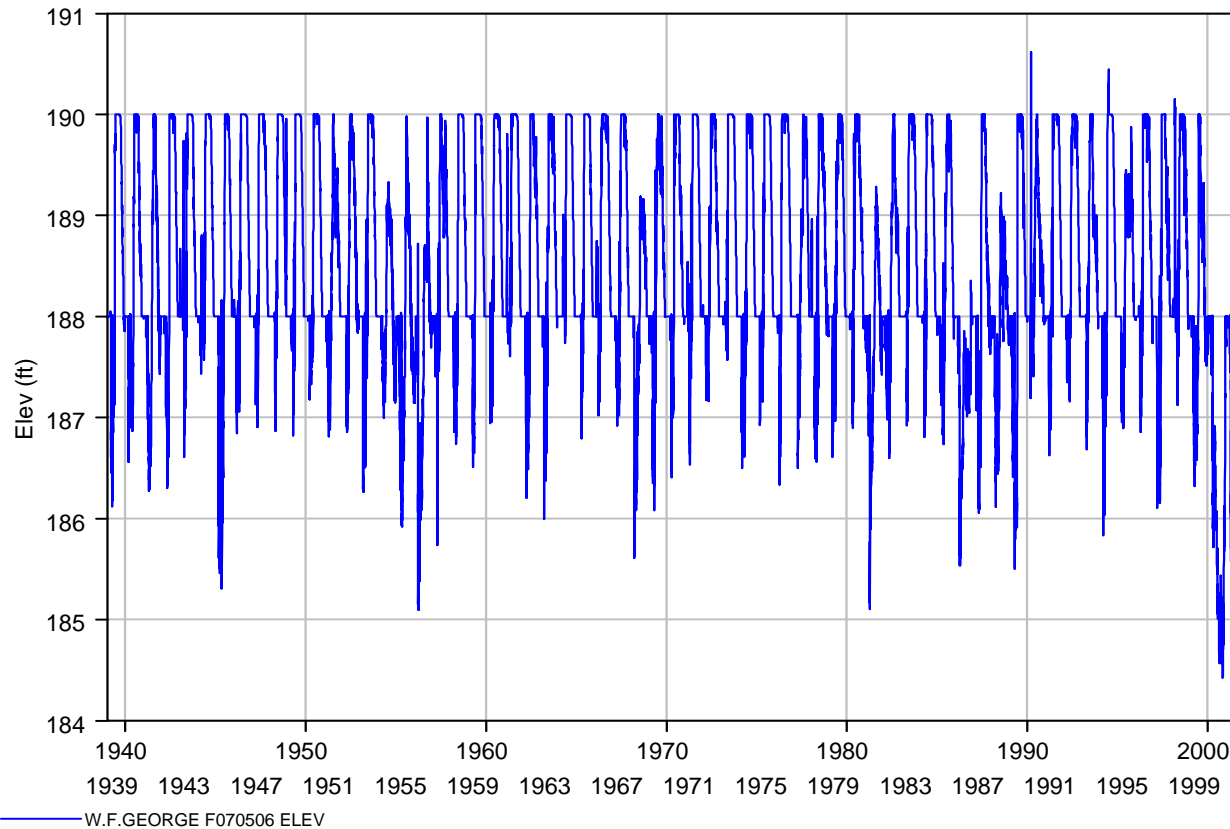


GaEPD HEC-5 Results

West Point Elevation

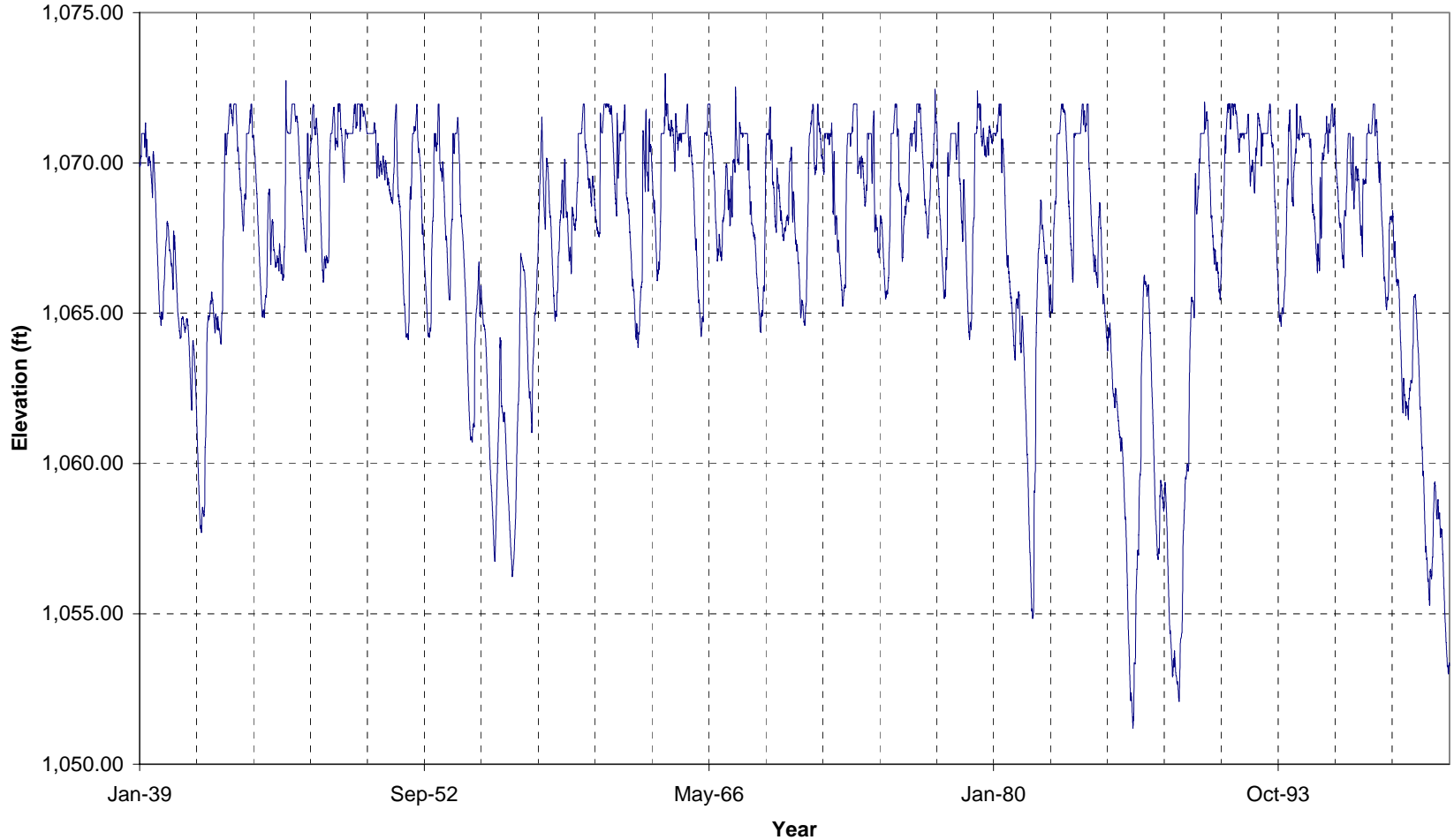


GaEPD HEC-5 Results W.F. George Elevation



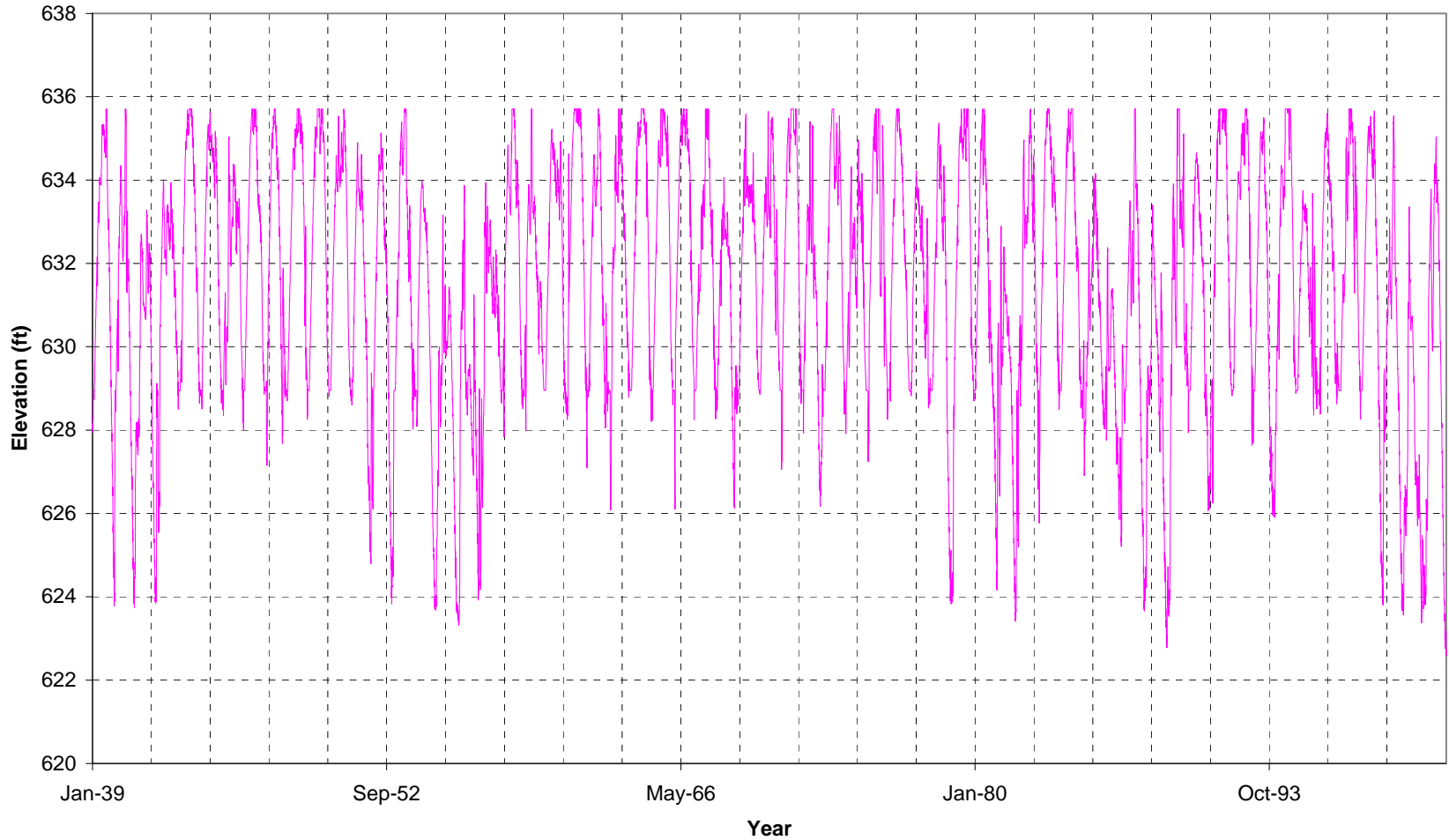
GaEPD STELLA Results

Lanier Elevation



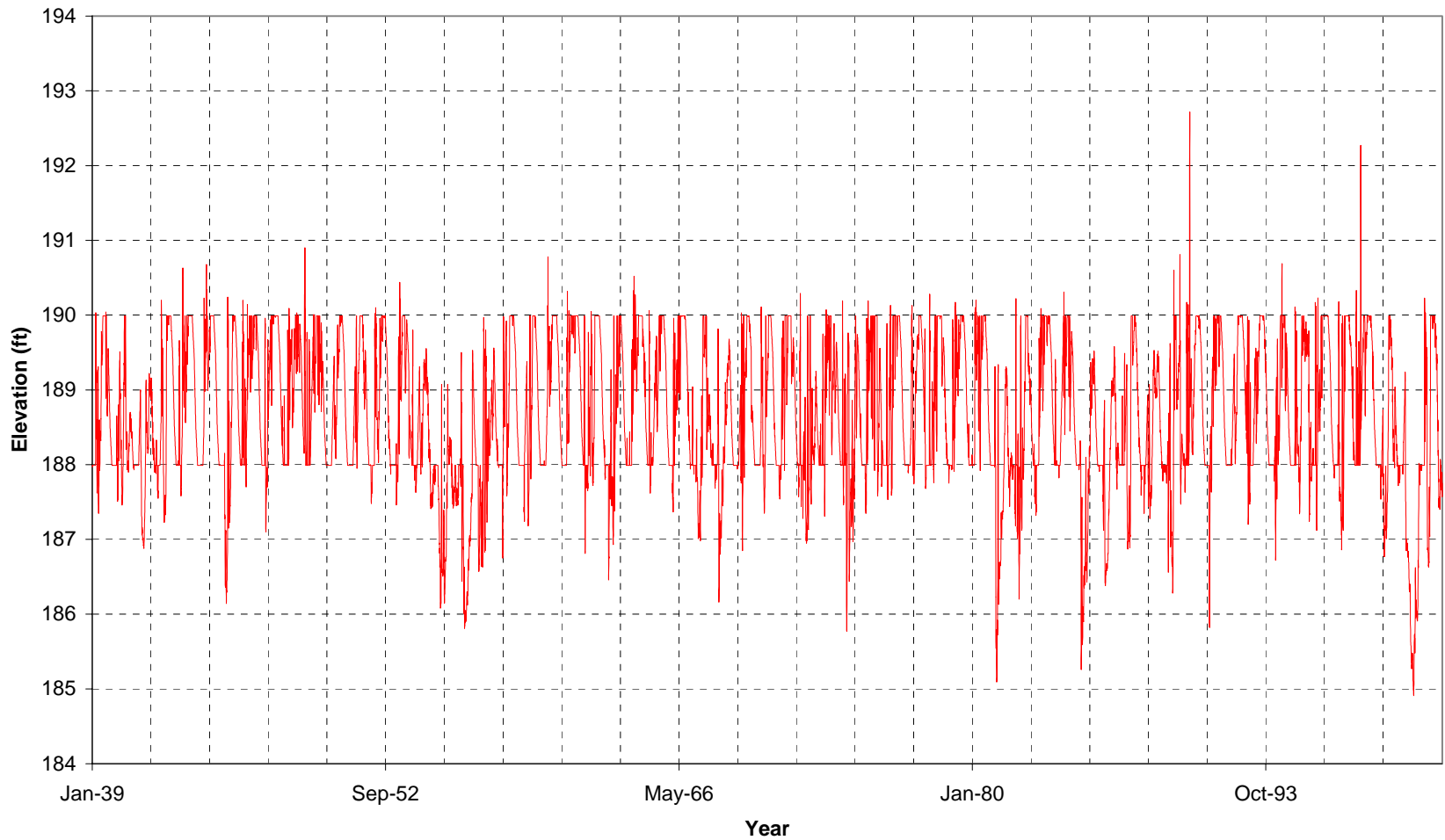
GaEPD STELLA Results

West Point Elevation



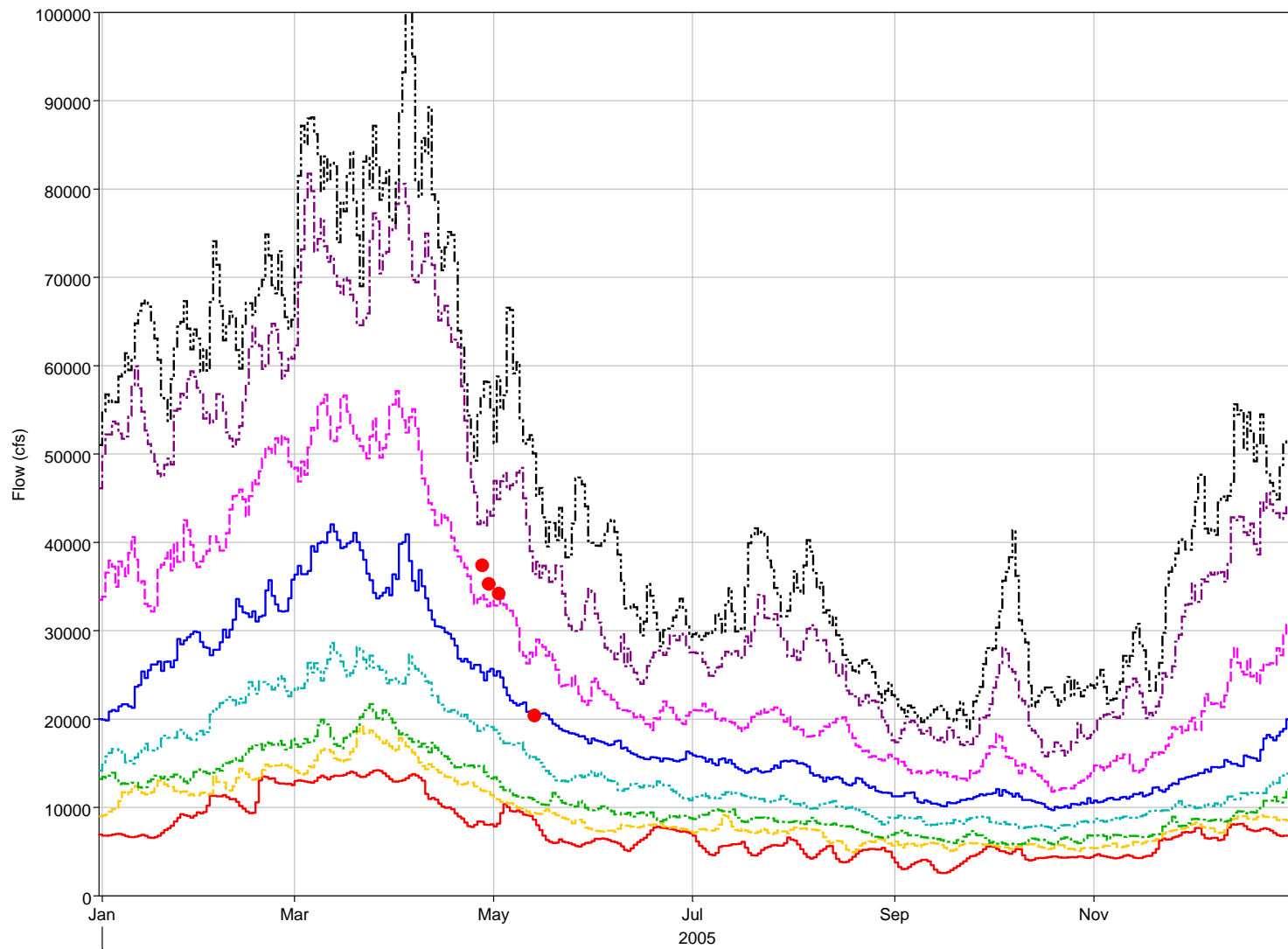
GaEPD STELLA Results

W.F. George Elevation



4. Hydrological Basis for IOP

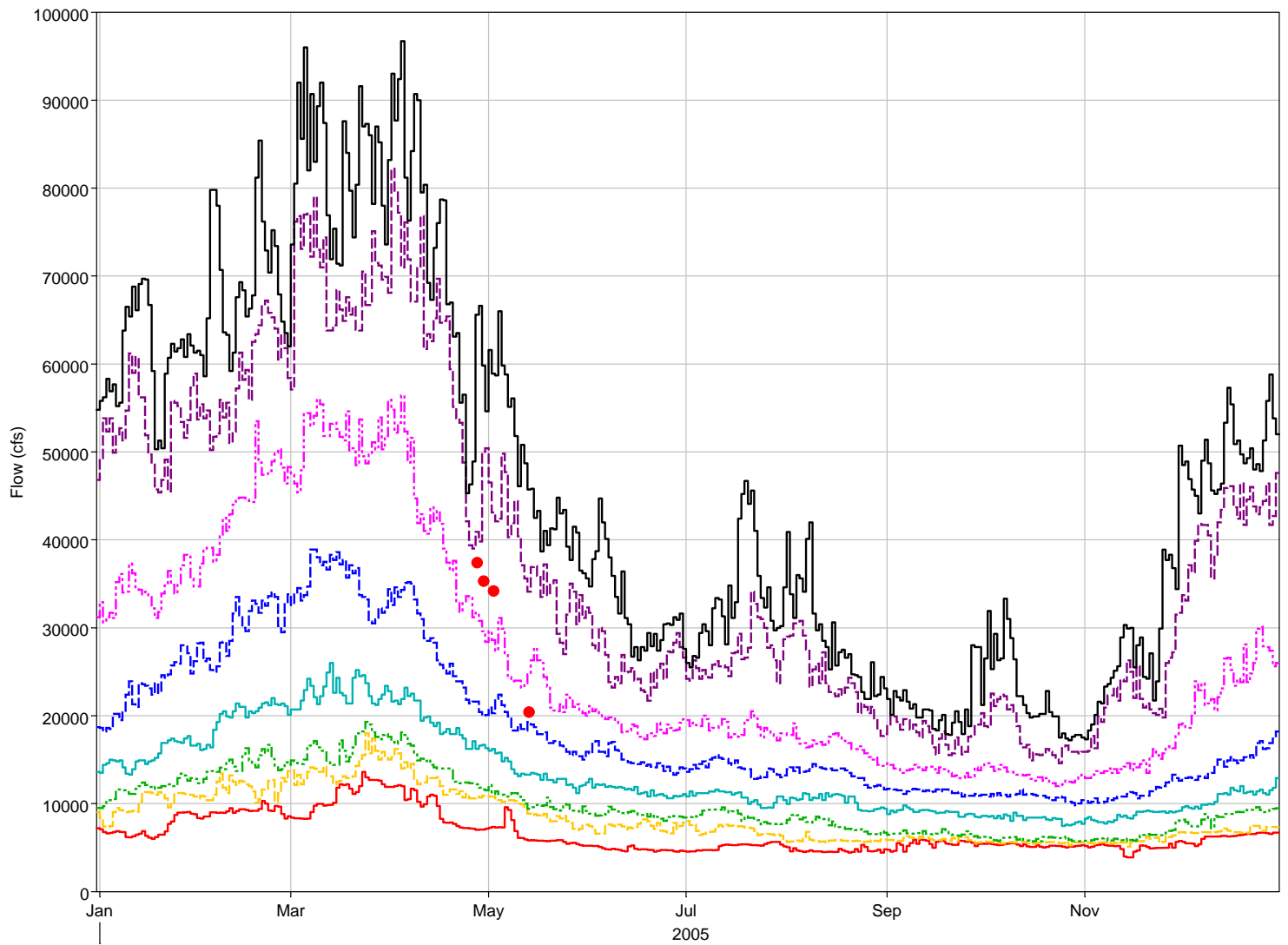
- A. Flow rates (corresponding to the 4 days of sturgeon egg-collection in 2005) at Chattahoochee, Florida in the background of exceedance levels of
 - I. Cumulative unimpaired flow
 - II. Observed flow
 - III. Basin Inflow
- B. This year's data points vs. exceedance levels



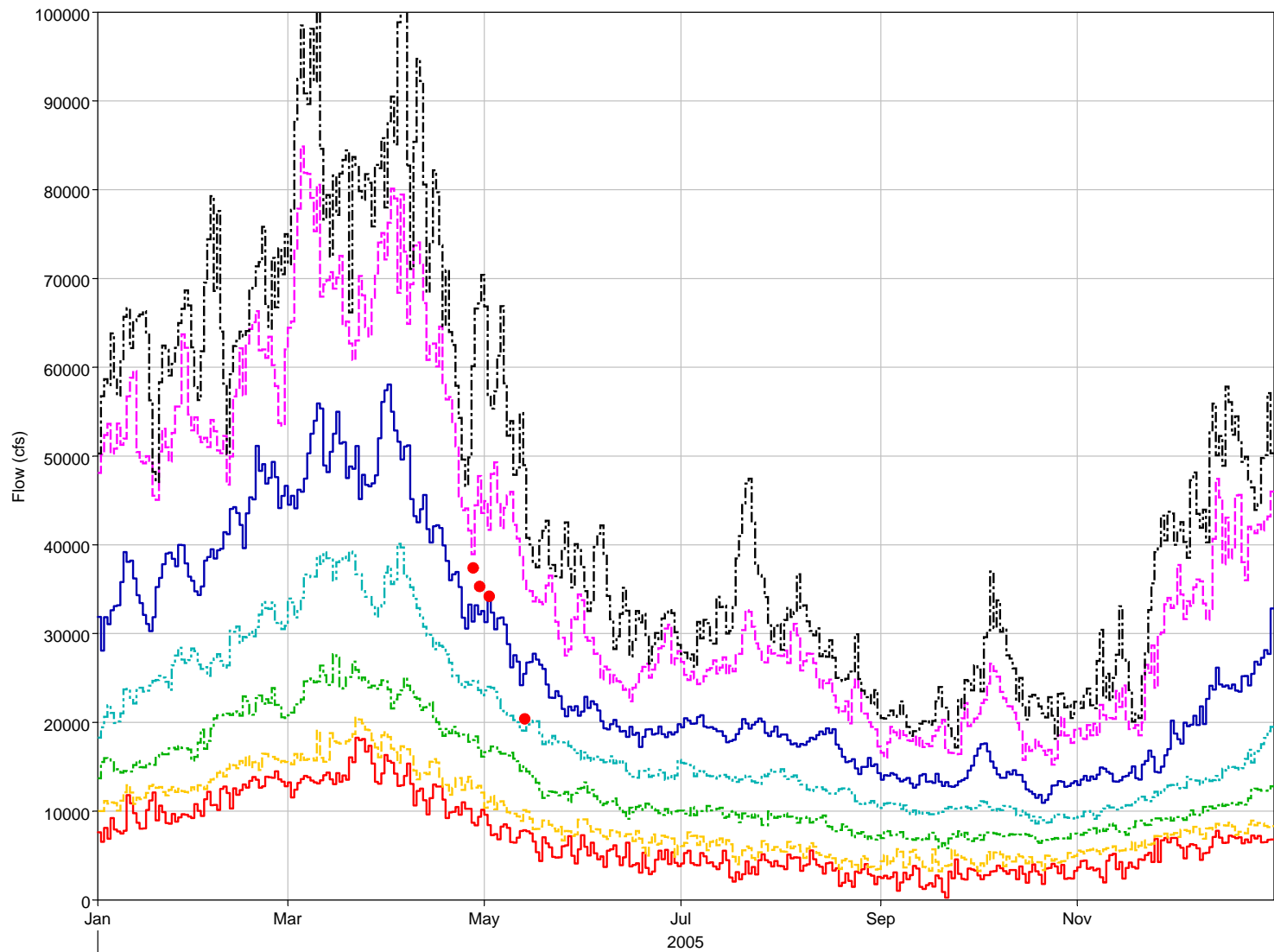
— CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-MIN]
 — CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P05]
 — CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P10]

— CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P25]
 — CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P50]
 — CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P75]

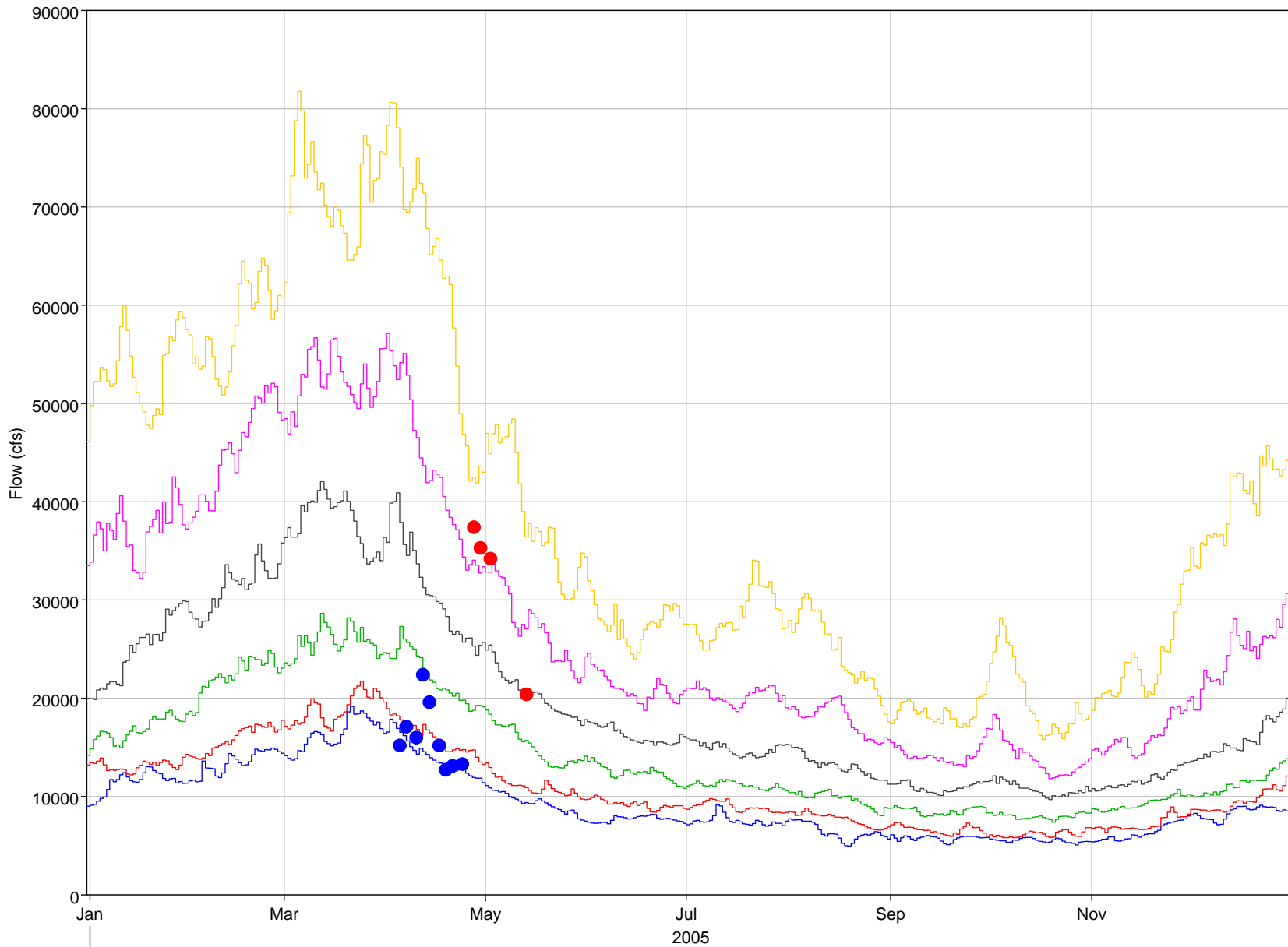
- - - CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P95]
 ● CHATTAHOOCHEE EGG COLLECTED FLOW



CHATTAHOOCHEE OBS_ADJ01JAN1939-31DEC2001 FLOW-MIN CHATTAHOOCHEE OBS_ADJ01JAN1939-31DEC2001 FLOW-P05 CHATTAHOOCHEE OBS_ADJ01JAN1939-31DEC2001 FLOW-P10 CHATTAHOOCHEE OBS_ADJ01JAN1939-31DEC2001 FLOW-P25
 CHATTAHOOCHEE OBS_ADJ01JAN1939-31DEC2001 FLOW-P50 CHATTAHOOCHEE OBS_ADJ01JAN1939-31DEC2001 FLOW-P75 CHATTAHOOCHEE OBS_ADJ01JAN1939-31DEC2001 FLOW-P90 CHATTAHOOCHEE OBS_ADJ01JAN1939-31DEC2001 FLOW-P95
 ● CHATTAHOOCHEE EGG COLLECTED FLOW



— JIM WOODRUFF COE BI[01JAN1939-31DEC2001] FLOW-BI-P05
 — JIM WOODRUFF COE BI[01JAN1939-31DEC2001] FLOW-BI-P10
 — JIM WOODRUFF COE BI[01JAN1939-31DEC2001] FLOW-BI-P25
 — JIM WOODRUFF COE BI[01JAN1939-31DEC2001] FLOW-BI-P50
— JIM WOODRUFF COE BI[01JAN1939-31DEC2001] FLOW-BI-P75
 — JIM WOODRUFF COE BI[01JAN1939-31DEC2001] FLOW-BI-P95
 - - - JIM WOODRUFF COE BI[01JAN1939-31DEC2001] FLOW-BI-P95
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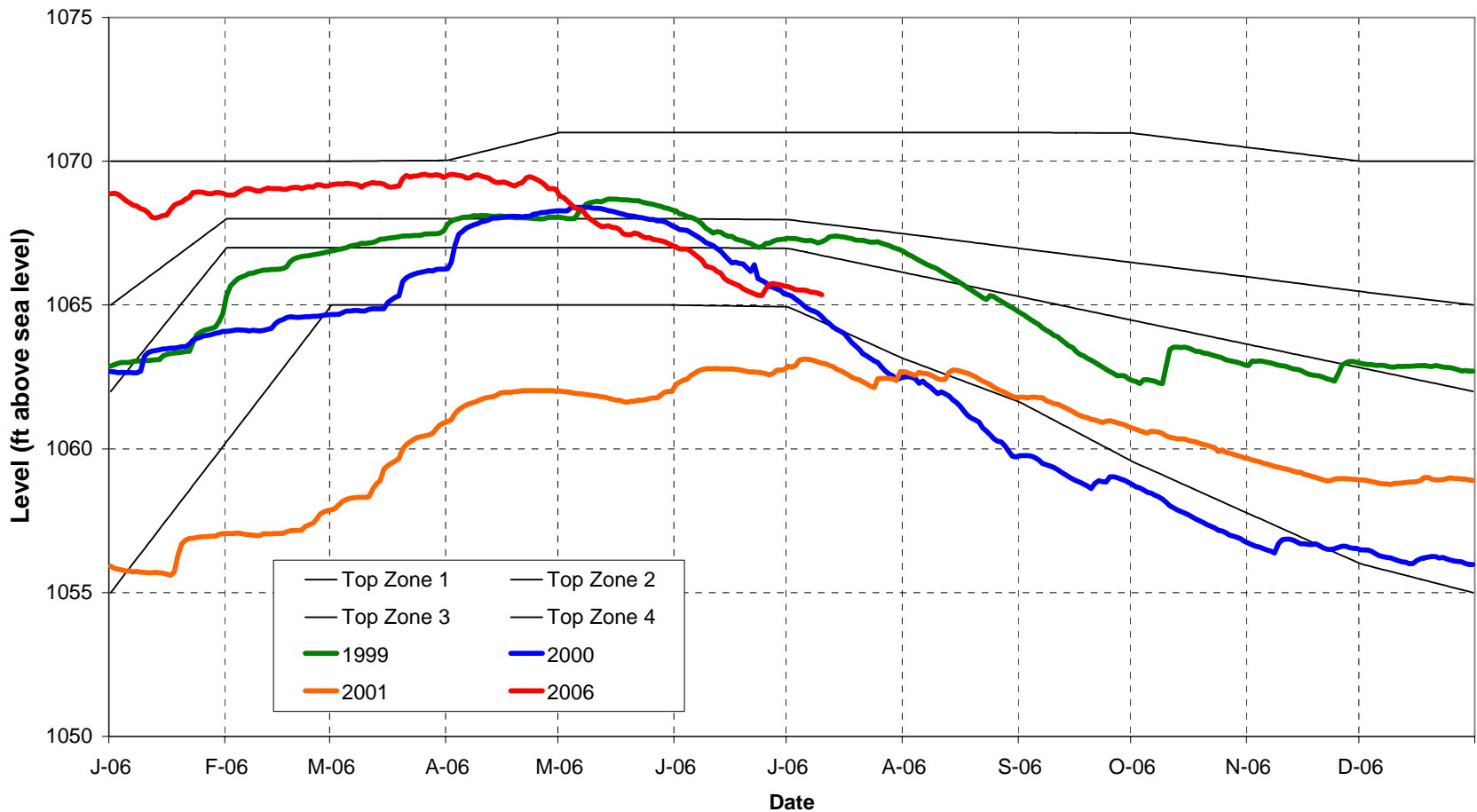
— CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P05
 — CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P50
 ● CHATTAHOOCHEE EGG 2006 FLOW

— CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P10
 — CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P75
 ● CHATTAHOOCHEE EGG COLLECTED FLOW

— CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P25
 — CHATTAHOOCHEE ROUTED_CUM[01JAN1939-31 FLOW_CUM-P90

5. Impacts of the IOP

Reservoir Levels of the years vs. Conservation Levels at Lanier



5. Impacts of the IOP (continued)

Reservoir Levels of the years vs. Conservation Levels at Lanier

