



Calibration Activities for the South Florida Water Management Model (SFWMM a.k.a. 2x2 Model)

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Introduction

The South Florida Water Management Model (SFWMM) is a regional-scale computer model that simulates the hydrology and management of the water resources system from Lake Okeechobee to Florida Bay, covering an area of 7,600 square miles. The model simulates the major components of the hydrologic cycle in south Florida on a daily basis. The SFWMM is currently being updated to simulate the 1965-2012 period.

Projects

- Operational Planning
- Comprehensive Everglades Restoration Plan
- Lower East Coast Water Supply Plans
- Boundary conditions for sub-regional models in multiple projects



Enhancements Since v5.4

- Dynamic Position Analysis
- Adaptive Protocols for Lake Okeechobee
- Levee seepage into the Everglades Agricultural Area
- Water supply backpumping to Lake Okeechobee improvements
- Land use estimates within Everglades Agricultural Area improved

Enhancements Since v5.4 (cont.)

- Modified Delta Storage calculation improvements
- Improvements to the Palm Beach County Chain of Lakes representation including the C-51 canal and Lake Worth Drainage District canals
- Enhancements in northern Palm Beach County for Loxahatchee River Restoration flexibility

Time Periods Modeled

- Calibration
 - 1991-2001
- Verification
 - 1984-1990
 - 2002-2010
- Simulation
 - 1965-2012



Linear Auto-Calibration with PEST

PEST is a parameter estimation tool developed by John Doherty at Watermark Numerical Computing

- Jacobian matrix
 - 56,692 historical observations
 - 474 parameters
- Objective function minimizes the difference between historical and simulated values

Stage Hydrographs
1991-2001 and 1984-2010
V7.0_β Calibration vs. Historical Stage
Calibration Period 1991-2001
Key Gages Used by Operations

1-7

1-8T

1-9

2-17

3A-2

3A-3

3A-4

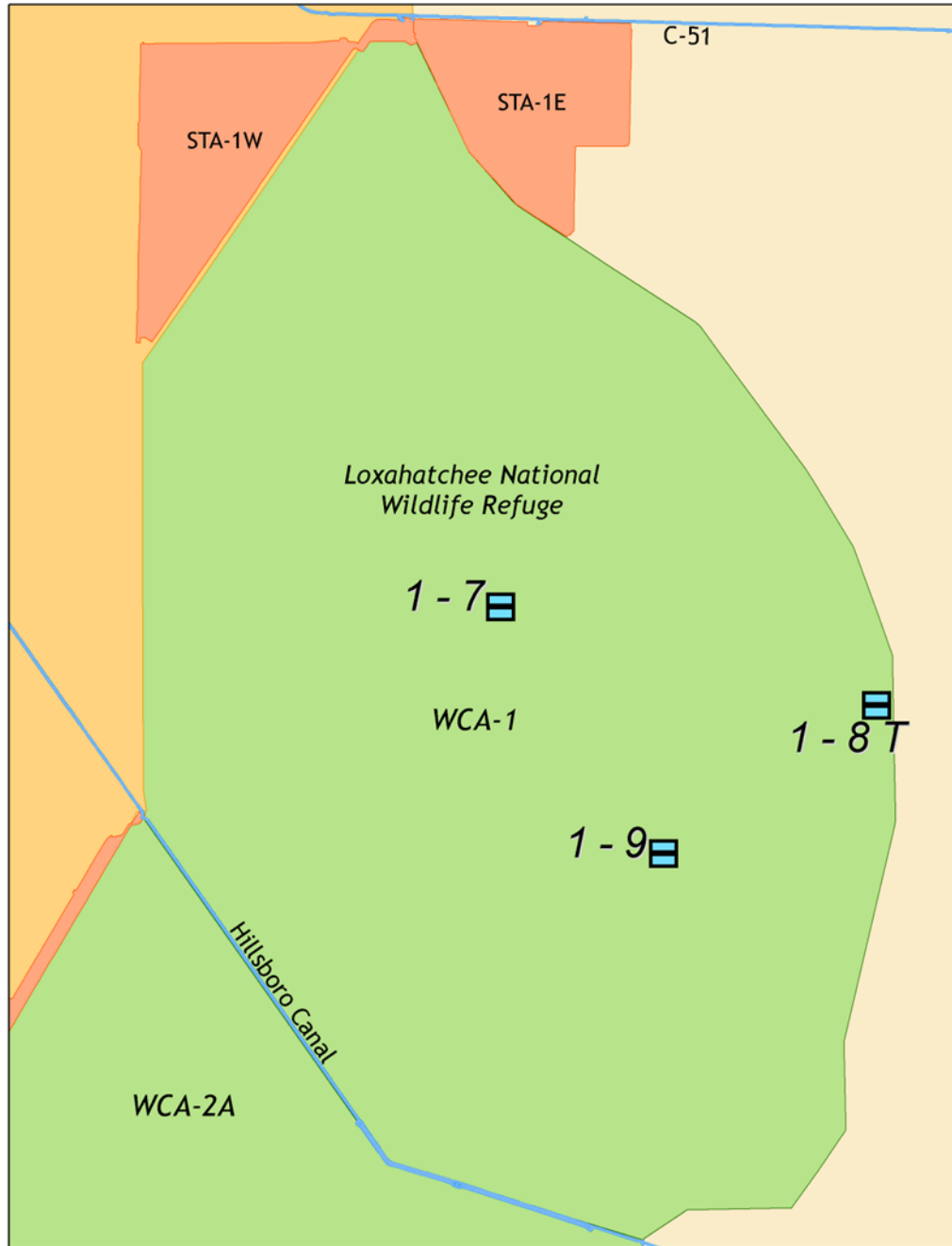
3A-28

G-3273

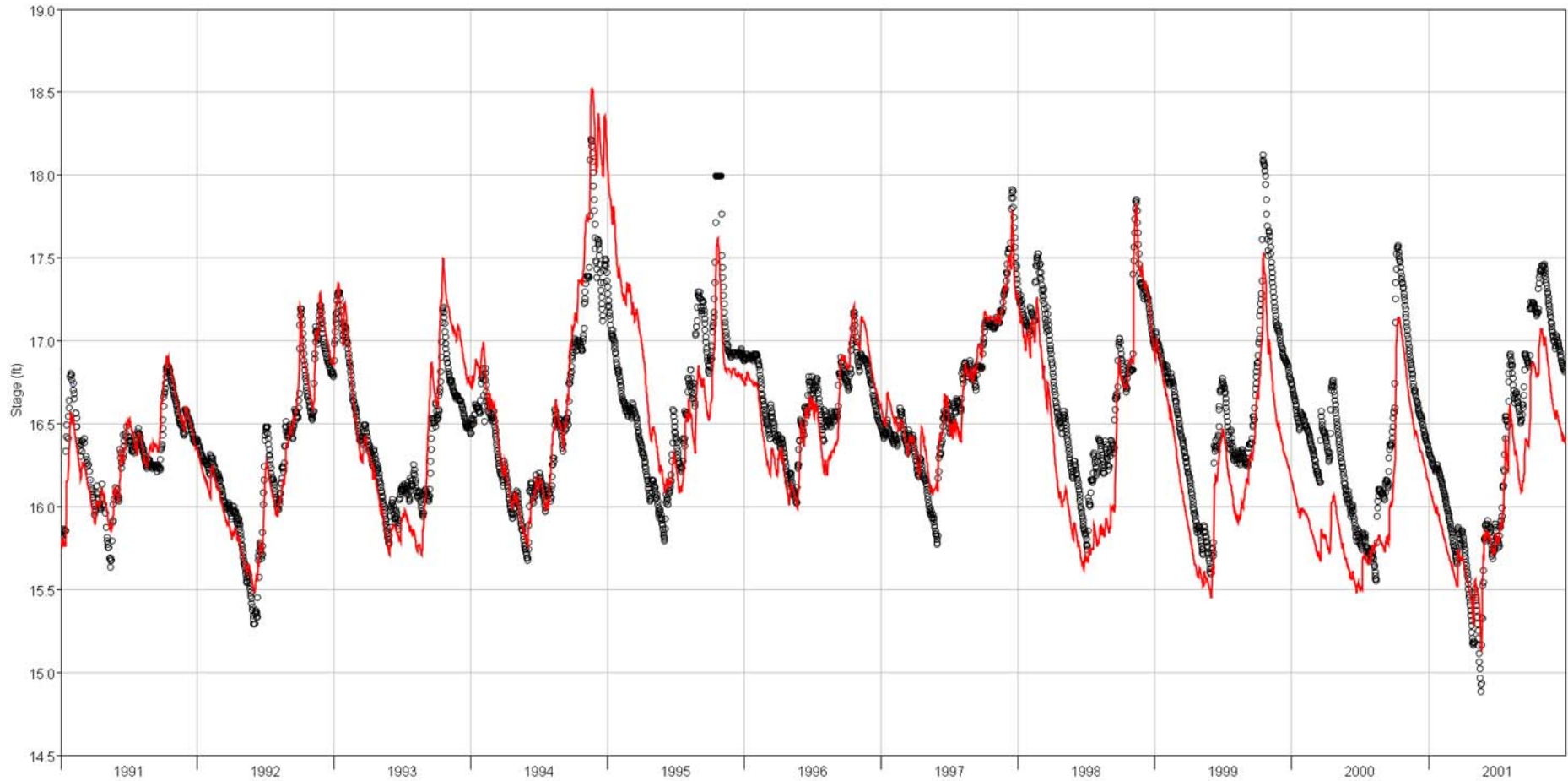
NESRS-2

NP-205





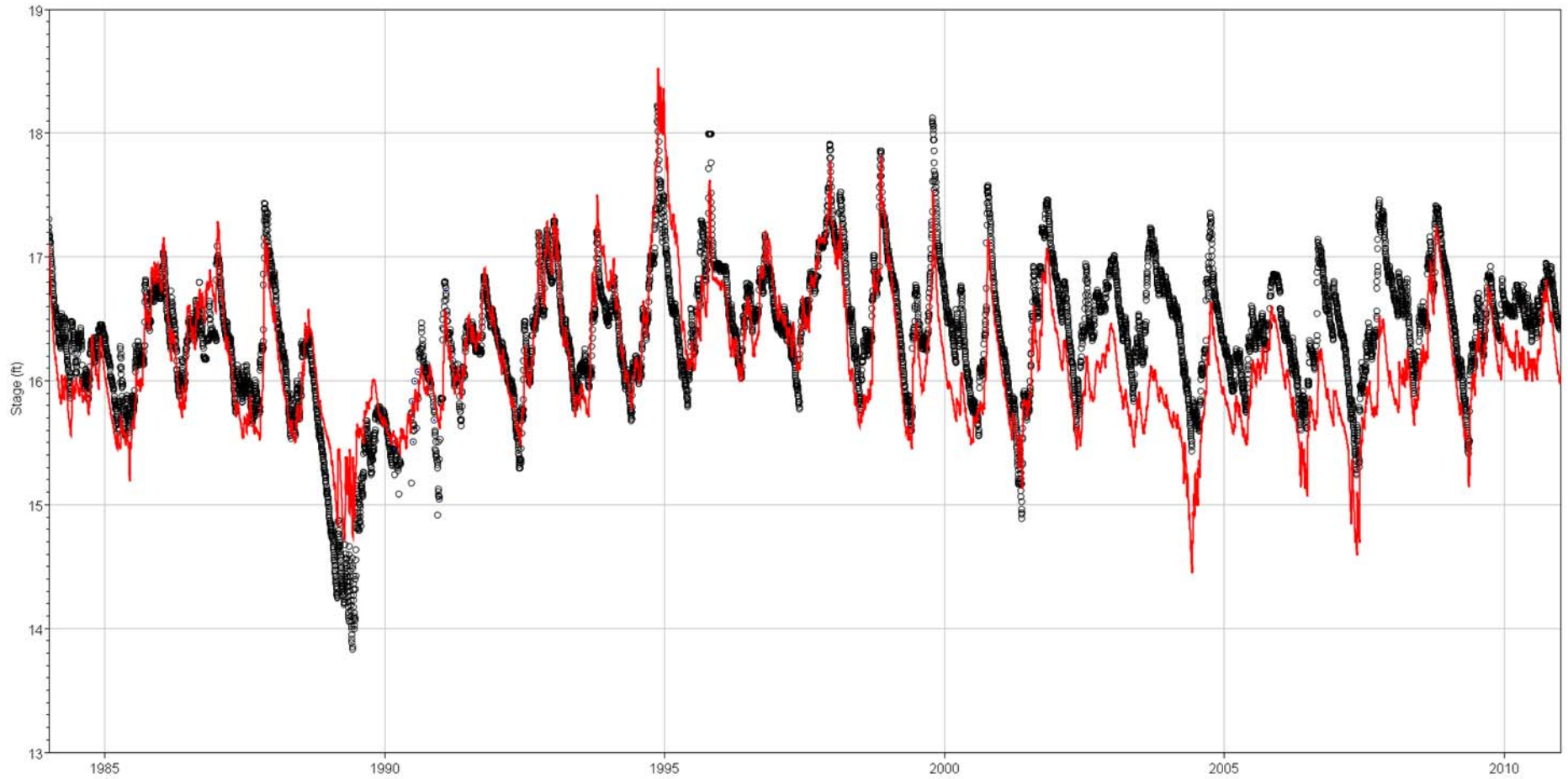
Gage 1-7 Calibration (1991-2001)



— Historical — Simulated



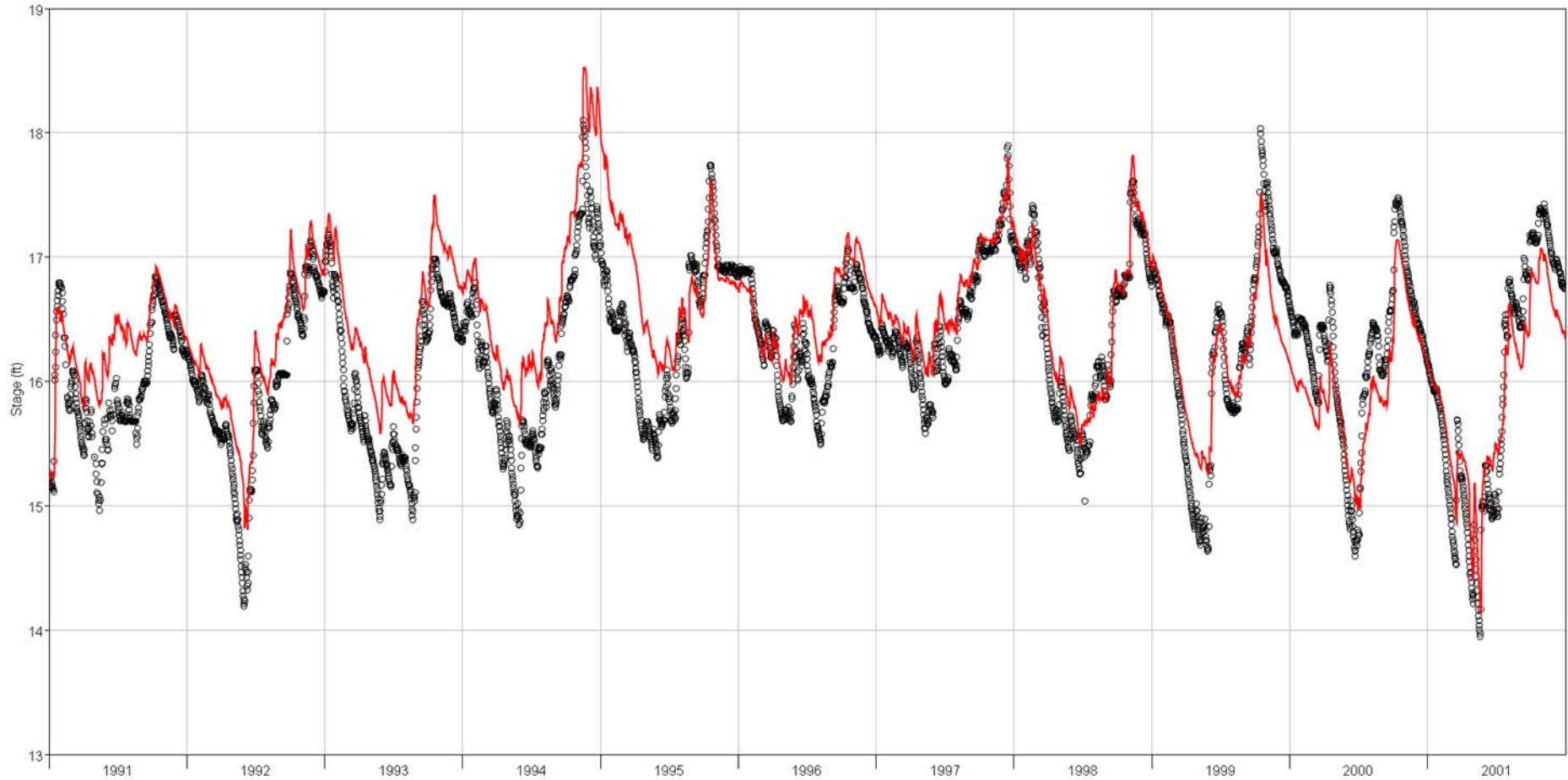
Gage 1-7 (1984-2010)



— Historical

— Simulated

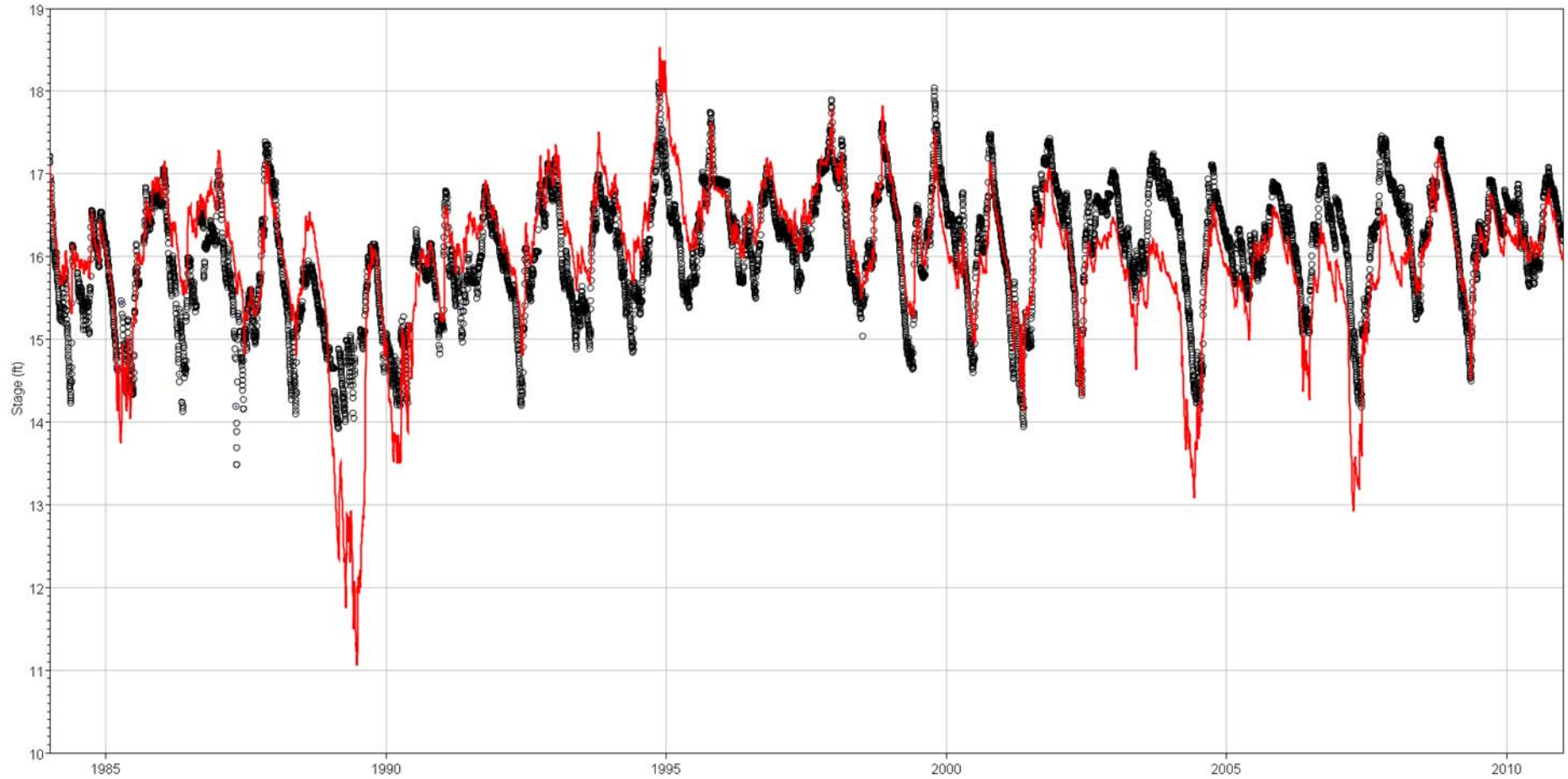
Gage 1-8T Calibration (1991-2001)



— Historical

— Simulated

Gage 1-8T (1984-2010)

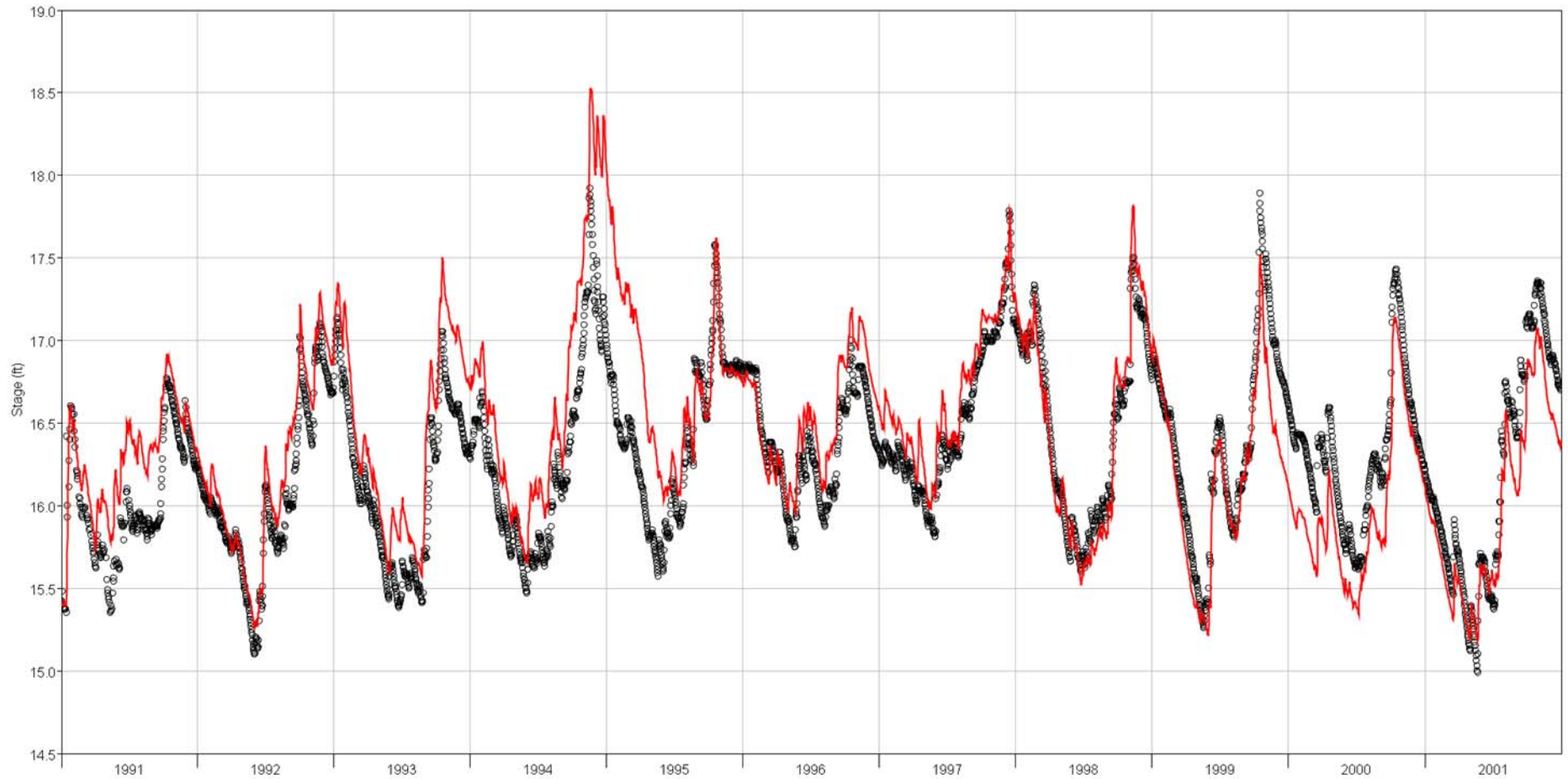


— Historical

— Simulated



Gage 1-9 Calibration (1991-2001)

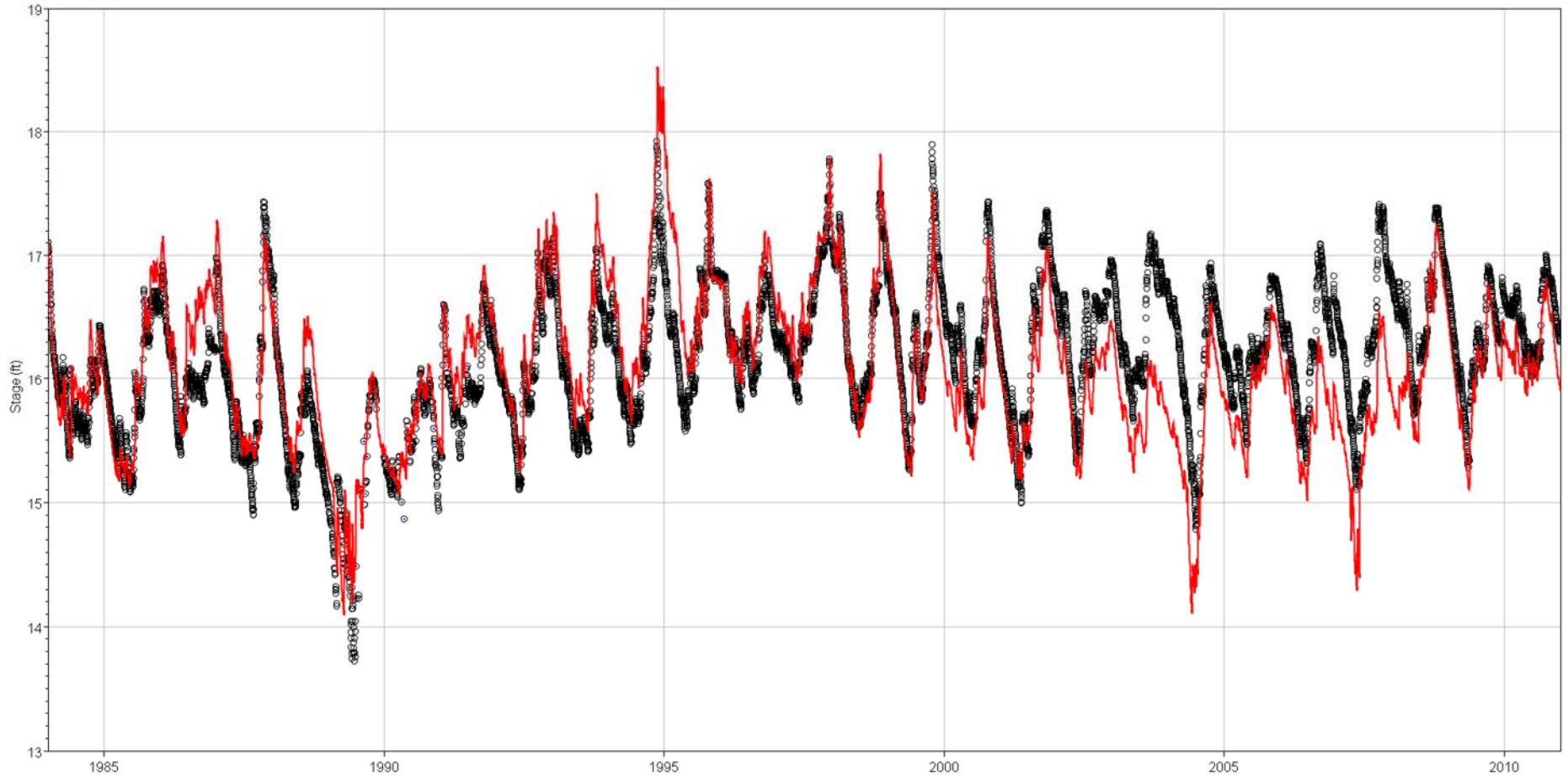


— Historical

— Simulated

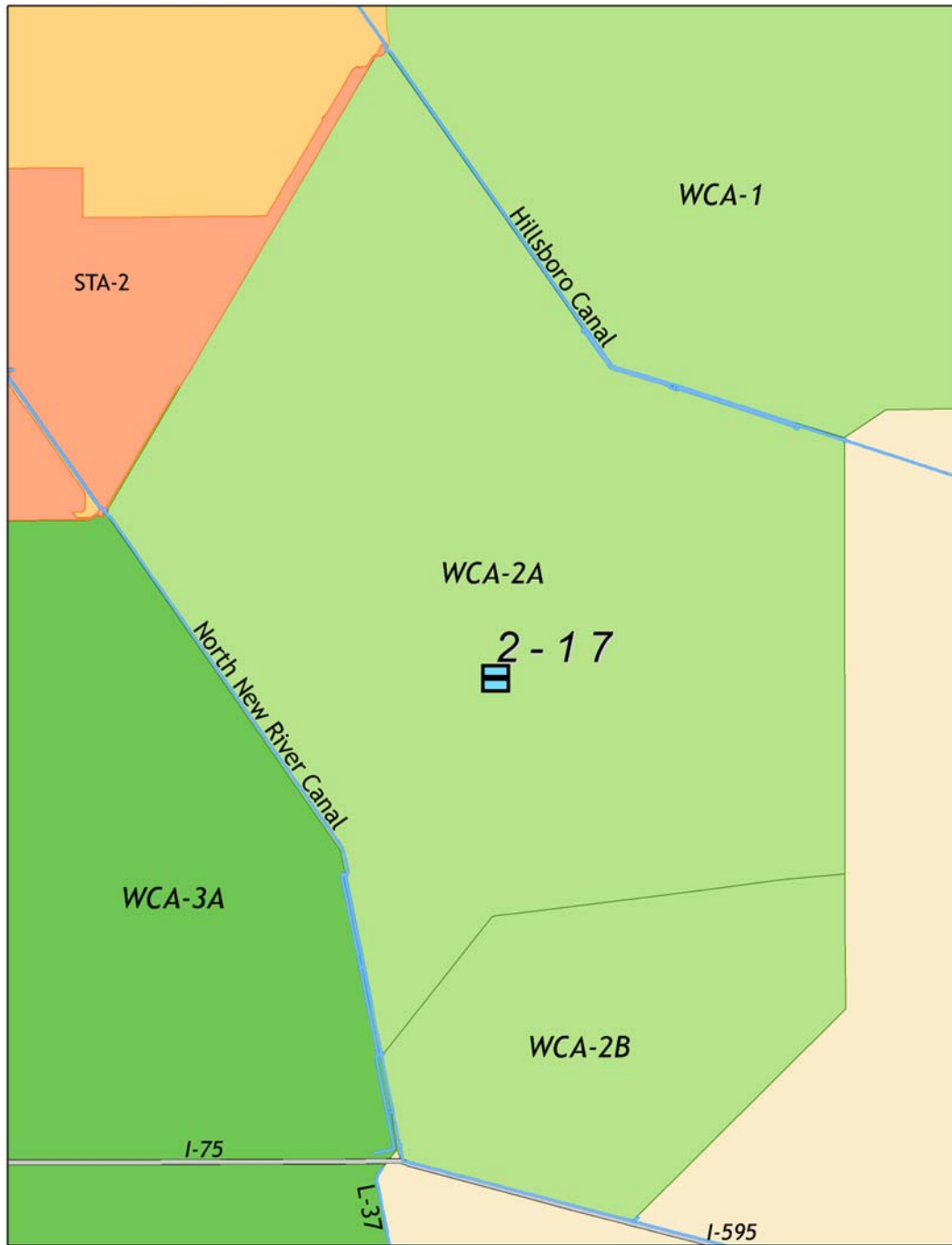


Gage 1-9 (1984-2010)

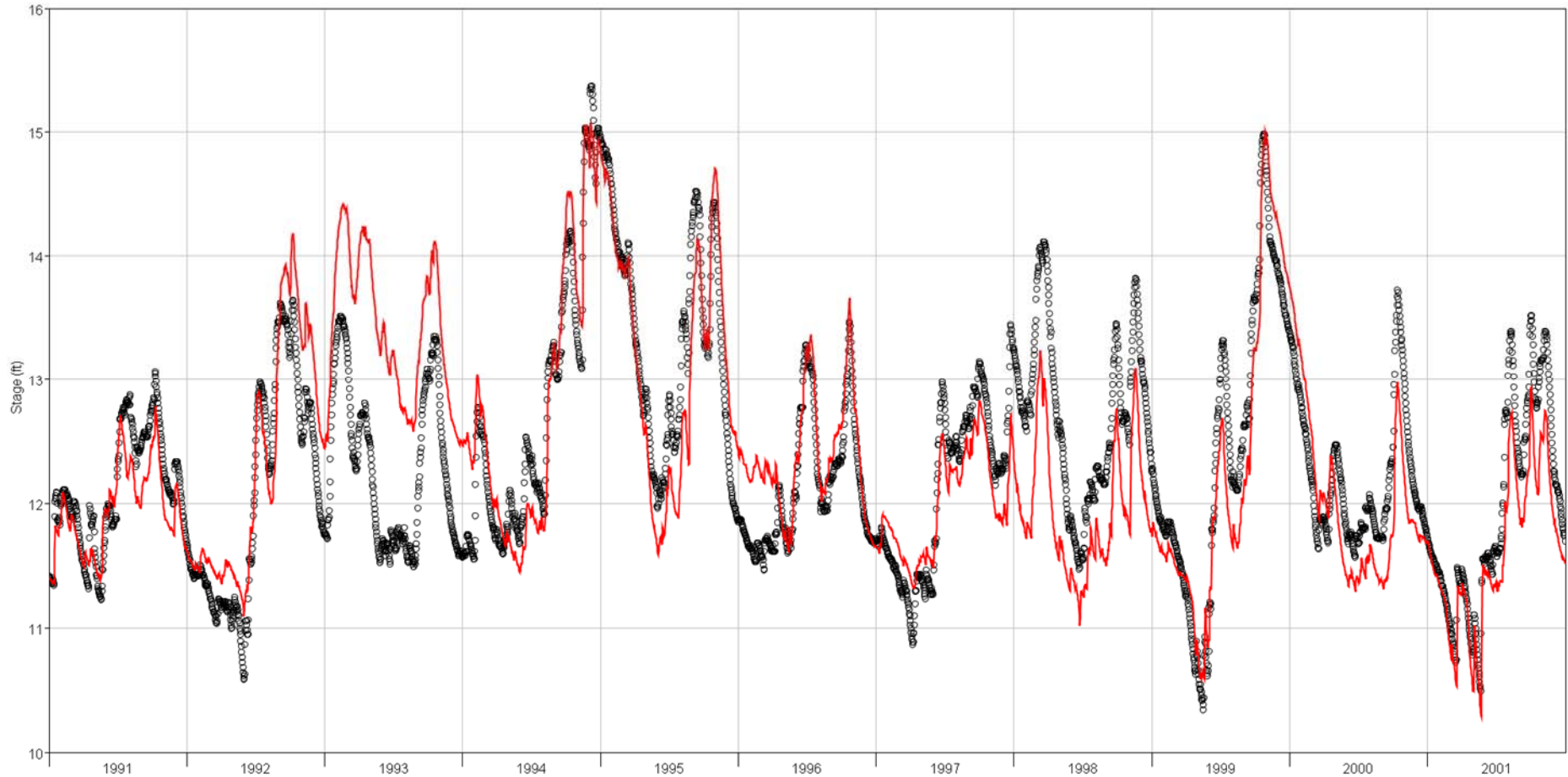


— Historical

— Simulated

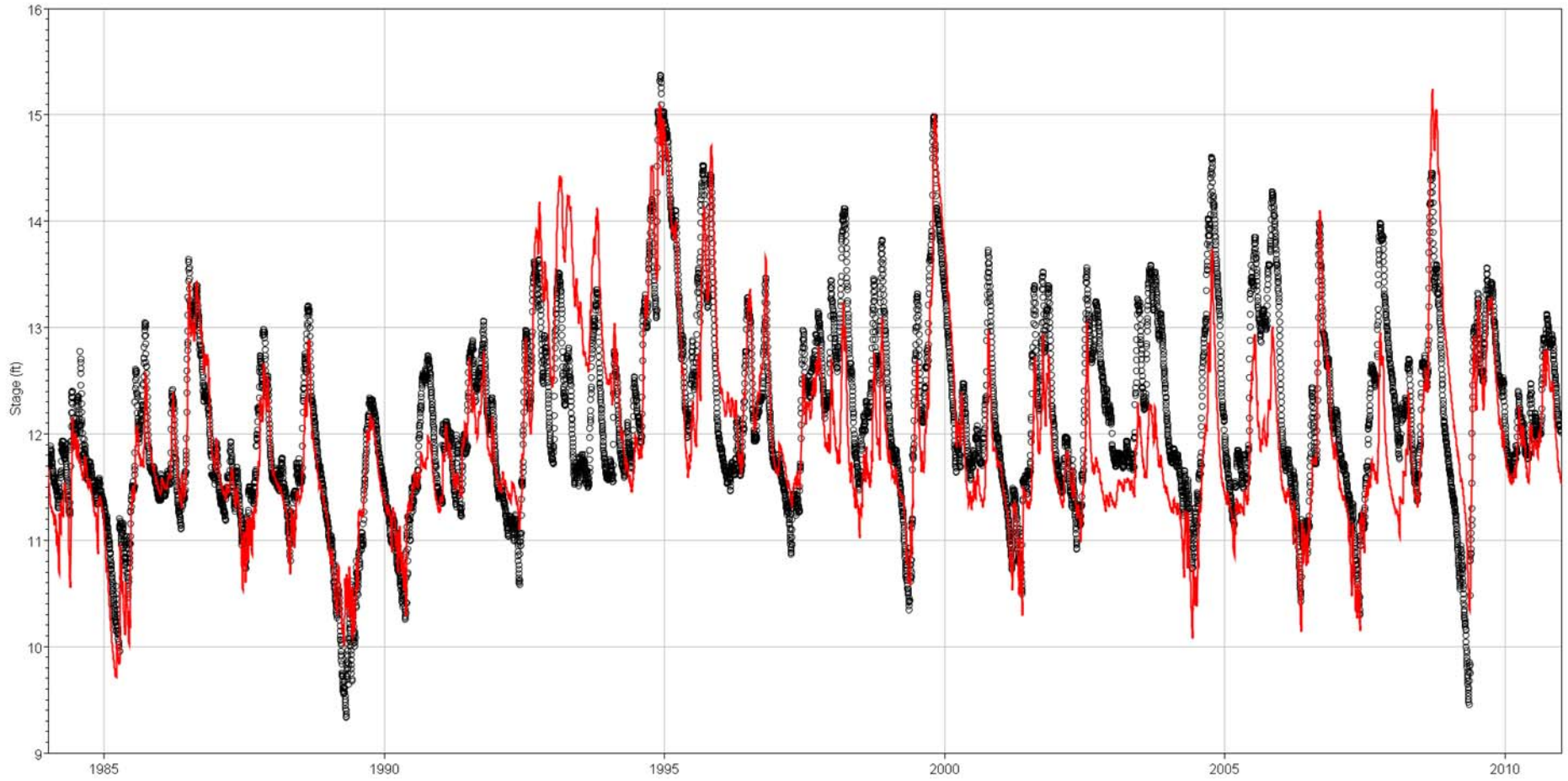


Gage 2-17 Calibration (1991-2001)



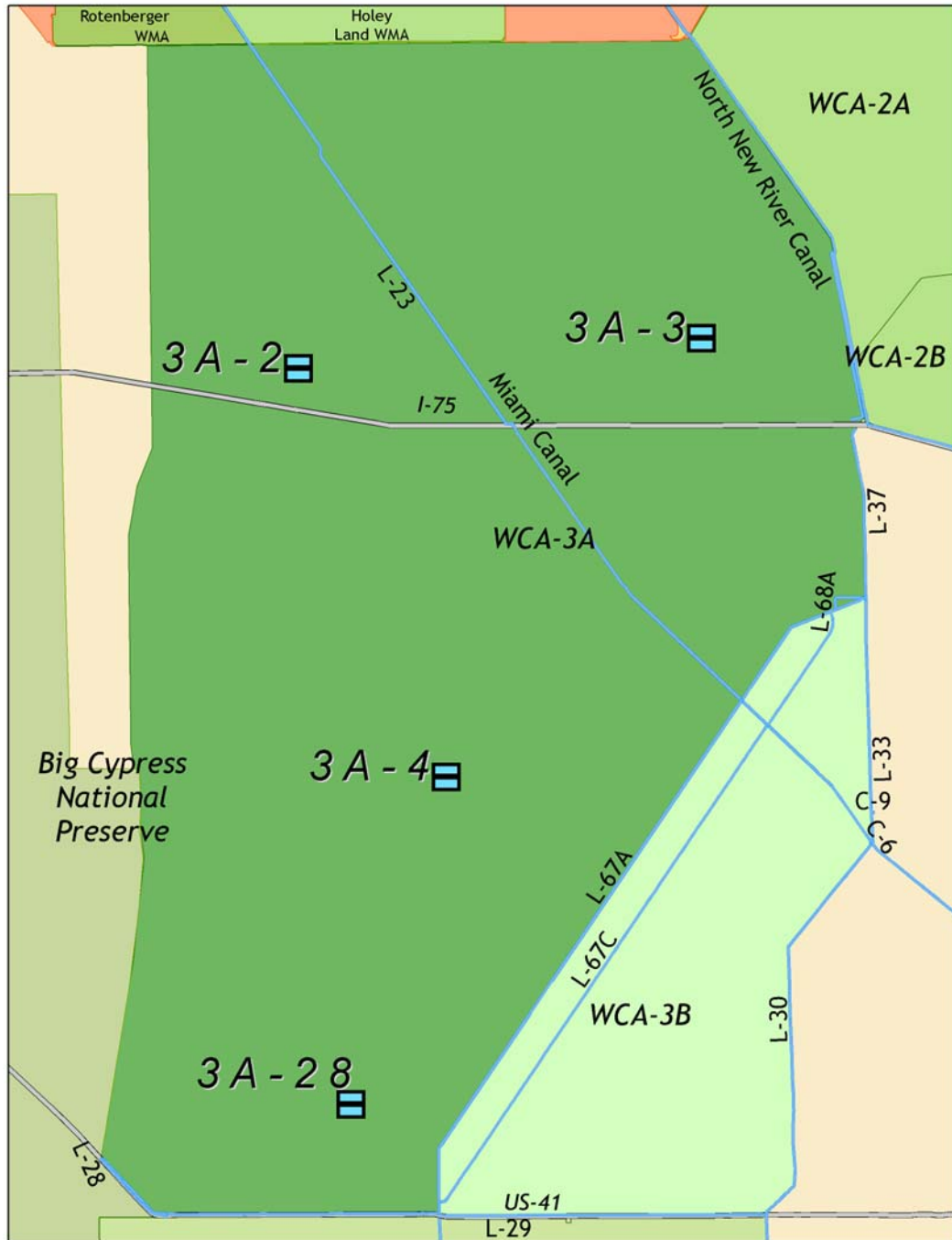
— Historical — Simulated

Gage 2-17 (1984-2010)

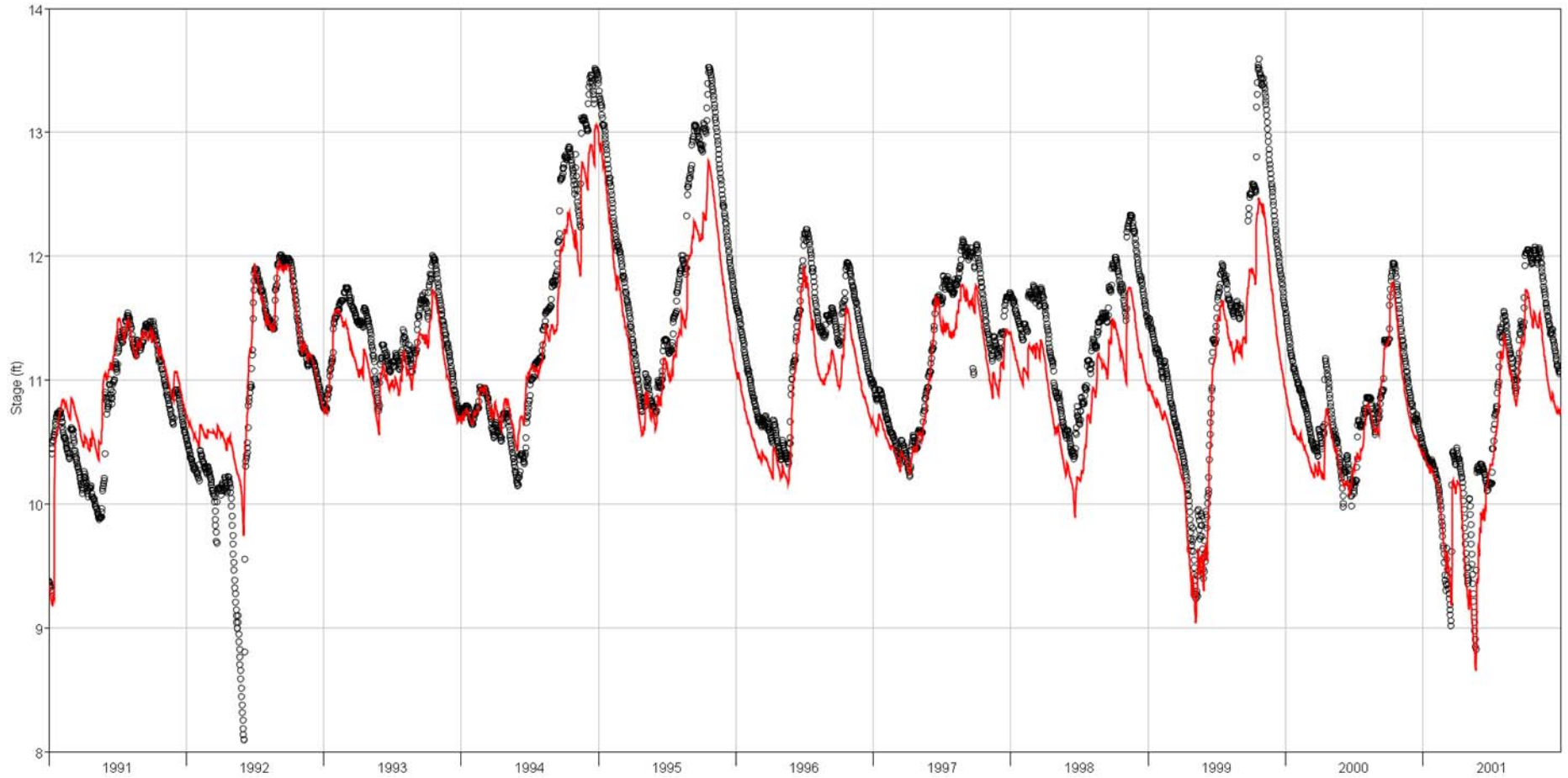


— Historical

— Simulated



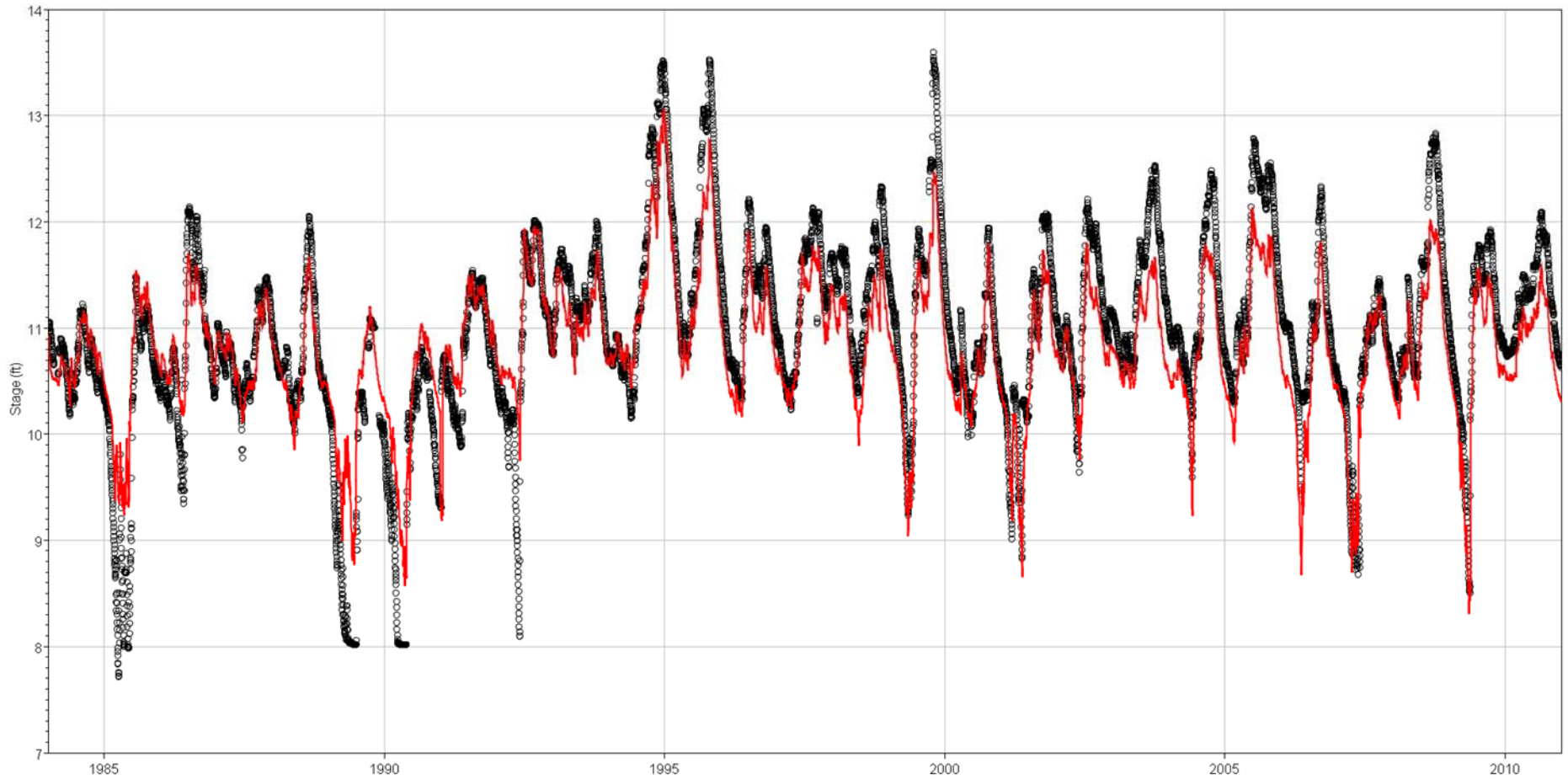
Gage 3A-2 Calibration (1991-2001)



— Historical

— Simulated

Gage 3A-2 (1984-2010)

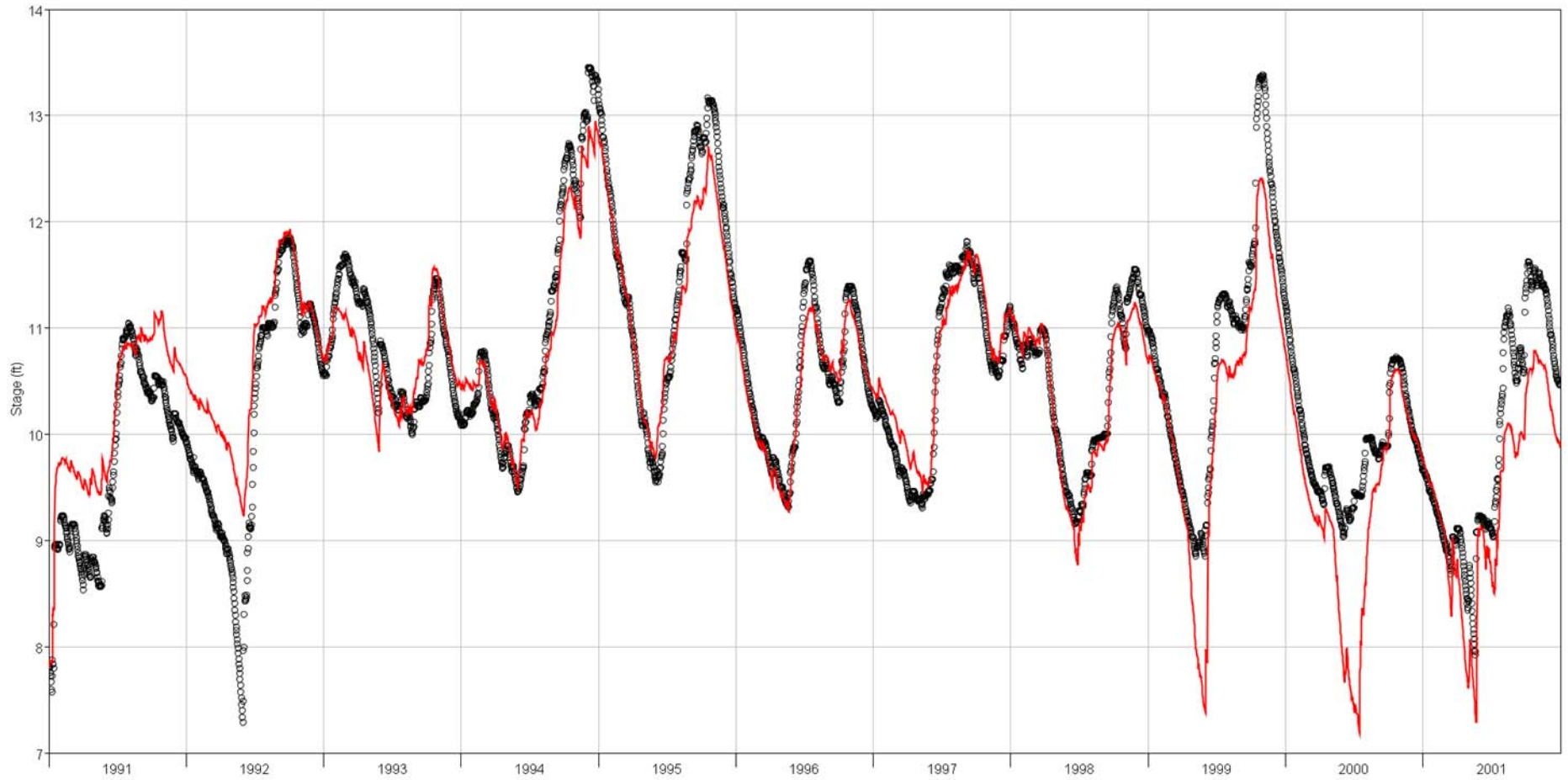


— Historical

— Simulated



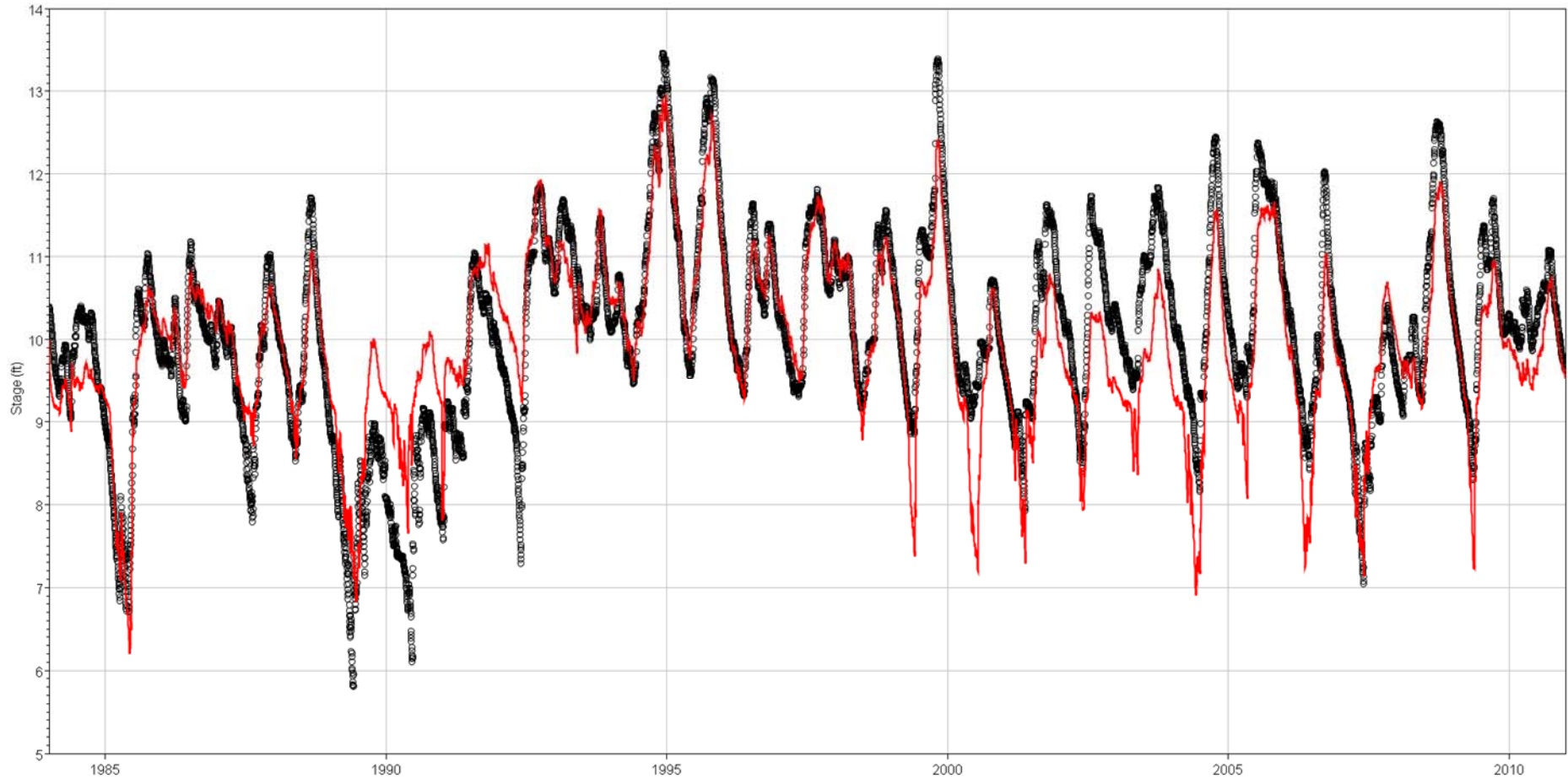
Gage 3A-3 Calibration (1991-2001)



— Historical

— Simulated

Gage 3A-3 (1984-2010)

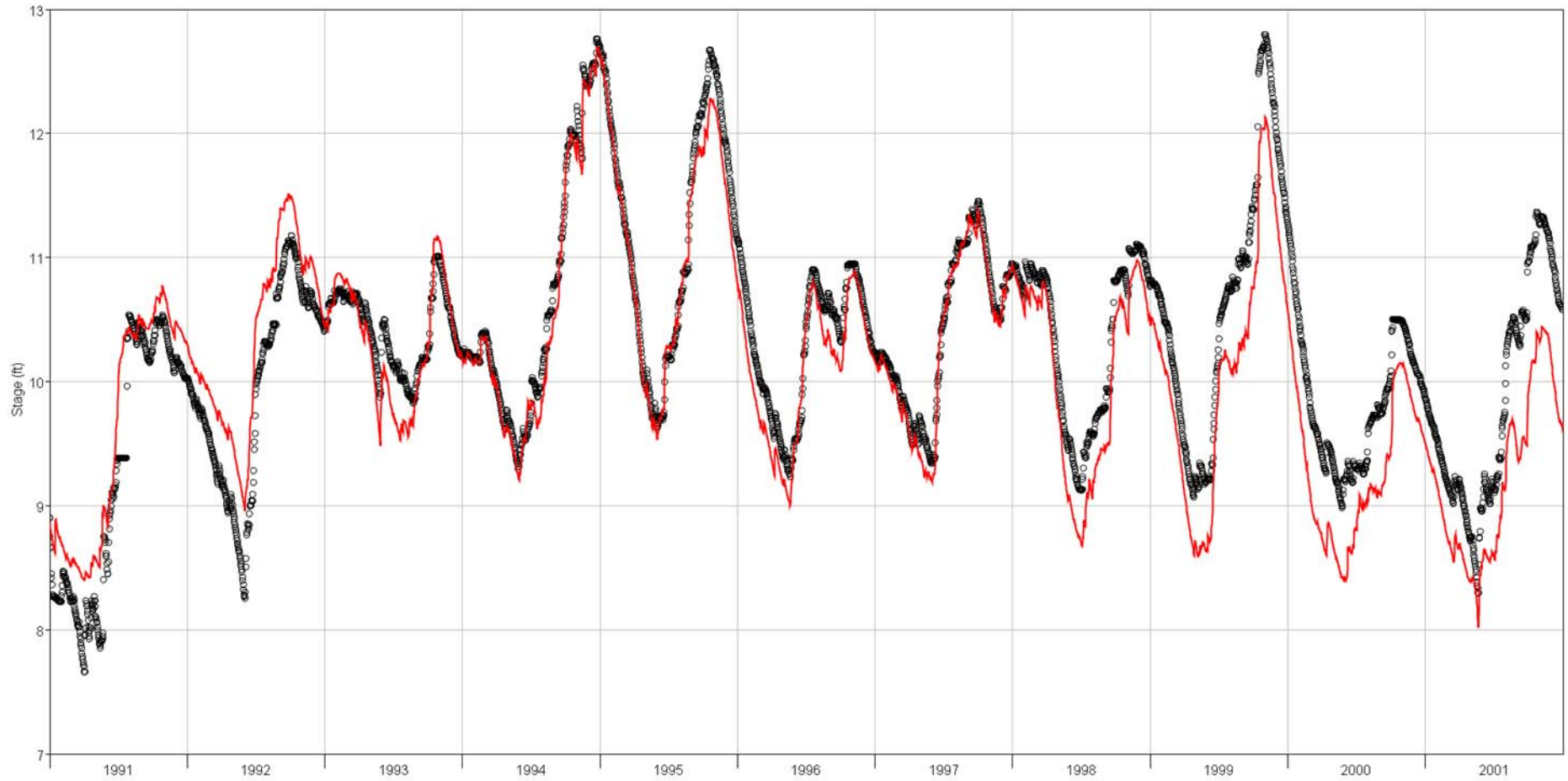


— Historical

— Simulated



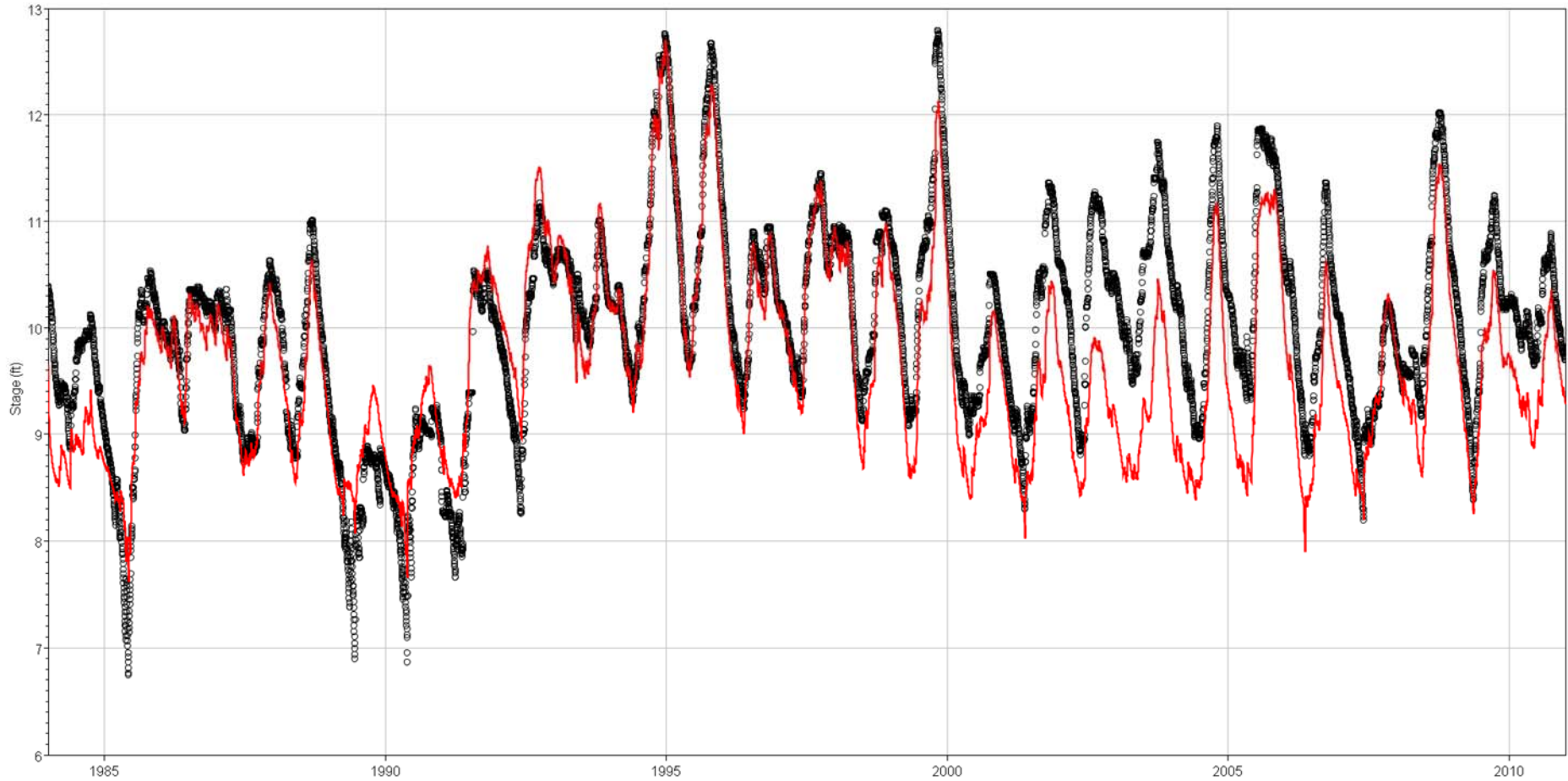
Gage 3A-4 Calibration (1991-2001)



— Historical

— Simulated

Gage 3A-4 (1984-2010)

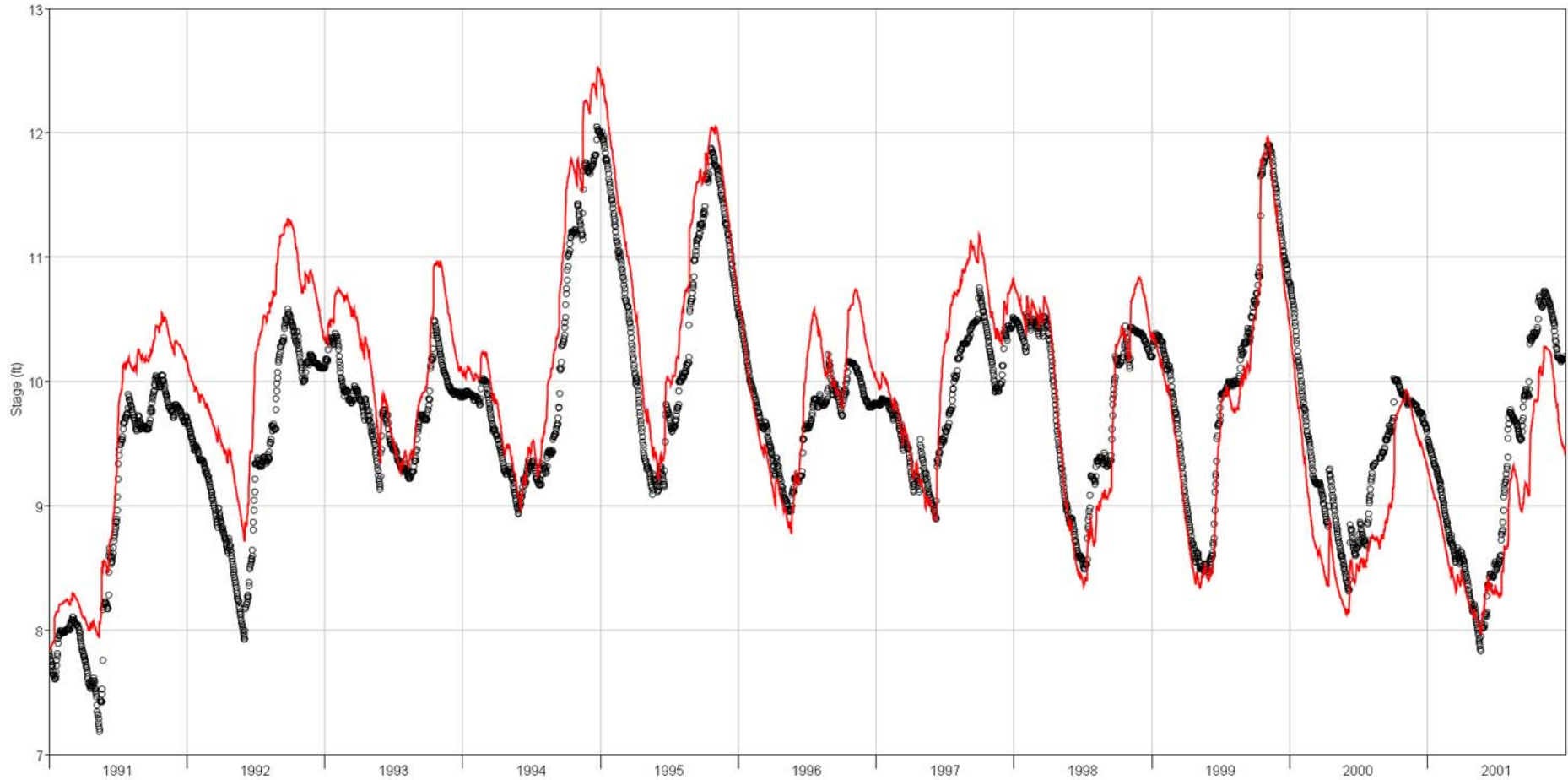


— Historical

— Simulated



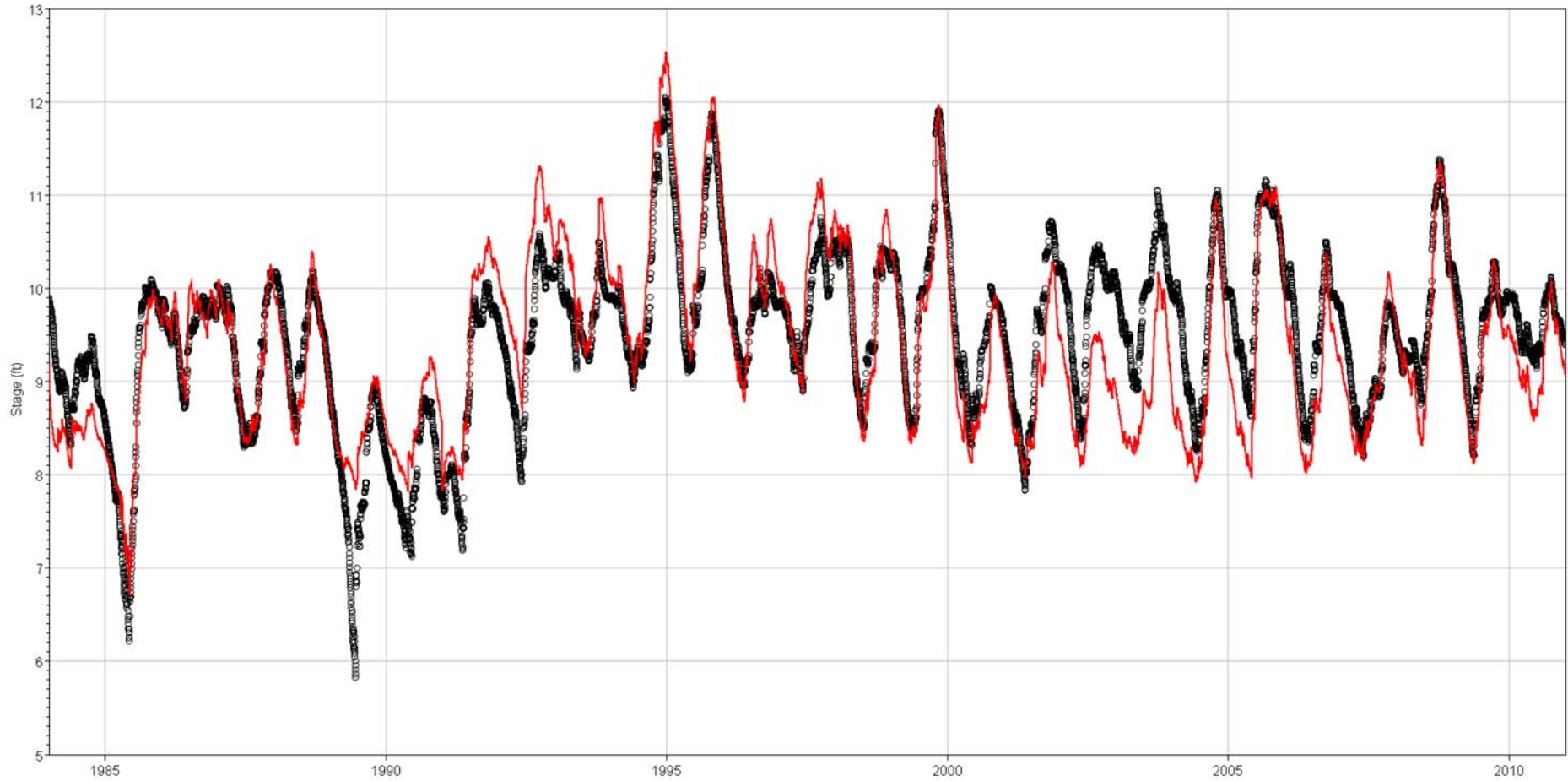
Gage 3A-28 Calibration (1991-2001)



— Historical

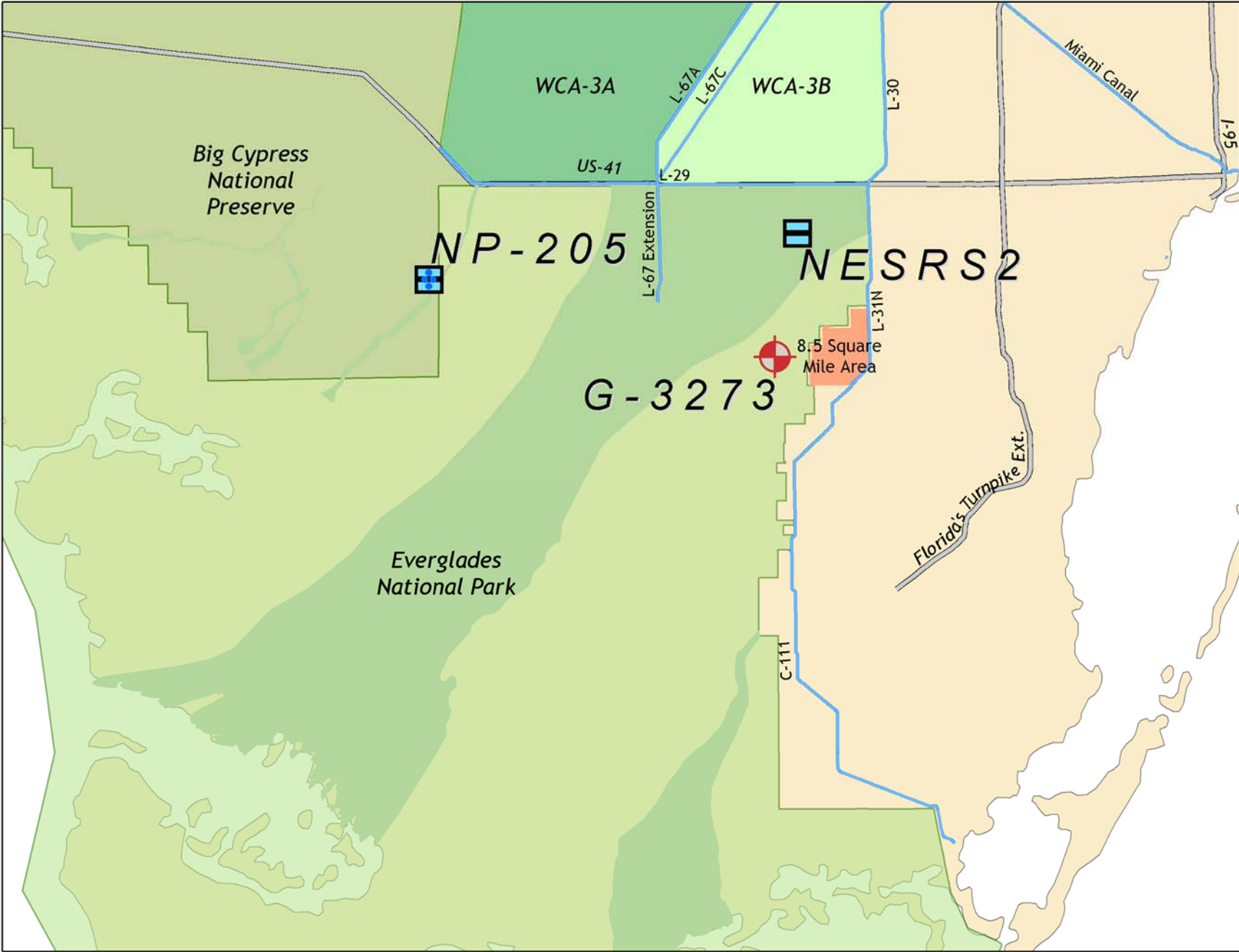
— Simulated

Gage 3A-28 (1984-2010)

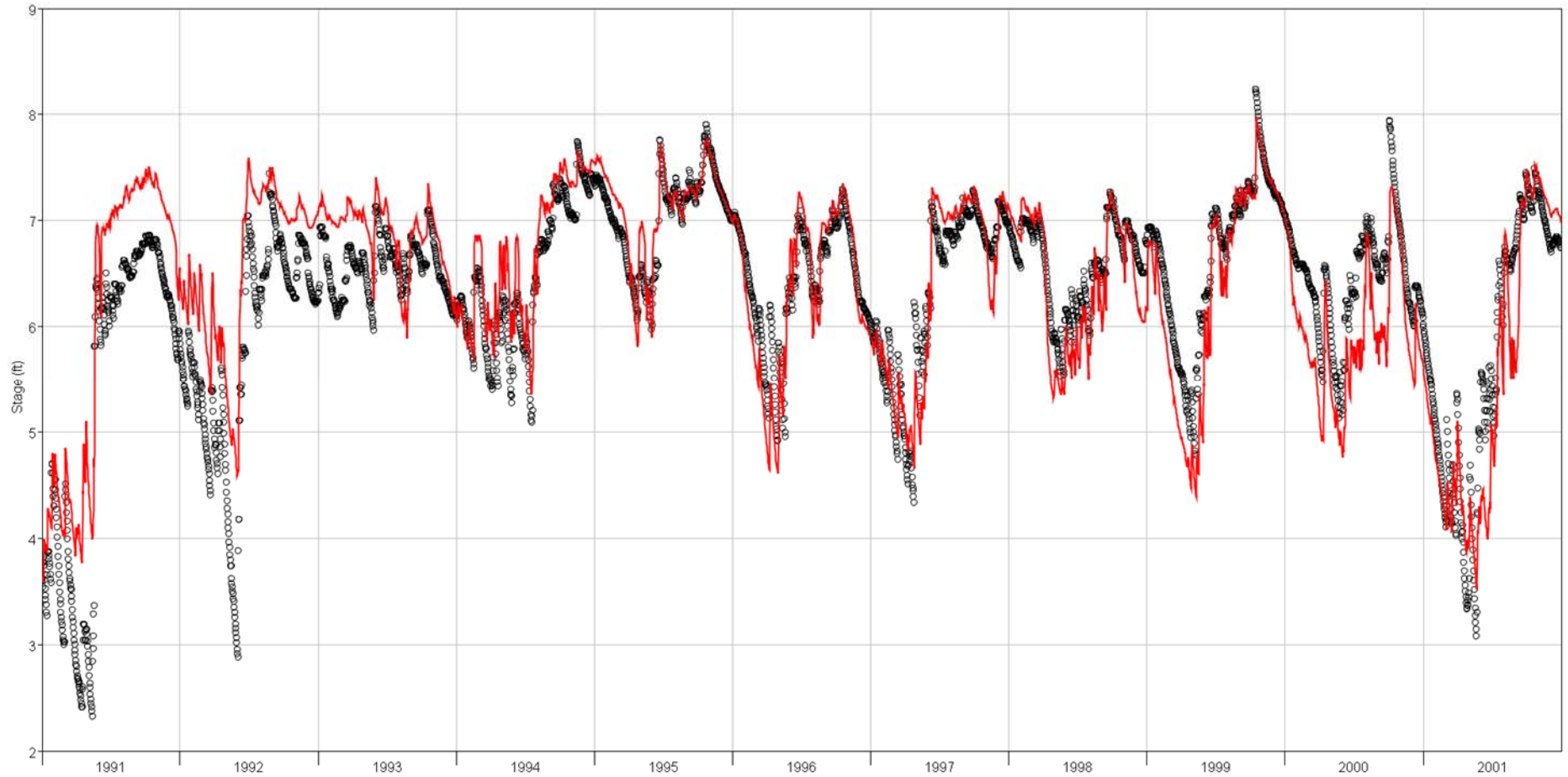


— Historical

— Simulated



Gage G-3273 Calibration (1991-2001)

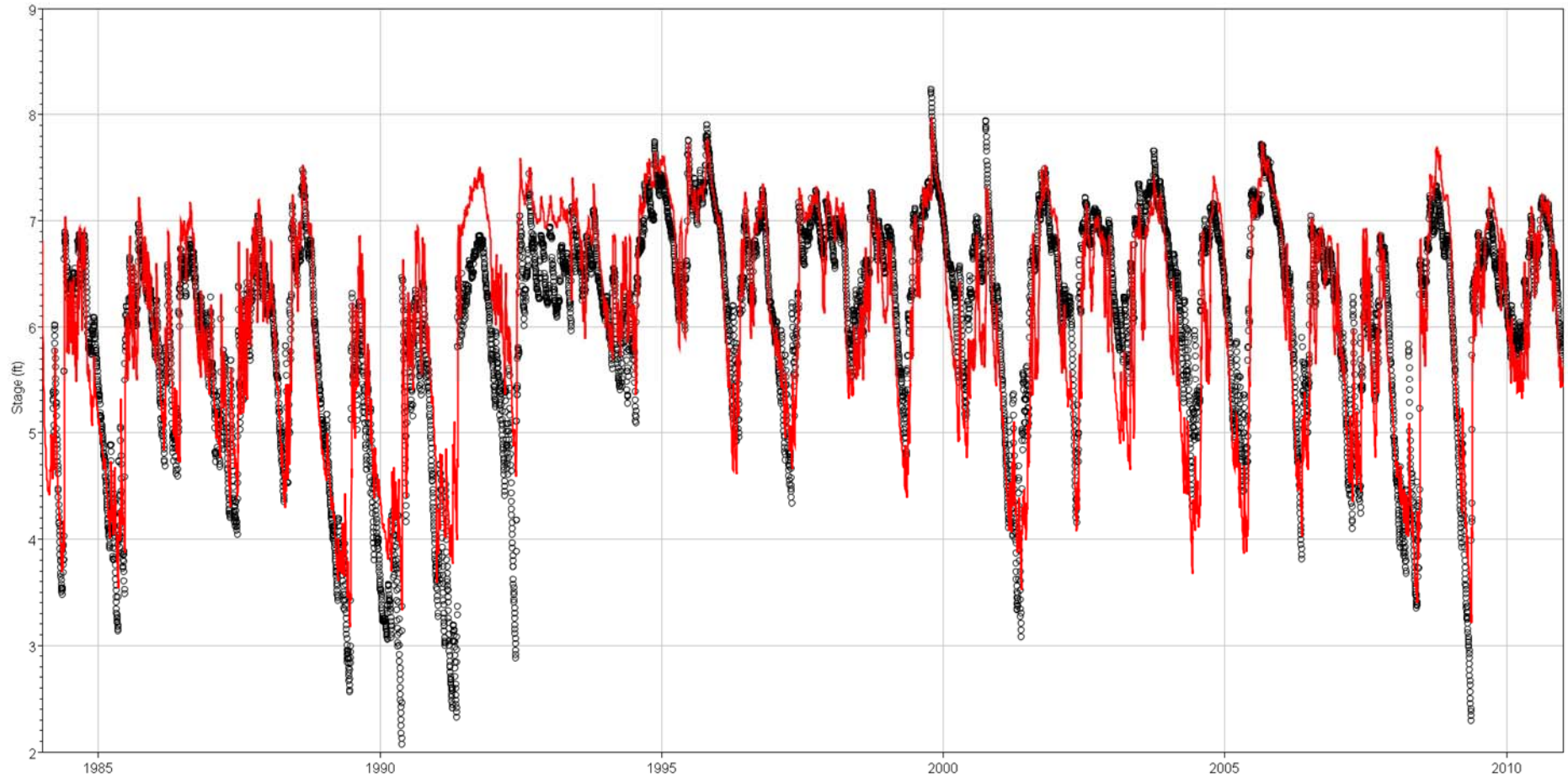


— Historical

— Simulated



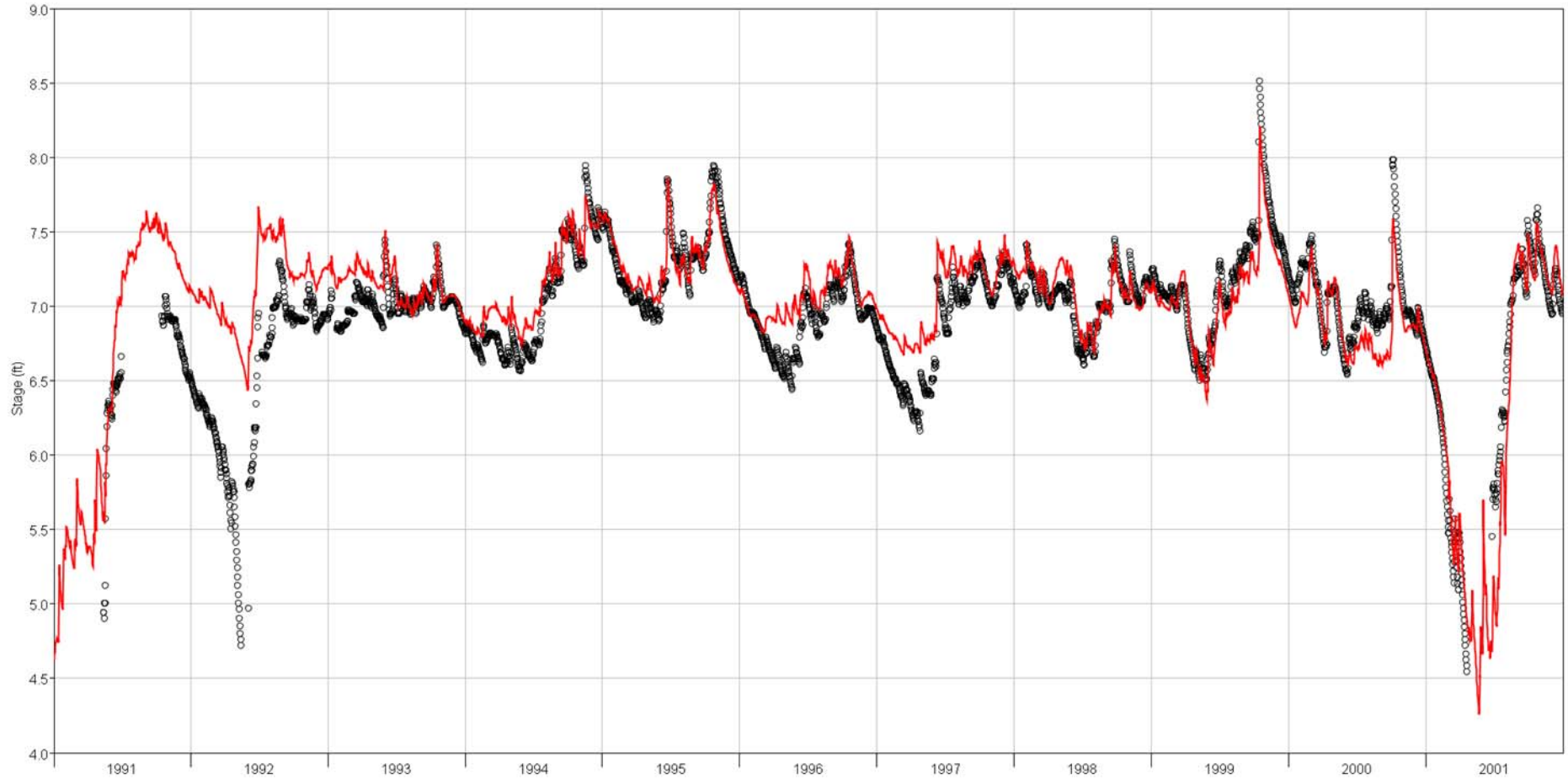
Gage G-3273 (1984-2010)



— Historical — Simulated



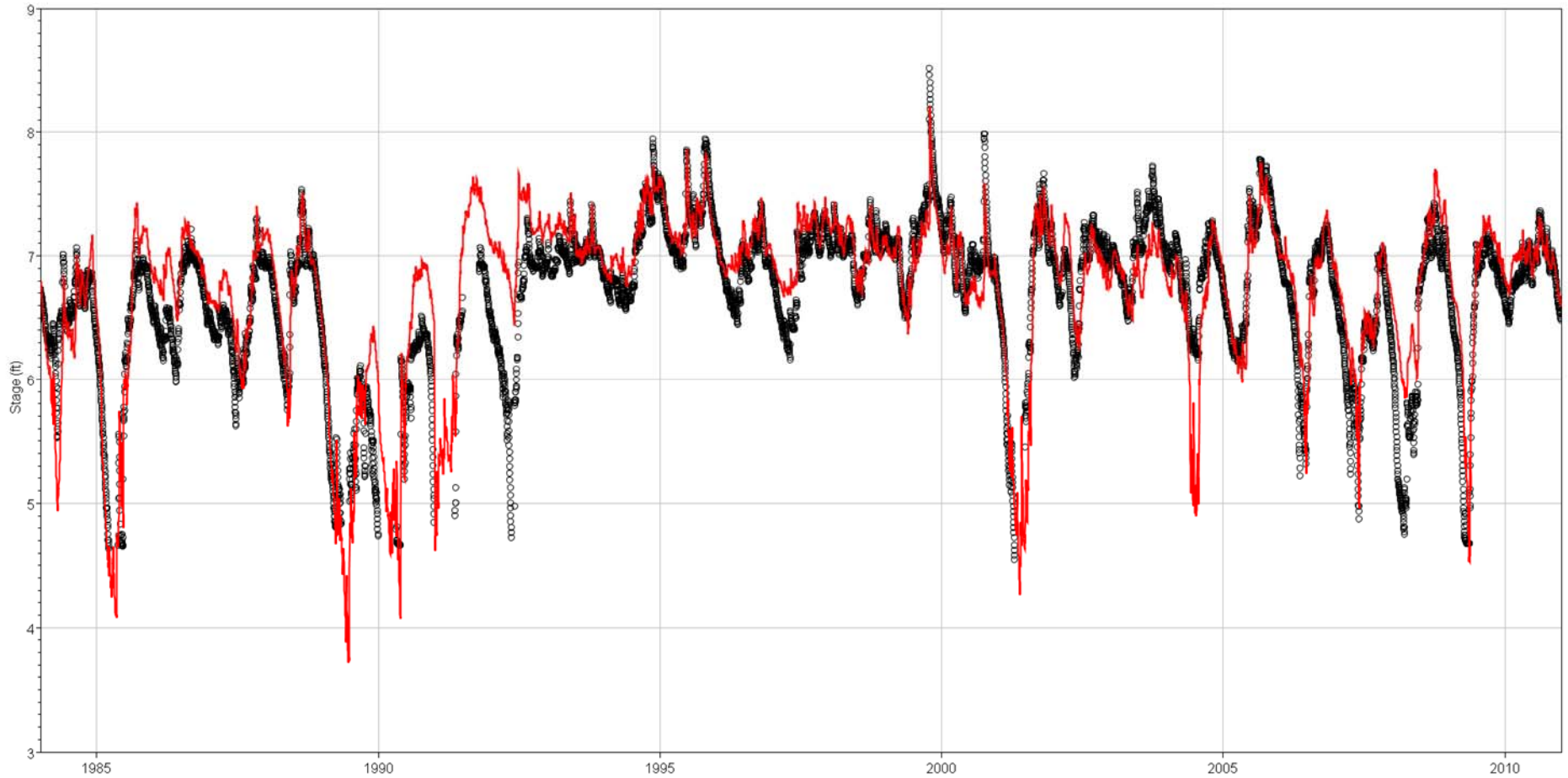
Gage NESRS-2 Calibration (1991-2001)



— Historical

— Simulated

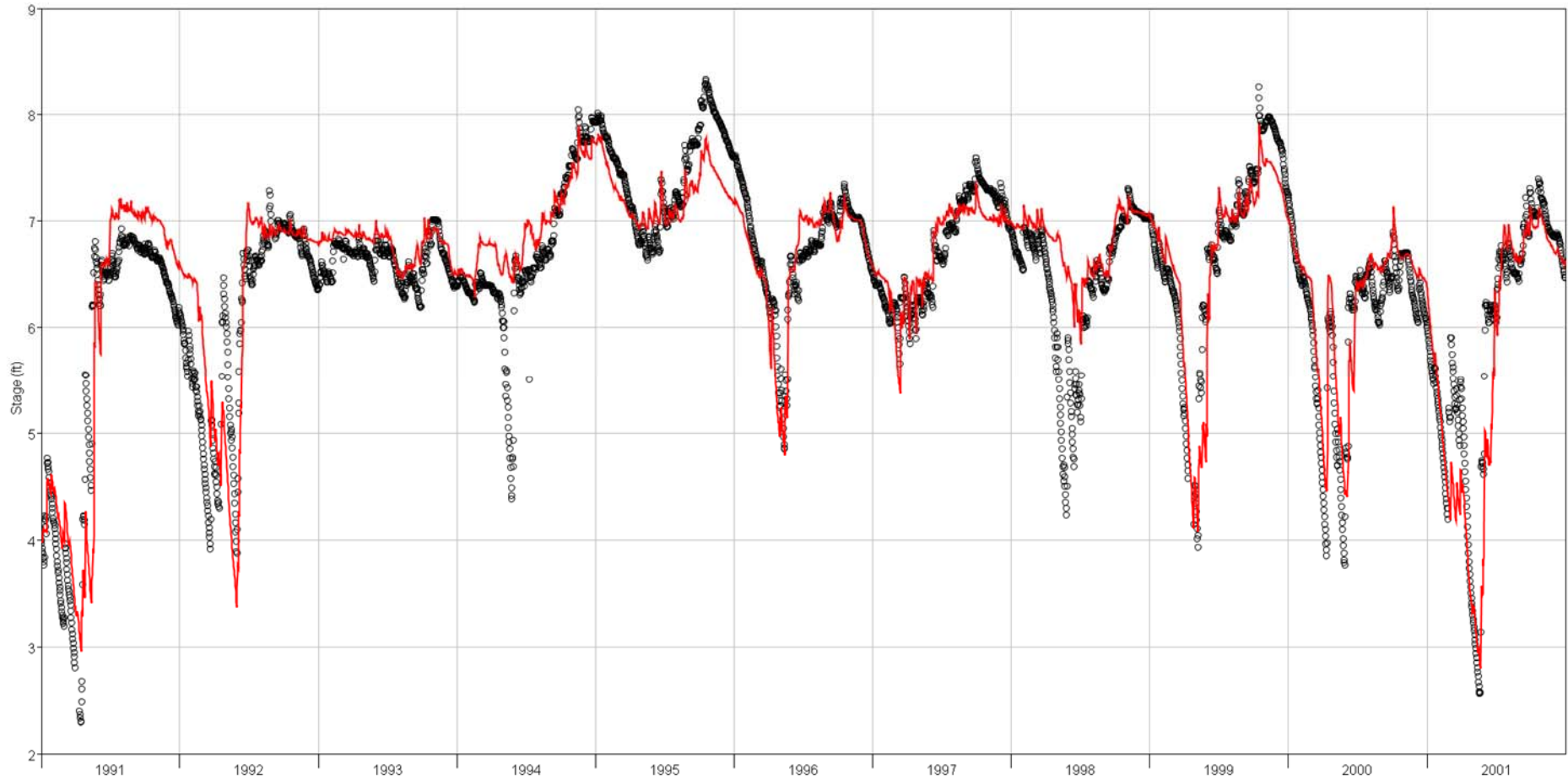
Gage NESRS-2 (1984-2010)



— Historical

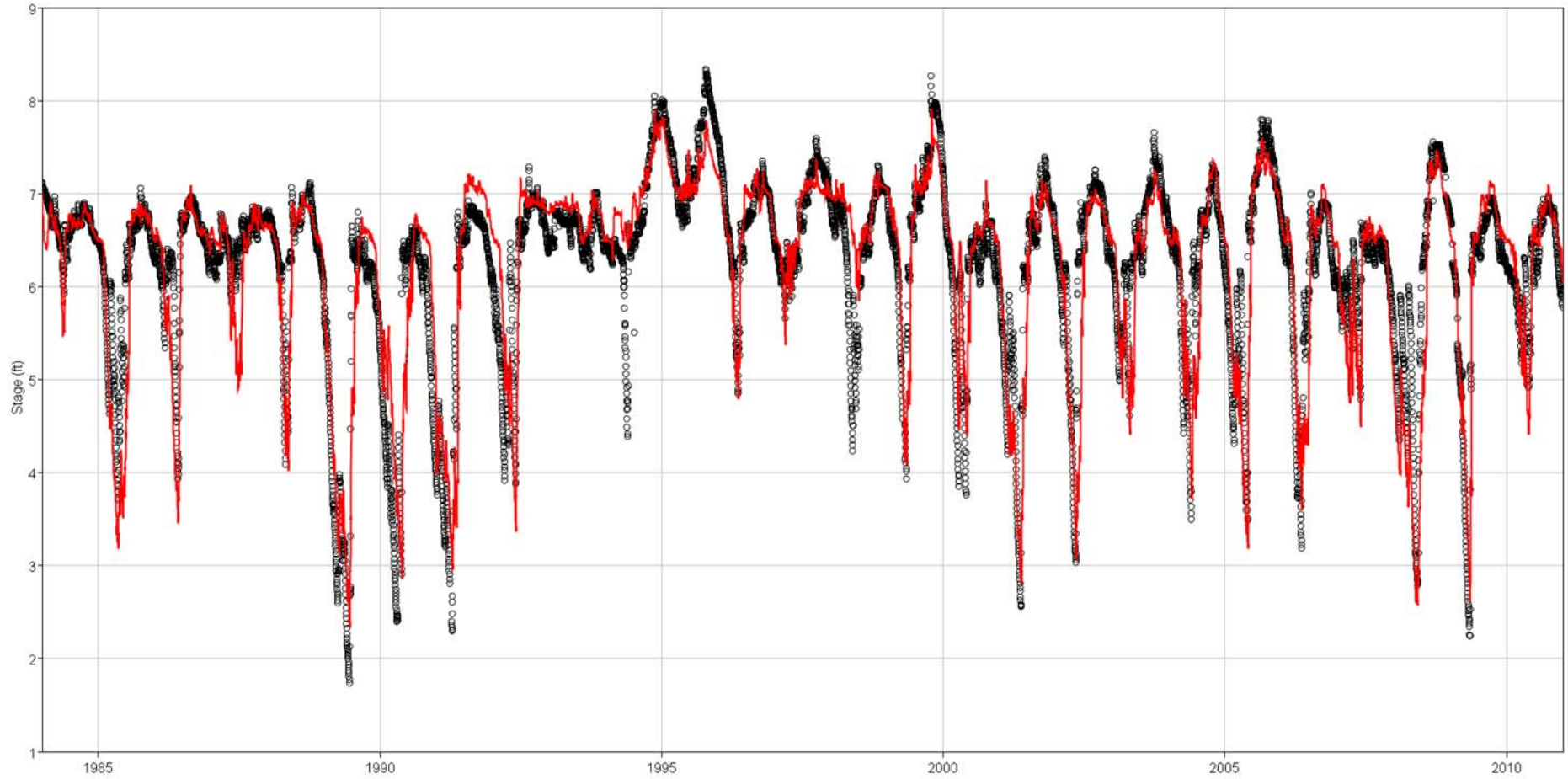
— Simulated

Gage NP-205 Calibration (1991-2001)



— Historical — Simulated

Gage NP-205 (1984-2010)



— Historical

— Simulated



PEST 02-17-15 Simulation

0217 Station	1984-1990				1991-2001				2006-2010			
	Bias, ft	RMSE, ft	Det_Coef	Eff	Bias, ft	RMSE, ft	Det_Coef	Eff	Bias, ft	RMSE, ft	Det_Coef	Eff
CH_1-7	0	0.33	0.86	0.73	-0.08	0.28	0.87	0.67	-0.43	0.48	0.87	-0.45
CH_1-8T	0.02	0.69	0.79	0.1	0.2	0.39	0.88	0.68	-0.35	0.53	0.83	0.3
CH_1-9	0.14	0.28	0.91	0.76	0.1	0.32	0.86	0.63	-0.4	0.48	0.85	-0.12
CH_2A-17_B	-0.13	0.31	0.92	0.81	-0.01	0.54	0.83	0.63	-0.15	0.56	0.81	0.57
CH_3A-2	0.22	0.5	0.93	0.71	-0.2	0.37	0.93	0.79	-0.31	0.4	0.94	0.71
CH_3A-28	0.04	0.45	0.88	0.76	0.17	0.42	0.92	0.76	-0.27	0.36	0.94	0.66
CH_3A-3	0.26	0.67	0.85	0.67	-0.08	0.48	0.89	0.79	-0.29	0.5	0.91	0.74
CH_3A-4	-0.11	0.44	0.87	0.73	-0.16	0.4	0.92	0.82	-0.5	0.56	0.94	0.41
CH_G-3273	0.09	0.37	0.94	0.88	0.09	0.49	0.87	0.74	-0.03	0.32	0.95	0.9
CH_NESRS2	0.15	0.35	0.88	0.66	0.12	0.29	0.8	0.57	0.21	0.32	0.93	0.75
CH_NP-205	-0.06	0.54	0.87	0.75	0.08	0.43	0.9	0.8	-0.1	0.45	0.92	0.77
Average	0.056	0.448	0.882	0.687	0.021	0.401	0.879	0.716	-0.238	0.451	0.899	0.476

Final Refinements

- The calibration team is finalizing aquifer thickness measurements in the western portion of WCA-3A
- Everglades Agricultural Area demand and runoff historical measurements are being QA/QC'd and finalized

Customer Needs

Stakeholders in need of support for model boundary conditions or other data needs are encouraged to communicate with SFWMD staff. The Existing Condition Baseline will be completed along with the Calibration/Verification.

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Calibration Team

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Questions?

